WINDLER HOMESTEAD

TRAFFIC IMPACT STUDY

Prepared for:

GVP Windler LLC
5750 DTC Parkway, Suite 210
Greenwood Village, CO 80111

Prepared by:

Felsburg Holt & Ullevig
6400 S Fiddlers Green Circle, Suite 1500
Greenwood Village, CO 80111
303.721.1440

Project Manager: Philip Dunham, PE, PTOE
Project Engineer(s): Kornel Gwiazdowski, EI, Tom Loseke, EI

FELSBURG HOLT & ULLEVIG
connecting & enhancing communities

FHU Reference No. 123657-01

July 2023

TABLE OF CONTENTS

Appendices

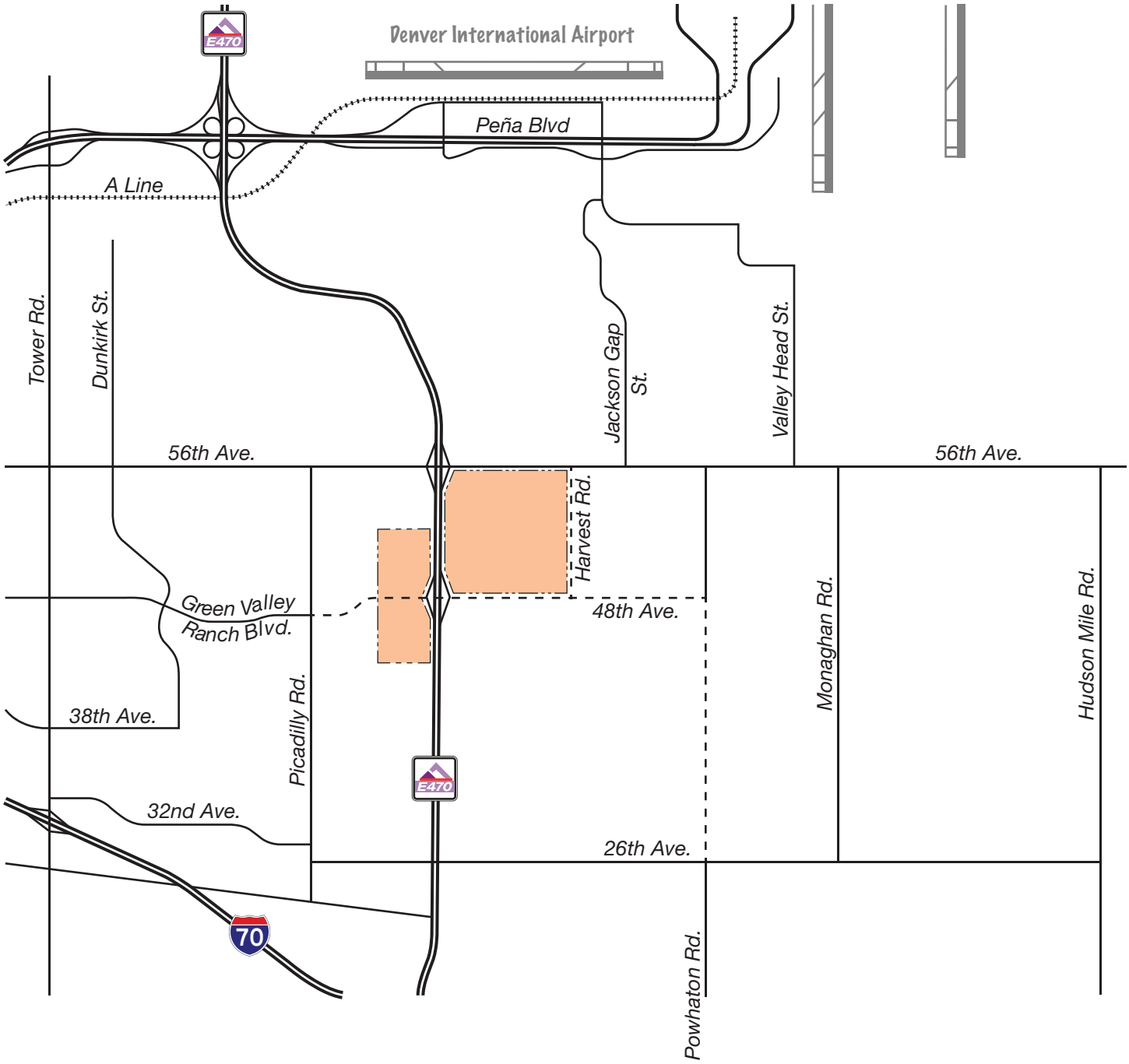
List of Figures

List of Tables

1. INTRODUCTION

Windler Homestead (Windler) Master Plan (MP) is a mixed-use development, consisting of single-family residential, multifamily residential, office space, retail, industrial/warehousing uses, and an elementary school. The approximately 852-acre site, currently vacant, is split into two adjoining pieces on either side of E-470. The first is roughly a full section of land east of E-470, north of the future 48th Avenue, west of the future Harvest Road, and south of 56th Avenue. The second is roughly a half section of land west of E-470, north of the future 42nd Avenue, east of the future Tibet Road, and south of the future 52nd Avenue and excludes the roughly 20-acre Brandenburg Parcel, part of the 310 West development, located on the northeast corner of the future intersection of Tibet Road and 48th Avenue. At build-out, the proposed development would consist of 3,310 units of single-family housing, 2,185 multifamily units, 648,900 square feet of retail space, 290,000 square feet of office space, 2.2 million square feet of industrial/warehousing space, and a 300-student elementary school. **Figure 1** illustrates the location of the site and the adjacent roadway network. **Figure 2** depicts the current land use plan. The site will have access to several collector and arterial roadways surrounding the site, namely; Tibet Road, 48th Avenue, 56th Avenue, and Harvest Road.

The purpose of this traffic study is to identify the potential impacts specific to the Windler MP development and any resultant required roadway or traffic control improvements. The study will explore full buildout of the site, evaluating a Long-Range (year 2040) planning horizon for the site. This planning horizon is based on the City of Aurora's 2018 *Northeast Area Transportation Study* (NEATS). Additional studies and conformance letters are anticipated with each subdivision application will provide more clarity on internal site transportation infrastructure and intersection geometries. This study is intended to establish the needs for the major roadway network, arterials and collectors, and proposed connections to those roadways.



LEGEND

= Project Site

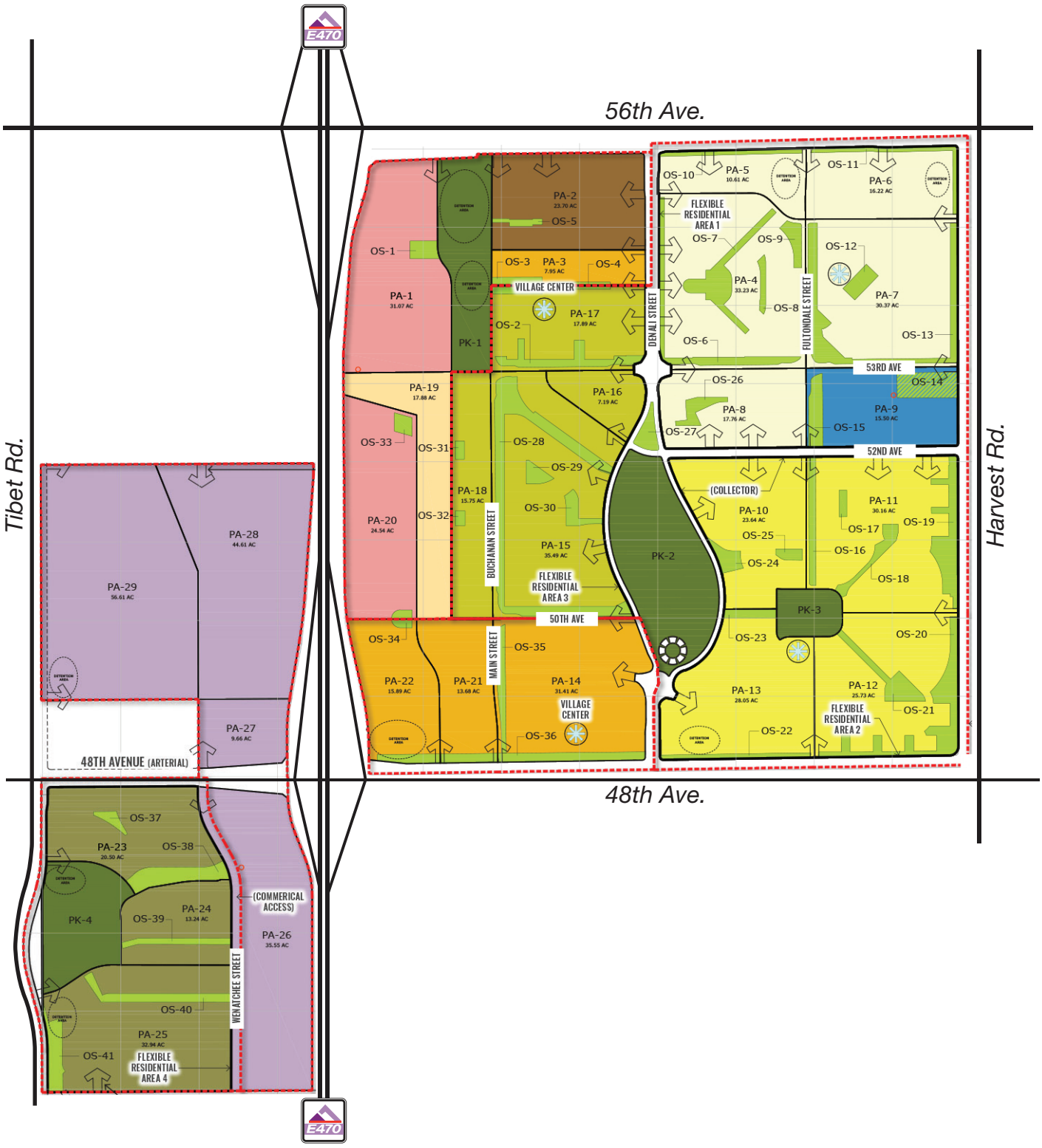
NORTH

FELSBURG HOLT & ULLEVIG

NOTE: Drawing Not to Scale

FIGURE 1
Vicinity Map

Windler TIS 123657-01 4/21/23



NORTH

FELSBURG HOLT & ULLEVIG

NOTE: Drawing Not to Scale

FIGURE 2
Site Plan Concept

Windler TIS 123657-01 4/21/23

II. EXISTING CONDITIONS

II.A. Surrounding Land Use

The area around the Windler site primarily consists of vacant land. The Green Valley Ranch East residential development exists immediately to the west of the future Tibet Road in Denver. Fulenwider Harvest Mile, Porteos, and Sun Empire are planned FDPs located north and east of the site and represent the other three quadrants of the future intersection of 56th Avenue and Harvest Road. Denver International Airport (DEN) is located approximately two and a half miles northeast of the site.

II.B. Transportation Network

Roadways

The existing transportation system around Windler includes the following facilities:

- **56th Avenue**. This east-west facility serves as the northern boundary of the site and consists of a two-lane cross-section with turn lanes located at the E-470 Interchange. The posted speed limit is 45 miles per hour (mph).
- **E-470**. This four-lane tollway facility runs north-south and splits the FDP site. A grade-separated interchange is provided at 56th Avenue and at 64th Avenue north of the site. A future interchange is planned at 48th Avenue, connecting the parcels on each side of the highway.

II.C. Traffic Volumes and Operations

A 72-hour automated traffic count was recently conducted on 56th Avenue adjacent to the anticipated site. AM and PM peak hour turning movements counts were recently conducted at the following intersections:

- 56th Avenue with E-470 NB Ramps
- 56th Avenue with E-470 SB Ramps

Appendix A contains the traffic count data. **Figure 3** depicts the existing traffic volumes. As shown, 56th Avenue currently serves approximately 7,800 vehicles per day (VPD) adjacent to the site. These current volumes are well below the Level of Service (LOS) C daily threshold established in the 2018 NEATS study for two-lane roadways.

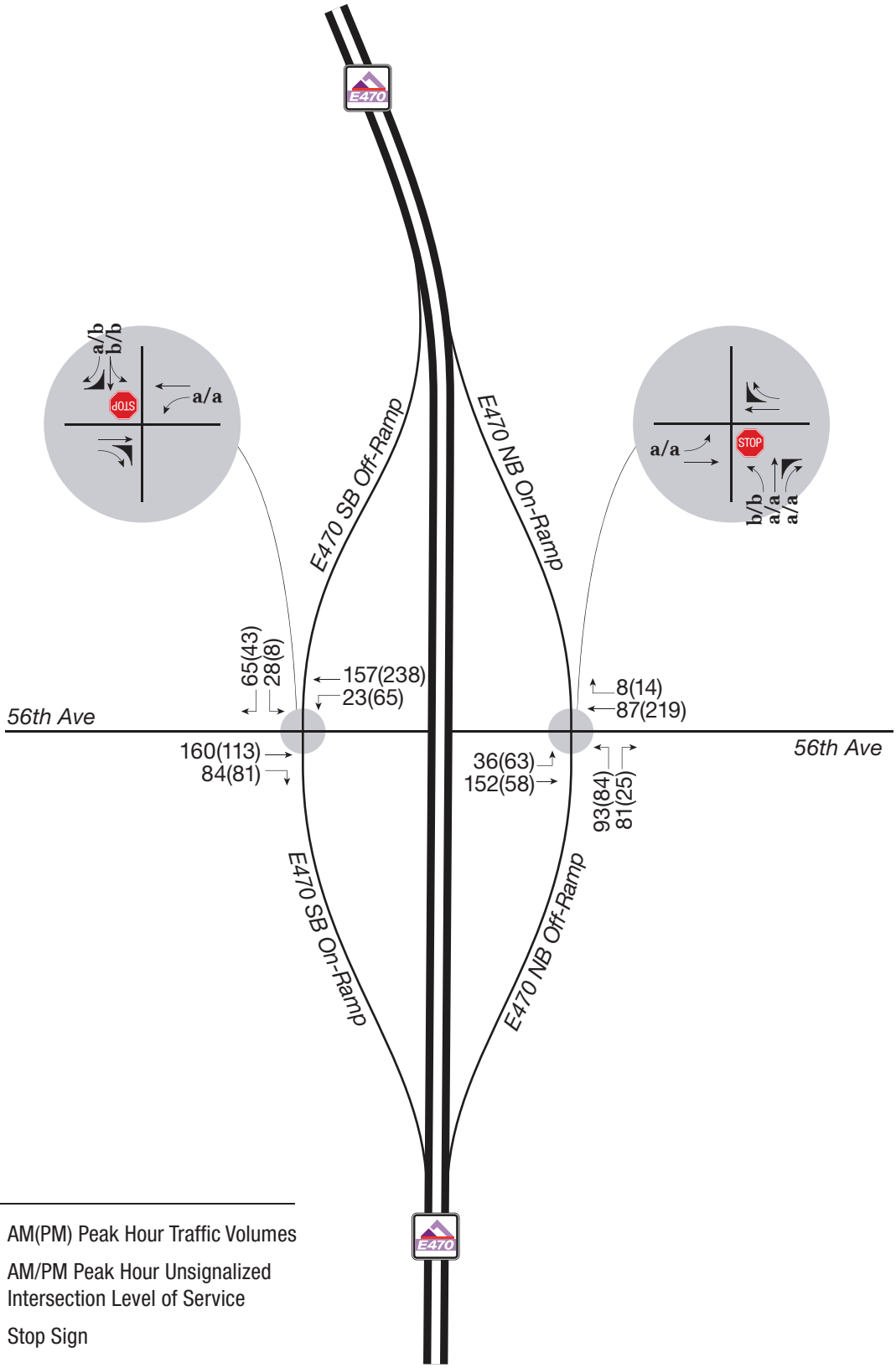
Calculations were conducted to assess operations given current traffic demands. These were conducted using techniques documented in the *Highway Capacity Manual (HCM) 6th Edition*, (Transportation Research Board, 2016) using the existing traffic volumes and intersection geometry. Level of Service (LOS) is a qualitative measure of traffic operational conditions, based on roadway capacity and vehicle delay. Levels of service are described by a letter designation ranging from A to F, with LOS A representing free-flow travel, while LOS F represents congested conditions. For signalized intersections, LOS is calculated for the entire intersection while LOS for unsignalized intersections is calculated for movements that must yield right-of-way to other traffic movements.

Table 1 summarizes LOS criteria for signalized and unsignalized (stop-controlled & roundabout) intersections. Synchro 11 was utilized for stop-control and signalized intersections, and SIDRA Intersection 9 for roundabout analysis within this report, with both software packages utilizing HCM methodologies.

Table 1. Level of Service (LOS) Criteria

Level of Service	Average Control Delay per Vehicle (sec/veh)	
	Signalized Intersections	Stop/Roundabout Controlled Intersections
A	≤ 10	≤ 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	> 80	> 50
HCM 6th Edition, Exhibit 19-8 & Exhibit 20-2		

Figure 3 depicts the existing intersection geometrics, traffic control, and intersection LOS results, and **Appendix B** contains existing LOS worksheets. As indicated, existing traffic operations at the study area intersections are acceptable, all intersection movements are anticipated to operate at LOS B or better, during the peak times analyzed.



LEGEND

XXX(XXX)	=	AM(PM) Peak Hour Traffic Volumes
x/x	=	AM/PM Peak Hour Unsignalized Intersection Level of Service
STOP	=	Stop Sign

NORTH

FELSBURG HOLT & ULLEVIG

NOTE: Drawing Not to Scale

FIGURE 3
Existing (2021) Traffic Conditions

Windler TIS 123657-01 4/21/23

III. PROPOSED CONDITIONS

III.A. Trip Generation

The *Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition, 2021* was used to estimate trip generation. The development would consist of 3,310 units of single-family housing, 2,185 multifamily units, 648,900 square feet of retail space, 290,000 square feet of office space, 2.2 million square feet of industrial/warehousing space, and a 300-student elementary school. This analysis used a mix of regression equations and average rates for the corresponding ITE code based on the methodology outlined in *ITE Trip Generation Handbook, 3rd Edition, 2017* for selecting the proper rates. **Table 2** shows the trip generation rates and equations for each land use code.

Table 2. ITE Trip Generation Rates and Equations

Land Use	ITE Code	Unit	Daily	Peak	Equations & Rates	Distributions	
						In	Out
General Light Industrial	110	KSF	T=3.76*X+50.47	AM	T=0.68*X+3.81	88%	12%
				PM	Ln(T)=0.72*Ln(X)+0.38	14%	86%
High-Cube Transload & Short-Term Storage Warehouse	154	KSF	T=6.41*X+75.31	AM	T=0.31*X+22.85	24%	76%
				PM	T=0.43*X+20.55	63%	37%
Single-family Detached	210	DU	Ln(T)=0.92*Ln(X)+2.68	AM	Ln(T)=0.91*Ln(T)+0.12	26%	74%
				PM	Ln(T)=0.94*Ln(X)+0.27	63%	37%
Multifamily (Low-Rise)	220	DU	T=6.41*X+75.31	AM	T=0.31*X+22.85	24%	76%
				PM	T=0.43*X+20.55	63%	37%
Elementary School	520	Students	T=2.27*X	AM	T=0.74*X	54%	46%
				PM	T=0.16*X	46%	54%
General Office	710	KSF	T=10.84*X	AM	T=1.52*X	88%	12%
				PM	T=1.44*X	17%	83%
Shopping Center (>150 KSF)	820	KSF	T=10.84*X	AM	T=1.52*X	88%	12%
				PM	T=1.44*X	17%	83%
Shopping Plaza (40-150 KSF)	821	KSF	T=67.52*X	AM	T=1.73*X	62%	38%
				PM	T=5.19*X	49%	51%
Strip Retail Plaza (<40KSF)	822	KSF	T=42.2*X+229.68	AM	T=2.36*X	60%	40%
				PM	T=6.59*X	50%	50%
DU = Dwelling Units KSF = 1,000 SF							

Table 3 outlines the estimated vehicle-trip generation for the proposed development. The Windler development is anticipated to generate a total of 88,699 vehicle trips per day and approximately 5,454 and 8,226 trips during the AM and PM peak hours, respectively.

Internal trip capture was determined using the National Cooperative Highway Research Program (NCHRP) 684 spreadsheet. Given the NCHRP 684 internal capture calculation methods, approximately 11 percent of the total generated trips were found to be internal, and 16 percent of the PM trips were determined to be internal. This equates to an estimated internal trip capture of 614 vehicle-trips during the AM peak hour and 1,232 vehicle-trips during the PM peak hour.

Additionally, A pass-by trip deduction was applied to traffic on the adjacent roadway. Pass-by trips consist of existing trips on the adjacent roadway that choose to make an interim stop on the way to their destination. Pass-by trip percentages from the *ITE Trip Generation Handbook* were used for the appropriate uses. **Appendix C** shows the NCHRP 684 internal capture summary sheets.

Table 3. Site Trip Generation

Map Code	ITE Code	Land Use Description	Size	Unit	Daily	AM Peak Hour Total Trip Generation			AM Peak Hour Internal Capture Trips					AM Peak Hour External Trips			PM Peak Hour Total Trip Generation			PM Peak Hour Internal Capture Trips					PM Peak Hour External Trips			PM Pass-By %	PM Pass-By Trips
					Total	In	Out	Total	In %	Out %	In	Out	Total	In	Out	Total	In	Out	Total	In %	Out %	In	Out	Total	In	Out	Total		
PA-1	820	Shopping Center	338.0	KSF	14,689	206	127	333	7%	10%	61	31	92	145	96	241	651	705	1,356	15%	28%	98	197	295	553	508	1,061	19%	105
PA-2	220	Multifamily Housing (Low-Rise)	711	DU	4,633	58	185	243	2%	2%	1	4	5	57	181	238	205	121	326	16%	12%	33	20	53	172	101	273	-	-
PA-3.1	210	Single Family Detached Housing	76	DU	784	15	43	58	2%	2%	0	1	1	15	42	57	49	28	77	16%	12%	8	3	11	41	25	66	-	-
PA-3.2	822	Strip Retail Plaza	10.0	KSF	652	14	10	24	7%	10%	1	1	2	13	9	22	39	39	78	15%	28%	6	11	17	33	28	61	40%	13
PA-4	210	Single Family Detached Housing	316	DU	2,908	53	159	212	2%	2%	1	9	10	52	150	202	185	108	293	16%	12%	30	18	48	155	90	245	-	-
PA-5	220	Multifamily Housing (Low-Rise)	228	DU	1,537	23	71	94	2%	2%	1	2	3	22	69	91	75	44	119	16%	12%	12	5	17	63	39	102	-	-
PA-6	220	Multifamily Housing (Low-Rise)	322	DU	2,139	30	93	123	2%	2%	1	2	3	29	91	120	100	59	159	16%	12%	16	7	23	84	52	136	-	-
PA-7.1	210	Single Family Detached Housing	269	DU	2,508	46	137	183	2%	2%	2	3	5	44	134	178	159	93	252	16%	12%	26	11	37	133	82	215	-	-
PA-7.2	822	Strip Retail Plaza	5.0	KSF	441	7	5	12	7%	10%	1	1	2	6	4	10	24	24	48	15%	28%	4	7	11	20	17	37	40%	8
PA-8	210	Single Family Detached Housing	160	DU	1,555	29	86	114	2%	2%	1	2	3	28	84	111	98	57	155	16%	12%	16	7	23	82	50	132	-	-
PA-9	520	Elementary School	300	Students	681	120	102	222	33%	42%	40	42	82	80	60	140	22	26	48	68%	62%	15	16	31	7	10	17	-	-
PA-10	210	Single Family Detached Housing	185	DU	1,777	33	98	130	2%	2%	1	2	3	32	96	127	112	65	177	16%	12%	18	8	26	94	57	151	-	-
PA-11	210	Single Family Detached Housing	206	DU	1,962	36	108	144	2%	2%	1	2	3	35	106	141	123	73	196	16%	12%	20	9	29	103	64	167	-	-
PA-12	210	Single Family Detached Housing	205	DU	1,953	36	107	143	2%	2%	1	6	7	35	101	136	123	72	195	16%	12%	20	9	29	103	63	166	-	-
PA-13.1	210	Single Family Detached Housing	160	DU	1,555	29	86	114	2%	2%	1	2	3	28	84	111	98	57	155	16%	12%	16	7	23	82	50	132	-	-
PA-13.2	220	Multifamily Housing (Low-Rise)	338	DU	2,242	31	97	128	2%	2%	1	2	3	30	95	125	105	61	166	16%	12%	17	7	24	88	54	142	-	-
PA-14.1	210	Single Family Detached Housing	195	DU	1,865	34	103	137	2%	2%	1	2	3	33	101	134	117	69	186	16%	12%	19	8	27	98	61	159	-	-
PA-14.2	220	Multifamily Housing (Low-Rise)	320	DU	2,127	29	93	122	2%	2%	1	5	6	28	88	116	100	58	158	16%	12%	16	7	23	84	51	135	-	-
PA-14.3	710	General Office Building	130	KSF	1,458	185	25	210	7%	27%	40	7	47	145	18	163	35	171	206	88%	22%	31	11	42	4	160	164	-	-
PA-15	210	Single Family Detached Housing	313	DU	2,883	53	158	210	2%	2%	1	9	10	52	149	200	183	107	290	16%	12%	29	13	42	154	94	248	-	-
PA-16	210	Single Family Detached Housing	59	DU	621	12	35	46	2%	2%	1	1	2	11	34	44	38	23	61	16%	12%	6	3	9	32	20	52	-	-
PA-17.1	210	Single Family Detached Housing	152	DU	1,483	27	82	109	2%	2%	1	2	3	26	80	106	93	54	147	16%	12%	15	7	22	78	47	125	-	-
PA-17.2	822	Strip Retail Plaza	10.9	KSF	690	15	11	26	7%	10%	5	1	6	10	10	20	41	42	83	15%	28%	6	9	15	35	33	68	40%	14
PA-18	210	Single Family Detached Housing	142	DU	1,393	26	77	102	2%	2%	1	4	5	25	73	97	87	51	138	16%	12%	14	6	20	73	45	118	-	-
PA-19	210	Single Family Detached Housing	161	DU	1,564	29	86	115	2%	2%	1	2	3	28	84	112	98	57	155	16%	12%	16	10	26	82	47	129	-	-
PA-20	710	General Office Building	160	KSF	1,747	221	30	251	7%	27%	16	8	24	205	22	227	42	203	245	88%	22%	37	13	50	5	190	195	-	-
PA-21.1	220	Multifamily Housing (Low-Rise)	320	DU	2,127	29	93	122	2%	2%	1	2	3	28	91	119	100	58	158	16%	12%	16	10	26	84	48	132	-	-
PA-21.2	821	Shopping Plaza	45	KSF	4,252	98	61	159	7%	10%	7	6	13	91	55	146	223	241	464	15%	28%	34	49	83	189	192	381	29%	55
PA-22.1	820	Shopping Center	240.0	KSF	12,130	171	105	275	7%	10%	12	11	23	159	94	252	509	551	1,060	15%	28%	76	154	230	433	397	830	19%	82
PA-22.2	220	Multifamily Housing (Low-Rise)	103	DU	736	13	42	55	2%	2%	1	2	3	12	40	52	41	24	65	16%	12%	7	3	10	34	21	55	-	-
PA-23	210	Single Family Detached Housing	209	DU	1,988	37	110	146	2%	2%	1	6	7	36	104	139	125	74	199	16%	12%	20	9	29	105	65	170	-	-
PA-24	210	Single Family Detached Housing	118	DU	1,175	22	65	87	2%	2%	1	1	2	21	64	85	73	43	116	16%	12%	12	5	17	61	38	99	-	-
PA-25	210	Single Family Detached Housing	276	DU	2,568	47	141	188	2%	2%	1	8	9	46	133	179	163	95	258	16%	12%	26	16	42	137	79	216	-	-
PA-26.1	154	High-Cube Transload and Short-Term Storage Warehouse	250	KSF	350	15	5	20	0%	0%	0	0	0	15	5	20	7	18	25	0%	0%	0	0	0	7	18	25	-	-
PA-26.2	110	General Light Industrial	250	KSF	990	153	21	174	0%	0%	0	0	0	153	21	174	11	67	78	0%	0%	0	0	0	11	67	78	-	-
PA-27.1	154	High-Cube Transload and Short-Term Storage Warehouse	100	KSF	140	6	2	8	0%	0%	0	0	0	6	2	8	3	7	10	0%	0%	0	0	0	3	7	10	-	-
PA-21.2	110	General Light Industrial	100	KSF	426	63	9	72	0%	0%	0	0	0	63	9	72	6	34	40	0%	0%	0	0	0	6	34	40		-
PA-28.1	154	High-Cube Transload and Short-Term Storage Warehouse	375	KSF	525	23	7	30	0%	0%	0	0	0	23	7	30	11	27	38	0%	0%	0	0	0	11	27	38	-	-
PA-28.2	110	General Light Industrial	375	KSF	1,460	228	31	259	0%	0%	0	0	0	228	31	259	15	89	104	0%	0%	0	0	0	15	89	104	-	-
PA-29.1	154	High-Cube Transload and Short-Term Storage Warehouse	375	KSF	525	23	7	30	0%	0%	0	0	0	23	7	30	11	27	38	0%	0%	0	0	0	11	27	38	-	-
PA-29.2	110	General Light Industrial	375	KSF	1,460	228	31	259	0%	0%	0	0	0	228	31	259	15	89	104	0%	0%	0	0	0	15	89	104	-	-
Total Vehicles					**88,699**	**2,553**	**2,944**	**5,497**	**-**	**-**	**207**	**189**	**396**	**2,346**	**2,755**	**5,101**	**4,315**	**3,911**	**8,226**	**-**	**-**	**735**	**675**	**1,410**	**3,580**	**3,236**	**6,816**	**-**	**277**

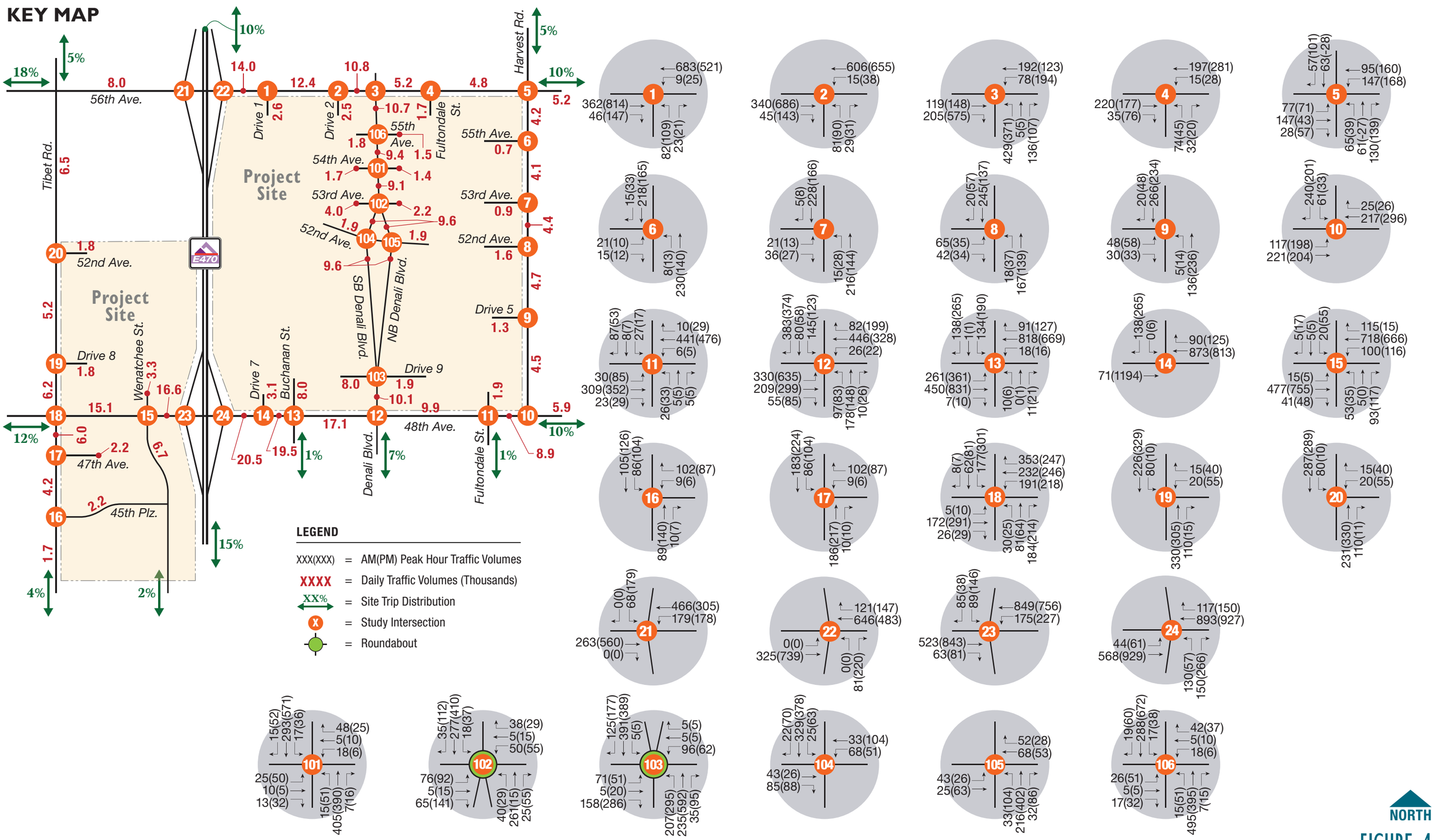
DU = Dwelling Units KSF = 1,000 SF

III.B. Site Trip Distribution and Site-Generated Traffic Assignment

The trip generation estimates from were assigned to the adjacent roadway system based on existing travel patterns, travel demand modeling information, and engineering judgment. The following distribution percentages were used to assign the site generated trips to the roadway network:

- **5%** oriented to/from the north on Harvest Road
- **10%** percent oriented to/from the east on 56th Avenue
- **18%** oriented to/from the west on 56th Avenue
- **10%** oriented to/from the north on E-470
- **15%** oriented to/from the south on E-470
- **10%** oriented to/from the east on 48th Avenue
- **12%** oriented to/from the west on 48th Avenue
- **4%** oriented to/from the south on Tibet Road
- **5%** oriented to/from the north on Tibet Road
- **1%** oriented to/from the south on Buchanan Street
- **7%** oriented to/from the south on Denali Boulevard
- **1%** oriented to/from the south on Fultondale Street
- **2%** oriented to/from the south on Wenatchee Street

Figure 4 shows the site trip distribution and resultant traffic assignment for external site generated trips that come in and out of the development via the surrounding roadway network. **Figure 5** shows the traffic assignment for site generated trips within the development. These trips are indicated as internal capture trips in. As indicated, 48th Avenue would carry between 5,900 and 20,500 VPD of site-generated traffic, 56th Avenue would carry between 4,800 and 12,400 VPD of site-generated traffic, Tibet Road would carry between 1,700 and 6,500 VPD of site-generated traffic, Harvest Road would carry between 4,100 and 4,700 VPD of site-generated traffic, and Denali Boulevard would carry between 9,100 and 10,700 VPD of site-generated traffic.



FELSBURG HOLT & ULLEVIG

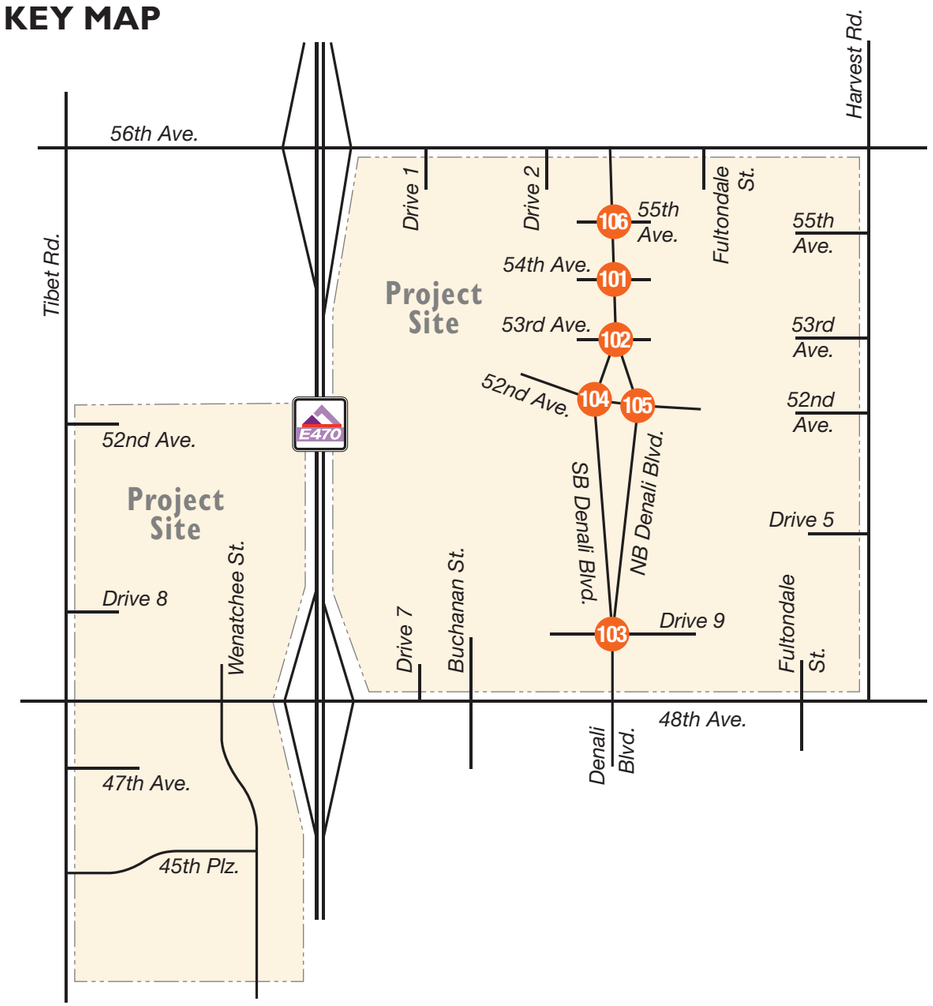
NOTE: Drawing Not to Scale

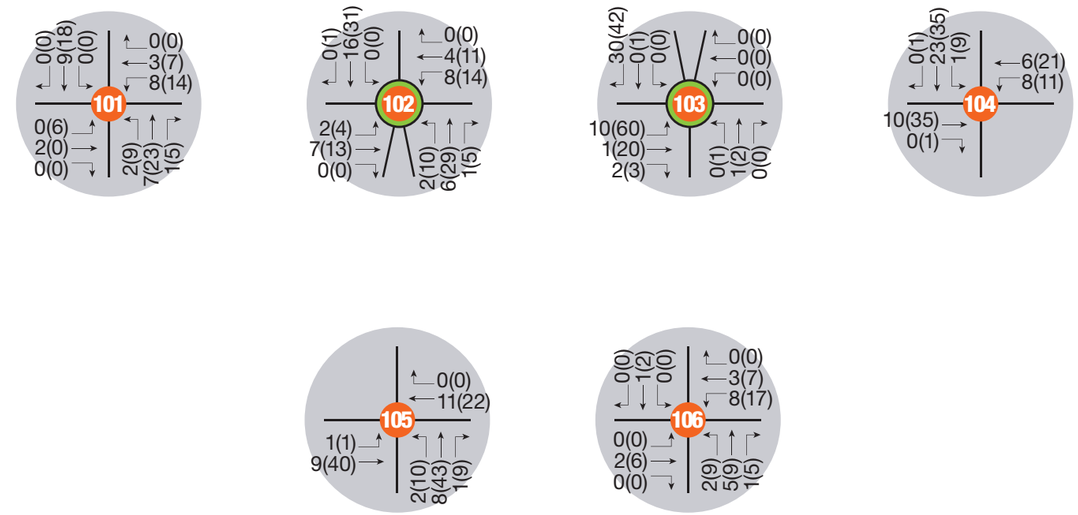
FIGURE 4

Site Trip Distribution and Traffic Assignment - External Trips

Windler TIS 123657-01 6/14/23

KEY MAP





LEGEND

XXX(XXX) = AM(PM) Peak Hour Traffic Volumes

X = Study Intersection

= Roundabout

NORTH

FELSBURG HOLT & ULLEVIG

NOTE: Drawing Not to Scale

FIGURE 5

Site Trip Distribution and Traffic Assignment - Internal Trips

Windler TIS 123657-01 6/14/23

IV. BACKGROUND CONDITIONS

This section presents background traffic projections for the buildout 2040 planning horizon. The following subsections describe the anticipated roadway network identified by NEATS, and the derivation of background traffic projections using the NEATS travel demand model.

IV.A. Transportation Network

As indicated, this study provides Year 2040 Buildout transportation recommendations for the roadways. The NEATS study area encompasses a regional area extending from approximately between Tower Road east to Schumaker Road and from Jewell Avenue on the south to 72nd Avenue on the north. Recommendations with respect to the Windler development include the construction of the following roadway network:

Six-lane Tollway

- E-470 adjacent to and through the site

Six-lane Major Arterials

- Harvest Road adjacent to the site
- 56th Avenue adjacent to the site
- 48th Avenue adjacent to and through the site

Four-lane Minor Arterials:

- Tibet Road adjacent to the site
- Denali Boulevard through the site

The above descriptions set the stage relative to the network and intersection through-lanes used in this effort with respect to the study area intersections. However, three significant developments have occurred related to the proposed roadway network since the development of the latest NEATS revision:

1. The parcel immediately north of 56th Avenue, within the Fulenwider Harvest Mile development, does not intend to construct Denali Boulevard between 56th Avenue and 60th Avenue. As a result of this break in connectivity to the north and the fact that Denali Boulevard is only constructed as far south as 38th Avenue within Aurora Highlands, the previously anticipated through volumes are projected to be reduced, allowing for the roadway classification to be downgraded to a collector roadway with half mile spacing between E-470 and Harvest Road, consistent with Aurora roadway network guidelines detailed within both NEATS and the City of Aurora Unified Development Ordinance (UDO).

