

August 4, 2016

Delhi Charter Township
2074 Aurelius Road
Holt, Michigan 48842

Attn: Tracy LC Miller, Director
Department of Community Development

Re: Cedar Street Traffic Analysis

HRC Job No. 20150384

Dear Ms. Miller:

At your request, Hubbell, Roth & Clark, Inc. (HRC) has prepared a traffic analysis to determine potential impacts of converting Cedar Street from Aurelius Road to Holt Road from 4 lanes to 3 lanes in downtown Holt. The traffic analysis is intended for inclusion in the planning report being prepared by McKenna Associates.

To complete the traffic analysis, HRC undertook the following tasks:

- Collect turning movement counts during AM and PM Peak hours (7:00 -9:00 AM and 2:00 – 6:00 PM) at the following intersections:
 - Cedar Street and Aurelius Road and Keller Road
 - Cedar Street and Holt Road
- Project future traffic volumes
- Conduct a capacity analysis for the intersections during AM and PM peak hours using Synchro 9 Software and the techniques outlined in the Transportation Research Board Highway Capacity Manual
- Prepare a letter report with our findings and recommendations

Executive Summary

A capacity analysis was conducted for the two signalized intersections during the AM and PM peak hours for four scenarios:

1. Existing traffic volumes and existing 4 lane road
2. Existing traffic volumes and 3-lane road
3. Future traffic volumes and existing 4-lane road
4. Future traffic volumes and 3-lane road

Table 1 summarizes the levels of service for each scenario evaluated.

PRINCIPALS

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Table 1: Summary Intersection Level of Service Comparison

Intersection	Existing 4 Lane		Existing 3 Lane		Future 4 Lane		Future 3 Lane	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
AM Peak								
Cedar Street and Aurelius Road	45.6	D	31.7	C	48.2	D	29.9	C
Holt Road and Cedar Street	30.5	C	29.1	C	34.4	C	27.8	C
PM Peak								
Cedar Street and Aurelius Road	40.1	D	29.6	C	45.2	D	33.4	C
Holt Road and Cedar Street	47.5	D	25.3	C	55.0	E	31.6	C

The traffic analysis has demonstrated that converting Cedar Street from 4 lanes to 3 lanes will not adversely impact traffic operations. The 3 lane scenario allows for more efficient operation of the traffic signals, the center left turn lane allows northwest and southeast Cedar traffic to travel at the same time, not separate times as in the 4 lane scenario. The 3 lane scenario and associated signal timings will improve the level of service at the two intersections.

The improvements will require realignment of Keller Road away from the intersection of Cedar Street and Aurelius Road. Keller Road should be realigned to the south so that it intersects Cedar Street at 90 degrees. Keller Road should be stop controlled.

Data Collection

HRC collected turning movement counts at the two intersections on Thursday, May 12, 2016. At the Cedar/Aurelius/Keller intersection, the AM peak hour is 7:45 – 8:45 AM and the PM peak hour is 5:00 – 6:00 PM. At the Cedar/Holt intersection, the AM Peak hour 7:30 – 8:30 AM and the PM peak hour is 4:45 – 5:45 PM. **Attachment A** provides the peak hour turning movement counts for each intersection.

When road conversions are proposed, it is typical to analyze the impact on current traffic volumes as well as well as future traffic volumes. HRC projected future traffic volumes to 2026. Based on a recommendation from the Tri-County Regional Planning Commission, an annual growth rate of 0.8% was applied over 10 years and resulted in an increase of 8% over 2016 volumes.

The analysis was completed with Keller Road realigned to the south. Keller Road would intersect with Cedar at a stop controlled intersection perpendicular to Cedar.

Intersection Capacity Analysis

HRC created a road network using Synchro 9 software and the Highway Capacity Manual (HCM) procedures for analysis. **Attachment B** contains Synchro reports for the analysis.

Signalized Intersections

For signalized intersections, the HCM defines level of service in terms of control delay. Delay may be measured in the field, or it may be estimated. Delay is a complex measure, and is dependent on a number of variables, including the quality of progression, the cycle length, the green ratio, and the volume to capacity ratio for the lane group or approach in question. **Table 2** indicates the control delay criteria used for determining level of service (LOS) for signalized intersections.

Table 2: Level of Service Criteria for Signalized Intersections

Level of Service	Control Delay per Vehicle (Seconds)
A	<10
B	>10 to ≤ 20
C	>20 to ≤ 35
D	>35 to ≤ 55
E	>55 to ≤ 80
F	>80

Level of Service A describes operations with very low control delay up to 10.0 sec per vehicle. This occurs when progression is exceptionally favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

Level of Service B describes operations with control delay in the range of 10.1 to 20.0 sec per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for Level of Service A, causing higher levels of average delay.

Level of Service C describes operations with control delay in the range of 20.1 to 35.0 sec per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.

Level of Service D describes operations with control delay in the range of 35.1 to 55.0 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume to capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

Level of Service E describes operations with control delay in the range of 55.1 to 80.0 sec per vehicle. This is considered to be above the limit of acceptable delay for an urban roadway in the study area. These high delay values generally indicate poor progression, long cycle lengths, and high volume to capacity ratios. Individual cycle failures are frequent occurrences.

Level of Service F describes operations with control delay in excess of 80.1 sec per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with over saturation, i.e.,

when arrival flow rates exceed the capacity of the intersection. It may also occur at high volume to capacity ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

A capacity analysis was conducted for the two signalized intersections during the AM and PM peak hours for four scenarios:

5. Existing traffic volumes and existing 4 lane road
6. Existing traffic volumes and 3-lane road
7. Future traffic volumes and existing 4-lane road
8. Future traffic volumes and 3-lane road

Table 3 provides the results of the AM and PM peak hour capacity analysis for the intersection of Cedar Street and Aurelius Road by scenario and movement. The Synchro results show an acceptable level of service for all scenarios and movements.

Table 3: Cedar Street and Aurelius Road Level of Service Comparison

Approach/Lane		Existing 4 Lane		Existing 3 Lane		Future 4 Lane		Future 3 Lane	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
AM Peak (7:45 AM - 8:45 AM)									
NB Aurelius	LT	46.5	D	30.3	C	52.9	D	38.4	D
	TH	45.5	D	30.0	C	51.4	D	38.0	D
SB Aurelius	LT	40.7	D	37.4	D	37.7	D	38.6	D
	TH	42.1	D	40.6	D	39.8	D	40.3	D
SEB Cedar	LT			18.2	B			16.7	B
	TH	41.1	D	22.6	C	50.6	D	20.8	C
	RT	33.9	C	17.2	B	34.5	C	16.0	B
NWB Cedar	LT			17.4	B			15.8	B
	TH	53.1	D	43.6	D	50.5	D	32.8	C
PM Peak (5:00 PM - 6:00 PM)									
NB Aurelius	LT	42.0	D	32.5	C	49.4	D	48.2	D
	TH	40.3	D	24.1	C	48.8	D	32.8	C
SB Aurelius	LT	35.7	D	33.7	C	41.2	D	43.0	D
	TH	38.4	D	35.5	D	45.5	D	47.9	D
SEB Cedar	LT			18.8	B			19.0	B
	TH	41.9	D	22.6	C	44.5	D	23.2	C
	RT	34.0	C	18.4	B	37.4	D	19.2	B
NWB Cedar	LT			18.0	B			18.5	B
	TH	42.4	D	40.2	D	47.7	D	39.2	D

The signal timing plan at this intersection provides a separate phase for each approach for the 4-lane scenarios. For the three lane scenarios, southeast bound (SEB) and northwest bound (NWB) Cedar traffic share a phase and left turns are permitted. The signal timing was optimized for all scenarios. A proposed layout for the three lane geometry is shown in **Figure 1**.

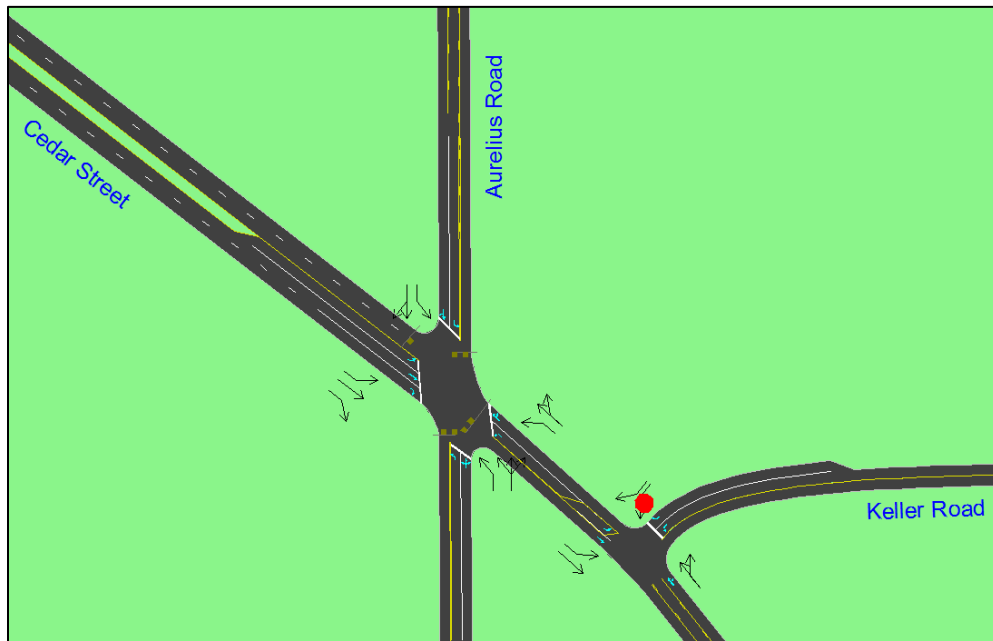


Figure 1. Proposed Three Lane Geometry on Cedar Street South of Aurelius Road

Table 4 provides the results of the AM and PM capacity analysis at the intersection of Cedar Street and Holt Road by scenario and movement. The Synchro results show an acceptable level of service in the AM peak hour. In the PM peak hour, the WB and NWB through movements are currently experiencing a LOS E, which is not acceptable. In the future with the existing geometry, the delay will increase.

