Memorandum

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January 16, 2015

TO: David Wildwering, Community Development Director

CC:

FR: Molly Long, PE

RE: Revisions to Brite Beginnings Daycare & Kevin's Place Shopping Center Traffic Study

The contents of this memo supplement the *Traffic Impact Study for Brite Beginnings Daycare & Kevin's Place Shopping Center* completed May 4 2007. Further analysis was requested based on a revised site plan.

Traffic

Trip Generation

The trip generation has changed for the requested revisions. The proposed building on the site is now a grocery store instead of retail space and a restaurant. The total number of trips generated by the proposed grocery store has been estimated using the information provided in the *Institute of Transportation Engineers (ITE) Trip Generation, 8th Edition*. The weekday daily traffic, AM peak hour of the street traffic, and PM peak hour of the street traffic trip generation rates were developed and shown in Table 1.

Table 1. Site Trip Generation

	SF	ITE Land Use Code	Weekday Daily	AM Peak Hour Trips			PM Peak Hour Trips		
				Total	Entering	Exiting	Total	Entering	Exiting
Grocery	27,230	850	2780	190	99	91	230	120	110

The total daily trips generated by the proposed redevelopment are approximately 2,780 vehicles per day. The AM and PM peak hour traffic generated by the proposed redevelopment is 190 vehicles per hour (vph), and 230 vph, respectively.

The difference in trips generated for the new site plan compared to the original study is shown in Table 2. The proposed change in site will generate an additional 490 trips daily, 88 more trips during the AM peak hour and 28 more trips during the PM peak hour.

Table 2. Trip Generation Comparison

Site	SF	SF			SF		
	Total	Total	Entering	Exiting	Total	Entering	Exiting
New Grocery Site	2780	190	99	91	230	120	110
Previous Site Plan	2290	102	58	44	202	100	102
Difference	490	88	41	47	28	20	8

Trip Distribution and Assignment

The distribution of the projected trips due to the site redevelopment was based on existing traffic patterns in the study area.

The additional trips estimated for the proposed change in the site were assigned to the anticipated entrances based on the new site development. There are two access locations: one at Merle Hay Road between NW 60th and NW 61st and a south access location on 60th Avenue. Two scenarios were modeled, one allowing full access from the Merle Hay Road access point and another reducing access to a right in right out situation.

As in the original study the traffic data of the PM peak hour for the study area is greater than the AM peak hour and the majority of impacts by the addition of a grocery store would be during the PM peak hour. Therefore only the PM peak hour was used as a conservative case in the operational analyses as in the previous study.

The traffic generated from the PM peak hour of the proposed site was assigned to the available access points for two scenarios as follows:

1st Scenario

West Drive - Merle Hay road RIRO Access: 33% entering, 36% exiting

South Drive - NW 60th Avenue Full Access: 67% entering, 64% exiting

2nd Scenario

West Drive - Merle Hay road Full Access: 75% entering, 64% exiting

South Drive - NW 60th Avenue Full Access: 25% entering, 36% exiting

The traffic distribution from commercial areas in the May 2007 report was not used. The trips generated have been assigned to the access points in the revised site development.

Trip assignments from the PM peak hour were assigned to the adjacent roads and intersections of the study area based on proposed site access locations and existing traffic patterns.

Existing and Projected Traffic Volumes

Historical turning movement counts from Johnston's May 2013 Fiber Optic Phase 1 report were used as the basis of this supplemental memo. The distributed trips were added to the base traffic to get the hourly volumes for the analysis of each scenario. Each scenario for the PM peak hour is shown below in Figures 1-3. Future traffic volumes were projected 20 years at a growth rate of one percent and shown in Figures 4-5. All traffic information is attached in the Appendix.

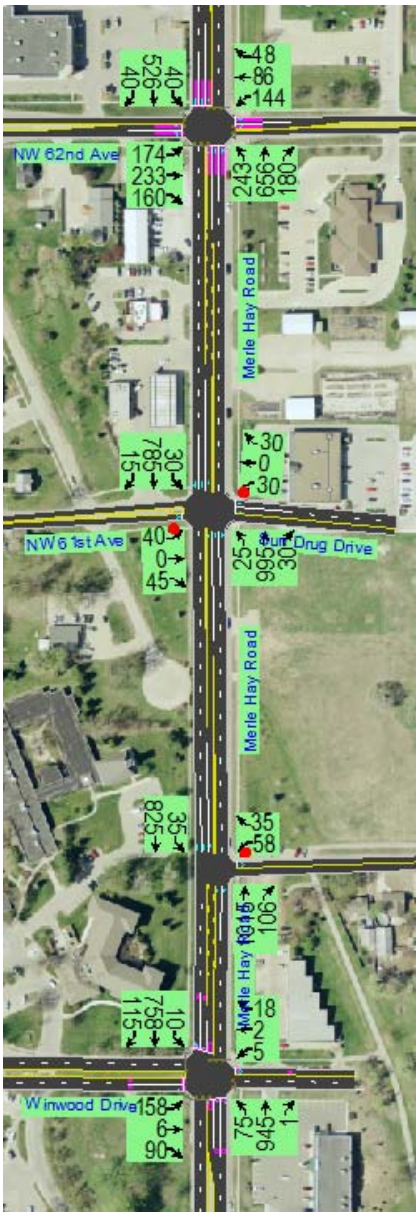


Figure 1
2014 Traffic

Figure 2
Right In Right Out
2014 Traffic

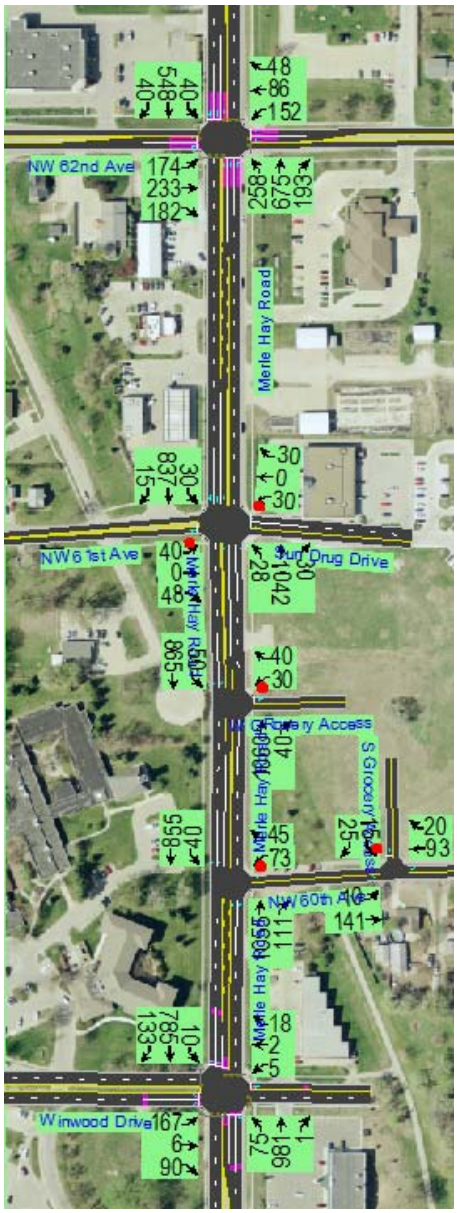


Figure 3
Full Access
2014 Traffic

Operational Analysis

This section includes the analysis for all the intersections and driveways introduced with the development of the proposed grocery store and for the intersections of Merle Hay Road with South Winwood Drive, NW 60th Avenue, NW 61st Avenue and NW 62nd Avenue. The operational analysis includes the performance measures and geometric needs at these locations for the existing and projected traffic conditions. Performance measures used to assess the operation of the system included delay, operations of adjacent intersections, control delay, and access management considerations.

Figure 4
2034 Traffic No-Build Scenario

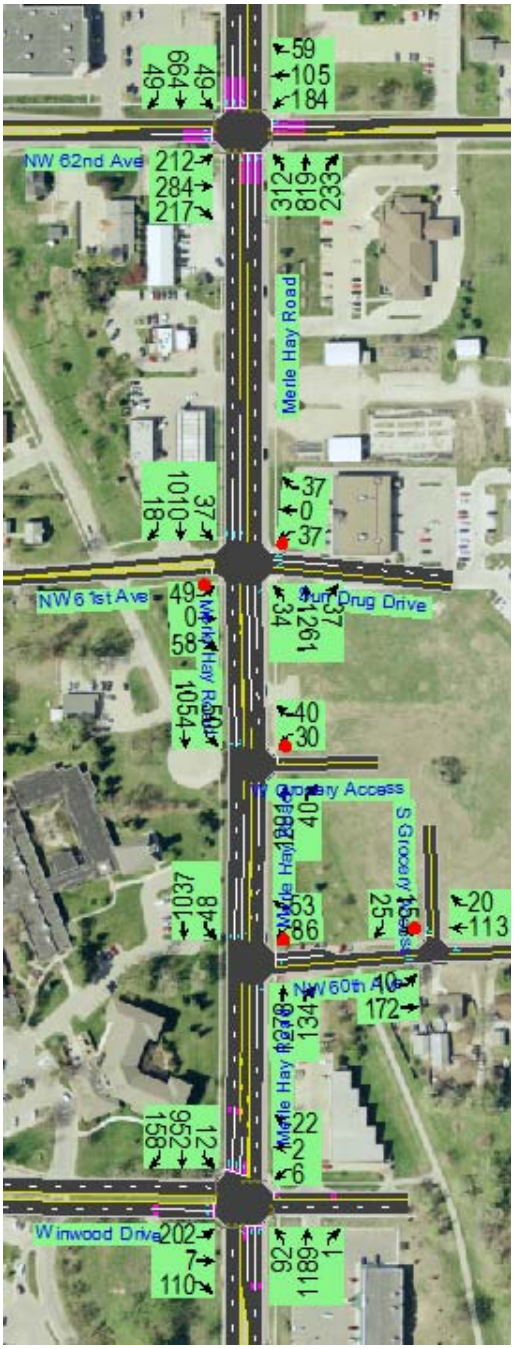


Figure 5
Full Access
2034 Traffic

Intersection Analysis

PM peak hour traffic analyses were performed for the new Kevin's Place Development. All intersection capacity analyses were evaluated in *Synchro, Version 9*, which used *Highway Capacity Manual* 2010 methods. Level of service (LOS) criteria was used to evaluate the traffic movements and is shown in Table 3.

Table 3. Level of Service (LOS) Definition

LOS	*Average Delay per Vehicle (sec)*	
	Signalized Intersections	*Unsignalized Intersections*
A	Less than 10	Less than 10
B	10 to 20	10 to 15
C	20 to 35	15 to 25
D	35 to 55	25 to 35
E	55 to 80	35 to 50
F	Greater than 80	Greater than 50

The following scenarios were analyzed for operations for the 2015 Opening Day traffic volumes for the PM peak hour. The results from these analyses are shown in Table 4.

1. No Build option (no revisions)
2. Grocery Store Opening Day traffic with RIRO access on Merle Hay Road.
3. Grocery Store Opening Day traffic with RIRO access and right turn lane (RTL) on NW 60th Avenue.
4. Grocery Store Opening Day traffic with full access on Merle Hay Road.
5. Grocery Store Opening Day traffic with full access on Merle Hay Road and a RTL on 60th Ave.
6. Scenarios 4 and 5 above with a signalized intersection at Merle Hay Road and 60th Avenue.

For the 2035 future traffic volumes, the following multiple scenarios were analyzed. The results from the analyses are shown in Table 4.

1. No Build without existing road changes (no revisions)
2. Grocery Store traffic with full access on Merle Hay Road.
3. Grocery Store traffic with full access and a right turn lane on 60th Ave at Merle Hay Road.

The peak hour operational analysis shows that most of the existing street network and traffic control can accommodate the 2015 Opening Day scenarios for the proposed grocery store site without a decrease in LOS.

Traffic Signals

Preliminary traffic signal warrant analysis in accordance with Section 4c of the *Manual on Uniform Traffic Control Devices* (MUTCD) was performed for the intersection of Merle Hay Road and 60th Avenue. To estimate volumes for the build conditions, the Iowa DOT hourly distribution factors for municipal roads were applied to the projected ADT volumes by intersection resulting in estimated hourly volumes. The revised traffic signal warrant summary sheets are located in the Appendix.

For the 2015 opening day traffic scenarios Warrants 1, 2 and 3 were met at the intersection of Merle Hay Road with 60th Avenue. When a right turn lane on NW 60th Avenue at Merle Hay Road was provided, no warrants were met under the full access scenario. In the 2034 full access scenario with at right turn lane on 60th at Merle Hay Road only warrant 1B was met.

Table 4. **HCM 2010 Level of Service and Delay (sec/vehicle) by Intersection**

	2014					2034		
		RIRO access on MHR		Full access on MHR			Full access on MHR	
Location on Merle Hay Road	Exsisting (No Build)	RIRO access on MHR	w RTL ON 60TH	Full access on MHR	w RTL on 60TH	Exsisting (No Build)	Full access on MHR	w RTL on 60TH
62nd Avenue	D(42)	D(48)	D(48)	D(48)	D(48)	E(73)	F(85)	F(85)
61st Avenue	EB - F(81)	EB - F(109)	EB - F(109)	EB - F(109)	EB - F(109)	EB - F(422)	EB - F(542)	EB - F(542)
	WB - F(74)	WB - F(95)	WB - F(95)	WB - F(95)	WB - F(95)	WB - F(276)	WB - F(367)	WB - F(367)
	NBL - A(10)	NBL - B(10)	NBL - B(10)	NBL - B(10)	NBL - B(10)	NBL - B(11)	NBL - B(11)	NBL - B(11)
	SBL - B(11)	SBL - B(11)	SBL - B(11)	SBL - B(11)	SBL - B(11)	SBL - B(13)	SBL - B(13)	SBL - B(13)
Grocery Store West Access								
		WB - B(14)	WB - B(14)	WB - C(24)	WB - C(24)		WB - D(35)	WB - D(35)
		NB - A(0)	NB - A(0)	NB - A(0)	NB - A(0)		NB - A(0)	NB - A(0)
				SBL - B(12)	SBL - B(12)		SBL - B(14)	SBL - B(14)
60th Avenue	WB - D(30)	WB - F(72)	WB - F(50)	WB - E(39)	WB - D(31)	WB - E(37)	WB - F(100)	WB - F(60)
	SBL - B(12)	SBL - B(13)	SBL - B(13)	SBL - B(12)	SBL - B(12)	SBL - B(14)	SBL - B(15)	SBL - B(15)
Winwood	A(10)	A(10)	A(10)	A(10)	A(10)	B(12)	B(12)	B(12)
Grocery Store South Access		EB - A(8)	EB - A(8)	EBL - A(8)	EBL - A(8)		EBL - A(8)	EBL - A(8)
		SB - A(10)	SB - A(10)	SB - B(10)	SB - B(10)		SB - A(10)	SB - A(10)

	Signalized intersection @NW 60th		
	2014		2034
Location on Merle Hay Road	Full access on MHR	w RTL on 60TH	Full Access w RTL on 60th
62nd Avenue	D(40)	D(40)	
61st Avenue	EB - F(109)	EB - F(109)	
	WB - F(121)	WB - F(121)	
	NBL - B(10)	NBL - B(10)	
	SBL - B(11)	SBL - B(11)	
Grocery Store West Access			
	WB - C(24)	WB - C(24)	
	NB - A(0)	NB - A(0)	
	SBL - B(12)	SBL - B(12)	
60th Avenue		A(3)	A(8)
Winwood	B(20)	B(20)	
Grocery Store South Access	EBL - A(8)	EBL - A(8)	
	SB - B(10)	SB - B(10)	

Access Locations

There were no changes to the access locations from the May 2007 report. However the site is no longer interconnected as in Phase 2 of the 2007 report; access to NW 60th Avenue from the north portion of the site is not viable until further future development. Traffic patterns were re-evaluated based on the site plan provided for this supplemental revision.

RIRO versus Full Access Operations

The analysis showed a delay of 72 seconds per vehicle in the westbound direction at Merle Hay Road and NW 60th Avenue for the scenario with RIRO access on Merle Hay Road versus 39 seconds per vehicle for the full access scenario. In the RIRO scenario, the traffic distribution increased the number of trips to the NW 60th Avenue access, any traffic exiting the site to travel south on Merle Hay Road is directed on to NW 60th Avenue. In the full access scenario, the west grocery entrance allowed left turn movements which reduced NW 60th Avenue traffic. The RIRO access location has 14 seconds per vehicle of delay compared to 24 seconds of delay for the full access scenario. The addition of a right turn lane on NW 60th Avenue at Merle Hay road decreased delay from 72 to 50 seconds for RIRO access on Merle Hay Road and from 39 to 31 seconds with full access which is LOS D for the unsignalized condition. Currently at the intersection of NW 60th and Merle Hay road the delay is 30 seconds.

Intersection Operations

Both scenarios put the same increase of delay on the intersection of Merle Hay Road and 62nd Avenue which remained at LOS D. The intersection of Winwood Drive stayed at LOS A with the additional traffic in each scenario without the addition of a signal at NW 60th. In 2034 LOS E is expected at NW 62nd Avenue and Merle Hay Road. With the grocery store addition, LOS F is expected. Most of the delay increase is due to an overall corridor growth and increase in traffic volumes.

Conclusions

The revisions to the proposed new Kevin's Place site have the following impacts on the surrounding area and road network.

1. Traffic Projections show that the new Kevin's Place site will generate 2,400 total vehicles per day (vph) for opening day. The total traffic for the AM and PM peak hour is 110 vehicles per hour (vph) and 120 vph respectively. The proposed change in site will generate an additional 490 trips daily, 88 more trips during the AM peak hour and 28 more trips during the PM peak hour.

2. The intersection of Merle Hay Road & NW 62nd Avenue remains LOS D. The additional traffic from the proposed grocery store site shows minimal increases in delay but there is no change in LOS.

3. The RIRO access location on Merle Hay Road has a significant impact on operations of NW 60th Avenue when compared to the full access operations. LOS F would be reduced to LOS E and delay decreased from 72 to 39 seconds when allowing full access. With the addition of a right turn lane on NW 60th at Merle Hay Road and full access at the west grocery entrance the LOS would not change on NW 60th Avenue and the delay increased by one second compared to the current condition.

4. Although LOS F is typical at unsignalized side streets or drives during peak hour traffic conditions, the intersection Merle Hay Road & NW 61st Avenue is experiencing large delays not foreseen in the May 2007 study.

5. Signal warrant analyses indicate the need for a signalized intersection at NW 60th Avenue and Merle Hay Road when only right in right out access is provided. No warrants were satisfied when allowing full access on Merle Hay Road and providing a right turn lane on 60th at Merle Hay Road for opening day traffic and in 2034 only Warrant 1 was met.

6. The revision to the site plan only provides truck access on NW 60th Avenue which is east of the south site access. The May 2007 report recommended prohibiting truck traffic for the site on NW 60th Avenue. Currently Johnston City Code does not prohibit truck traffic on NW 60th Avenue. However, the pavement was not originally constructed to carry truck traffic.

The conclusions from the May 2007 that remained the same with the revisions are as follows.

1. No additional traffic signals are necessary. Traffic signal warrants were not met for the intersection at Merle Hay Road with NW 60th Avenue with recommended modifications.

2. Having an access onto NW 60th Avenue could result in traffic volumes on that street that are inconsistent with a residential neighborhood, including some heavy truck traffic. However the access could be beneficial to residents since they would not have to use higher volume roads to access the site and provides another, possibly less congested option for entering and exiting site traffic.

Recommendations
Based on the previous information the following improvements are recommended.

- The access locations on NW 60th Avenue and Merle Hay Road should be given full access to the site.

- Allow the revised site plan to use NW 60th Avenue for truck traffic accessing NW 60th Avenue only from Merle Hay Road. The pavement along NW 60th Avenue to the truck entrance will need to be reconstructed to handle the truck traffic loading.

- Add a westbound right turn lane at the intersection of Merle Hay Road and NW 60th Avenue.

- Monitor traffic volumes, crash patterns, and congestion at the intersection of Merle Hay Road and NW 60th Avenue. Intersection control may be warranted in the future due to changing traffic and crash patterns.

Based on the *Traffic Impact Study for Brite Beginnings Daycare & Kevin's Place Shopping Center* dated May 2007, the following recommended improvements remain.

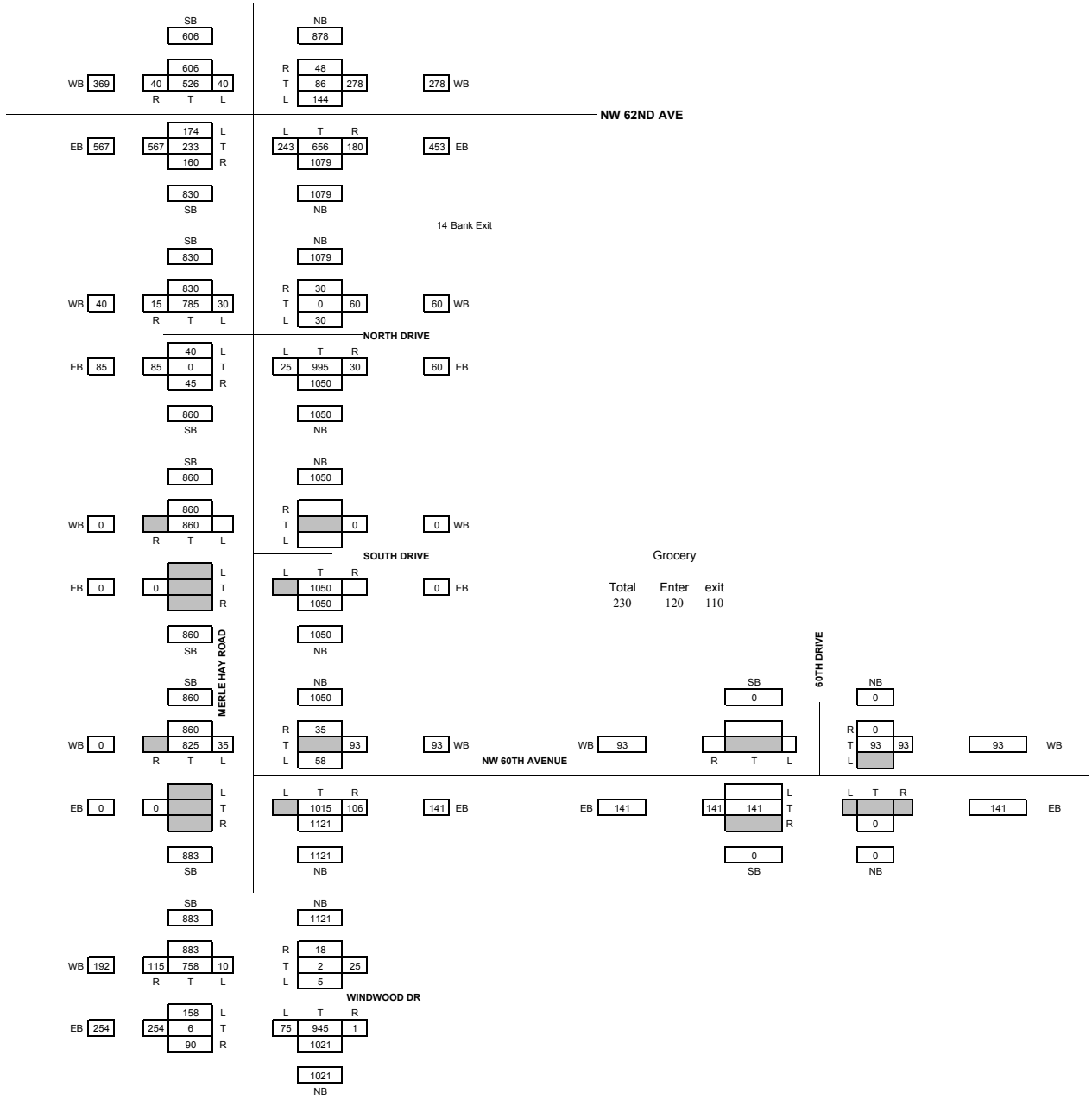
- Remove the on-street parking near the NW 60th Avenue access location at the time of development.