2. Major changes are proposed to the alignment of Aerotropolis Parkway. NEATS had previously explored a diagonal connection between Powhaton Road and Harvest Road between 48th Avenue and 56th Avenue. A current effort being undertaken by the City of Aurora now recommends the diagonal occur between Powhaton Road and Jackson Gap Street. This new recommendation results in a significant reduction in traffic volumes along Harvest Road adjacent to the Windler site. Given this reduction in volumes, this NEATS update has preliminarily recommended that Harvest Road be constructed as a four-lane minor arterial between 48th Avenue and 64th Avenue.

3. An analysis of Green Valley Ranch East FDP determined that volumes along Tibet Street south of 48th Avenue do not support the previously proposed four-lane arterial, and the recommended cross-section was downgraded to a three-lane collector. Tibet Steet will remain a four-lane arterial north of 48th Avenue.

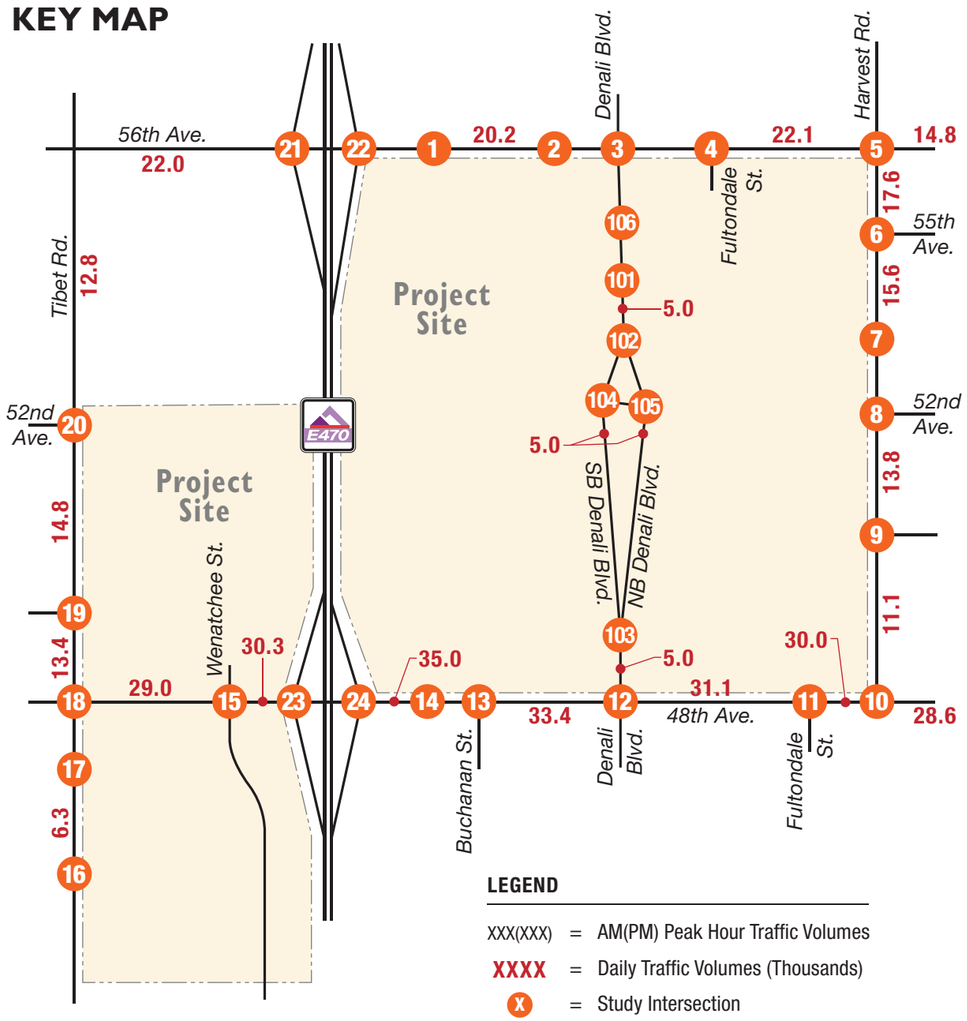
IV.B. Traffic Volumes and Operations

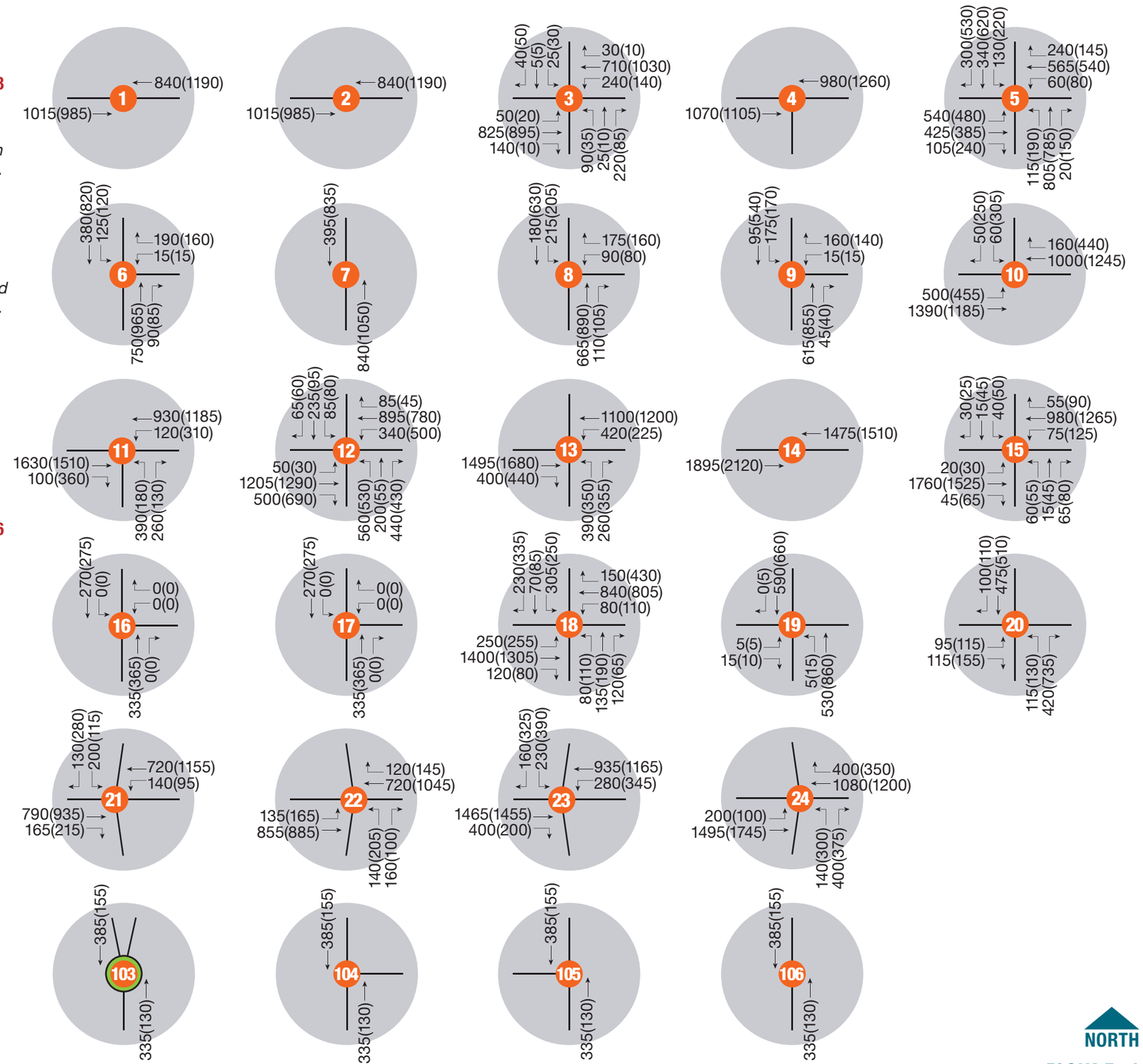
The NEATS travel demand model was used as the primary means of developing background traffic for the Windler development traffic study. Specifically, raw model results were extracted from the 2040 travel demand models, and trips estimated to originate from the Windler property, within the NEATS models, were manually removed from the totals, yielding model-based daily background traffic. Other nearby development's traffic studies were also considered in an effort to further refine volumes provided in NEATS based on planned development in the area. Those studies included TIS's for the adjacent developments of Fulenwider Harvest Mile, Sun Empire, Green Valley Ranch East, and 310 West, as well as the unpublished study being conducted by the City of Aurora regarding a new preferred alignment for Aerotropolis Parkway discussed in the previous section of this report.

Background traffic volume estimates for the 2040 Buildout scenario are shown in **Figure 6**. In 2040 background traffic volumes adjacent to the site along 48th Avenue are anticipated to be between 28,600 and 35,000 VPD, 56th Avenue would carry between 14,800 and 22,100 VPD, Tibet Road would carry between 6,300 and 14,800 VPD, Harvest Road would carry between 11,100 and 17,600 VPD and Denali Boulevard would carry approximately 5,000 VPD.

Figure 7 depicts the anticipated background intersection geometrics, traffic control, and intersection LOS results, and **Appendix B** contains LOS worksheets. At the signalized intersections in the study area, all intersections are anticipated to operate at LOS D or better during the peak times analyzed. At unsignalized intersections in the study area, all movements are expected to operate at LOS D or better except for the westbound left-turn movement at the intersection of Harvest Drive with Drive 5 (ID# 9), which is expected to operate at LOS E during the PM peak hour. It should be noted that it is not uncommon for side street movements to operate to a LOS E or F during peak hours. It is anticipated that traffic may divert to the adjacent signalized intersection of Harvest Road with 52nd Avenue to avoid long queues and delay, if any.

KEY MAP





LEGEND

XXX(XXX)	=	AM(PM) Peak Hour Traffic Volumes
XXXX	=	Daily Traffic Volumes (Thousands)
X	=	Study Intersection
	=	Roundabout

FELSBURG HOLT & ULLEVIG

NOTE: Drawing Not to Scale

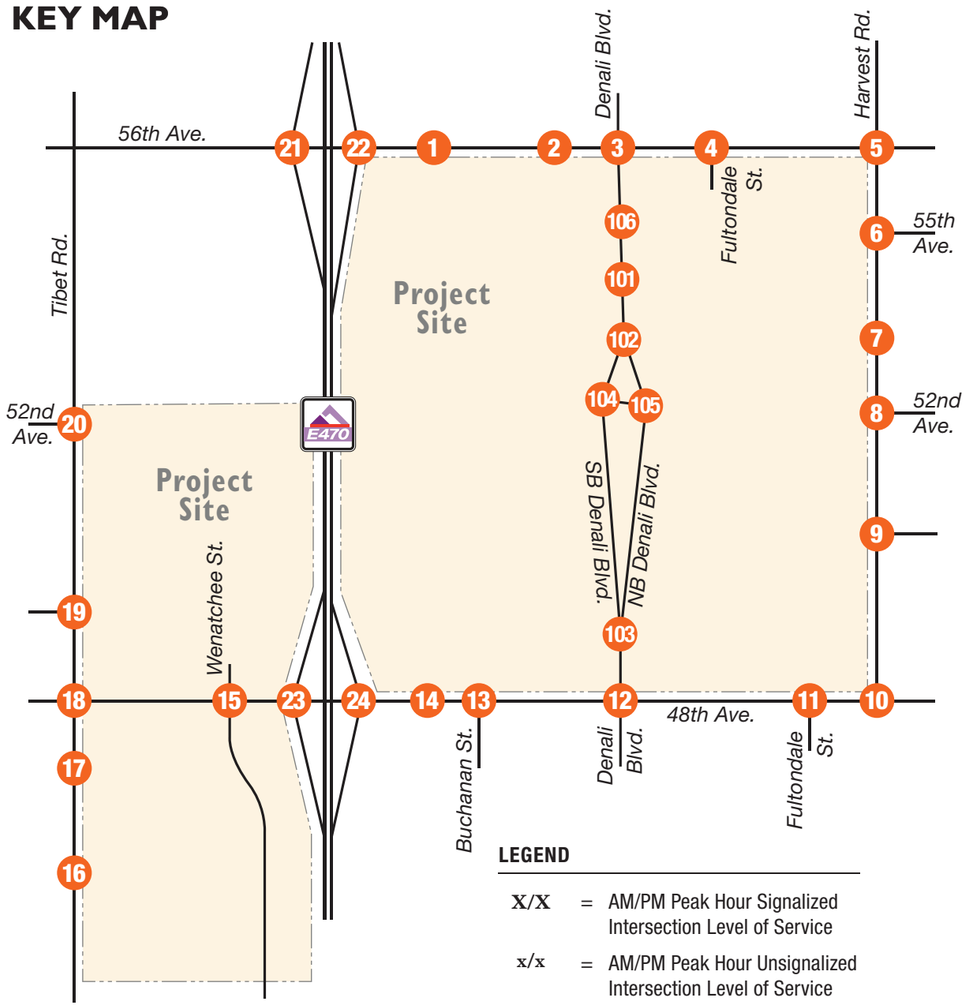
NORTH

FIGURE 6

Background (2040) Traffic Volumes

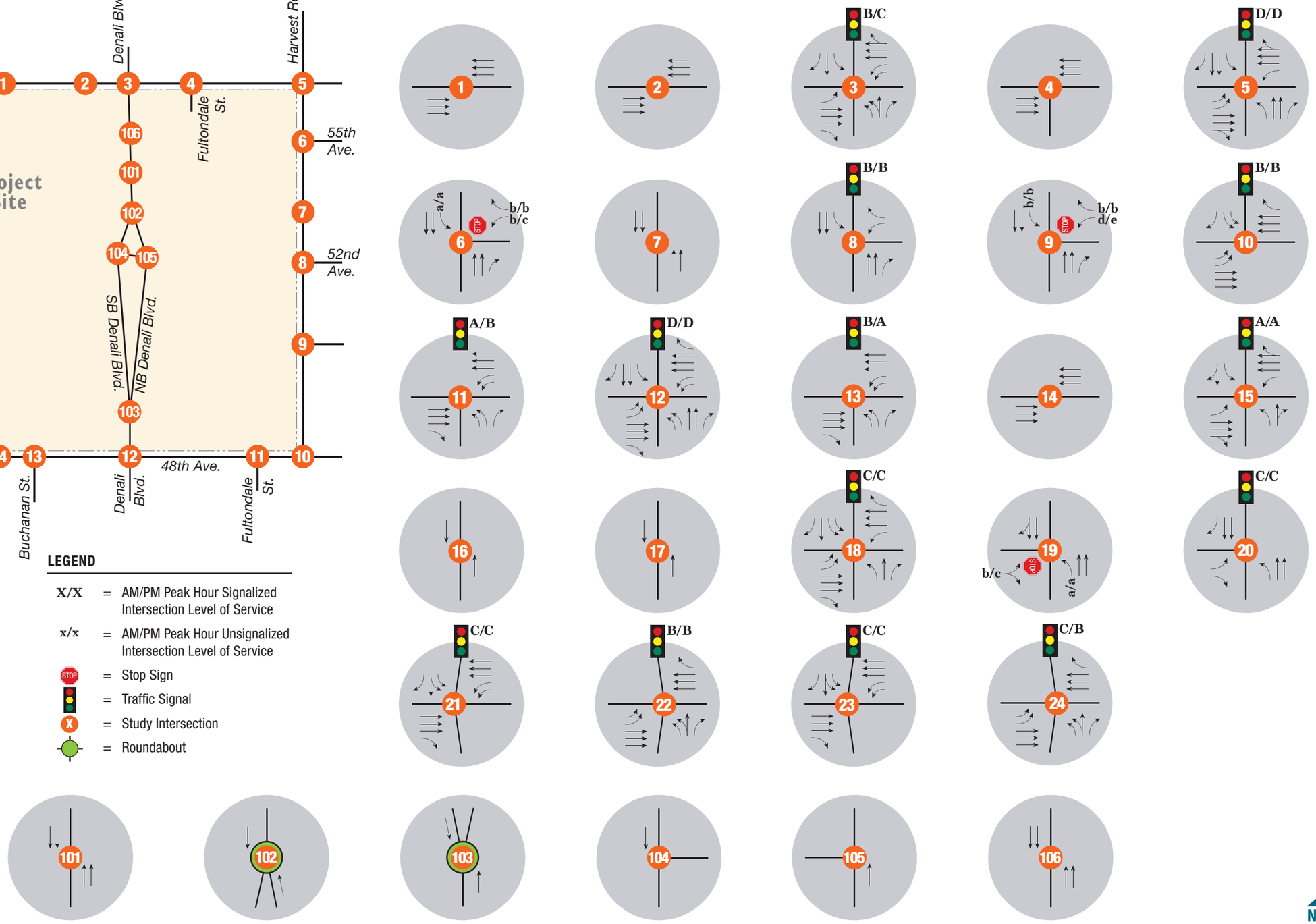
Windler TIS 123657-01 5/9/23

KEY MAP



LEGEND

X/X	=	AM/PM Peak Hour Signalized Intersection Level of Service
x/x	=	AM/PM Peak Hour Unsignalized Intersection Level of Service
STOP	=	Stop Sign
	=	Traffic Signal
X	=	Study Intersection
	=	Roundabout



NORTH

FELSBURG HOLT & ULLEVIG

NOTE: Drawing Not to Scale

FIGURE 7

Background (2040) Lane Geometry and Level of Service

Windler TIS 123657-01 6/12/23

V. TOTAL FUTURE TRAFFIC

V.A. Transportation Network

The buildout transportation network is anticipated to be consistent with NEATS, with the exceptions described in the background section of this report. In addition to the NEATS roadway network Windler is required to provide an east-west collector on the half mile spacing between the arterial roadways of 56th Avenue and 48th Avenue, which will be achieved with the construction of 52nd Avenue to meet standards set forth in NEATS. Additional roadways that will function as hybrids between collectors and local streets, known as "connectors," will also be provided via 53rd Avenue as an east-west connection on the northern 1/3 of the full section east of E-470, and via Buchanan Street as a north-south connection on the western 1/3 of the full section east of E-470.

V.B. Traffic Volumes and Operations

The external and internal site-generated traffic volumes from **Figure 4** and **Figure 5** were added to the year 2040 background traffic volumes shown in **Figure 6** to produce the 2040 total traffic volumes illustrated in **Figure 8**. By 2040, 48th Avenue volumes are anticipated to be between 34,500 and 55,400 VPD, 56th Avenue would carry between 20,000 and 34,200 VPD, Tibet Road would carry between 8,800 and 20,000 VPD, Harvest Road would carry between 15,600 and 27,800 VPD, and Denali Boulevard would carry between 14,100 and 15,700 VPD.

Intersection Operations Summary

Figure 9 depicts the anticipated buildout intersection geometrics, traffic control, and intersection LOS results, and **Appendix B** contains existing LOS worksheets. At the signalized intersections in the study area, all intersections are anticipated to operate at LOS D or better during the peak times analyzed except for the intersection of 48th Avenue with Denali Boulevard during the AM peak hour. At the unsignalized intersections in the study area, all movements are expected to operate at LOS D or better except for the following intersection movements:

- Eastbound and westbound shared left/through movement at the intersection of Harvest Road with Drive 5 under both peak hours (ID #9).
- Southbound right-turn movement at the intersection of 48th Avenue with Drive 7 during the PM peak hour (ID #14).
- Westbound shared left/through movement at the intersection of SB Denali Boulevard with 52nd Avenue during the AM and PM peak hours (ID #104).
- Westbound shared left-turn movement at the intersection of Tibet Road with Drive 8 during the PM peak hour (ID #19).

It should be noted that it is not uncommon for side street movements to operate to a LOS E or F during peak hours. It is anticipated that traffic may divert to the adjacent signalized intersection of Harvest Road with 52nd Avenue to avoid long queues and delay, if any. A LOS and delay summary table for 2040 future total year conditions is provided in **Appendix G.**

Denali Boulevard Operations & Conditions

Due to the planned data center now ending at 56th Avenue, Denali Boulevard is expected to be reconfigured to fit the needs of the surrounding neighborhoods and land uses. This will be accomplished by introducing Denali Street as a one-way couplet through the middle of Windler that will surround a park intended to be the centerpiece of the development. As noted previously, daily volumes along the street are expected to range from 14,100 and 15,700 VPD. The daily volumes on the Denali Boulevard couplets are anticipated to be approximately 7,300 VPD in each direction.

The street will be a four-lane, median divided street with attached 16-foot walks on each side at 56th Avenue and 48th Avenue and then leading up to the couplet section. Once in the core of Windler, volumes are expected to reduce such that a single lane in each direction will be adequate. The proposed cross section of each couplet, a single lane with on-street parking and bike lanes, is also expected to lend to reduced speeds. Proposed access drives along the couplet will function as RIRO intersections and are expected to operate with acceptable levels of service.

Roundabouts are proposed to be constructed at either end of the couplets to allow for safe and effective traffic operations. Roundabouts were analyzed at the intersections of Denali Boulevard with 52nd Avenue and Drive 9. The roundabout at Denali Boulevard with 52nd Avenue was analyzed as single-lane roundabouts with southbound right-turn drop-lane. At the Denali Boulevard with Drive 9 intersection the roundabout was analyzed as a two-lane roundabout with northbound and southbound two-lane approaches. A shared left/through and shared through/right-turn lanes should be provided on the north and south approaches. with a northbound two-lane approach. With the proposed southbound couplet being a single lane, the southbound approach would widen before roundabout to provide the two-lane approach. Two outgoing northbound lanes would be provided on the Denali Boulevard couplet north of the northbound before tapering into a single lane. Single-lane eastbound and westbound approaches would be provided at intersection. The roundabouts were analyzed using SIDRA Intersection 9 analysis software. All roundabout movements are anticipated to operate at LOS C or better during the AM and PM peak hours.

56th Avenue Operations & Conditions

56th Avenue is anticipated to be constructed as a six-lane cross-section with left-turn lanes provided at full-access points. Per the SHAC, right-turn lanes are generally not required at intersections along six-lane cross sections. A right-turn lane was recommended at the intersection of 56th Avenue with Denali Boulevard (ID #3) to improve traffic operations and safety due to high eastbound right-turn volumes. All signalized intersections along 56th Avenue are anticipated to operate at LOS D or better during the AM and PM peak hours. All movements at unsignalized intersections are anticipated to operate at LOS C or better during the peak periods. The intersections were analyzed with the assumption that the traffic signals would be coordinated to allow for efficient progression of traffic and upstream signals were considered for stop-controlled intersections along the corridor to account for the effect of upstream platooning to provide gaps in traffic. Based on the current site plan, it is anticipated that all proposed signalized intersections meet the required 660-feet of spacing, with the approximately at least 794-feet of spacing between the proposed traffic signal at E-470 SB Ramp (ID #18) and Drive (ID #1) having the least spacing.

Protected-T intersections or otherwise known as green T-intersections may be designed and implemented at the intersections along 56th Avenue with Drive 1 (ID #1), Drive 2 (ID #2), and Fultondale Street (ID #4). This allows for a two-stage westbound left-turn lane on the median. At the proposed signalized intersections of 56th Avenue with Drive 1 and Drive 2, the intersections are anticipated to operate at LOS A during the peak hours. At the stop-controlled of 56th Avenue with Fultondale Street, all movements are anticipated to operate at LOS C or better during the peak hours. If the intersections are designed to be protected-T intersections, traffic operations and progression are expected to improve due to the westbound movement essentially becoming a free-flow movement.

At the northbound and southbound E-370 interchange ramps with 56th Avenue, traffic operations are anticipated to be adequate. The intersections are anticipated to operate at LOS C during the peak hours under future 2040 traffic operations. The northbound and southbound off ramp approaches will provide a dedicated left-turn lane, a shared left/through-turn lane, and a dedicated right-turn lane. Although the westbound and eastbound left-turn lanes are currently being striped out for a single left-turn lane, it is anticipated that dual-left turn lanes will be needed based on future traffic projections. It was assumed that dual left-turn lanes would be needed and provided upon 2040 total future traffic conditions.

48th Avenue Operations & Conditions

48th Avenue is anticipated to be constructed as a six-lane cross-section with left-turn lanes provided at full-access points. Per the SHAC, right-turn lanes are generally not required at intersections along six-lane cross sections. However, right-turn lanes were recommended at the following intersections based on traffic volumes and operations:

- 48th Avenue with Harvest Road (ID #10)
- 48th Avenue with Denali Boulevard (ID #12)
- 48th Avenue with Drive 7 (ID #14)
- 48th Avenue with NB E-370 Ramp (ID #24)
- 48th Avenue with SB E-370 Ramp (ID #23)
- 48th Avenue with Tibet Road (ID #18)

All signalized intersections along 48th Avenue are anticipated to operate at LOS D or better during the AM and PM peak hours except for the intersection of 48th Avenue with Denali Boulevard (ID #12) during the AM peak hour. All movements at unsignalized intersections are anticipated to operate at LOS C during the peak periods except for the southbound right-turn movement at the intersection of 48th Avenue with Drive 7 (ID # 14) during the PM peak hour.

At the northbound and southbound E-370 interchange ramps with 48th Avenue, traffic operations are anticipated to be adequate. The intersections are anticipated to operate at LOS C or better during the peak periods under future 2040 traffic operations. The northbound and southbound off ramp approaches will provide a dedicated left-turn lane, a shared left/through-turn lane, and a dedicated right-turn lane. Although the westbound and eastbound left-turn lanes are currently being striped out for a single left-turn lane, it is anticipated that dual-left turn lanes will be needed based on future traffic projections. It was assumed that dual left-turn lanes would be needed and provided upon 2040 total future traffic conditions.

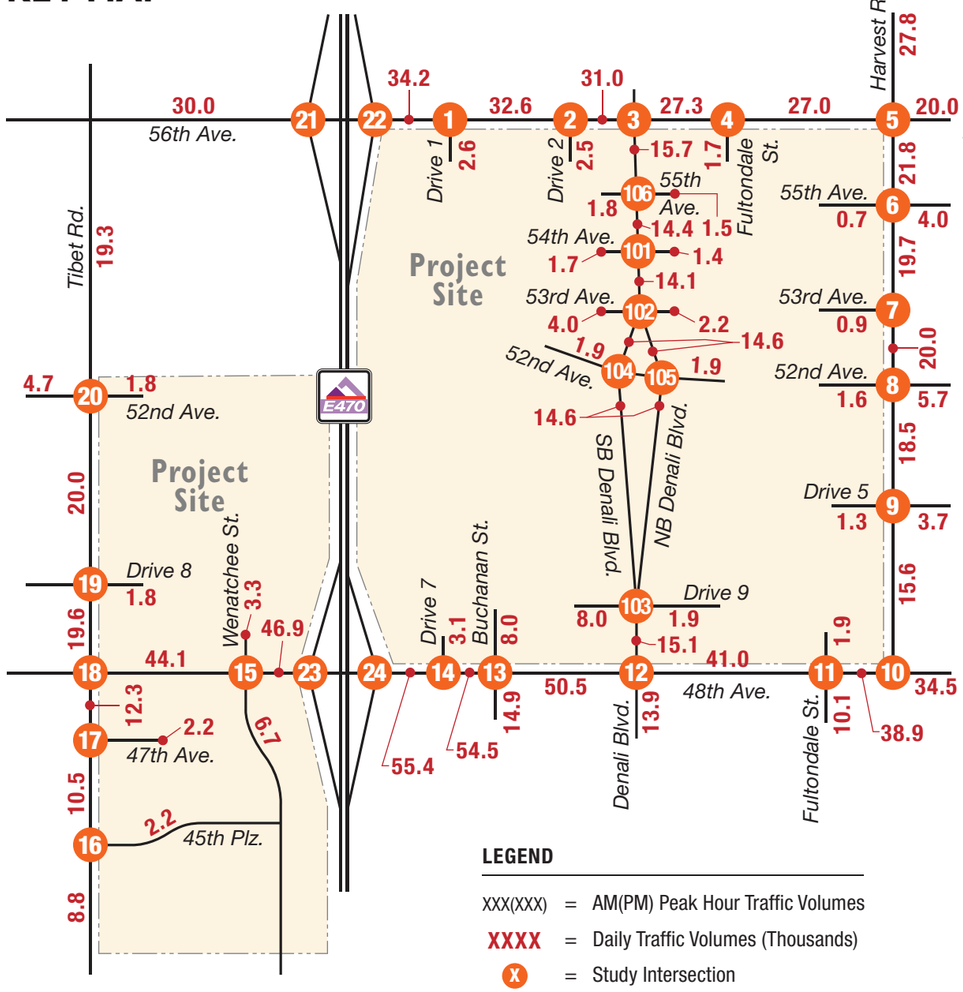
Harvest Road Operations & Conditions

A four-lane cross-section is anticipated to be constructed along Harvest Road. Left-turn and right-turn lanes were recommended based on SHAC requirements. All study intersections along Harvest Road are expected to operate at LOS D or better during the AM and PM peak hours. At stop-controlled intersections along Harvest Road, all movements are anticipated to operate at LOS D or better except for the eastbound and westbound shared left/through movements at the intersections Harvest Road with 55th Avenue (ID #6) and Drive 5 (ID #9).

Tibet Road Operations & Conditions

A four-lane cross-section is anticipated to be constructed along Tibet Road, north of 48th Avenue. A three-lane cross section is proposed to be constructed Tibet Road, south of 48th Avenue. Left-turn and right-turn lanes were recommended based on SHAC requirements. The signalized intersections in the study area along Tibet Road are anticipated to operate at LOS D or better during the peak periods. All movements at the stop-controlled intersections along Tibet Road are anticipated to operate at LOS D or better during the peak hours except for the westbound left-turn movement at the intersection of Tibet Road with Drive 8 (ID # 19) during the PM peak hour. It should be noted that the westbound left-turn volumes at the intersection of 48th Avenue with Tibet Road are close to meeting thresholds for a dual left-turn, however the three-lane cross-section being constructed along Tibet Road, south of 48th Avenue, does not provide the geometry necessary to capture dual left-turn lanes.

KEY MAP



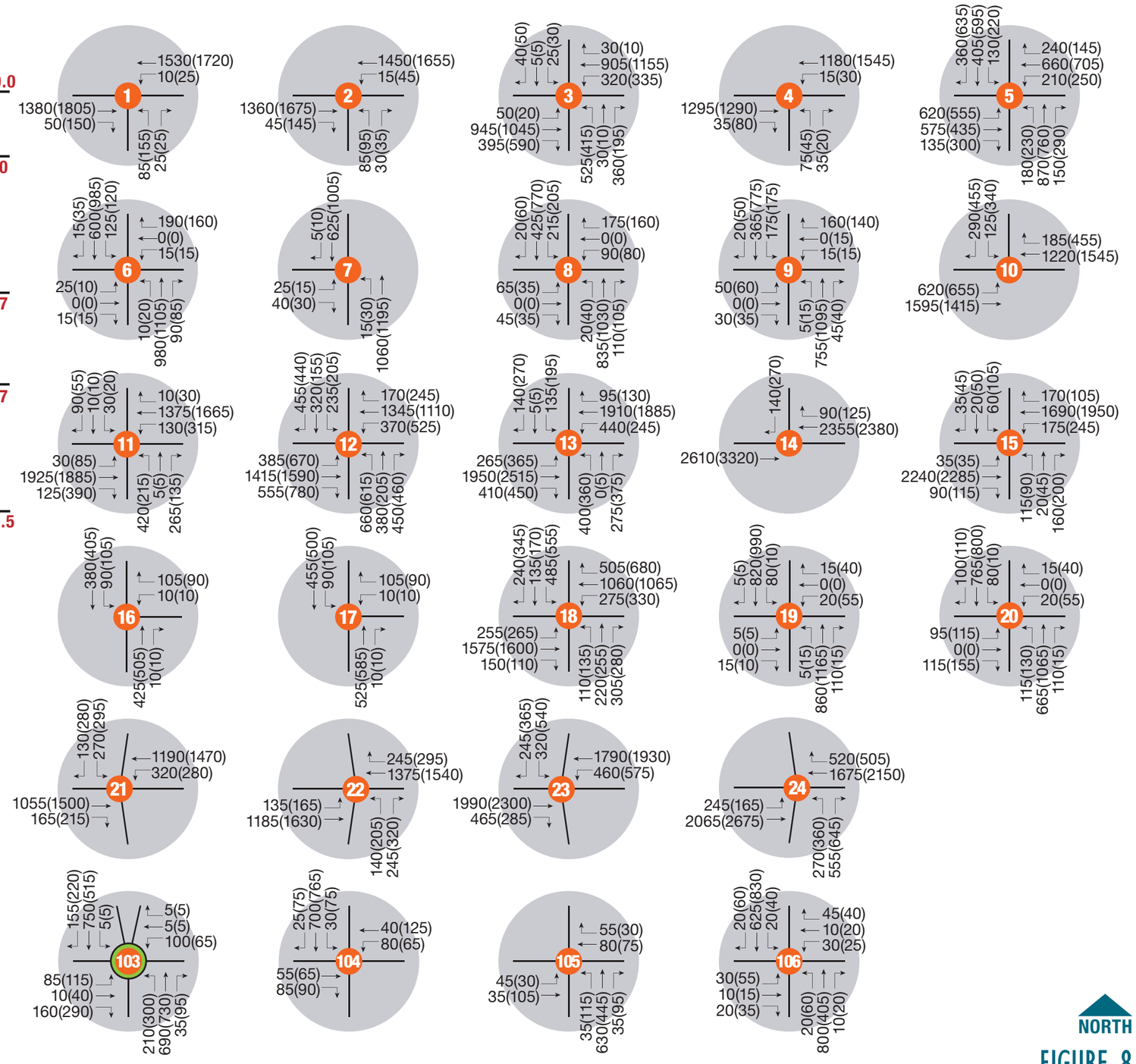
LEGEND

XXX(XXX) = AM(PM) Peak Hour Traffic Volumes

XXXX = Daily Traffic Volumes (Thousands)

X = Study Intersection

= Roundabout



NORTH

FELSBURG HOLT & ULLEVIG

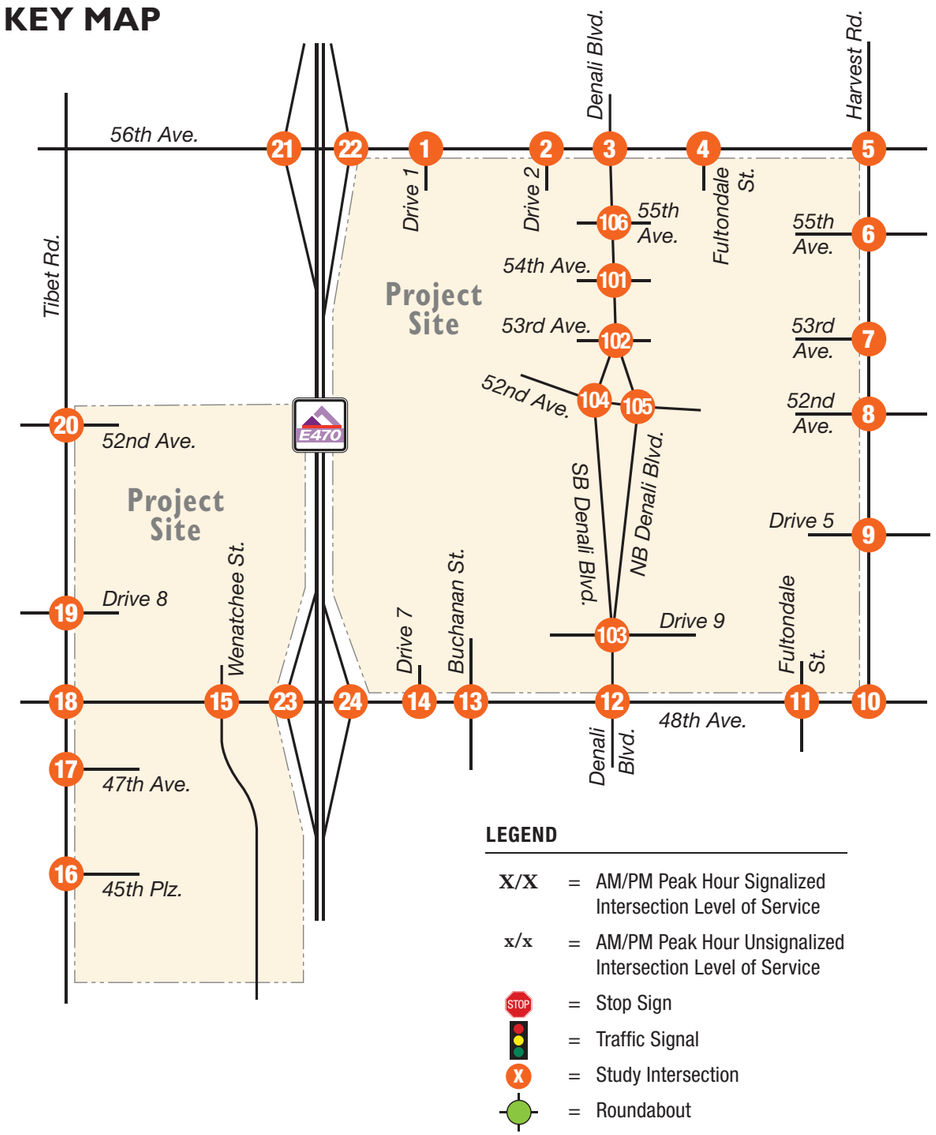
NOTE: Drawing Not to Scale

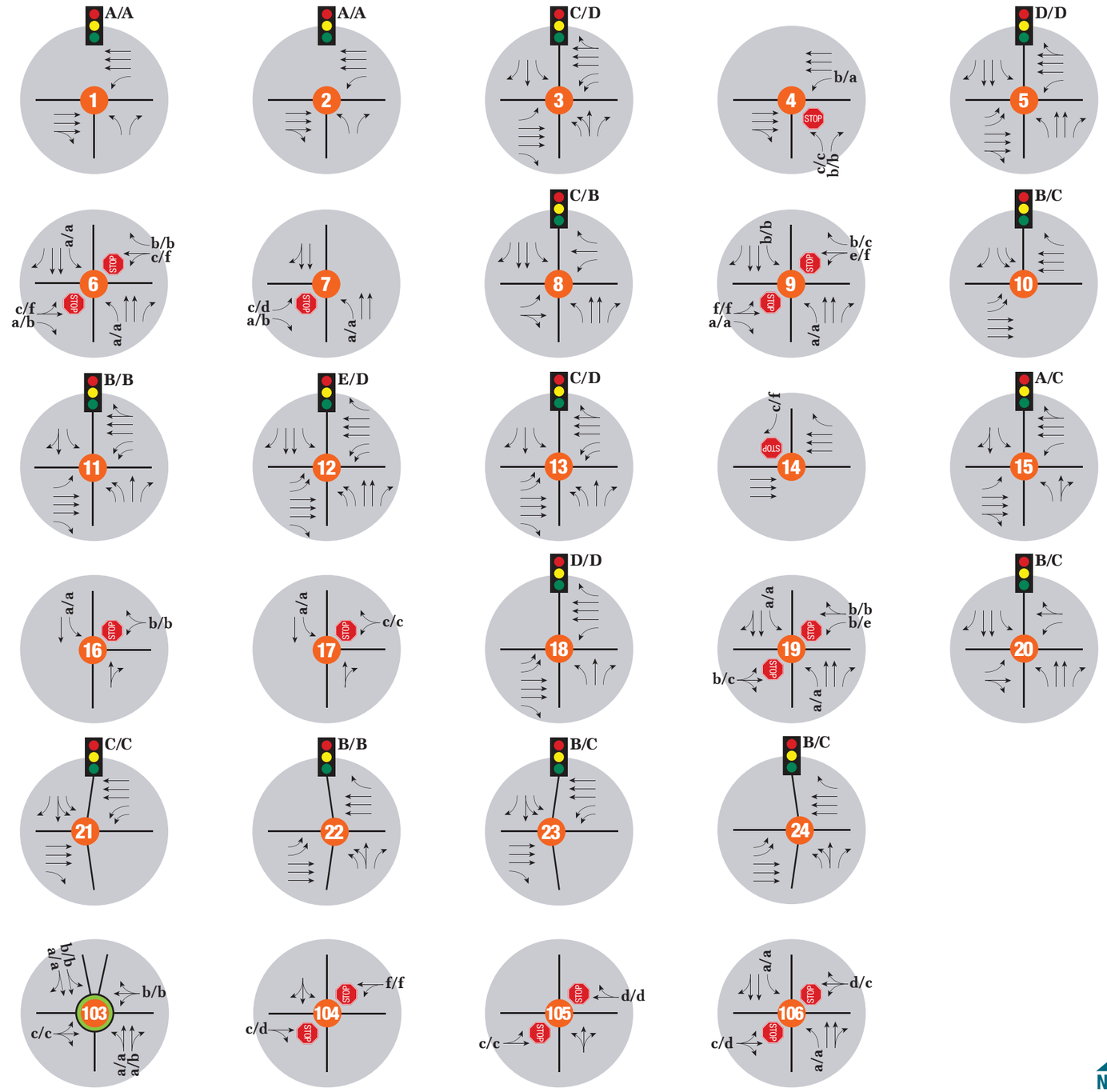
FIGURE 8

Future Total (2040) Traffic Volumes

Windler TIS 123657-01 6/14/23

KEY MAP





NORTH

FELSBURG HOLT & ULLEVIG

NOTE: Drawing Not to Scale

FIGURE 9

Future Total (2040) Lane Geometry and Level of Service

Windler TIS 123657-01 7/7/23

V.C. Traffic Control Devices

The majority of site accesses are projected to function at acceptable levels with unsignalized traffic control in the 2040 buildout scenario. However, some site access points, and several perimeter roadway intersections are anticipated to meet signalization warrants upon buildout. The *Manual on Uniform Traffic Control Devices* (MUTCD) identifies eight warrants that provide guidance in determining whether a traffic signal installation might be justified. Some of these warrants are based on traffic volume levels, while others are based on the accident history of an intersection or whether the intersection is a designated school crossing. Warrant 1 (Eight Hour Vehicular Volume) and Warrant 2 (Four Hour Vehicular Volume) from the MUTCD have been applied here in assessing the appropriateness for signalization at study area intersections. From other studies that FHU has prepared in the area, a factor of 5.71 percent has been used and applied to the peak hour traffic as a means of estimating the 8th highest hour. This factor assumes that 10% of the daily traffic occurs during the peak hour. The 2nd through 7th highest hours were determined through linear interpolation of the peak hour and 8th highest hour traffic, which were then assessed with respect to Traffic Signal Warrants 1 and 2. The procedure outlined above provides a reasonable set of data in which to assess future signalization potential.