Table 4: Holt Road and Cedar Street Level of Service Comparison

Approach/Lane		Existing 4 Lane		Existing 3 Lane		Future 4 Lane		Future 3 Lane	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
AM Peak (7:45 AM - 8:45 AM)									
EB Holt	LT	19.2	B	17.6	B	20.3	C	15.4	B
	TH	32.3	C	46.6	D	38.5	D	44.5	D
	RT	18.5	B	20.6	C	19.5	B	19.2	B
WB Holt	LT	31.3	C	22.5	C	32.5	C	20.1	C
	TH	24.9	C	24.3	C	28.6	C	22.9	C
	RT	21.2	C	20.7	C	23.7	C	19.4	B
SEB Cedar	LT			18.2	B			18.0	B
	TH	35.4	D	25.2	C	38.5	D	24.5	C
NWB Cedar	LT			17.8	B			17.6	B
	TH	35.4	D	24.5	C	39.2	D	23.7	C
	RT			20.4	C			19.5	B
PM Peak (5:00 PM - 6:00 PM)									
EB Holt	LT	31.8	C	18.8	B	33.3	C	20.8	C
	TH	40.6	D	26.0	C	42.2	D	28.3	C
	RT	31.4	C	31.1	C	31.3	C	21.9	C
WB Holt	LT	28.8	C	18.2	B	29.9	C	18.3	B
	TH	56.3	E	34.8	C	66.7	E	36.3	D
	RT	30.3	C	21.1	C	30.2	C	20.8	C
SEB Cedar	LT			18.9	B			25.5	C
	TH	40.2	D	24.7	C	41.6	D	31.7	C
NWB Cedar	LT			19.1	B			32.1	C
	TH	58.8	E	27.0	C	74.6	E	42.9	D
	RT			17.5	B			21.6	C

Key: Highlighted cells have unacceptable levels of service (E or F)

The signal timing plan for this intersection provides a separate phase for SEB and NEB Cedar movements while EB and WB Holt movements share a through phase. It should be noted that the WB left-turns have a leading left turn phase and the EB left-turns have a lagging left turn phase. For the three lane scenarios, SEB/NWB and EB/WB are protected-permissive left-turn phases. The signal timing was optimized for all scenarios. A proposed layout for the three lane geometry is shown in **Figure 2**.

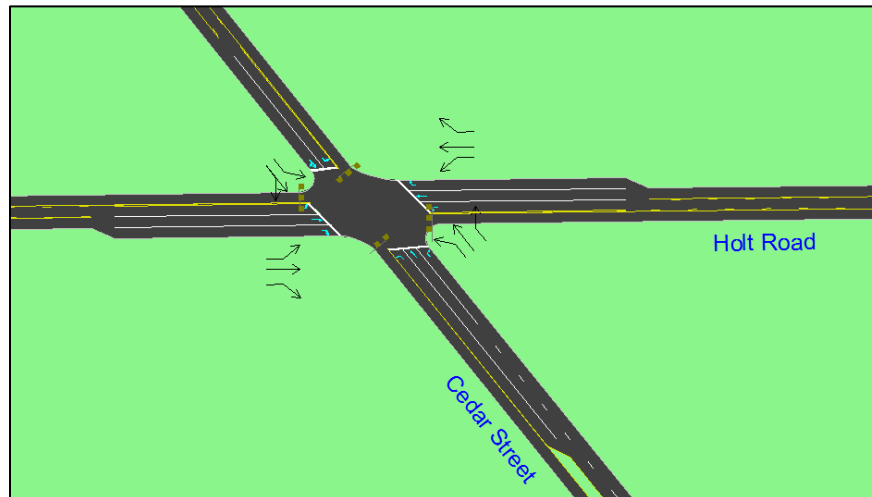


Figure 2. Proposed Three Lane Geometry on Cedar Street North of Holt Road

Findings and Recommendation

The traffic analysis has demonstrated that converting Cedar Street from 4 lanes to 3 lanes will not adversely impact traffic operations. The 3 lane scenario allows for more efficient operation of the traffic signals, the center left turn lane allows northwest and southeast Cedar traffic to travel at the same time, not separate times as in the 4 lane scenario. The 3 lane scenario and associated signal timings will improve the level of service at the two intersections.

The improvements will require realignment of Keller Road away from the intersection of Cedar Street and Aurelius Road. Keller Road should be realigned to the south so that it intersects Cedar Street at 90 degrees. Keller Road should be stop controlled.

If you have any questions or require any additional information, please contact the undersigned.

Very truly yours,

HUBBELL, ROTH & CLARK, INC.



Colleen Hill-Stramsak, P.E., PTOE
Associate

CH-S/cob/bjl

Attachment A – Turning Movement Counts

Attachment B – Synchro Reports

pc: McKenna Associates; Paul Lippens
HRC; Jamie Burton, Chuck Hart, File

Attachment A: Turning Movement Counts

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
 Bloomfield Hills, Michigan, 48303
 (248) 454-6300

Job Number: 20150384
 Date: 5/12/2016
 Location: Cedar Street and Holt Road
 Counted by: KMK

File Name : Holt_Cedar
 Site Code : 20150384
 Start Date : 5/12/2016
 Page No : 1

Groups Printed- Unshifted - Bank 1

Start Time	HOLT Eastbound					HOLT Westbound					CEDAR Northbound					CEDAR Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
07:00 AM	12	80	20	0	112	15	67	17	0	99	11	37	23	1	72	11	41	6	0	58	341
07:15 AM	14	113	10	0	137	20	65	26	0	111	15	38	26	0	79	16	52	8	0	76	403
07:30 AM	17	114	18	0	149	18	38	30	0	86	10	62	28	0	100	21	64	4	0	89	424
07:45 AM	14	126	33	2	175	21	62	32	1	116	16	65	17	0	98	8	68	5	4	85	474
Total	57	433	81	2	573	74	232	105	1	412	52	202	94	1	349	56	225	23	4	308	1642
08:00 AM	6	87	14	0	107	28	48	20	0	96	12	44	22	0	78	24	41	5	0	70	351
08:15 AM	12	103	19	1	135	20	85	21	0	126	13	47	30	0	90	25	44	8	2	79	430
08:30 AM	14	98	16	0	128	20	40	29	0	89	4	58	27	0	89	13	37	9	3	62	368
08:45 AM	9	49	19	0	77	12	25	21	0	58	18	56	11	0	85	19	38	7	3	67	287
Total	41	337	68	1	447	80	198	91	0	369	47	205	90	0	342	81	160	29	8	278	1436
*** BREAK ***																					
02:00 PM	7	44	21	0	72	14	43	22	4	83	33	57	20	0	110	17	65	4	3	89	354
02:15 PM	10	44	17	1	72	11	78	26	1	116	19	66	13	0	98	34	63	8	0	105	391
02:30 PM	9	69	19	0	97	19	55	31	0	105	25	90	14	1	130	26	62	8	1	97	429
02:45 PM	19	93	24	7	143	22	65	24	2	113	16	68	16	3	103	22	59	10	3	94	453
Total	45	250	81	8	384	66	241	103	7	417	93	281	63	4	441	99	249	30	7	385	1627
03:00 PM	11	68	25	6	110	11	75	32	0	118	21	70	22	5	118	20	57	19	9	105	451
03:15 PM	13	80	23	2	118	21	67	38	3	129	23	56	22	2	103	31	80	10	0	121	471
03:30 PM	12	82	23	6	123	21	97	31	1	150	28	51	29	0	108	32	57	16	5	110	491
03:45 PM	21	93	23	8	145	25	109	24	1	159	18	59	20	0	97	23	69	25	3	120	521
Total	57	323	94	22	496	78	348	125	5	556	90	236	93	7	426	106	263	70	17	456	1934
04:00 PM	9	70	25	0	104	29	89	22	2	142	26	95	36	0	157	13	58	7	1	79	482
04:15 PM	17	73	20	2	112	30	108	19	0	157	27	78	19	0	124	23	70	18	1	112	505
04:30 PM	21	92	20	1	134	17	92	21	0	130	31	61	20	0	112	29	72	4	0	105	481
04:45 PM	14	81	26	1	122	36	104	25	0	165	31	56	13	0	100	36	55	8	0	99	486
Total	61	316	91	4	472	112	393	87	2	594	115	290	88	0	493	101	255	37	2	395	1954
05:00 PM	14	61	25	2	102	24	90	28	0	142	44	107	25	1	177	28	76	10	0	114	535
05:15 PM	25	68	15	0	108	34	113	24	0	171	49	118	21	0	188	24	71	12	1	108	575
05:30 PM	15	80	23	1	119	26	114	27	0	167	37	58	14	0	109	29	67	19	0	115	510
05:45 PM	7	60	17	0	84	26	98	34	0	158	24	67	24	0	115	17	70	10	0	97	454
Total	61	269	80	3	413	110	415	113	0	638	154	350	84	1	589	98	284	51	1	434	2074
Grand Total	322	1928	495	40	2785	520	1827	624	15	2986	551	1564	512	13	2640	541	1436	240	39	2256	10667
Apprch %	11.6	69.2	17.8	1.4		17.4	61.2	20.9	0.5		20.9	59.2	19.4	0.5		24	63.7	10.6	1.7		
Total %	3	18.1	4.6	0.4	26.1	4.9	17.1	5.8	0.1	28	5.2	14.7	4.8	0.1	24.7	5.1	13.5	2.2	0.4	21.1	