- Monitor the intersection of Merle Hay Road and NW 61st Avenue for traffic, turning movement conflicts, and crash patterns after the Kevin's Place is fully developed. Review traffic signal warrants when deemed necessary by either the City or development group.

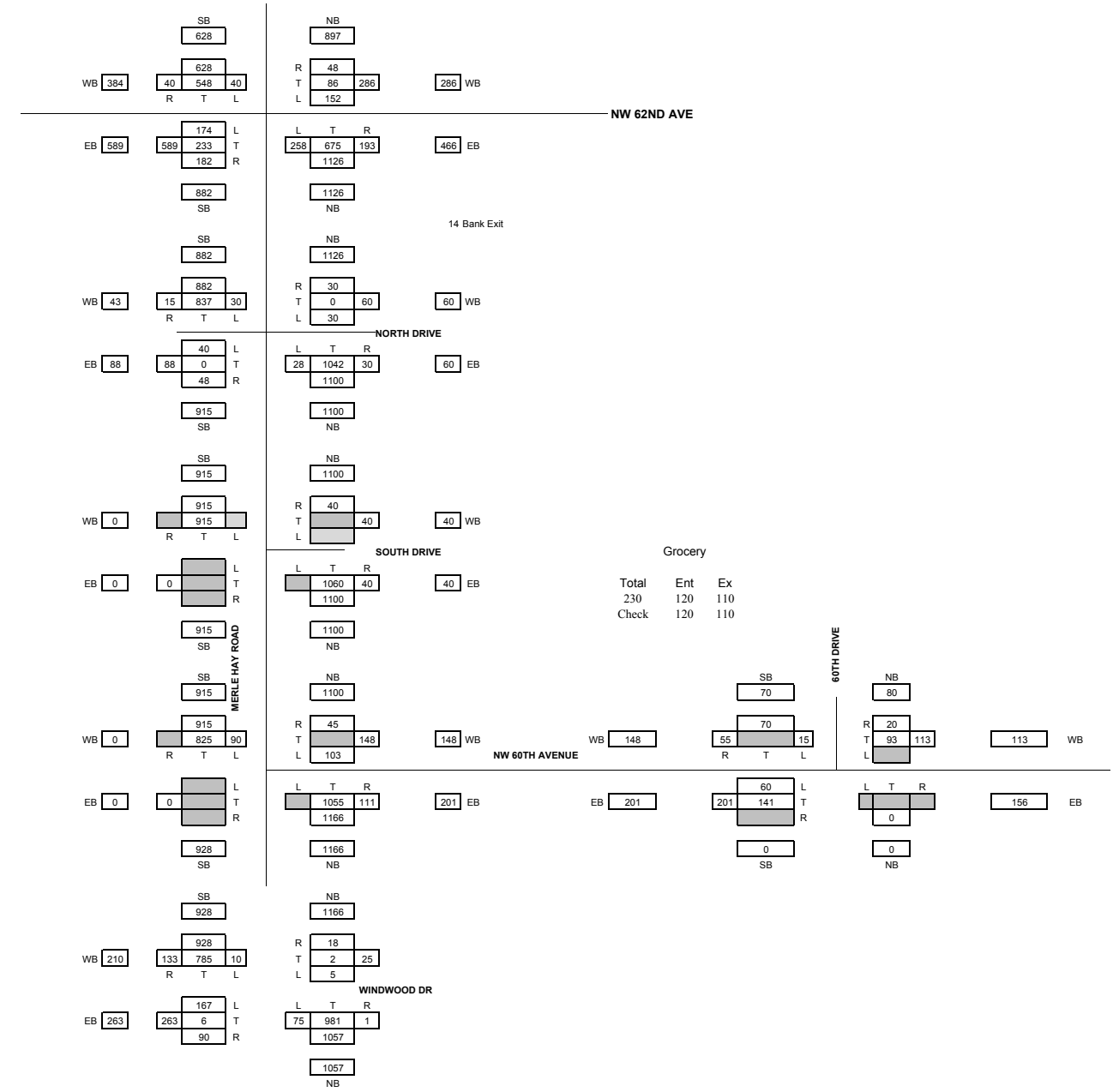
Memo Appendix

PM Peak Hour Traffic Volumes
Synchro Analysis Output
Traffic Signal Warrant Summary Output

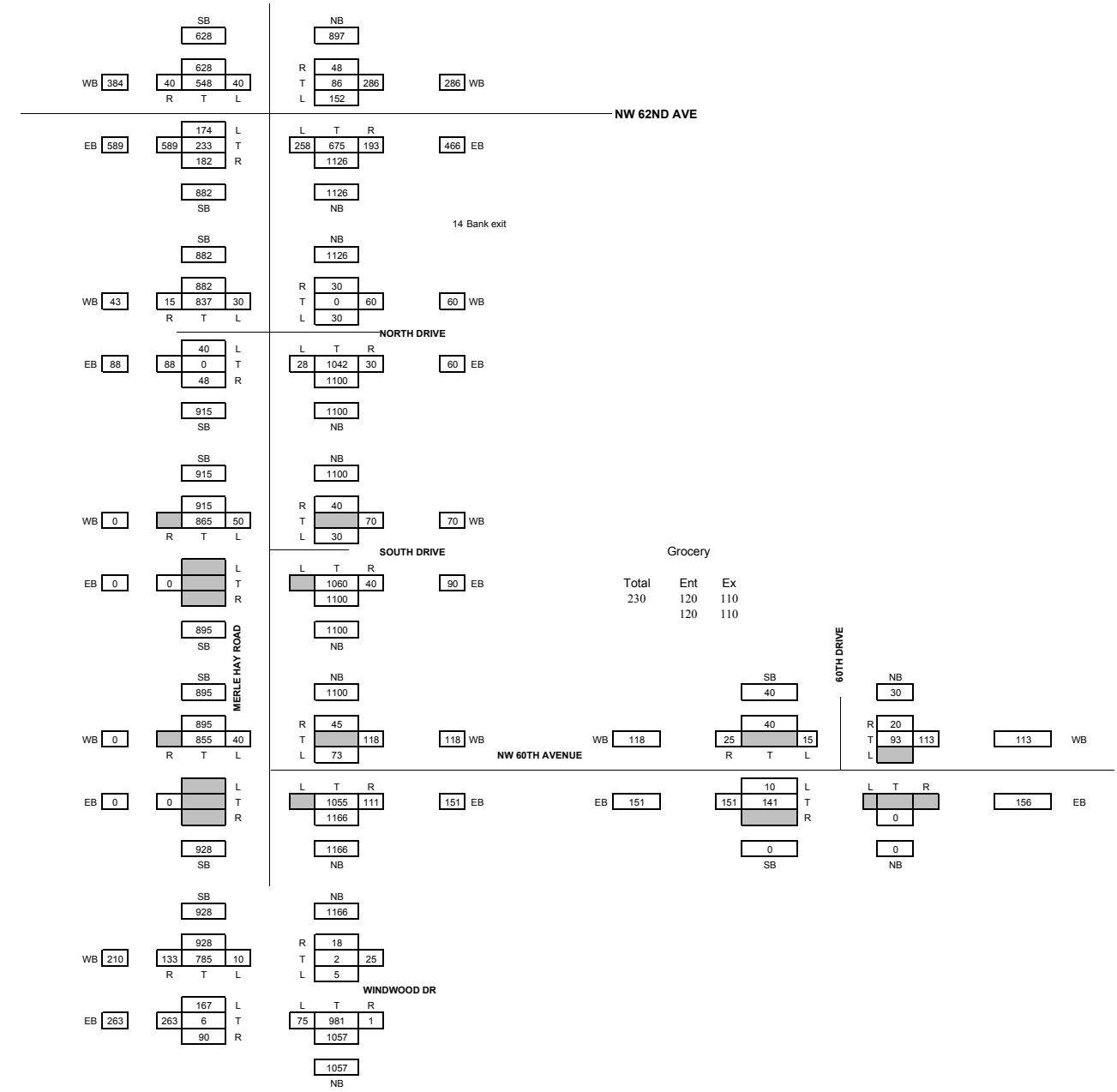
Exsisting
2014 PM counts



2014 PM w RIRO West Grocery Access

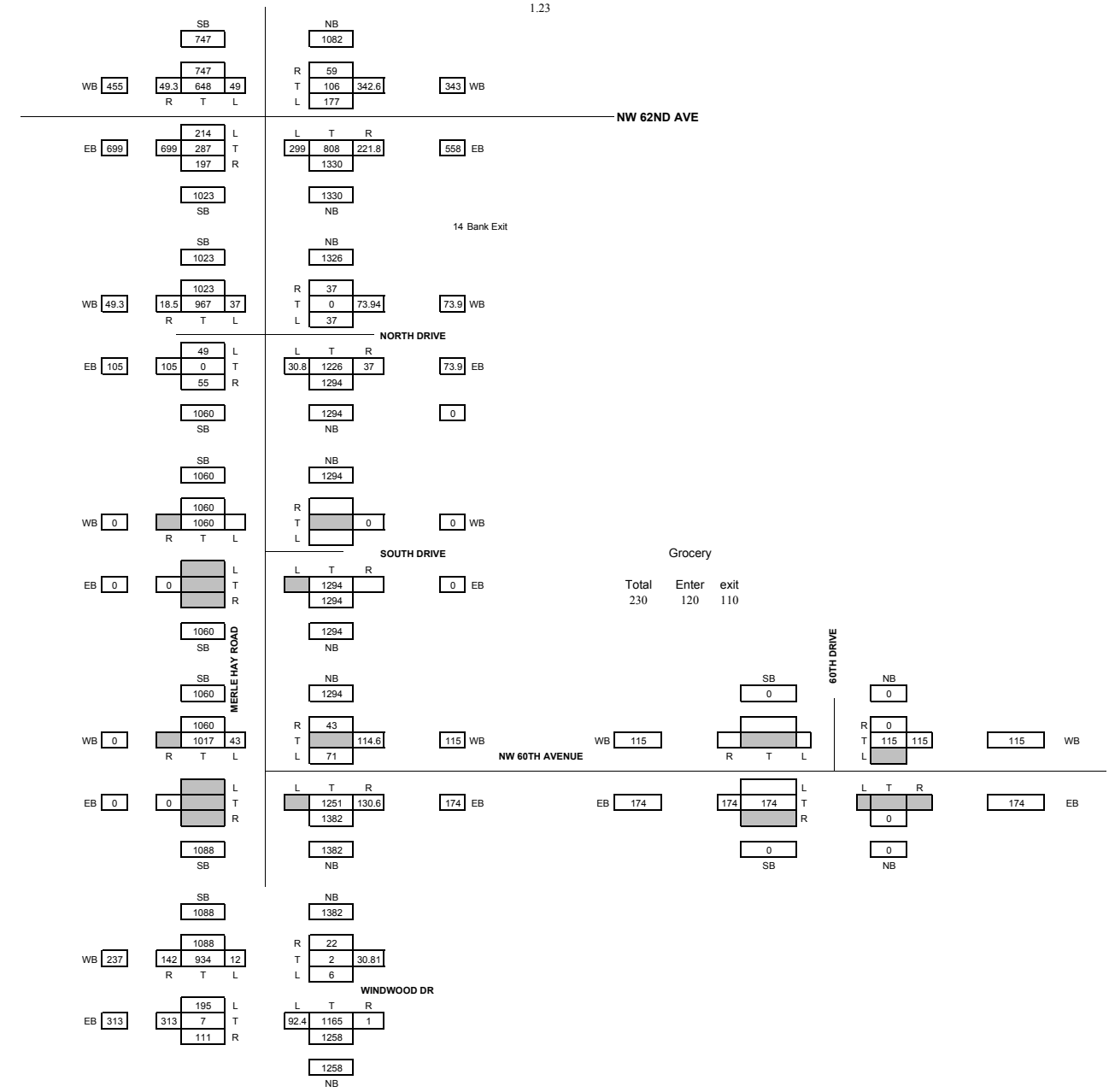


2014 PM w Full West Grocery Access



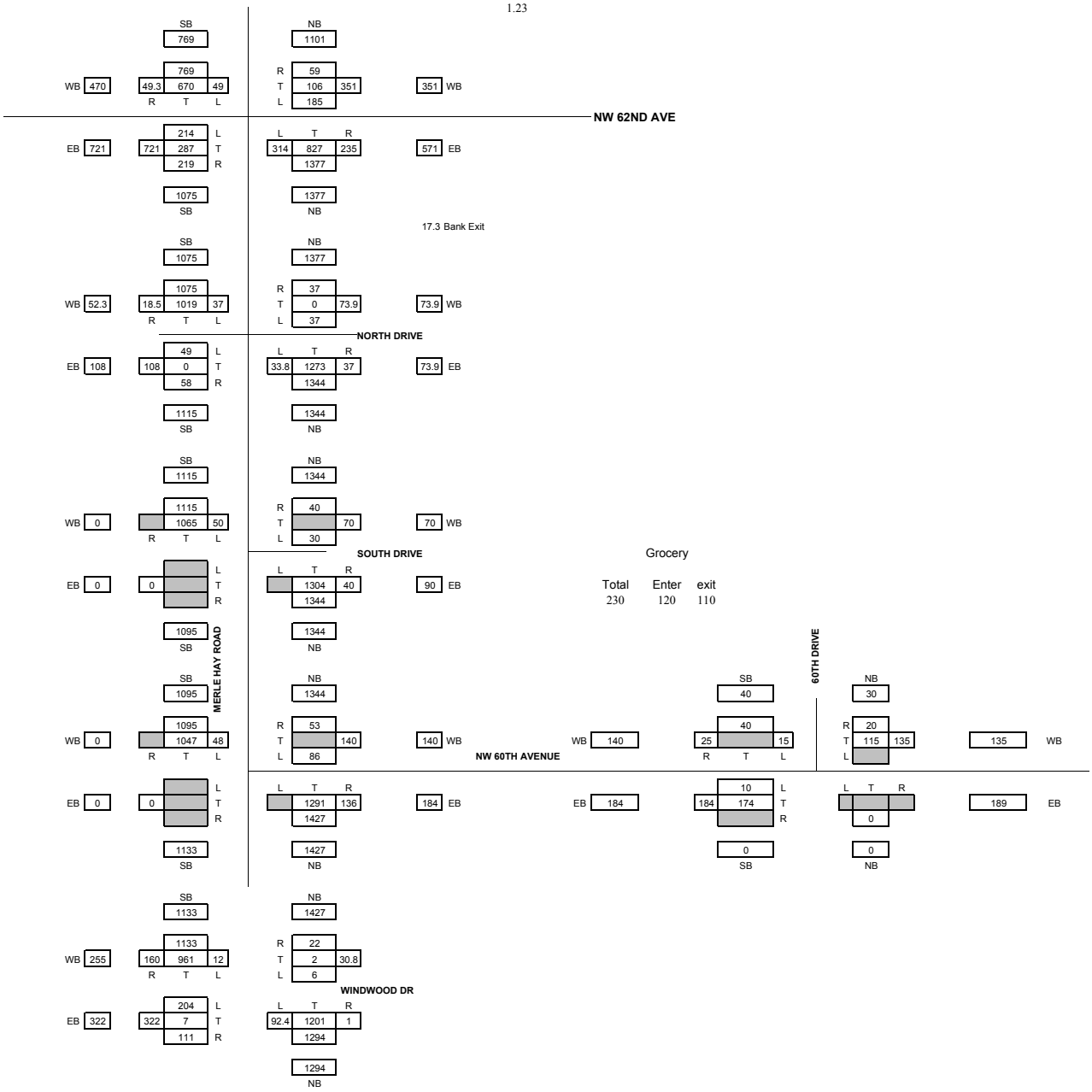
2034 PM No Build

Growth Factor
1.23



2034 PM w Full West Grocery Access

Growth Factor
1.23



HCM 2010 Signalized Intersection Summary
44: Merle Hay Road & Winwood Drive

1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	158	6	90	5	2	18	75	945	1	10	758	115
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	172	7	98	5	2	20	82	1027	1	11	824	125
Adj No. of Lanes	0	2	0	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	290	14	200	69	40	174	521	2319	2	375	1862	282
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.05	0.64	0.64	0.03	1.00	1.00
Sat Flow, veh/h	1422	97	1358	144	268	1178	1774	3628	4	1774	3082	468
Grp Volume(v), veh/h	172	0	105	27	0	0	82	501	527	11	473	476
Grp Sat Flow(s),veh/h/ln	1422	0	1455	1590	0	0	1774	1770	1862	1774	1770	1780
Q Serve(g_s), s	9.2	0.0	6.0	0.0	0.0	0.0	1.5	12.8	12.8	0.2	0.0	0.0
Cycle Q Clear(g_c), s	10.5	0.0	6.0	1.3	0.0	0.0	1.5	12.8	12.8	0.2	0.0	0.0
Prop In Lane	1.00		0.93	0.19		0.74	1.00		0.00	1.00		0.26
Lane Grp Cap(c), veh/h	290	0	215	282	0	0	521	1131	1190	375	1069	1075
V/C Ratio(X)	0.59	0.00	0.49	0.10	0.00	0.00	0.16	0.44	0.44	0.03	0.44	0.44
Avail Cap(c_a), veh/h	362	0	291	362	0	0	574	1131	1190	470	1069	1075
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.0	0.0	35.2	33.2	0.0	0.0	5.3	8.2	8.2	7.1	0.0	0.0
Incr Delay (d2), s/veh	1.9	0.0	1.7	0.1	0.0	0.0	0.1	1.3	1.2	0.0	1.3	1.3
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	4.3	0.0	2.5	0.6	0.0	0.0	0.7	6.5	6.8	0.1	0.4	0.4
LnGrp Delay(d),s/veh	39.0	0.0	37.0	33.4	0.0	0.0	5.4	9.4	9.4	7.1	1.3	1.3
LnGrp LOS	D		D	C			A	A	A	A	A	A
Approach Vol, veh/h		277			27			1110			960	
Approach Delay, s/veh		38.2			33.4			9.1			1.4	
Approach LOS		D			C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.2	64.5		20.3	8.4	61.4		20.3
Change Period (Y+Rc), s	4.0	7.0		7.0	4.0	7.0		7.0
Max Green Setting (Gmax), s	6.0	48.0		18.0	7.0	47.0		18.0
Max Q Clear Time (g_c+I1), s	2.2	14.8		12.5	3.5	2.0		3.3
Green Ext Time (p_c), s	0.0	16.4		0.8	0.0	18.6		1.5

Intersection Summary	
HCM 2010 Ctrl Delay	9.7
HCM 2010 LOS	A

HCM 2010 Signalized Intersection Summary
1: Merle Hay Road & NW 62nd Ave

1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	174	233	160	144	86	48	243	656	180	40	526	40
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	260	268	262	176	112	57	286	754	247	58	701	50
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.67	0.87	0.61	0.82	0.77	0.84	0.85	0.87	0.73	0.69	0.75	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	514	279	273	205	305	155	368	966	317	199	940	67
Arrive On Green	0.13	0.32	0.31	0.07	0.26	0.25	0.04	0.12	0.12	0.04	0.28	0.27
Sat Flow, veh/h	1774	866	847	1774	1165	593	1774	2622	859	1774	3351	239
Grp Volume(v), veh/h	260	0	530	176	0	169	286	509	492	58	370	381
Grp Sat Flow(s),veh/h/ln	1774	0	1713	1774	0	1758	1774	1770	1711	1774	1770	1821
Q Serve(g_s), s	9.3	0.0	27.3	6.0	0.0	7.1	9.7	25.1	25.1	2.1	17.1	17.2
Cycle Q Clear(g_c), s	9.3	0.0	27.3	6.0	0.0	7.1	9.7	25.1	25.1	2.1	17.1	17.2
Prop In Lane	1.00		0.49	1.00		0.34	1.00		0.50	1.00		0.13
Lane Grp Cap(c), veh/h	514	0	552	205	0	460	368	652	631	199	496	510
V/C Ratio(X)	0.51	0.00	0.96	0.86	0.00	0.37	0.78	0.78	0.78	0.29	0.75	0.75
Avail Cap(c_a), veh/h	544	0	552	205	0	460	372	652	631	242	496	510
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.6	0.0	30.2	27.8	0.0	27.3	23.2	36.0	36.1	23.9	29.5	29.5
Incr Delay (d2), s/veh	0.8	0.0	28.4	28.9	0.0	0.5	9.9	9.0	9.3	0.8	9.8	9.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.0	17.2	3.1	0.0	3.5	5.7	13.9	13.5	1.1	9.7	9.9
LnGrp Delay(d),s/veh	20.3	0.0	58.6	56.7	0.0	27.8	33.1	45.0	45.3	24.7	39.3	39.1
LnGrp LOS	C		E	E		C	C	D	D	C	D	D
Approach Vol, veh/h		790			345			1287			809	
Approach Delay, s/veh		46.0			42.5			42.5			38.2	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.8	38.2	10.0	34.0	15.8	30.2	15.4	28.6
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	6.0	30.0	6.0	28.0	12.0	24.0	13.0	21.0
Max Q Clear Time (g_c+I1), s	4.1	27.1	8.0	29.3	11.7	19.2	11.3	9.1
Green Ext Time (p_c), s	0.0	2.0	0.0	0.0	0.0	3.1	0.2	2.7

Intersection Summary	
HCM 2010 Ctrl Delay	42.3
HCM 2010 LOS	D

HCM 2010 TWSC
9: Merle Hay Road & NW 60th Ave 1/14/2015

Intersection	
Int Delay, s/veh	1.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	58	35	1015	106	35	825
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	63	38	1103	115	38	897

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1685	609	0	0	1218	0
Stage 1	1161	-	-	-	-	-
Stage 2	524	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	85	438	-	-	568	-
Stage 1	260	-	-	-	-	-
Stage 2	559	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	79	438	-	-	568	-
Mov Cap-2 Maneuver	260	-	-	-	-	-
Stage 1	260	-	-	-	-	-
Stage 2	522	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22.4	0	0.5
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	307	568	-
HCM Lane V/C Ratio	-	-	0.329	0.067	-
HCM Control Delay (s)	-	-	22.4	11.8	-
HCM Lane LOS	-	-	C	B	-
HCM 95th %tile Q(veh)	-	-	1.4	0.2	-