Each site access not anticipated to meet signalization warrants would need a STOP sign exiting the site. Traffic control within the Windler site would be unsignalized, including two roundabouts along Denali Boulevard at 53rd Avenue and Drive 9 which also mark the north and south endpoints of the boulevard section of Denali Boulevard that include a large greenspace between north and south travel lanes.

By 2040 the following intersections are anticipated to meet signalization warrants

- #1 – 56th Avenue with Drive 1
- #2 – 56th Avenue with Drive 2
- #3 – 56th Avenue with Denali Boulevard
- #5 – 56th Avenue with Harvest Road
- #8 – 52nd Avenue with Harvest Road
- #10 – 48th Avenue with Harvest Road
- #11 – 48th Avenue with Fultondale Street
- #12 – 48th Avenue with Denali Boulevard
- #13 – 48th Avenue with Buchanan Street
- #15 – 48th Avenue with Wenatchee Street
- #18 – 48th Avenue with Tibet Street
- #20 – Tibet Street with 52nd Avenue
- #21 – 56th Avenue with E-470 SB Ramps
- #22 – 56th Avenue with E-470 NB Ramps
- #23 – 48th Avenue with E-470 SB Ramps
- #24 – 48th Avenue with E-470 NB Ramp

Traffic conditions should be periodically monitored to determine the timing of traffic control improvements. Details of the MUTCD signalization warrants can be found in **Appendix F.**

V.D. Queuing and Auxiliary Lane Requirements

Recommendations for vehicle storage lengths at each of the external study area intersections are included in **Tables 4-8** for use in identifying construction needs for the Windler site. These dimensions represent the storage space necessary to meet the 95th percentile maximum queue during either the AM or PM peak hour.

Output from the traffic analysis effort was used to recommend these storage lengths, using the following methodology:

- **Left turn lane storage lengths**. At signalized intersections, the greater of the HCM 6th Edition or Synchro methodology queue calculations were reported. For unsignalized intersections, the HCM 6th Edition calculation was reported.
- **Through movements**. For signalized intersections, Synchro calculation results were reported. No through movement queues are reported for unsignalized intersections as the through movements are free.
- **Right turn movements**. The Synchro queue length was used. HCM 6th Edition information was not used because HCM's signalized intersection methodology does not account for right turns on red.

Deceleration lane and taper lengths should be added to these dimensions per the City of Aurora standards to identify the total length of each auxiliary lane. Upon the development of site plans, more detailed traffic impact studies should be prepared to confirm/refine the above queue lengths as well as all the study area intersection operations.

Table 4. Turn Lane Storage & 95th Percentile Queue Lengths

Location	Movement	95% Queue Length (ft) 2040 Future Total (AM Peak/PM Peak)	Recommended Storage Length (ft)	SHAC Recommendation (ft)
#1 – Drive 1 & 56th Avenue	NB Left-turn	120 / 151	175	150
	NB Right-turn	28 / 27	Continuous	Continuous
	EB Through+	83 / 598	Continuous	Continuous
	WB Through	138 / 189	Continuous	Continuous
	WB Left-turn	5 / 11	50	50
#2 – Drive 2 & 56th Avenue	NB Left-turn	129 / 140	Continuous	Continuous
	NB Right-turn	32 / 33	50	125
	EB Through+	193 / 289	Continuous	Continuous
	WB Left-turn	7 / 14	50	75
	WB Through	131 / 167	Continuous	Continuous
#3 – Denali Boulevard & 56th Avenue	NB Left-turn	311 / 255	Continuous	550
	NB Through+	307 / 256	Continuous	Continuous
	NB Right-turn	54 / 44	Continuous	Continuous
	EB Left-turn	61 / 29	75	75
	EB Through	300 / 312	Continuous	Continuous
	EB Right-turn	20 / 46	150	875
	SB Left-turn	51 / 58	50	50
	SB Through	17 / 17	Continuous	Continuous
	SB Right-turn	0 / 8	50	75
	WB Left-turn**	m151 / m193	225	550
	WB Through+	169 / 317	Continuous	Continuous
#4 – Fultondale Street & 56th Avenue	NB Left-turn	8 / 13	Continuous	Continuous
	NB Right-turn	3 / 3	50	50
	WB Left-turn	3 / 3	50	50

Table 5. Turn Lane Storage & 95th Percentile Queue Lengths (Continued)

Location	Movement	95% Queue Length (ft) 2040 Future Total (AM Peak/PM Peak)	Recommended Storage Length (ft)	SHAC Recommendation (ft)
#5 – Harvest Road & 56th Avenue	NB Left-turn	155 / #258	275	300
	NB Through	#486 / 363	Continuous	Continuous
	NB Right-turn	39 / 195	200	375
	EB Left-turn**	#347 / #219	350	775
	EB Through+	238 / 108	Continuous	Continuous
	SB Left-turn	#143 / #272	300	300
	SB Through	192 / 301	Continuous	Continuous
	SB Right-turn	192 / 549	500	850
	WB Left-turn	150 / #322	350	350
	WB Through+	300 / 293	Continuous	Continuous
#6 – Harvest Road & 55th Avenue	NB Left-turn	0 / 3	50	50
	EB Left-turn+	5 / 25	Continuous	Continuous
	EB Right-turn	0 / 3	50	25
	SB Left-turn	13 / 13	50	175
	WB Left-turn+	3 / 18	Continuous	Continuous
	WB Right-turn	30 / 33	50	250
#7 – Harvest Road & 53rd Avenue	NB Left-turn	0 / 3	50	50
	EB Left-turn	3 / 8	Continuous	Continuous
	EB Right-turn	3 / 3	50	50
#8 – Harvest Road & 52nd Avenue	NB Left-turn	m7 / m27	50	75
	NB Through	151 / 440	Continuous	Continuous
	NB Right-turn	m0 / m22	50	150
	EB Left-turn	95 / 60	100	50
	EB Through+	0 / 0	Continuous	Continuous
	SB Left-turn	60 / m157	175	300
	SB Through+	45 / 299	Continuous	Continuous
	WB Left-turn	#170 / #166	175	125
	WB Through	0 / 0	Continuous	Continuous
	WB Right-turn	108 / 110	125	250
#9 – Harvest Road & Drive 5	NB Left-turn	0 / 0	50	25
	EB Left-turn+	20 / 170	Continuous	Continuous
	EB Right-turn	25 / 3	50	50
	SB Left-turn	23 / 35	50	250
	WB Left-turn+	13 / 38	Continuous	Continuous
	WB Right-turn	30 / 35	50	225
#10 – Harvest Road & 48th Avenue	EB Left-turn**	m326 / 360	375	825
	EB Through	480 / 18	Continuous	Continuous
	SB Left-turn**	m82 / m119	200	450
	SB Right-turn	m111 / m89	Continuous	Continuous
	WB Through	321 / 481	Continuous	Continuous
	WB Right-turn	42 / 66	75	600

Table 6. Turn Lane Storage & 95th Percentile Queue Lengths (Continued)

Location	Movement	95% Queue Length (ft) 2040 Future Total (AM Peak/PM Peak)	Recommended Storage Length (ft)	SHAC Recommendation (ft)
#11 – Fultondale Street & 48th Avenue	NB Left-turn**	#254 / 127	275	550
	NB Through	13 / 15	Continuous	Continuous
	NB Right-turn	160 / 84	175	350
	EB Left-turn	m9 / m26	50	125
	EB Through	653 / m173	Continuous	Continuous
	EB Right-turn	m2 / m0	50	525
	SB Left-turn	40 / 45	50	25
	SB Through+	61 / 54	Continuous	Continuous
	WB Left-turn**	78 / #202	225	425
	WB Through+	299 / 74	Continuous	Continuous
#12 – Denali Boulevard & 48th Avenue	NB Left-turn**	#401 / #389	425	825
	NB Through	206 / 126	Continuous	Continuous
	NB Right-turn	410 / #387	425	600
	EB Left-turn**	m150 / m#357	375	775
	EB Through	m449 / m#542	Continuous	Continuous
	EB Right-turn	m32 / m93	675	1000
	SB Left-turn	204 / 242	375	375
	SB Through	187 / 97	Continuous	Continuous
	SB Right-turn	#296 / 206	300	600
	WB Left-turn**	m#243 / #346	350	700
	WB Through	428 / 331	Continuous	Continuous
	WB Right-turn	m38 / 16	50	400
#13 – Buchanan Street & 48th Avenue	NB Left-turn**	#270 / #253	275	525
	NB Through	/ 17	Continuous	Continuous
	NB Right-turn	151 / #520	Continuous	Continuous
	EB Left-turn**	m#152 / m155	175	475
	EB Through	m#694 / m163	Continuous	Continuous
	EB Right-turn	m45 / m0	50	600
	SB Left-turn	138 / #277	300	200
	SB Through	16 / 17	Continuous	Continuous
	SB Right-turn	60 / #267	Continuous	Continuous
	WB Left-turn**	m#234 / m#161	250	575
	WB Through+	m699 / m442	Continuous	Continuous
#14 – Drive 7 & 48th Avenue	SB Right-turn	20 / 68	Continuous	Continuous
#15 – Wenatchee Street & 48th Avenue	NB Left-turn	136 / 109	150	125
	NB Through+	85 / 177	Continuous	Continuous
	EB Left-turn	m5 / m4	50	50
	EB Through+	#801 / m#873	Continuous	Continuous
	SB Left-turn	79 / #131	150	150
	SB Through+	55 / 104	Continuous	Continuous
	WB Left-turn	m#188 / m#292	300	325
	WB Through+	426 / m612	Continuous	Continuous
#16 – Tibet Road & 45th Plaza	SB Left-turn	8 / 10	50	150
	WB Left-turn+	8 / 18	Continuous	Continuous
#17 – Tibet Road & 47th Avenue	SB Left-turn	8 / 10	50	150
	WB Left-turn+	8 / 20	Continuous	Continuous

Table 7. Turn Lane Storage & 95th Percentile Queue Lengths (Continued)

Location	Movement	95% Queue Length (ft) 2040 Future Total (AM Peak/PM Peak)	Recommended Storage Length (ft)	SHAC Recommendation (ft)
#18 – Tibet Road & 48th Avenue	NB Left-turn	109 / 128	150	200
	NB Through	#317 / #392	Continuous	Continuous
	NB Right-turn	213 / 182	225	375
	EB Left-turn	152 / 154	350	350
	EB Through	518 / #584	Continuous	Continuous
	EB Right-turn	35 / 28	50	200
	SB Left-turn**	#289 / #344	350	725
	SB Through	169 / 209	Continuous	Continuous
	SB Right-turn	131 / 258	275	450
	WB Left-turn	#410 / #412	425	425
	WB Through	385 / 287	Continuous	Continuous
	WB Right-turn	363 / 488	500	825
#19 – Tibet Road & Drive 8	NB Left-turn	0 / 3	50	25
	EB Left-turn+	3 / 3	Continuous	Continuous
	SB Left-turn	8 / 0	50	125
	WB Left-turn+	5 / 30	Continuous	Continuous
	WB Right-turn	3 / 5	Continuous	Continuous
#20 – Tibet Road & 52nd Avenue	NB Left-turn	m58 / m69	75	175
	NB Through	m166 / m349	Continuous	Continuous
	NB Right-turn	m14 / m0	150	150
	EB Left-turn	123 / 144	175	150
	EB Through+	0 / 0	Continuous	Continuous
	SB Left-turn	51 / 15	75	125
	SB Through	216 / 291	Continuous	Continuous
	SB Right-turn	9 / 21	150	150
	WB Left-turn	38 / 83	100	75
	WB Through+	0 / 0	Continuous	Continuous
#21 – SB E-470 & 56th Avenue	EB Through	254 / 426	Continuous	Continuous
	EB Right-turn	38 / 45	175	300
	SB Left-turn	182 / 183	200	400
	SB Through+	182 / 185	Continuous	Continuous
	SB Right-turn	97 / 271	275	375
	WB Left-turn**	146 / 155	135	375
	WB Through	9 / 18	Continuous	Continuous
#22 – NB E-470 & 56th Avenue	NB Left-turn+	#395 / #534	Continuous	Continuous
	NB Through+	#395 / #534	Continuous	Continuous
	NB Right-turn	22 / 306	350	425
	EB Left-turn**	91 / m103	100	225
	EB Through	130 / 112	Continuous	Continuous
	WB Through	360 / 335	Continuous	Continuous
	WB Right-turn	19 / 38	400	400
#23 – SB E-470 & 48th Avenue	EB Through	319 / m#829	Continuous	Continuous
	EB Right-turn	m97 / m20	100	575
	SB Left-turn	m175 / m312	325	725
	SB Through+	m175 / m314	Continuous	Continuous
	SB Right-turn	m185 / m#447	475	475
	WB Left-turn**	m181 / m#265	440	700
	WB Through	m79 / m95	Continuous	Continuous

Table 8. Turn Lane Storage & 95th Percentile Queue Lengths (Continued)

Location	Movement	95% Queue Length (ft) 2040 Future Total (AM Peak/PM Peak)	Recommended Storage Length (ft)	SHAC Recommendation (ft)
#24 – NB E-470 & 48th Avenue	NB Left-turn	m134 / m167	175	475
	NB Through+	m135 / m168	Continuous	Continuous
	NB Right-turn	#643 / m#748	750	850
	EB Left-turn	m#257 / m#107	440	300
	EB Through	98 / m#878	Continuous	Continuous
	WB Through	m407 / m#652	Continuous	Continuous
	WB Right-turn	m41 / m127	150	625
#101 – Denali Boulevard & 54th Avenue	NB Left-turn	0 / 5	50	50
	EB Left-turn+	15 / 50	Continuous	Continuous
	SB Left-turn	3 / 3	50	45
	WB Left-turn+	10 / 23	Continuous	Continuous
#102 – Denali Boulevard & 53rd Avenue	NB Through+	164 / 89	Continuous	Continuous
	EB Through+	30 / 87	Continuous	Continuous
	SB Left/Through+	107 / 314	Continuous	Continuous
	SB Right-turn	3 / 12	Continuous	Continuous
	WB Through+	21 / 21	Continuous	Continuous
#103 – Denali Boulevard & Drive 9	NB Left/Through+	35 / 48	Continuous	Continuous
	NB Through/Right-turn+	94 / 179	Continuous	Continuous
	EB Through+	56 / 123	Continuous	Continuous
	SB Left/Through+	80 / 55	Continuous	Continuous
	SB Through/Right-turn+	80 / 55	100 feet	220 feet
	WB Through+	19 / 15	Continuous	Continuous
#104 – SB Denali Boulevard & 52nd Avenue	EB Through+	23 / 95	Continuous	Continuous
	WB Left-turn+	28 / 225	Continuous	Continuous
#105 – NB Denali Boulevard & 52nd Avenue	EB Left-turn+	20 / 170	Continuous	Continuous
	WB Through+	18 / 40	Continuous	Continuous
#106 – Denali Boulevard & 55th Avenue	NB Left-turn	0 / 5	50	50
	EB Left-turn+	13 / 55	Continuous	Continuous
	SB Left-turn	3 / 3	50	45
	WB Left-turn+	10 / 18	Continuous	Continuous

+shared lane **dual turn lane SHAC values based on a HV% of ten percent.
- 95th percentile volume exceeds capacity; queues may be longer
m - volume for 95th percentile queue is metered by upstream signal

V.E. Transit Network

NEATS states that a well-developed transit system, properly related to the development patterns and land uses within the NEATS study area, will provide travelers with an effective alternative to single-occupancy vehicles. The reduction in single-occupancy vehicle use will help reduce congestion and improve air quality within the surrounding region.

NEATS identifies a proposed transit network, including a series of mobility hubs that will anchor transit routes that serve major employment and population areas. The network is designed to allow a systematic transition from traditional fixed route bus services and park-n-rides to a comprehensive transit system, including high frequency fixed transit routes and on-demand transit services linked with mobility hubs.

As identified in NEATS, while RTD is operating traditional fixed route bus service, the envisioned service plan for the transit routes is outlined below:

- 1 to 2-mile route spacing along major arterials.
- All routes connect to a park-n-ride, FasTracks station and/or mobility hub.
- Most routes would meet RTD's "Suburban Local" classification with at least 20 riders boarding on average per hour.
- All routes would have 15-minute peak hour services and at least 60-minute off peak service.
- The possible ridership for each route would range from 170 to 2,400 rides per day based on comparable existing service ridership.

NEATS has identified the following high frequency transit routes surrounding the Windler site:

- Along 56th Avenue from the western NEATS boundary at Tower Road extending east to Imboden Road.
- Along 48th Avenue from Picadilly Road extending east to Powhaton Road.
- Along Harvest Road from 48th Avenue extending north to the northern NEATS boundary at 72nd Avenue.

Additionally, NEATS identifies a Type 1 Mobility Hub planned for the southeast corner of Windler at the intersection of 48th Avenue and Harvest Road. Features of a Type 1 Mobility Hubs at intersections include but are not limited to:

- Enhanced bus stops with real time information
- Designated bus lanes and priority signals
- Secure bike parking
- Car sharing
- Off-street bike paths
- Public art
- A transit/community information kiosk

V.F. Bicycle and Pedestrian Network

NEATS states that a safe and connected walking and biking network is the cornerstone of the mobility system. The proposed network of trails along drainageways, bike lanes, and sidewalks will allow people of all ages and abilities to safely travel to and from their destinations. The network includes on and off-street travel ways that people can use for commuting, recreation, exercise, and short personal trips.

The network of bicycle and pedestrian facilities is designed for people who are traveling by foot or using a variety of e-motorized and non-motorized vehicles. This network includes facilities along roadway corridors and along drainageways. The range of facilities includes the following: sidewalks, shared-use paths, off-street trails, on-street bike lanes and buffered bike lanes, and protected or separated bike lanes. This network will provide the flexibility to serve pedestrians, bicycles, small e-vehicles, skateboarders, and other non-motorized vehicles that will emerge in the future. This walk and wheel accessible network will work in conjunction with the roadway and transit networks to provide safe access within neighborhoods and around the study area. In this context, the recommended bicycle and pedestrian network from the *NEATS Refresh* study creates a "complete street" system of multimodal facilities along the arterial and collector roadway grid in the study area.

Pedestrian and bicycle facilities identified in the *NEATS Refresh* study surrounding the Windler site include:

Primary Bike Routes (Separated bike lanes and Trails):

- Along 56th Avenue from the western NEATS boundary at Tower Road extending east to Imboden Road
- Along 48th Avenue from Picadilly Road extending east to Powhaton Road
- Along Harvest Road from 48th Avenue extending north to the northern NEATS boundary at 72nd Avenue

Secondary Bike Routes (Buffered or Separated bike lanes):

- Along Denali Boulevard from 38th Avenue extending north to 56th Avenue
- Along Tibet Street from 38th Avenue extending north to 64th Avenue

Trails

- The E-470 along the westside of E470 along the east side of E-470 through the entire NEATS study area from Jewell Avenue extending north to 72nd Avenue.
- A Connector Trail branching off of the secondary bike route along Denali Boulevard within the Windler site extending north to the Second Creek drainage near the northern NEATS boundary at 72nd Avenue, including an Enhanced At-Grade Crossing at 56th Avenue.

Midblock Pedestrian Crossings

- Midblock crossings are not generally needed along the Denali Boulevard and local street network of Windler as block lengths are less than 600 feet and vehicle speeds are expected to be low.
- Two midblock crossing locations are proposed along Denali Boulevard. The first location is between 55th Avenue (ID #106) and 54th Avenue (ID #101) and the second location is north of Drive 9 (ID # 103) to provide pedestrian and bicycle connectivity through the development.
- Signing and crosswalk marking should be provided at these locations. Enhanced treatments such as a rectangular rapid flashing beacons (RRFB) may be implemented if pedestrian traffic and safety support a need for one.

VI. CONCLUSIONS AND RECOMMENDATIONS

The approximate 852-acre Windler Homestead site would consist of 3,310 units of single-family housing, 2,185 multifamily units, 648,900 square feet of retail space, 290,000 square feet of office space, 2.2 million square feet of industrial/warehousing space, and a 300-student elementary school. The proposed development would generate approximately 88,699 vehicle trips per day, with approximately 5,454 and 8,226 trips during the AM and PM peak hours, respectively. The potential impacts of the site-generated traffic were evaluated under Long-Range Future (2040) scenarios. The following summarizes the findings and recommendations of this analysis.

The recently updated *NEATS Refresh* identifies the planned classification and laneage of the surrounding street system. The NEATS study was a key resource in preparing this traffic impact study. Some key revisions to the roadway network based on the findings of traffic studies conducted by City of Aurora and for nearby development:

1. *Fulenwider Harvest Mile TIS* – Eliminated Denali Boulevard between 56th Avenue and 60th Avenue. This break in connectivity reduces projected volumes and allows for the classification of Denali Boulevard to be downgraded to a collector roadway through the Windler Homestead site instead of a four-lane arterial.

2. The City of Aurora study on the alignment of Aerotropolis Parkway – The study proposes a connection to Jackson Gap Street from Powhaton Road instead of the previous proposal to connect to Harvest Road. This realignment results in a significant reduction in projected volumes on Harvest Road adjacent to the site resulting in the recommendation for a four-lane arterial instead of the previously proposed six-lane arterial.

3. *Green Valley Ranch East TIS* – Analysis indicated volumes along Tibet Street south of 48th Avenue do not support the previously proposed four-lane arterial, and the recommended cross-section was downgraded to a three-lane collector between 38th Avenue and 48th Avenue.

Roadway Improvement Recommendations:

- 56th Avenue is anticipated to be constructed as a six-lane cross-section with left-turn lanes provided at full-access points. Per the SHAC, right-turn lanes are generally not required at intersections along six-lane cross sections and therefore were not recommended except for an eastbound right-turn lane at the intersection of 56th Avenue with Denali Boulevard (ID #3) to improve traffic operations and safety.
- 48th Avenue is anticipated to be constructed as a six-lane cross-section with left-turn lanes provided at full-access points. As noted above, the SHAC does not require right-turn lanes at intersections along a six-lane cross sections. Right-turn lanes were recommended at intersections based on traffic volumes anticipated. These are summarized in further detail in the section below.
- A four-lane cross-section is recommended to be constructed along Harvest Road. Left-turn and right-turn lanes were recommended based on SHAC requirements.
- A four-lane cross-section should be constructed along Tibet Road, north of 48th Avenue. A three-lane cross section is proposed on Tibet Road, south of 48th Avenue. Left-turn and right-turn lanes were recommended based on SHAC requirements.
- Denali Boulevard should be constructed as a four-lane, median divided street. It is proposed that a one-way couplet be provided through the middle of Denali Boulevard between Drive 9 (ID #103) and 53rd Avenue (ID #102). The proposed cross section of each couplet is a single lane with on-street parking and bike lanes. Roundabouts are proposed to be constructed at either end of the couplets to allow for safe and effective traffic operations.
- Two-lane local streets should be constructed internally within the Windler development.

Intersection Improvement Recommendations:

The following improvements would be required for the 2040 background conditions, regardless of the development of Windler Homestead:

- Install a traffic signal at intersection #3 – 56th Street with Denali Boulevard. A westbound left-turn lane and a dedicated eastbound left-turn lane should be provided.
- Install a traffic signal at intersection #5 – 56th Street with Harvest Road. Dual eastbound left-turn lanes and a dedicated northbound right-turn lane should be provided.
- At the stop-controlled intersection #6 – Harvest Road with 55th Avenue, a southbound left-turn lane and northbound right-turn lane should be provided.
- Install a traffic signal at intersection # 8 – Harvest Road with 52nd Avenue. A southbound left-turn and northbound right-turn lane should be provided.
- At the stop-controlled intersection #9 – Harvest Road with Drive 5, a southbound left-turn lane and northbound right-turn lane should be provided.
- Install a traffic signal at intersection #10 – 48th Street with Harvest Road. Dual eastbound left-turn lanes and a dedicated westbound right-turn lane should be provided. The southbound approach should provide dual left-turn lanes and a right-turn lane.
- Install a traffic signal at intersection #11 – 48th Street with Fultondale Street. Dual westbound left-turn lanes and a dedicated eastbound right-turn lane should be provided. The northbound approach should provide dual left-turn lanes and a right-turn lane.
- Install a traffic signal at intersection #12 – 48th Street with Denali Boulevard. An eastbound and westbound left-turn lane and dedicated westbound right-turn lane should be provided. The northbound approach should provide dual left-turn lanes and a dedicated right-turn lane. The southbound approach should provide a single left-turn lane and a dedicated right-turn lane.
- Install a traffic signal at intersection #13 – 48th Street with Buchanan Street. Dual westbound left-turn lanes and a dedicated eastbound right-turn lane should be provided. The northbound approach should provide dual left-turn lanes and a right-turn lane.
- Install a traffic signal at intersection #15 – 48th Avenue with Wenatchee Street. Dedicated left-turn lanes should be provided on all approaches of the intersection.
- Install a traffic signal at intersection #18 – 48th Avenue with Tibet Road. Dedicated right-turn lanes should be provided on all approaches of the intersection. Dual left-turn lanes should be provided on the southbound approach.
- Install a traffic signal at intersection #20 – Tibet Road with 52nd Avenue. A dedicated northbound left-turn lane and a southbound right-turn lane should be provided.

The following improvements are a requirement of the Windler Homestead development based upon impacts of site generated traffic:

- Install a traffic signal at intersections #1 – 56th Street with Drive 1 and #2 – 56th Street with Drive 2. A westbound left-turn lane and a two-lane northbound approach with a left-turn and right-turn lane should be provided.
- Dual westbound left-turn lane should be provided at intersection #3 – 56th Street with Denali Boulevard upon buildout of the site.
- Provide a westbound left-turn lane and a two-lane northbound approach with a left-turn and right-turn lane at intersection #11 – 56th Avenue with Fultondale Street.
- Provide a northbound left-turn and southbound right-turn lane at intersection #6 – Harvest Road with 55th Avenue. The eastbound approach out of the site should provide a two-lane approach with a shared left/through lane and a dedicated right-turn lane.

- Provide a northbound left-turn lane at intersection #8 – Harvest Road with 52nd Avenue. The eastbound approach out of the site should provide a two-lane approach with a left-turn lane and a shared through/right-turn lane.
- Provide a northbound left-turn and southbound right-turn lane at intersection #9 – Harvest Road with Drive 5. The eastbound approach out of the site should provide a two-lane approach with a shared left/through lane and a dedicated right-turn lane.
- Provide an eastbound left-turn lane and a southbound two-lane approach with a dedicated left-turn lane and shared through/right-turn lane at intersection #11 – 48th Avenue with Fultondale Street.
- Dual eastbound left-turn lanes and an eastbound right-turn lane should be provided upon buildout at intersection #12 – 48th Street with Denali Boulevard.
- Provide dual eastbound left-turn lanes and three-lane southbound approach with a dedicated left-turn, though, and right-turn lane at intersection #13 – 48th Street with Buchanan Street.
- Provide a right-in right-out (RIRO) access at intersection #14 – 48th Avenue with Drive 7. A westbound right-turn lane should be provided.
- Provide two-way stop controlled (TWSC) access at intersections #16 – Tibet Road with 45th Plaza and #17 –Tibet Road with 47th Avenue. Southbound left-turn lanes should be provided at the intersection via the proposed two-way left-turn lane (TWLTL).
- Provide a southbound left-turn and northbound right-turn lane at intersection #19 – Tibet Road with Drive 8. The westbound approach out of the site should provide a two-lane approach with a shared left/through lane and a dedicated right-turn lane.
- Provide a southbound left-turn and northbound right-turn lane at intersection #20 – Tibet Road with 52nd Avenue. The westbound approach out of the site should provide a two-lane approach with a dedicated left-turn lane and a shared through/right-turn lane.

APPENDIX A. TRAFFIC COUNTS

All Traffic Data Services

www.alltrafficdata.net

Date Start: 12-Oct-21
Site Code: 9
Station ID: 9
56TH AVE E.O. PICADILLY RD

Start Time	12-Oct-21 Tue	EB	WB							Total
12:00 AM		26	32							58
01:00		33	44							77
02:00		31	21							52
03:00		72	46							118
04:00		225	46							271
05:00		288	82							370
06:00		**347**	131							478
07:00		307	186							**493**
08:00		200	205							405
09:00		199	202							401
10:00		190	211							401
11:00		215	**267**							482
12:00 PM		**254**	241							495
01:00		244	235							479
02:00		217	332							549
03:00		214	**351**							**565**
04:00		232	324							556
05:00		208	286							494
06:00		139	181							320
07:00		83	140							223
08:00		78	84							162
09:00		46	68							114
10:00		36	91							127
11:00		12	56							68
Total		3896	3862							7758
Percent		50.2%	49.8%							
AM Peak	-	06:00	11:00	-	-	-	-	-	-	07:00
Vol.	-	347	267	-	-	-	-	-	-	493
PM Peak	-	12:00	15:00	-	-	-	-	-	-	15:00
Vol.	-	254	351	-	-	-	-	-	-	565

All Traffic Data Services

www.alltrafficdata.net

Date Start: 12-Oct-21
Site Code: 9
Station ID: 9
56TH AVE E.O. PICADILLY RD

Start Time	13-Oct-21 Wed	EB	WB							Total
12:00 AM		16	40							56
01:00		24	26							50
02:00		28	21							49
03:00		65	31							96
04:00		220	37							257
05:00		277	79							356
06:00		**320**	127							447
07:00		289	194							**483**
08:00		202	216							418
09:00		199	204							403
10:00		185	209							394
11:00		211	**261**							472
12:00 PM		**250**	236							486
01:00		240	238							478
02:00		213	336							549
03:00		209	**350**							**559**
04:00		225	319							544
05:00		199	280							479
06:00		138	186							324
07:00		87	134							221
08:00		79	85							164
09:00		46	82							128
10:00		44	114							158
11:00		20	65							85
Total		3786	3870							7656
Percent		49.5%	50.5%							
AM Peak	-	06:00	11:00	-	-	-	-	-	-	07:00
Vol.	-	320	261	-	-	-	-	-	-	483
PM Peak	-	12:00	15:00	-	-	-	-	-	-	15:00
Vol.	-	250	350	-	-	-	-	-	-	559

All Traffic Data Services

www.alltrafficdata.net

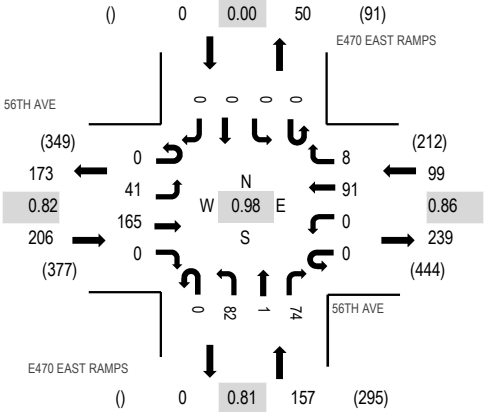
Date Start: 12-Oct-21
Site Code: 9
Station ID: 9
56TH AVE E.O. PICADILLY RD

Start Time	14-Oct-21 Thu	EB	WB							Total
12:00 AM		18	34							52
01:00		16	19							35
02:00		25	16							41
03:00		78	25							103
04:00		203	34							237
05:00		282	88							370
06:00		**380**	178							**558**
07:00		279	**231**							510
08:00		228	215							443
09:00		192	181							373
10:00		208	218							426
11:00		216	208							424
12:00 PM		**257**	262							519
01:00		249	300							549
02:00		219	394							613
03:00		216	**407**							**623**
04:00		217	329							546
05:00		193	310							503
06:00		129	184							313
07:00		110	120							230
08:00		76	102							178
09:00		57	118							175
10:00		45	99							144
11:00		21	76							97
Total		3914	4148							8062
Percent		48.5%	51.5%							
AM Peak	-	06:00	07:00	-	-	-	-	-	-	06:00
Vol.	-	380	231	-	-	-	-	-	-	558
PM Peak	-	12:00	15:00	-	-	-	-	-	-	15:00
Vol.	-	257	407	-	-	-	-	-	-	623
Grand Total		11596	11880							23476
Percent		49.4%	50.6%							
ADT		ADT 7,825		AADT 7,825						

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

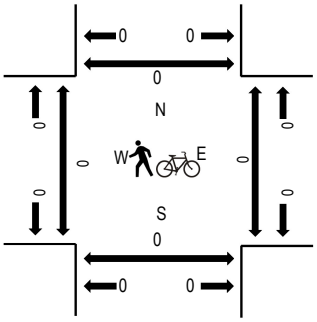
Location: 1 E470 EAST RAMPS & 56TH AVE AM
Date: Thursday, October 14, 2021
Peak Hour: 07:00 AM - 08:00 AM
Peak 15-Minutes: 07:00 AM - 07:15 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



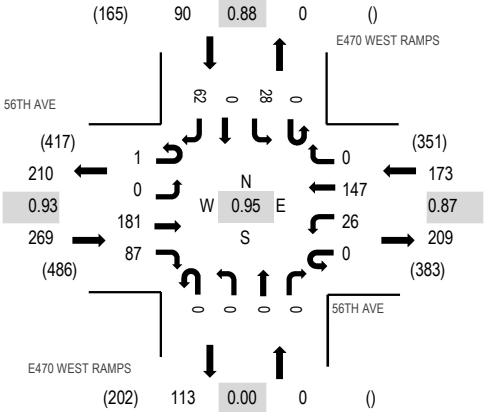
Traffic Counts

Interval Start Time	56TH AVE Eastbound				56TH AVE Westbound				E470 EAST RAMPS Northbound				E470 EAST RAMPS Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	11	52	0	0	0	25	1	0	13	1	15	0	0	0	0	118	462	0	0	0	0
7:15 AM	0	11	37	0	0	0	28	2	0	21	0	13	0	0	0	0	112	448	0	0	0	0
7:30 AM	0	5	33	0	0	0	22	1	0	28	0	25	0	0	0	0	114	449	0	0	0	0
7:45 AM	0	14	43	0	0	0	16	4	0	20	0	21	0	0	0	0	118	437	0	0	0	0
8:00 AM	0	7	33	0	0	0	25	2	0	20	0	17	0	0	0	0	104	422	0	0	1	0
8:15 AM	0	9	39	0	0	0	23	1	0	23	0	18	0	0	0	0	113		0	0	0	0
8:30 AM	0	6	38	0	0	0	27	2	0	16	0	13	0	0	0	0	102		0	0	0	0
8:45 AM	0	7	32	0	0	0	26	7	0	16	0	15	0	0	0	0	103		0	0	0	0
Count Total	0	70	307	0	0	0	192	20	0	157	1	137	0	0	0	0	884		0	0	1	0
Peak Hour	0	41	165	0	0	0	91	8	0	82	1	74	0	0	0	0	462		0	0	0	0

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

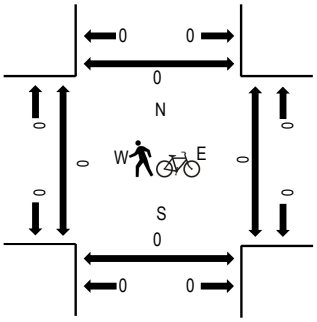
Location: 2 E470 WEST RAMPS & 56TH AVE AM
Date: Thursday, October 14, 2021
Peak Hour: 07:00 AM - 08:00 AM
Peak 15-Minutes: 07:15 AM - 07:30 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



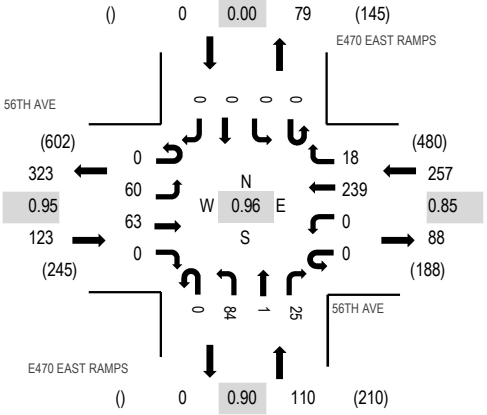
Traffic Counts

Interval Start Time	56TH AVE Eastbound				56TH AVE Westbound				E470 WEST RAMPS Northbound				E470 WEST RAMPS Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	0	56	13	0	5	35	0	0	0	0	0	0	5	0	18	132	532	0	0	0	0
7:15 AM	0	0	46	26	0	9	43	0	0	0	0	0	0	4	0	12	140	525	0	0	0	0
7:30 AM	0	0	34	29	0	6	40	0	0	0	0	0	0	7	0	18	134	510	0	0	0	0
7:45 AM	1	0	45	19	0	6	29	0	0	0	0	0	0	12	0	14	126	488	0	0	0	0
8:00 AM	0	0	34	19	0	5	43	0	0	0	0	0	0	5	0	19	125	470	0	0	1	0
8:15 AM	0	0	45	17	0	6	41	0	0	0	0	0	0	4	0	12	125		0	0	0	0
8:30 AM	0	0	33	16	1	3	36	0	0	0	0	0	0	10	0	13	112		0	0	0	0
8:45 AM	0	0	38	15	0	8	35	0	0	0	0	0	0	4	0	8	108		0	0	0	0
Count Total	1	0	331	154	1	48	302	0	0	0	0	0	0	51	0	114	1,002		0	0	1	0
Peak Hour	1	0	181	87	0	26	147	0	0	0	0	0	0	28	0	62	532		0	0	0	0

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

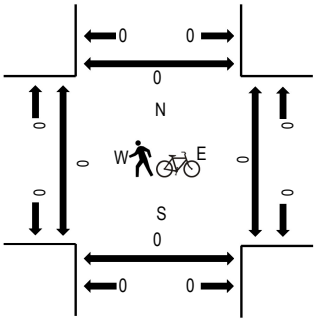
Location: 1 E470 EAST RAMPS & 56TH AVE PM
Date: Thursday, October 14, 2021
Peak Hour: 04:45 PM - 05:45 PM
Peak 15-Minutes: 05:15 PM - 05:30 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



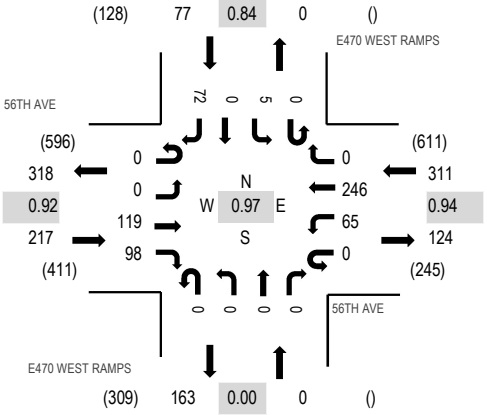
Traffic Counts

Interval Start Time	56TH AVE Eastbound				56TH AVE Westbound				E470 EAST RAMPS Northbound				E470 EAST RAMPS Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	8	25	0	0	0	53	5	0	14	1	2	0	0	0	0	108	473	0	0	0	0
4:15 PM	0	10	23	0	0	0	62	7	0	18	0	7	0	0	0	0	127	478	0	0	0	0
4:30 PM	0	15	11	0	0	0	56	3	0	17	0	10	0	0	0	0	112	478	0	0	0	0
4:45 PM	0	12	21	0	0	0	54	7	0	25	0	7	0	0	0	0	126	490	0	0	0	0
5:00 PM	0	13	10	0	0	0	56	3	0	21	1	9	0	0	0	0	113	462	0	0	0	0
5:15 PM	0	11	19	0	0	0	71	5	0	18	0	3	0	0	0	0	127		0	0	0	0
5:30 PM	0	24	13	0	0	0	58	3	0	20	0	6	0	0	0	0	124		0	0	0	0
5:45 PM	0	14	16	0	0	0	34	3	0	25	0	6	0	0	0	0	98		0	0	0	0
Count Total	0	107	138	0	0	0	444	36	0	158	2	50	0	0	0	0	935		0	0	0	0
Peak Hour	0	60	63	0	0	0	239	18	0	84	1	25	0	0	0	0	490		0	0	0	0