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
Bloomfield Hills, Michigan, 48303
(248) 454-6300

Job Number: 20150384
Date: 5/12/2016
Location: Cedar Street and Holt Road
Counted by: KMK

File Name : Holt_Cedar
Site Code : 20150384
Start Date : 5/12/2016
Page No : 2

Groups Printed- Unshifted - Bank 1

	HOLT Eastbound					HOLT Westbound					CEDAR Northbound					CEDAR Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Unshifted	306	1842	478	40	2666	497	1731	608	15	2851	532	1517	492	13	2554	514	1407	236	39	2196	10267
% Unshifted	95	95.5	96.6	100	95.7	95.6	94.7	97.4	100	95.5	96.6	97	96.1	100	96.7	95	98	98.3	100	97.3	96.3
Bank 1	16	86	17	0	119	23	96	16	0	135	19	47	20	0	86	27	29	4	0	60	400
% Bank 1	5	4.5	3.4	0	4.3	4.4	5.3	2.6	0	4.5	3.4	3	3.9	0	3.3	5	2	1.7	0	2.7	3.7

Start Time	HOLT Eastbound					HOLT Westbound					CEDAR Northbound					CEDAR Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	17	114	18	0	149	18	38	30	0	86	10	62	28	0	100	21	64	4	0	89	424
07:45 AM	14	126	33	2	175	21	62	32	1	116	16	65	17	0	98	8	68	5	4	85	474
08:00 AM	6	87	14	0	107	28	48	20	0	96	12	44	22	0	78	24	41	5	0	70	351
08:15 AM	12	103	19	1	135	20	85	21	0	126	13	47	30	0	90	25	44	8	2	79	430
Total Volume	49	430	84	3	566	87	233	103	1	424	51	218	97	0	366	78	217	22	6	323	1679
% App. Total	8.7	76	14.8	0.5		20.5	55	24.3	0.2		13.9	59.6	26.5	0		24.1	67.2	6.8	1.9		
PHF	.721	.853	.636	.375	.809	.777	.685	.805	.250	.841	.797	.838	.808	.000	.915	.780	.798	.688	.375	.907	.886

Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	14	81	26	1	122	36	104	25	0	165	31	56	13	0	100	36	55	8	0	99	486
05:00 PM	14	61	25	2	102	24	90	28	0	142	44	107	25	1	177	28	76	10	0	114	535
05:15 PM	25	68	15	0	108	34	113	24	0	171	49	118	21	0	188	24	71	12	1	108	575
05:30 PM	15	80	23	1	119	26	114	27	0	167	37	58	14	0	109	29	67	19	0	115	510
Total Volume	68	290	89	4	451	120	421	104	0	645	161	339	73	1	574	117	269	49	1	436	2106
% App. Total	15.1	64.3	19.7	0.9		18.6	65.3	16.1	0		28	59.1	12.7	0.2		26.8	61.7	11.2	0.2		
PHF	.680	.895	.856	.500	.924	.833	.923	.929	.000	.943	.821	.718	.730	.250	.763	.813	.885	.645	.250	.948	.916

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
 Bloomfield Hills, Michigan, 48303
 (248) 454-6300

Job Number: 20150384
 Date: 5/12/2016
 Location: Cedar Street and Aurelius Road
 Counted by: HRC

File Name : Cedar_Aurelius
 Site Code : 20150384
 Start Date : 5/12/2016
 Page No : 1

Groups Printed- Lights - Mediums - Articulated Trucks - Bicycles on Crosswalk - Pedestrians

Start Time	Cedar Southeastbound					Cedar Northwestbound					Aurelius Northbound					Aurelius Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
07:00 AM	0	56	67	0	123	5	74	2	0	81	89	8	2	0	99	6	17	2	0	25	328
07:15 AM	1	61	56	3	121	8	85	8	0	101	102	28	0	3	133	6	23	0	0	29	384
07:30 AM	2	76	40	0	118	3	109	4	0	116	93	20	1	0	114	13	12	3	1	29	377
07:45 AM	2	91	48	0	141	6	116	6	0	128	70	12	1	0	83	18	17	7	0	42	394
Total	5	284	211	3	503	22	384	20	0	426	354	68	4	3	429	43	69	12	1	125	1483
08:00 AM	2	82	42	0	126	7	90	5	1	103	68	15	2	0	85	8	20	5	2	35	349
08:15 AM	1	117	63	0	181	5	115	9	1	130	75	16	3	1	95	12	23	1	2	38	444
08:30 AM	7	68	47	0	122	7	163	7	0	177	113	24	7	0	144	6	11	4	0	21	464
08:45 AM	8	60	44	1	113	4	90	7	0	101	84	27	4	0	115	9	18	4	0	31	360
Total	18	327	196	1	542	23	458	28	2	511	340	82	16	1	439	35	72	14	4	125	1617
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
 Bloomfield Hills, Michigan, 48303
 (248) 454-6300

Job Number: 20150384
 Date: 5/12/2016
 Location: Cedar Street and Aurelius Road
 Counted by: HRC

File Name : Cedar_Aurelius
 Site Code : 20150384
 Start Date : 5/12/2016
 Page No : 2

Groups Printed- Lights - Mediums - Articulated Trucks - Bicycles on Crosswalk - Pedestrians

Start Time	Cedar Southeastbound					Cedar Northwestbound					Aurelius Northbound					Aurelius Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00 PM	3	98	66	0	167	4	110	10	0	124	56	10	3	3	72	6	19	1	0	26	389
02:15 PM	2	123	96	0	221	4	104	8	0	116	47	13	6	0	66	7	11	2	0	20	423
02:30 PM	4	101	102	0	207	4	122	10	2	138	66	18	5	0	89	4	18	3	0	25	459
02:45 PM	5	100	72	0	177	8	110	8	2	128	101	30	5	1	137	9	19	4	0	32	474
Total	14	422	336	0	772	20	446	36	4	506	270	71	19	4	364	26	67	10	0	103	1745
03:00 PM	3	104	85	0	192	10	111	13	0	134	59	25	5	2	91	6	20	3	0	29	446
03:15 PM	5	117	103	1	226	10	90	15	3	118	54	16	2	1	73	18	25	4	0	47	464
03:30 PM	4	114	81	1	200	4	125	9	1	139	70	29	5	3	107	10	21	6	0	37	483
03:45 PM	9	98	82	0	189	8	144	11	0	163	103	37	4	3	147	4	14	7	2	27	526
Total	21	433	351	2	807	32	470	48	4	554	286	107	16	9	418	38	80	20	2	140	1919
04:00 PM	7	101	74	1	183	7	128	16	0	151	64	19	5	0	88	11	20	2	0	33	455
04:15 PM	5	99	76	0	180	6	113	10	0	129	78	24	4	0	106	15	40	4	0	59	474
04:30 PM	8	89	76	0	173	5	117	7	1	130	81	34	6	0	121	10	22	2	1	35	459
04:45 PM	4	100	94	1	199	11	110	5	0	126	59	17	7	0	83	12	22	1	0	35	443
Total	24	389	320	2	735	29	468	38	1	536	282	94	22	0	398	48	104	9	1	162	1831
05:00 PM	2	93	79	0	174	8	119	15	0	142	70	35	11	0	116	6	26	3	2	37	469
05:15 PM	7	110	93	0	210	9	158	12	0	179	61	14	2	0	77	14	34	1	1	50	516
05:30 PM	2	112	103	0	217	8	118	8	0	134	82	23	4	1	110	10	19	4	0	33	494
05:45 PM	4	95	103	0	202	12	115	9	0	136	66	17	5	0	88	23	20	2	0	45	471
Total	15	410	378	0	803	37	510	44	0	591	279	89	22	1	391	53	99	10	3	165	1950
Grand Total	97	2265	1792	8	4162	163	2736	214	11	3124	1811	511	99	18	2439	243	491	75	11	820	10545
Apprch %	2.3	54.4	43.1	0.2		5.2	87.6	6.9	0.4		74.3	21	4.1	0.7		29.6	59.9	9.1	1.3		
Total %	0.9	21.5	17	0.1	39.5	1.5	25.9	2	0.1	29.6	17.2	4.8	0.9	0.2	23.1	2.3	4.7	0.7	0.1	7.8	
Lights	97	2211	1746	0	4054	160	2675	209	0	3044	1782	495	96	0	2373	239	483	72	0	794	10265
% Lights	100	97.6	97.4	0	97.4	98.2	97.8	97.7	0	97.4	98.4	96.9	97	0	97.3	98.4	98.4	96	0	96.8	97.3
Mediums	0	47	44	0	91	3	57	5	0	65	28	15	2	0	45	4	8	3	0	15	216
% Mediums	0	2.1	2.5	0	2.2	1.8	2.1	2.3	0	2.1	1.5	2.9	2	0	1.8	1.6	1.6	4	0	1.8	2
Articulated Trucks	0	7	2	0	9	0	4	0	0	4	1	1	1	0	3	0	0	0	0	0	16
% Articulated Trucks	0	0.3	0.1	0	0.2	0	0.1	0	0	0.1	0.1	0.2	1	0	0.1	0	0	0	0	0	0.2
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0	0	0	4	4	7
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	16.7	0.1	0	0	0	36.4	0.5	0.1
Pedestrians	0	0	0	8	8	0	0	0	11	11	0	0	0	15	15	0	0	0	7	7	41
% Pedestrians	0	0	0	100	0.2	0	0	0	100	0.4	0	0	0	83.3	0.6	0	0	0	63.6	0.9	0.4