HCM 2010 TWSC
2: Merle Hay Road & NW 61st Ave/Sun Drug Drive 1/14/2015

Intersection	
Int Delay, s/veh	5.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	40	0	45	30	0	30	25	995	30	30	785	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	200	-	-	200	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	43	0	49	33	0	33	27	1082	33	33	853	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1522	2095	435	1644	2087	557	870	0	0	1114	0	0
Stage 1	927	927	-	1152	1152	-	-	-	-	-	-	-
Stage 2	595	1168	-	492	935	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	81	52	569	66	52	474	770	-	-	623	-	-
Stage 1	289	345	-	210	270	-	-	-	-	-	-	-
Stage 2	458	266	-	527	342	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	70	48	569	56	48	474	770	-	-	623	-	-
Mov Cap-2 Maneuver	70	48	-	56	48	-	-	-	-	-	-	-
Stage 1	279	327	-	203	261	-	-	-	-	-	-	-
Stage 2	412	257	-	456	324	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	80.7	74.4	0.2	0.4
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	770	-	-	131	56	474	623	-	-
HCM Lane V/C Ratio	0.035	-	-	0.705	0.582	0.069	0.052	-	-
HCM Control Delay (s)	9.8	-	-	80.7	135.5	13.2	11.1	-	-
HCM Lane LOS	A	-	-	F	F	B	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	3.9	2.3	0.2	0.2	-	-

HCM 2010 Signalized Intersection Summary
9: Merle Hay Road & NW 60th Ave

1/14/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	103	45	1055	111	90	825
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1900	1863	1863
Adj Flow Rate, veh/h	112	49	1147	121	98	897
Adj No. of Lanes	1	1	2	0	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	153	137	2450	258	410	2683
Arrive On Green	0.09	0.09	1.00	1.00	1.00	1.00
Sat Flow, veh/h	1774	1583	3325	340	435	3632
Grp Volume(v), veh/h	112	49	627	641	98	897
Grp Sat Flow(s),veh/h/ln	1774	1583	1770	1803	435	1770
Q Serve(g_s), s	5.5	2.6	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	5.5	2.6	0.0	0.0	0.0	0.0
Prop In Lane	1.00	1.00		0.19	1.00	
Lane Grp Cap(c), veh/h	153	137	1341	1366	410	2683
V/C Ratio(X)	0.73	0.36	0.47	0.47	0.24	0.33
Avail Cap(c_a), veh/h	335	299	1341	1366	410	2683
HCM Platoon Ratio	1.00	1.00	2.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	0.90	0.90	1.00	1.00
Uniform Delay (d), s/veh	40.1	38.8	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	6.5	1.6	1.1	1.0	1.4	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	1.2	0.4	0.4	0.2	0.1
LnGrp Delay(d),s/veh	46.6	40.3	1.1	1.0	1.4	0.3
LnGrp LOS	D	D	A	A	A	A
Approach Vol, veh/h	161		1268			995
Approach Delay, s/veh	44.7		1.0			0.4
Approach LOS	D		A			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		75.2				75.2		14.8
Change Period (Y+Rc), s		7.0				7.0		7.0
Max Green Setting (Gmax), s		59.0				59.0		17.0
Max Q Clear Time (g_c+I1), s		2.0				2.0		7.5
Green Ext Time (p_c), s		19.0				19.0		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	3.7
HCM 2010 LOS	A

HCM 2010 Signalized Intersection Summary
1: Merle Hay Road & NW 62nd Ave

1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	174	233	182	152	86	48	258	675	193	40	548	40
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	260	268	298	185	112	57	304	776	264	58	731	50
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.67	0.87	0.61	0.82	0.77	0.84	0.85	0.87	0.73	0.69	0.75	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	514	260	289	198	305	155	362	956	325	241	934	64
Arrive On Green	0.13	0.32	0.31	0.07	0.26	0.25	0.27	0.74	0.71	0.04	0.28	0.27
Sat Flow, veh/h	1774	807	897	1774	1165	593	1774	2594	882	1774	3362	230
Grp Volume(v), veh/h	260	0	566	185	0	169	304	529	511	58	385	396
Grp Sat Flow(s),veh/h/ln	1774	0	1704	1774	0	1758	1774	1770	1707	1774	1770	1822
Q Serve(g_s), s	9.3	0.0	29.0	6.0	0.0	7.1	11.5	17.6	18.0	2.1	18.1	18.1
Cycle Q Clear(g_c), s	9.3	0.0	29.0	6.0	0.0	7.1	11.5	17.6	18.0	2.1	18.1	18.1
Prop In Lane	1.00		0.53	1.00		0.34	1.00		0.52	1.00		0.13
Lane Grp Cap(c), veh/h	514	0	549	198	0	460	362	652	629	241	492	506
V/C Ratio(X)	0.51	0.00	1.03	0.93	0.00	0.37	0.84	0.81	0.81	0.24	0.78	0.78
Avail Cap(c_a), veh/h	544	0	549	198	0	460	362	652	629	283	492	506
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.6	0.0	30.8	28.7	0.0	27.3	18.3	9.8	10.3	22.8	30.0	30.1
Incr Delay (d2), s/veh	0.8	0.0	46.5	45.3	0.0	0.5	16.0	10.6	10.9	0.5	11.8	11.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.0	20.7	4.1	0.0	3.5	6.9	10.1	9.9	1.0	10.4	10.6
LnGrp Delay(d),s/veh	20.3	0.0	77.2	73.9	0.0	27.8	34.3	20.3	21.2	23.3	41.7	41.5
LnGrp LOS	C		F	E		C	C	C	C	C	D	D
Approach Vol, veh/h		826			354			1344			839	
Approach Delay, s/veh		59.3			51.9			23.8			40.4	
Approach LOS		E			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.8	38.2	10.0	34.0	16.0	30.0	15.4	28.6
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	6.0	30.0	6.0	28.0	12.0	24.0	13.0	21.0
Max Q Clear Time (g_c+I1), s	4.1	20.0	8.0	31.0	13.5	20.1	11.3	9.1
Green Ext Time (p_c), s	0.0	5.6	0.0	0.0	0.0	2.7	0.2	2.9

Intersection Summary	
HCM 2010 Ctrl Delay	39.6
HCM 2010 LOS	D

HCM 2010 TWSC
2: Merle Hay Road & NW 61st Ave/Sun Drug Drive 1/14/2015

Intersection	
Int Delay, s/veh	8.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	40	0	48	30	0	30	28	1042	30	30	837	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	200	-	-	200	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	43	0	52	33	0	33	30	1133	33	33	910	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1610	2209	463	1730	2201	583	926	0	0	1165	0	0
Stage 1	983	983	-	1210	1210	-	-	-	-	-	-	-
Stage 2	627	1226	-	520	991	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	70	44	546	57	44	456	734	-	-	595	-	-
Stage 1	267	325	-	194	254	-	-	-	-	-	-	-
Stage 2	438	249	-	507	322	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	60	40	546	48	40	456	734	-	-	595	-	-
Mov Cap-2 Maneuver	60	40	-	48	40	-	-	-	-	-	-	-
Stage 1	256	307	-	186	244	-	-	-	-	-	-	-
Stage 2	390	239	-	433	304	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	108.8	120.9	0.3	0.4
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	734	-	-	117	87	595	-	-
HCM Lane V/C Ratio	0.041	-	-	0.818	0.75	0.055	-	-
HCM Control Delay (s)	10.1	-	-	108.8	120.9	11.4	-	-
HCM Lane LOS	B	-	-	F	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	4.8	3.8	0.2	-	-

HCM 2010 Signalized Intersection Summary
44: Merle Hay Road & Winwood Drive 1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	167	6	90	5	2	18	75	981	1	10	785	133
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	182	7	98	5	2	20	82	1066	1	11	853	145
Adj No. of Lanes	0	2	0	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	299	15	209	70	41	181	361	2295	2	356	1808	307
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.05	0.63	0.63	0.00	0.20	0.20
Sat Flow, veh/h	1420	97	1358	147	264	1177	1774	3628	3	1774	3027	515
Grp Volume(v), veh/h	182	0	105	27	0	0	82	520	547	11	499	499
Grp Sat Flow(s),veh/h/ln	1420	0	1455	1589	0	0	1774	1770	1862	1774	1770	1772
Q Serve(g_s), s	9.8	0.0	5.9	0.0	0.0	0.0	1.5	13.8	13.8	0.2	22.4	22.5
Cycle Q Clear(g_c), s	11.1	0.0	5.9	1.3	0.0	0.0	1.5	13.8	13.8	0.2	22.4	22.5
Prop In Lane	1.00		0.93	0.19		0.74	1.00		0.00	1.00		0.29
Lane Grp Cap(c), veh/h	299	0	224	292	0	0	361	1119	1178	356	1057	1059
V/C Ratio(X)	0.61	0.00	0.47	0.09	0.00	0.00	0.23	0.46	0.46	0.03	0.47	0.47
Avail Cap(c_a), veh/h	362	0	291	363	0	0	414	1119	1178	451	1057	1059
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.94	0.94	0.94
Uniform Delay (d), s/veh	36.7	0.0	34.7	32.7	0.0	0.0	9.1	8.6	8.6	7.6	23.6	23.6
Incr Delay (d2), s/veh	2.0	0.0	1.5	0.1	0.0	0.0	0.3	1.4	1.3	0.0	1.4	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.0	2.5	0.6	0.0	0.0	0.7	7.1	7.4	0.1	11.4	11.5
LnGrp Delay(d),s/veh	38.8	0.0	36.2	32.9	0.0	0.0	9.4	10.0	9.9	7.6	25.0	25.0
LnGrp LOS	D		D	C			A	A	A	A	C	C
Approach Vol, veh/h		287			27			1149			1009	
Approach Delay, s/veh		37.8			32.9			9.9			24.8	
Approach LOS		D			C			A			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.2	63.9		20.9	8.4	60.8		20.9
Change Period (Y+Rc), s	4.0	7.0		7.0	4.0	7.0		7.0
Max Green Setting (Gmax), s	6.0	48.0		18.0	7.0	47.0		18.0
Max Q Clear Time (g_c+I1), s	2.2	15.8		13.1	3.5	24.5		3.3
Green Ext Time (p_c), s	0.0	17.2		0.8	0.0	13.9		1.6

Intersection Summary		
HCM 2010 Ctrl Delay		19.5
HCM 2010 LOS		B

HCM 2010 TWSC
12: NW 60th Ave & S Grocery Access 1/14/2015

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	60	141	93	20	15	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	65	153	101	22	16	60

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	123	0	-	0	396	112
Stage 1	-	-	-	-	112	-
Stage 2	-	-	-	-	284	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1464	-	-	-	609	941
Stage 1	-	-	-	-	913	-
Stage 2	-	-	-	-	764	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1464	-	-	-	579	941
Mov Cap-2 Maneuver	-	-	-	-	579	-
Stage 1	-	-	-	-	913	-
Stage 2	-	-	-	-	727	-

Approach	EB	WB	SB
HCM Control Delay, s	2.3	0	9.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1464	-	-	-	830
HCM Lane V/C Ratio	0.045	-	-	-	0.092
HCM Control Delay (s)	7.6	0	-	-	9.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

HCM 2010 TWSC
6: Merle Hay Road & W Grocery Access 1/14/2015

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	40	1060	40	0	915
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	43	1152	43	0	995

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1671	598	0	0	1196	0
Stage 1	1174	-	-	-	-	-
Stage 2	497	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	87	445	-	-	579	-
Stage 1	256	-	-	-	-	-
Stage 2	577	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	87	445	-	-	579	-
Mov Cap-2 Maneuver	194	-	-	-	-	-
Stage 1	256	-	-	-	-	-
Stage 2	577	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	445	579	-
HCM Lane V/C Ratio	-	-	0.098	-	-
HCM Control Delay (s)	-	-	14	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0	-

HCM 2010 Signalized Intersection Summary
44: Merle Hay Road & Winwood Drive 1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	167	6	90	5	2	18	75	981	1	10	785	133
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	182	7	98	5	2	20	82	1066	1	11	853	145
Adj No. of Lanes	0	2	0	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	299	15	209	70	41	181	502	2295	2	356	1808	307
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.05	0.63	0.63	0.03	1.00	1.00
Sat Flow, veh/h	1420	97	1358	147	264	1177	1774	3628	3	1774	3027	515
Grp Volume(v), veh/h	182	0	105	27	0	0	82	520	547	11	499	499
Grp Sat Flow(s),veh/h/ln	1420	0	1455	1589	0	0	1774	1770	1862	1774	1770	1772
Q Serve(g_s), s	9.8	0.0	5.9	0.0	0.0	0.0	1.5	13.8	13.8	0.2	0.0	0.0
Cycle Q Clear(g_c), s	11.1	0.0	5.9	1.3	0.0	0.0	1.5	13.8	13.8	0.2	0.0	0.0
Prop In Lane	1.00		0.93	0.19		0.74	1.00		0.00	1.00		0.29
Lane Grp Cap(c), veh/h	299	0	224	292	0	0	502	1119	1178	356	1057	1059
V/C Ratio(X)	0.61	0.00	0.47	0.09	0.00	0.00	0.16	0.46	0.46	0.03	0.47	0.47
Avail Cap(c_a), veh/h	362	0	291	363	0	0	554	1119	1178	451	1057	1059
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.7	0.0	34.7	32.7	0.0	0.0	5.5	8.6	8.6	7.4	0.0	0.0
Incr Delay (d2), s/veh	2.0	0.0	1.5	0.1	0.0	0.0	0.2	1.4	1.3	0.0	1.5	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.0	2.5	0.6	0.0	0.0	0.7	7.1	7.4	0.1	0.4	0.4
LnGrp Delay(d),s/veh	38.8	0.0	36.2	32.9	0.0	0.0	5.7	10.0	9.9	7.4	1.5	1.5
LnGrp LOS	D		D	C			A	A	A	A	A	A
Approach Vol, veh/h		287			27			1149			1009	
Approach Delay, s/veh		37.8			32.9			9.7			1.6	
Approach LOS		D			C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.2	63.9		20.9	8.4	60.8		20.9
Change Period (Y+Rc), s	4.0	7.0		7.0	4.0	7.0		7.0
Max Green Setting (Gmax), s	6.0	48.0		18.0	7.0	47.0		18.0
Max Q Clear Time (g_c+I1), s	2.2	15.8		13.1	3.5	2.0		3.3
Green Ext Time (p_c), s	0.0	17.2		0.8	0.0	20.0		1.6

Intersection Summary	
HCM 2010 Ctrl Delay	9.9
HCM 2010 LOS	A

HCM 2010 Signalized Intersection Summary
1: Merle Hay Road & NW 62nd Ave 1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	174	233	182	152	86	48	258	675	193	40	548	40
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	260	268	298	185	112	57	304	776	264	58	731	50
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.67	0.87	0.61	0.82	0.77	0.84	0.85	0.87	0.73	0.69	0.75	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	514	260	289	198	305	155	362	956	325	191	934	64
Arrive On Green	0.13	0.32	0.31	0.07	0.26	0.25	0.04	0.12	0.12	0.04	0.28	0.27
Sat Flow, veh/h	1774	807	897	1774	1165	593	1774	2594	882	1774	3362	230
Grp Volume(v), veh/h	260	0	566	185	0	169	304	529	511	58	385	396
Grp Sat Flow(s),veh/h/ln	1774	0	1704	1774	0	1758	1774	1770	1707	1774	1770	1822
Q Serve(g_s), s	9.3	0.0	29.0	6.0	0.0	7.1	10.4	26.2	26.3	2.1	18.1	18.1
Cycle Q Clear(g_c), s	9.3	0.0	29.0	6.0	0.0	7.1	10.4	26.2	26.3	2.1	18.1	18.1
Prop In Lane	1.00		0.53	1.00		0.34	1.00		0.52	1.00		0.13
Lane Grp Cap(c), veh/h	514	0	549	198	0	460	362	652	629	191	492	506
V/C Ratio(X)	0.51	0.00	1.03	0.93	0.00	0.37	0.84	0.81	0.81	0.30	0.78	0.78
Avail Cap(c_a), veh/h	544	0	549	198	0	460	362	652	629	234	492	506
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.6	0.0	30.8	28.7	0.0	27.3	23.6	36.5	36.6	24.2	30.0	30.1
Incr Delay (d2), s/veh	0.8	0.0	46.5	45.3	0.0	0.5	16.0	10.6	10.9	0.9	11.8	11.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.0	20.7	4.1	0.0	3.5	6.6	14.8	14.4	1.1	10.4	10.6
LnGrp Delay(d),s/veh	20.3	0.0	77.2	73.9	0.0	27.8	39.6	47.0	47.5	25.1	41.7	41.5
LnGrp LOS	C		F	E		C	D	D	D	C	D	D
Approach Vol, veh/h		826			354			1344			839	
Approach Delay, s/veh		59.3			51.9			45.5			40.5	
Approach LOS		E			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.8	38.2	10.0	34.0	16.0	30.0	15.4	28.6
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	6.0	30.0	6.0	28.0	12.0	24.0	13.0	21.0
Max Q Clear Time (g_c+I1), s	4.1	28.3	8.0	31.0	12.4	20.1	11.3	9.1
Green Ext Time (p_c), s	0.0	1.3	0.0	0.0	0.0	2.7	0.2	2.9

Intersection Summary	
HCM 2010 Ctrl Delay	48.3
HCM 2010 LOS	D

HCM 2010 TWSC
6: Merle Hay Road & W Grocery Access 1/14/2015

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	40	1060	40	0	915
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	43	1152	43	0	995

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1671	598	0	0	1196	0
Stage 1	1174	-	-	-	-	-
Stage 2	497	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	87	445	-	-	579	-
Stage 1	256	-	-	-	-	-
Stage 2	577	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	87	445	-	-	579	-
Mov Cap-2 Maneuver	194	-	-	-	-	-
Stage 1	256	-	-	-	-	-
Stage 2	577	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	445	579	-
HCM Lane V/C Ratio	-	-	0.098	-	-
HCM Control Delay (s)	-	-	14	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0	-

HCM 2010 TWSC
2: Merle Hay Road & NW 61st Ave/Sun Drug Drive 1/14/2015

Intersection	
Int Delay, s/veh	7.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	40	0	48	30	0	30	28	1042	30	30	837	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	200	-	-	200	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	43	0	52	33	0	33	30	1133	33	33	910	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1610	2209	463	1730	2201	583	926	0	0	1165	0	0
Stage 1	983	983	-	1210	1210	-	-	-	-	-	-	-
Stage 2	627	1226	-	520	991	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	70	44	546	57	44	456	734	-	-	595	-	-
Stage 1	267	325	-	194	254	-	-	-	-	-	-	-
Stage 2	438	249	-	507	322	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	60	40	546	48	40	456	734	-	-	595	-	-
Mov Cap-2 Maneuver	60	40	-	48	40	-	-	-	-	-	-	-
Stage 1	256	307	-	186	244	-	-	-	-	-	-	-
Stage 2	390	239	-	433	304	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	108.8	94.6	0.3	0.4
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	734	-	-	117	48	456	595	-	-
HCM Lane V/C Ratio	0.041	-	-	0.818	0.679	0.072	0.055	-	-
HCM Control Delay (s)	10.1	-	-	108.8	175.6	13.5	11.4	-	-
HCM Lane LOS	B	-	-	F	F	B	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	4.8	2.7	0.2	0.2	-	-

HCM 2010 TWSC
12: NW 60th Ave & S Grocery Access 1/14/2015

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	60	141	93	20	15	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	65	153	101	22	16	60

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	123	0	-	0	396	112
Stage 1	-	-	-	-	112	-
Stage 2	-	-	-	-	284	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1464	-	-	-	609	941
Stage 1	-	-	-	-	913	-
Stage 2	-	-	-	-	764	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1464	-	-	-	579	941
Mov Cap-2 Maneuver	-	-	-	-	579	-
Stage 1	-	-	-	-	913	-
Stage 2	-	-	-	-	727	-

Approach	EB	WB	SB
HCM Control Delay, s	2.3	0	9.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1464	-	-	-	830
HCM Lane V/C Ratio	0.045	-	-	-	0.092
HCM Control Delay (s)	7.6	0	-	-	9.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

HCM 2010 TWSC
9: Merle Hay Road & NW 60th Ave 1/14/2015

Intersection	
Int Delay, s/veh	3.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	103	45	1055	111	90	825
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	75	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	112	49	1147	121	98	897

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1851	634	0	0	1267	0
Stage 1	1207	-	-	-	-	-
Stage 2	644	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 66	422	-	-	544	-
Stage 1	246	-	-	-	-	-
Stage 2	485	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 54	422	-	-	544	-
Mov Cap-2 Maneuver	162	-	-	-	-	-
Stage 1	246	-	-	-	-	-
Stage 2	398	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	50.4	0	1.3
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	162	422	544	-
HCM Lane V/C Ratio	-	-	0.691	0.116	0.18	-
HCM Control Delay (s)	-	-	66.1	14.6	13.1	-
HCM Lane LOS	-	-	F	B	B	-
HCM 95th %tile Q(veh)	-	-	4.1	0.4	0.7	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 2010 Signalized Intersection Summary
44: Merle Hay Road & Winwood Drive

1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	167	6	90	5	2	18	75	981	1	10	785	133
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	182	7	98	5	2	20	82	1066	1	11	853	145
Adj No. of Lanes	0	2	0	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	299	15	209	70	41	181	361	2295	2	356	1808	307
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.05	0.63	0.63	0.00	0.20	0.20
Sat Flow, veh/h	1420	97	1358	147	264	1177	1774	3628	3	1774	3027	515
Grp Volume(v), veh/h	182	0	105	27	0	0	82	520	547	11	499	499
Grp Sat Flow(s),veh/h/ln	1420	0	1455	1589	0	0	1774	1770	1862	1774	1770	1772
Q Serve(g_s), s	9.8	0.0	5.9	0.0	0.0	0.0	1.5	13.8	13.8	0.2	22.4	22.5
Cycle Q Clear(g_c), s	11.1	0.0	5.9	1.3	0.0	0.0	1.5	13.8	13.8	0.2	22.4	22.5
Prop In Lane	1.00		0.93	0.19		0.74	1.00		0.00	1.00		0.29
Lane Grp Cap(c), veh/h	299	0	224	292	0	0	361	1119	1178	356	1057	1059
V/C Ratio(X)	0.61	0.00	0.47	0.09	0.00	0.00	0.23	0.46	0.46	0.03	0.47	0.47
Avail Cap(c_a), veh/h	362	0	291	363	0	0	414	1119	1178	451	1057	1059
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.92	0.92	0.92
Uniform Delay (d), s/veh	36.7	0.0	34.7	32.7	0.0	0.0	9.1	8.6	8.6	7.6	23.6	23.6
Incr Delay (d2), s/veh	2.0	0.0	1.5	0.1	0.0	0.0	0.3	1.4	1.3	0.0	1.4	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.0	2.5	0.6	0.0	0.0	0.7	7.1	7.4	0.1	11.4	11.4
LnGrp Delay(d),s/veh	38.8	0.0	36.2	32.9	0.0	0.0	9.4	10.0	9.9	7.6	25.0	25.0
LnGrp LOS	D		D	C			A	A	A	A	C	C
Approach Vol, veh/h		287			27			1149			1009	
Approach Delay, s/veh		37.8			32.9			9.9			24.8	
Approach LOS		D			C			A			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.2	63.9		20.9	8.4	60.8		20.9
Change Period (Y+Rc), s	4.0	7.0		7.0	4.0	7.0		7.0
Max Green Setting (Gmax), s	6.0	48.0		18.0	7.0	47.0		18.0
Max Q Clear Time (g_c+I1), s	2.2	15.8		13.1	3.5	24.5		3.3
Green Ext Time (p_c), s	0.0	17.2		0.8	0.0	13.9		1.6

Intersection Summary	
HCM 2010 Ctrl Delay	19.5
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
1: Merle Hay Road & NW 62nd Ave