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

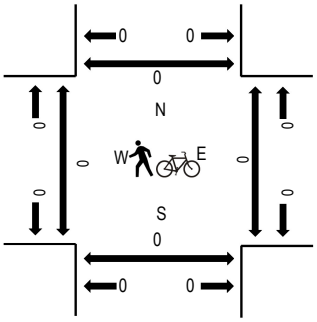
Location: 2 E470 WEST RAMPS & 56TH AVE PM
Date: Thursday, October 14, 2021
Peak Hour: 04:00 PM - 05:00 PM
Peak 15-Minutes: 04:15 PM - 04:30 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	56TH AVE Eastbound				56TH AVE Westbound				E470 WEST RAMPS Northbound				E470 WEST RAMPS Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	0	33	26	0	15	58	0	0	0	0	0	0	1	0	21	154	605	0	0	0	0
4:15 PM	0	0	30	24	0	23	60	0	0	0	0	0	0	1	0	18	156	582	0	0	0	0
4:30 PM	0	0	25	22	0	13	62	0	0	0	0	0	0	3	0	20	145	572	0	0	0	0
4:45 PM	0	0	31	26	0	14	66	0	0	0	0	0	0	0	0	13	150	578	0	0	0	0
5:00 PM	0	0	20	23	0	15	66	0	0	0	0	0	0	2	0	5	131	545	0	0	0	0
5:15 PM	0	0	30	17	0	15	72	0	0	0	0	0	0	2	0	10	146		0	0	0	0
5:30 PM	0	0	32	23	0	23	56	0	0	0	0	0	0	3	0	14	151		0	0	0	0
5:45 PM	0	0	31	18	0	12	41	0	0	0	0	0	0	1	0	14	117		0	0	0	0
Count Total	0	0	232	179	0	130	481	0	0	0	0	0	0	13	0	115	1,150		0	0	0	0
Peak Hour	0	0	119	98	0	65	246	0	0	0	0	0	0	5	0	72	605		0	0	0	0

APPENDIX B. EXISTING CONDITIONS LOS

Intersection	
Int Delay, s/veh	2.2

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	1	0	160	84	23	157	0	0	0	0	28	0	65
Future Vol, veh/h	1	0	160	84	23	157	0	0	0	0	28	0	65
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	-	550	150	-	-	-	-	-	-	-	175
Veh in Median Storage, #	-	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	87	87	87	90	90	90	88	88	88
Heavy Vehicles, %	12	12	12	12	22	22	22	2	2	2	13	13	13
Mvmt Flow	1	0	172	90	26	180	0	0	0	0	32	0	74

Major/Minor	Major1				Major2					Minor2		
Conflicting Flow All	-	-	0	0	172	0	0			404	406	180
Stage 1	-	-	-	-	-	-	-			232	232	-
Stage 2	-	-	-	-	-	-	-			172	174	-
Critical Hdwy	-	-	-	-	4.32	-	-			6.53	6.63	6.33
Critical Hdwy Stg 1	-	-	-	-	-	-	-			5.53	5.63	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-			5.53	5.63	-
Follow-up Hdwy	-	-	-	-	2.398	-	-			3.617	4.117	3.417
Pot Cap-1 Maneuver	-	0	-	-	1293	-	0			582	518	835
Stage 1	-	0	-	-	-	-	0			781	693	-
Stage 2	-	0	-	-	-	-	0			832	735	-
Platoon blocked, %			-	-		-						
Mov Cap-1 Maneuver	-	-	-	-	1293	-	-			570	0	835
Mov Cap-2 Maneuver	-	-	-	-	-	-	-			570	0	-
Stage 1	-	-	-	-	-	-	-			781	0	-
Stage 2	-	-	-	-	-	-	-			815	0	-

Approach	EB	WB	SB
HCM Control Delay, s		1	10.3
HCM LOS			B

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1293	-	570	835
HCM Lane V/C Ratio	-	-	0.02	-	0.056	0.088
HCM Control Delay (s)	-	-	7.8	-	11.7	9.7
HCM Lane LOS	-	-	A	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0.2	0.3

Intersection	
Int Delay, s/veh	5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	36	152	0	0	87	8	93	0	81	0	0	0
Future Vol, veh/h	36	152	0	0	87	8	93	0	81	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	450	200	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	86	86	86	81	81	81	90	90	90
Heavy Vehicles, %	15	15	15	34	34	34	10	10	10	2	2	2
Mvmt Flow	44	185	0	0	101	9	115	0	100	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	110	0	-	-	-	0	379	383	185
Stage 1	-	-	-	-	-	-	273	273	-
Stage 2	-	-	-	-	-	-	106	110	-
Critical Hdwy	4.25	-	-	-	-	-	6.5	6.6	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-	5.5	5.6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.5	5.6	-
Follow-up Hdwy	2.335	-	-	-	-	-	3.59	4.09	3.39
Pot Cap-1 Maneuver	1403	-	0	0	-	-	607	538	837
Stage 1	-	-	0	0	-	-	755	670	-
Stage 2	-	-	0	0	-	-	899	789	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1403	-	-	-	-	-	588	0	837
Mov Cap-2 Maneuver	-	-	-	-	-	-	588	0	-
Stage 1	-	-	-	-	-	-	732	0	-
Stage 2	-	-	-	-	-	-	899	0	-

Approach	EB	WB	NB
HCM Control Delay, s	1.5	0	11.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	WBT	WBR
Capacity (veh/h)	588	-	837	1403	-	-	-
HCM Lane V/C Ratio	0.195	-	0.119	0.031	-	-	-
HCM Control Delay (s)	12.6	0	9.9	7.6	-	-	-
HCM Lane LOS	B	A	A	A	-	-	-
HCM 95th %tile Q(veh)	0.7	-	0.4	0.1	-	-	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	113	81	65	238	0	0	0	0	8	0	43
Future Vol, veh/h	0	113	81	65	238	0	0	0	0	8	0	43
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	550	150	-	-	-	-	-	-	-	175
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	94	94	94	90	90	90	84	84	84
Heavy Vehicles, %	6	6	6	4	4	4	2	2	2	23	23	23
Mvmt Flow	0	123	88	69	253	0	0	0	0	10	0	51

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	-	0	0	123	0	0	514	514	253
Stage 1	-	-	-	-	-	-	391	391	-
Stage 2	-	-	-	-	-	-	123	123	-
Critical Hdwy	-	-	-	4.14	-	-	6.63	6.73	6.43
Critical Hdwy Stg 1	-	-	-	-	-	-	5.63	5.73	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.63	5.73	-
Follow-up Hdwy	-	-	-	2.236	-	-	3.707	4.207	3.507
Pot Cap-1 Maneuver	0	-	-	1452	-	0	485	435	737
Stage 1	0	-	-	-	-	0	640	572	-
Stage 2	0	-	-	-	-	0	853	755	-
Platoon blocked, %		-	-		-				
Mov Cap-1 Maneuver	-	-	-	1452	-	-	462	0	737
Mov Cap-2 Maneuver	-	-	-	-	-	-	462	0	-
Stage 1	-	-	-	-	-	-	640	0	-
Stage 2	-	-	-	-	-	-	812	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	1.6	10.6
HCM LOS			B

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1452	-	462	737
HCM Lane V/C Ratio	-	-	0.048	-	0.021	0.069
HCM Control Delay (s)	-	-	7.6	-	13	10.2
HCM Lane LOS	-	-	A	-	B	B
HCM 95th %tile Q(veh)	-	-	0.1	-	0.1	0.2

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	63	58	0	0	219	14	84	1	24	0	0	0
Future Vol, veh/h	63	58	0	0	219	14	84	1	24	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	450	200	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	85	85	85	90	90	90	90	90	90
Heavy Vehicles, %	7	7	7	2	2	2	8	8	8	2	2	2
Mvmt Flow	66	61	0	0	258	16	93	1	27	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	274	0	-	-	-	0	459	467	61
Stage 1	-	-	-	-	-	-	193	193	-
Stage 2	-	-	-	-	-	-	266	274	-
Critical Hdwy	4.17	-	-	-	-	-	6.48	6.58	6.28
Critical Hdwy Stg 1	-	-	-	-	-	-	5.48	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.48	5.58	-
Follow-up Hdwy	2.263	-	-	-	-	-	3.572	4.072	3.372
Pot Cap-1 Maneuver	1261	-	0	0	-	-	549	485	988
Stage 1	-	-	0	0	-	-	826	730	-
Stage 2	-	-	0	0	-	-	765	672	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1261	-	-	-	-	-	520	0	988
Mov Cap-2 Maneuver	-	-	-	-	-	-	520	0	-
Stage 1	-	-	-	-	-	-	783	0	-
Stage 2	-	-	-	-	-	-	765	0	-

Approach	EB	WB	NB
HCM Control Delay, s	4.2	0	
HCM LOS			-

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	WBT	WBR
Capacity (veh/h)	520	-	988	1261	-	-	-
HCM Lane V/C Ratio	0.179	-	0.027	0.053	-	-	-
HCM Control Delay (s)	13.4	-	8.7	8	-	-	-
HCM Lane LOS	B	-	A	A	-	-	-
HCM 95th %tile Q(veh)	0.6	-	0.1	0.2	-	-	-

APPENDIX C. INTERNAL CAPTURE WORKSHEET

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Windler TIA	**Organization:**	Felsburg Holt & Ullevig
Project Location:	Aurora, CO	**Performed By:**	KG
Scenario Description:	Full Buildout	**Date:**	6/6/2023
Analysis Year:	2040	**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	710	290	KSF	461	406	55
Retail	820,821,822	650	KSF	830	511	319
Restaurant	-	-	-	0	0	0
Cinema/Entertainment	-	-	-	0	0	0
Residential	210 & 220	5,544	DU	3,089	777	2,312
Hotel	-	-	-	0	0	0
All Other Land Uses[2]	110, 154, 520	2,200	KSF	1,071	856	215
				5,451	2,550	2,901

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.00	0%	0%	1.00	0%	0%
Retail	1.00	0%	0%	1.00	0%	0%
Restaurant	1.00	0%	0%	1.00	0%	0%
Cinema/Entertainment	1.00	0%	0%	1.00	0%	0%
Residential	1.00	0%	0%	1.00	0%	0%
Hotel	1.00	0%	0%	1.00	0%	0%
All Other Land Uses[2]	1.00	0%	0%	1.00	0%	0%

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		15	0	0	0	0
Retail	16		0	0	16	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	12	23	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	5,451	2,550	2,901
Internal Capture Percentage	3%	3%	3%
External Vehicle-Trips[5]	5,287	2,468	2,819
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	7%	27%
Retail	7%	10%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	2%	2%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Windler TIA
Analysis Period:	**AM Street Peak Hour**

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	406	406	1.00	55	55
Retail	1.00	511	511	1.00	319	319
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	777	777	1.00	2312	2312
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		15	35	0	1	0
Retail	93		41	0	45	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	46	23	462	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		164	0	0	0	0
Retail	16		0	0	16	0
Restaurant	57	41		0	39	0
Cinema/Entertainment	0	0	0		0	0
Residential	12	87	0	0		0
Hotel	12	20	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	28	378	406	378	0	0
Retail	38	473	511	473	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	16	761	777	761	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	856	856	856	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	15	40	55	40	0	0
Retail	32	287	319	287	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	35	2277	2312	2277	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	215	215	215	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Windler TIA	**Organization:**	Felsburg Holt & Ullevig
Project Location:	Aurora, CO	**Performed By:**	KG
Scenario Description:	Full Buildout	**Date:**	6/6/2023
Analysis Year:	2040	**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	710	290	KSF	451	77	374
Retail	820,821,822	650	KSF	3,089	1,487	1,602
Restaurant	-	-	-	0	0	0
Cinema/Entertainment	-	-	-	0	0	0
Residential	210 & 220	5,544	DU	4,201	2,650	1,551
Hotel	-	-	-	0	0	0
All Other Land Uses[2]	110, 154, 520	2,200	KSF	449	101	348
				8,190	4,315	3,875

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.00	0%	0%	1.00	0%	0%
Retail	1.00	0%	0%	1.00	0%	0%
Restaurant	1.00	0%	0%	1.00	0%	0%
Cinema/Entertainment	1.00	0%	0%	1.00	0%	0%
Residential	1.00	0%	0%	1.00	0%	0%
Hotel	1.00	0%	0%	1.00	0%	0%
All Other Land Uses[2]	1.00	0%	0%	1.00	0%	0%

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0		0	
Retail					0	
Restaurant					0	
Cinema/Entertainment					0	
Residential		0	0			
Hotel					0	

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		75	0	0	7	0
Retail	24		0	0	417	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	44	149	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	8,190	4,315	3,875
Internal Capture Percentage	17%	17%	18%
External Vehicle-Trips[5]	6,758	3,599	3,159
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	88%	22%
Retail	15%	28%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	16%	12%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Windler TIA
Analysis Period:	**PM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips				Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*		Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	77	77		1.00	374	374
Retail	1.00	1487	1487		1.00	1602	1602
Restaurant	1.00	0	0		1.00	0	0
Cinema/Entertainment	1.00	0	0		1.00	0	0
Residential	1.00	2650	2650		1.00	1551	1551
Hotel	1.00	0	0		1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		75	15	0	7	0
Retail	32		465	64	417	80
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	62	651	326	0		47
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		119	0	0	106	0
Retail	24		0	0	1219	0
Restaurant	23	744		0	424	0
Cinema/Entertainment	5	59	0		106	0
Residential	44	149	0	0		0
Hotel	0	30	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates				External Trips by Mode*		
	Internal	External	Total		Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	68	9	77		9	0	0
Retail	224	1263	1487		1263	0	0
Restaurant	0	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0	0
Residential	424	2226	2650		2226	0	0
Hotel	0	0	0		0	0	0
All Other Land Uses[3]	0	101	101		101	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates				External Trips by Mode*		
	Internal	External	Total		Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	82	292	374		292	0	0
Retail	441	1161	1602		1161	0	0
Restaurant	0	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0	0
Residential	193	1358	1551		1358	0	0
Hotel	0	0	0		0	0	0
All Other Land Uses[3]	0	348	348		348	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

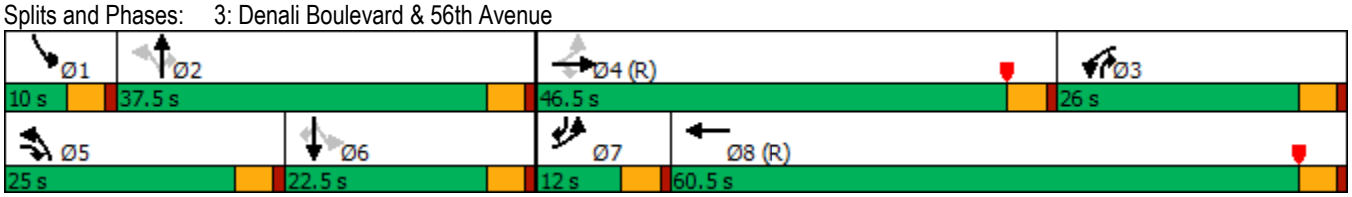
*Indicates computation that has been rounded to the nearest whole number.

APPENDIX D. 2040 BACKGROUND TRAFFIC LOS

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	50	825	140	240	710	90	25	220	25	5	40
Future Volume (vph)	50	825	140	240	710	90	25	220	25	5	40
Turn Type	pm+pt	NA	pm+ov	Prot	NA	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	7	4	5	3	8	5	2	3	1	6	7
Permitted Phases	4		4			2		2	6		6
Detector Phase	7	4	5	3	8	5	2	3	1	6	7
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	22.5	9.5	9.5	22.5	9.5
Total Split (s)	12.0	46.5	25.0	26.0	60.5	25.0	37.5	26.0	10.0	22.5	12.0
Total Split (%)	10.0%	38.8%	20.8%	21.7%	50.4%	20.8%	31.3%	21.7%	8.3%	18.8%	10.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	None	C-Max	None	Max	None	None	Max	None
Act Effct Green (s)	42.0	42.0	50.5	21.5	58.5	42.6	42.6	60.3	35.5	30.0	41.5
Actuated g/C Ratio	0.35	0.35	0.42	0.18	0.49	0.36	0.36	0.50	0.30	0.25	0.35
v/c Ratio	0.25	0.50	0.20	0.42	0.33	0.14	0.11	0.28	0.07	0.01	0.07
Control Delay	23.0	24.0	3.3	37.7	10.4	16.5	16.3	3.5	26.0	35.4	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.0	24.0	3.3	37.7	10.4	16.5	16.3	3.5	26.0	35.4	0.2
LOS	C	C	A	D	B	B	B	A	C	D	A
Approach Delay		21.1			17.0		7.9			11.8	
Approach LOS		C			B		A			B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 10 (8%), Referenced to phase 4:EBTL and 8:WBT, Start of Yellow	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.50	
Intersection Signal Delay: 17.3	Intersection LOS: B
Intersection Capacity Utilization 45.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Denali Boulevard & 56th Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	54	897	152	261	805	62	63	239	27	5	43
v/c Ratio	0.25	0.50	0.20	0.42	0.33	0.14	0.11	0.28	0.07	0.01	0.07
Control Delay	23.0	24.0	3.3	37.7	10.4	16.5	16.3	3.5	26.0	35.4	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.0	24.0	3.3	37.7	10.4	16.5	16.3	3.5	26.0	35.4	0.2
Queue Length 50th (ft)	23	142	0	96	74	37	37	6	14	3	0
Queue Length 95th (ft)	47	167	14	137	93	74	75	21	34	14	0
Internal Link Dist (ft)		546			823		622			214	
Turn Bay Length (ft)	150		350	275		275			100		100
Base Capacity (vph)	222	1779	897	615	2468	506	565	866	413	466	642
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.50	0.17	0.42	0.33	0.12	0.11	0.28	0.07	0.01	0.07

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	825	140	240	710	30	90	25	220	25	5	40
Future Volume (veh/h)	50	825	140	240	710	30	90	25	220	25	5	40
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	54	897	152	261	772	33	62	77	239	27	5	43
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	269	1787	614	692	2589	110	480	514	753	363	491	471
Arrive On Green	0.03	0.35	0.35	0.27	0.69	0.69	0.04	0.28	0.28	0.02	0.26	0.26
Sat Flow, veh/h	1781	5106	1585	3456	5022	214	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	54	897	152	261	523	282	62	77	239	27	5	43
Grp Sat Flow(s),veh/h/ln	1781	1702	1585	1728	1702	1832	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	2.5	16.6	3.8	7.4	7.3	7.3	3.0	3.7	1.3	1.3	0.2	2.4
Cycle Q Clear(g_c), s	2.5	16.6	3.8	7.4	7.3	7.3	3.0	3.7	1.3	1.3	0.2	2.4
Prop In Lane	1.00		1.00	1.00		0.12	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	269	1787	614	692	1755	944	480	514	753	363	491	471
V/C Ratio(X)	0.20	0.50	0.25	0.38	0.30	0.30	0.13	0.15	0.32	0.07	0.01	0.09
Avail Cap(c_a), veh/h	318	1787	614	692	1755	944	718	514	753	401	491	471
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.2	30.8	9.7	37.9	10.3	10.3	30.5	32.9	10.9	31.0	32.7	30.5
Incr Delay (d2), s/veh	0.4	1.0	1.0	0.3	0.4	0.8	0.1	0.6	1.1	0.1	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	6.7	1.6	3.0	2.5	2.8	1.3	1.8	2.9	0.6	0.1	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.6	31.8	10.7	38.3	10.7	11.1	30.6	33.5	12.0	31.1	32.8	30.8
LnGrp LOS	C	C	B	D	B	B	C	C	B	C	C	C
Approach Vol, veh/h		1103			1066			378			75	
Approach Delay, s/veh		28.7			17.6			19.4			31.1	
Approach LOS		C			B			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.5	37.5	28.5	46.5	9.0	36.0	8.7	66.4
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.5	33.0	21.5	42.0	20.5	18.0	7.5	56.0
Max Q Clear Time (g_c+I1), s	3.3	5.7	9.4	18.6	5.0	4.4	4.5	9.3
Green Ext Time (p_c), s	0.0	1.2	0.7	6.6	0.1	0.1	0.0	5.4

Intersection Summary	
HCM 6th Ctrl Delay	22.9
HCM 6th LOS	C

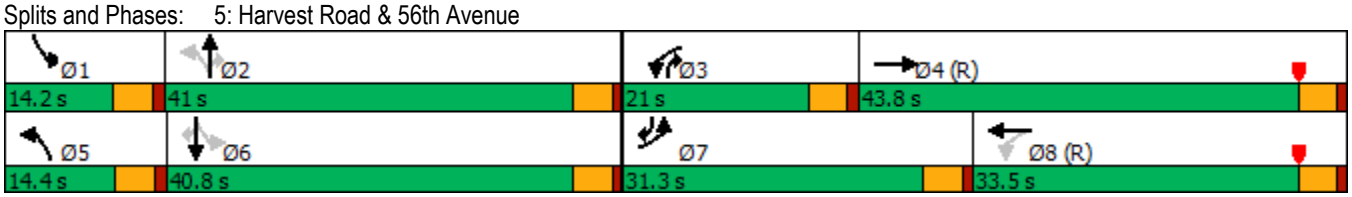
Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	540	425	60	565	115	805	20	130	340	300
Future Volume (vph)	540	425	60	565	115	805	20	130	340	300
Turn Type	Prot	NA	pm+pt	NA	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	7	4	3	8	5	2	3	1	6	7
Permitted Phases			8		2		2	6		6
Detector Phase	7	4	3	8	5	2	3	1	6	7
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	9.5	22.5	9.5	9.5	22.5	9.5
Total Split (s)	31.3	43.8	21.0	33.5	14.4	41.0	21.0	14.2	40.8	31.3
Total Split (%)	26.1%	36.5%	17.5%	27.9%	12.0%	34.2%	17.5%	11.8%	34.0%	26.1%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	Max	None	None	Max	None
Act Effct Green (s)	24.7	50.1	38.8	31.1	46.1	36.8	49.1	46.3	36.9	66.2
Actuated g/C Ratio	0.21	0.42	0.32	0.26	0.38	0.31	0.41	0.39	0.31	0.55
v/c Ratio	0.83	0.28	0.20	0.66	0.32	0.81	0.03	0.70	0.34	0.34
Control Delay	40.4	20.7	19.4	39.0	18.7	35.9	0.2	42.4	33.4	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.4	20.7	19.4	39.0	18.7	35.9	0.2	42.4	33.4	8.0
LOS	D	C	B	D	B	D	A	D	C	A
Approach Delay		30.6		37.6		33.0			25.0	
Approach LOS		C		D		C			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 88 (73%), Referenced to phase 4:EBT and 8:WBTL, Start of Yellow	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 31.7	Intersection LOS: C
Intersection Capacity Utilization 76.1%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 5: Harvest Road & 56th Avenue



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	587	576	65	875	125	875	22	141	370	326
v/c Ratio	0.83	0.28	0.20	0.66	0.32	0.81	0.03	0.70	0.34	0.34
Control Delay	40.4	20.7	19.4	39.0	18.7	35.9	0.2	42.4	33.4	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.4	20.7	19.4	39.0	18.7	35.9	0.2	42.4	33.4	8.0
Queue Length 50th (ft)	236	134	25	205	44	333	0	67	117	60
Queue Length 95th (ft)	303	174	50	257	78	426	0	#141	161	115
Internal Link Dist (ft)		1540		4791		759			2985	
Turn Bay Length (ft)	300		275		275		275	275		600
Base Capacity (vph)	766	2088	448	1319	404	1085	812	207	1089	969
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.28	0.15	0.66	0.31	0.81	0.03	0.68	0.34	0.34

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	540	425	105	60	565	240	115	805	20	130	340	300
Future Volume (veh/h)	540	425	105	60	565	240	115	805	20	130	340	300
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	587	462	114	65	614	261	125	875	22	141	370	326
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	668	1799	431	364	999	415	346	1081	543	224	1104	799
Arrive On Green	0.06	0.14	0.14	0.04	0.28	0.28	0.02	0.10	0.10	0.07	0.31	0.31
Sat Flow, veh/h	3456	4112	985	1781	3538	1471	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	587	380	196	65	590	285	125	875	22	141	370	326
Grp Sat Flow(s),veh/h/ln	1728	1702	1693	1781	1702	1606	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	20.2	11.9	12.3	3.1	18.1	18.6	5.7	28.9	1.4	6.5	9.6	15.4
Cycle Q Clear(g_c), s	20.2	11.9	12.3	3.1	18.1	18.6	5.7	28.9	1.4	6.5	9.6	15.4
Prop In Lane	1.00		0.58	1.00		0.92	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	668	1490	741	364	961	453	346	1081	543	224	1104	799
V/C Ratio(X)	0.88	0.26	0.26	0.18	0.61	0.63	0.36	0.81	0.04	0.63	0.34	0.41
Avail Cap(c_a), veh/h	772	1490	741	541	961	453	380	1081	543	243	1104	799
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.8	34.0	34.2	28.8	37.4	37.6	27.4	50.6	34.2	30.0	31.8	18.6
Incr Delay (d2), s/veh	10.2	0.4	0.9	0.2	2.9	6.5	0.6	6.6	0.1	4.5	0.8	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	10.3	5.4	5.7	1.3	7.7	7.9	2.5	14.7	0.6	2.9	4.1	5.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	65.0	34.4	35.0	29.0	40.3	44.0	28.0	57.1	34.3	34.5	32.6	20.1
LnGrp LOS	E	C	D	C	D	D	C	E	C	C	C	C
Approach Vol, veh/h		1163			940			1022			837	
Approach Delay, s/veh		50.0			40.7			53.1			28.1	
Approach LOS		D			D			D			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.9	41.0	9.1	57.0	12.1	41.8	27.7	38.4
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.7	36.5	16.5	39.3	9.9	36.3	26.8	29.0
Max Q Clear Time (g_c+I1), s	8.5	30.9	5.1	14.3	7.7	17.4	22.2	20.6
Green Ext Time (p_c), s	0.0	2.6	0.1	3.5	0.1	3.2	1.0	3.4

Intersection Summary	
HCM 6th Ctrl Delay	43.9
HCM 6th LOS	D

Intersection	
Int Delay, s/veh	2.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	190	750	90	125	380
Future Vol, veh/h	15	190	750	90	125	380
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	-	-	150	150	-
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	16	207	815	98	136	413

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1294	408	0	0	913	0
Stage 1	815	-	-	-	-	-
Stage 2	479	-	-	-	-	-
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	*517	*772	-	-	1089	-
Stage 1	*728	-	-	-	-	-
Stage 2	*777	-	-	-	-	-
Platoon blocked, %	1	1	-	-	1	-
Mov Cap-1 Maneuver	*453	*772	-	-	1089	-
Mov Cap-2 Maneuver	*453	-	-	-	-	-
Stage 1	*728	-	-	-	-	-
Stage 2	*680	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.5	0	2.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	453	772	1089	-
HCM Lane V/C Ratio	-	-	0.036	0.268	0.125	-
HCM Control Delay (s)	-	-	13.2	11.4	8.8	-
HCM Lane LOS	-	-	B	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	1.1	0.4	-

Notes

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

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø8
Lane Configurations							
Traffic Volume (vph)	90	175	665	110	215	180	
Future Volume (vph)	90	175	665	110	215	180	
Turn Type	pm+pt	pm+ov	NA	pm+ov	pm+pt	NA	
Protected Phases	3	1	2	3	1	6	8
Permitted Phases	8	8		2	6		
Detector Phase	3	1	2	3	1	6	
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	9.5	22.5	9.5	9.5	22.5	22.5
Total Split (s)	27.0	34.0	59.0	27.0	34.0	93.0	27.0
Total Split (%)	22.5%	28.3%	49.2%	22.5%	28.3%	77.5%	23%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag		Lead	Lag		Lead		
Lead-Lag Optimize?		Yes	Yes		Yes		
Recall Mode	None	None	C-Max	None	None	C-Max	None
Act Effct Green (s)	11.8	25.2	85.8	102.2	99.2	99.2	
Actuated g/C Ratio	0.10	0.21	0.72	0.85	0.83	0.83	
v/c Ratio	0.56	0.43	0.29	0.09	0.39	0.07	
Control Delay	63.3	15.7	3.0	0.1	2.9	0.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	63.3	15.7	3.0	0.1	2.9	0.4	
LOS	E	B	A	A	A	A	
Approach Delay	31.9		2.6			1.8	
Approach LOS	C		A			A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 5 (4%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.56	
Intersection Signal Delay: 7.8	Intersection LOS: A
Intersection Capacity Utilization 46.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 8: Harvest Road & 52nd Avenue

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	98	190	723	120	234	196
v/c Ratio	0.56	0.43	0.29	0.09	0.39	0.07
Control Delay	63.3	15.7	3.0	0.1	2.9	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.3	15.7	3.0	0.1	2.9	0.4
Queue Length 50th (ft)	74	36	32	0	2	1
Queue Length 95th (ft)	126	96	62	0	3	1
Internal Link Dist (ft)	762		1101			640
Turn Bay Length (ft)	200	200		150	175	
Base Capacity (vph)	331	687	2530	1495	801	2924
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.28	0.29	0.08	0.29	0.07

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	90	175	665	110	215	180
Future Volume (veh/h)	90	175	665	110	215	180
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
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	98	190	723	120	234	196
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	235	295	2492	1321	565	2818
Arrive On Green	0.13	0.13	0.70	0.70	0.02	0.26
Sat Flow, veh/h	1781	1585	3647	1585	1781	3647
Grp Volume(v), veh/h	98	190	723	120	234	196
Grp Sat Flow(s),veh/h/ln	1781	1585	1777	1585	1781	1777
Q Serve(g_s), s	6.1	13.3	9.2	0.9	3.9	5.0
Cycle Q Clear(g_c), s	6.1	13.3	9.2	0.9	3.9	5.0
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	235	295	2492	1321	565	2818
V/C Ratio(X)	0.42	0.64	0.29	0.09	0.41	0.07
Avail Cap(c_a), veh/h	334	383	2492	1321	906	2818
HCM Platoon Ratio	1.00	1.00	1.00	1.00	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.8	45.1	6.7	0.5	4.6	11.0
Incr Delay (d2), s/veh	1.2	2.3	0.3	0.1	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	5.4	3.0	0.4	1.2	1.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	49.0	47.5	7.0	0.7	5.0	11.1
LnGrp LOS	D	D	A	A	A	B
Approach Vol, veh/h	288		843			430
Approach Delay, s/veh	48.0		6.1			7.8
Approach LOS	D		A			A

Timer - Assigned Phs	1	2				6	8
Phs Duration (G+Y+Rc), s	11.0	88.7				99.7	20.3
Change Period (Y+Rc), s	4.5	4.5				4.5	4.5
Max Green Setting (Gmax), s	29.5	54.5				88.5	22.5
Max Q Clear Time (g_c+I1), s	5.9	11.2				7.0	15.3
Green Ext Time (p_c), s	0.6	5.6				1.2	0.5

Intersection Summary	
HCM 6th Ctrl Delay	14.3
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	3.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	160	615	45	175	95
Future Vol, veh/h	15	160	615	45	175	95
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	-	-	150	150	-
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	16	174	668	49	190	103

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1100	334	0	0	717	0
Stage 1	668	-	-	-	-	-
Stage 2	432	-	-	-	-	-
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	218	662	-	-	880	-
Stage 1	471	-	-	-	-	-
Stage 2	660	-	-	-	-	-
Platoon blocked, %	1		-	-		-
Mov Cap-1 Maneuver	171	662	-	-	880	-
Mov Cap-2 Maneuver	171	-	-	-	-	-
Stage 1	471	-	-	-	-	-
Stage 2	517	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.8	0	6.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	171	662	880	-
HCM Lane V/C Ratio	-	-	0.095	0.263	0.216	-
HCM Control Delay (s)	-	-	28.3	12.4	10.2	-
HCM Lane LOS	-	-	D	B	B	-
HCM 95th %tile Q(veh)	-	-	0.3	1.1	0.8	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	500	1390	1000	160	60	50
Future Volume (vph)	500	1390	1000	160	60	50
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		1	
Permitted Phases				8		6
Detector Phase	7	4	8	8	1	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	9.5	22.5
Total Split (s)	42.0	95.0	53.0	53.0	25.0	25.0
Total Split (%)	35.0%	79.2%	44.2%	44.2%	20.8%	20.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag		Lead	Lead		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	37.5	106.3	63.4	63.4	7.7	7.6
Actuated g/C Ratio	0.31	0.89	0.53	0.53	0.06	0.06
v/c Ratio	0.51	0.34	0.40	0.19	0.30	0.36
Control Delay	52.3	6.7	18.2	2.9	36.4	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.3	6.7	18.2	2.9	36.4	11.4
LOS	D	A	B	A	D	B
Approach Delay		18.8	16.1		25.0	
Approach LOS		B	B		C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 27 (23%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.51	
Intersection Signal Delay: 18.0	Intersection LOS: B
Intersection Capacity Utilization 49.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 10: 48th Avenue & Harvest Road

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	543	1511	1087	174	65	54
v/c Ratio	0.51	0.34	0.40	0.19	0.30	0.36
Control Delay	52.3	6.7	18.2	2.9	36.4	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.3	6.7	18.2	2.9	36.4	11.4
Queue Length 50th (ft)	183	258	185	0	19	1
Queue Length 95th (ft)	238	308	229	36	35	12
Internal Link Dist (ft)		649	786		1558	
Turn Bay Length (ft)	275			500	275	
Base Capacity (vph)	1072	4502	2684	918	586	315
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.34	0.40	0.19	0.11	0.17

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	500	1390	1000	160	60	50
Future Volume (veh/h)	500	1390	1000	160	60	50
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
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	543	1511	1087	0	65	0
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	1543	4535	2064		127	
Arrive On Green	0.45	0.89	0.40	0.00	0.04	0.00
Sat Flow, veh/h	3456	5274	5274	1585	3456	1585
Grp Volume(v), veh/h	543	1511	1087	0	65	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1702	1585	1728	1585
Q Serve(g_s), s	12.4	5.6	19.3	0.0	2.2	0.0
Cycle Q Clear(g_c), s	12.4	5.6	19.3	0.0	2.2	0.0
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	1543	4535	2064		127	
V/C Ratio(X)	0.35	0.33	0.53		0.51	
Avail Cap(c_a), veh/h	1543	4535	2064		590	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.72	0.72	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	21.8	1.1	27.1	0.0	56.7	0.0
Incr Delay (d2), s/veh	0.1	0.1	1.0	0.0	3.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.8	0.2	7.7	0.0	1.0	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	21.9	1.2	28.0	0.0	59.8	0.0
LnGrp LOS	C	A	C		E	
Approach Vol, veh/h		2054	1087		65	
Approach Delay, s/veh		6.7	28.0		59.8	
Approach LOS		A	C		E	

Timer - Assigned Phs	4	6	7	8
Phs Duration (G+Y+Rc), s	111.1	8.9	58.1	53.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	90.5	20.5	37.5	48.5
Max Q Clear Time (g_c+I1), s	7.6	4.2	14.4	21.3
Green Ext Time (p_c), s	15.7	0.1	1.9	7.9

Intersection Summary	
HCM 6th Ctrl Delay	15.0
HCM 6th LOS	B

Notes

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

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø2
Lane Configurations							
Traffic Volume (vph)	1630	100	120	930	390	260	
Future Volume (vph)	1630	100	120	930	390	260	
Turn Type	NA	pm+ov	Prot	NA	Prot	pm+ov	
Protected Phases	4	5	3	8	5	3	2
Permitted Phases		4				2	
Detector Phase	4	5	3	8	5	3	
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	9.5	9.5	22.5	9.5	9.5	22.5
Total Split (s)	66.0	29.0	25.0	91.0	29.0	25.0	29.0
Total Split (%)	55.0%	24.2%	20.8%	75.8%	24.2%	20.8%	24%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag	Lead		Lag			Lag	
Lead-Lag Optimize?	Yes		Yes			Yes	
Recall Mode	C-Max	None	None	C-Max	None	None	Max
Act Effct Green (s)	61.5	90.5	20.5	86.5	24.5	49.5	
Actuated g/C Ratio	0.51	0.75	0.17	0.72	0.20	0.41	
v/c Ratio	0.68	0.09	0.22	0.28	0.61	0.43	
Control Delay	17.4	0.1	26.2	4.7	47.6	26.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	17.4	0.1	26.2	4.7	47.6	26.9	
LOS	B	A	C	A	D	C	
Approach Delay	16.4			7.1	39.3		
Approach LOS	B			A	D		

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 110 (92%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 17.9	Intersection LOS: B
Intersection Capacity Utilization 58.0%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 11: Fultondale Street & 48th Avenue

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1772	109	130	1011	424	283
v/c Ratio	0.68	0.09	0.22	0.28	0.61	0.43
Control Delay	17.4	0.1	26.2	4.7	47.6	26.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.4	0.1	26.2	4.7	47.6	26.9
Queue Length 50th (ft)	441	0	44	58	155	149
Queue Length 95th (ft)	484	m1	61	67	209	227
Internal Link Dist (ft)	1760			649	394	
Turn Bay Length (ft)		150	275		225	150
Base Capacity (vph)	2606	1220	586	3665	700	658
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.09	0.22	0.28	0.61	0.43

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1630	100	120	930	390	260
Future Volume (veh/h)	1630	100	120	930	390	260
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
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	1772	109	130	1011	424	283
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	2617	1051	776	3955	520	594
Arrive On Green	1.00	1.00	0.45	1.00	0.15	0.15
Sat Flow, veh/h	5274	1585	3456	5274	3456	1585
Grp Volume(v), veh/h	1772	109	130	1011	424	283
Grp Sat Flow(s),veh/h/ln	1702	1585	1728	1702	1728	1585
Q Serve(g_s), s	0.0	0.0	2.7	0.0	14.3	0.0
Cycle Q Clear(g_c), s	0.0	0.0	2.7	0.0	14.3	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2617	1051	776	3955	520	594
V/C Ratio(X)	0.68	0.10	0.17	0.26	0.82	0.48
Avail Cap(c_a), veh/h	2617	1051	776	3955	706	680
HCM Platoon Ratio	2.00	2.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	0.67	0.67	0.92	0.92	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	26.4	0.0	49.4	28.5
Incr Delay (d2), s/veh	1.0	0.1	0.1	0.1	5.4	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	0.2	0.0	1.1	0.1	6.5	6.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	1.0	0.1	26.5	0.1	54.7	29.1
LnGrp LOS	A	A	C	A	D	C
Approach Vol, veh/h	1881			1141	707	
Approach Delay, s/veh	0.9			3.1	44.5	
Approach LOS	A			A	D	

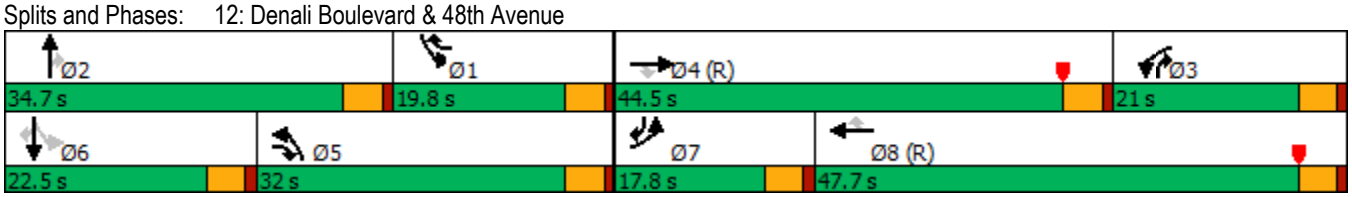
Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		22.6	31.4	66.0		97.4
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		24.5	20.5	61.5		86.5
Max Q Clear Time (g_c+I1), s		16.3	4.7	2.0		2.0
Green Ext Time (p_c), s		1.8	0.3	21.2		8.2

Intersection Summary	
HCM 6th Ctrl Delay	9.9
HCM 6th LOS	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	1205	500	340	895	85	560	200	440	85	235	65
Future Volume (vph)	50	1205	500	340	895	85	560	200	440	85	235	65
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	7
Permitted Phases			4			8			2	6		6
Detector Phase	7	4	5	3	8	1	5	2	3	1	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5
Total Split (s)	17.8	44.5	32.0	21.0	47.7	19.8	32.0	34.7	21.0	19.8	22.5	17.8
Total Split (%)	14.8%	37.1%	26.7%	17.5%	39.8%	16.5%	26.7%	28.9%	17.5%	16.5%	18.8%	14.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	None	C-Max	None	None	Max	None	None	Max	None
Act Effct Green (s)	7.3	41.6	72.0	16.5	52.8	67.4	25.9	30.2	51.2	31.7	18.0	25.3
Actuated g/C Ratio	0.06	0.35	0.60	0.14	0.44	0.56	0.22	0.25	0.43	0.26	0.15	0.21
v/c Ratio	0.26	0.74	0.55	0.78	0.43	0.10	0.82	0.24	0.61	0.26	0.48	0.16
Control Delay	45.9	46.2	18.9	52.3	16.4	3.4	54.9	36.7	18.9	26.3	50.2	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.9	46.2	18.9	52.3	16.4	3.4	54.9	36.7	18.9	26.3	50.2	0.8
LOS	D	D	B	D	B	A	D	D	B	C	D	A
Approach Delay		38.4			24.8			38.7			36.5	
Approach LOS		D			C			D			D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 48 (40%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 34.5	Intersection LOS: C
Intersection Capacity Utilization 70.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 12: Denali Boulevard & 48th Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	54	1310	543	370	973	92	609	217	478	92	255	71
v/c Ratio	0.26	0.74	0.55	0.78	0.43	0.10	0.82	0.24	0.61	0.26	0.48	0.16
Control Delay	45.9	46.2	18.9	52.3	16.4	3.4	54.9	36.7	18.9	26.3	50.2	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.9	46.2	18.9	52.3	16.4	3.4	54.9	36.7	18.9	26.3	50.2	0.8
Queue Length 50th (ft)	20	392	316	148	186	14	229	71	166	43	96	0
Queue Length 95th (ft)	m35	443	472	#212	226	m25	296	105	280	78	140	0
Internal Link Dist (ft)		1300			1760			542			586	
Turn Bay Length (ft)	250		275	300		150	400		250	300		225
Base Capacity (vph)	380	1763	972	472	2238	935	786	890	786	382	530	513
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.74	0.56	0.78	0.43	0.10	0.77	0.24	0.61	0.24	0.48	0.14