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
 Bloomfield Hills, Michigan, 48303
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Job Number: 20150384
 Date: 5/12/2016
 Location: Cedar Street and Aurelius Road
 Counted by: HRC

File Name : Cedar_Aurelius
 Site Code : 20150384
 Start Date : 5/12/2016
 Page No : 3

Start Time	Cedar Southeastbound					Cedar Northwestbound					Aurelius Northbound					Aurelius Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	2	91	48	0	141	6	116	6	0	128	70	12	1	0	83	18	17	7	0	42	394
08:00 AM	2	82	42	0	126	7	90	5	1	103	68	15	2	0	85	8	20	5	2	35	349
08:15 AM	1	117	63	0	181	5	115	9	1	130	75	16	3	1	95	12	23	1	2	38	444
08:30 AM	7	68	47	0	122	7	163	7	0	177	113	24	7	0	144	6	11	4	0	21	464
Total Volume	12	358	200	0	570	25	484	27	2	538	326	67	13	1	407	44	71	17	4	136	1651
% App. Total	2.1	62.8	35.1	0		4.6	90	5	0.4		80.1	16.5	3.2	0.2		32.4	52.2	12.5	2.9		
PHF	.429	.765	.794	.000	.787	.893	.742	.750	.500	.760	.721	.698	.464	.250	.707	.611	.772	.607	.500	.810	.890

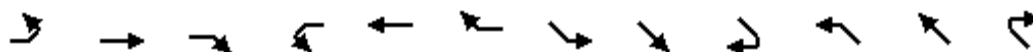
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	2	93	79	0	174	8	119	15	0	142	70	35	11	0	116	6	26	3	2	37	469
05:15 PM	7	110	93	0	210	9	158	12	0	179	61	14	2	0	77	14	34	1	1	50	516
05:30 PM	2	112	103	0	217	8	118	8	0	134	82	23	4	1	110	10	19	4	0	33	494
05:45 PM	4	95	103	0	202	12	115	9	0	136	66	17	5	0	88	23	20	2	0	45	471
Total Volume	15	410	378	0	803	37	510	44	0	591	279	89	22	1	391	53	99	10	3	165	1950
% App. Total	1.9	51.1	47.1	0		6.3	86.3	7.4	0		71.4	22.8	5.6	0.3		32.1	60	6.1	1.8		
PHF	.536	.915	.917	.000	.925	.771	.807	.733	.000	.825	.851	.636	.500	.250	.843	.576	.728	.625	.375	.825	.945

Attachment B: Synchro Reports

HCM Signalized Intersection Capacity Analysis

6: Cedar Street & Holt Road

7/28/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations	↗	↑	↖	↗	↑	↖		↕			↕	
Traffic Volume (vph)	49	430	84	87	233	103	78	217	22	51	218	97
Future Volume (vph)	49	430	84	87	233	103	78	217	22	51	218	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	5.8	5.8	5.8		5.7			5.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		0.95			0.95	
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98		1.00			0.99	
Flpb, ped/bikes	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		0.99			0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99			0.99	
Satd. Flow (prot)	1765	1863	1583	1770	1863	1555		3454			3356	
Flt Permitted	0.59	1.00	1.00	0.18	1.00	1.00		0.99			0.99	
Satd. Flow (perm)	1095	1863	1583	327	1863	1555		3454			3356	
Peak-hour factor, PHF	0.81	0.81	0.81	0.84	0.84	0.84	0.91	0.91	0.91	0.92	0.92	0.92
Adj. Flow (vph)	60	531	104	104	277	123	86	238	24	55	237	105
RTOR Reduction (vph)	0	0	67	0	0	85	0	6	0	0	37	0
Lane Group Flow (vph)	60	531	37	104	277	38	0	342	0	0	360	0
Confl. Peds. (#/hr)	6					6	1		3	3		1
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA		Split	NA	
Protected Phases	7	4		3	8		1	1		2	2	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	30.6	30.6	30.6	26.7	26.7	26.7		14.1			14.8	
Effective Green, g (s)	30.6	30.6	30.6	26.7	26.7	26.7		14.1			14.8	
Actuated g/C Ratio	0.35	0.35	0.35	0.31	0.31	0.31		0.16			0.17	
Clearance Time (s)	5.8	5.8	5.8	5.8	5.8	5.8		5.7			5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	448	659	560	166	575	480		563			574	
v/s Ratio Prot	0.01	c0.29		0.03	c0.15			c0.10			c0.11	
v/s Ratio Perm	0.04		0.02	0.17		0.02						
v/c Ratio	0.13	0.81	0.07	0.63	0.48	0.08		0.61			0.63	
Uniform Delay, d1	19.1	25.2	18.4	24.1	24.2	21.1		33.6			33.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	0.1	7.1	0.0	7.2	0.6	0.1		1.9			2.1	
Delay (s)	19.2	32.3	18.5	31.3	24.9	21.2		35.4			35.4	
Level of Service	B	C	B	C	C	C		D			D	
Approach Delay (s)		29.1			25.3			35.4			35.4	
Approach LOS		C			C			D			D	





















Intersection Summary

HCM 2000 Control Delay	30.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	86.4	Sum of lost time (s)	23.0
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

7: Aurelius Road & Cedar Street

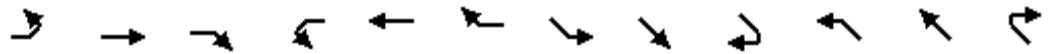
7/28/2016

													
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR	
Lane Configurations													
Traffic Volume (vph)	326	67	13	44	71	17	12	358	200	25	484	27	
Future Volume (vph)	326	67	13	44	71	17	12	358	200	25	484	27	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	6.0	6.0		6.0	6.0			5.8	5.8		6.1		
Lane Util. Factor	0.95	0.95		1.00	1.00			0.95	1.00		0.95		
Frbp, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.98		1.00		
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00		
Frt	1.00	0.99		1.00	0.97			1.00	0.85		0.99		
Flt Protected	0.95	0.97		0.95	1.00			1.00	1.00		1.00		
Satd. Flow (prot)	1681	1700		1770	1809			3534	1547		3499		
Flt Permitted	0.95	0.97		0.95	1.00			1.00	1.00		1.00		
Satd. Flow (perm)	1681	1700		1770	1809			3534	1547		3499		
Peak-hour factor, PHF	0.71	0.71	0.71	0.81	0.81	0.81	0.79	0.79	0.79	0.76	0.76	0.76	
Adj. Flow (vph)	459	94	18	54	88	21	15	453	253	33	637	36	
RTOR Reduction (vph)	0	2	0	0	8	0	0	0	202	0	3	0	
Lane Group Flow (vph)	285	284	0	54	101	0	0	468	51	0	703	0	
Confl. Peds. (#/hr)			2	2			4		1	1		4	
Turn Type	Split	NA		Split	NA		Split	NA	Perm	Split	NA		
Protected Phases	3	3		4	4		2	2		1	1		
Permitted Phases									2				
Actuated Green, G (s)	21.9	21.9		11.8	11.8			20.3	20.3		22.0		
Effective Green, g (s)	21.9	21.9		11.8	11.8			20.3	20.3		22.0		
Actuated g/C Ratio	0.22	0.22		0.12	0.12			0.20	0.20		0.22		
Clearance Time (s)	6.0	6.0		6.0	6.0			5.8	5.8		6.1		
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0		
Lane Grp Cap (vph)	368	372		209	213			718	314		770		
v/s Ratio Prot	c0.17	0.17		0.03	c0.06			c0.13			c0.20		
v/s Ratio Perm									0.03				
v/c Ratio	0.77	0.76		0.26	0.47			0.65	0.16		0.91		
Uniform Delay, d1	36.7	36.6		40.1	41.2			36.6	32.8		38.0		
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00		
Incremental Delay, d2	9.8	8.9		0.7	1.7			4.6	1.1		15.1		
Delay (s)	46.5	45.5		40.7	42.8			41.1	33.9		53.1		
Level of Service	D	D		D	D			D	C		D		
Approach Delay (s)		46.0			42.1			38.6			53.1		
Approach LOS		D			D			D			D		
Intersection Summary													
HCM 2000 Control Delay			45.6									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.73										
Actuated Cycle Length (s)			99.9									Sum of lost time (s)	23.9
Intersection Capacity Utilization			60.8%									ICU Level of Service	B
Analysis Period (min)			15										
c	Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