1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	174	233	182	152	86	48	258	675	193	40	548	40
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	260	268	298	185	112	57	304	776	264	58	731	50
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.67	0.87	0.61	0.82	0.77	0.84	0.85	0.87	0.73	0.69	0.75	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	514	260	289	198	305	155	362	956	325	241	934	64
Arrive On Green	0.13	0.32	0.31	0.07	0.26	0.25	0.27	0.74	0.71	0.04	0.28	0.27
Sat Flow, veh/h	1774	807	897	1774	1165	593	1774	2594	882	1774	3362	230
Grp Volume(v), veh/h	260	0	566	185	0	169	304	529	511	58	385	396
Grp Sat Flow(s),veh/h/ln	1774	0	1704	1774	0	1758	1774	1770	1707	1774	1770	1822
Q Serve(g_s), s	9.3	0.0	29.0	6.0	0.0	7.1	11.5	17.6	18.0	2.1	18.1	18.1
Cycle Q Clear(g_c), s	9.3	0.0	29.0	6.0	0.0	7.1	11.5	17.6	18.0	2.1	18.1	18.1
Prop In Lane	1.00		0.53	1.00		0.34	1.00		0.52	1.00		0.13
Lane Grp Cap(c), veh/h	514	0	549	198	0	460	362	652	629	241	492	506
V/C Ratio(X)	0.51	0.00	1.03	0.93	0.00	0.37	0.84	0.81	0.81	0.24	0.78	0.78
Avail Cap(c_a), veh/h	544	0	549	198	0	460	362	652	629	283	492	506
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.6	0.0	30.8	28.7	0.0	27.3	18.3	9.8	10.3	22.8	30.0	30.1
Incr Delay (d2), s/veh	0.8	0.0	46.5	45.3	0.0	0.5	16.0	10.6	10.9	0.5	11.8	11.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.0	20.7	4.1	0.0	3.5	6.9	10.1	9.9	1.0	10.4	10.6
LnGrp Delay(d),s/veh	20.3	0.0	77.2	73.9	0.0	27.8	34.3	20.3	21.2	23.3	41.7	41.5
LnGrp LOS	C		F	E		C	C	C	C	C	D	D
Approach Vol, veh/h		826			354			1344			839	
Approach Delay, s/veh		59.3			51.9			23.8			40.4	
Approach LOS		E			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.8	38.2	10.0	34.0	16.0	30.0	15.4	28.6
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	6.0	30.0	6.0	28.0	12.0	24.0	13.0	21.0
Max Q Clear Time (g_c+I1), s	4.1	20.0	8.0	31.0	13.5	20.1	11.3	9.1
Green Ext Time (p_c), s	0.0	5.6	0.0	0.0	0.0	2.7	0.2	2.9

Intersection Summary	
HCM 2010 Ctrl Delay	39.6
HCM 2010 LOS	D

HCM 2010 TWSC
6: Merle Hay Road & W Grocery Access 1/14/2015

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	40	1060	40	0	915
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	43	1152	43	0	995

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1671	598	0	0	1196	0
Stage 1	1174	-	-	-	-	-
Stage 2	497	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	87	445	-	-	579	-
Stage 1	256	-	-	-	-	-
Stage 2	577	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	87	445	-	-	579	-
Mov Cap-2 Maneuver	194	-	-	-	-	-
Stage 1	256	-	-	-	-	-
Stage 2	577	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	445	579	-
HCM Lane V/C Ratio	-	-	0.098	-	-
HCM Control Delay (s)	-	-	14	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0	-

HCM 2010 TWSC
2: Merle Hay Road & NW 61st Ave/Sun Drug Drive 1/14/2015

Intersection	
Int Delay, s/veh	8.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	40	0	48	30	0	30	28	1042	30	30	837	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	200	-	-	200	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	43	0	52	33	0	33	30	1133	33	33	910	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1610	2209	463	1730	2201	583	926	0	0	1165	0	0
Stage 1	983	983	-	1210	1210	-	-	-	-	-	-	-
Stage 2	627	1226	-	520	991	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	70	44	546	57	44	456	734	-	-	595	-	-
Stage 1	267	325	-	194	254	-	-	-	-	-	-	-
Stage 2	438	249	-	507	322	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	60	40	546	48	40	456	734	-	-	595	-	-
Mov Cap-2 Maneuver	60	40	-	48	40	-	-	-	-	-	-	-
Stage 1	256	307	-	186	244	-	-	-	-	-	-	-
Stage 2	390	239	-	433	304	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	108.8	120.9	0.3	0.4
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	734	-	-	117	87	595	-	-
HCM Lane V/C Ratio	0.041	-	-	0.818	0.75	0.055	-	-
HCM Control Delay (s)	10.1	-	-	108.8	120.9	11.4	-	-
HCM Lane LOS	B	-	-	F	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	4.8	3.8	0.2	-	-

HCM 2010 Signalized Intersection Summary
1: Merle Hay Road & NW 62nd Ave

1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	174	233	182	152	86	48	258	675	193	40	548	40
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	260	268	298	185	112	57	304	776	264	58	731	50
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.67	0.87	0.61	0.82	0.77	0.84	0.85	0.87	0.73	0.69	0.75	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	514	260	289	198	305	155	362	956	325	191	934	64
Arrive On Green	0.13	0.32	0.31	0.07	0.26	0.25	0.04	0.12	0.12	0.04	0.28	0.27
Sat Flow, veh/h	1774	807	897	1774	1165	593	1774	2594	882	1774	3362	230
Grp Volume(v), veh/h	260	0	566	185	0	169	304	529	511	58	385	396
Grp Sat Flow(s),veh/h/ln	1774	0	1704	1774	0	1758	1774	1770	1707	1774	1770	1822
Q Serve(g_s), s	9.3	0.0	29.0	6.0	0.0	7.1	10.4	26.2	26.3	2.1	18.1	18.1
Cycle Q Clear(g_c), s	9.3	0.0	29.0	6.0	0.0	7.1	10.4	26.2	26.3	2.1	18.1	18.1
Prop In Lane	1.00		0.53	1.00		0.34	1.00		0.52	1.00		0.13
Lane Grp Cap(c), veh/h	514	0	549	198	0	460	362	652	629	191	492	506
V/C Ratio(X)	0.51	0.00	1.03	0.93	0.00	0.37	0.84	0.81	0.81	0.30	0.78	0.78
Avail Cap(c_a), veh/h	544	0	549	198	0	460	362	652	629	234	492	506
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.6	0.0	30.8	28.7	0.0	27.3	23.6	36.5	36.6	24.2	30.0	30.1
Incr Delay (d2), s/veh	0.8	0.0	46.5	45.3	0.0	0.5	16.0	10.6	10.9	0.9	11.8	11.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.0	20.7	4.1	0.0	3.5	6.6	14.8	14.4	1.1	10.4	10.6
LnGrp Delay(d),s/veh	20.3	0.0	77.2	73.9	0.0	27.8	39.6	47.0	47.5	25.1	41.7	41.5
LnGrp LOS	C		F	E		C	D	D	D	C	D	D
Approach Vol, veh/h		826			354			1344			839	
Approach Delay, s/veh		59.3			51.9			45.5			40.5	
Approach LOS		E			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.8	38.2	10.0	34.0	16.0	30.0	15.4	28.6
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	6.0	30.0	6.0	28.0	12.0	24.0	13.0	21.0
Max Q Clear Time (g_c+I1), s	4.1	28.3	8.0	31.0	12.4	20.1	11.3	9.1
Green Ext Time (p_c), s	0.0	1.3	0.0	0.0	0.0	2.7	0.2	2.9

Intersection Summary	
HCM 2010 Ctrl Delay	48.3
HCM 2010 LOS	D

HCM 2010 TWSC
12: NW 60th Ave & S Grocery Access

1/14/2015

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	60	141	93	20	15	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	65	153	101	22	16	60

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	123	0	-	0	396	112
Stage 1	-	-	-	-	112	-
Stage 2	-	-	-	-	284	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1464	-	-	-	609	941
Stage 1	-	-	-	-	913	-
Stage 2	-	-	-	-	764	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1464	-	-	-	579	941
Mov Cap-2 Maneuver	-	-	-	-	579	-
Stage 1	-	-	-	-	913	-
Stage 2	-	-	-	-	727	-

Approach	EB	WB	SB
HCM Control Delay, s	2.3	0	9.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1464	-	-	-	830
HCM Lane V/C Ratio	0.045	-	-	-	0.092
HCM Control Delay (s)	7.6	0	-	-	9.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

HCM 2010 TWSC
2: Merle Hay Road & NW 61st Ave/Sun Drug Drive 1/14/2015

Intersection	
Int Delay, s/veh	7.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	40	0	48	30	0	30	28	1042	30	30	837	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	200	-	-	200	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	43	0	52	33	0	33	30	1133	33	33	910	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1610	2209	463	1730	2201	583	926	0	0	1165	0	0
Stage 1	983	983	-	1210	1210	-	-	-	-	-	-	-
Stage 2	627	1226	-	520	991	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	70	44	546	57	44	456	734	-	-	595	-	-
Stage 1	267	325	-	194	254	-	-	-	-	-	-	-
Stage 2	438	249	-	507	322	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	60	40	546	48	40	456	734	-	-	595	-	-
Mov Cap-2 Maneuver	60	40	-	48	40	-	-	-	-	-	-	-
Stage 1	256	307	-	186	244	-	-	-	-	-	-	-
Stage 2	390	239	-	433	304	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	108.8	94.6	0.3	0.4
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	734	-	-	117	48	456	595	-	-
HCM Lane V/C Ratio	0.041	-	-	0.818	0.679	0.072	0.055	-	-
HCM Control Delay (s)	10.1	-	-	108.8	175.6	13.5	11.4	-	-
HCM Lane LOS	B	-	-	F	F	B	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	4.8	2.7	0.2	0.2	-	-

HCM 2010 Signalized Intersection Summary
44: Merle Hay Road & Winwood Drive 1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	167	6	90	5	2	18	75	981	1	10	785	133
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	182	7	98	5	2	20	82	1066	1	11	853	145
Adj No. of Lanes	0	2	0	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	299	15	209	70	41	181	502	2295	2	356	1808	307
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.05	0.63	0.63	0.03	1.00	1.00
Sat Flow, veh/h	1420	97	1358	147	264	1177	1774	3628	3	1774	3027	515
Grp Volume(v), veh/h	182	0	105	27	0	0	82	520	547	11	499	499
Grp Sat Flow(s),veh/h/ln	1420	0	1455	1589	0	0	1774	1770	1862	1774	1770	1772
Q Serve(g_s), s	9.8	0.0	5.9	0.0	0.0	0.0	1.5	13.8	13.8	0.2	0.0	0.0
Cycle Q Clear(g_c), s	11.1	0.0	5.9	1.3	0.0	0.0	1.5	13.8	13.8	0.2	0.0	0.0
Prop In Lane	1.00		0.93	0.19		0.74	1.00		0.00	1.00		0.29
Lane Grp Cap(c), veh/h	299	0	224	292	0	0	502	1119	1178	356	1057	1059
V/C Ratio(X)	0.61	0.00	0.47	0.09	0.00	0.00	0.16	0.46	0.46	0.03	0.47	0.47
Avail Cap(c_a), veh/h	362	0	291	363	0	0	554	1119	1178	451	1057	1059
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.7	0.0	34.7	32.7	0.0	0.0	5.5	8.6	8.6	7.4	0.0	0.0
Incr Delay (d2), s/veh	2.0	0.0	1.5	0.1	0.0	0.0	0.2	1.4	1.3	0.0	1.5	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.0	2.5	0.6	0.0	0.0	0.7	7.1	7.4	0.1	0.4	0.4
LnGrp Delay(d),s/veh	38.8	0.0	36.2	32.9	0.0	0.0	5.7	10.0	9.9	7.4	1.5	1.5
LnGrp LOS	D		D	C			A	A	A	A	A	A
Approach Vol, veh/h		287			27			1149			1009	
Approach Delay, s/veh		37.8			32.9			9.7			1.6	
Approach LOS		D			C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.2	63.9		20.9	8.4	60.8		20.9
Change Period (Y+Rc), s	4.0	7.0		7.0	4.0	7.0		7.0
Max Green Setting (Gmax), s	6.0	48.0		18.0	7.0	47.0		18.0
Max Q Clear Time (g_c+I1), s	2.2	15.8		13.1	3.5	2.0		3.3
Green Ext Time (p_c), s	0.0	17.2		0.8	0.0	20.0		1.6

Intersection Summary		
HCM 2010 Ctrl Delay	9.9	
HCM 2010 LOS	A	

Intersection	
Int Delay, s/veh	2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	103	45	1055	111	90	825
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	112	49	1147	121	98	897

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1851	634	0	0	1267	0
Stage 1	1207	-	-	-	-	-
Stage 2	644	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 66	422	-	-	544	-
Stage 1	246	-	-	-	-	-
Stage 2	485	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 54	422	-	-	544	-
Mov Cap-2 Maneuver	246	-	-	-	-	-
Stage 1	246	-	-	-	-	-
Stage 2	398	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	33.4	0	1.3
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	282	544	-
HCM Lane V/C Ratio	-	-	0.57	0.18	-
HCM Control Delay (s)	-	-	33.4	13.1	-
HCM Lane LOS	-	-	D	B	-
HCM 95th %tile Q(veh)	-	-	3.3	0.7	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	40	1060	40	0	915
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	43	1152	43	0	995

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1671	598	0	0	1196	0
Stage 1	1174	-	-	-	-	-
Stage 2	497	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	87	445	-	-	579	-
Stage 1	256	-	-	-	-	-
Stage 2	577	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	87	445	-	-	579	-
Mov Cap-2 Maneuver	256	-	-	-	-	-
Stage 1	256	-	-	-	-	-
Stage 2	577	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	445	579	-
HCM Lane V/C Ratio	-	-	0.098	-	-
HCM Control Delay (s)	-	-	14	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0	-

HCM 2010 Signalized Intersection Summary
44: Merle Hay Road & Winwood Drive 1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	167	6	90	5	2	18	75	981	1	10	785	133
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	182	7	98	5	2	20	82	1066	1	11	853	145
Adj No. of Lanes	0	2	0	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	299	15	209	70	41	181	502	2295	2	356	1808	307
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.05	0.63	0.63	0.03	1.00	1.00
Sat Flow, veh/h	1420	97	1358	147	264	1177	1774	3628	3	1774	3027	515
Grp Volume(v), veh/h	182	0	105	27	0	0	82	520	547	11	499	499
Grp Sat Flow(s),veh/h/ln	1420	0	1455	1589	0	0	1774	1770	1862	1774	1770	1772
Q Serve(g_s), s	9.8	0.0	5.9	0.0	0.0	0.0	1.5	13.8	13.8	0.2	0.0	0.0
Cycle Q Clear(g_c), s	11.1	0.0	5.9	1.3	0.0	0.0	1.5	13.8	13.8	0.2	0.0	0.0
Prop In Lane	1.00		0.93	0.19		0.74	1.00		0.00	1.00		0.29
Lane Grp Cap(c), veh/h	299	0	224	292	0	0	502	1119	1178	356	1057	1059
V/C Ratio(X)	0.61	0.00	0.47	0.09	0.00	0.00	0.16	0.46	0.46	0.03	0.47	0.47
Avail Cap(c_a), veh/h	362	0	291	363	0	0	554	1119	1178	451	1057	1059
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.7	0.0	34.7	32.7	0.0	0.0	5.5	8.6	8.6	7.4	0.0	0.0
Incr Delay (d2), s/veh	2.0	0.0	1.5	0.1	0.0	0.0	0.2	1.4	1.3	0.0	1.5	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.0	2.5	0.6	0.0	0.0	0.7	7.1	7.4	0.1	0.4	0.4
LnGrp Delay(d),s/veh	38.8	0.0	36.2	32.9	0.0	0.0	5.7	10.0	9.9	7.4	1.5	1.5
LnGrp LOS	D		D	C			A	A	A	A	A	A
Approach Vol, veh/h		287			27			1149			1009	
Approach Delay, s/veh		37.8			32.9			9.7			1.6	
Approach LOS		D			C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.2	63.9		20.9	8.4	60.8		20.9
Change Period (Y+Rc), s	4.0	7.0		7.0	4.0	7.0		7.0
Max Green Setting (Gmax), s	6.0	48.0		18.0	7.0	47.0		18.0
Max Q Clear Time (g_c+I1), s	2.2	15.8		13.1	3.5	2.0		3.3
Green Ext Time (p_c), s	0.0	17.2		0.8	0.0	20.0		1.6

Intersection Summary	
HCM 2010 Ctrl Delay	9.9
HCM 2010 LOS	A

HCM 2010 Signalized Intersection Summary
1: Merle Hay Road & NW 62nd Ave 1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	174	233	182	152	86	48	258	675	193	40	548	40
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	260	268	298	185	112	57	304	776	264	58	731	50
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.67	0.87	0.61	0.82	0.77	0.84	0.85	0.87	0.73	0.69	0.75	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	514	260	289	198	305	155	362	956	325	191	934	64
Arrive On Green	0.13	0.32	0.31	0.07	0.26	0.25	0.04	0.12	0.12	0.04	0.28	0.27
Sat Flow, veh/h	1774	807	897	1774	1165	593	1774	2594	882	1774	3362	230
Grp Volume(v), veh/h	260	0	566	185	0	169	304	529	511	58	385	396
Grp Sat Flow(s),veh/h/ln	1774	0	1704	1774	0	1758	1774	1770	1707	1774	1770	1822
Q Serve(g_s), s	9.3	0.0	29.0	6.0	0.0	7.1	10.4	26.2	26.3	2.1	18.1	18.1
Cycle Q Clear(g_c), s	9.3	0.0	29.0	6.0	0.0	7.1	10.4	26.2	26.3	2.1	18.1	18.1
Prop In Lane	1.00		0.53	1.00		0.34	1.00		0.52	1.00		0.13
Lane Grp Cap(c), veh/h	514	0	549	198	0	460	362	652	629	191	492	506
V/C Ratio(X)	0.51	0.00	1.03	0.93	0.00	0.37	0.84	0.81	0.81	0.30	0.78	0.78
Avail Cap(c_a), veh/h	544	0	549	198	0	460	362	652	629	234	492	506
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.6	0.0	30.8	28.7	0.0	27.3	23.6	36.5	36.6	24.2	30.0	30.1
Incr Delay (d2), s/veh	0.8	0.0	46.5	45.3	0.0	0.5	16.0	10.6	10.9	0.9	11.8	11.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.0	20.7	4.1	0.0	3.5	6.6	14.8	14.4	1.1	10.4	10.6
LnGrp Delay(d),s/veh	20.3	0.0	77.2	73.9	0.0	27.8	39.6	47.0	47.5	25.1	41.7	41.5
LnGrp LOS	C		F	E		C	D	D	D	C	D	D
Approach Vol, veh/h		826			354			1344			839	
Approach Delay, s/veh		59.3			51.9			45.5			40.5	
Approach LOS		E			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.8	38.2	10.0	34.0	16.0	30.0	15.4	28.6
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	6.0	30.0	6.0	28.0	12.0	24.0	13.0	21.0
Max Q Clear Time (g_c+I1), s	4.1	28.3	8.0	31.0	12.4	20.1	11.3	9.1
Green Ext Time (p_c), s	0.0	1.3	0.0	0.0	0.0	2.7	0.2	2.9

Intersection Summary	
HCM 2010 Ctrl Delay	48.3
HCM 2010 LOS	D

HCM 2010 TWSC
6: Merle Hay Road & W GRocery Access 1/14/2015

Intersection	
Int Delay, s/veh	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	30	40	1060	40	50	865
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	43	1152	43	54	940

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1753	598	0	0	1196	0
Stage 1	1174	-	-	-	-	-
Stage 2	579	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	76	445	-	-	579	-
Stage 1	256	-	-	-	-	-
Stage 2	524	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	61	445	-	-	579	-
Mov Cap-2 Maneuver	171	-	-	-	-	-
Stage 1	256	-	-	-	-	-
Stage 2	422	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	24.1	0	1.6
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	264	579	-
HCM Lane V/C Ratio	-	-	0.288	0.094	-
HCM Control Delay (s)	-	-	24.1	11.9	1
HCM Lane LOS	-	-	C	B	A
HCM 95th %tile Q(veh)	-	-	1.2	0.3	-

HCM 2010 TWSC
2: Merle Hay Road & NW 61st Ave/Sun Drug Drive 1/14/2015

Intersection	
Int Delay, s/veh	7.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	40	0	48	30	0	30	28	1042	30	30	837	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	200	-	-	200	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	43	0	52	33	0	33	30	1133	33	33	910	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1610	2209	463	1730	2201	583	926	0	0	1165	0	0
Stage 1	983	983	-	1210	1210	-	-	-	-	-	-	-
Stage 2	627	1226	-	520	991	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	70	44	546	57	44	456	734	-	-	595	-	-
Stage 1	267	325	-	194	254	-	-	-	-	-	-	-
Stage 2	438	249	-	507	322	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	60	40	546	48	40	456	734	-	-	595	-	-
Mov Cap-2 Maneuver	60	40	-	48	40	-	-	-	-	-	-	-
Stage 1	256	307	-	186	244	-	-	-	-	-	-	-
Stage 2	390	239	-	433	304	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	108.8	94.6	0.3	0.4
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	734	-	-	117	48	456	595	-	-
HCM Lane V/C Ratio	0.041	-	-	0.818	0.679	0.072	0.055	-	-
HCM Control Delay (s)	10.1	-	-	108.8	175.6	13.5	11.4	-	-
HCM Lane LOS	B	-	-	F	F	B	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	4.8	2.7	0.2	0.2	-	-

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	10	141	93	20	15	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	153	101	22	16	27

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	123	0	-	0	287	112
Stage 1	-	-	-	-	112	-
Stage 2	-	-	-	-	175	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1464	-	-	-	703	941
Stage 1	-	-	-	-	913	-
Stage 2	-	-	-	-	855	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1464	-	-	-	697	941
Mov Cap-2 Maneuver	-	-	-	-	697	-
Stage 1	-	-	-	-	913	-
Stage 2	-	-	-	-	848	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	9.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1464	-	-	-	832
HCM Lane V/C Ratio	0.007	-	-	-	0.052
HCM Control Delay (s)	7.5	0	-	-	9.6
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	2.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	73	45	1055	111	40	855
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	79	49	1147	121	43	929