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	1205	500	340	895	85	560	200	440	85	235	65
Future Volume (veh/h)	50	1205	500	340	895	85	560	200	440	85	235	65
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	54	1310	0	370	973	92	609	217	0	92	255	71
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	120	1702		584	2387	893	683	894		349	533	293
Arrive On Green	0.03	0.33	0.00	0.17	0.47	0.47	0.20	0.25	0.00	0.10	0.15	0.15
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	3456	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	54	1310	0	370	973	92	609	217	0	92	255	71
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1728	1777	1585	1781	1777	1585
Q Serve(g_s), s	1.8	27.6	0.0	12.0	15.0	0.5	20.6	5.8	0.0	0.0	7.9	2.8
Cycle Q Clear(g_c), s	1.8	27.6	0.0	12.0	15.0	0.5	20.6	5.8	0.0	0.0	7.9	2.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	120	1702		584	2387	893	683	894		349	533	293
V/C Ratio(X)	0.45	0.77		0.63	0.41	0.10	0.89	0.24		0.26	0.48	0.24
Avail Cap(c_a), veh/h	383	1702		584	2387	893	792	894		405	533	293
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.77	0.77	0.00	0.94	0.94	0.94	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.8	35.9	0.0	46.4	21.0	5.7	46.9	35.8	0.0	42.0	46.7	19.5
Incr Delay (d2), s/veh	2.0	2.7	0.0	2.1	0.5	0.2	11.2	0.6	0.0	0.4	3.1	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	11.4	0.0	5.2	5.8	0.6	9.9	2.6	0.0	2.4	3.7	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.8	38.5	0.0	48.5	21.5	5.9	58.1	36.4	0.0	42.4	49.8	21.4
LnGrp LOS	E	D		D	C	A	E	D		D	D	C
Approach Vol, veh/h		1364			1435			826			418	
Approach Delay, s/veh		39.3			27.5			52.4			43.3	
Approach LOS		D			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.0	34.7	24.8	44.5	28.2	22.5	8.7	60.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	15.3	30.2	16.5	40.0	27.5	18.0	13.3	43.2
Max Q Clear Time (g_c+I1), s	2.0	7.8	14.0	29.6	22.6	9.9	3.8	17.0
Green Ext Time (p_c), s	0.2	1.3	0.3	5.9	1.1	1.1	0.1	7.2

Intersection Summary	
HCM 6th Ctrl Delay	38.2
HCM 6th LOS	D

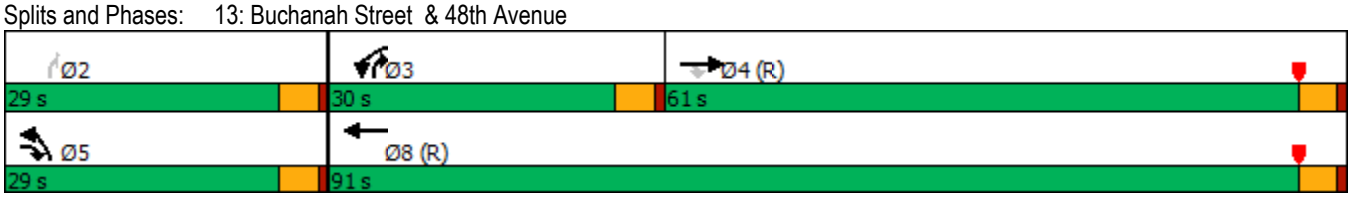
Notes

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

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø2
Lane Configurations							
Traffic Volume (vph)	1495	400	420	1100	390	260	
Future Volume (vph)	1495	400	420	1100	390	260	
Turn Type	NA	pm+ov	Prot	NA	Prot	pm+ov	
Protected Phases	4	5	3	8	5	3	2
Permitted Phases		4				2	
Detector Phase	4	5	3	8	5	3	
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	9.5	9.5	22.5	9.5	9.5	22.5
Total Split (s)	61.0	29.0	30.0	91.0	29.0	30.0	29.0
Total Split (%)	50.8%	24.2%	25.0%	75.8%	24.2%	25.0%	24%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag	Lag		Lead			Lead	
Lead-Lag Optimize?	Yes		Yes			Yes	
Recall Mode	C-Max	None	None	C-Max	None	None	Max
Act Effct Green (s)	60.7	89.7	21.3	86.5	24.5	50.3	
Actuated g/C Ratio	0.51	0.75	0.18	0.72	0.20	0.42	
v/c Ratio	0.63	0.36	0.75	0.33	0.61	0.42	
Control Delay	35.7	2.8	57.1	8.2	47.6	25.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	35.7	2.8	57.1	8.2	47.6	25.4	
LOS	D	A	E	A	D	C	
Approach Delay	28.8			21.7	38.7		
Approach LOS	C			C	D		

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 109 (91%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 27.7	Intersection LOS: C
Intersection Capacity Utilization 63.2%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 13: Buchanah Street & 48th Avenue



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1625	435	457	1196	424	283
v/c Ratio	0.63	0.36	0.75	0.33	0.61	0.42
Control Delay	35.7	2.8	57.1	8.2	47.6	25.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.7	2.8	57.1	8.2	47.6	25.4
Queue Length 50th (ft)	358	24	176	139	155	146
Queue Length 95th (ft)	445	59	221	158	209	210
Internal Link Dist (ft)	420			1300	548	
Turn Bay Length (ft)		400	275		250	300
Base Capacity (vph)	2571	1198	729	3665	700	723
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.36	0.63	0.33	0.61	0.39

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1495	400	420	1100	390	260
Future Volume (veh/h)	1495	400	420	1100	390	260
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
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	1625	0	457	1196	424	0
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	3021		522	3984	500	
Arrive On Green	1.00	0.00	0.30	1.00	0.14	0.00
Sat Flow, veh/h	5274	1585	3456	5274	3456	1585
Grp Volume(v), veh/h	1625	0	457	1196	424	0
Grp Sat Flow(s),veh/h/ln	1702	1585	1728	1702	1728	1585
Q Serve(g_s), s	0.0	0.0	15.1	0.0	14.4	0.0
Cycle Q Clear(g_c), s	0.0	0.0	15.1	0.0	14.4	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	3021		522	3984	500	
V/C Ratio(X)	0.54		0.87	0.30	0.85	
Avail Cap(c_a), veh/h	3021		734	3984	706	
HCM Platoon Ratio	2.00	2.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.80	0.80	1.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	40.8	0.0	50.0	0.0
Incr Delay (d2), s/veh	0.7	0.0	7.0	0.2	6.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	5.7	0.1	6.7	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.7	0.0	47.8	0.2	56.8	0.0
LnGrp LOS	A		D	A	E	
Approach Vol, veh/h	1625			1653	424	
Approach Delay, s/veh	0.7			13.3	56.8	
Approach LOS	A			B	E	

Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		21.9	22.6	75.5		98.1
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		24.5	25.5	56.5		86.5
Max Q Clear Time (g_c+I1), s		16.4	17.1	2.0		2.0
Green Ext Time (p_c), s		1.0	1.1	16.9		10.5

Intersection Summary	
HCM 6th Ctrl Delay	12.8
HCM 6th LOS	B

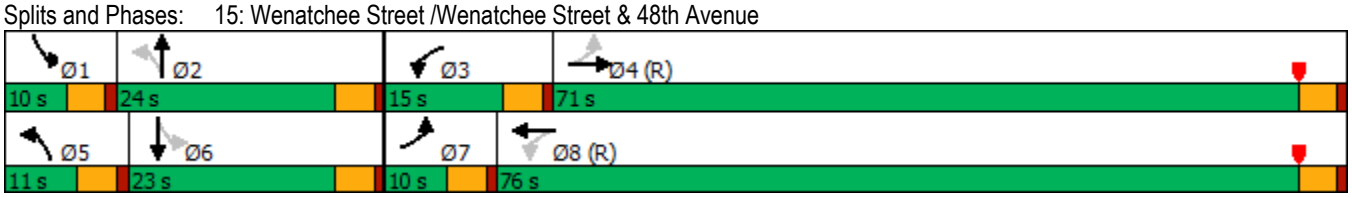
Notes

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

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	20	1760	75	980	60	15	40	15
Future Volume (vph)	20	1760	75	980	60	15	40	15
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	9.5	22.5	9.5	22.5
Total Split (s)	10.0	71.0	15.0	76.0	11.0	24.0	10.0	23.0
Total Split (%)	8.3%	59.2%	12.5%	63.3%	9.2%	20.0%	8.3%	19.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	Max	None	Max
Act Effct Green (s)	75.7	71.3	80.6	75.5	26.7	21.5	25.1	20.7
Actuated g/C Ratio	0.63	0.59	0.67	0.63	0.22	0.18	0.21	0.17
v/c Ratio	0.07	0.65	0.47	0.35	0.21	0.25	0.15	0.16
Control Delay	7.1	30.4	37.2	6.6	37.5	15.8	36.6	22.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.1	30.4	37.2	6.6	37.5	15.8	36.6	22.2
LOS	A	C	D	A	D	B	D	C
Approach Delay		30.1		8.6		25.1		28.9
Approach LOS		C		A		C		C

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Yellow	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.65	
Intersection Signal Delay: 22.3	Intersection LOS: C
Intersection Capacity Utilization 60.4%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 15: Wenatchee Street /Wenatchee Street & 48th Avenue



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	1962	82	1125	65	87	43	49
v/c Ratio	0.07	0.65	0.47	0.35	0.21	0.25	0.15	0.16
Control Delay	7.1	30.4	37.2	6.6	37.5	15.8	36.6	22.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.1	30.4	37.2	6.6	37.5	15.8	36.6	22.2
Queue Length 50th (ft)	5	588	41	49	40	11	26	11
Queue Length 95th (ft)	m7	640	89	111	78	57	57	47
Internal Link Dist (ft)		1340		538		422		321
Turn Bay Length (ft)	150		150		100		100	
Base Capacity (vph)	320	3012	215	3179	315	351	294	316
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.65	0.38	0.35	0.21	0.25	0.15	0.16

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	1760	45	75	980	55	60	15	65	40	15	30
Future Volume (veh/h)	20	1760	45	75	980	55	60	15	65	40	15	30
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	22	1913	49	82	1065	60	65	16	71	43	16	33
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	406	3149	81	267	3128	176	309	49	219	270	84	173
Arrive On Green	0.04	1.00	1.00	0.08	1.00	1.00	0.04	0.16	0.16	0.03	0.15	0.15
Sat Flow, veh/h	1781	5120	131	1781	4946	278	1781	300	1331	1781	545	1123
Grp Volume(v), veh/h	22	1271	691	82	733	392	65	0	87	43	0	49
Grp Sat Flow(s),veh/h/ln	1781	1702	1847	1781	1702	1820	1781	0	1631	1781	0	1668
Q Serve(g_s), s	0.5	0.0	0.0	2.0	0.0	0.0	3.7	0.0	5.7	2.4	0.0	3.1
Cycle Q Clear(g_c), s	0.5	0.0	0.0	2.0	0.0	0.0	3.7	0.0	5.7	2.4	0.0	3.1
Prop In Lane	1.00		0.07	1.00		0.15	1.00		0.82	1.00		0.67
Lane Grp Cap(c), veh/h	406	2094	1136	267	2153	1151	309	0	268	270	0	257
V/C Ratio(X)	0.05	0.61	0.61	0.31	0.34	0.34	0.21	0.00	0.32	0.16	0.00	0.19
Avail Cap(c_a), veh/h	450	2094	1136	353	2153	1151	331	0	268	295	0	257
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.73	0.73	0.73	0.97	0.97	0.97	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.8	0.0	0.0	7.2	0.0	0.0	40.3	0.0	44.3	40.8	0.0	44.2
Incr Delay (d2), s/veh	0.0	1.0	1.8	0.6	0.4	0.8	0.3	0.0	3.2	0.3	0.0	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.3	0.6	0.7	0.1	0.3	1.6	0.0	2.5	1.1	0.0	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.9	1.0	1.8	7.9	0.4	0.8	40.6	0.0	47.5	41.1	0.0	45.9
LnGrp LOS	A	A	A	A	A	A	D	A	D	D	A	D
Approach Vol, veh/h		1984			1207			152			92	
Approach Delay, s/veh		1.3			1.0			44.6			43.6	
Approach LOS		A			A			D			D	

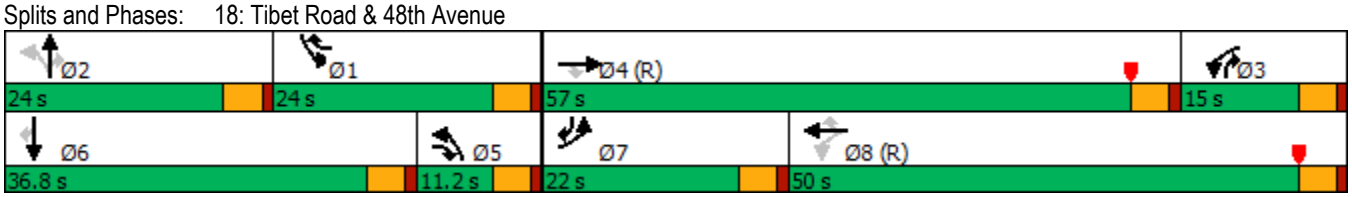
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.3	24.2	9.2	78.3	9.5	23.0	7.1	80.4
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.5	19.5	10.5	66.5	6.5	18.5	5.5	71.5
Max Q Clear Time (g_c+I1), s	4.4	7.7	4.0	2.0	5.7	5.1	2.5	2.0
Green Ext Time (p_c), s	0.0	0.3	0.1	23.0	0.0	0.1	0.0	8.7

Intersection Summary	
HCM 6th Ctrl Delay	4.3
HCM 6th LOS	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	250	1400	120	80	840	150	80	135	120	305	70	230
Future Volume (vph)	250	1400	120	80	840	150	80	135	120	305	70	230
Turn Type	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA	pm+ov
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	7
Permitted Phases			4	8		8	2		2			6
Detector Phase	7	4	5	3	8	1	5	2	3	1	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5
Total Split (s)	22.0	57.0	11.2	15.0	50.0	24.0	11.2	24.0	15.0	24.0	36.8	22.0
Total Split (%)	18.3%	47.5%	9.3%	12.5%	41.7%	20.0%	9.3%	20.0%	12.5%	20.0%	30.7%	18.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	None	C-Max	None	None	Max	None	None	Max	None
Act Effct Green (s)	14.5	52.9	63.7	48.9	48.9	68.0	25.8	19.5	34.5	19.1	32.3	46.8
Actuated g/C Ratio	0.12	0.44	0.53	0.41	0.41	0.57	0.22	0.16	0.29	0.16	0.27	0.39
v/c Ratio	0.66	0.68	0.14	0.37	0.44	0.17	0.28	0.49	0.24	0.61	0.15	0.36
Control Delay	58.0	28.7	2.7	43.4	28.8	5.8	30.4	51.9	5.9	40.3	25.1	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.0	28.7	2.7	43.4	28.8	5.8	30.4	51.9	5.9	40.3	25.1	3.7
LOS	E	C	A	D	C	A	C	D	A	D	C	A
Approach Delay		31.1			26.7			30.3			24.7	
Approach LOS		C			C			C			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 60 (50%), Referenced to phase 4:EBT and 8:WBTL, Start of Yellow	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 28.8	Intersection LOS: C
Intersection Capacity Utilization 62.3%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 18: Tibet Road & 48th Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	272	1522	130	87	913	163	87	147	130	332	76	250
v/c Ratio	0.66	0.68	0.14	0.37	0.44	0.17	0.28	0.49	0.24	0.61	0.15	0.36
Control Delay	58.0	28.7	2.7	43.4	28.8	5.8	30.4	51.9	5.9	40.3	25.1	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.0	28.7	2.7	43.4	28.8	5.8	30.4	51.9	5.9	40.3	25.1	3.7
Queue Length 50th (ft)	105	337	0	55	225	23	45	105	0	128	30	11
Queue Length 95th (ft)	147	395	29	106	276	60	83	172	43	176	53	16
Internal Link Dist (ft)		947			1340			509			857	
Turn Bay Length (ft)	275		300	275		275	275		100	275		150
Base Capacity (vph)	500	2241	873	233	2072	972	313	302	552	557	501	725
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.68	0.15	0.37	0.44	0.17	0.28	0.49	0.24	0.60	0.15	0.34

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	250	1400	120	80	840	150	80	135	120	305	70	230
Future Volume (veh/h)	250	1400	120	80	840	150	80	135	120	305	70	230
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	272	1522	130	87	913	163	87	147	130	332	76	250
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	337	2234	756	300	2266	935	262	304	422	505	503	581
Arrive On Green	0.10	0.44	0.44	0.14	0.59	0.59	0.04	0.16	0.16	0.05	0.09	0.09
Sat Flow, veh/h	3456	5106	1585	1781	5106	1585	1781	1870	1585	3456	1870	1585
Grp Volume(v), veh/h	272	1522	130	87	913	163	87	147	130	332	76	250
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1781	1702	1585	1781	1870	1585	1728	1870	1585
Q Serve(g_s), s	9.3	28.7	0.9	0.0	11.5	1.4	0.0	8.6	0.0	11.3	4.5	12.0
Cycle Q Clear(g_c), s	9.3	28.7	0.9	0.0	11.5	1.4	0.0	8.6	0.0	11.3	4.5	12.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	337	2234	756	300	2266	935	262	304	422	505	503	581
V/C Ratio(X)	0.81	0.68	0.17	0.29	0.40	0.17	0.33	0.48	0.31	0.66	0.15	0.43
Avail Cap(c_a), veh/h	504	2234	756	300	2266	935	291	304	422	562	503	581
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.0	27.0	17.9	39.4	16.0	2.8	45.7	45.7	35.2	54.2	42.0	21.5
Incr Delay (d2), s/veh	5.8	1.7	0.5	0.5	0.5	0.4	0.7	5.4	1.9	2.4	0.6	2.3
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	4.2	11.3	2.1	2.2	4.0	0.5	2.4	4.3	3.2	5.3	2.2	5.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.8	28.7	18.4	39.9	16.5	3.2	46.4	51.1	37.1	56.6	42.6	23.8
LnGrp LOS	E	C	B	D	B	A	D	D	D	E	D	C
Approach Vol, veh/h		1924			1163			364			658	
Approach Delay, s/veh		32.3			16.4			45.0			42.5	
Approach LOS		C			B			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	22.0	24.0	17.0	57.0	9.2	36.8	16.2	57.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	19.5	19.5	10.5	52.5	6.7	32.3	17.5	45.5
Max Q Clear Time (g_c+I1), s	13.3	10.6	2.0	30.7	2.0	14.0	11.3	13.5
Green Ext Time (p_c), s	0.6	0.7	0.1	11.4	0.1	1.1	0.5	7.3

Intersection Summary	
HCM 6th Ctrl Delay	30.6
HCM 6th LOS	C

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	15	5	530	590	0
Future Vol, veh/h	5	15	5	530	590	0
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	-	150	-	-	-
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	5	16	5	576	641	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	939	321	641	0	-	0
Stage 1	641	-	-	-	-	-
Stage 2	298	-	-	-	-	-
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	263	675	939	-	-	-
Stage 1	487	-	-	-	-	-
Stage 2	727	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	262	675	939	-	-	-
Mov Cap-2 Maneuver	262	-	-	-	-	-
Stage 1	485	-	-	-	-	-
Stage 2	727	-	-	-	-	-

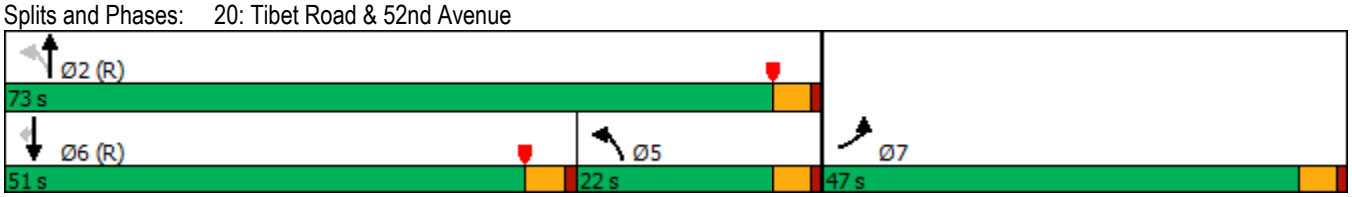
Approach	EB	NB	SB
HCM Control Delay, s	12.8	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	939	-	484	-	-
HCM Lane V/C Ratio	0.006	-	0.045	-	-
HCM Control Delay (s)	8.9	-	12.8	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Lane Group	EBL	NBL	NBT	SBT	SBR
Lane Configurations					
Traffic Volume (vph)	95	115	420	475	100
Future Volume (vph)	95	115	420	475	100
Turn Type	Prot	pm+pt	NA	NA	Perm
Protected Phases	7	5	2	6	
Permitted Phases		2			6
Detector Phase	7	5	2	6	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	9.5	22.5	22.5	22.5
Total Split (s)	47.0	22.0	73.0	51.0	51.0
Total Split (%)	39.2%	18.3%	60.8%	42.5%	42.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5
Lead/Lag		Lag		Lead	Lead
Lead-Lag Optimize?		Yes		Yes	Yes
Recall Mode	None	None	C-Max	C-Max	C-Max
Act Effct Green (s)	18.1	92.9	92.9	70.9	70.9
Actuated g/C Ratio	0.15	0.77	0.77	0.59	0.59
v/c Ratio	0.75	0.16	0.17	0.25	0.11
Control Delay	51.6	4.2	2.7	12.9	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	51.6	4.2	2.7	12.9	2.8
LOS	D	A	A	B	A
Approach Delay	51.6		3.0	11.2	
Approach LOS	D		A	B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 14.3	Intersection LOS: B
Intersection Capacity Utilization 43.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 20: Tibet Road & 52nd Avenue



Lane Group	EBL	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	228	125	457	516	109
v/c Ratio	0.75	0.16	0.17	0.25	0.11
Control Delay	51.6	4.2	2.7	12.9	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	51.6	4.2	2.7	12.9	2.8
Queue Length 50th (ft)	130	8	15	95	0
Queue Length 95th (ft)	203	64	136	148	28
Internal Link Dist (ft)	437		1723	253	
Turn Bay Length (ft)	150	150			150
Base Capacity (vph)	633	768	2738	2089	979
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.36	0.16	0.17	0.25	0.11

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	95	115	115	420	475	100
Future Volume (veh/h)	95	115	115	420	475	100
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
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	103	125	125	457	516	109
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	143	885	2731	1377	614
Arrive On Green	0.16	0.16	0.69	1.00	0.39	0.39
Sat Flow, veh/h	751	911	1781	3647	3647	1585
Grp Volume(v), veh/h	229	0	125	457	516	109
Grp Sat Flow(s),veh/h/ln	1669	0	1781	1777	1777	1585
Q Serve(g_s), s	16.1	0.0	0.0	0.0	12.5	3.4
Cycle Q Clear(g_c), s	16.1	0.0	0.0	0.0	12.5	3.4
Prop In Lane	0.45	0.55	1.00			1.00
Lane Grp Cap(c), veh/h	261	0	885	2731	1377	614
V/C Ratio(X)	0.88	0.00	0.14	0.17	0.37	0.18
Avail Cap(c_a), veh/h	591	0	885	2731	1377	614
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	49.5	0.0	4.7	0.0	26.3	9.3
Incr Delay (d2), s/veh	9.1	0.0	0.1	0.1	0.8	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	7.4	0.0	0.6	0.1	5.2	5.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	58.6	0.0	4.8	0.1	27.1	10.0
LnGrp LOS	E	A	A	A	C	A
Approach Vol, veh/h	229			582	625	
Approach Delay, s/veh	58.6			1.1	24.1	
Approach LOS	E			A	C	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		96.7		23.3	45.7	51.0
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		68.5		42.5	17.5	46.5
Max Q Clear Time (g_c+I1), s		2.0		18.1	2.0	14.5
Green Ext Time (p_c), s		3.0		0.7	0.2	3.7

Intersection Summary	
HCM 6th Ctrl Delay	20.3
HCM 6th LOS	C

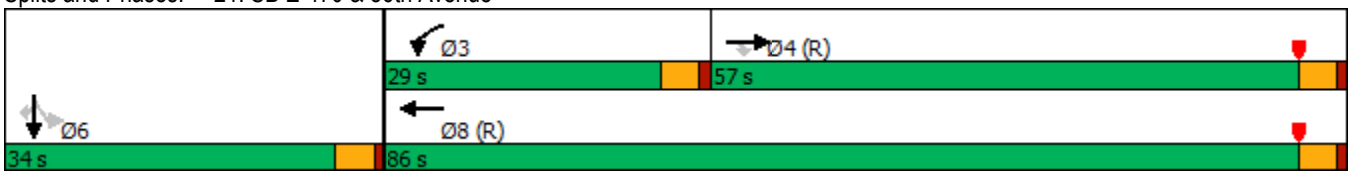
Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	790	165	140	720	200	0	130
Future Volume (vph)	790	165	140	720	200	0	130
Turn Type	NA	Perm	Prot	NA	Perm	NA	Perm
Protected Phases	4		3	8		6	
Permitted Phases		4			6		6
Detector Phase	4	4	3	8	6	6	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	9.5	22.5	22.5	22.5	22.5
Total Split (s)	57.0	57.0	29.0	86.0	34.0	34.0	34.0
Total Split (%)	47.5%	47.5%	24.2%	71.7%	28.3%	28.3%	28.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lag	Lead				
Lead-Lag Optimize?	Yes	Yes	Yes				
Recall Mode	C-Max	C-Max	None	C-Max	Max	Max	Max
Act Effct Green (s)	66.3	66.3	10.7	81.5	29.5	29.5	29.5
Actuated g/C Ratio	0.55	0.55	0.09	0.68	0.25	0.25	0.25
v/c Ratio	0.31	0.19	0.50	0.23	0.26	0.26	0.28
Control Delay	15.1	2.5	37.3	7.8	46.8	46.9	20.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.1	2.5	37.3	7.8	46.8	46.9	20.2
LOS	B	A	D	A	D	D	C
Approach Delay	12.9			12.6		36.4	
Approach LOS	B			B		D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 1 (1%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.50	
Intersection Signal Delay: 16.4	Intersection LOS: B
Intersection Capacity Utilization 37.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 21: SB E-470 & 56th Avenue



Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	859	179	152	783	108	109	141
v/c Ratio	0.31	0.19	0.50	0.23	0.26	0.26	0.28
Control Delay	15.1	2.5	37.3	7.8	46.8	46.9	20.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.1	2.5	37.3	7.8	46.8	46.9	20.2
Queue Length 50th (ft)	125	0	38	169	83	84	38
Queue Length 95th (ft)	162	34	54	46	144	144	88
Internal Link Dist (ft)	4670			560		1605	
Turn Bay Length (ft)		275	275		400		400
Base Capacity (vph)	2809	954	700	3453	413	413	495
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.19	0.22	0.23	0.26	0.26	0.28

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	790	165	140	720	0	0	0	0	200	0	130
Future Volume (veh/h)	0	790	165	140	720	0	0	0	0	200	0	130
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0				1870	1870	1870
Adj Flow Rate, veh/h	0	859	0	152	783	0				217	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	2953		219	3468	0				876	0	
Arrive On Green	0.00	0.58	0.00	0.02	0.22	0.00				0.25	0.00	0.00
Sat Flow, veh/h	0	5274	1585	3456	5274	0				3563	0	1585
Grp Volume(v), veh/h	0	859	0	152	783	0				217	0	0
Grp Sat Flow(s),veh/h/ln	0	1702	1585	1728	1702	0				1781	0	1585
Q Serve(g_s), s	0.0	10.2	0.0	5.2	15.0	0.0				5.9	0.0	0.0
Cycle Q Clear(g_c), s	0.0	10.2	0.0	5.2	15.0	0.0				5.9	0.0	0.0
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2953		219	3468	0				876	0	
V/C Ratio(X)	0.00	0.29		0.70	0.23	0.00				0.25	0.00	
Avail Cap(c_a), veh/h	0	2953		706	3468	0				876	0	
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	0.98	0.98	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	12.8	0.0	57.6	20.8	0.0				36.3	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.2	0.0	3.9	0.1	0.0				0.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.7	0.0	2.4	6.8	0.0				2.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	13.1	0.0	61.5	20.9	0.0				37.0	0.0	0.0
LnGrp LOS	A	B		E	C	A				D	A	
Approach Vol, veh/h		859			935						217	
Approach Delay, s/veh		13.1			27.5						37.0	
Approach LOS		B			C						D	

Timer - Assigned Phs		3	4		6		8					
Phs Duration (G+Y+Rc), s		12.1	73.9		34.0		86.0					
Change Period (Y+Rc), s		4.5	4.5		4.5		4.5					
Max Green Setting (Gmax), s		24.5	52.5		29.5		81.5					
Max Q Clear Time (g_c+I1), s		7.2	12.2		7.9		17.0					
Green Ext Time (p_c), s		0.4	6.3		0.7		5.8					

Intersection Summary	
HCM 6th Ctrl Delay	22.4
HCM 6th LOS	C

Notes

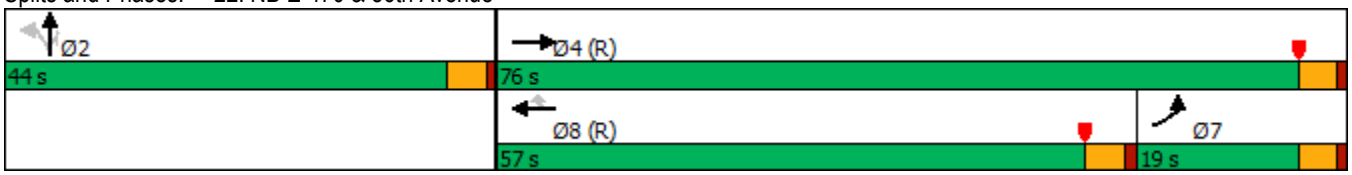
User approved volume balancing among the lanes for turning movement.

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

Lane Group	EBL	EBT	WBT	WBR	NBT	NBR
Lane Configurations						
Traffic Volume (vph)	135	855	720	120	0	160
Future Volume (vph)	135	855	720	120	0	160
Turn Type	Prot	NA	NA	Perm	NA	Perm
Protected Phases	7	4	8		2	
Permitted Phases				8		2
Detector Phase	7	4	8	8	2	2
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	19.0	76.0	57.0	57.0	44.0	44.0
Total Split (%)	15.8%	63.3%	47.5%	47.5%	36.7%	36.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag		Lead	Lead		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	14.5	95.1	76.1	76.1	15.9	15.9
Actuated g/C Ratio	0.12	0.79	0.63	0.63	0.13	0.13
v/c Ratio	0.36	0.23	0.24	0.12	0.65	0.53
Control Delay	46.8	3.5	5.5	2.3	40.5	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.8	3.5	5.5	2.3	40.5	6.6
LOS	D	A	A	A	D	A
Approach Delay		9.4	5.0		22.4	
Approach LOS		A	A		C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 100 (83%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.65	
Intersection Signal Delay: 9.5	Intersection LOS: A
Intersection Capacity Utilization 37.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 22: NB E-470 & 56th Avenue



Lane Group	EBL	EBT	WBT	WBR	NBT	NBR
Lane Group Flow (vph)	147	929	783	130	152	174
v/c Ratio	0.36	0.23	0.24	0.12	0.65	0.53
Control Delay	46.8	3.5	5.5	2.3	40.5	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.8	3.5	5.5	2.3	40.5	6.6
Queue Length 50th (ft)	56	74	7	0	59	0
Queue Length 95th (ft)	90	89	194	63	79	4
Internal Link Dist (ft)		560	670		1780	
Turn Bay Length (ft)	175			275		300
Base Capacity (vph)	414	4030	3225	1051	582	614
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.23	0.24	0.12	0.26	0.28

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	135	855	0	0	720	120	140	0	160	0	0	0
Future Volume (veh/h)	135	855	0	0	720	120	140	0	160	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1870	1870	1870	1870	1870			
Adj Flow Rate, veh/h	147	929	0	0	783	0	152	0	0			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	1187	4180	0	0	2234		190	0				
Arrive On Green	0.11	0.27	0.00	0.00	0.44	0.00	0.11	0.00	0.00			
Sat Flow, veh/h	3456	5274	0	0	5274	1585	1781	0	1585			
Grp Volume(v), veh/h	147	929	0	0	783	0	152	0	0			
Grp Sat Flow(s),veh/h/ln	1728	1702	0	0	1702	1585	1781	0	1585			
Q Serve(g_s), s	4.6	17.0	0.0	0.0	12.2	0.0	10.0	0.0	0.0			
Cycle Q Clear(g_c), s	4.6	17.0	0.0	0.0	12.2	0.0	10.0	0.0	0.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	1187	4180	0	0	2234		190	0				
V/C Ratio(X)	0.12	0.22	0.00	0.00	0.35		0.80	0.00				
Avail Cap(c_a), veh/h	1187	4180	0	0	2234		586	0				
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.96	0.96	0.00	0.00	1.00	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	37.0	14.1	0.0	0.0	22.4	0.0	52.4	0.0	0.0			
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	0.4	0.0	7.6	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.9	7.7	0.0	0.0	4.8	0.0	4.9	0.0	0.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.0	14.3	0.0	0.0	22.9	0.0	60.0	0.0	0.0			
LnGrp LOS	D	B	A	A	C		E	A				
Approach Vol, veh/h		1076			783			152				
Approach Delay, s/veh		17.4			22.9			60.0				
Approach LOS		B			C			E				

Timer - Assigned Phs		2		4			7	8				
Phs Duration (G+Y+Rc), s		17.3		102.7			45.7	57.0				
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5				
Max Green Setting (Gmax), s		39.5		71.5			14.5	52.5				
Max Q Clear Time (g_c+I1), s		12.0		19.0			6.6	14.2				
Green Ext Time (p_c), s		0.9		7.2			0.2	5.6				

Intersection Summary	
HCM 6th Ctrl Delay	22.7
HCM 6th LOS	C

Notes

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

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	1465	400	280	950	230	0	160
Future Volume (vph)	1465	400	280	950	230	0	160
Turn Type	NA	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	4		3	8	1	6	
Permitted Phases		4					6
Detector Phase	4	4	3	8	1	6	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	9.5	22.5	9.5	22.5	22.5
Total Split (s)	66.0	66.0	27.0	93.0	27.0	27.0	27.0
Total Split (%)	55.0%	55.0%	22.5%	77.5%	22.5%	22.5%	22.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes				
Recall Mode	C-Max	C-Max	None	C-Max	None	None	None
Act Effct Green (s)	61.5	61.5	22.5	88.5	22.5	22.5	22.5
Actuated g/C Ratio	0.51	0.51	0.19	0.74	0.19	0.19	0.19
v/c Ratio	0.61	0.43	0.47	0.28	0.40	0.40	0.40
Control Delay	12.5	3.9	47.6	0.7	50.9	50.9	17.0
Queue Delay	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.7	3.9	47.6	0.7	50.9	50.9	17.0
LOS	B	A	D	A	D	D	B
Approach Delay	10.8			11.4		37.0	
Approach LOS	B			B		D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 15 (13%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 13.9	Intersection LOS: B
Intersection Capacity Utilization 61.2%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 23: SB E-470 & 48th Avenue

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	1592	435	304	1033	125	125	174
v/c Ratio	0.61	0.43	0.47	0.28	0.40	0.40	0.40
Control Delay	12.5	3.9	47.6	0.7	50.9	50.9	17.0
Queue Delay	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.7	3.9	47.6	0.7	50.9	50.9	17.0
Queue Length 50th (ft)	408	58	128	9	104	104	40
Queue Length 95th (ft)	250	46	176	9	m171	m171	113
Internal Link Dist (ft)	538			585		1090	
Turn Bay Length (ft)		275	275		275		300
Base Capacity (vph)	2606	1023	643	3750	315	315	438
Starvation Cap Reductn	343	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.43	0.47	0.28	0.40	0.40	0.40

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1465	400	280	950	0	0	0	0	230	0	160
Future Volume (veh/h)	0	1465	400	280	950	0	0	0	0	230	0	160
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0				1870	1870	1870
Adj Flow Rate, veh/h	0	1592	0	304	1033	0				250	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	2617		979	4254	0				327	0	
Arrive On Green	0.00	0.68	0.00	0.09	0.27	0.00				0.03	0.00	0.00
Sat Flow, veh/h	0	5274	1585	3456	5274	0				3563	0	1585
Grp Volume(v), veh/h	0	1592	0	304	1033	0				250	0	0
Grp Sat Flow(s),veh/h/ln	0	1702	1585	1728	1702	0				1781	0	1585
Q Serve(g_s), s	0.0	20.4	0.0	9.9	18.9	0.0				8.4	0.0	0.0
Cycle Q Clear(g_c), s	0.0	20.4	0.0	9.9	18.9	0.0				8.4	0.0	0.0
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2617		979	4254	0				327	0	
V/C Ratio(X)	0.00	0.61		0.31	0.24	0.00				0.76	0.00	
Avail Cap(c_a), veh/h	0	2617		979	4254	0				668	0	
HCM Platoon Ratio	1.00	1.33	1.33	0.33	0.33	1.00				0.33	0.33	0.33
Upstream Filter(I)	0.00	0.72	0.00	0.83	0.83	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	12.6	0.0	43.5	14.1	0.0				56.9	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.8	0.0	0.1	0.1	0.0				3.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	5.7	0.0	4.4	8.6	0.0				4.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	13.3	0.0	43.6	14.2	0.0				60.6	0.0	0.0
LnGrp LOS	A	B		D	B	A				E	A	
Approach Vol, veh/h		1592			1337						250	
Approach Delay, s/veh		13.3			20.9						60.6	
Approach LOS		B			C						E	

Timer - Assigned Phs		3	4		6		8					
Phs Duration (G+Y+Rc), s		38.5	66.0		15.5		104.5					
Change Period (Y+Rc), s		4.5	4.5		4.5		4.5					
Max Green Setting (Gmax), s		22.5	61.5		22.5		88.5					
Max Q Clear Time (g_c+I1), s		11.9	22.4		10.4		20.9					
Green Ext Time (p_c), s		0.7	15.0		0.7		8.4					

Intersection Summary	
HCM 6th Ctrl Delay	20.2
HCM 6th LOS	C

Notes

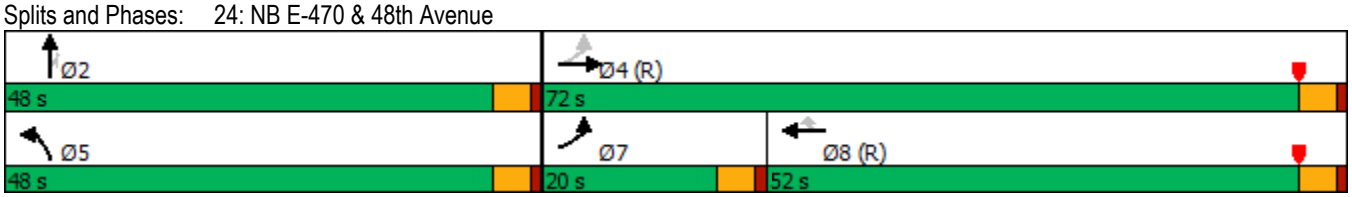
User approved volume balancing among the lanes for turning movement.