6: Cedar Street & Holt Road

7/28/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	49	430	84	87	233	103	78	217	22	51	218	97
Future Volume (vph)	49	430	84	87	233	103	78	217	22	51	218	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	5.8	5.8	5.8	4.5	5.7		4.5	5.7	5.7
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.97	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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1765	1863	1583	1770	1863	1536	1769	1833		1767	1863	1549
Flt Permitted	0.48	1.00	1.00	0.15	1.00	1.00	0.54	1.00		0.51	1.00	1.00
Satd. Flow (perm)	895	1863	1583	279	1863	1536	1010	1833		942	1863	1549
Peak-hour factor, PHF	0.81	0.81	0.81	0.84	0.84	0.84	0.91	0.91	0.91	0.92	0.92	0.92
Adj. Flow (vph)	60	531	104	104	277	123	86	238	24	55	237	105
RTOR Reduction (vph)	0	0	71	0	0	84	0	4	0	0	0	71
Lane Group Flow (vph)	60	531	33	104	277	39	86	258	0	55	237	34
Confl. Peds. (#/hr)	6					6	1		3	3		1
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Actuated Green, G (s)	32.0	26.7	26.7	32.0	26.7	26.7	31.5	27.4		31.5	27.4	27.4
Effective Green, g (s)	32.0	26.7	26.7	32.0	26.7	26.7	31.5	27.4		31.5	27.4	27.4
Actuated g/C Ratio	0.38	0.31	0.31	0.38	0.31	0.31	0.37	0.32		0.37	0.32	0.32
Clearance Time (s)	5.8	5.8	5.8	5.8	5.8	5.8	4.5	5.7		4.5	5.7	5.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	389	583	495	197	583	480	409	588		387	598	497
v/s Ratio Prot	0.01	c0.29		c0.03	0.15		c0.01	c0.14		0.01	0.13	
v/s Ratio Perm	0.05		0.02	0.16		0.03	0.07			0.05		0.02
v/c Ratio	0.15	0.91	0.07	0.53	0.48	0.08	0.21	0.44		0.14	0.40	0.07
Uniform Delay, d1	17.4	28.2	20.6	20.0	23.6	20.6	17.9	22.9		17.6	22.5	20.1
Progression Factor	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	0.2	18.5	0.1	2.5	0.6	0.1	0.3	2.4		0.2	2.0	0.3
Delay (s)	17.6	46.6	20.6	22.5	24.3	20.7	18.2	25.2		17.8	24.5	20.4
Level of Service	B	D	C	C	C	C	B	C		B	C	C
Approach Delay (s)		40.2			23.0			23.5			22.5	
Approach LOS		D			C			C			C	























Intersection Summary

HCM 2000 Control Delay	29.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	85.3	Sum of lost time (s)	21.8
Intersection Capacity Utilization	72.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

7: Aurelius Road & Cedar Street

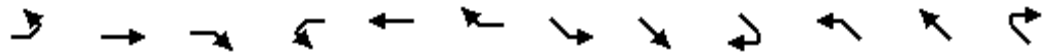
7/28/2016

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	326	67	13	44	71	17	12	358	200	25	484	27
Future Volume (vph)	326	67	13	44	71	17	12	358	200	25	484	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		5.8	5.8	5.8	6.1	6.1	
Lane Util. Factor	0.95	0.95		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98	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		1.00	0.97		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	0.97		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1699		1770	1809		1770	1863	1547	1768	1845	
Flt Permitted	0.95	0.97		0.95	1.00		0.12	1.00	1.00	0.33	1.00	
Satd. Flow (perm)	1681	1699		1770	1809		216	1863	1547	607	1845	
Peak-hour factor, PHF	0.71	0.71	0.71	0.81	0.81	0.81	0.79	0.79	0.79	0.76	0.76	0.76
Adj. Flow (vph)	459	94	18	54	88	21	15	453	253	33	637	36
RTOR Reduction (vph)	0	2	0	0	10	0	0	0	153	0	2	0
Lane Group Flow (vph)	285	284	0	54	99	0	15	453	100	33	671	0
Confl. Peds. (#/hr)			2	2			4		1	1		4
Turn Type	Split	NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	2	2		6	6			4			8	
Permitted Phases							4		4	8		
Actuated Green, G (s)	26.2	26.2		8.8	8.8		34.5	34.5	34.5	34.2	34.2	
Effective Green, g (s)	26.2	26.2		8.8	8.8		34.5	34.5	34.5	34.2	34.2	
Actuated g/C Ratio	0.30	0.30		0.10	0.10		0.40	0.40	0.40	0.39	0.39	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.8	5.8	5.8	6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	504	509		178	182		85	736	611	237	722	
v/s Ratio Prot	c0.17	0.17		0.03	c0.05			0.24			c0.36	
v/s Ratio Perm							0.07		0.06	0.05		
v/c Ratio	0.57	0.56		0.30	0.54		0.18	0.62	0.16	0.14	0.93	
Uniform Delay, d1	25.8	25.7		36.4	37.3		17.2	21.1	17.1	17.1	25.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.5	4.4		1.0	3.3		1.0	1.5	0.1	0.3	18.2	
Delay (s)	30.3	30.0		37.4	40.6		18.2	22.6	17.2	17.4	43.6	
Level of Service	C	C		D	D		B	C	B	B	D	
Approach Delay (s)		30.2			39.6			20.6			42.4	
Approach LOS		C			D			C			D	
Intersection Summary												
HCM 2000 Control Delay			31.7				HCM 2000 Level of Service		C			
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			87.3				Sum of lost time (s)		18.1			
Intersection Capacity Utilization			55.1%				ICU Level of Service		B			
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis

6: Cedar Street & Holt Road

7/28/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	49	430	84	87	233	103	78	217	22	51	218	97
Future Volume (vph)	49	430	84	87	233	103	78	217	22	51	218	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	5.8	5.8	5.8		5.7			5.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		0.95			0.95	
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98		1.00			0.99	
Flpb, ped/bikes	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		0.99			0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99			0.99	
Satd. Flow (prot)	1765	1863	1583	1770	1863	1554		3454			3356	
Flt Permitted	0.58	1.00	1.00	0.19	1.00	1.00		0.99			0.99	
Satd. Flow (perm)	1072	1863	1583	347	1863	1554		3454			3356	
Peak-hour factor, PHF	0.81	0.81	0.81	0.84	0.84	0.84	0.91	0.91	0.91	0.92	0.92	0.92
Growth Factor (vph)	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%
Adj. Flow (vph)	65	573	112	112	300	132	93	258	26	60	256	114
RTOR Reduction (vph)	0	0	72	0	0	94	0	6	0	0	37	0
Lane Group Flow (vph)	65	573	40	112	300	38	0	371	0	0	393	0
Confl. Peds. (#/hr)	6						6	1		3	3	1
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA		Split	NA	
Protected Phases	7	4		3	8		1	1		2	2	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	32.7	32.7	32.7	26.7	26.7	26.7		15.1			15.6	
Effective Green, g (s)	32.7	32.7	32.7	26.7	26.7	26.7		15.1			15.6	
Actuated g/C Ratio	0.36	0.36	0.36	0.29	0.29	0.29		0.16			0.17	
Clearance Time (s)	5.8	5.8	5.8	5.8	5.8	5.8		5.7			5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	467	665	565	181	543	452		569			571	
v/s Ratio Prot	0.02	c0.31		0.03	c0.16			c0.11			c0.12	
v/s Ratio Perm	0.03		0.03	0.14		0.02						
v/c Ratio	0.14	0.86	0.07	0.62	0.55	0.09		0.65			0.69	
Uniform Delay, d1	20.2	27.3	19.4	26.3	27.4	23.6		35.8			35.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	0.1	11.1	0.1	6.2	1.2	0.1		2.7			3.4	
Delay (s)	20.3	38.5	19.5	32.5	28.6	23.7		38.5			39.2	
Level of Service	C	D	B	C	C	C		D			D	
Approach Delay (s)		34.0			28.2			38.5			39.2	
Approach LOS		C			C			D			D	





















Intersection Summary		
HCM 2000 Control Delay	34.4	HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio	0.78	
Actuated Cycle Length (s)	91.6	Sum of lost time (s) 23.0
Intersection Capacity Utilization	72.1%	ICU Level of Service C
Analysis Period (min)	15	