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1759	634	0	0	1267	0
Stage 1	1207	-	-	-	-	-
Stage 2	552	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 76	422	-	-	544	-
Stage 1	246	-	-	-	-	-
Stage 2	541	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 70	422	-	-	544	-
Mov Cap-2 Maneuver	178	-	-	-	-	-
Stage 1	246	-	-	-	-	-
Stage 2	498	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	39.3	0	0.5
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	228	544	-
HCM Lane V/C Ratio	-	-	0.563	0.08	-
HCM Control Delay (s)	-	-	39.3	12.2	-
HCM Lane LOS	-	-	E	B	-
HCM 95th %tile Q(veh)	-	-	3.1	0.3	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 2010 Signalized Intersection Summary
44: Merle Hay Road & Winwood Drive 1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	167	6	90	5	2	18	75	981	1	10	785	133
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	182	7	98	5	2	20	82	1066	1	11	853	145
Adj No. of Lanes	0	2	0	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	299	15	209	70	41	181	502	2295	2	356	1808	307
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.05	0.63	0.63	0.03	1.00	1.00
Sat Flow, veh/h	1420	97	1358	147	264	1177	1774	3628	3	1774	3027	515
Grp Volume(v), veh/h	182	0	105	27	0	0	82	520	547	11	499	499
Grp Sat Flow(s),veh/h/ln	1420	0	1455	1589	0	0	1774	1770	1862	1774	1770	1772
Q Serve(g_s), s	9.8	0.0	5.9	0.0	0.0	0.0	1.5	13.8	13.8	0.2	0.0	0.0
Cycle Q Clear(g_c), s	11.1	0.0	5.9	1.3	0.0	0.0	1.5	13.8	13.8	0.2	0.0	0.0
Prop In Lane	1.00		0.93	0.19		0.74	1.00		0.00	1.00		0.29
Lane Grp Cap(c), veh/h	299	0	224	292	0	0	502	1119	1178	356	1057	1059
V/C Ratio(X)	0.61	0.00	0.47	0.09	0.00	0.00	0.16	0.46	0.46	0.03	0.47	0.47
Avail Cap(c_a), veh/h	362	0	291	363	0	0	554	1119	1178	451	1057	1059
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.7	0.0	34.7	32.7	0.0	0.0	5.5	8.6	8.6	7.4	0.0	0.0
Incr Delay (d2), s/veh	2.0	0.0	1.5	0.1	0.0	0.0	0.2	1.4	1.3	0.0	1.5	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.0	2.5	0.6	0.0	0.0	0.7	7.1	7.4	0.1	0.4	0.4
LnGrp Delay(d),s/veh	38.8	0.0	36.2	32.9	0.0	0.0	5.7	10.0	9.9	7.4	1.5	1.5
LnGrp LOS	D		D	C			A	A	A	A	A	A
Approach Vol, veh/h		287			27			1149			1009	
Approach Delay, s/veh		37.8			32.9			9.7			1.6	
Approach LOS		D			C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.2	63.9		20.9	8.4	60.8		20.9
Change Period (Y+Rc), s	4.0	7.0		7.0	4.0	7.0		7.0
Max Green Setting (Gmax), s	6.0	48.0		18.0	7.0	47.0		18.0
Max Q Clear Time (g_c+I1), s	2.2	15.8		13.1	3.5	2.0		3.3
Green Ext Time (p_c), s	0.0	17.2		0.8	0.0	20.0		1.6

Intersection Summary	
HCM 2010 Ctrl Delay	9.9
HCM 2010 LOS	A

HCM 2010 Signalized Intersection Summary
1: Merle Hay Road & NW 62nd Ave 1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	174	233	182	152	86	48	258	675	193	40	548	40
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	260	268	298	185	112	57	304	776	264	58	731	50
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.67	0.87	0.61	0.82	0.77	0.84	0.85	0.87	0.73	0.69	0.75	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	514	260	289	198	305	155	362	956	325	191	934	64
Arrive On Green	0.13	0.32	0.31	0.07	0.26	0.25	0.04	0.12	0.12	0.04	0.28	0.27
Sat Flow, veh/h	1774	807	897	1774	1165	593	1774	2594	882	1774	3362	230
Grp Volume(v), veh/h	260	0	566	185	0	169	304	529	511	58	385	396
Grp Sat Flow(s),veh/h/ln	1774	0	1704	1774	0	1758	1774	1770	1707	1774	1770	1822
Q Serve(g_s), s	9.3	0.0	29.0	6.0	0.0	7.1	10.4	26.2	26.3	2.1	18.1	18.1
Cycle Q Clear(g_c), s	9.3	0.0	29.0	6.0	0.0	7.1	10.4	26.2	26.3	2.1	18.1	18.1
Prop In Lane	1.00		0.53	1.00		0.34	1.00		0.52	1.00		0.13
Lane Grp Cap(c), veh/h	514	0	549	198	0	460	362	652	629	191	492	506
V/C Ratio(X)	0.51	0.00	1.03	0.93	0.00	0.37	0.84	0.81	0.81	0.30	0.78	0.78
Avail Cap(c_a), veh/h	544	0	549	198	0	460	362	652	629	234	492	506
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.6	0.0	30.8	28.7	0.0	27.3	23.6	36.5	36.6	24.2	30.0	30.1
Incr Delay (d2), s/veh	0.8	0.0	46.5	45.3	0.0	0.5	16.0	10.6	10.9	0.9	11.8	11.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.0	20.7	4.1	0.0	3.5	6.6	14.8	14.4	1.1	10.4	10.6
LnGrp Delay(d),s/veh	20.3	0.0	77.2	73.9	0.0	27.8	39.6	47.0	47.5	25.1	41.7	41.5
LnGrp LOS	C		F	E		C	D	D	D	C	D	D
Approach Vol, veh/h		826			354			1344			839	
Approach Delay, s/veh		59.3			51.9			45.5			40.5	
Approach LOS		E			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.8	38.2	10.0	34.0	16.0	30.0	15.4	28.6
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	6.0	30.0	6.0	28.0	12.0	24.0	13.0	21.0
Max Q Clear Time (g_c+I1), s	4.1	28.3	8.0	31.0	12.4	20.1	11.3	9.1
Green Ext Time (p_c), s	0.0	1.3	0.0	0.0	0.0	2.7	0.2	2.9

Intersection Summary	
HCM 2010 Ctrl Delay	48.3
HCM 2010 LOS	D

HCM 2010 TWSC
6: Merle Hay Road & W GRocery Access 1/14/2015

Intersection	
Int Delay, s/veh	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	30	40	1060	40	50	865
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	43	1152	43	54	940

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1753	598	0	0	1196	0
Stage 1	1174	-	-	-	-	-
Stage 2	579	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	76	445	-	-	579	-
Stage 1	256	-	-	-	-	-
Stage 2	524	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	61	445	-	-	579	-
Mov Cap-2 Maneuver	171	-	-	-	-	-
Stage 1	256	-	-	-	-	-
Stage 2	422	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	24.1	0	1.6
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	264	579	-
HCM Lane V/C Ratio	-	-	0.288	0.094	-
HCM Control Delay (s)	-	-	24.1	11.9	1
HCM Lane LOS	-	-	C	B	A
HCM 95th %tile Q(veh)	-	-	1.2	0.3	-

HCM 2010 TWSC
2: Merle Hay Road & NW 61st Ave/Sun Drug Drive 1/14/2015

Intersection	
Int Delay, s/veh	7.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	40	0	48	30	0	30	28	1042	30	30	837	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	200	-	-	200	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	43	0	52	33	0	33	30	1133	33	33	910	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1610	2209	463	1730	2201	583	926	0	0	1165	0	0
Stage 1	983	983	-	1210	1210	-	-	-	-	-	-	-
Stage 2	627	1226	-	520	991	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	70	44	546	57	44	456	734	-	-	595	-	-
Stage 1	267	325	-	194	254	-	-	-	-	-	-	-
Stage 2	438	249	-	507	322	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	60	40	546	48	40	456	734	-	-	595	-	-
Mov Cap-2 Maneuver	60	40	-	48	40	-	-	-	-	-	-	-
Stage 1	256	307	-	186	244	-	-	-	-	-	-	-
Stage 2	390	239	-	433	304	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	108.8	94.6	0.3	0.4
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	734	-	-	117	48	456	595	-	-
HCM Lane V/C Ratio	0.041	-	-	0.818	0.679	0.072	0.055	-	-
HCM Control Delay (s)	10.1	-	-	108.8	175.6	13.5	11.4	-	-
HCM Lane LOS	B	-	-	F	F	B	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	4.8	2.7	0.2	0.2	-	-

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	10	141	93	20	15	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	153	101	22	16	27

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	123	0	-	0	287	112
Stage 1	-	-	-	-	112	-
Stage 2	-	-	-	-	175	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1464	-	-	-	703	941
Stage 1	-	-	-	-	913	-
Stage 2	-	-	-	-	855	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1464	-	-	-	697	941
Mov Cap-2 Maneuver	-	-	-	-	697	-
Stage 1	-	-	-	-	913	-
Stage 2	-	-	-	-	848	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	9.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1464	-	-	-	832
HCM Lane V/C Ratio	0.007	-	-	-	0.052
HCM Control Delay (s)	7.5	0	-	-	9.6
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	1.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	73	45	1055	111	40	855
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	75	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	79	49	1147	121	43	929

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1759	634	0	0	1267	0
Stage 1	1207	-	-	-	-	-
Stage 2	552	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 76	422	-	-	544	-
Stage 1	246	-	-	-	-	-
Stage 2	541	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 70	422	-	-	544	-
Mov Cap-2 Maneuver	178	-	-	-	-	-
Stage 1	246	-	-	-	-	-
Stage 2	498	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	30.7	0	0.5
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	178	422	544	-
HCM Lane V/C Ratio	-	-	0.446	0.116	0.08	-
HCM Control Delay (s)	-	-	40.6	14.6	12.2	-
HCM Lane LOS	-	-	E	B	B	-
HCM 95th %tile Q(veh)	-	-	2.1	0.4	0.3	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 2010 Signalized Intersection Summary
9: Merle Hay Road & NW 60th Ave

1/14/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT		
Lane Configurations								
Volume (veh/h)	73	45	1055	111	40	855		
Number	3	18	2	12	1	6		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1900	1863	1863		
Adj Flow Rate, veh/h	79	49	1147	121	43	929		
Adj No. of Lanes	1	1	2	0	1	2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	118	105	2515	265	419	2754		
Arrive On Green	0.07	0.07	1.00	1.00	1.00	1.00		
Sat Flow, veh/h	1774	1583	3325	340	435	3632		
Grp Volume(v), veh/h	79	49	627	641	43	929		
Grp Sat Flow(s),veh/h/ln	1774	1583	1770	1803	435	1770		
Q Serve(g_s), s	3.9	2.7	0.0	0.0	0.0	0.0		
Cycle Q Clear(g_c), s	3.9	2.7	0.0	0.0	0.0	0.0		
Prop In Lane	1.00	1.00		0.19	1.00			
Lane Grp Cap(c), veh/h	118	105	1377	1403	419	2754		
V/C Ratio(X)	0.67	0.47	0.46	0.46	0.10	0.34		
Avail Cap(c_a), veh/h	335	299	1377	1403	419	2754		
HCM Platoon Ratio	1.00	1.00	2.00	2.00	2.00	2.00		
Upstream Filter(I)	1.00	1.00	0.90	0.90	1.00	1.00		
Uniform Delay (d), s/veh	41.1	40.5	0.0	0.0	0.0	0.0		
Incr Delay (d2), s/veh	6.5	3.2	1.0	1.0	0.5	0.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.1	1.3	0.4	0.4	0.1	0.1		
LnGrp Delay(d),s/veh	47.5	43.7	1.0	1.0	0.5	0.3		
LnGrp LOS	D	D	A	A	A	A		
Approach Vol, veh/h	128		1268			972		
Approach Delay, s/veh	46.0		1.0			0.3		
Approach LOS	D		A			A		

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		77.0				77.0		13.0
Change Period (Y+Rc), s		7.0				7.0		7.0
Max Green Setting (Gmax), s		59.0				59.0		17.0
Max Q Clear Time (g_c+I1), s		2.0				2.0		5.9
Green Ext Time (p_c), s		17.4				17.4		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	3.1
HCM 2010 LOS	A

HCM 2010 Signalized Intersection Summary
1: Merle Hay Road & NW 62nd Ave

1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	174	233	182	152	86	48	258	675	193	40	548	40
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	260	268	298	185	112	57	304	776	264	58	731	50
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.67	0.87	0.61	0.82	0.77	0.84	0.85	0.87	0.73	0.69	0.75	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	514	260	289	198	305	155	362	956	325	241	934	64
Arrive On Green	0.13	0.32	0.31	0.07	0.26	0.25	0.27	0.74	0.71	0.04	0.28	0.27
Sat Flow, veh/h	1774	807	897	1774	1165	593	1774	2594	882	1774	3362	230
Grp Volume(v), veh/h	260	0	566	185	0	169	304	529	511	58	385	396
Grp Sat Flow(s),veh/h/ln	1774	0	1704	1774	0	1758	1774	1770	1707	1774	1770	1822
Q Serve(g_s), s	9.3	0.0	29.0	6.0	0.0	7.1	11.5	17.6	18.0	2.1	18.1	18.1
Cycle Q Clear(g_c), s	9.3	0.0	29.0	6.0	0.0	7.1	11.5	17.6	18.0	2.1	18.1	18.1
Prop In Lane	1.00		0.53	1.00		0.34	1.00		0.52	1.00		0.13
Lane Grp Cap(c), veh/h	514	0	549	198	0	460	362	652	629	241	492	506
V/C Ratio(X)	0.51	0.00	1.03	0.93	0.00	0.37	0.84	0.81	0.81	0.24	0.78	0.78
Avail Cap(c_a), veh/h	544	0	549	198	0	460	362	652	629	283	492	506
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.6	0.0	30.8	28.7	0.0	27.3	18.3	9.8	10.3	22.8	30.0	30.1
Incr Delay (d2), s/veh	0.8	0.0	46.5	45.3	0.0	0.5	16.0	10.6	10.9	0.5	11.8	11.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.0	20.7	4.1	0.0	3.5	6.9	10.1	9.9	1.0	10.4	10.6
LnGrp Delay(d),s/veh	20.3	0.0	77.2	73.9	0.0	27.8	34.3	20.3	21.2	23.3	41.7	41.5
LnGrp LOS	C		F	E		C	C	C	C	C	D	D
Approach Vol, veh/h		826			354			1344			839	
Approach Delay, s/veh		59.3			51.9			23.8			40.4	
Approach LOS		E			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.8	38.2	10.0	34.0	16.0	30.0	15.4	28.6
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	6.0	30.0	6.0	28.0	12.0	24.0	13.0	21.0
Max Q Clear Time (g_c+I1), s	4.1	20.0	8.0	31.0	13.5	20.1	11.3	9.1
Green Ext Time (p_c), s	0.0	5.6	0.0	0.0	0.0	2.7	0.2	2.9

Intersection Summary	
HCM 2010 Ctrl Delay	39.6
HCM 2010 LOS	D

HCM 2010 TWSC
2: Merle Hay Road & NW 61st Ave/Sun Drug Drive 1/14/2015

Intersection	
Int Delay, s/veh	8.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	40	0	48	30	0	30	28	1042	30	30	837	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	200	-	-	200	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	43	0	52	33	0	33	30	1133	33	33	910	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1610	2209	463	1730	2201	583	926	0	0	1165	0	0
Stage 1	983	983	-	1210	1210	-	-	-	-	-	-	-
Stage 2	627	1226	-	520	991	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	70	44	546	57	44	456	734	-	-	595	-	-
Stage 1	267	325	-	194	254	-	-	-	-	-	-	-
Stage 2	438	249	-	507	322	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	60	40	546	48	40	456	734	-	-	595	-	-
Mov Cap-2 Maneuver	60	40	-	48	40	-	-	-	-	-	-	-
Stage 1	256	307	-	186	244	-	-	-	-	-	-	-
Stage 2	390	239	-	433	304	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	108.8	120.9	0.3	0.4
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	734	-	-	117	87	595	-	-
HCM Lane V/C Ratio	0.041	-	-	0.818	0.75	0.055	-	-
HCM Control Delay (s)	10.1	-	-	108.8	120.9	11.4	-	-
HCM Lane LOS	B	-	-	F	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	4.8	3.8	0.2	-	-

HCM 2010 Signalized Intersection Summary
44: Merle Hay Road & Winwood Drive 1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	167	6	90	5	2	18	75	981	1	10	785	133
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	182	7	98	5	2	20	82	1066	1	11	853	145
Adj No. of Lanes	0	2	0	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	299	15	209	70	41	181	361	2295	2	356	1808	307
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.05	0.63	0.63	0.00	0.20	0.20
Sat Flow, veh/h	1420	97	1358	147	264	1177	1774	3628	3	1774	3027	515
Grp Volume(v), veh/h	182	0	105	27	0	0	82	520	547	11	499	499
Grp Sat Flow(s),veh/h/ln	1420	0	1455	1589	0	0	1774	1770	1862	1774	1770	1772
Q Serve(g_s), s	9.8	0.0	5.9	0.0	0.0	0.0	1.5	13.8	13.8	0.2	22.4	22.5
Cycle Q Clear(g_c), s	11.1	0.0	5.9	1.3	0.0	0.0	1.5	13.8	13.8	0.2	22.4	22.5
Prop In Lane	1.00		0.93	0.19		0.74	1.00		0.00	1.00		0.29
Lane Grp Cap(c), veh/h	299	0	224	292	0	0	361	1119	1178	356	1057	1059
V/C Ratio(X)	0.61	0.00	0.47	0.09	0.00	0.00	0.23	0.46	0.46	0.03	0.47	0.47
Avail Cap(c_a), veh/h	362	0	291	363	0	0	414	1119	1178	451	1057	1059
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.95	0.95	0.95
Uniform Delay (d), s/veh	36.7	0.0	34.7	32.7	0.0	0.0	9.1	8.6	8.6	7.6	23.6	23.6
Incr Delay (d2), s/veh	2.0	0.0	1.5	0.1	0.0	0.0	0.3	1.4	1.3	0.0	1.4	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.0	2.5	0.6	0.0	0.0	0.7	7.1	7.4	0.1	11.4	11.5
LnGrp Delay(d),s/veh	38.8	0.0	36.2	32.9	0.0	0.0	9.4	10.0	9.9	7.6	25.0	25.0
LnGrp LOS	D		D	C			A	A	A	A	C	C
Approach Vol, veh/h		287			27			1149			1009	
Approach Delay, s/veh		37.8			32.9			9.9			24.8	
Approach LOS		D			C			A			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.2	63.9		20.9	8.4	60.8		20.9
Change Period (Y+Rc), s	4.0	7.0		7.0	4.0	7.0		7.0
Max Green Setting (Gmax), s	6.0	48.0		18.0	7.0	47.0		18.0
Max Q Clear Time (g_c+I1), s	2.2	15.8		13.1	3.5	24.5		3.3
Green Ext Time (p_c), s	0.0	17.2		0.8	0.0	13.9		1.6

Intersection Summary		
HCM 2010 Ctrl Delay		19.5
HCM 2010 LOS		B

HCM 2010 TWSC
12: NW 60th Ave & S Grocery Access 1/14/2015

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	10	141	93	20	15	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	153	101	22	16	27

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	123	0	-	0	287	112
Stage 1	-	-	-	-	112	-
Stage 2	-	-	-	-	175	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1464	-	-	-	703	941
Stage 1	-	-	-	-	913	-
Stage 2	-	-	-	-	855	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1464	-	-	-	697	941
Mov Cap-2 Maneuver	-	-	-	-	697	-
Stage 1	-	-	-	-	913	-
Stage 2	-	-	-	-	848	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	9.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1464	-	-	-	832
HCM Lane V/C Ratio	0.007	-	-	-	0.052
HCM Control Delay (s)	7.5	0	-	-	9.6
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2

HCM 2010 TWSC
6: Merle Hay Road & w grocery Access 1/14/2015

Intersection	
Int Delay, s/veh	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	30	40	1060	40	50	865
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	43	1152	43	54	940

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1753	598	0	0	1196	0
Stage 1	1174	-	-	-	-	-
Stage 2	579	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	76	445	-	-	579	-
Stage 1	256	-	-	-	-	-
Stage 2	524	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	61	445	-	-	579	-
Mov Cap-2 Maneuver	171	-	-	-	-	-
Stage 1	256	-	-	-	-	-
Stage 2	422	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	24.1	0	1.6
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	264	579	-
HCM Lane V/C Ratio	-	-	0.288	0.094	-
HCM Control Delay (s)	-	-	24.1	11.9	1
HCM Lane LOS	-	-	C	B	A
HCM 95th %tile Q(veh)	-	-	1.2	0.3	-

HCM 2010 Signalized Intersection Summary
44: Merle Hay Road & Winwood Drive 1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	167	6	90	5	2	18	75	981	1	10	785	133
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	182	7	98	5	2	20	82	1066	1	11	853	145
Adj No. of Lanes	0	2	0	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	299	15	209	70	41	181	361	2295	2	356	1808	307
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.05	0.63	0.63	0.00	0.20	0.20
Sat Flow, veh/h	1420	97	1358	147	264	1177	1774	3628	3	1774	3027	515
Grp Volume(v), veh/h	182	0	105	27	0	0	82	520	547	11	499	499
Grp Sat Flow(s),veh/h/ln	1420	0	1455	1589	0	0	1774	1770	1862	1774	1770	1772
Q Serve(g_s), s	9.8	0.0	5.9	0.0	0.0	0.0	1.5	13.8	13.8	0.2	22.4	22.5
Cycle Q Clear(g_c), s	11.1	0.0	5.9	1.3	0.0	0.0	1.5	13.8	13.8	0.2	22.4	22.5
Prop In Lane	1.00		0.93	0.19		0.74	1.00		0.00	1.00		0.29
Lane Grp Cap(c), veh/h	299	0	224	292	0	0	361	1119	1178	356	1057	1059
V/C Ratio(X)	0.61	0.00	0.47	0.09	0.00	0.00	0.23	0.46	0.46	0.03	0.47	0.47
Avail Cap(c_a), veh/h	362	0	291	363	0	0	414	1119	1178	451	1057	1059
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.93	0.93	0.93
Uniform Delay (d), s/veh	36.7	0.0	34.7	32.7	0.0	0.0	9.1	8.6	8.6	7.6	23.6	23.6
Incr Delay (d2), s/veh	2.0	0.0	1.5	0.1	0.0	0.0	0.3	1.4	1.3	0.0	1.4	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.0	2.5	0.6	0.0	0.0	0.7	7.1	7.4	0.1	11.4	11.4
LnGrp Delay(d),s/veh	38.8	0.0	36.2	32.9	0.0	0.0	9.4	10.0	9.9	7.6	25.0	25.0
LnGrp LOS	D		D	C			A	A	A	A	C	C
Approach Vol, veh/h		287			27			1149			1009	
Approach Delay, s/veh		37.8			32.9			9.9			24.8	
Approach LOS		D			C			A			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.2	63.9		20.9	8.4	60.8		20.9
Change Period (Y+Rc), s	4.0	7.0		7.0	4.0	7.0		7.0
Max Green Setting (Gmax), s	6.0	48.0		18.0	7.0	47.0		18.0
Max Q Clear Time (g_c+I1), s	2.2	15.8		13.1	3.5	24.5		3.3
Green Ext Time (p_c), s	0.0	17.2		0.8	0.0	13.9		1.6