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

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Configurations							
Traffic Volume (vph)	200	1495	1090	400	140	0	400
Future Volume (vph)	200	1495	1090	400	140	0	400
Turn Type	pm+pt	NA	NA	Perm	Prot	NA	Perm
Protected Phases	7	4	8		5	2	
Permitted Phases	4			8			2
Detector Phase	7	4	8	8	5	2	2
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	48.0	22.5	22.5
Total Split (s)	20.0	72.0	52.0	52.0	48.0	48.0	48.0
Total Split (%)	16.7%	60.0%	43.3%	43.3%	40.0%	40.0%	40.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead		Lag	Lag			
Lead-Lag Optimize?	Yes		Yes	Yes			
Recall Mode	None	C-Max	C-Max	C-Max	None	Max	Max
Act Effct Green (s)	67.5	67.5	50.2	50.2	36.1	34.8	43.5
Actuated g/C Ratio	0.56	0.56	0.42	0.42	0.30	0.29	0.36
v/c Ratio	0.72	0.57	0.56	0.48	0.15	0.16	0.72
Control Delay	49.3	2.9	36.1	13.2	25.1	23.7	29.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.3	2.9	36.1	13.2	25.1	23.7	29.1
LOS	D	A	D	B	C	C	C
Approach Delay		8.4	29.9			27.9	
Approach LOS		A	C			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 2 (2%), Referenced to phase 4:EBTL and 8:WBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 19.8	Intersection LOS: B
Intersection Capacity Utilization 61.2%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 24: NB E-470 & 48th Avenue



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	217	1625	1185	435	76	76	435
v/c Ratio	0.72	0.57	0.56	0.48	0.15	0.16	0.72
Control Delay	49.3	2.9	36.1	13.2	25.1	23.7	29.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.3	2.9	36.1	13.2	25.1	23.7	29.1
Queue Length 50th (ft)	90	9	331	124	34	34	166
Queue Length 95th (ft)	175	61	391	221	75	75	271
Internal Link Dist (ft)		585	565			1471	
Turn Bay Length (ft)	225			275	225		225
Base Capacity (vph)	336	2860	2128	915	609	487	608
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	0.57	0.56	0.48	0.12	0.16	0.72

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	200	1495	0	0	1090	400	140	0	400	0	0	0
Future Volume (veh/h)	200	1495	0	0	1090	400	140	0	400	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1870	1870	1870	1870	1870			
Adj Flow Rate, veh/h	217	1625	0	0	1185	0	152	0	0			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	505	4405	0	0	4000		222	0				
Arrive On Green	0.01	0.28	0.00	0.00	1.00	0.00	0.06	0.00	0.00			
Sat Flow, veh/h	1781	5274	0	0	5274	1585	3563	0	1585			
Grp Volume(v), veh/h	217	1625	0	0	1185	0	152	0	0			
Grp Sat Flow(s),veh/h/ln	1781	1702	0	0	1702	1585	1781	0	1585			
Q Serve(g_s), s	2.5	30.5	0.0	0.0	0.0	0.0	5.0	0.0	0.0			
Cycle Q Clear(g_c), s	2.5	30.5	0.0	0.0	0.0	0.0	5.0	0.0	0.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	505	4405	0	0	4000		222	0				
V/C Ratio(X)	0.43	0.37	0.00	0.00	0.30		0.68	0.00				
Avail Cap(c_a), veh/h	661	4405	0	0	4000		1291	0				
HCM Platoon Ratio	0.33	0.33	1.00	1.00	2.00	2.00	1.00	1.00	1.00			
Upstream Filter(I)	0.77	0.77	0.00	0.00	1.00	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	1.8	16.8	0.0	0.0	0.0	0.0	55.1	0.0	0.0			
Incr Delay (d2), s/veh	0.4	0.2	0.0	0.0	0.2	0.0	3.7	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.5	13.8	0.0	0.0	0.1	0.0	2.4	0.0	0.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	2.2	17.0	0.0	0.0	0.2	0.0	58.8	0.0	0.0			
LnGrp LOS	A	B	A	A	A		E	A				
Approach Vol, veh/h		1842			1185			152				
Approach Delay, s/veh		15.3			0.2			58.8				
Approach LOS		B			A			E				

Timer - Assigned Phs		2		4			7	8				
Phs Duration (G+Y+Rc), s		12.0		108.0			9.5	98.5				
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5				
Max Green Setting (Gmax), s		43.5		67.5			15.5	47.5				
Max Q Clear Time (g_c+I1), s		7.0		32.5			4.5	2.0				
Green Ext Time (p_c), s		0.5		14.8			0.4	9.9				

Intersection Summary	
HCM 6th Ctrl Delay	11.7
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

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

Lane Group	NBT	SBT	Ø4	Ø8
Lane Configurations				
Traffic Volume (vph)	335	385		
Future Volume (vph)	335	385		
Turn Type	NA	NA		
Protected Phases	2	6	4	8
Permitted Phases				
Detector Phase	2	6		
Switch Phase				
Minimum Initial (s)	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5
Total Split (s)	78.0	78.0	42.0	42.0
Total Split (%)	65.0%	65.0%	35%	35%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		
Total Lost Time (s)	4.5	4.5		
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	C-Max	C-Max	Max	Max
Act Effct Green (s)	73.5	73.5		
Actuated g/C Ratio	0.61	0.61		
v/c Ratio	0.17	0.19		
Control Delay	10.3	0.5		
Queue Delay	0.0	0.0		
Total Delay	10.3	0.5		
LOS	B	A		
Approach Delay	10.3	0.5		
Approach LOS	B	A		

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 65 (54%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.19	
Intersection Signal Delay: 5.1	Intersection LOS: A
Intersection Capacity Utilization 14.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 101: Denali Boulevard & 54th Avenue

Lane Group	NBT	SBT
Lane Group Flow (vph)	364	418
v/c Ratio	0.17	0.19
Control Delay	10.3	0.5
Queue Delay	0.0	0.0
Total Delay	10.3	0.5
Queue Length 50th (ft)	60	1
Queue Length 95th (ft)	82	2
Internal Link Dist (ft)	488	494
Turn Bay Length (ft)		
Base Capacity (vph)	2167	2167
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.17	0.19

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	0	0	0	0	335	0	0	385	0
Future Volume (veh/h)	0	0	0	0	0	0	0	335	0	0	385	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	0	0	0	0	0	0	0	364	0	0	418	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	0	584	0	0	584	0	60	2177	0	60	2177	0
Arrive On Green	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.00	0.00	1.00	0.00
Sat Flow, veh/h	0	1870	0	0	1870	0	969	3647	0	1018	3647	0
Grp Volume(v), veh/h	0	0	0	0	0	0	0	364	0	0	418	0
Grp Sat Flow(s),veh/h/ln	0	1870	0	0	1870	0	969	1777	0	1018	1777	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	0.0	0.0	0.0	0.0
Prop In Lane	0.00		0.00	0.00		0.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	0	584	0	0	584	0	60	2177	0	60	2177	0
V/C Ratio(X)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.19	0.00
Avail Cap(c_a), veh/h	0	584	0	0	584	0	60	2177	0	60	2177	0
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)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.99	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.2	0.0	0.0	0.2	0.0
LnGrp LOS	A	A	A	A	A	A	A	B	A	A	A	A
Approach Vol, veh/h		0			0			364			418	
Approach Delay, s/veh		0.0			0.0			10.2			0.2	
Approach LOS								B			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	78.0	42.0	78.0	42.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	73.5	37.5	73.5	37.5
Max Q Clear Time (g_c+I1), s	7.3	0.0	2.0	0.0
Green Ext Time (p_c), s	2.7	0.0	3.2	0.0

Intersection Summary	
HCM 6th Ctrl Delay	4.9
HCM 6th LOS	A

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	0	0	0	0	0	385	0
Future Vol, veh/h	0	0	0	0	0	0	0	0	0	0	385	0
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	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	0	0	0	0	418	0

Major/Minor	Minor2			Minor1				Major2		
Conflicting Flow All	-	418	418	418	418	-		0	0	0
Stage 1	-	418	-	0	0	-		-	-	-
Stage 2	-	0	-	418	418	-		-	-	-
Critical Hdwy	-	6.52	6.22	7.12	6.52	-		4.12	-	-
Critical Hdwy Stg 1	-	5.52	-	-	-	-		-	-	-
Critical Hdwy Stg 2	-	-	-	6.12	5.52	-		-	-	-
Follow-up Hdwy	-	4.018	3.318	3.518	4.018	-		2.218	-	-
Pot Cap-1 Maneuver	0	526	635	545	526	0		-	-	-
Stage 1	0	591	-	-	-	0		-	-	-
Stage 2	0	-	-	612	591	0		-	-	-
Platoon blocked, %									-	-
Mov Cap-1 Maneuver	-	526	635	545	526	-		-	-	-
Mov Cap-2 Maneuver	-	526	-	545	526	-		-	-	-
Stage 1	-	591	-	-	-	-		-	-	-
Stage 2	-	-	-	612	591	-		-	-	-

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

Minor Lane/Major Mvmt	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	-	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	0	0	335	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0	0	335	0	0	0	0
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	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	0	364	0	0	0	0

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	364	364	-	-	364	364	0	0	0
Stage 1	0	0	-	-	364	-	-	-	-
Stage 2	364	364	-	-	0	-	-	-	-
Critical Hdwy	7.12	6.52	-	-	6.52	6.22	4.12	-	-
Critical Hdwy Stg 1	-	-	-	-	5.52	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	-	-	4.018	3.318	2.218	-	-
Pot Cap-1 Maneuver	592	564	0	0	564	681	-	-	-
Stage 1	-	-	0	0	624	-	-	-	-
Stage 2	655	624	0	0	-	-	-	-	-
Platoon blocked, %								-	-
Mov Cap-1 Maneuver	592	564	-	-	564	681	-	-	-
Mov Cap-2 Maneuver	592	564	-	-	564	-	-	-	-
Stage 1	-	-	-	-	624	-	-	-	-
Stage 2	655	624	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS	A	A	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1
Capacity (veh/h)	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	-	-	-	-	-

Lane Group	NBT	SBT	Ø4	Ø8
Lane Configurations				
Traffic Volume (vph)	335	385		
Future Volume (vph)	335	385		
Turn Type	NA	NA		
Protected Phases	2	6	4	8
Permitted Phases				
Detector Phase	2	6		
Switch Phase				
Minimum Initial (s)	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5
Total Split (s)	79.0	79.0	41.0	41.0
Total Split (%)	65.8%	65.8%	34%	34%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		
Total Lost Time (s)	4.5	4.5		
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	C-Max	C-Max	Max	Max
Act Effct Green (s)	74.5	74.5		
Actuated g/C Ratio	0.62	0.62		
v/c Ratio	0.17	0.19		
Control Delay	6.0	3.0		
Queue Delay	0.0	0.0		
Total Delay	6.0	3.0		
LOS	A	A		
Approach Delay	6.0	3.0		
Approach LOS	A	A		

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 59 (49%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.19	
Intersection Signal Delay: 4.4	Intersection LOS: A
Intersection Capacity Utilization 14.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 106: Denali Boulevard & 55th Avenue

Lane Group	NBT	SBT
Lane Group Flow (vph)	364	418
v/c Ratio	0.17	0.19
Control Delay	6.0	3.0
Queue Delay	0.0	0.0
Total Delay	6.0	3.0
Queue Length 50th (ft)	25	20
Queue Length 95th (ft)	33	18
Internal Link Dist (ft)	494	622
Turn Bay Length (ft)		
Base Capacity (vph)	2197	2197
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.17	0.19

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	0	0	0	0	335	0	0	385	0
Future Volume (veh/h)	0	0	0	0	0	0	0	335	0	0	385	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	0	0	0	0	0	0	0	364	0	0	418	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	60	569	0	60	569	0	60	2206	0	60	2206	0
Arrive On Green	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.20	0.00
Sat Flow, veh/h	1781	1870	0	1781	1870	0	969	3647	0	1018	3647	0
Grp Volume(v), veh/h	0	0	0	0	0	0	0	364	0	0	418	0
Grp Sat Flow(s),veh/h/ln	1781	1870	0	1781	1870	0	969	1777	0	1018	1777	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.7	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.7	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	60	569	0	60	569	0	60	2206	0	60	2206	0
V/C Ratio(X)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.19	0.00
Avail Cap(c_a), veh/h	60	569	0	60	569	0	60	2206	0	60	2206	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	0.33	0.33	0.33
Upstream Filter(I)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00	0.95	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.7	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	22.9	0.0
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	C	A
Approach Vol, veh/h		0			0			364			418	
Approach Delay, s/veh		0.0			0.0			0.2			22.9	
Approach LOS								A			C	

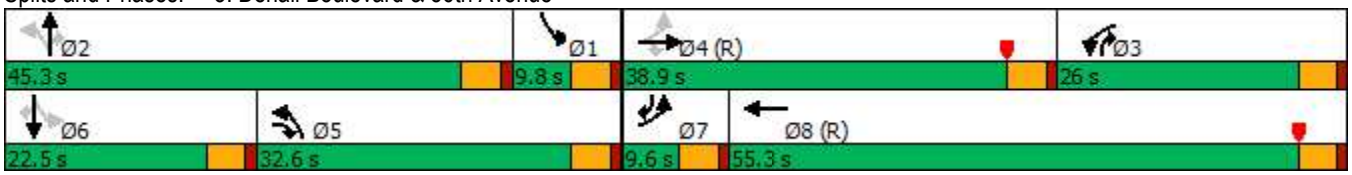
Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	79.0	41.0	79.0	41.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	74.5	36.5	74.5	36.5
Max Q Clear Time (g_c+I1), s	2.0	0.0	13.7	0.0
Green Ext Time (p_c), s	2.7	0.0	3.1	0.0

Intersection Summary	
HCM 6th Ctrl Delay	12.3
HCM 6th LOS	B

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	20	895	10	140	1030	35	10	85	30	5	50
Future Volume (vph)	20	895	10	140	1030	35	10	85	30	5	50
Turn Type	pm+pt	NA	pm+ov	Prot	NA	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	7	4	5	3	8	5	2	3	1	6	7
Permitted Phases	4		4			2		2	6		6
Detector Phase	7	4	5	3	8	5	2	3	1	6	7
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	22.5	9.5	9.5	22.5	9.5
Total Split (s)	9.6	38.9	32.6	26.0	55.3	32.6	45.3	26.0	9.8	22.5	9.6
Total Split (%)	8.0%	32.4%	27.2%	21.7%	46.1%	27.2%	37.8%	21.7%	8.2%	18.8%	8.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lead	Lag	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)	74.9	74.9	87.2	21.5	93.1	13.8	13.8	29.0	8.2	5.9	7.6
Actuated g/C Ratio	0.62	0.62	0.73	0.18	0.78	0.12	0.12	0.24	0.07	0.05	0.06
v/c Ratio	0.07	0.31	0.01	0.25	0.29	0.13	0.13	0.20	0.27	0.05	0.24
Control Delay	5.0	4.2	0.0	40.1	5.6	35.1	35.2	30.6	54.9	55.2	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.0	4.2	0.0	40.1	5.6	35.1	35.2	30.6	54.9	55.2	2.5
LOS	A	A	A	D	A	D	D	C	D	E	A
Approach Delay		4.2			9.7		32.2			24.1	
Approach LOS		A			A		C			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 86 (72%), Referenced to phase 4:EBTL and 8:WBT, Start of Yellow	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.31	
Intersection Signal Delay: 9.3	Intersection LOS: A
Intersection Capacity Utilization 43.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Denali Boulevard & 56th Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	22	973	11	152	1131	24	25	92	33	5	54
v/c Ratio	0.07	0.31	0.01	0.25	0.29	0.13	0.13	0.20	0.27	0.05	0.24
Control Delay	5.0	4.2	0.0	40.1	5.6	35.1	35.2	30.6	54.9	55.2	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.0	4.2	0.0	40.1	5.6	35.1	35.2	30.6	54.9	55.2	2.5
Queue Length 50th (ft)	2	31	0	55	110	11	12	0	25	4	0
Queue Length 95th (ft)	6	40	m0	89	137	29	30	74	53	17	0
Internal Link Dist (ft)		546			823		622			214	
Turn Bay Length (ft)	150		350	275		275			100		100
Base Capacity (vph)	305	3173	1165	615	3940	415	584	454	122	279	227
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.31	0.01	0.25	0.29	0.06	0.04	0.20	0.27	0.02	0.24

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	895	10	140	1030	10	35	10	85	30	5	50
Future Volume (veh/h)	20	895	10	140	1030	10	35	10	85	30	5	50
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	22	973	11	152	1120	11	24	30	92	33	5	54
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	150	1464	492	1707	3957	39	155	78	849	143	85	106
Arrive On Green	0.02	0.29	0.29	0.33	0.51	0.51	0.02	0.04	0.04	0.03	0.05	0.05
Sat Flow, veh/h	1781	5106	1585	3456	5214	51	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	22	973	11	152	731	400	24	30	92	33	5	54
Grp Sat Flow(s),veh/h/ln	1781	1702	1585	1728	1702	1861	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	1.1	20.2	0.0	3.6	14.8	14.8	0.0	1.9	0.0	0.0	0.3	3.4
Cycle Q Clear(g_c), s	1.1	20.2	0.0	3.6	14.8	14.8	0.0	1.9	0.0	0.0	0.3	3.4
Prop In Lane	1.00		1.00	1.00		0.03	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	150	1464	492	1707	2583	1412	155	78	849	143	85	106
V/C Ratio(X)	0.15	0.66	0.02	0.09	0.28	0.28	0.15	0.39	0.11	0.23	0.06	0.51
Avail Cap(c_a), veh/h	188	1464	492	1707	2583	1412	530	636	1322	172	281	272
HCM Platoon Ratio	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.0	37.7	28.7	21.5	10.7	10.7	53.6	56.0	13.7	55.2	54.8	39.6
Incr Delay (d2), s/veh	0.4	2.4	0.1	0.0	0.3	0.5	0.5	3.1	0.1	0.8	0.3	3.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	8.4	0.2	1.4	6.1	6.7	0.7	1.0	1.2	1.0	0.2	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.4	40.1	28.8	21.6	11.0	11.2	54.1	59.1	13.8	56.0	55.1	43.3
LnGrp LOS	C	D	C	C	B	B	D	E	B	E	E	D
Approach Vol, veh/h		1006			1283			146			92	
Approach Delay, s/veh		39.9			12.3			29.7			48.5	
Approach LOS		D			B			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.8	9.5	63.8	38.9	7.4	10.0	7.1	95.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.3	40.8	21.5	34.4	28.1	18.0	5.1	50.8
Max Q Clear Time (g_c+I1), s	2.0	3.9	5.6	22.2	2.0	5.4	3.1	16.8
Green Ext Time (p_c), s	0.0	0.5	0.4	4.9	0.0	0.1	0.0	8.1

Intersection Summary	
HCM 6th Ctrl Delay	25.6
HCM 6th LOS	C

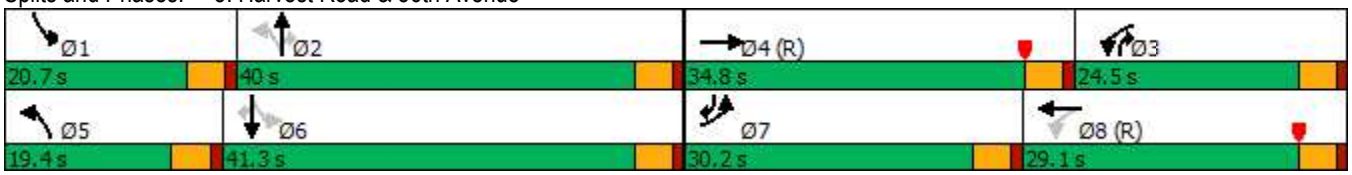
Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	480	385	80	540	190	785	150	220	620	530
Future Volume (vph)	480	385	80	540	190	785	150	220	620	530
Turn Type	Prot	NA	pm+pt	NA	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	7	4	3	8	5	2	3	1	6	7
Permitted Phases			8		2		2	6		6
Detector Phase	7	4	3	8	5	2	3	1	6	7
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	9.5	22.5	9.5	9.5	22.5	9.5
Total Split (s)	30.2	34.8	24.5	29.1	19.4	40.0	24.5	20.7	41.3	30.2
Total Split (%)	25.2%	29.0%	20.4%	24.3%	16.2%	33.3%	20.4%	17.3%	34.4%	25.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)	23.4	33.3	29.8	29.8	46.7	33.5	53.5	50.7	35.5	63.4
Actuated g/C Ratio	0.20	0.28	0.25	0.25	0.39	0.28	0.45	0.42	0.30	0.53
v/c Ratio	0.78	0.48	0.24	0.59	0.66	0.87	0.21	0.83	0.64	0.64
Control Delay	52.2	35.4	42.3	40.3	29.9	52.1	4.8	53.0	39.8	18.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.2	35.4	42.3	40.3	29.9	52.1	4.8	53.0	39.8	18.4
LOS	D	D	D	D	C	D	A	D	D	B
Approach Delay		42.7		40.5		42.1			33.7	
Approach LOS		D		D		D			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 30 (25%), Referenced to phase 4:EBT and 8:WBTL, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.87	
Intersection Signal Delay: 39.3	Intersection LOS: D
Intersection Capacity Utilization 76.3%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 5: Harvest Road & 56th Avenue



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	522	679	87	745	207	853	163	239	674	576
v/c Ratio	0.78	0.48	0.24	0.59	0.66	0.87	0.21	0.83	0.64	0.64
Control Delay	52.2	35.4	42.3	40.3	29.9	52.1	4.8	53.0	39.8	18.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.2	35.4	42.3	40.3	29.9	52.1	4.8	53.0	39.8	18.4
Queue Length 50th (ft)	220	173	56	183	124	340	4	124	232	220
Queue Length 95th (ft)	276	212	105	232	193	412	36	#251	299	337
Internal Link Dist (ft)		1540		4791		759			2985	
Turn Bay Length (ft)	300		275		275		275	275		600
Base Capacity (vph)	735	1419	357	1262	337	1046	784	300	1090	924
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.48	0.24	0.59	0.61	0.82	0.21	0.80	0.62	0.62

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	480	385	240	80	540	145	190	785	150	220	620	530
Future Volume (veh/h)	480	385	240	80	540	145	190	785	150	220	620	530
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	522	418	261	87	587	158	207	853	163	239	674	576
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	604	860	400	423	1092	288	297	1041	772	289	1090	763
Arrive On Green	0.06	0.08	0.08	0.19	0.27	0.27	0.03	0.10	0.10	0.11	0.31	0.31
Sat Flow, veh/h	3456	3404	1585	1781	4023	1060	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	522	418	261	87	495	250	207	853	163	239	674	576
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1781	1702	1679	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	18.0	14.1	19.2	0.0	14.9	15.3	9.5	28.3	2.4	11.1	19.5	35.5
Cycle Q Clear(g_c), s	18.0	14.1	19.2	0.0	14.9	15.3	9.5	28.3	2.4	11.1	19.5	35.5
Prop In Lane	1.00		1.00	1.00		0.63	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	604	860	400	423	924	456	297	1041	772	289	1090	763
V/C Ratio(X)	0.86	0.49	0.65	0.21	0.54	0.55	0.70	0.82	0.21	0.83	0.62	0.75
Avail Cap(c_a), veh/h	740	860	400	423	924	456	345	1051	776	332	1090	763
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.1	47.6	49.9	38.7	37.3	37.4	29.9	51.1	9.3	29.3	35.6	25.3
Incr Delay (d2), s/veh	8.9	2.0	8.0	0.2	2.2	4.7	5.0	5.2	0.1	14.1	1.1	4.3
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	9.1	6.6	9.0	2.1	6.3	6.7	4.7	14.2	1.5	5.6	8.3	13.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	64.0	49.5	57.9	38.9	39.5	42.1	34.9	56.3	9.5	43.4	36.7	29.6
LnGrp LOS	E	D	E	D	D	D	C	E	A	D	D	C
Approach Vol, veh/h		1201			832			1223			1489	
Approach Delay, s/veh		57.6			40.2			46.4			35.0	
Approach LOS		E			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.8	39.7	27.8	34.8	16.1	41.3	25.5	37.1
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	16.2	35.5	20.0	30.3	14.9	36.8	25.7	24.6
Max Q Clear Time (g_c+I1), s	13.1	30.3	2.0	21.2	11.5	37.5	20.0	17.3
Green Ext Time (p_c), s	0.2	2.6	0.2	2.8	0.2	0.0	1.0	2.6

Intersection Summary	
HCM 6th Ctrl Delay	44.6
HCM 6th LOS	D

Intersection	
Int Delay, s/veh	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	160	965	85	120	820
Future Vol, veh/h	15	160	965	85	120	820
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	-	-	150	150	-
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	16	174	1049	92	130	891

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1755	525	0	0	1141	0
Stage 1	1049	-	-	-	-	-
Stage 2	706	-	-	-	-	-
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	*338	*695	-	-	954	-
Stage 1	*656	-	-	-	-	-
Stage 2	*704	-	-	-	-	-
Platoon blocked, %	1	1	-	-	1	-
Mov Cap-1 Maneuver	*292	*695	-	-	954	-
Mov Cap-2 Maneuver	*292	-	-	-	-	-
Stage 1	*656	-	-	-	-	-
Stage 2	*608	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.4	0	1.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	292	695	954	-
HCM Lane V/C Ratio	-	-	0.056	0.25	0.137	-
HCM Control Delay (s)	-	-	18.1	11.9	9.4	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.2	1	0.5	-

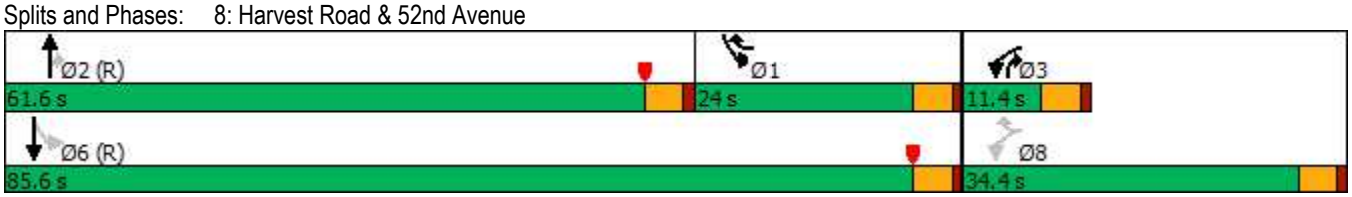
Notes

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

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø8
Lane Configurations							
Traffic Volume (vph)	80	160	890	105	205	630	
Future Volume (vph)	80	160	890	105	205	630	
Turn Type	pm+pt	pm+ov	NA	pm+ov	pm+pt	NA	
Protected Phases	3	1	2	3	1	6	8
Permitted Phases	8	8		2	6		
Detector Phase	3	1	2	3	1	6	
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	9.5	22.5	9.5	9.5	22.5	22.5
Total Split (s)	11.4	24.0	61.6	11.4	24.0	85.6	34.4
Total Split (%)	9.5%	20.0%	51.3%	9.5%	20.0%	71.3%	29%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag		Lag	Lead		Lag		
Lead-Lag Optimize?		Yes	Yes		Yes		
Recall Mode	None	None	C-Max	None	None	C-Max	None
Act Effct Green (s)	6.9	30.9	80.1	91.5	104.1	104.1	
Actuated g/C Ratio	0.06	0.26	0.67	0.76	0.87	0.87	
v/c Ratio	0.86	0.38	0.41	0.09	0.36	0.22	
Control Delay	114.2	23.5	5.5	0.5	7.5	0.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	114.2	23.5	5.5	0.5	7.5	0.3	
LOS	F	C	A	A	A	A	
Approach Delay	53.8		5.0			2.1	
Approach LOS	D		A			A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 57 (48%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 9.5	Intersection LOS: A
Intersection Capacity Utilization 51.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 8: Harvest Road & 52nd Avenue



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	87	174	967	114	223	685
v/c Ratio	0.86	0.38	0.41	0.09	0.36	0.22
Control Delay	114.2	23.5	5.5	0.5	7.5	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	114.2	23.5	5.5	0.5	7.5	0.3
Queue Length 50th (ft)	68	62	79	0	33	3
Queue Length 95th (ft)	#166	129	124	9	74	4
Internal Link Dist (ft)	762		1101			640
Turn Bay Length (ft)	200	200		150	175	
Base Capacity (vph)	101	461	2362	1231	625	3070
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.38	0.41	0.09	0.36	0.22

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	80	160	890	105	205	630
Future Volume (veh/h)	80	160	890	105	205	630
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
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	87	174	967	114	223	685
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	102	653	1691	845	828	3083
Arrive On Green	0.06	0.06	0.48	0.48	0.35	0.87
Sat Flow, veh/h	1781	1585	3647	1585	1781	3647
Grp Volume(v), veh/h	87	174	967	114	223	685
Grp Sat Flow(s),veh/h/ln	1781	1585	1777	1585	1781	1777
Q Serve(g_s), s	5.8	0.0	23.5	0.0	0.0	3.8
Cycle Q Clear(g_c), s	5.8	0.0	23.5	0.0	0.0	3.8
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	102	653	1691	845	828	3083
V/C Ratio(X)	0.85	0.27	0.57	0.13	0.27	0.22
Avail Cap(c_a), veh/h	102	653	1691	845	828	3083
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.0	23.3	22.6	9.9	15.3	1.3
Incr Delay (d2), s/veh	45.4	0.2	1.4	0.3	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	3.3	9.6	1.3	3.6	0.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	101.4	23.5	24.1	10.2	15.5	1.5
LnGrp LOS	F	C	C	B	B	A
Approach Vol, veh/h	261		1081			908
Approach Delay, s/veh	49.5		22.6			4.9
Approach LOS	D		C			A

Timer - Assigned Phs	1	2				6	8
Phs Duration (G+Y+Rc), s	47.0	61.6				108.6	11.4
Change Period (Y+Rc), s	4.5	4.5				4.5	4.5
Max Green Setting (Gmax), s	19.5	57.1				81.1	6.9
Max Q Clear Time (g_c+I1), s	2.0	25.5				5.8	7.8
Green Ext Time (p_c), s	0.5	7.7				4.9	0.0

Intersection Summary	
HCM 6th Ctrl Delay	18.6
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	2.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	140	855	40	170	540
Future Vol, veh/h	15	140	855	40	170	540
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	-	-	150	150	-
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	16	152	929	43	185	587

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1593	465	0	0	972	0
Stage 1	929	-	-	-	-	-
Stage 2	664	-	-	-	-	-
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	132	544	-	-	705	-
Stage 1	345	-	-	-	-	-
Stage 2	733	-	-	-	-	-
Platoon blocked, %	1		-	-		-
Mov Cap-1 Maneuver	97	544	-	-	705	-
Mov Cap-2 Maneuver	97	-	-	-	-	-
Stage 1	345	-	-	-	-	-
Stage 2	541	-	-	-	-	-

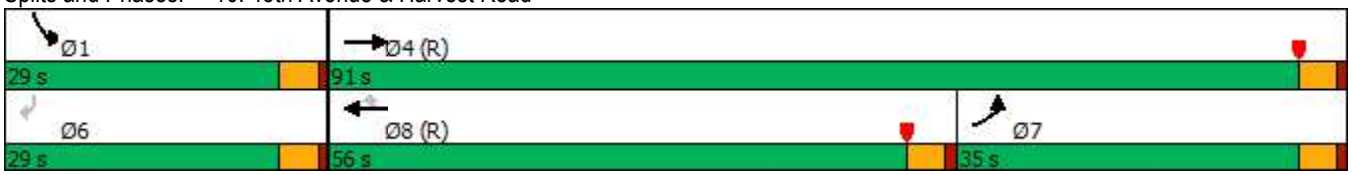
Approach	WB	NB	SB
HCM Control Delay, s	17.6	0	2.9
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	97	544	705	-
HCM Lane V/C Ratio	-	-	0.168	0.28	0.262	-
HCM Control Delay (s)	-	-	49.5	14.2	11.9	-
HCM Lane LOS	-	-	E	B	B	-
HCM 95th %tile Q(veh)	-	-	0.6	1.1	1	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	455	1185	1245	440	305	250
Future Volume (vph)	455	1185	1245	440	305	250
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		1	
Permitted Phases				8		6
Detector Phase	7	4	8	8	1	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	9.5	22.5
Total Split (s)	35.0	91.0	56.0	56.0	29.0	29.0
Total Split (%)	29.2%	75.8%	46.7%	46.7%	24.2%	24.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag		Lead	Lead		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	30.5	94.1	59.1	59.1	16.9	16.9
Actuated g/C Ratio	0.25	0.78	0.49	0.49	0.14	0.14
v/c Ratio	0.57	0.32	0.54	0.47	0.69	0.60
Control Delay	38.6	0.4	22.4	3.3	59.9	25.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.6	0.4	22.4	3.3	59.9	25.6
LOS	D	A	C	A	E	C
Approach Delay		11.0	17.5		44.5	
Approach LOS		B	B		D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 78 (65%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 18.6	Intersection LOS: B
Intersection Capacity Utilization 57.0%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 10: 48th Avenue & Harvest Road



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	495	1288	1353	478	332	272
v/c Ratio	0.57	0.32	0.54	0.47	0.69	0.60
Control Delay	38.6	0.4	22.4	3.3	59.9	25.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.6	0.4	22.4	3.3	59.9	25.6
Queue Length 50th (ft)	198	5	257	0	126	75
Queue Length 95th (ft)	254	7	325	58	m168	m130
Internal Link Dist (ft)		649	786		1558	
Turn Bay Length (ft)	275			500	275	
Base Capacity (vph)	872	3989	2506	1022	700	539
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.32	0.54	0.47	0.47	0.50

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	455	1185	1245	440	305	250
Future Volume (veh/h)	455	1185	1245	440	305	250
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
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	495	1288	1353	0	332	0
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	1178	4123	2191		406	
Arrive On Green	0.68	1.00	0.43	0.00	0.12	0.00
Sat Flow, veh/h	3456	5274	5274	1585	3456	1585
Grp Volume(v), veh/h	495	1288	1353	0	332	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1702	1585	1728	1585
Q Serve(g_s), s	7.7	0.0	24.7	0.0	11.3	0.0
Cycle Q Clear(g_c), s	7.7	0.0	24.7	0.0	11.3	0.0
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	1178	4123	2191		406	
V/C Ratio(X)	0.42	0.31	0.62		0.82	
Avail Cap(c_a), veh/h	1178	4123	2191		706	
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.83	0.83	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	13.8	0.0	26.6	0.0	51.7	0.0
Incr Delay (d2), s/veh	0.2	0.2	1.3	0.0	4.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.1	9.7	0.0	5.0	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.0	0.2	27.9	0.0	55.8	0.0
LnGrp LOS	B	A	C		E	
Approach Vol, veh/h		1783	1353		332	
Approach Delay, s/veh		4.0	27.9		55.8	
Approach LOS		A	C		E	

Timer - Assigned Phs	4	6	7	8
Phs Duration (G+Y+Rc), s	101.4	18.6	45.4	56.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	86.5	24.5	30.5	51.5
Max Q Clear Time (g_c+I1), s	2.0	13.3	9.7	26.7
Green Ext Time (p_c), s	11.8	0.9	1.7	10.1

Intersection Summary	
HCM 6th Ctrl Delay	18.3
HCM 6th LOS	B

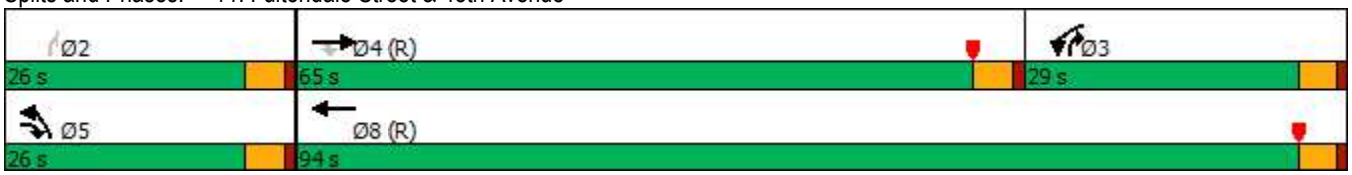
Notes

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

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø2
Lane Configurations							
Traffic Volume (vph)	1510	360	310	1185	180	130	
Future Volume (vph)	1510	360	310	1185	180	130	
Turn Type	NA	pm+ov	Prot	NA	Prot	pm+ov	
Protected Phases	4	5	3	8	5	3	2
Permitted Phases		4				2	
Detector Phase	4	5	3	8	5	3	
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	9.5	9.5	22.5	9.5	9.5	22.5
Total Split (s)	65.0	26.0	29.0	94.0	26.0	29.0	26.0
Total Split (%)	54.2%	21.7%	24.2%	78.3%	21.7%	24.2%	22%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag	Lead		Lag			Lag	
Lead-Lag Optimize?	Yes		Yes			Yes	
Recall Mode	C-Max	None	None	C-Max	None	None	None
Act Effct Green (s)	68.5	86.5	24.5	97.5	13.5	42.5	
Actuated g/C Ratio	0.57	0.72	0.20	0.81	0.11	0.35	
v/c Ratio	0.57	0.33	0.48	0.31	0.51	0.25	
Control Delay	5.6	0.9	47.2	0.7	54.1	25.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	5.6	0.9	47.2	0.7	54.1	25.2	
LOS	A	A	D	A	D	C	
Approach Delay	4.7			10.4	42.0		
Approach LOS	A			B	D		

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 85 (71%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.57	
Intersection Signal Delay: 10.1	Intersection LOS: B
Intersection Capacity Utilization 54.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 11: Fultondale Street & 48th Avenue



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1641	391	337	1288	196	141
v/c Ratio	0.57	0.33	0.48	0.31	0.51	0.25
Control Delay	5.6	0.9	47.2	0.7	54.1	25.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.6	0.9	47.2	0.7	54.1	25.2
Queue Length 50th (ft)	93	0	141	17	75	70
Queue Length 95th (ft)	118	m4	191	32	107	111
Internal Link Dist (ft)	1760			649	394	
Turn Bay Length (ft)		150	275		225	150
Base Capacity (vph)	2904	1169	700	4133	615	568
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.33	0.48	0.31	0.32	0.25

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1510	360	310	1185	180	130
Future Volume (veh/h)	1510	360	310	1185	180	130
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
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	1641	391	337	1288	196	141
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	2574	926	1049	4316	276	608
Arrive On Green	0.17	0.17	0.61	1.00	0.08	0.08
Sat Flow, veh/h	5274	1585	3456	5274	3456	1585
Grp Volume(v), veh/h	1641	391	337	1288	196	141
Grp Sat Flow(s),veh/h/ln	1702	1585	1728	1702	1728	1585
Q Serve(g_s), s	36.0	16.4	5.7	0.0	6.6	0.0
Cycle Q Clear(g_c), s	36.0	16.4	5.7	0.0	6.6	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2574	926	1049	4316	276	608
V/C Ratio(X)	0.64	0.42	0.32	0.30	0.71	0.23
Avail Cap(c_a), veh/h	2574	926	1049	4316	619	765
HCM Platoon Ratio	0.33	0.33	2.00	2.00	1.00	1.00
Upstream Filter(I)	0.59	0.59	0.82	0.82	1.00	1.00
Uniform Delay (d), s/veh	39.8	27.4	17.5	0.0	53.9	25.0
Incr Delay (d2), s/veh	0.7	0.8	0.1	0.1	3.4	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.5	7.0	2.0	0.1	3.0	2.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	40.5	28.3	17.7	0.1	57.2	25.2
LnGrp LOS	D	C	B	A	E	C
Approach Vol, veh/h	2032			1625	337	
Approach Delay, s/veh	38.2			3.8	43.8	
Approach LOS	D			A	D	

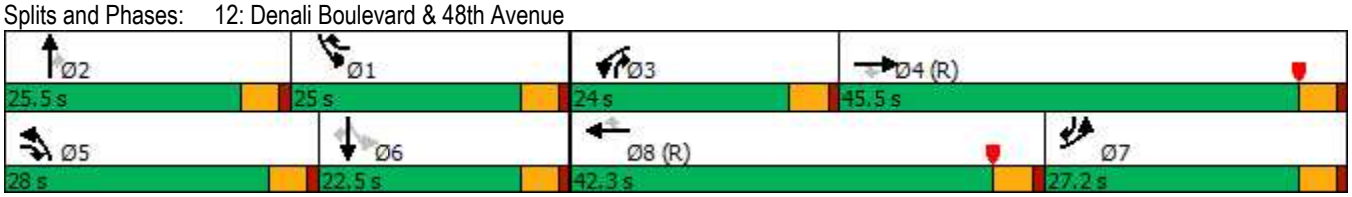
Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		14.1	40.9	65.0		105.9
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		21.5	24.5	60.5		89.5
Max Q Clear Time (g_c+I1), s		8.6	7.7	38.0		2.0
Green Ext Time (p_c), s		0.9	1.0	13.7		11.8

Intersection Summary	
HCM 6th Ctrl Delay	24.7
HCM 6th LOS	C

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	1290	690	500	780	45	530	55	430	80	95	60
Future Volume (vph)	30	1290	690	500	780	45	530	55	430	80	95	60
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	7
Permitted Phases			4			8			2	6		6
Detector Phase	7	4	5	3	8	1	5	2	3	1	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5
Total Split (s)	27.2	45.5	28.0	24.0	42.3	25.0	28.0	25.5	24.0	25.0	22.5	27.2
Total Split (%)	22.7%	37.9%	23.3%	20.0%	35.3%	20.8%	23.3%	21.3%	20.0%	20.8%	18.8%	22.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lag	Lead	Lead	Lead	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	None	C-Max	None	None	None	None	None	None	None
Act Effct Green (s)	19.3	44.2	71.7	25.9	52.9	84.7	23.0	7.4	32.2	26.4	8.9	28.1
Actuated g/C Ratio	0.16	0.37	0.60	0.22	0.44	0.71	0.19	0.06	0.27	0.22	0.07	0.23
v/c Ratio	0.06	0.75	0.72	0.73	0.38	0.04	0.88	0.28	0.83	0.22	0.39	0.15
Control Delay	24.0	19.5	9.1	37.8	27.2	1.3	62.6	56.4	31.6	41.0	57.1	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.0	19.5	9.1	37.8	27.2	1.3	62.6	56.4	31.6	41.0	57.1	2.1
LOS	C	B	A	D	C	A	E	E	C	D	E	A
Approach Delay		16.0			30.3			49.2			37.6	
Approach LOS		B			C			D			D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 16 (13%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 28.6	Intersection LOS: C
Intersection Capacity Utilization 72.4%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 12: Denali Boulevard & 48th Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	33	1402	750	543	848	49	576	60	467	87	103	65
v/c Ratio	0.06	0.75	0.72	0.73	0.38	0.04	0.88	0.28	0.83	0.22	0.39	0.15
Control Delay	24.0	19.5	9.1	37.8	27.2	1.3	62.6	56.4	31.6	41.0	57.1	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.0	19.5	9.1	37.8	27.2	1.3	62.6	56.4	31.6	41.0	57.1	2.1
Queue Length 50th (ft)	8	254	206	204	221	0	224	23	123	57	40	0
Queue Length 95th (ft)	m11	276	629	272	279	3	#312	46	241	104	68	10
Internal Link Dist (ft)		1300			1760			542			586	
Turn Bay Length (ft)	250		275	300		150	400		250	300		225
Base Capacity (vph)	649	1874	1041	741	2241	1133	672	619	564	390	530	486
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.75	0.72	0.73	0.38	0.04	0.86	0.10	0.83	0.22	0.19	0.13