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

7: Aurelius Road & Cedar Street

7/28/2016

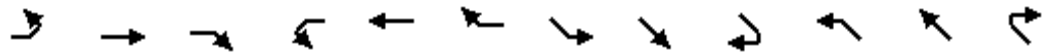
													
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR	
Lane Configurations													
Traffic Volume (vph)	326	67	13	44	71	17	12	358	200	25	484	27	
Future Volume (vph)	326	67	13	44	71	17	12	358	200	25	484	27	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	6.0	6.0		6.0	6.0			5.8	5.8		6.1		
Lane Util. Factor	0.95	0.95		1.00	1.00			0.95	1.00		0.95		
Frbp, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.98		1.00		
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00		
Frt	1.00	0.99		1.00	0.97			1.00	0.85		0.99		
Flt Protected	0.95	0.97		0.95	1.00			1.00	1.00		1.00		
Satd. Flow (prot)	1681	1699		1770	1808			3534	1547		3500		
Flt Permitted	0.95	0.97		0.95	1.00			1.00	1.00		1.00		
Satd. Flow (perm)	1681	1699		1770	1808			3534	1547		3500		
Peak-hour factor, PHF	0.71	0.71	0.71	0.81	0.81	0.81	0.79	0.79	0.79	0.76	0.76	0.76	
Growth Factor (vph)	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	
Adj. Flow (vph)	496	102	20	59	95	23	16	489	273	36	688	38	
RTOR Reduction (vph)	0	2	0	0	10	0	0	0	226	0	4	0	
Lane Group Flow (vph)	308	308	0	59	108	0	0	505	47	0	758	0	
Confl. Peds. (#/hr)			2	2			4		1	1		4	
Turn Type	Split	NA		Split	NA		Split	NA	Perm	Split	NA		
Protected Phases	3	3		4	4		2	2		1	1		
Permitted Phases									2				
Actuated Green, G (s)	20.0	20.0		11.5	11.5			15.9	15.9		21.9		
Effective Green, g (s)	20.0	20.0		11.5	11.5			15.9	15.9		21.9		
Actuated g/C Ratio	0.21	0.21		0.12	0.12			0.17	0.17		0.23		
Clearance Time (s)	6.0	6.0		6.0	6.0			5.8	5.8		6.1		
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0		
Lane Grp Cap (vph)	360	364		218	223			602	263		822		
v/s Ratio Prot	c0.18	0.18		0.03	c0.06			c0.14			c0.22		
v/s Ratio Perm									0.03				
v/c Ratio	0.86	0.85		0.27	0.49			0.84	0.18		0.92		
Uniform Delay, d1	35.2	35.1		37.0	38.1			37.4	33.1		34.8		
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00		
Incremental Delay, d2	17.7	16.3		0.7	1.7			13.2	1.5		15.7		
Delay (s)	52.9	51.4		37.7	39.8			50.6	34.5		50.5		
Level of Service	D	D		D	D			D	C		D		
Approach Delay (s)		52.1			39.1			44.9			50.5		
Approach LOS		D			D			D			D		
Intersection Summary													
HCM 2000 Control Delay			48.2									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.81										
Actuated Cycle Length (s)			93.2									Sum of lost time (s)	23.9
Intersection Capacity Utilization			63.4%									ICU Level of Service	B
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

6: Cedar Street & Holt Road

7/28/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	49	430	84	87	233	103	78	217	22	51	218	97
Future Volume (vph)	49	430	84	87	233	103	78	217	22	51	218	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.97	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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1766	1863	1583	1770	1863	1536	1769	1833		1767	1863	1549
Flt Permitted	0.43	1.00	1.00	0.14	1.00	1.00	0.48	1.00		0.45	1.00	1.00
Satd. Flow (perm)	801	1863	1583	258	1863	1536	901	1833		830	1863	1549
Peak-hour factor, PHF	0.81	0.81	0.81	0.84	0.84	0.84	0.91	0.91	0.91	0.92	0.92	0.92
Growth Factor (vph)	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%
Adj. Flow (vph)	65	573	112	112	300	132	93	258	26	60	256	114
RTOR Reduction (vph)	0	0	74	0	0	87	0	4	0	0	0	75
Lane Group Flow (vph)	65	573	38	112	300	45	93	280	0	60	256	39
Confl. Peds. (#/hr)	6					6	1		3	3		1
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Actuated Green, G (s)	32.4	27.1	27.1	32.4	27.1	27.1	31.3	27.2		31.3	27.2	27.2
Effective Green, g (s)	36.0	28.9	28.9	36.0	28.9	28.9	32.3	28.9		32.3	28.9	28.9
Actuated g/C Ratio	0.42	0.34	0.34	0.42	0.34	0.34	0.38	0.34		0.38	0.34	0.34
Clearance Time (s)	5.8	5.8	5.8	5.8	5.8	5.8	4.5	5.7		4.5	5.7	5.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	417	629	535	234	629	519	387	619		363	629	523
v/s Ratio Prot	0.01	c0.31		c0.04	0.16		c0.01	c0.15		0.01	0.14	
v/s Ratio Perm	0.05		0.02	0.16		0.03	0.08			0.05		0.02
v/c Ratio	0.16	0.91	0.07	0.48	0.48	0.09	0.24	0.45		0.17	0.41	0.07
Uniform Delay, d1	15.2	27.1	19.2	18.6	22.3	19.3	17.7	22.1		17.4	21.7	19.2
Progression Factor	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	0.2	17.5	0.1	1.5	0.6	0.1	0.3	2.4		0.2	1.9	0.3
Delay (s)	15.4	44.5	19.2	20.1	22.9	19.4	18.0	24.5		17.6	23.7	19.5
Level of Service	B	D	B	C	C	B	B	C		B	C	B
Approach Delay (s)		38.2			21.5			22.9			21.7	
Approach LOS		D			C			C			C	

Intersection Summary























HCM 2000 Control Delay	27.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	85.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

7: Aurelius Road & Cedar Street

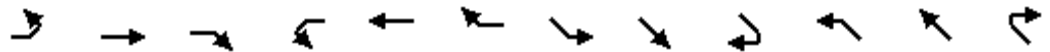
7/28/2016

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	326	67	13	44	71	17	12	358	200	25	484	27
Future Volume (vph)	326	67	13	44	71	17	12	358	200	25	484	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.95	0.95		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98	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		1.00	0.97		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	0.97		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1698		1770	1808		1770	1863	1547	1770	1845	
Flt Permitted	0.95	0.97		0.95	1.00		0.11	1.00	1.00	0.31	1.00	
Satd. Flow (perm)	1681	1698		1770	1808		208	1863	1547	584	1845	
Peak-hour factor, PHF	0.71	0.71	0.71	0.81	0.81	0.81	0.79	0.79	0.79	0.76	0.76	0.76
Growth Factor (vph)	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%
Adj. Flow (vph)	496	102	20	59	95	23	16	489	273	36	688	38
RTOR Reduction (vph)	0	2	0	0	9	0	0	0	148	0	2	0
Lane Group Flow (vph)	308	308	0	59	109	0	16	489	125	36	724	0
Confl. Peds. (#/hr)			2	2			4		1	1		4
Turn Type	Split	NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	2	2		6	6			4			8	
Permitted Phases							4		4	8		
Actuated Green, G (s)	26.0	26.0		12.0	12.0		43.8	43.8	43.8	43.5	43.5	
Effective Green, g (s)	28.0	28.0		14.0	14.0		45.6	45.6	45.6	45.6	45.6	
Actuated g/C Ratio	0.28	0.28		0.14	0.14		0.46	0.46	0.46	0.46	0.46	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.8	5.8	5.8	6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	472	477		248	254		95	852	708	267	844	
v/s Ratio Prot	c0.18	0.18		0.03	c0.06			0.26			c0.39	
v/s Ratio Perm							0.08		0.08	0.06		
v/c Ratio	0.65	0.65		0.24	0.43		0.17	0.57	0.18	0.13	0.86	
Uniform Delay, d1	31.5	31.4		38.1	39.2		15.9	19.9	15.9	15.6	24.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.9	6.6		0.5	1.2		0.8	0.9	0.1	0.2	8.6	
Delay (s)	38.4	38.0		38.6	40.3		16.7	20.8	16.0	15.8	32.8	
Level of Service	D	D		D	D		B	C	B	B	C	
Approach Delay (s)		38.2			39.7			19.0			32.0	
Approach LOS		D			D			B			C	
Intersection Summary												
HCM 2000 Control Delay			29.9				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			99.6				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			54.7%				ICU Level of Service			A		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

6: Cedar Street & Holt Road

7/28/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	68	290	89	120	421	104	117	269	49	161	339	73
Future Volume (vph)	68	290	89	120	421	104	117	269	49	161	339	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	5.8	5.8	5.8		5.7			5.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		0.95			0.95	
Frbp, ped/bikes	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	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98			0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99			0.99	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		3422			3422	
Flt Permitted	0.16	1.00	1.00	0.32	1.00	1.00		0.99			0.99	
Satd. Flow (perm)	296	1863	1583	590	1863	1583		3422			3422	
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.95	0.95	0.95	0.76	0.76	0.76
Adj. Flow (vph)	74	315	97	128	448	111	123	283	52	212	446	96
RTOR Reduction (vph)	0	0	72	0	0	81	0	9	0	0	10	0
Lane Group Flow (vph)	74	315	25	128	448	30	0	449	0	0	744	0
Confl. Peds. (#/hr)									4	4		
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA		Split	NA	
Protected Phases	7	4		3	8		1	1		2	2	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	34.2	28.6	28.6	37.4	30.2	30.2		26.4			26.4	
Effective Green, g (s)	34.2	28.6	28.6	37.4	30.2	30.2		26.4			26.4	
Actuated g/C Ratio	0.31	0.26	0.26	0.34	0.27	0.27		0.24			0.24	
Clearance Time (s)	5.8	5.8	5.8	5.8	5.8	5.8		5.7			5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	164	477	405	273	504	428		809			809	
v/s Ratio Prot	0.02	0.17		c0.03	c0.24			c0.13			c0.22	
v/s Ratio Perm	0.12		0.02	0.13		0.02						
v/c Ratio	0.45	0.66	0.06	0.47	0.89	0.07		0.55			0.92	
Uniform Delay, d1	29.9	37.2	31.4	27.5	39.1	30.3		37.4			41.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	2.0	3.4	0.1	1.3	17.2	0.1		2.7			17.3	
Delay (s)	31.8	40.6	31.4	28.8	56.3	30.3		40.2			58.8	
Level of Service	C	D	C	C	E	C		D			E	
Approach Delay (s)		37.4			47.0			40.2			58.8	
Approach LOS		D			D			D			E	





















Intersection Summary

HCM 2000 Control Delay	47.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	111.6	Sum of lost time (s)	23.0
Intersection Capacity Utilization	85.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