Intersection Summary	
HCM 2010 Ctrl Delay	19.5
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
1: Merle Hay Road & NW 62nd Ave 1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	174	233	182	152	86	48	258	675	193	40	548	40
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	260	268	298	185	112	57	304	776	264	58	731	50
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.67	0.87	0.61	0.82	0.77	0.84	0.85	0.87	0.73	0.69	0.75	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	514	260	289	198	305	155	362	956	325	241	934	64
Arrive On Green	0.13	0.32	0.31	0.07	0.26	0.25	0.27	0.74	0.71	0.04	0.28	0.27
Sat Flow, veh/h	1774	807	897	1774	1165	593	1774	2594	882	1774	3362	230
Grp Volume(v), veh/h	260	0	566	185	0	169	304	529	511	58	385	396
Grp Sat Flow(s),veh/h/ln	1774	0	1704	1774	0	1758	1774	1770	1707	1774	1770	1822
Q Serve(g_s), s	9.3	0.0	29.0	6.0	0.0	7.1	11.5	17.6	18.0	2.1	18.1	18.1
Cycle Q Clear(g_c), s	9.3	0.0	29.0	6.0	0.0	7.1	11.5	17.6	18.0	2.1	18.1	18.1
Prop In Lane	1.00		0.53	1.00		0.34	1.00		0.52	1.00		0.13
Lane Grp Cap(c), veh/h	514	0	549	198	0	460	362	652	629	241	492	506
V/C Ratio(X)	0.51	0.00	1.03	0.93	0.00	0.37	0.84	0.81	0.81	0.24	0.78	0.78
Avail Cap(c_a), veh/h	544	0	549	198	0	460	362	652	629	283	492	506
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.6	0.0	30.8	28.7	0.0	27.3	18.3	9.8	10.3	22.8	30.0	30.1
Incr Delay (d2), s/veh	0.8	0.0	46.5	45.3	0.0	0.5	16.0	10.6	10.9	0.5	11.8	11.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.0	20.7	4.1	0.0	3.5	6.9	10.1	9.9	1.0	10.4	10.6
LnGrp Delay(d),s/veh	20.3	0.0	77.2	73.9	0.0	27.8	34.3	20.3	21.2	23.3	41.7	41.5
LnGrp LOS	C		F	E		C	C	C	C	C	D	D
Approach Vol, veh/h		826			354			1344			839	
Approach Delay, s/veh		59.3			51.9			23.8			40.4	
Approach LOS		E			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.8	38.2	10.0	34.0	16.0	30.0	15.4	28.6
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	6.0	30.0	6.0	28.0	12.0	24.0	13.0	21.0
Max Q Clear Time (g_c+I1), s	4.1	20.0	8.0	31.0	13.5	20.1	11.3	9.1
Green Ext Time (p_c), s	0.0	5.6	0.0	0.0	0.0	2.7	0.2	2.9

Intersection Summary	
HCM 2010 Ctrl Delay	39.6
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	30	40	1060	40	50	865
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	43	1152	43	54	940

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1753	598	0	0	1196	0
Stage 1	1174	-	-	-	-	-
Stage 2	579	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	76	445	-	-	579	-
Stage 1	256	-	-	-	-	-
Stage 2	524	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	61	445	-	-	579	-
Mov Cap-2 Maneuver	171	-	-	-	-	-
Stage 1	256	-	-	-	-	-
Stage 2	422	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	24.1	0	1.6
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	264	579	-
HCM Lane V/C Ratio	-	-	0.288	0.094	-
HCM Control Delay (s)	-	-	24.1	11.9	1
HCM Lane LOS	-	-	C	B	A
HCM 95th %tile Q(veh)	-	-	1.2	0.3	-

Intersection	
Int Delay, s/veh	8.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	40	0	48	30	0	30	28	1042	30	30	837	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	200	-	-	200	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	43	0	52	33	0	33	30	1133	33	33	910	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1610	2209	463	1730	2201	583	926	0	0	1165	0	0
Stage 1	983	983	-	1210	1210	-	-	-	-	-	-	-
Stage 2	627	1226	-	520	991	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	70	44	546	57	44	456	734	-	-	595	-	-
Stage 1	267	325	-	194	254	-	-	-	-	-	-	-
Stage 2	438	249	-	507	322	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	60	40	546	48	40	456	734	-	-	595	-	-
Mov Cap-2 Maneuver	60	40	-	48	40	-	-	-	-	-	-	-
Stage 1	256	307	-	186	244	-	-	-	-	-	-	-
Stage 2	390	239	-	433	304	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	108.8	120.9	0.3	0.4
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	734	-	-	117	87	595	-	-
HCM Lane V/C Ratio	0.041	-	-	0.818	0.75	0.055	-	-
HCM Control Delay (s)	10.1	-	-	108.8	120.9	11.4	-	-
HCM Lane LOS	B	-	-	F	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	4.8	3.8	0.2	-	-

HCM 2010 Signalized Intersection Summary
1: Merle Hay Road & NW 62nd Ave

1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	214	287	197	177	106	59	299	808	222	49	648	49
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	319	330	323	216	138	70	352	929	304	71	864	61
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.67	0.87	0.61	0.82	0.77	0.84	0.85	0.87	0.73	0.69	0.75	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	490	279	273	198	285	145	326	958	312	162	932	66
Arrive On Green	0.14	0.32	0.31	0.07	0.24	0.23	0.04	0.12	0.12	0.05	0.28	0.27
Sat Flow, veh/h	1774	866	847	1774	1167	592	1774	2626	856	1774	3354	237
Grp Volume(v), veh/h	319	0	653	216	0	208	352	625	608	71	456	469
Grp Sat Flow(s),veh/h/ln	1774	0	1713	1774	0	1758	1774	1770	1712	1774	1770	1821
Q Serve(g_s), s	11.8	0.0	29.0	6.0	0.0	9.1	12.0	31.6	31.9	2.6	22.6	22.6
Cycle Q Clear(g_c), s	11.8	0.0	29.0	6.0	0.0	9.1	12.0	31.6	31.9	2.6	22.6	22.6
Prop In Lane	1.00		0.49	1.00		0.34	1.00		0.50	1.00		0.13
Lane Grp Cap(c), veh/h	490	0	552	198	0	430	326	646	625	162	492	506
V/C Ratio(X)	0.65	0.00	1.18	1.09	0.00	0.48	1.08	0.97	0.97	0.44	0.93	0.93
Avail Cap(c_a), veh/h	490	0	552	198	0	430	326	646	625	198	492	506
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.7	0.0	30.7	30.7	0.0	29.3	27.1	39.1	39.2	25.3	31.6	31.7
Incr Delay (d2), s/veh	3.0	0.0	99.7	89.8	0.0	0.8	72.6	28.3	30.0	1.9	26.0	25.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.1	0.0	28.9	6.9	0.0	4.6	14.7	20.6	20.3	1.3	14.6	14.9
LnGrp Delay(d),s/veh	23.7	0.0	130.5	120.5	0.0	30.1	99.6	67.4	69.2	27.2	57.7	57.2
LnGrp LOS	C		F	F		C	F	E	E	C	E	E
Approach Vol, veh/h		972			424			1585			996	
Approach Delay, s/veh		95.4			76.2			75.3			55.3	
Approach LOS		F			E			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.2	37.8	10.0	34.0	16.0	30.0	17.0	27.0
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	6.0	30.0	6.0	28.0	12.0	24.0	13.0	21.0
Max Q Clear Time (g_c+I1), s	4.6	33.9	8.0	31.0	14.0	24.6	13.8	11.1
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1

Intersection Summary	
HCM 2010 Ctrl Delay	75.3
HCM 2010 LOS	E

HCM 2010 TWSC
12: NW 60th Ave

1/14/2015

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	10	141	93	20	15	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	153	101	22	16	27

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	123	0	-	0	287	112
Stage 1	-	-	-	-	112	-
Stage 2	-	-	-	-	175	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1464	-	-	-	703	941
Stage 1	-	-	-	-	913	-
Stage 2	-	-	-	-	855	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1464	-	-	-	697	941
Mov Cap-2 Maneuver	-	-	-	-	697	-
Stage 1	-	-	-	-	913	-
Stage 2	-	-	-	-	848	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	9.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1464	-	-	-	832
HCM Lane V/C Ratio	0.007	-	-	-	0.052
HCM Control Delay (s)	7.5	0	-	-	9.6
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2

HCM 2010 TWSC
2: Merle Hay Road & NW 61st Ave/Sun Drug Drive 1/14/2015

Intersection	
Int Delay, s/veh	26.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	49	0	55	37	0	37	31	1226	37	37	967	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	200	-	-	200	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	53	0	60	40	0	40	34	1333	40	40	1051	20

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1875	2581	535	2026	2571	686	1071	0	0	1373	0	0
Stage 1	1141	1141	-	1420	1420	-	-	-	-	-	-	-
Stage 2	734	1440	-	606	1151	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	~ 44	25	490	~ 34	26	390	647	-	-	496	-	-
Stage 1	214	274	-	143	201	-	-	-	-	-	-	-
Stage 2	378	196	-	451	271	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 36	22	490	~ 27	23	390	647	-	-	496	-	-
Mov Cap-2 Maneuver	~ 36	22	-	~ 27	23	-	-	-	-	-	-	-
Stage 1	203	252	-	135	190	-	-	-	-	-	-	-
Stage 2	321	186	-	364	249	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 421.5	291.2	0.3	0.5
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	647	-	-	71	27	390	496	-	-
HCM Lane V/C Ratio	0.052	-	-	1.592	1.49	0.103	0.081	-	-
HCM Control Delay (s)	10.9	-	-	-$ 421.5	$ 567.1	15.3	12.9	-	-
HCM Lane LOS	B	-	-	F	F	C	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	9.6	4.8	0.3	0.3	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 2010 Signalized Intersection Summary
44: Merle Hay Road & Winwood Drive 1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	195	7	111	6	2	22	92	1165	1	12	934	142
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	212	8	121	7	2	24	100	1266	1	13	1015	154
Adj No. of Lanes	0	2	0	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	320	17	263	85	43	212	436	2147	2	270	1714	260
Arrive On Green	0.19	0.19	0.19	0.19	0.19	0.19	0.05	0.59	0.59	0.03	1.00	1.00
Sat Flow, veh/h	1247	90	1364	190	223	1101	1774	3629	3	1774	3083	467
Grp Volume(v), veh/h	212	0	129	33	0	0	100	617	650	13	582	587
Grp Sat Flow(s),veh/h/ln	1247	0	1454	1514	0	0	1774	1770	1862	1774	1770	1780
Q Serve(g_s), s	8.1	0.0	7.1	0.0	0.0	0.0	2.0	19.7	19.7	0.3	0.0	0.0
Cycle Q Clear(g_c), s	15.2	0.0	7.1	7.1	0.0	0.0	2.0	19.7	19.7	0.3	0.0	0.0
Prop In Lane	1.00		0.94	0.21		0.73	1.00		0.00	1.00		0.26
Lane Grp Cap(c), veh/h	320	0	280	340	0	0	436	1047	1102	270	984	990
V/C Ratio(X)	0.66	0.00	0.46	0.10	0.00	0.00	0.23	0.59	0.59	0.05	0.59	0.59
Avail Cap(c_a), veh/h	330	0	291	351	0	0	484	1047	1102	361	984	990
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.9	0.0	32.2	29.9	0.0	0.0	6.9	11.5	11.5	9.7	0.0	0.0
Incr Delay (d2), s/veh	4.7	0.0	1.2	0.1	0.0	0.0	0.3	2.4	2.3	0.1	2.6	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	0.0	2.9	0.7	0.0	0.0	1.0	10.1	10.6	0.1	0.7	0.7
LnGrp Delay(d),s/veh	40.6	0.0	33.3	30.0	0.0	0.0	7.1	14.0	13.8	9.8	2.6	2.6
LnGrp LOS	D		C	C			A	B	B	A	A	A
Approach Vol, veh/h		341			33			1367			1182	
Approach Delay, s/veh		37.9			30.0			13.4			2.7	
Approach LOS		D			C			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.4	60.3		24.4	8.6	57.1		24.4
Change Period (Y+Rc), s	4.0	7.0		7.0	4.0	7.0		7.0
Max Green Setting (Gmax), s	6.0	48.0		18.0	7.0	47.0		18.0
Max Q Clear Time (g_c+I1), s	2.3	21.7		17.2	4.0	2.0		9.1
Green Ext Time (p_c), s	0.0	18.5		0.2	0.1	26.1		1.5

Intersection Summary	
HCM 2010 Ctrl Delay	12.1
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
1: Merle Hay Road & NW 62nd Ave

1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	214	287	219	177	106	59	314	827	235	49	670	49
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	319	330	359	216	138	70	369	951	322	71	893	61
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.67	0.87	0.61	0.82	0.77	0.84	0.85	0.87	0.73	0.69	0.75	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	490	263	286	198	285	145	320	950	320	162	934	64
Arrive On Green	0.14	0.32	0.31	0.07	0.24	0.23	0.04	0.12	0.12	0.05	0.28	0.27
Sat Flow, veh/h	1774	817	889	1774	1167	592	1774	2602	876	1774	3362	230
Grp Volume(v), veh/h	319	0	689	216	0	208	369	645	628	71	470	484
Grp Sat Flow(s),veh/h/ln	1774	0	1706	1774	0	1758	1774	1770	1708	1774	1770	1822
Q Serve(g_s), s	11.8	0.0	29.0	6.0	0.0	9.1	12.0	32.8	32.8	2.6	23.5	23.5
Cycle Q Clear(g_c), s	11.8	0.0	29.0	6.0	0.0	9.1	12.0	32.8	32.8	2.6	23.5	23.5
Prop In Lane	1.00		0.52	1.00		0.34	1.00		0.51	1.00		0.13
Lane Grp Cap(c), veh/h	490	0	550	198	0	430	320	646	623	162	492	506
V/C Ratio(X)	0.65	0.00	1.25	1.09	0.00	0.48	1.15	1.00	1.01	0.44	0.96	0.96
Avail Cap(c_a), veh/h	490	0	550	198	0	430	320	646	623	198	492	506
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.7	0.0	30.8	30.7	0.0	29.3	27.9	39.6	39.7	25.3	32.0	32.0
Incr Delay (d2), s/veh	3.0	0.0	128.4	89.8	0.0	0.8	98.9	35.2	37.8	1.9	31.0	30.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.1	0.0	33.2	6.9	0.0	4.6	16.7	22.4	22.1	1.3	15.7	16.1
LnGrp Delay(d),s/veh	23.7	0.0	159.2	120.5	0.0	30.1	126.8	74.7	77.5	27.2	63.0	62.5
LnGrp LOS	C		F	F		C	F	E	F	C	E	E
Approach Vol, veh/h		1008			424			1642			1025	
Approach Delay, s/veh		116.3			76.2			87.5			60.3	
Approach LOS		F			E			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.2	37.8	10.0	34.0	16.0	30.0	17.0	27.0
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	6.0	30.0	6.0	28.0	12.0	24.0	13.0	21.0
Max Q Clear Time (g_c+I1), s	4.6	34.8	8.0	31.0	14.0	25.5	13.8	11.1
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3

Intersection Summary	
HCM 2010 Ctrl Delay	86.6
HCM 2010 LOS	F

HCM 2010 TWSC
9: Merle Hay Road & NW 60th Ave

1/14/2015

Intersection	
Int Delay, s/veh	3.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	71	43	1251	131	43	1017
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	77	47	1360	142	47	1105

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2077	751	0	0	1502	0
Stage 1	1431	-	-	-	-	-
Stage 2	646	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 46	353	-	-	442	-
Stage 1	186	-	-	-	-	-
Stage 2	484	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 41	353	-	-	442	-
Mov Cap-2 Maneuver	134	-	-	-	-	-
Stage 1	186	-	-	-	-	-
Stage 2	433	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	64.1	0	0.6
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 175	442	-
HCM Lane V/C Ratio	-	- 0.708	0.106	-
HCM Control Delay (s)	-	- 64.1	14.1	-
HCM Lane LOS	-	- F	B	-
HCM 95th %tile Q(veh)	-	- 4.3	0.4	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

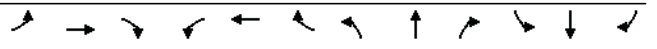
HCM 2010 TWSC
2: NW 61st Ave/Sun Drug Drive & Merle Hay Road 1/14/2015

Intersection													
Int Delay, s/veh	42.1												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Vol, veh/h	49	0	58	37	0	37	34	1273	37	37	1019	18	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None	
Storage Length	-	-	-	-	-	-	200	-	-	200	-	-	
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	
Mvmt Flow	53	0	63	40	0	40	37	1384	40	40	1108	20	
Major/Minor	Minor2			Minor1			Major1			Major2			
Conflicting Flow All	1964	2696	564	2112	2686	712	1127	0	0	1424	0	0	
Stage 1	1198	1198	-	1478	1478	-	-	-	-	-	-	-	
Stage 2	766	1498	-	634	1208	-	-	-	-	-	-	-	
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-	
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-	
Pot Cap-1 Maneuver	~ 38	21	469	~ 29	21	375	616	-	-	474	-	-	
Stage 1	197	257	-	132	188	-	-	-	-	-	-	-	
Stage 2	361	184	-	434	254	-	-	-	-	-	-	-	
Platoon blocked, %								-	-		-	-	
Mov Cap-1 Maneuver	~ 30	18	469	~ 22	18	375	616	-	-	474	-	-	
Mov Cap-2 Maneuver	~ 30	18	-	~ 22	18	-	-	-	-	-	-	-	
Stage 1	185	235	-	124	177	-	-	-	-	-	-	-	
Stage 2	303	173	-	344	233	-	-	-	-	-	-	-	
Approach	EB			WB			NB			SB			
HCM Control Delay, s	$ 571.7			$ 637.6			0.3			0.5			
HCM LOS	F			F									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	616	-	-	61	42	474	-	-					
HCM Lane V/C Ratio	0.06	-	-	1.907	1.915	0.085	-	-					
HCM Control Delay (s)	11.2	-	-	-$ 571.7	$ 637.6	13.3	-	-					
HCM Lane LOS	B	-	-	F	F	B	-	-					
HCM 95th %tile Q(veh)	0.2	-	-	10.9	8.4	0.3	-	-					

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 2010 Signalized Intersection Summary
44: Merle Hay Road & Winwood Drive 1/14/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	204	7	111	6	2	22	92	1201	1	12	961	160
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	222	8	121	7	2	24	100	1305	1	13	1045	174
Adj No. of Lanes	0	2	0	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	328	18	270	87	44	219	422	2128	2	256	1674	278
Arrive On Green	0.20	0.20	0.20	0.20	0.20	0.20	0.05	0.59	0.59	0.03	1.00	1.00
Sat Flow, veh/h	1254	90	1364	195	221	1108	1774	3629	3	1774	3038	505
Grp Volume(v), veh/h	222	0	129	33	0	0	100	636	670	13	608	611
Grp Sat Flow(s),veh/h/ln	1254	0	1454	1523	0	0	1774	1770	1862	1774	1770	1774
Q Serve(g_s), s	8.7	0.0	7.0	0.0	0.0	0.0	2.1	20.9	20.9	0.3	0.0	0.0
Cycle Q Clear(g_c), s	15.8	0.0	7.0	7.0	0.0	0.0	2.1	20.9	20.9	0.3	0.0	0.0
Prop In Lane	1.00		0.94	0.21		0.73	1.00		0.00	1.00		0.28
Lane Grp Cap(c), veh/h	328	0	288	350	0	0	422	1038	1092	256	975	977
V/C Ratio(X)	0.68	0.00	0.45	0.09	0.00	0.00	0.24	0.61	0.61	0.05	0.62	0.63
Avail Cap(c_a), veh/h	331	0	291	353	0	0	469	1038	1092	347	975	977
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.7	0.0	31.7	29.5	0.0	0.0	7.1	12.0	12.0	10.2	0.0	0.0
Incr Delay (d2), s/veh	5.3	0.0	1.1	0.1	0.0	0.0	0.3	2.7	2.6	0.1	3.0	3.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	0.0	2.9	0.7	0.0	0.0	1.0	10.9	11.4	0.1	0.8	0.8
LnGrp Delay(d),s/veh	41.1	0.0	32.8	29.6	0.0	0.0	7.4	14.7	14.6	10.2	3.0	3.0
LnGrp LOS	D		C	C			A	B	B	B	A	A
Approach Vol, veh/h		351			33			1406			1232	
Approach Delay, s/veh		38.1			29.6			14.1			3.1	
Approach LOS		D			C			B			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.4	59.8		24.8	8.6	56.6		24.8				
Change Period (Y+Rc), s	4.0	7.0		7.0	4.0	7.0		7.0				
Max Green Setting (Gmax), s	6.0	48.0		18.0	7.0	47.0		18.0				
Max Q Clear Time (g_c+I1), s	2.3	22.9		17.8	4.1	2.0		9.0				
Green Ext Time (p_c), s	0.0	18.5		0.1	0.1	27.5		1.5				
Intersection Summary												
HCM 2010 Ctrl Delay			12.6									
HCM 2010 LOS			B									

Intersection	
Int Delay, s/veh	5.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	86	53	1291	136	48	1095
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	93	58	1403	148	52	1190

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2176	776	0	0	1551	0
Stage 1	1477	-	-	-	-	-
Stage 2	699	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 40	340	-	-	423	-
Stage 1	176	-	-	-	-	-
Stage 2	454	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 35	340	-	-	423	-
Mov Cap-2 Maneuver	125	-	-	-	-	-
Stage 1	176	-	-	-	-	-
Stage 2	398	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	104.5	0	0.6
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	165	423	-
HCM Lane V/C Ratio	-	-	0.916	0.123	-
HCM Control Delay (s)	-	-	104.5	14.7	-
HCM Lane LOS	-	-	F	B	-
HCM 95th %tile Q(veh)	-	-	6.7	0.4	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	2.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	30	40	1291	40	50	1065
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	43	1403	43	54	1158

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2113	723	0	0	1447	0
Stage 1	1425	-	-	-	-	-
Stage 2	688	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	44	369	-	-	464	-
Stage 1	188	-	-	-	-	-
Stage 2	460	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 30	369	-	-	464	-
Mov Cap-2 Maneuver	120	-	-	-	-	-
Stage 1	188	-	-	-	-	-
Stage 2	310	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	34.8	0	2.6
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	195	464	-
HCM Lane V/C Ratio	-	-	0.39	0.117	-
HCM Control Delay (s)	-	-	34.8	13.8	2.1
HCM Lane LOS	-	-	D	B	A
HCM 95th %tile Q(veh)	-	-	1.7	0.4	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 2010 Signalized Intersection Summary
1: Merle Hay Road & NW 62nd Ave

1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	212	284	217	184	105	59	312	819	233	49	664	49
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	316	326	356	224	136	70	367	941	319	71	885	61
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.67	0.87	0.61	0.82	0.77	0.84	0.85	0.87	0.73	0.69	0.75	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	492	263	287	198	284	146	321	949	320	162	933	64
Arrive On Green	0.14	0.32	0.31	0.07	0.24	0.23	0.04	0.12	0.12	0.05	0.28	0.27
Sat Flow, veh/h	1774	815	890	1774	1160	597	1774	2600	877	1774	3360	232
Grp Volume(v), veh/h	316	0	682	224	0	206	367	639	621	71	466	480
Grp Sat Flow(s),veh/h/ln	1774	0	1706	1774	0	1757	1774	1770	1708	1774	1770	1822
Q Serve(g_s), s	11.7	0.0	29.0	6.0	0.0	9.1	12.0	32.4	32.7	2.6	23.2	23.2
Cycle Q Clear(g_c), s	11.7	0.0	29.0	6.0	0.0	9.1	12.0	32.4	32.7	2.6	23.2	23.2
Prop In Lane	1.00		0.52	1.00		0.34	1.00		0.51	1.00		0.13
Lane Grp Cap(c), veh/h	492	0	550	198	0	430	321	646	623	162	492	506
V/C Ratio(X)	0.64	0.00	1.24	1.13	0.00	0.48	1.14	0.99	1.00	0.44	0.95	0.95
Avail Cap(c_a), veh/h	492	0	550	198	0	430	321	646	623	198	492	506
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.6	0.0	30.8	30.7	0.0	29.3	27.7	39.4	39.6	25.3	31.9	31.9
Incr Delay (d2), s/veh	2.8	0.0	123.3	103.1	0.0	0.8	94.2	32.9	35.2	1.9	29.6	29.0
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	6.0	0.0	32.4	7.7	0.0	4.5	16.4	21.8	21.6	1.3	15.3	15.7
LnGrp Delay(d),s/veh	23.5	0.0	154.0	133.8	0.0	30.1	121.9	72.3	74.8	27.2	61.4	60.9
LnGrp LOS	C		F	F		C	F	E	E	C	E	E
Approach Vol, veh/h		998			430			1627			1017	
Approach Delay, s/veh		112.7			84.1			84.4			58.8	
Approach LOS		F			F			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.2	37.8	10.0	34.0	16.0	30.0	17.0	27.0
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	6.0	30.0	6.0	28.0	12.0	24.0	13.0	21.0
Max Q Clear Time (g_c+I1), s	4.6	34.7	8.0	31.0	14.0	25.2	13.7	11.1
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3