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	1290	690	500	780	45	530	55	430	80	95	60
Future Volume (veh/h)	30	1290	690	500	780	45	530	55	430	80	95	60
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	33	1402	0	543	848	49	576	60	0	87	103	65
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	1041	2316		562	1608	804	636	148		402	177	556
Arrive On Green	0.40	0.60	0.00	0.05	0.10	0.10	0.18	0.04	0.00	0.19	0.05	0.05
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	3456	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	33	1402	0	543	848	49	576	60	0	87	103	65
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1728	1777	1585	1781	1777	1585
Q Serve(g_s), s	0.7	20.6	0.0	18.8	18.9	0.0	19.6	2.0	0.0	0.7	3.4	1.1
Cycle Q Clear(g_c), s	0.7	20.6	0.0	18.8	18.9	0.0	19.6	2.0	0.0	0.7	3.4	1.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	1041	2316		562	1608	804	636	148		402	177	556
V/C Ratio(X)	0.03	0.61		0.97	0.53	0.06	0.91	0.41		0.22	0.58	0.12
Avail Cap(c_a), veh/h	1041	2316		562	1608	804	677	622		402	533	715
HCM Platoon Ratio	1.33	1.33	1.33	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.69	0.69	0.00	0.95	0.95	0.95	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.3	17.1	0.0	56.5	45.3	19.9	47.9	56.1	0.0	39.2	55.8	10.8
Incr Delay (d2), s/veh	0.0	0.8	0.0	28.8	1.2	0.1	15.3	1.8	0.0	0.3	3.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	6.4	0.0	10.9	8.8	0.9	9.8	0.9	0.0	2.1	1.6	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.4	17.9	0.0	85.2	46.5	20.0	63.3	57.8	0.0	39.5	58.8	10.9
LnGrp LOS	C	B		F	D	C	E	E		D	E	B
Approach Vol, veh/h		1435			1440			636			255	
Approach Delay, s/veh		18.1			60.2			62.8			40.0	
Approach LOS		B			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	27.6	9.5	24.0	58.9	26.6	10.5	40.6	42.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	20.5	21.0	19.5	41.0	23.5	18.0	22.7	37.8
Max Q Clear Time (g_c+I1), s	2.7	4.0	20.8	22.6	21.6	5.4	2.7	20.9
Green Ext Time (p_c), s	0.2	0.2	0.0	9.0	0.5	0.6	0.1	5.1

Intersection Summary	
HCM 6th Ctrl Delay	43.2
HCM 6th LOS	D

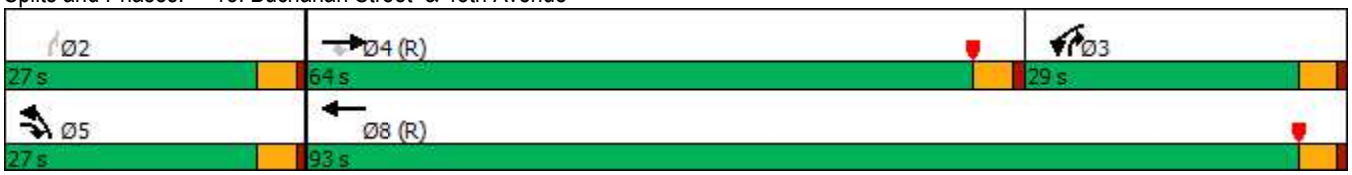
Notes

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

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø2
Lane Configurations							
Traffic Volume (vph)	1680	440	225	1200	350	355	
Future Volume (vph)	1680	440	225	1200	350	355	
Turn Type	NA	pm+ov	Prot	NA	Prot	pm+ov	
Protected Phases	4	5	3	8	5	3	2
Permitted Phases		4				2	
Detector Phase	4	5	3	8	5	3	
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	9.5	9.5	22.5	9.5	9.5	22.5
Total Split (s)	64.0	27.0	29.0	93.0	27.0	29.0	27.0
Total Split (%)	53.3%	22.5%	24.2%	77.5%	22.5%	24.2%	23%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag	Lead		Lag			Lag	
Lead-Lag Optimize?	Yes		Yes			Yes	
Recall Mode	C-Max	None	None	C-Max	None	None	None
Act Effct Green (s)	63.1	86.5	24.5	92.1	18.9	47.9	
Actuated g/C Ratio	0.53	0.72	0.20	0.77	0.16	0.40	
v/c Ratio	0.68	0.40	0.35	0.33	0.71	0.61	
Control Delay	13.5	1.2	62.0	9.1	55.1	32.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	13.5	1.2	62.0	9.1	55.1	32.3	
LOS	B	A	E	A	E	C	
Approach Delay	11.0			17.5	43.6		
Approach LOS	B			B	D		

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 38 (32%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.71	
Intersection Signal Delay: 18.6	Intersection LOS: B
Intersection Capacity Utilization 61.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 13: Buchanah Street & 48th Avenue



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1826	478	245	1304	380	386
v/c Ratio	0.68	0.40	0.35	0.33	0.71	0.61
Control Delay	13.5	1.2	62.0	9.1	55.1	32.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.5	1.2	62.0	9.1	55.1	32.3
Queue Length 50th (ft)	217	6	103	157	144	229
Queue Length 95th (ft)	358	12	m137	178	191	319
Internal Link Dist (ft)	420			1300	548	
Turn Bay Length (ft)		400	275		250	300
Base Capacity (vph)	2675	1194	700	3904	643	635
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.40	0.35	0.33	0.59	0.61

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1680	440	225	1200	350	355
Future Volume (veh/h)	1680	440	225	1200	350	355
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
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	1826	0	245	1304	380	0
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	2532		900	4054	453	
Arrive On Green	0.99	0.00	0.52	1.00	0.13	0.00
Sat Flow, veh/h	5274	1585	3456	5274	3456	1585
Grp Volume(v), veh/h	1826	0	245	1304	380	0
Grp Sat Flow(s),veh/h/ln	1702	1585	1728	1702	1728	1585
Q Serve(g_s), s	1.3	0.0	4.7	0.0	12.9	0.0
Cycle Q Clear(g_c), s	1.3	0.0	4.7	0.0	12.9	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2532		900	4054	453	
V/C Ratio(X)	0.72		0.27	0.32	0.84	
Avail Cap(c_a), veh/h	2532		900	4054	648	
HCM Platoon Ratio	2.00	2.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.81	0.81	1.00	0.00
Uniform Delay (d), s/veh	0.3	0.0	22.4	0.0	50.9	0.0
Incr Delay (d2), s/veh	1.8	0.0	0.1	0.2	6.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	1.8	0.1	6.0	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	2.1	0.0	22.5	0.2	57.5	0.0
LnGrp LOS	A		C	A	E	
Approach Vol, veh/h	1826			1549	380	
Approach Delay, s/veh	2.1			3.7	57.5	
Approach LOS	A			A	E	

Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		20.2	35.8	64.0		99.8
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		22.5	24.5	59.5		88.5
Max Q Clear Time (g_c+I1), s		14.9	6.7	3.3		2.0
Green Ext Time (p_c), s		0.9	0.7	21.0		12.1

Intersection Summary	
HCM 6th Ctrl Delay	8.4
HCM 6th LOS	A

Notes

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

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	30	1525	125	1265	55	45	50	45
Future Volume (vph)	30	1525	125	1265	55	45	50	45
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	9.5	22.5	9.5	22.5
Total Split (s)	10.2	63.0	21.0	73.8	11.0	25.0	11.0	25.0
Total Split (%)	8.5%	52.5%	17.5%	61.5%	9.2%	20.8%	9.2%	20.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	None	None	None
Act Effct Green (s)	82.8	76.7	91.3	84.8	16.1	10.8	16.0	10.8
Actuated g/C Ratio	0.69	0.64	0.76	0.71	0.13	0.09	0.13	0.09
v/c Ratio	0.12	0.53	0.52	0.41	0.30	0.65	0.36	0.43
Control Delay	4.0	14.4	21.4	8.4	44.4	42.1	46.4	44.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.0	14.4	21.4	8.4	44.4	42.1	46.4	44.7
LOS	A	B	C	A	D	D	D	D
Approach Delay		14.2		9.5		42.8		45.4
Approach LOS		B		A		D		D

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Yellow	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.65	
Intersection Signal Delay: 14.7	Intersection LOS: B
Intersection Capacity Utilization 64.3%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 15: Wenatchee Street /Wenatchee Street & 48th Avenue

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	33	1729	136	1473	60	136	54	76
v/c Ratio	0.12	0.53	0.52	0.41	0.30	0.65	0.36	0.43
Control Delay	4.0	14.4	21.4	8.4	44.4	42.1	46.4	44.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.0	14.4	21.4	8.4	44.4	42.1	46.4	44.7
Queue Length 50th (ft)	3	450	48	167	40	54	36	42
Queue Length 95th (ft)	m6	571	m110	208	75	116	69	87
Internal Link Dist (ft)		1340		538		422		321
Turn Bay Length (ft)	150		150		100		100	
Base Capacity (vph)	275	3233	346	3562	199	340	155	317
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.53	0.39	0.41	0.30	0.40	0.35	0.24

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	1525	65	125	1265	90	55	45	80	50	45	25
Future Volume (veh/h)	30	1525	65	125	1265	90	55	45	80	50	45	25
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	33	1658	71	136	1375	98	60	49	87	54	49	27
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	350	3369	144	324	3337	238	205	60	107	150	108	60
Arrive On Green	0.06	1.00	1.00	0.09	1.00	1.00	0.04	0.10	0.10	0.04	0.10	0.10
Sat Flow, veh/h	1781	5021	215	1781	4865	347	1781	604	1073	1781	1133	625
Grp Volume(v), veh/h	33	1124	605	136	962	511	60	0	136	54	0	76
Grp Sat Flow(s),veh/h/ln	1781	1702	1832	1781	1702	1808	1781	0	1677	1781	0	1758
Q Serve(g_s), s	0.7	0.0	0.0	3.0	0.0	0.0	3.6	0.0	9.5	3.3	0.0	4.9
Cycle Q Clear(g_c), s	0.7	0.0	0.0	3.0	0.0	0.0	3.6	0.0	9.5	3.3	0.0	4.9
Prop In Lane	1.00		0.12	1.00		0.19	1.00		0.64	1.00		0.36
Lane Grp Cap(c), veh/h	350	2284	1229	324	2335	1240	205	0	167	150	0	168
V/C Ratio(X)	0.09	0.49	0.49	0.42	0.41	0.41	0.29	0.00	0.81	0.36	0.00	0.45
Avail Cap(c_a), veh/h	386	2284	1229	493	2335	1240	229	0	287	182	0	300
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.79	0.79	0.79	0.89	0.89	0.89	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	5.4	0.0	0.0	5.1	0.0	0.0	46.4	0.0	52.9	46.9	0.0	51.3
Incr Delay (d2), s/veh	0.1	0.6	1.1	0.8	0.5	0.9	0.8	0.0	9.2	1.4	0.0	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.2	0.4	0.9	0.2	0.3	1.7	0.0	4.4	1.5	0.0	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	5.5	0.6	1.1	5.9	0.5	0.9	47.2	0.0	62.1	48.4	0.0	53.2
LnGrp LOS	A	A	A	A	A	A	D	A	E	D	A	D
Approach Vol, veh/h		1762			1609			196			130	
Approach Delay, s/veh		0.9			1.1			57.6			51.2	
Approach LOS		A			A			E			D	

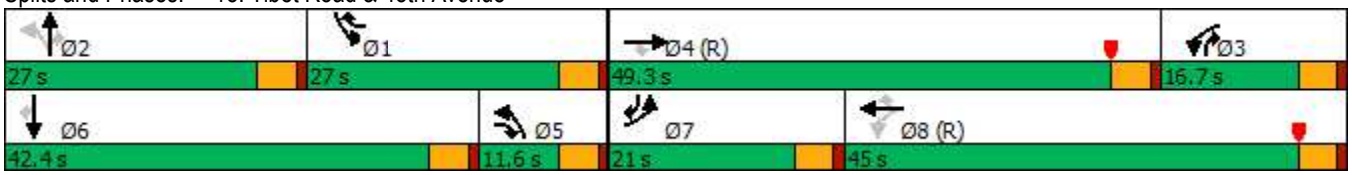
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.9	16.5	9.6	85.0	9.4	16.0	7.8	86.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	6.5	20.5	16.5	58.5	6.5	20.5	5.7	69.3
Max Q Clear Time (g_c+I1), s	5.3	11.5	5.0	2.0	5.6	6.9	2.7	2.0
Green Ext Time (p_c), s	0.0	0.4	0.2	17.6	0.0	0.2	0.0	13.5

Intersection Summary	
HCM 6th Ctrl Delay	5.7
HCM 6th LOS	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	255	1305	80	110	805	430	110	190	65	250	85	335
Future Volume (vph)	255	1305	80	110	805	430	110	190	65	250	85	335
Turn Type	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA	pm+ov
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	7
Permitted Phases			4	8		8	2		2			6
Detector Phase	7	4	5	3	8	1	5	2	3	1	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5
Total Split (s)	21.0	49.3	11.6	16.7	45.0	27.0	11.6	27.0	16.7	27.0	42.4	21.0
Total Split (%)	17.5%	41.1%	9.7%	13.9%	37.5%	22.5%	9.7%	22.5%	13.9%	22.5%	35.3%	17.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	None	C-Max	None	None	None	None	None	None	None
Act Effct Green (s)	14.9	56.4	83.0	53.7	53.7	69.1	37.9	18.0	34.7	15.4	11.3	26.2
Actuated g/C Ratio	0.12	0.47	0.69	0.45	0.45	0.58	0.32	0.15	0.29	0.13	0.09	0.22
v/c Ratio	0.65	0.59	0.08	0.42	0.38	0.47	0.25	0.74	0.13	0.62	0.53	0.85
Control Delay	57.3	25.9	1.4	35.3	23.7	4.6	30.8	64.5	0.5	43.3	58.3	33.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.3	25.9	1.4	35.3	23.7	4.6	30.8	64.5	0.5	43.3	58.3	33.8
LOS	E	C	A	D	C	A	C	E	A	D	E	C
Approach Delay		29.6			18.6			42.9			40.4	
Approach LOS		C			B			D			D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 72 (60%), Referenced to phase 4:EBT and 8:WBTL, Start of Yellow	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.85	
Intersection Signal Delay: 28.9	Intersection LOS: C
Intersection Capacity Utilization 63.4%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 18: Tibet Road & 48th Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	277	1418	87	120	875	467	120	207	71	272	92	364
v/c Ratio	0.65	0.59	0.08	0.42	0.38	0.47	0.25	0.74	0.13	0.62	0.53	0.85
Control Delay	57.3	25.9	1.4	35.3	23.7	4.6	30.8	64.5	0.5	43.3	58.3	33.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.3	25.9	1.4	35.3	23.7	4.6	30.8	64.5	0.5	43.3	58.3	33.8
Queue Length 50th (ft)	107	287	0	60	163	21	68	154	0	107	46	83
Queue Length 95th (ft)	148	393	15	94	180	37	102	230	0	146	109	221
Internal Link Dist (ft)		947			1340			509			857	
Turn Bay Length (ft)	275		300	275		275	275		100	275		150
Base Capacity (vph)	484	2390	1124	289	2277	1071	482	349	554	643	588	452
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.59	0.08	0.42	0.38	0.44	0.25	0.59	0.13	0.42	0.16	0.81

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	255	1305	80	110	805	430	110	190	65	250	85	335
Future Volume (veh/h)	255	1305	80	110	805	430	110	190	65	250	85	335
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	277	1418	87	120	875	467	120	207	71	272	92	364
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	341	1906	657	538	2657	984	212	245	597	347	355	457
Arrive On Green	0.10	0.37	0.37	0.49	1.00	1.00	0.04	0.13	0.13	0.03	0.06	0.06
Sat Flow, veh/h	3456	5106	1585	1781	5106	1585	1781	1870	1585	3456	1870	1585
Grp Volume(v), veh/h	277	1418	87	120	875	467	120	207	71	272	92	364
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1781	1702	1585	1781	1870	1585	1728	1870	1585
Q Serve(g_s), s	9.4	28.9	0.0	0.0	0.0	0.0	0.0	13.0	0.0	9.4	5.6	19.2
Cycle Q Clear(g_c), s	9.4	28.9	0.0	0.0	0.0	0.0	0.0	13.0	0.0	9.4	5.6	19.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	341	1906	657	538	2657	984	212	245	597	347	355	457
V/C Ratio(X)	0.81	0.74	0.13	0.22	0.33	0.47	0.57	0.85	0.12	0.78	0.26	0.80
Avail Cap(c_a), veh/h	475	1906	657	538	2657	984	244	351	686	648	591	657
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	0.92	0.92	0.92	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.0	32.6	21.8	20.7	0.0	0.0	51.9	51.0	24.4	56.7	48.2	28.4
Incr Delay (d2), s/veh	7.3	2.7	0.4	0.2	0.3	1.5	2.4	12.3	0.1	3.9	0.4	4.4
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	4.3	11.8	1.5	1.8	0.1	0.4	3.5	6.8	1.3	4.4	2.7	8.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.3	35.3	22.2	20.9	0.3	1.5	54.2	63.3	24.5	60.7	48.6	32.8
LnGrp LOS	E	D	C	C	A	A	D	E	C	E	D	C
Approach Vol, veh/h		1782			1462			398			728	
Approach Delay, s/veh		38.5			2.4			53.6			45.2	
Approach LOS		D			A			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.5	20.2	34.0	49.3	9.4	27.3	16.3	66.9
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	22.5	22.5	12.2	44.8	7.1	37.9	16.5	40.5
Max Q Clear Time (g_c+I1), s	11.4	15.0	2.0	30.9	2.0	21.2	11.4	2.0
Green Ext Time (p_c), s	0.7	0.7	0.2	7.9	0.1	1.5	0.4	8.9

Intersection Summary	
HCM 6th Ctrl Delay	28.9
HCM 6th LOS	C

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	10	15	860	660	5
Future Vol, veh/h	5	10	15	860	660	5
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	-	150	-	-	-
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	5	11	16	935	717	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1220	361	722	0	-	0
Stage 1	720	-	-	-	-	-
Stage 2	500	-	-	-	-	-
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	172	636	876	-	-	-
Stage 1	443	-	-	-	-	-
Stage 2	575	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	169	636	876	-	-	-
Mov Cap-2 Maneuver	169	-	-	-	-	-
Stage 1	435	-	-	-	-	-
Stage 2	575	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.4	0.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	876	-	331	-	-
HCM Lane V/C Ratio	0.019	-	0.049	-	-
HCM Control Delay (s)	9.2	-	16.4	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Lane Group	EBL	NBL	NBT	SBT	SBR
Lane Configurations					
Traffic Volume (vph)	115	130	735	510	110
Future Volume (vph)	115	130	735	510	110
Turn Type	Prot	pm+pt	NA	NA	Perm
Protected Phases	7	5	2	6	
Permitted Phases		2			6
Detector Phase	7	5	2	6	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	9.5	22.5	22.5	22.5
Total Split (s)	51.0	21.0	69.0	48.0	48.0
Total Split (%)	42.5%	17.5%	57.5%	40.0%	40.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5
Lead/Lag		Lag		Lead	Lead
Lead-Lag Optimize?		Yes		Yes	Yes
Recall Mode	None	None	C-Max	C-Max	C-Max
Act Effct Green (s)	22.6	88.4	88.4	67.4	67.4
Actuated g/C Ratio	0.19	0.74	0.74	0.56	0.56
v/c Ratio	0.79	0.20	0.31	0.28	0.13
Control Delay	50.6	8.9	8.1	15.1	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	50.6	8.9	8.1	15.1	3.1
LOS	D	A	A	B	A
Approach Delay	50.6		8.2	13.0	
Approach LOS	D		A	B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 16.4	Intersection LOS: B
Intersection Capacity Utilization 48.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 20: Tibet Road & 52nd Avenue

Lane Group	EBL	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	293	141	799	554	120
v/c Ratio	0.79	0.20	0.31	0.28	0.13
Control Delay	50.6	8.9	8.1	15.1	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	50.6	8.9	8.1	15.1	3.1
Queue Length 50th (ft)	172	34	113	111	0
Queue Length 95th (ft)	248	71	217	174	31
Internal Link Dist (ft)	437		1723	253	
Turn Bay Length (ft)	150	150			150
Base Capacity (vph)	692	701	2608	1988	942
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.42	0.20	0.31	0.28	0.13

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	115	155	130	735	510	110
Future Volume (veh/h)	115	155	130	735	510	110
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
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	125	168	141	799	554	120
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	139	187	819	2588	1288	575
Arrive On Green	0.20	0.20	0.66	1.00	0.36	0.36
Sat Flow, veh/h	707	951	1781	3647	3647	1585
Grp Volume(v), veh/h	294	0	141	799	554	120
Grp Sat Flow(s),veh/h/ln	1664	0	1781	1777	1777	1585
Q Serve(g_s), s	20.7	0.0	0.0	0.0	14.1	6.3
Cycle Q Clear(g_c), s	20.7	0.0	0.0	0.0	14.1	6.3
Prop In Lane	0.43	0.57	1.00			1.00
Lane Grp Cap(c), veh/h	328	0	819	2588	1288	575
V/C Ratio(X)	0.90	0.00	0.17	0.31	0.43	0.21
Avail Cap(c_a), veh/h	645	0	819	2588	1288	575
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.0	0.0	6.7	0.0	28.9	26.4
Incr Delay (d2), s/veh	8.8	0.0	0.1	0.3	1.1	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.3	0.0	0.9	0.1	6.0	6.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	55.8	0.0	6.8	0.3	29.9	27.2
LnGrp LOS	E	A	A	A	C	C
Approach Vol, veh/h	294			940	674	
Approach Delay, s/veh	55.8			1.3	29.5	
Approach LOS	E			A	C	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		91.9		28.1	43.9	48.0
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		64.5		46.5	16.5	43.5
Max Q Clear Time (g_c+I1), s		2.0		22.7	2.0	16.1
Green Ext Time (p_c), s		5.9		0.9	0.3	3.9

Intersection Summary	
HCM 6th Ctrl Delay	19.6
HCM 6th LOS	B

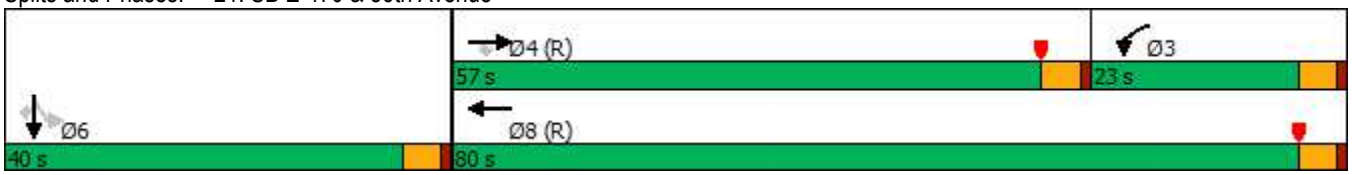
Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	935	215	95	1155	115	0	280
Future Volume (vph)	935	215	95	1155	115	0	280
Turn Type	NA	Perm	Prot	NA	Perm	NA	Perm
Protected Phases	4		3	8		6	
Permitted Phases		4			6		6
Detector Phase	4	4	3	8	6	6	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	9.5	22.5	22.5	22.5	22.5
Total Split (s)	57.0	57.0	23.0	80.0	40.0	40.0	40.0
Total Split (%)	47.5%	47.5%	19.2%	66.7%	33.3%	33.3%	33.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes				
Recall Mode	C-Max	C-Max	None	C-Max	None	None	None
Act Effct Green (s)	64.2	64.2	18.5	87.2	23.8	23.8	23.8
Actuated g/C Ratio	0.54	0.54	0.15	0.73	0.20	0.20	0.20
v/c Ratio	0.37	0.25	0.19	0.34	0.19	0.19	0.81
Control Delay	17.8	3.0	38.2	2.4	25.5	25.6	37.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.8	3.0	38.2	2.4	25.5	25.6	37.5
LOS	B	A	D	A	C	C	D
Approach Delay	15.0			5.1		34.0	
Approach LOS	B			A		C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 54 (45%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 13.3	Intersection LOS: B
Intersection Capacity Utilization 47.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 21: SB E-470 & 56th Avenue



Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	1016	234	103	1255	62	63	304
v/c Ratio	0.37	0.25	0.19	0.34	0.19	0.19	0.81
Control Delay	17.8	3.0	38.2	2.4	25.5	25.6	37.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.8	3.0	38.2	2.4	25.5	25.6	37.5
Queue Length 50th (ft)	159	0	39	29	47	48	186
Queue Length 95th (ft)	233	45	70	46	m84	m86	283
Internal Link Dist (ft)	4670			560		1605	
Turn Bay Length (ft)		275	275		400		400
Base Capacity (vph)	2719	955	529	3694	497	497	522
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.25	0.19	0.34	0.12	0.13	0.58

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	935	215	95	1155	0	0	0	0	115	0	280
Future Volume (veh/h)	0	935	215	95	1155	0	0	0	0	115	0	280
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0				1870	1870	1870
Adj Flow Rate, veh/h	0	1016	0	103	1255	0				125	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	2234		1370	4450	0				191	0	
Arrive On Green	0.00	0.44	0.00	0.13	0.29	0.00				0.05	0.00	0.00
Sat Flow, veh/h	0	5274	1585	3456	5274	0				3563	0	1585
Grp Volume(v), veh/h	0	1016	0	103	1255	0				125	0	0
Grp Sat Flow(s),veh/h/ln	0	1702	1585	1728	1702	0				1781	0	1585
Q Serve(g_s), s	0.0	16.8	0.0	3.1	22.9	0.0				4.1	0.0	0.0
Cycle Q Clear(g_c), s	0.0	16.8	0.0	3.1	22.9	0.0				4.1	0.0	0.0
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2234		1370	4450	0				191	0	
V/C Ratio(X)	0.00	0.45		0.08	0.28	0.00				0.66	0.00	
Avail Cap(c_a), veh/h	0	2234		1370	4450	0				1054	0	
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	0.88	0.88	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	23.7	0.0	32.8	13.6	0.0				55.7	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.0	0.0	0.1	0.0				3.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	6.5	0.0	1.3	10.4	0.0				2.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	24.4	0.0	32.9	13.8	0.0				59.5	0.0	0.0
LnGrp LOS	A	C		C	B	A				E	A	
Approach Vol, veh/h		1016			1358						125	
Approach Delay, s/veh		24.4			15.2						59.5	
Approach LOS		C			B						E	

Timer - Assigned Phs		3	4		6		8					
Phs Duration (G+Y+Rc), s		52.1	57.0		10.9		109.1					
Change Period (Y+Rc), s		4.5	4.5		4.5		4.5					
Max Green Setting (Gmax), s		18.5	52.5		35.5		75.5					
Max Q Clear Time (g_c+I1), s		5.1	18.8		6.1		24.9					
Green Ext Time (p_c), s		0.2	7.7		0.4		11.0					

Intersection Summary	
HCM 6th Ctrl Delay	21.2
HCM 6th LOS	C

Notes

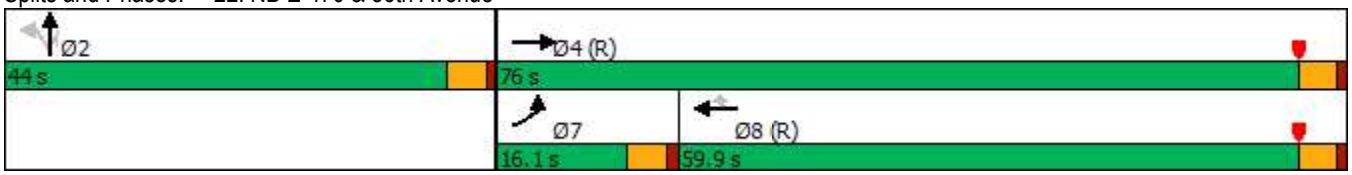
User approved volume balancing among the lanes for turning movement.

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

Lane Group	EBL	EBT	WBT	WBR	NBT	NBR
Lane Configurations						
Traffic Volume (vph)	165	885	1045	145	0	100
Future Volume (vph)	165	885	1045	145	0	100
Turn Type	Prot	NA	NA	Perm	NA	Perm
Protected Phases	7	4	8		2	
Permitted Phases				8		2
Detector Phase	7	4	8	8	2	2
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	16.1	76.0	59.9	59.9	44.0	44.0
Total Split (%)	13.4%	63.3%	49.9%	49.9%	36.7%	36.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Max	C-Max	C-Max	Max	Max
Act Effct Green (s)	10.7	71.5	56.3	56.3	39.5	39.5
Actuated g/C Ratio	0.09	0.60	0.47	0.47	0.33	0.33
v/c Ratio	0.59	0.32	0.48	0.19	0.38	0.18
Control Delay	83.7	4.5	25.2	9.8	35.1	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.7	4.5	25.2	9.8	35.1	9.8
LOS	F	A	C	A	D	A
Approach Delay		16.9	23.3		26.8	
Approach LOS		B	C		C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 55 (46%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.59	
Intersection Signal Delay: 21.1	Intersection LOS: C
Intersection Capacity Utilization 47.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 22: NB E-470 & 56th Avenue



Lane Group	EBL	EBT	WBT	WBR	NBT	NBR
Lane Group Flow (vph)	179	962	1136	158	223	109
v/c Ratio	0.59	0.32	0.48	0.19	0.38	0.18
Control Delay	83.7	4.5	25.2	9.8	35.1	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.7	4.5	25.2	9.8	35.1	9.8
Queue Length 50th (ft)	76	49	284	30	150	8
Queue Length 95th (ft)	115	56	343	84	199	26
Internal Link Dist (ft)		560	670		1780	
Turn Bay Length (ft)	175			275		300
Base Capacity (vph)	331	3029	2386	826	582	594
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.32	0.48	0.19	0.38	0.18

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	165	885	0	0	1045	145	205	0	100	0	0	0
Future Volume (veh/h)	165	885	0	0	1045	145	205	0	100	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1870	1870	1870	1870	1870			
Adj Flow Rate, veh/h	179	962	0	0	1136	0	223	0	0			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	240	3042	0	0	2497		586	0				
Arrive On Green	0.02	0.20	0.00	0.00	0.49	0.00	0.33	0.00	0.00			
Sat Flow, veh/h	3456	5274	0	0	5274	1585	1781	0	1585			
Grp Volume(v), veh/h	179	962	0	0	1136	0	223	0	0			
Grp Sat Flow(s),veh/h/ln	1728	1702	0	0	1702	1585	1781	0	1585			
Q Serve(g_s), s	6.2	19.4	0.0	0.0	17.5	0.0	11.5	0.0	0.0			
Cycle Q Clear(g_c), s	6.2	19.4	0.0	0.0	17.5	0.0	11.5	0.0	0.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	240	3042	0	0	2497		586	0				
V/C Ratio(X)	0.75	0.32	0.00	0.00	0.45		0.38	0.00				
Avail Cap(c_a), veh/h	334	3042	0	0	2497		586	0				
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.94	0.94	0.00	0.00	1.00	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	57.6	27.3	0.0	0.0	20.2	0.0	30.9	0.0	0.0			
Incr Delay (d2), s/veh	5.4	0.3	0.0	0.0	0.6	0.0	1.9	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	2.9	8.8	0.0	0.0	6.7	0.0	5.3	0.0	0.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	63.0	27.5	0.0	0.0	20.8	0.0	32.7	0.0	0.0			
LnGrp LOS	E	C	A	A	C		C	A				
Approach Vol, veh/h		1141			1136			223				
Approach Delay, s/veh		33.1			20.8			32.7				
Approach LOS		C			C			C				

Timer - Assigned Phs		2		4			7	8				
Phs Duration (G+Y+Rc), s		44.0		76.0			12.8	63.2				
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5				
Max Green Setting (Gmax), s		39.5		71.5			11.6	55.4				
Max Q Clear Time (g_c+I1), s		13.5		21.4			8.2	19.5				
Green Ext Time (p_c), s		1.3		7.5			0.2	9.0				

Intersection Summary	
HCM 6th Ctrl Delay	27.4
HCM 6th LOS	C

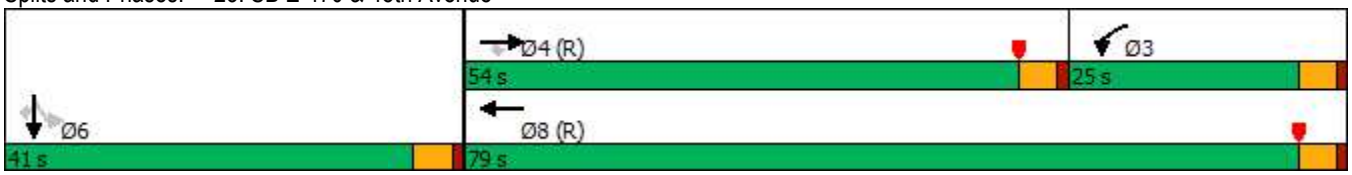
Notes

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

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	1455	200	345	1155	390	0	325
Future Volume (vph)	1455	200	345	1155	390	0	325
Turn Type	NA	Perm	Prot	NA	Perm	NA	Perm
Protected Phases	4		3	8		6	
Permitted Phases		4			6		6
Detector Phase	4	4	3	8	6	6	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	9.5	22.5	22.5	22.5	22.5
Total Split (s)	54.0	54.0	25.0	79.0	41.0	41.0	41.0
Total Split (%)	45.0%	45.0%	20.8%	65.8%	34.2%	34.2%	34.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes				
Recall Mode	C-Max	C-Max	None	C-Max	None	None	None
Act Effct Green (s)	57.4	57.4	20.5	82.4	28.6	28.6	28.6
Actuated g/C Ratio	0.48	0.48	0.17	0.69	0.24	0.24	0.24
v/c Ratio	0.65	0.25	0.64	0.36	0.53	0.53	0.82
Control Delay	30.3	9.8	45.4	2.5	39.5	39.5	44.0
Queue Delay	0.4	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.7	9.8	45.4	2.5	39.5	39.5	44.0
LOS	C	A	D	A	D	D	D
Approach Delay	28.2			12.4		41.5	
Approach LOS	C			B		D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 23 (19%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 24.5	Intersection LOS: C
Intersection Capacity Utilization 64.4%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 23: SB E-470 & 48th Avenue



Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	1582	217	375	1255	212	212	353
v/c Ratio	0.65	0.25	0.64	0.36	0.53	0.53	0.82
Control Delay	30.3	9.8	45.4	2.5	39.5	39.5	44.0
Queue Delay	0.4	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.7	9.8	45.4	2.5	39.5	39.5	44.0
Queue Length 50th (ft)	466	95	159	15	153	153	214
Queue Length 95th (ft)	518	127	210	61	232	232	316
Internal Link Dist (ft)	538			585		1090	
Turn Bay Length (ft)		275	275		275		300
Base Capacity (vph)	2431	870	586	3490	511	511	532
Starvation Cap Reductn	350	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.25	0.64	0.36	0.41	0.41	0.66

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1455	200	345	1155	0	0	0	0	390	0	325
Future Volume (veh/h)	0	1455	200	345	1155	0	0	0	0	390	0	325
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0				1870	1870	1870
Adj Flow Rate, veh/h	0	1582	0	375	1255	0				424	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	2106		1134	3973	0				523	0	
Arrive On Green	0.00	0.14	0.00	0.11	0.26	0.00				0.05	0.00	0.00
Sat Flow, veh/h	0	5274	1585	3456	5274	0				3563	0	1585
Grp Volume(v), veh/h	0	1582	0	375	1255	0				424	0	0
Grp Sat Flow(s),veh/h/ln	0	1702	1585	1728	1702	0				1781	0	1585
Q Serve(g_s), s	0.0	35.8	0.0	12.0	23.9	0.0				14.1	0.0	0.0
Cycle Q Clear(g_c), s	0.0	35.8	0.0	12.0	23.9	0.0				14.1	0.0	0.0
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2106		1134	3973	0				523	0	
V/C Ratio(X)	0.00	0.75		0.33	0.32	0.00				0.81	0.00	
Avail Cap(c_a), veh/h	0	2106		1134	3973	0				1084	0	
HCM Platoon Ratio	1.00	0.33	0.33	0.33	0.33	1.00				0.33	0.33	0.33
Upstream Filter(I)	0.00	0.83	0.00	0.83	0.83	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	45.9	0.0	41.3	18.8	0.0				55.4	0.0	0.0
Incr Delay (d2), s/veh	0.0	2.1	0.0	0.1	0.2	0.0				3.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	16.6	0.0	5.5	10.8	0.0				7.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	48.0	0.0	41.5	18.9	0.0				58.5	0.0	0.0
LnGrp LOS	A	D		D	B	A				E	A	
Approach Vol, veh/h		1582			1630						424	
Approach Delay, s/veh		48.0			24.1						58.5	
Approach LOS		D			C						E	

Timer - Assigned Phs		3	4		6		8					
Phs Duration (G+Y+Rc), s		43.9	54.0		22.1		97.9					
Change Period (Y+Rc), s		4.5	4.5		4.5		4.5					
Max Green Setting (Gmax), s		20.5	49.5		36.5		74.5					
Max Q Clear Time (g_c+I1), s		14.0	37.8		16.1		25.9					
Green Ext Time (p_c), s		0.7	7.6		1.5		10.9					

Intersection Summary	
HCM 6th Ctrl Delay	38.5
HCM 6th LOS	D

Notes

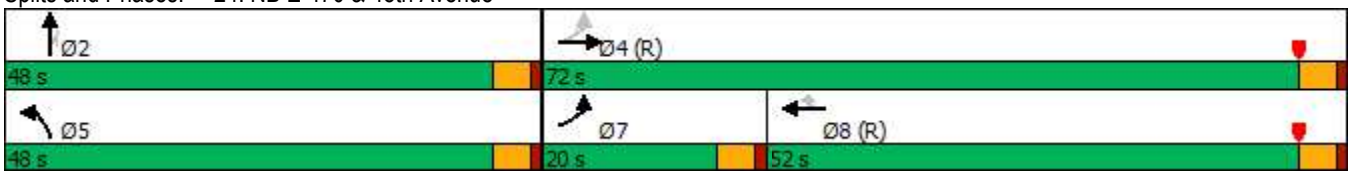
User approved volume balancing among the lanes for turning movement.