7: Aurelius Road & Cedar Street

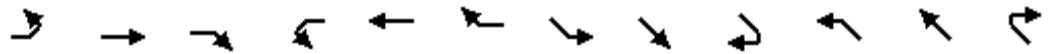
7/28/2016

													
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR	
Lane Configurations													
Traffic Volume (vph)	279	89	22	53	99	10	15	410	378	37	510	44	
Future Volume (vph)	279	89	22	53	99	10	15	410	378	37	510	44	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	5.8	5.8		6.0	6.0			5.8	5.8		6.1		
Lane Util. Factor	0.95	0.95		1.00	1.00			0.95	1.00		0.95		
Frbp, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.98		1.00		
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00		
Frt	1.00	0.98		1.00	0.99			1.00	0.85		0.99		
Flt Protected	0.95	0.98		0.95	1.00			1.00	1.00		1.00		
Satd. Flow (prot)	1681	1703		1770	1837			3533	1547		3482		
Flt Permitted	0.95	0.98		0.95	1.00			1.00	1.00		1.00		
Satd. Flow (perm)	1681	1703		1770	1837			3533	1547		3482		
Peak-hour factor, PHF	0.84	0.84	0.84	0.83	0.83	0.83	0.93	0.93	0.93	0.83	0.83	0.83	
Adj. Flow (vph)	332	106	26	64	119	12	16	441	406	45	614	53	
RTOR Reduction (vph)	0	5	0	0	3	0	0	0	334	0	6	0	
Lane Group Flow (vph)	232	227	0	64	128	0	0	457	73	0	706	0	
Confl. Peds. (#/hr)							3		1	1		3	
Turn Type	Split	NA		Split	NA		Split	NA	Perm	Split	NA		
Protected Phases	3	3		4	4		2	2		1	1		
Permitted Phases									2				
Actuated Green, G (s)	17.1	17.1		11.8	11.8			16.0	16.0		21.0		
Effective Green, g (s)	17.1	17.1		11.8	11.8			16.0	16.0		21.0		
Actuated g/C Ratio	0.19	0.19		0.13	0.13			0.18	0.18		0.23		
Clearance Time (s)	5.8	5.8		6.0	6.0			5.8	5.8		6.1		
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0		
Lane Grp Cap (vph)	320	325		233	241			630	276		816		
v/s Ratio Prot	c0.14	0.13		0.04	c0.07			c0.13			c0.20		
v/s Ratio Perm									0.05				
v/c Ratio	0.72	0.70		0.27	0.53			0.73	0.26		0.87		
Uniform Delay, d1	34.0	33.8		35.0	36.3			34.7	31.7		32.9		
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00		
Incremental Delay, d2	7.9	6.4		0.6	2.1			7.1	2.3		9.5		
Delay (s)	42.0	40.3		35.7	38.4			41.9	34.0		42.4		
Level of Service	D	D		D	D			D	C		D		
Approach Delay (s)		41.1			37.5			38.2			42.4		
Approach LOS		D			D			D			D		
Intersection Summary													
HCM 2000 Control Delay			40.1									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.73										
Actuated Cycle Length (s)			89.6									Sum of lost time (s)	23.7
Intersection Capacity Utilization			63.5%									ICU Level of Service	B
Analysis Period (min)			15										
c Critical Lane Group													

HCM Signalized Intersection Capacity Analysis

6: Cedar Street & Holt Road

7/28/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	68	290	89	120	421	104	117	269	49	161	339	73
Future Volume (vph)	68	290	89	120	421	104	117	269	49	161	339	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	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	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1812		1768	1863	1583
Flt Permitted	0.20	1.00	1.00	0.38	1.00	1.00	0.29	1.00		0.37	1.00	1.00
Satd. Flow (perm)	367	1863	1583	707	1863	1583	538	1812		695	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.95	0.95	0.95	0.76	0.76	0.76
Adj. Flow (vph)	74	315	97	128	448	111	123	283	52	212	446	96
RTOR Reduction (vph)	0	0	68	0	0	77	0	7	0	0	0	61
Lane Group Flow (vph)	74	315	29	128	448	34	123	328	0	212	446	35
Confl. Peds. (#/hr)									4	4		
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Actuated Green, G (s)	29.2	23.8	23.8	29.2	23.8	23.8	32.3	28.1		35.1	29.5	29.5
Effective Green, g (s)	32.8	25.6	25.6	32.8	25.6	25.6	33.3	29.8		36.1	31.2	31.2
Actuated g/C Ratio	0.39	0.30	0.30	0.39	0.30	0.30	0.39	0.35		0.43	0.37	0.37
Clearance Time (s)	5.8	5.8	5.8	5.8	5.8	5.8	4.5	5.7		4.5	5.7	5.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	261	563	478	364	563	478	279	637		373	686	583
v/s Ratio Prot	0.02	0.17		c0.03	c0.24		0.02	0.18		c0.04	c0.24	
v/s Ratio Perm	0.09		0.02	0.11		0.02	0.15			0.20		0.02
v/c Ratio	0.28	0.56	0.06	0.35	0.80	0.07	0.44	0.51		0.57	0.65	0.06
Uniform Delay, d1	18.2	24.8	21.0	17.6	27.1	21.1	17.8	21.7		17.2	22.2	17.3
Progression Factor	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	0.6	1.2	0.1	0.6	7.7	0.1	1.1	3.0		2.0	4.7	0.2
Delay (s)	18.8	26.0	21.1	18.2	34.8	21.1	18.9	24.7		19.1	27.0	17.5
Level of Service	B	C	C	B	C	C	B	C		B	C	B
Approach Delay (s)		23.9			29.5			23.1			23.5	
Approach LOS		C			C			C			C	























Intersection Summary

HCM 2000 Control Delay	25.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	84.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

7: Aurelius Road & Cedar Street

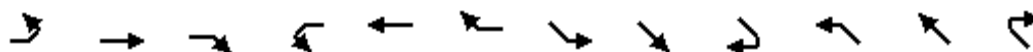
7/28/2016

													
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR	
Lane Configurations													
Traffic Volume (vph)	279	89	22	53	99	10	15	410	378	37	510	44	
Future Volume (vph)	279	89	22	53	99	10	15	410	378	37	510	44	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0		
Lane Util. Factor	0.95	0.95		1.00	1.00		1.00	1.00	1.00	1.00	1.00		
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98	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	0.97		1.00	0.99		1.00	1.00	0.85	1.00	0.99		
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1681	1717		1770	1837		1770	1863	1547	1768	1837		
Flt Permitted	0.95	1.00		0.95	1.00		0.11	1.00	1.00	0.32	1.00		
Satd. Flow (perm)	1681	1717		1770	1837		207	1863	1547	588	1837		
Peak-hour factor, PHF	0.84	0.84	0.84	0.83	0.83	0.83	0.93	0.93	0.93	0.83	0.83	0.83	
Adj. Flow (vph)	332	106	26	64	119	12	16	441	406	45	614	53	
RTOR Reduction (vph)	0	8	0	0	4	0	0	0	244	0	3	0	
Lane Group Flow (vph)	332	124	0	64	127	0	16	441	162	45	664	0	
Confl. Peds. (#/hr)							3		1	1		3	
Turn Type	Split	NA		Split	NA		Perm	NA	Perm	Perm	NA		
Protected Phases	2	2		6	6			4			8		
Permitted Phases							4		4	8			
Actuated Green, G (s)	26.0	26.0		12.1	12.1		34.2	34.2	34.2	33.9	33.9		
Effective Green, g (s)	28.0	28.0		14.1	14.1		36.0	36.0	36.0	36.0	36.0		
Actuated g/C Ratio	0.31	0.31		0.16	0.16		0.40	0.40	0.40	0.40	0.40		
Clearance Time (s)	6.0	6.0		6.0	6.0		5.8	5.8	5.8	6.1	6.1		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	522	533		276	287		82	744	618	234	733		
v/s Ratio Prot	c0.20	0.07		0.04	c0.07			0.24			c0.36		
v/s Ratio Perm							0.08		0.10	0.08			
v/c Ratio	0.64	0.23		0.23	0.44		0.20	0.59	0.26	0.19	0.91		
Uniform Delay, d1	26.7	23.1		33.3	34.4		17.6	21.3	18.1	17.6	25.5		
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	5.8	1.0		0.4	1.1		1.2	1.3	0.2	0.4	14.7		
Delay (s)	32.5	24.1		33.7	35.5		18.8	22.6	18.4	18.0	40.2		
Level of Service	C	C		C	D		B	C	B	B	D		
Approach Delay (s)		30.1			34.9			20.5			38.8		
Approach LOS		C			C			C			D		
Intersection Summary													
HCM 2000 Control Delay			29.6									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.72										
Actuated Cycle Length (s)			90.1									Sum of lost time (s)	12.0
Intersection Capacity Utilization			54.8%									ICU Level of Service	A
Analysis Period (min)			15										
c	Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