Intersection Summary	
HCM 2010 Ctrl Delay	84.9
HCM 2010 LOS	F

HCM 2010 TWSC
12: NW 60th Ave & S Grocery Access

1/14/2015

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	10	174	115	20	15	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	189	125	22	16	27

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	147	0	-	0	347	136
Stage 1	-	-	-	-	136	-
Stage 2	-	-	-	-	211	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1435	-	-	-	650	913
Stage 1	-	-	-	-	890	-
Stage 2	-	-	-	-	824	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1435	-	-	-	644	913
Mov Cap-2 Maneuver	-	-	-	-	644	-
Stage 1	-	-	-	-	890	-
Stage 2	-	-	-	-	817	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	9.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1435	-	-	-	789
HCM Lane V/C Ratio	0.008	-	-	-	0.055
HCM Control Delay (s)	7.5	0	-	-	9.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2

HCM 2010 TWSC
2: Merle Hay Road & NW 61st Ave/Sun Drug Drive 1/14/2015

Intersection													
Int Delay, s/veh	33.4												
Movement	EBL	EBT	EBR		WBL	WBT	WBR		NBL	NBT	NBR		SBL	SBT	SBR
Vol, veh/h	49	0	58		37	0	37		34	1261	37		37	1010	18
Conflicting Peds, #/hr	0	0	0		0	0	0		0	0	0		0	0	0
Sign Control	Stop	Stop	Stop		Stop	Stop	Stop		Free	Free	Free		Free	Free	Free
RT Channelized	-	-	None		-	-	None		-	-	None		-	-	None
Storage Length	-	-	-		0	-	-		200	-	-		200	-	-
Veh in Median Storage, #	-	0	-		-	0	-		-	0	-		-	0	-
Grade, %	-	0	-		-	0	-		-	0	-		-	0	-
Peak Hour Factor	92	92	92		92	92	92		92	92	92		92	92	92
Heavy Vehicles, %	2	2	2		2	2	2		2	2	2		2	2	2
Mvmt Flow	53	0	63		40	0	40		37	1371	40		40	1098	20
Major/Minor	Minor2				Minor1				Major1				Major2		
Conflicting Flow All	1947	2673	559		2094	2663	705		1117	0	0		1411	0	0
Stage 1	1188	1188	-		1465	1465	-		-	-	-		-	-	-
Stage 2	759	1485	-		629	1198	-		-	-	-		-	-	-
Critical Hdwy	7.54	6.54	6.94		7.54	6.54	6.94		4.14	-	-		4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-		6.54	5.54	-		-	-	-		-	-	-
Critical Hdwy Stg 2	6.54	5.54	-		6.54	5.54	-		-	-	-		-	-	-
Follow-up Hdwy	3.52	4.02	3.32		3.52	4.02	3.32		2.22	-	-		2.22	-	-
Pot Cap-1 Maneuver	~ 39	22	472		~ 30	22	379		621	-	-		479	-	-
Stage 1	200	260	-		134	191	-		-	-	-		-	-	-
Stage 2	365	187	-		437	257	-		-	-	-		-	-	-
Platoon blocked, %										-	-			-	-
Mov Cap-1 Maneuver	~ 31	19	472		~ 23	19	379		621	-	-		479	-	-
Mov Cap-2 Maneuver	~ 31	19	-		~ 23	19	-		-	-	-		-	-	-
Stage 1	188	238	-		126	180	-		-	-	-		-	-	-
Stage 2	307	176	-		347	236	-		-	-	-		-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 541.8	$ 367.4	0.3	0.5
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	621	-	-	63	23	379	479	-	-
HCM Lane V/C Ratio	0.06	-	-	1.846	1.749	0.106	0.084	-	-
HCM Control Delay (s)	11.2	-	-	-$ 541.8	$ 719.2	15.6	13.2	-	-
HCM Lane LOS	B	-	-	F	F	C	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	10.7	5.1	0.4	0.3	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 2010 Signalized Intersection Summary
44: Merle Hay Road & Winwood Drive 1/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	202	7	110	6	2	22	92	1189	1	12	952	158
Number	7	4	14	3	8	18	5	2	12	1	6	16
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		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
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	220	8	120	7	2	24	100	1292	1	13	1035	172
Adj No. of Lanes	0	2	0	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	327	18	268	87	44	218	425	2134	2	260	1679	279
Arrive On Green	0.20	0.20	0.20	0.20	0.20	0.20	0.05	0.59	0.59	0.03	1.00	1.00
Sat Flow, veh/h	1256	91	1364	195	222	1110	1774	3629	3	1774	3039	504
Grp Volume(v), veh/h	220	0	128	33	0	0	100	630	663	13	602	605
Grp Sat Flow(s),veh/h/ln	1256	0	1454	1526	0	0	1774	1770	1862	1774	1770	1774
Q Serve(g_s), s	8.6	0.0	7.0	0.0	0.0	0.0	2.1	20.5	20.5	0.3	0.0	0.0
Cycle Q Clear(g_c), s	15.6	0.0	7.0	7.0	0.0	0.0	2.1	20.5	20.5	0.3	0.0	0.0
Prop In Lane	1.00		0.94	0.21		0.73	1.00		0.00	1.00		0.28
Lane Grp Cap(c), veh/h	327	0	286	349	0	0	425	1040	1095	260	977	980
V/C Ratio(X)	0.67	0.00	0.45	0.09	0.00	0.00	0.24	0.61	0.61	0.05	0.62	0.62
Avail Cap(c_a), veh/h	332	0	291	354	0	0	473	1040	1095	351	977	980
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.8	0.0	31.8	29.6	0.0	0.0	7.0	11.9	11.9	10.0	0.0	0.0
Incr Delay (d2), s/veh	5.2	0.0	1.1	0.1	0.0	0.0	0.3	2.6	2.5	0.1	2.9	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	5.8	0.0	2.9	0.7	0.0	0.0	1.0	10.7	11.3	0.1	0.8	0.8
LnGrp Delay(d),s/veh	41.0	0.0	32.9	29.8	0.0	0.0	7.3	14.5	14.4	10.1	2.9	2.9
LnGrp LOS	D		C	C			A	B	B	B	A	A
Approach Vol, veh/h		348			33			1393			1220	
Approach Delay, s/veh		38.0			29.8			13.9			3.0	
Approach LOS		D			C			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.4	59.9		24.7	8.6	56.7		24.7
Change Period (Y+Rc), s	4.0	7.0		7.0	4.0	7.0		7.0
Max Green Setting (Gmax), s	6.0	48.0		18.0	7.0	47.0		18.0
Max Q Clear Time (g_c+I1), s	2.3	22.5		17.6	4.1	2.0		9.0
Green Ext Time (p_c), s	0.0	18.6		0.1	0.1	27.1		1.5

Intersection Summary	
HCM 2010 Ctrl Delay	12.4
HCM 2010 LOS	B

HCM 2010 TWSC
9: Merle Hay Road & NW 60th Ave 1/14/2015

Intersection	
Int Delay, s/veh	3.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	86	53	1278	134	48	1037
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	75	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	93	58	1389	146	52	1127

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2130	767	0	0	1535	0
Stage 1	1462	-	-	-	-	-
Stage 2	668	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 43	345	-	-	429	-
Stage 1	179	-	-	-	-	-
Stage 2	471	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 38	345	-	-	429	-
Mov Cap-2 Maneuver	128	-	-	-	-	-
Stage 1	179	-	-	-	-	-
Stage 2	414	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	59.9	0	0.6
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	128	345	429	-
HCM Lane V/C Ratio	-	-	0.73	0.167	0.122	-
HCM Control Delay (s)	-	-	86.1	17.5	14.6	-
HCM Lane LOS	-	-	F	C	B	-
HCM 95th %tile Q(veh)	-	-	4.1	0.6	0.4	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 2010 TWSC
6: Merle Hay Road & W Grocery Access 1/14/2015

Intersection	
Int Delay, s/veh	2.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	30	40	1291	40	50	1054
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	43	1403	43	54	1146

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2107	723	0	0	1447	0
Stage 1	1425	-	-	-	-	-
Stage 2	682	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	44	369	-	-	464	-
Stage 1	188	-	-	-	-	-
Stage 2	464	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 30	369	-	-	464	-
Mov Cap-2 Maneuver	120	-	-	-	-	-
Stage 1	188	-	-	-	-	-
Stage 2	316	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	34.8	0	2.5
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	195	464	-
HCM Lane V/C Ratio	-	-	0.39	0.117	-
HCM Control Delay (s)	-	-	34.8	13.8	2
HCM Lane LOS	-	-	D	B	A
HCM 95th %tile Q(veh)	-	-	1.7	0.4	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 2010 Signalized Intersection Summary
9: Merle Hay Road & NW 60th Ave

1/15/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	86	53	1278	134	48	1037
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1900	1863	1863
Adj Flow Rate, veh/h	93	58	1389	146	52	1127
Adj No. of Lanes	1	1	2	0	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	148	132	2211	231	269	2419
Arrive On Green	0.08	0.08	0.68	0.68	0.68	0.68
Sat Flow, veh/h	1774	1583	3328	338	337	3632
Grp Volume(v), veh/h	93	58	756	779	52	1127
Grp Sat Flow(s),veh/h/ln	1774	1583	1770	1803	337	1770
Q Serve(g_s), s	3.0	2.1	14.2	14.4	6.1	8.9
Cycle Q Clear(g_c), s	3.0	2.1	14.2	14.4	20.5	8.9
Prop In Lane	1.00	1.00		0.19	1.00	
Lane Grp Cap(c), veh/h	148	132	1209	1232	269	2419
V/C Ratio(X)	0.63	0.44	0.63	0.63	0.19	0.47
Avail Cap(c_a), veh/h	473	422	1209	1232	269	2419
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.82	0.82	1.00	1.00
Uniform Delay (d), s/veh	26.6	26.2	5.2	5.3	11.0	4.4
Incr Delay (d2), s/veh	4.4	2.3	2.0	2.0	1.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	1.0	7.4	7.6	0.7	4.4
LnGrp Delay(d),s/veh	31.0	28.5	7.3	7.3	12.6	5.1
LnGrp LOS	C	C	A	A	B	A
Approach Vol, veh/h	151		1535			1179
Approach Delay, s/veh	30.0		7.3			5.4
Approach LOS	C		A			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		48.0				48.0		12.0
Change Period (Y+Rc), s		7.0				7.0		7.0
Max Green Setting (Gmax), s		30.0				30.0		16.0
Max Q Clear Time (g_c+I1), s		16.4				22.5		5.0
Green Ext Time (p_c), s		10.6				6.3		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	7.7
HCM 2010 LOS	A

HCM 2010 TWSC
12: NW 60th Ave & S Grocery Access

1/14/2015

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	10	172	113	20	15	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	187	123	22	16	27

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	145	0	-	0	343	134
Stage 1	-	-	-	-	134	-
Stage 2	-	-	-	-	209	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1437	-	-	-	653	915
Stage 1	-	-	-	-	892	-
Stage 2	-	-	-	-	826	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1437	-	-	-	647	915
Mov Cap-2 Maneuver	-	-	-	-	647	-
Stage 1	-	-	-	-	892	-
Stage 2	-	-	-	-	819	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	9.8
HCM LOS			A

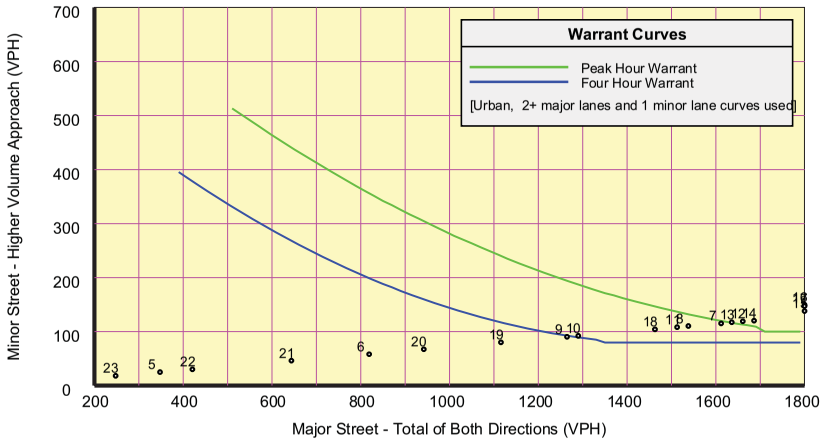
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1437	-	-	-	792
HCM Lane V/C Ratio	0.008	-	-	-	0.055
HCM Control Delay (s)	7.5	0	-	-	9.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2

FOTH Infrastructure & Enviroment, LLC

2014 Merle Hay Rd & NW 60th Avenue

RIRO Access

Signal Warrants - Summary



Analysis of 8-Hour Volume Warrants:

War 1A-Minimum Volume

Hour Begin	Major Total	Minor Vol	Minor Dir	Maj 600	Min 150
16:00	2,084	149	W	Yes	No
15:45	2,084	149	W	Yes	No
15:30	2,084	149	W	Yes	No
15:15	2,084	149	W	Yes	No
17:00	2,059	147	W	Yes	No
16:45	2,059	147	W	Yes	No
16:30	2,059	147	W	Yes	No
16:15	2,059	147	W	Yes	No
15:00	1,934	138	W	Yes	No
14:45	1,934	138	W	Yes	No
14:30	1,934	138	W	Yes	No
14:15	1,934	138	W	Yes	No
14:00	1,686	120	W	Yes	No
13:45	1,686	120	W	Yes	No
13:30	1,686	120	W	Yes	No
13:15	1,686	120	W	Yes	No
12:00	1,661	119	W	Yes	No
11:45	1,661	119	W	Yes	No
11:30	1,661	119	W	Yes	No
11:15	1,661	119	W	Yes	No
13:00	1,636	117	W	Yes	No
12:45	1,636	117	W	Yes	No
12:30	1,636	117	W	Yes	No
12:15	1,636	117	W	Yes	No

War 1B-Interruption of Traffic

Hour Begin	Major Total	Minor Vol	Minor Dir	Maj 900	Min 75
15:15	2,084	149	W	Yes	Yes
16:15	2,059	147	W	Yes	Yes
14:15	1,934	138	W	Yes	Yes
13:15	1,686	120	W	Yes	Yes
11:15	1,661	119	W	Yes	Yes
06:15	1,612	115	W	Yes	Yes
07:15	1,538	110	W	Yes	Yes
10:15	1,513	108	W	Yes	Yes
17:15	1,463	104	W	Yes	Yes
09:15	1,290	92	W	Yes	Yes
08:15	1,265	90	W	Yes	Yes
18:15	1,116	80	W	Yes	Yes
20:00	942	67	W	Yes	No
19:45	942	67	W	Yes	No
19:30	942	67	W	Yes	No
19:15	942	67	W	Yes	No
06:00	819	58	W	No	No
05:45	819	58	W	No	No
05:30	819	58	W	No	No
05:15	819	58	W	No	No
21:00	644	46	W	No	No
20:45	644	46	W	No	No
20:30	644	46	W	No	No

War 1C-Combination of Warrants

Hour Begin	Major Total	Minor Vol	Minor Dir	Maj 720	Min 120
15:15	2,084	149	W	Yes	Yes
16:15	2,059	147	W	Yes	Yes
14:15	1,934	138	W	Yes	Yes
13:15	1,686	120	W	Yes	Yes
12:00	1,661	119	W	Yes	No
11:45	1,661	119	W	Yes	No
11:30	1,661	119	W	Yes	No
11:15	1,661	119	W	Yes	No
13:00	1,636	117	W	Yes	No
12:45	1,636	117	W	Yes	No
12:30	1,636	117	W	Yes	No
12:15	1,636	117	W	Yes	No
07:00	1,612	115	W	Yes	No
06:45	1,612	115	W	Yes	No
06:30	1,612	115	W	Yes	No
06:15	1,612	115	W	Yes	No
08:00	1,538	110	W	Yes	No
07:45	1,538	110	W	Yes	No
07:30	1,538	110	W	Yes	No
07:15	1,538	110	W	Yes	No
11:00	1,513	108	W	Yes	No
10:45	1,513	108	W	Yes	No
10:30	1,513	108	W	Yes	No
10:15	1,513	108	W	Yes	No

FOTH Infrastructure & Enviroment, LLC

2014 Merle Hay Rd & NW 60th Avenue

RIRO Access

Signal Warrants - Summary

Major Street Approaches

Northbound: **Merle Hay Road**
Number of Lanes: **2**
85% Speed < 40 MPH.
Total Approach Volume: **13,902**

Southbound: **Merle Hay Road**
Number of Lanes: **2**
85% Speed < 40 MPH.
Total Approach Volume: **10,899**

Minor Street Approaches

Westbound: **NW 60th Ave**
Number of Lanes: **1**
Total Approach Volume: **1,770**

Warrant Summary (Urban values apply.)

Warrant 1 - Eight Hour Vehicular Volumes ..... **Satisfied**

Warrant 1A - Minimum Vehicular Volume ..... Not Satisfied
Required volumes reached for 0 hours, 8 are needed

Warrant 1B - Interruption of Continuous Traffic ..... Satisfied
Required volumes reached for 13 hours, 8 are needed

Warrant 1 A&B - Combination of Warrants ..... Not Satisfied
Required volumes reached for 4 hours, 8 are needed

Warrant 2 - Four Hour Volumes ..... **Satisfied**
Number of hours (11) volumes exceed minimum < minimum required (4).

Warrant 3 - Peak Hour ..... **Satisfied**

Warrant 3A - Peak Hour Delay ..... Satisfied
Number of hours (40) volumes exceed minimum >= required (1). Delay data not evaluated.

Warrant 3B - Peak Hour Volumes ..... Satisfied
Volumes exceed minimums for at least one hour.

Warrant 4 - Pedestrian Volumes ..... Not Evaluated

Warrant 5 - School Crossing ..... Not Evaluated

Warrant 6 - Coordinated Signal System ..... Not Evaluated

Warrant 7 - Crash Experience ..... Not Evaluated

Warrant 8 - Roadway Network ..... Not Evaluated

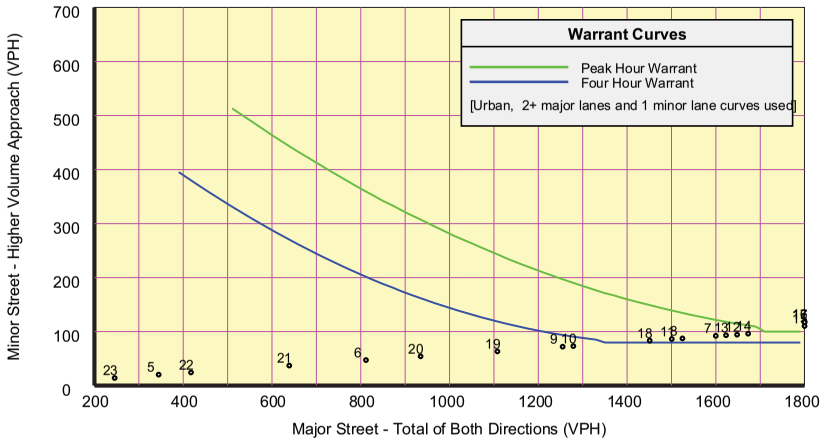
Warrant 9 - Intersection Near a Grade Crossing ..... Not Evaluated

FOTH Infrastructure & Enviroment, LLC

2014 Merle Hay Rd & NW 60th Avenue

Full Access

Signal Warrants - Summary



Analysis of 8-Hour Volume Warrants:

War 1A-Minimum Volume **War 1B-Interruption of Traffic** **War 1C-Combination of Warrants**

Hour	Major	Minor		Maj	Min	Hour	Major	Minor		Maj	Min	Hour	Major	Minor		Maj	Min
Begin	Total	Vol	Dir	600	150	Begin	Total	Vol	Dir	900	75	Begin	Total	Vol	Dir	720	120
16:00	2,067	118	W	Yes	No	15:15	2,067	118	W	Yes	Yes	16:00	2,067	118	W	Yes	No
15:45	2,067	118	W	Yes	No	16:15	2,042	117	W	Yes	Yes	15:45	2,067	118	W	Yes	No
15:30	2,067	118	W	Yes	No	14:15	1,919	110	W	Yes	Yes	15:30	2,067	118	W	Yes	No
15:15	2,067	118	W	Yes	No	13:15	1,673	96	W	Yes	Yes	15:15	2,067	118	W	Yes	No
17:00	2,042	117	W	Yes	No	11:15	1,648	94	W	Yes	Yes	17:00	2,042	117	W	Yes	No
16:45	2,042	117	W	Yes	No	12:15	1,623	93	W	Yes	Yes	16:45	2,042	117	W	Yes	No
16:30	2,042	117	W	Yes	No	06:15	1,600	92	W	Yes	Yes	16:30	2,042	117	W	Yes	No
16:15	2,042	117	W	Yes	No	07:15	1,525	87	W	Yes	Yes	16:15	2,042	117	W	Yes	No
15:00	1,919	110	W	Yes	No	10:15	1,501	86	W	Yes	Yes	15:00	1,919	110	W	Yes	No
14:45	1,919	110	W	Yes	No	17:15	1,451	83	W	Yes	Yes	14:45	1,919	110	W	Yes	No
14:30	1,919	110	W	Yes	No	10:00	1,279	73	W	Yes	No	14:30	1,919	110	W	Yes	No
14:15	1,919	110	W	Yes	No	09:45	1,279	73	W	Yes	No	14:15	1,919	110	W	Yes	No
14:00	1,673	96	W	Yes	No	09:30	1,279	73	W	Yes	No	14:00	1,673	96	W	Yes	No
13:45	1,673	96	W	Yes	No	09:15	1,279	73	W	Yes	No	13:45	1,673	96	W	Yes	No
13:30	1,673	96	W	Yes	No	09:00	1,255	72	W	Yes	No	13:30	1,673	96	W	Yes	No
13:15	1,673	96	W	Yes	No	08:45	1,255	72	W	Yes	No	13:15	1,673	96	W	Yes	No
12:00	1,648	94	W	Yes	No	08:30	1,255	72	W	Yes	No	12:00	1,648	94	W	Yes	No
11:45	1,648	94	W	Yes	No	08:15	1,255	72	W	Yes	No	11:45	1,648	94	W	Yes	No
11:30	1,648	94	W	Yes	No	19:00	1,108	63	W	Yes	No	11:30	1,648	94	W	Yes	No
11:15	1,648	94	W	Yes	No	18:45	1,108	63	W	Yes	No	11:15	1,648	94	W	Yes	No
13:00	1,623	93	W	Yes	No	18:30	1,108	63	W	Yes	No	13:00	1,623	93	W	Yes	No
12:45	1,623	93	W	Yes	No	18:15	1,108	63	W	Yes	No	12:45	1,623	93	W	Yes	No
12:30	1,623	93	W	Yes	No	20:00	935	54	W	Yes	No	12:30	1,623	93	W	Yes	No
12:15	1,623	93	W	Yes	No	19:45	935	54	W	Yes	No	12:15	1,623	93	W	Yes	No

FOTH Infrastructure & Enviroment, LLC

2014 Merle Hay Rd & NW 60th Avenue

Full Access

Signal Warrants - Summary

Major Street Approaches

Northbound: **Merle Hay Road**
Number of Lanes: **2**
85% Speed < 40 MPH.
Total Approach Volume: **13,902**

Southbound: **Merle hay Road**
Number of Lanes: **2**
85% Speed < 40 MPH.
Total Approach Volume: **10,702**

Minor Street Approaches

Westbound: **NW 60th Avenue**
Number of Lanes: **1**
Total Approach Volume: **1,409**

Warrant Summary (Urban values apply.)

Warrant 1 - Eight Hour Vehicular Volumes ..... **Satisfied**

Warrant 1A - Minimum Vehicular Volume ..... Not Satisfied
Required volumes reached for 0 hours, 8 are needed

Warrant 1B - Interruption of Continuous Traffic ..... Satisfied
Required volumes reached for 10 hours, 8 are needed

Warrant 1 A&B - Combination of Warrants ..... Not Satisfied
Required volumes reached for 0 hours, 8 are needed

Warrant 2 - Four Hour Volumes ..... **Satisfied**
Number of hours (10) volumes exceed minimum < minimum required (4).

Warrant 3 - Peak Hour ..... **Satisfied**

Warrant 3A - Peak Hour Delay ..... Satisfied
Number of hours (12) volumes exceed minimum >= required (1). Delay data not evaluated.

Warrant 3B - Peak Hour Volumes ..... Satisfied
Volumes exceed minimums for at least one hour.

Warrant 4 - Pedestrian Volumes ..... Not Evaluated

Warrant 5 - School Crossing ..... Not Evaluated

Warrant 6 - Coordinated Signal System ..... Not Evaluated

Warrant 7 - Crash Experience ..... Not Evaluated

Warrant 8 - Roadway Network ..... Not Evaluated

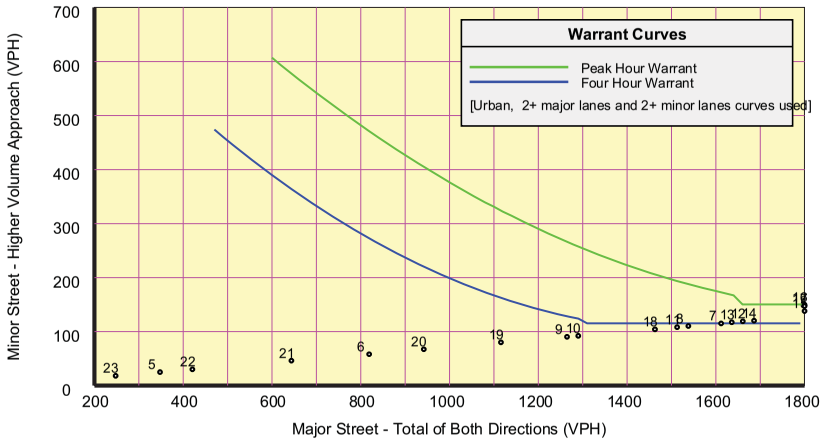
Warrant 9 - Intersection Near a Grade Crossing ..... Not Evaluated

FOTH Infrastructure & Enviroment, LLC

2014 Merle Hay Rd & NW 60th Avenue

RIRO Access with RTL on NW 60th at MHR

Signal Warrants - Summary



Analysis of 8-Hour Volume Warrants:

War 1A-Minimum Volume | **War 1B-Interruption of Traffic** | **War 1C-Combination of Warrants**

Hour Begin	Major Total	Minor Vol	Minor Dir	Maj 600	Min 200	Hour Begin	Major Total	Minor Vol	Minor Dir	Maj 900	Min 100	Hour Begin	Major Total	Minor Vol	Minor Dir	Maj 720	Min 160
16:00	2,084	149	W	Yes	No	15:15	2,084	149	W	Yes	Yes	16:00	2,084	149	W	Yes	No
15:45	2,084	149	W	Yes	No	16:15	2,059	147	W	Yes	Yes	15:45	2,084	149	W	Yes	No
15:30	2,084	149	W	Yes	No	14:15	1,934	138	W	Yes	Yes	15:30	2,084	149	W	Yes	No
15:15	2,084	149	W	Yes	No	13:15	1,686	120	W	Yes	Yes	15:15	2,084	149	W	Yes	No
17:00	2,059	147	W	Yes	No	11:15	1,661	119	W	Yes	Yes	17:00	2,059	147	W	Yes	No
16:45	2,059	147	W	Yes	No	12:15	1,636	117	W	Yes	Yes	16:45	2,059	147	W	Yes	No
16:30	2,059	147	W	Yes	No	06:15	1,612	115	W	Yes	Yes	16:30	2,059	147	W	Yes	No
16:15	2,059	147	W	Yes	No	07:15	1,538	110	W	Yes	Yes	16:15	2,059	147	W	Yes	No
15:00	1,934	138	W	Yes	No	10:15	1,513	108	W	Yes	Yes	15:00	1,934	138	W	Yes	No
14:45	1,934	138	W	Yes	No	17:15	1,463	104	W	Yes	Yes	14:45	1,934	138	W	Yes	No
14:30	1,934	138	W	Yes	No	10:00	1,290	92	W	Yes	No	14:30	1,934	138	W	Yes	No
14:15	1,934	138	W	Yes	No	09:45	1,290	92	W	Yes	No	14:15	1,934	138	W	Yes	No
14:00	1,686	120	W	Yes	No	09:30	1,290	92	W	Yes	No	14:00	1,686	120	W	Yes	No
13:45	1,686	120	W	Yes	No	09:15	1,290	92	W	Yes	No	13:45	1,686	120	W	Yes	No
13:30	1,686	120	W	Yes	No	09:00	1,265	90	W	Yes	No	13:30	1,686	120	W	Yes	No
13:15	1,686	120	W	Yes	No	08:45	1,265	90	W	Yes	No	13:15	1,686	120	W	Yes	No
12:00	1,661	119	W	Yes	No	08:30	1,265	90	W	Yes	No	12:00	1,661	119	W	Yes	No
11:45	1,661	119	W	Yes	No	08:15	1,265	90	W	Yes	No	11:45	1,661	119	W	Yes	No
11:30	1,661	119	W	Yes	No	19:00	1,116	80	W	Yes	No	11:30	1,661	119	W	Yes	No
11:15	1,661	119	W	Yes	No	18:45	1,116	80	W	Yes	No	11:15	1,661	119	W	Yes	No
13:00	1,636	117	W	Yes	No	18:30	1,116	80	W	Yes	No	13:00	1,636	117	W	Yes	No
12:45	1,636	117	W	Yes	No	18:15	1,116	80	W	Yes	No	12:45	1,636	117	W	Yes	No
12:30	1,636	117	W	Yes	No	20:00	942	67	W	Yes	No	12:30	1,636	117	W	Yes	No
12:15	1,636	117	W	Yes	No	19:45	942	67	W	Yes	No	12:15	1,636	117	W	Yes	No

FOTH Infrastructure & Enviroment, LLC

2014 Merle Hay Rd & NW 60th Avenue

RIRO Access with RTL on NW 60th at MHR

Signal Warrants - Summary

Major Street Approaches

Northbound: **Merle Hay Road**
Number of Lanes: **2**
85% Speed < 40 MPH.
Total Approach Volume: **13,902**

Southbound: **Merle Hay Road**
Number of Lanes: **2**
85% Speed < 40 MPH.
Total Approach Volume: **10,899**

Minor Street Approaches

Westbound: **NW 60th Ave**
Number of Lanes: **2**
Total Approach Volume: **1,770**

Warrant Summary (Urban values apply.)

Warrant 1 - Eight Hour Vehicular Volumes ..... **Satisfied**

Warrant 1A - Minimum Vehicular Volume ..... Not Satisfied
Required volumes reached for 0 hours, 8 are needed

Warrant 1B - Interruption of Continuous Traffic ..... Satisfied
Required volumes reached for 10 hours, 8 are needed

Warrant 1 A&B - Combination of Warrants ..... Not Satisfied
Required volumes reached for 0 hours, 8 are needed

Warrant 2 - Four Hour Volumes ..... **Satisfied**
Number of hours (7) volumes exceed minimum < minimum required (4).

Warrant 3 - Peak Hour ..... **Not Satisfied**

Warrant 3A - Peak Hour Delay ..... Not Satisfied
Approach volumes on minor street don't exceed minimums for any hour. Delay data not evaluated.

Warrant 3B - Peak Hour Volumes ..... Not Satisfied
Volumes do not exceed minimums for any hour.

Warrant 4 - Pedestrian Volumes ..... Not Evaluated

Warrant 5 - School Crossing ..... Not Evaluated

Warrant 6 - Coordinated Signal System ..... Not Evaluated

Warrant 7 - Crash Experience ..... Not Evaluated

Warrant 8 - Roadway Network ..... Not Evaluated

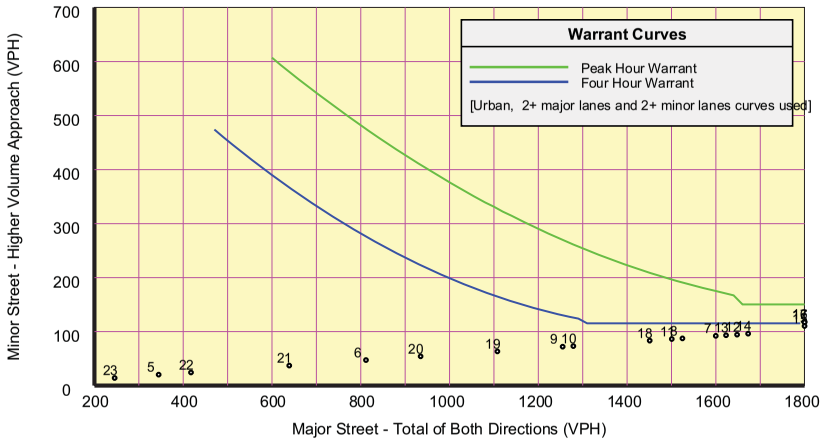
Warrant 9 - Intersection Near a Grade Crossing ..... Not Evaluated

FOTH Infrastructure & Enviroment, LLC

2014 Merle Hay Rd & NW 60th Avenue

Full Access w RTL on 60th at MHR

Signal Warrants - Summary



Analysis of 8-Hour Volume Warrants:

War 1A-Minimum Volume **War 1B-Interruption of Traffic** **War 1C-Combination of Warrants**

Hour	Major	Minor		Maj	Min	Hour	Major	Minor		Maj	Min	Hour	Major	Minor		Maj	Min
Begin	Total	Vol	Dir	600	200	Begin	Total	Vol	Dir	900	100	Begin	Total	Vol	Dir	720	160
16:00	2,067	118	W	Yes	No	15:15	2,067	118	W	Yes	Yes	16:00	2,067	118	W	Yes	No
15:45	2,067	118	W	Yes	No	16:15	2,042	117	W	Yes	Yes	15:45	2,067	118	W	Yes	No
15:30	2,067	118	W	Yes	No	14:15	1,919	110	W	Yes	Yes	15:30	2,067	118	W	Yes	No
15:15	2,067	118	W	Yes	No	14:00	1,673	96	W	Yes	No	15:15	2,067	118	W	Yes	No
17:00	2,042	117	W	Yes	No	13:45	1,673	96	W	Yes	No	17:00	2,042	117	W	Yes	No
16:45	2,042	117	W	Yes	No	13:30	1,673	96	W	Yes	No	16:45	2,042	117	W	Yes	No
16:30	2,042	117	W	Yes	No	13:15	1,673	96	W	Yes	No	16:30	2,042	117	W	Yes	No
16:15	2,042	117	W	Yes	No	12:00	1,648	94	W	Yes	No	16:15	2,042	117	W	Yes	No
15:00	1,919	110	W	Yes	No	11:45	1,648	94	W	Yes	No	15:00	1,919	110	W	Yes	No
14:45	1,919	110	W	Yes	No	11:30	1,648	94	W	Yes	No	14:45	1,919	110	W	Yes	No
14:30	1,919	110	W	Yes	No	11:15	1,648	94	W	Yes	No	14:30	1,919	110	W	Yes	No
14:15	1,919	110	W	Yes	No	13:00	1,623	93	W	Yes	No	14:15	1,919	110	W	Yes	No
14:00	1,673	96	W	Yes	No	12:45	1,623	93	W	Yes	No	14:00	1,673	96	W	Yes	No
13:45	1,673	96	W	Yes	No	12:30	1,623	93	W	Yes	No	13:45	1,673	96	W	Yes	No
13:30	1,673	96	W	Yes	No	12:15	1,623	93	W	Yes	No	13:30	1,673	96	W	Yes	No
13:15	1,673	96	W	Yes	No	07:00	1,600	92	W	Yes	No	13:15	1,673	96	W	Yes	No
12:00	1,648	94	W	Yes	No	06:45	1,600	92	W	Yes	No	12:00	1,648	94	W	Yes	No
11:45	1,648	94	W	Yes	No	06:30	1,600	92	W	Yes	No	11:45	1,648	94	W	Yes	No
11:30	1,648	94	W	Yes	No	06:15	1,600	92	W	Yes	No	11:30	1,648	94	W	Yes	No
11:15	1,648	94	W	Yes	No	08:00	1,525	87	W	Yes	No	11:15	1,648	94	W	Yes	No
13:00	1,623	93	W	Yes	No	07:45	1,525	87	W	Yes	No	13:00	1,623	93	W	Yes	No
12:45	1,623	93	W	Yes	No	07:30	1,525	87	W	Yes	No	12:45	1,623	93	W	Yes	No
12:30	1,623	93	W	Yes	No	07:15	1,525	87	W	Yes	No	12:30	1,623	93	W	Yes	No
12:15	1,623	93	W	Yes	No	11:00	1,501	86	W	Yes	No	12:15	1,623	93	W	Yes	No

FOTH Infrastructure & Enviroment, LLC

2014 Merle Hay Rd & NW 60th Avenue

Full Access w RTL on 60th at MHR

Signal Warrants - Summary

Major Street Approaches

Northbound: **Merle Hay Road**
Number of Lanes: **2**
85% Speed < 40 MPH.
Total Approach Volume: **13,902**

Southbound: **Merle hay Road**
Number of Lanes: **2**
85% Speed < 40 MPH.
Total Approach Volume: **10,702**

Minor Street Approaches

Westbound: **NW 60th Avenue**
Number of Lanes: **2**
Total Approach Volume: **1,409**

Warrant Summary (Urban values apply.)

Warrant 1 - Eight Hour Vehicular Volumes ..... Not Satisfied

Warrant 1A - Minimum Vehicular Volume ..... Not Satisfied
Required volumes reached for 0 hours, 8 are needed

Warrant 1B - Interruption of Continuous Traffic ..... Not Satisfied
Required volumes reached for 3 hours, 8 are needed

Warrant 1 A&B - Combination of Warrants ..... Not Satisfied
Required volumes reached for 0 hours, 8 are needed

Warrant 2 - Four Hour Volumes ..... Not Satisfied
Number of hours (2) volumes exceed minimum < minimum required (4).

Warrant 3 - Peak Hour ..... Not Satisfied

Warrant 3A - Peak Hour Delay ..... Not Satisfied
Approach volumes on minor street don't exceed minimums for any hour. Delay data not evaluated.

Warrant 3B - Peak Hour Volumes ..... Not Satisfied
Volumes do not exceed minimums for any hour.

Warrant 4 - Pedestrian Volumes ..... Not Evaluated

Warrant 5 - School Crossing ..... Not Evaluated

Warrant 6 - Coordinated Signal System ..... Not Evaluated

Warrant 7 - Crash Experience ..... Not Evaluated

Warrant 8 - Roadway Network ..... Not Evaluated

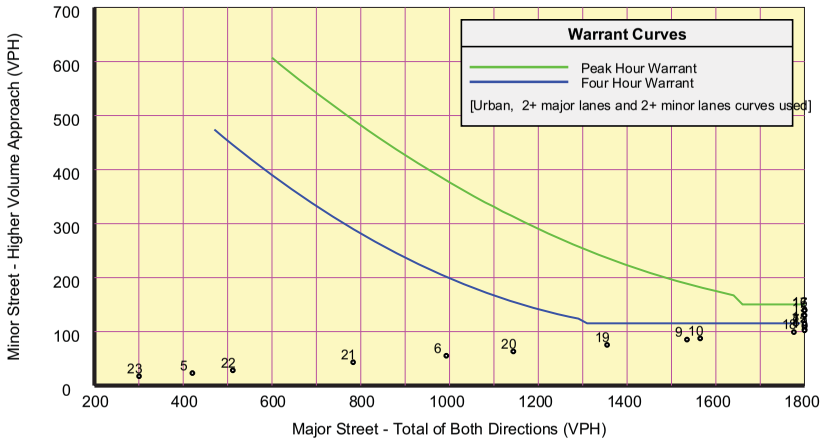
Warrant 9 - Intersection Near a Grade Crossing ..... Not Evaluated

FOTH Infrastructure & Enviroment, LLC

2034 Merle Hay Rd & NW 60th Avenue

Full Access with RTL on NW 60th at MHR

Signal Warrants - Summary



Analysis of 8-Hour Volume Warrants:

War 1A-Minimum Volume **War 1B-Interruption of Traffic** **War 1C-Combination of Warrants**

Hour	Major	Minor		Maj	Min	Hour	Major	Minor		Maj	Min	Hour	Major	Minor		Maj	Min
Begin	Total	Vol	Dir	600	200	Begin	Total	Vol	Dir	900	100	Begin	Total	Vol	Dir	720	160
16:00	2,528	140	W	Yes	No	15:15	2,528	140	W	Yes	Yes	16:00	2,528	140	W	Yes	No
15:45	2,528	140	W	Yes	No	16:15	2,498	139	W	Yes	Yes	15:45	2,528	140	W	Yes	No
15:30	2,528	140	W	Yes	No	14:15	2,348	130	W	Yes	Yes	15:30	2,528	140	W	Yes	No
15:15	2,528	140	W	Yes	No	13:15	2,047	114	W	Yes	Yes	15:15	2,528	140	W	Yes	No
17:00	2,498	139	W	Yes	No	11:15	2,017	112	W	Yes	Yes	17:00	2,498	139	W	Yes	No
16:45	2,498	139	W	Yes	No	12:15	1,987	110	W	Yes	Yes	16:45	2,498	139	W	Yes	No
16:30	2,498	139	W	Yes	No	06:15	1,957	109	W	Yes	Yes	16:30	2,498	139	W	Yes	No
16:15	2,498	139	W	Yes	No	07:15	1,866	104	W	Yes	Yes	16:15	2,498	139	W	Yes	No
15:00	2,348	130	W	Yes	No	10:15	1,836	102	W	Yes	Yes	15:00	2,348	130	W	Yes	No
14:45	2,348	130	W	Yes	No	18:00	1,776	99	W	Yes	No	14:45	2,348	130	W	Yes	No
14:30	2,348	130	W	Yes	No	17:45	1,776	99	W	Yes	No	14:30	2,348	130	W	Yes	No
14:15	2,348	130	W	Yes	No	17:30	1,776	99	W	Yes	No	14:15	2,348	130	W	Yes	No
14:00	2,047	114	W	Yes	No	17:15	1,776	99	W	Yes	No	14:00	2,047	114	W	Yes	No
13:45	2,047	114	W	Yes	No	10:00	1,565	87	W	Yes	No	13:45	2,047	114	W	Yes	No
13:30	2,047	114	W	Yes	No	09:45	1,565	87	W	Yes	No	13:30	2,047	114	W	Yes	No
13:15	2,047	114	W	Yes	No	09:30	1,565	87	W	Yes	No	13:15	2,047	114	W	Yes	No
12:00	2,017	112	W	Yes	No	09:15	1,565	87	W	Yes	No	12:00	2,017	112	W	Yes	No
11:45	2,017	112	W	Yes	No	09:00	1,535	85	W	Yes	No	11:45	2,017	112	W	Yes	No
11:30	2,017	112	W	Yes	No	08:45	1,535	85	W	Yes	No	11:30	2,017	112	W	Yes	No
11:15	2,017	112	W	Yes	No	08:30	1,535	85	W	Yes	No	11:15	2,017	112	W	Yes	No
13:00	1,987	110	W	Yes	No	08:15	1,535	85	W	Yes	No	13:00	1,987	110	W	Yes	No
12:45	1,987	110	W	Yes	No	19:00	1,355	75	W	Yes	No	12:45	1,987	110	W	Yes	No
12:30	1,987	110	W	Yes	No	18:45	1,355	75	W	Yes	No	12:30	1,987	110	W	Yes	No
12:15	1,987	110	W	Yes	No	18:30	1,355	75	W	Yes	No	12:15	1,987	110	W	Yes	No

FOTH Infrastructure & Enviroment, LLC

2034 Merle Hay Rd & NW 60th Avenue

Full Access with RTL on NW 60th at MHR

Signal Warrants - Summary

Major Street Approaches

Northbound: **Merle hay Road**
Number of Lanes: **2**
85% Speed < 40 MPH.
Total Approach Volume: **17,000**

Southbound: **Merle Hay Road**
Number of Lanes: **2**
85% Speed < 40 MPH.
Total Approach Volume: **13,101**

Minor Street Approaches

Westbound: **NW 60th Ave**
Number of Lanes: **2**
Total Approach Volume: **1,670**

Warrant Summary **(Urban values apply.)**

Warrant 1 - Eight Hour Vehicular Volumes ..... **Satisfied**

Warrant 1A - Minimum Vehicular Volume ..... Not Satisfied
Required volumes reached for 0 hours, 8 are needed

Warrant 1B - Interruption of Continuous Traffic ..... Satisfied
Required volumes reached for 9 hours, 8 are needed

Warrant 1 A&B - Combination of Warrants ..... Not Satisfied
Required volumes reached for 0 hours, 8 are needed

Warrant 2 - Four Hour Volumes ..... **Not Satisfied**
Number of hours (3) volumes exceed minimum < minimum required (4).

Warrant 3 - Peak Hour ..... **Not Satisfied**

Warrant 3A - Peak Hour Delay ..... Not Satisfied
Approach volumes on minor street don't exceed minimums for any hour. Delay data not evaluated.

Warrant 3B - Peak Hour Volumes ..... Not Satisfied
Volumes do not exceed minimums for any hour.

Warrant 4 - Pedestrian Volumes ..... Not Evaluated

Warrant 5 - School Crossing ..... Not Evaluated

Warrant 6 - Coordinated Signal System ..... Not Evaluated

Warrant 7 - Crash Experience ..... Not Evaluated

Warrant 8 - Roadway Network ..... Not Evaluated

Warrant 9 - Intersection Near a Grade Crossing ..... Not Evaluated