6: Cedar Street & Holt Road

7/28/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	68	290	89	120	421	104	117	269	49	161	339	73
Future Volume (vph)	68	290	89	120	421	104	117	269	49	161	339	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	5.8	5.8	5.8		5.7			5.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		0.95			0.95	
Frbp, ped/bikes	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	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98			0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99			0.99	
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		3422			3423	
Flt Permitted	0.14	1.00	1.00	0.28	1.00	1.00		0.99			0.99	
Satd. Flow (perm)	255	1863	1583	527	1863	1583		3422			3423	
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.95	0.95	0.95	0.76	0.76	0.76
Growth Factor (vph)	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%
Adj. Flow (vph)	80	340	104	138	484	119	133	306	56	229	482	104
RTOR Reduction (vph)	0	0	77	0	0	86	0	8	0	0	10	0
Lane Group Flow (vph)	80	340	27	138	484	33	0	487	0	0	805	0
Confl. Peds. (#/hr)									4	4		
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA		Split	NA	
Protected Phases	7	4		3	8		1	1		2	2	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	34.8	29.2	29.2	38.0	30.8	30.8		26.4			26.4	
Effective Green, g (s)	34.8	29.2	29.2	38.0	30.8	30.8		26.4			26.4	
Actuated g/C Ratio	0.31	0.26	0.26	0.34	0.27	0.27		0.24			0.24	
Clearance Time (s)	5.8	5.8	5.8	5.8	5.8	5.8		5.7			5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	154	484	411	258	511	434		805			805	
v/s Ratio Prot	0.03	0.18		c0.03	c0.26			c0.14			c0.24	
v/s Ratio Perm	0.13		0.02	0.15		0.02						
v/c Ratio	0.52	0.70	0.07	0.53	0.95	0.08		0.60			1.00	
Uniform Delay, d1	30.4	37.6	31.2	27.8	39.9	30.2		38.2			42.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	2.9	4.6	0.1	2.1	26.8	0.1		3.4			31.7	
Delay (s)	33.3	42.2	31.3	29.9	66.7	30.2		41.6			74.6	
Level of Service	C	D	C	C	E	C		D			E	
Approach Delay (s)		38.7			54.0			41.6			74.6	
Approach LOS		D			D			D			E	

Intersection Summary





















HCM 2000 Control Delay	55.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	112.2	Sum of lost time (s)	23.0
Intersection Capacity Utilization	88.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

7: Aurelius Road & Cedar Street

7/28/2016

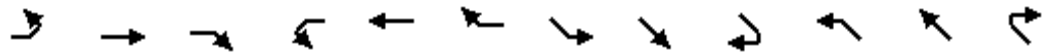
												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	279	89	22	53	99	10	15	410	378	37	510	44
Future Volume (vph)	279	89	22	53	99	10	15	410	378	37	510	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8		6.0	6.0			5.8	5.8		6.1	
Lane Util. Factor	0.95	0.95		1.00	1.00			0.95	1.00		0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.98		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.98		1.00	0.99			1.00	0.85		0.99	
Flt Protected	0.95	0.98		0.95	1.00			1.00	1.00		1.00	
Satd. Flow (prot)	1681	1703		1770	1837			3533	1547		3482	
Flt Permitted	0.95	0.98		0.95	1.00			1.00	1.00		1.00	
Satd. Flow (perm)	1681	1703		1770	1837			3533	1547		3482	
Peak-hour factor, PHF	0.84	0.84	0.84	0.83	0.83	0.83	0.93	0.93	0.93	0.83	0.83	0.83
Growth Factor (vph)	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%
Adj. Flow (vph)	359	114	28	69	129	13	17	476	439	48	664	57
RTOR Reduction (vph)	0	4	0	0	3	0	0	0	352	0	5	0
Lane Group Flow (vph)	248	249	0	69	139	0	0	493	87	0	764	0
Confl. Peds. (#/hr)							3		1	1		3
Turn Type	Split	NA		Split	NA		Split	NA	Perm	Split	NA	
Protected Phases	3	3		4	4		2	2		1	1	
Permitted Phases									2			
Actuated Green, G (s)	19.9	19.9		13.4	13.4			20.3	20.3		25.6	
Effective Green, g (s)	19.9	19.9		13.4	13.4			20.3	20.3		25.6	
Actuated g/C Ratio	0.19	0.19		0.13	0.13			0.20	0.20		0.25	
Clearance Time (s)	5.8	5.8		6.0	6.0			5.8	5.8		6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	325	329		230	239			696	305		866	
v/s Ratio Prot	c0.15	0.15		0.04	c0.08			c0.14			c0.22	
v/s Ratio Perm									0.06			
v/c Ratio	0.76	0.76		0.30	0.58			0.71	0.28		0.88	
Uniform Delay, d1	39.3	39.2		40.5	42.1			38.5	35.1		37.2	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	10.2	9.5		0.7	3.4			6.0	2.3		10.5	
Delay (s)	49.4	48.8		41.2	45.5			44.5	37.4		47.7	
Level of Service	D	D		D	D			D	D		D	
Approach Delay (s)		49.1			44.1			41.2			47.7	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			45.2								HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			102.9							23.7		
Intersection Capacity Utilization			66.6%								ICU Level of Service	C
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

6: Cedar Street & Holt Road

7/28/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	68	290	89	120	421	104	117	269	49	161	339	73
Future Volume (vph)	68	290	89	120	421	104	117	269	49	161	339	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	5.8	5.8	5.8	4.5	5.7		4.5	5.7	5.7
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	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	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1812		1768	1863	1583
Flt Permitted	0.22	1.00	1.00	0.35	1.00	1.00	0.19	1.00		0.35	1.00	1.00
Satd. Flow (perm)	404	1863	1583	655	1863	1583	348	1812		652	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.95	0.95	0.95	0.76	0.76	0.76
Growth Factor (vph)	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%
Adj. Flow (vph)	80	340	104	138	484	119	133	306	56	229	482	104
RTOR Reduction (vph)	0	0	73	0	0	81	0	7	0	0	0	72
Lane Group Flow (vph)	80	340	31	138	484	38	133	355	0	229	482	32
Confl. Peds. (#/hr)									4	4		
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Actuated Green, G (s)	31.3	25.8	25.8	34.7	27.5	27.5	32.0	26.5		32.0	26.5	26.5
Effective Green, g (s)	31.3	25.8	25.8	34.7	27.5	27.5	32.0	26.5		32.0	26.5	26.5
Actuated g/C Ratio	0.36	0.30	0.30	0.40	0.32	0.32	0.37	0.31		0.37	0.31	0.31
Clearance Time (s)	5.8	5.8	5.8	5.8	5.8	5.8	4.5	5.7		4.5	5.7	5.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	232	553	470	354	590	501	218	553		311	568	483
v/s Ratio Prot	0.02	0.18		c0.03	c0.26		0.04	0.20		c0.05	c0.26	
v/s Ratio Perm	0.10		0.02	0.12		0.02	0.19			0.22		0.02
v/c Ratio	0.34	0.61	0.07	0.39	0.82	0.08	0.61	0.64		0.74	0.85	0.07
Uniform Delay, d1	19.9	26.2	21.9	17.6	27.4	20.8	20.5	26.1		23.3	28.3	21.4
Progression Factor	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	0.9	2.0	0.1	0.7	8.9	0.1	5.0	5.6		8.8	14.6	0.3
Delay (s)	20.8	28.3	21.9	18.3	36.3	20.8	25.5	31.7		32.1	42.9	21.6
Level of Service	C	C	C	B	D	C	C	C		C	D	C
Approach Delay (s)		25.9			30.5			30.0			37.1	
Approach LOS		C			C			C			D	

Intersection Summary























HCM 2000 Control Delay	31.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	86.8	Sum of lost time (s)	21.8
Intersection Capacity Utilization	79.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

7: Aurelius Road & Cedar Street

7/28/2016

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	279	89	22	53	99	10	15	410	378	37	510	44
Future Volume (vph)	279	89	22	53	99	10	15	410	378	37	510	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		5.8	5.8	5.8	6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98	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	0.97		1.00	0.99		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1808		1770	1837		1770	1863	1546	1768	1837	
Flt Permitted	0.95	1.00		0.95	1.00		0.11	1.00	1.00	0.33	1.00	
Satd. Flow (perm)	1770	1808		1770	1837		207	1863	1546	611	1837	
Peak-hour factor, PHF	0.84	0.84	0.84	0.83	0.83	0.83	0.93	0.93	0.93	0.83	0.83	0.83
Growth Factor (vph)	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%
Adj. Flow (vph)	359	114	28	69	129	13	17	476	439	48	664	57
RTOR Reduction (vph)	0	7	0	0	3	0	0	0	245	0	2	0
Lane Group Flow (vph)	359	135	0	69	139	0	17	476	194	48	719	0
Confl. Peds. (#/hr)							3		1	1		3
Turn Type	Split	NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	2	2		6	6			4			8	
Permitted Phases							4		4		8	
Actuated Green, G (s)	28.0	28.0		13.6	13.6		47.2	47.2	47.2	46.9	46.9	
Effective Green, g (s)	28.0	28.0		13.6	13.6		47.2	47.2	47.2	46.9	46.9	
Actuated g/C Ratio	0.26	0.26		0.13	0.13		0.44	0.44	0.44	0.44	0.44	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.8	5.8	5.8	6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	464	474		225	234		91	824	684	268	808	
v/s Ratio Prot	c0.20	0.07		0.04	c0.08			0.26			c0.39	
v/s Ratio Perm							0.08		0.13	0.08		
v/c Ratio	0.77	0.28		0.31	0.59		0.19	0.58	0.28	0.18	0.89	
Uniform Delay, d1	36.4	31.3		42.2	43.9		18.0	22.2	18.9	18.1	27.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	11.9	1.5		0.8	4.0		1.0	1.0	0.2	0.3	11.7	
Delay (s)	48.2	32.8		43.0	47.9		19.0	23.2	19.2	18.5	39.2	
Level of Service	D	C		D	D		B	C	B	B	D	
Approach Delay (s)		43.9			46.3			21.2			37.9	
Approach LOS		D			D			C			D	
Intersection Summary												
HCM 2000 Control Delay			33.4				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			106.6			Sum of lost time (s)			18.1			
Intersection Capacity Utilization			66.7%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												