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

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Configurations							
Traffic Volume (vph)	100	1745	1200	350	300	0	375
Future Volume (vph)	100	1745	1200	350	300	0	375
Turn Type	pm+pt	NA	NA	Perm	Prot	NA	Perm
Protected Phases	7	4	8		5	2	
Permitted Phases	4			8			2
Detector Phase	7	4	8	8	5	2	2
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	20.0	72.0	52.0	52.0	48.0	48.0	48.0
Total Split (%)	16.7%	60.0%	43.3%	43.3%	40.0%	40.0%	40.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead		Lag	Lag			
Lead-Lag Optimize?	Yes		Yes	Yes			
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None
Act Effct Green (s)	67.5	67.5	54.1	54.1	43.5	43.5	43.5
Actuated g/C Ratio	0.56	0.56	0.45	0.45	0.36	0.36	0.36
v/c Ratio	0.46	0.66	0.57	0.41	0.27	0.27	0.67
Control Delay	24.3	10.2	26.0	8.4	26.5	26.5	31.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.3	10.3	26.0	8.4	26.5	26.5	31.4
LOS	C	B	C	A	C	C	C
Approach Delay		11.0	22.0			29.2	
Approach LOS		B	C			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 9 (8%), Referenced to phase 4:EBTL and 8:WBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay: 18.2	Intersection LOS: B
Intersection Capacity Utilization 64.4%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 24: NB E-470 & 48th Avenue



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	109	1897	1304	380	163	163	408
v/c Ratio	0.46	0.66	0.57	0.41	0.27	0.27	0.67
Control Delay	24.3	10.2	26.0	8.4	26.5	26.5	31.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.3	10.3	26.0	8.4	26.5	26.5	31.4
Queue Length 50th (ft)	23	65	171	71	98	98	221
Queue Length 95th (ft)	m73	309	223	130	162	162	323
Internal Link Dist (ft)		585	565			1471	
Turn Bay Length (ft)	225			275	225		225
Base Capacity (vph)	323	2860	2290	922	609	609	608
Starvation Cap Reductn	0	46	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.67	0.57	0.41	0.27	0.27	0.67

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	100	1745	0	0	1200	350	300	0	375	0	0	0
Future Volume (veh/h)	100	1745	0	0	1200	350	300	0	375	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1870	1870	1870	1870	1870			
Adj Flow Rate, veh/h	109	1897	0	0	1304	0	326	0	0			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	441	4133	0	0	3735		412	0				
Arrive On Green	0.01	0.27	0.00	0.00	1.00	0.00	0.12	0.00	0.00			
Sat Flow, veh/h	1781	5274	0	0	5274	1585	3563	0	1585			
Grp Volume(v), veh/h	109	1897	0	0	1304	0	326	0	0			
Grp Sat Flow(s),veh/h/ln	1781	1702	0	0	1702	1585	1781	0	1585			
Q Serve(g_s), s	1.6	37.2	0.0	0.0	0.0	0.0	10.7	0.0	0.0			
Cycle Q Clear(g_c), s	1.6	37.2	0.0	0.0	0.0	0.0	10.7	0.0	0.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	441	4133	0	0	3735		412	0				
V/C Ratio(X)	0.25	0.46	0.00	0.00	0.35		0.79	0.00				
Avail Cap(c_a), veh/h	599	4133	0	0	3735		1291	0				
HCM Platoon Ratio	0.33	0.33	1.00	1.00	2.00	2.00	1.00	1.00	1.00			
Upstream Filter(I)	0.73	0.73	0.00	0.00	1.00	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	3.0	22.0	0.0	0.0	0.0	0.0	51.7	0.0	0.0			
Incr Delay (d2), s/veh	0.2	0.3	0.0	0.0	0.3	0.0	3.5	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.4	16.9	0.0	0.0	0.1	0.0	5.0	0.0	0.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	3.2	22.3	0.0	0.0	0.3	0.0	55.1	0.0	0.0			
LnGrp LOS	A	C	A	A	A		E	A				
Approach Vol, veh/h		2006			1304			326				
Approach Delay, s/veh		21.3			0.3			55.1				
Approach LOS		C			A			E				

Timer - Assigned Phs		2		4			7	8				
Phs Duration (G+Y+Rc), s		18.4		101.6			9.4	92.3				
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5				
Max Green Setting (Gmax), s		43.5		67.5			15.5	47.5				
Max Q Clear Time (g_c+I1), s		12.7		39.2			3.6	2.0				
Green Ext Time (p_c), s		1.2		16.4			0.2	11.4				

Intersection Summary	
HCM 6th Ctrl Delay	16.8
HCM 6th LOS	B

Notes

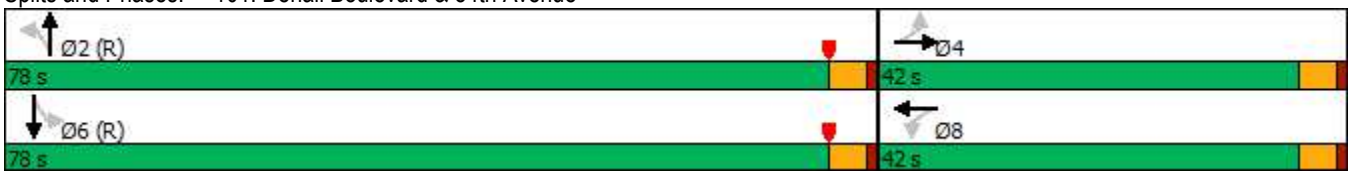
User approved volume balancing among the lanes for turning movement.

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

Lane Group	NBT	SBT	Ø4	Ø8
Lane Configurations				
Traffic Volume (vph)	130	155		
Future Volume (vph)	130	155		
Turn Type	NA	NA		
Protected Phases	2	6	4	8
Permitted Phases				
Detector Phase	2	6		
Switch Phase				
Minimum Initial (s)	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5
Total Split (s)	78.0	78.0	42.0	42.0
Total Split (%)	65.0%	65.0%	35%	35%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		
Total Lost Time (s)	4.5	4.5		
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	C-Max	C-Max	Max	Max
Act Effct Green (s)	73.5	73.5		
Actuated g/C Ratio	0.61	0.61		
v/c Ratio	0.07	0.08		
Control Delay	9.5	0.1		
Queue Delay	0.0	0.0		
Total Delay	9.5	0.1		
LOS	A	A		
Approach Delay	9.5	0.1		
Approach LOS	A	A		

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 53 (44%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.08	
Intersection Signal Delay: 4.4	Intersection LOS: A
Intersection Capacity Utilization 8.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 101: Denali Boulevard & 54th Avenue



Lane Group	NBT	SBT
Lane Group Flow (vph)	141	168
v/c Ratio	0.07	0.08
Control Delay	9.5	0.1
Queue Delay	0.0	0.0
Total Delay	9.5	0.1
Queue Length 50th (ft)	21	0
Queue Length 95th (ft)	35	0
Internal Link Dist (ft)	488	494
Turn Bay Length (ft)		
Base Capacity (vph)	2167	2167
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.07	0.08

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	0	0	0	0	130	0	0	155	0
Future Volume (veh/h)	0	0	0	0	0	0	0	130	0	0	155	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	0	0	0	0	0	0	0	141	0	0	168	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	0	584	0	0	584	0	60	2177	0	60	2177	0
Arrive On Green	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.00	0.00	0.61	0.00
Sat Flow, veh/h	0	1870	0	0	1870	0	1217	3647	0	1248	3647	0
Grp Volume(v), veh/h	0	0	0	0	0	0	0	141	0	0	168	0
Grp Sat Flow(s),veh/h/ln	0	1870	0	0	1870	0	1217	1777	0	1248	1777	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0	2.3	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0	2.3	0.0
Prop In Lane	0.00		0.00	0.00		0.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	0	584	0	0	584	0	60	2177	0	60	2177	0
V/C Ratio(X)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.08	0.00
Avail Cap(c_a), veh/h	0	584	0	0	584	0	60	2177	0	60	2177	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.4	0.0	0.0	9.5	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.4	0.0	0.0	9.5	0.0
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h		0			0			141			168	
Approach Delay, s/veh		0.0			0.0			9.4			9.5	
Approach LOS								A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	78.0	42.0	78.0	42.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	73.5	37.5	73.5	37.5
Max Q Clear Time (g_c+I1), s	3.9	0.0	4.3	0.0
Green Ext Time (p_c), s	1.0	0.0	1.2	0.0

Intersection Summary	
HCM 6th Ctrl Delay	9.5
HCM 6th LOS	A

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	0	0	0	0	0	155	0
Future Vol, veh/h	0	0	0	0	0	0	0	0	0	0	155	0
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	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	0	0	0	0	168	0

Major/Minor	Minor2			Minor1				Major2		
Conflicting Flow All	-	168	168	168	168	-		0	0	0
Stage 1	-	168	-	0	0	-		-	-	-
Stage 2	-	0	-	168	168	-		-	-	-
Critical Hdwy	-	6.52	6.22	7.12	6.52	-		4.12	-	-
Critical Hdwy Stg 1	-	5.52	-	-	-	-		-	-	-
Critical Hdwy Stg 2	-	-	-	6.12	5.52	-		-	-	-
Follow-up Hdwy	-	4.018	3.318	3.518	4.018	-		2.218	-	-
Pot Cap-1 Maneuver	0	725	876	796	725	0		-	-	-
Stage 1	0	759	-	-	-	0		-	-	-
Stage 2	0	-	-	834	759	0		-	-	-
Platoon blocked, %									-	-
Mov Cap-1 Maneuver	-	725	876	796	725	-		-	-	-
Mov Cap-2 Maneuver	-	725	-	796	725	-		-	-	-
Stage 1	-	759	-	-	-	-		-	-	-
Stage 2	-	-	-	834	759	-		-	-	-

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

Minor Lane/Major Mvmt	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	-	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	0	0	130	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0	0	130	0	0	0	0
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	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	0	0	141	0	0	0	0

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	141	141	-	-	141	141	0	0	0
Stage 1	0	0	-	-	141	-	-	-	-
Stage 2	141	141	-	-	0	-	-	-	-
Critical Hdwy	7.12	6.52	-	-	6.52	6.22	4.12	-	-
Critical Hdwy Stg 1	-	-	-	-	5.52	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	-	-	4.018	3.318	2.218	-	-
Pot Cap-1 Maneuver	829	750	0	0	750	907	-	-	-
Stage 1	-	-	0	0	780	-	-	-	-
Stage 2	862	780	0	0	-	-	-	-	-
Platoon blocked, %								-	-
Mov Cap-1 Maneuver	829	750	-	-	750	907	-	-	-
Mov Cap-2 Maneuver	829	750	-	-	750	-	-	-	-
Stage 1	-	-	-	-	780	-	-	-	-
Stage 2	862	780	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS	A	A	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1
Capacity (veh/h)	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	-	-	-	-	-

Lane Group	NBT	SBT	Ø4	Ø8
Lane Configurations				
Traffic Volume (vph)	130	155		
Future Volume (vph)	130	155		
Turn Type	NA	NA		
Protected Phases	2	6	4	8
Permitted Phases				
Detector Phase	2	6		
Switch Phase				
Minimum Initial (s)	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5
Total Split (s)	75.0	75.0	45.0	45.0
Total Split (%)	62.5%	62.5%	38%	38%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		
Total Lost Time (s)	4.5	4.5		
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	C-Max	C-Max	Max	Max
Act Effct Green (s)	70.5	70.5		
Actuated g/C Ratio	0.59	0.59		
v/c Ratio	0.07	0.08		
Control Delay	8.2	1.1		
Queue Delay	0.0	0.0		
Total Delay	8.2	1.1		
LOS	A	A		
Approach Delay	8.2	1.1		
Approach LOS	A	A		

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 40 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.08	
Intersection Signal Delay: 4.4	Intersection LOS: A
Intersection Capacity Utilization 8.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 106: Denali Boulevard & 55th Avenue

Lane Group	NBT	SBT
Lane Group Flow (vph)	141	168
v/c Ratio	0.07	0.08
Control Delay	8.2	1.1
Queue Delay	0.0	0.0
Total Delay	8.2	1.1
Queue Length 50th (ft)	13	3
Queue Length 95th (ft)	21	4
Internal Link Dist (ft)	494	622
Turn Bay Length (ft)		
Base Capacity (vph)	2079	2079
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.07	0.08

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	0	0	0	0	130	0	0	155	0
Future Volume (veh/h)	0	0	0	0	0	0	0	130	0	0	155	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	0	0	0	0	0	0	0	141	0	0	168	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	60	631	0	60	631	0	60	2088	0	60	2088	0
Arrive On Green	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
Sat Flow, veh/h	1781	1870	0	1781	1870	0	1217	3647	0	1248	3647	0
Grp Volume(v), veh/h	0	0	0	0	0	0	0	141	0	0	168	0
Grp Sat Flow(s),veh/h/ln	1781	1870	0	1781	1870	0	1217	1777	0	1248	1777	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	60	631	0	60	631	0	60	2088	0	60	2088	0
V/C Ratio(X)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.08	0.00
Avail Cap(c_a), veh/h	60	631	0	60	631	0	60	2088	0	60	2088	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
Upstream Filter(I)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.98	0.00
Uniform Delay (d), 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
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h		0			0			141			168	
Approach Delay, s/veh		0.0			0.0			0.1			0.1	
Approach LOS								A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	75.0	45.0	75.0	45.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	70.5	40.5	70.5	40.5
Max Q Clear Time (g_c+I1), s	2.0	0.0	2.0	0.0
Green Ext Time (p_c), s	1.0	0.0	1.2	0.0

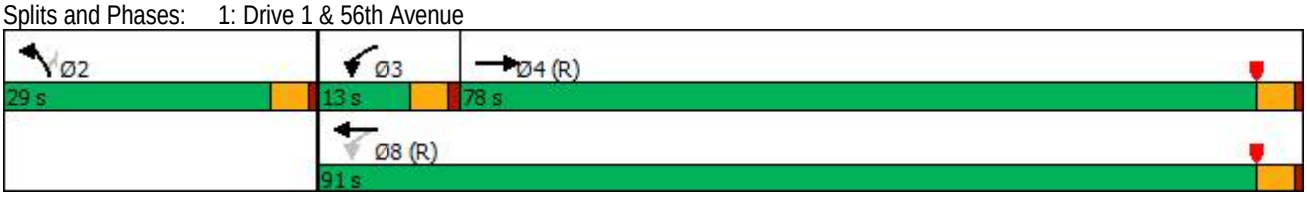
Intersection Summary	
HCM 6th Ctrl Delay	0.1
HCM 6th LOS	A

APPENDIX E. 2040 TOTAL TRAFFIC LOS

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Configurations					
Traffic Volume (vph)	1380	10	1530	85	25
Future Volume (vph)	1380	10	1530	85	25
Turn Type	NA	pm+pt	NA	Prot	Perm
Protected Phases	4	3	8	2	
Permitted Phases		8			2
Detector Phase	4	3	8	2	2
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	9.5	22.5	22.5	22.5
Total Split (s)	78.0	13.0	91.0	29.0	29.0
Total Split (%)	65.0%	10.8%	75.8%	24.2%	24.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	None
Act Effct Green (s)	97.3	99.4	99.4	11.6	11.6
Actuated g/C Ratio	0.81	0.83	0.83	0.10	0.10
v/c Ratio	0.38	0.04	0.39	0.54	0.15
Control Delay	2.1	2.6	3.1	62.6	18.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	2.1	2.6	3.1	62.6	18.3
LOS	A	A	A	E	B
Approach Delay	2.1		3.1	52.6	
Approach LOS	A		A	D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBTL, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.54	
Intersection Signal Delay: 4.4	Intersection LOS: A
Intersection Capacity Utilization 41.8%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Drive 1 & 56th Avenue



Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1554	11	1663	92	27
v/c Ratio	0.38	0.04	0.39	0.54	0.15
Control Delay	2.1	2.6	3.1	62.6	18.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	2.1	2.6	3.1	62.6	18.3
Queue Length 50th (ft)	52	1	91	69	0
Queue Length 95th (ft)	83	5	138	120	28
Internal Link Dist (ft)	670		1090	351	
Turn Bay Length (ft)		250		275	150
Base Capacity (vph)	4105	314	4212	361	344
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.38	0.04	0.39	0.25	0.08

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1380	50	10	1530	85	25
Future Volume (veh/h)	1380	50	10	1530	85	25
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
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	1500	54	11	1663	92	27
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	4080	147	351	4375	122	108
Arrive On Green	1.00	1.00	0.01	0.86	0.07	0.07
Sat Flow, veh/h	5228	182	1781	5274	1781	1585
Grp Volume(v), veh/h	1009	545	11	1663	92	27
Grp Sat Flow(s),veh/h/ln	1702	1838	1781	1702	1781	1585
Q Serve(g_s), s	0.0	0.0	0.1	8.3	6.1	1.9
Cycle Q Clear(g_c), s	0.0	0.0	0.1	8.3	6.1	1.9
Prop In Lane		0.10	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2745	1482	351	4375	122	108
V/C Ratio(X)	0.37	0.37	0.03	0.38	0.76	0.25
Avail Cap(c_a), veh/h	2745	1482	454	4375	364	324
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.91	0.91	0.93	0.93	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	1.6	1.8	54.9	53.0
Incr Delay (d2), s/veh	0.3	0.6	0.0	0.2	9.2	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.3	0.0	1.1	3.0	0.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.3	0.6	1.7	2.1	64.1	54.2
LnGrp LOS	A	A	A	A	E	D
Approach Vol, veh/h	1554			1674	119	
Approach Delay, s/veh	0.4			2.1	61.9	
Approach LOS	A			A	E	

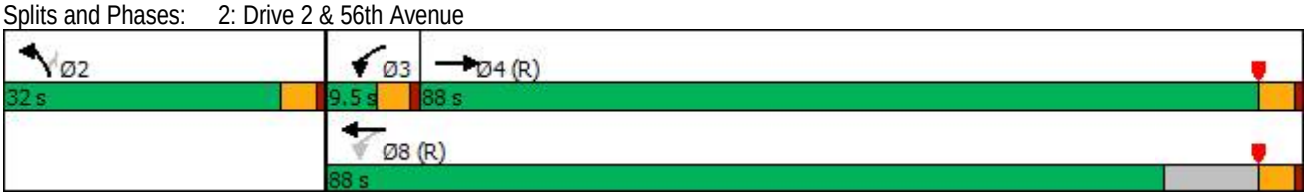
Timer - Assigned Phs		2	3	4			8
Phs Duration (G+Y+Rc), s		12.7	6.0	101.3			107.3
Change Period (Y+Rc), s		4.5	4.5	4.5			4.5
Max Green Setting (Gmax), s		24.5	8.5	73.5			86.5
Max Q Clear Time (g_c+I1), s		8.1	2.1	2.0			10.3
Green Ext Time (p_c), s		0.3	0.0	14.9			18.7

Intersection Summary	
HCM 6th Ctrl Delay	3.4
HCM 6th LOS	A

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Configurations					
Traffic Volume (vph)	1360	15	1450	85	30
Future Volume (vph)	1360	15	1450	85	30
Turn Type	NA	pm+pt	NA	Prot	Perm
Protected Phases	4	3	8	2	
Permitted Phases		8			2
Detector Phase	4	3	8	2	2
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	9.5	22.5	22.5	22.5
Total Split (s)	88.0	9.5	88.0	32.0	32.0
Total Split (%)	68.0%	7.3%	68.0%	24.7%	24.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	None
Act Effct Green (s)	104.2	108.4	108.4	12.1	12.1
Actuated g/C Ratio	0.80	0.84	0.84	0.09	0.09
v/c Ratio	0.37	0.06	0.37	0.56	0.19
Control Delay	4.5	2.6	2.9	68.3	18.7
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	4.5	2.6	3.2	68.3	18.7
LOS	A	A	A	E	B
Approach Delay	4.5		3.2	55.2	
Approach LOS	A		A	E	

Intersection Summary	
Cycle Length: 129.5	
Actuated Cycle Length: 129.5	
Offset: 68 (53%), Referenced to phase 4:EBT and 8:WBTL, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.56	
Intersection Signal Delay: 5.8	Intersection LOS: A
Intersection Capacity Utilization 40.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Drive 2 & 56th Avenue



Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1527	16	1576	92	33
v/c Ratio	0.37	0.06	0.37	0.56	0.19
Control Delay	4.5	2.6	2.9	68.3	18.7
Queue Delay	0.0	0.0	0.2	0.0	0.0
Total Delay	4.5	2.6	3.2	68.3	18.7
Queue Length 50th (ft)	83	2	87	75	0
Queue Length 95th (ft)	193	7	131	129	32
Internal Link Dist (ft)	1090		546	340	
Turn Bay Length (ft)		150			100
Base Capacity (vph)	4074	283	4257	375	362
Starvation Cap Reductn	0	0	1645	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.37	0.06	0.60	0.25	0.09

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1360	45	15	1450	85	30
Future Volume (veh/h)	1360	45	15	1450	85	30
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
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	1478	49	16	1576	92	33
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	4120	137	336	4407	121	107
Arrive On Green	0.81	0.81	0.02	0.86	0.07	0.07
Sat Flow, veh/h	5244	168	1781	5274	1781	1585
Grp Volume(v), veh/h	991	536	16	1576	92	33
Grp Sat Flow(s),veh/h/ln	1702	1840	1781	1702	1781	1585
Q Serve(g_s), s	10.1	10.1	0.2	7.9	6.6	2.6
Cycle Q Clear(g_c), s	10.1	10.1	0.2	7.9	6.6	2.6
Prop In Lane		0.09	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2763	1493	336	4407	121	107
V/C Ratio(X)	0.36	0.36	0.05	0.36	0.76	0.31
Avail Cap(c_a), veh/h	2763	1493	374	4407	377	335
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.93	0.93	0.89	0.89	1.00	1.00
Uniform Delay (d), s/veh	3.3	3.3	2.2	1.8	59.6	57.7
Incr Delay (d2), s/veh	0.3	0.6	0.1	0.2	9.6	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	3.2	0.0	1.6	3.3	1.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	3.6	3.9	2.2	2.0	69.1	59.3
LnGrp LOS	A	A	A	A	E	E
Approach Vol, veh/h	1527			1592	125	
Approach Delay, s/veh	3.7			2.0	66.5	
Approach LOS	A			A	E	

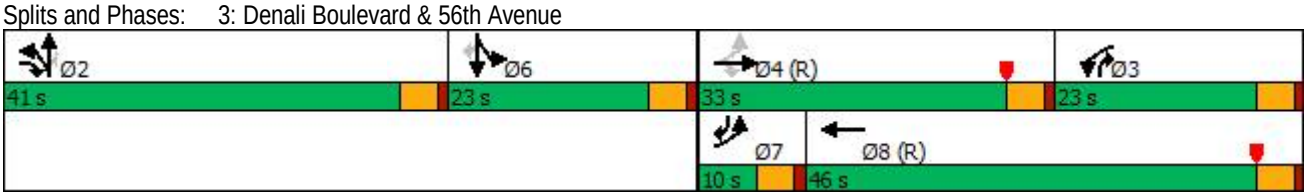
Timer - Assigned Phs		2	3	4			8
Phs Duration (G+Y+Rc), s		13.3	6.7	110.0			116.7
Change Period (Y+Rc), s		4.5	4.5	4.5			4.5
Max Green Setting (Gmax), s		27.5	5.0	83.5			83.5
Max Q Clear Time (g_c+I1), s		8.6	2.2	12.1			9.9
Green Ext Time (p_c), s		0.3	0.0	17.2			19.9

Intersection Summary	
HCM 6th Ctrl Delay	5.3
HCM 6th LOS	A

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	50	945	395	320	905	525	30	360	25	5	40
Future Volume (vph)	50	945	395	320	905	525	30	360	25	5	40
Turn Type	pm+pt	NA	pm+ov	Prot	NA	Split	NA	pm+ov	Split	NA	pm+ov
Protected Phases	7	4	2	3	8	2	2	3	6	6	7
Permitted Phases	4		4					2			6
Detector Phase	7	4	2	3	8	2	2	3	6	6	7
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	22.5	9.5	22.5	22.5	9.5
Total Split (s)	10.0	33.0	41.0	23.0	46.0	41.0	41.0	23.0	23.0	23.0	10.0
Total Split (%)	8.3%	27.5%	34.2%	19.2%	38.3%	34.2%	34.2%	19.2%	19.2%	19.2%	8.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lead		Lag	Lag			Lag			Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes			Yes			Yes
Recall Mode	None	C-Max	None	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)	50.5	50.5	82.1	18.5	63.1	29.8	29.8	52.8	7.3	7.3	15.6
Actuated g/C Ratio	0.42	0.42	0.68	0.15	0.53	0.25	0.25	0.44	0.06	0.06	0.13
v/c Ratio	0.24	0.48	0.35	0.66	0.38	0.73	0.71	0.43	0.25	0.04	0.15
Control Delay	28.7	28.5	1.3	42.6	16.1	51.1	50.4	3.5	58.7	52.6	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.7	28.5	1.3	42.6	16.1	51.1	50.4	3.5	58.7	52.6	1.1
LOS	C	C	A	D	B	D	D	A	E	D	A
Approach Delay		20.8			22.9		32.2			25.3	
Approach LOS		C			C		C			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 24.5	Intersection LOS: C
Intersection Capacity Utilization 60.6%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Denali Boulevard & 56th Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	54	1027	429	348	1017	303	301	391	27	5	43
v/c Ratio	0.24	0.48	0.35	0.66	0.38	0.73	0.71	0.43	0.25	0.04	0.15
Control Delay	28.7	28.5	1.3	42.6	16.1	51.1	50.4	3.5	58.7	52.6	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.7	28.5	1.3	42.6	16.1	51.1	50.4	3.5	58.7	52.6	1.1
Queue Length 50th (ft)	27	224	0	112	129	224	222	4	20	4	0
Queue Length 95th (ft)	61	300	20	m151	169	311	307	54	51	17	0
Internal Link Dist (ft)		546			823		622			214	
Turn Bay Length (ft)	150		350	275		275			100		100
Base Capacity (vph)	227	2139	1230	529	2660	511	515	909	272	287	288
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.48	0.35	0.66	0.38	0.59	0.58	0.43	0.10	0.02	0.15

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	945	395	320	905	30	525	30	360	25	5	40
Future Volume (veh/h)	50	945	395	320	905	30	525	30	360	25	5	40
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	54	1027	429	348	984	33	595	0	391	27	5	43
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	214	1213	701	1270	2894	97	730	0	907	71	75	119
Arrive On Green	0.03	0.24	0.24	0.74	1.00	1.00	0.20	0.00	0.20	0.04	0.04	0.04
Sat Flow, veh/h	1781	5106	1585	3456	5074	170	3563	0	1585	1781	1870	1585
Grp Volume(v), veh/h	54	1027	429	348	660	357	595	0	391	27	5	43
Grp Sat Flow(s),veh/h/ln	1781	1702	1585	1728	1702	1840	1781	0	1585	1781	1870	1585
Q Serve(g_s), s	2.9	23.0	24.8	4.0	0.0	0.0	19.1	0.0	0.0	1.8	0.3	3.1
Cycle Q Clear(g_c), s	2.9	23.0	24.8	4.0	0.0	0.0	19.1	0.0	0.0	1.8	0.3	3.1
Prop In Lane	1.00		1.00	1.00		0.09	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	214	1213	701	1270	1941	1049	730	0	907	71	75	119
V/C Ratio(X)	0.25	0.85	0.61	0.27	0.34	0.34	0.82	0.00	0.43	0.38	0.07	0.36
Avail Cap(c_a), veh/h	233	1213	701	1270	1941	1049	1084	0	1065	275	288	299
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.94	0.94	0.94	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.0	43.7	25.6	10.6	0.0	0.0	45.5	0.0	14.6	56.1	55.4	52.8
Incr Delay (d2), s/veh	0.6	7.0	3.7	0.1	0.5	0.9	3.1	0.0	0.3	3.3	0.4	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	10.4	13.8	1.4	0.1	0.3	8.7	0.0	6.0	0.9	0.2	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.6	50.7	29.3	10.7	0.5	0.9	48.6	0.0	14.9	59.4	55.8	54.7
LnGrp LOS	D	D	C	B	A	A	D	A	B	E	E	D
Approach Vol, veh/h		1510			1365			986			75	
Approach Delay, s/veh		44.2			3.2			35.2			56.5	
Approach LOS		D			A			D			E	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		29.1	48.6	33.0		9.3	8.7	72.9				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		36.5	18.5	28.5		18.5	5.5	41.5				
Max Q Clear Time (g_c+I1), s		21.1	6.0	26.8		5.1	4.9	2.0				
Green Ext Time (p_c), s		3.5	1.0	1.3		0.1	0.0	8.4				

Intersection Summary	
HCM 6th Ctrl Delay	28.0
HCM 6th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1295	35	15	1180	75	35
Future Vol, veh/h	1295	35	15	1180	75	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	150	-	0	100
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	1408	38	16	1283	82	38

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1446	0	1972	723
Stage 1	-	-	-	-	1427	-
Stage 2	-	-	-	-	545	-
Critical Hdwy	-	-	5.34	-	5.74	7.14
Critical Hdwy Stg 1	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	-	-	3.12	-	3.82	3.92
Pot Cap-1 Maneuver	-	-	776	-	*404	*624
Stage 1	-	-	-	-	*640	-
Stage 2	-	-	-	-	*663	-
Platoon blocked, %	-	-	1	-	1	1
Mov Cap-1 Maneuver	-	-	776	-	*396	*624
Mov Cap-2 Maneuver	-	-	-	-	*396	-
Stage 1	-	-	-	-	*640	-
Stage 2	-	-	-	-	*649	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	14.7
HCM LOS			B

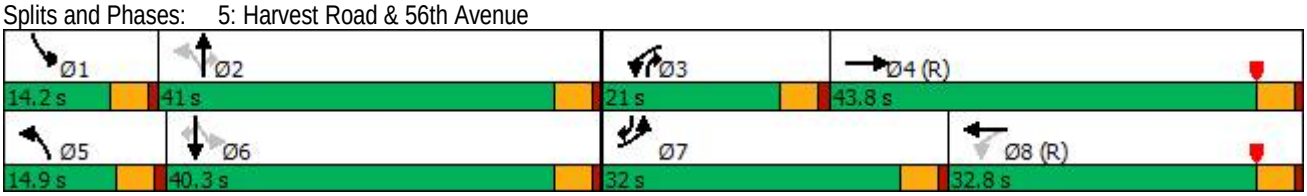
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	396	624	-	-	776	-
HCM Lane V/C Ratio	0.206	0.061	-	-	0.021	-
HCM Control Delay (s)	16.4	11.1	-	-	9.7	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	0.8	0.2	-	-	0.1	-

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

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	620	575	210	660	180	870	150	130	405	360
Future Volume (vph)	620	575	210	660	180	870	150	130	405	360
Turn Type	Prot	NA	pm+pt	NA	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	7	4	3	8	5	2	3	1	6	7
Permitted Phases			8		2		2	6		6
Detector Phase	7	4	3	8	5	2	3	1	6	7
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	9.5	22.5	9.5	9.5	22.5	9.5
Total Split (s)	32.0	43.8	21.0	32.8	14.9	41.0	21.0	14.2	40.3	32.0
Total Split (%)	26.7%	36.5%	17.5%	27.3%	12.4%	34.2%	17.5%	11.8%	33.6%	26.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	Max	None	None	Max	None
Act Effct Green (s)	26.7	41.9	42.9	29.1	47.0	36.8	55.2	45.4	36.0	67.2
Actuated g/C Ratio	0.22	0.35	0.36	0.24	0.39	0.31	0.46	0.38	0.30	0.56
v/c Ratio	0.88	0.44	0.63	0.79	0.53	0.87	0.21	0.70	0.42	0.42
Control Delay	40.3	28.4	27.5	45.0	35.8	58.8	12.3	43.7	35.1	12.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.3	28.4	27.5	45.0	35.8	58.8	12.3	43.7	35.1	12.6
LOS	D	C	C	D	D	E	B	D	D	B
Approach Delay		33.9		41.7		49.5			27.3	
Approach LOS		C		D		D			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 87 (73%), Referenced to phase 4:EBT and 8:WBTL, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 38.6	Intersection LOS: D
Intersection Capacity Utilization 82.1%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 5: Harvest Road & 56th Avenue



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	674	772	228	978	196	946	163	141	440	391
v/c Ratio	0.88	0.44	0.63	0.79	0.53	0.87	0.21	0.70	0.42	0.42
Control Delay	40.3	28.4	27.5	45.0	35.8	58.8	12.3	43.7	35.1	12.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.3	28.4	27.5	45.0	35.8	58.8	12.3	43.7	35.1	12.6
Queue Length 50th (ft)	260	206	98	245	116	392	27	67	143	121
Queue Length 95th (ft)	#354	243	150	300	155	#486	39	#143	192	192
Internal Link Dist (ft)		1540		4791		759			2985	
Turn Bay Length (ft)	300		275		275		275	275		600
Base Capacity (vph)	786	1757	399	1237	370	1085	822	204	1060	937
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.44	0.57	0.79	0.53	0.87	0.20	0.69	0.42	0.42

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	620	575	135	210	660	240	180	870	150	130	405	360
Future Volume (veh/h)	620	575	135	210	660	240	180	870	150	130	405	360
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	674	625	147	228	717	261	196	946	163	141	440	391
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	746	1462	338	406	922	331	346	1117	676	238	1060	815
Arrive On Green	0.07	0.12	0.12	0.11	0.25	0.25	0.17	0.63	0.63	0.07	0.30	0.30
Sat Flow, veh/h	3456	4144	958	1781	3704	1331	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	674	512	260	228	658	320	196	946	163	141	440	391
Grp Sat Flow(s),veh/h/ln	1728	1702	1698	1781	1702	1631	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	23.2	16.8	17.1	11.3	21.6	22.0	9.4	25.4	4.8	6.5	11.9	19.1
Cycle Q Clear(g_c), s	23.2	16.8	17.1	11.3	21.6	22.0	9.4	25.4	4.8	6.5	11.9	19.1
Prop In Lane	1.00		0.56	1.00		0.82	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	746	1201	599	406	848	406	346	1117	676	238	1060	815
V/C Ratio(X)	0.90	0.43	0.43	0.56	0.78	0.79	0.57	0.85	0.24	0.59	0.42	0.48
Avail Cap(c_a), veh/h	792	1201	599	452	848	406	346	1117	676	256	1060	815
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.5	41.7	41.9	28.2	42.0	42.1	23.9	20.0	11.4	29.1	33.7	18.8
Incr Delay (d2), s/veh	13.2	1.1	2.3	1.3	6.9	14.3	2.2	8.0	0.8	3.2	1.2	2.0
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	12.2	7.9	8.2	4.9	9.9	10.4	3.7	7.9	1.7	3.0	5.3	7.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.7	42.8	44.2	29.5	48.9	56.4	26.1	28.0	12.3	32.3	34.9	20.8
LnGrp LOS	E	D	D	C	D	E	C	C	B	C	C	C
Approach Vol, veh/h		1446			1206			1305			972	
Approach Delay, s/veh		54.6			47.2			25.7			28.9	
Approach LOS		D			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	42.2	17.9	46.9	14.9	40.3	30.4	34.4
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.7	36.5	16.5	39.3	10.4	35.8	27.5	28.3
Max Q Clear Time (g_c+I1), s	8.5	27.4	13.3	19.1	11.4	21.1	25.2	24.0
Green Ext Time (p_c), s	0.0	4.7	0.2	5.1	0.0	3.9	0.7	2.4

Intersection Summary	
HCM 6th Ctrl Delay	40.1
HCM 6th LOS	D

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	0	15	15	0	190	10	980	90	125	600	15
Future Vol, veh/h	25	0	15	15	0	190	10	980	90	125	600	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	-	-	100	-	-	100	150	-	150	150	-	150
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	27	0	16	16	0	207	11	1065	98	136	652	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1479	2109	326	1685	2027	533	668	0	0	1163	0	0
Stage 1	924	924	-	1087	1087	-	-	-	-	-	-	-
Stage 2	555	1185	-	598	940	-	-	-	-	-	-	-
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	*417	126	*841	*417	*165	*685	*1258	-	-	947	-	-
Stage 1	*513	502	-	*645	*566	-	-	-	-	-	-	-
Stage 2	*645	498	-	*793	*492	-	-	-	-	-	-	-
Platoon blocked, %	1	1	1	1	1	1	1	-	-	1	-	-
Mov Cap-1 Maneuver	*258	107	*841	*362	*140	*685	*1258	-	-	947	-	-
Mov Cap-2 Maneuver	*258	107	-	*362	*140	-	-	-	-	-	-	-
Stage 1	*508	429	-	*640	*561	-	-	-	-	-	-	-
Stage 2	*447	494	-	*666	*421	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.4	12.7	0.1	1.6
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	* 1258	-	-	258	841	362	685	947	-	-
HCM Lane V/C Ratio	0.009	-	-	0.105	0.019	0.045	0.301	0.143	-	-
HCM Control Delay (s)	7.9	-	-	20.6	9.4	15.4	12.5	9.4	-	-
HCM Lane LOS	A	-	-	C	A	C	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.1	0.1	1.3	0.5	-	-

Notes

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

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	40	15	1060	625	5
Future Vol, veh/h	25	40	15	1060	625	5
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	100	150	-	-	-
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	27	43	16	1152	679	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1290	342	684	0	-	0
Stage 1	682	-	-	-	-	-
Stage 2	608	-	-	-	-	-
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	*368	*841	1241	-	-	-
Stage 1	*780	-	-	-	-	-
Stage 2	*597	-	-	-	-	-
Platoon blocked, %	1	1	1	-	-	-
Mov Cap-1 Maneuver	*363	*841	1241	-	-	-
Mov Cap-2 Maneuver	*363	-	-	-	-	-
Stage 1	*770	-	-	-	-	-
Stage 2	*597	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.9	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1241	-	363	841	-	-
HCM Lane V/C Ratio	0.013	-	0.075	0.052	-	-
HCM Control Delay (s)	7.9	-	15.7	9.5	-	-
HCM Lane LOS	A	-	C	A	-	-
HCM 95th %tile Q(veh)	0	-	0.2	0.2	-	-

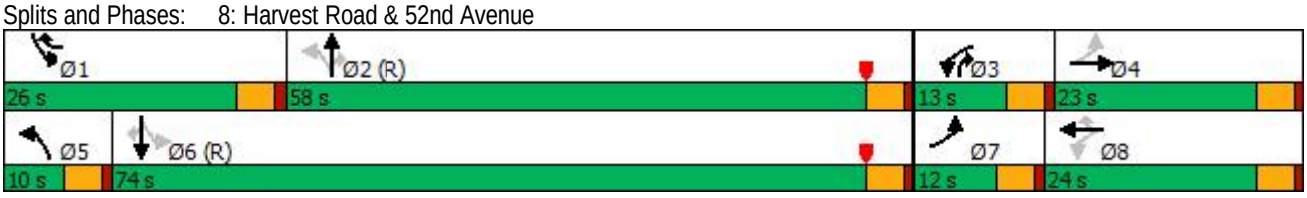
Notes

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

Lane Group	EBL	EBT	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø8
Lane Configurations											
Traffic Volume (vph)	65	0	90	175	20	835	110	215	425	20	
Future Volume (vph)	65	0	90	175	20	835	110	215	425	20	
Turn Type	pm+pt	NA	pm+pt	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	Perm	
Protected Phases	7	4	3	1	5	2	3	1	6		8
Permitted Phases	4		8	8	2		2	6		6	
Detector Phase	7	4	3	1	5	2	3	1	6	6	
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	9.5	22.5	9.5	9.5	22.5	22.5	22.5
Total Split (s)	12.0	23.0	13.0	26.0	10.0	58.0	13.0	26.0	74.0	74.0	24.0
Total Split (%)	10.0%	19.2%	10.8%	21.7%	8.3%	48.3%	10.8%	21.7%	61.7%	61.7%	20%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag	Lead	Lag	Lead	Lead	Lead	Lag	Lead	Lead	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	None	None	C-Max	C-Max	None
Act Effct Green (s)	16.0	5.5	8.3	13.4	85.1	79.2	92.0	94.6	88.4	88.4	
Actuated g/C Ratio	0.13	0.05	0.07	0.11	0.71	0.66	0.77	0.79	0.74	0.74	
v/c Ratio	0.30	0.10	0.80	0.63	0.03	0.39	0.10	0.48	0.18	0.02	
Control Delay	49.0	0.4	95.9	24.8	3.6	6.4	0.2	9.7	3.7	0.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	49.0	0.4	95.9	24.8	3.6	6.4	0.2	9.7	3.7	0.1	
LOS	D	A	F	C	A	A	A	A	A	A	
Approach Delay		29.1				5.6			5.5		
Approach LOS		C				A			A		

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 12.6	Intersection LOS: B
Intersection Capacity Utilization 57.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 8: Harvest Road & 52nd Avenue



Lane Group	EBL	EBT	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	71	49	98	190	22	908	120	234	462	22
v/c Ratio	0.30	0.10	0.80	0.63	0.03	0.39	0.10	0.48	0.18	0.02
Control Delay	49.0	0.4	95.9	24.8	3.6	6.4	0.2	9.7	3.7	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.0	0.4	95.9	24.8	3.6	6.4	0.2	9.7	3.7	0.1
Queue Length 50th (ft)	49	0	76	36	2	55	0	27	25	0
Queue Length 95th (ft)	95	0	#170	108	m7	151	m0	60	44	m0
Internal Link Dist (ft)		999				1101			640	
Turn Bay Length (ft)	150		200	200	150		150	175		
Base Capacity (vph)	240	636	126	428	683	2336	1243	600	2607	1191
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.08	0.78	0.44	0.03	0.39	0.10	0.39	0.18	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	0	45	90	0	175	20	835	110	215	425	20
Future Volume (veh/h)	65	0	45	90	0	175	20	835	110	215	425	20
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	71	0	49	98	0	190	22	908	120	234	462	22
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	278	0	179	286	240	307	597	2165	1064	438	2321	1035
Arrive On Green	0.05	0.00	0.11	0.06	0.00	0.13	0.02	0.61	0.61	0.02	0.22	0.22
Sat Flow, veh/h	1781	0	1585	1781	1870	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	71	0	49	98	0	190	22	908	120	234	462	22
Grp Sat Flow(s),veh/h/ln	1781	0	1585	1781	1870	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	4.2	0.0	3.4	5.8	0.0	13.2	0.6	16.1	3.2	5.3	12.8	1.3
Cycle Q Clear(g_c), s	4.2	0.0	3.4	5.8	0.0	13.2	0.6	16.1	3.2	5.3	12.8	1.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	278	0	179	286	240	307	597	2165	1064	438	2321	1035
V/C Ratio(X)	0.26	0.00	0.27	0.34	0.00	0.62	0.04	0.42	0.11	0.53	0.20	0.02
Avail Cap(c_a), veh/h	306	0	244	301	304	362	640	2165	1064	640	2321	1035
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.1	0.0	48.7	43.3	0.0	44.3	8.5	12.3	7.0	9.4	21.3	16.8
Incr Delay (d2), s/veh	0.5	0.0	0.8	0.7	0.0	2.4	0.0	0.6	0.2	1.0	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.0	1.4	2.6	0.0	5.4	0.2	6.4	1.1	2.2	6.2	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.6	0.0	49.6	44.0	0.0	46.7	8.5	12.9	7.2	10.4	21.5	16.9
LnGrp LOS	D	A	D	D	A	D	A	B	A	B	C	B
Approach Vol, veh/h		120			288			1050			718	
Approach Delay, s/veh		46.6			45.8			12.2			17.8	
Approach LOS		D			D			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.4	77.6	12.0	18.0	7.1	82.9	10.1	19.9
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	21.5	53.5	8.5	18.5	5.5	69.5	7.5	19.5
Max Q Clear Time (g_c+I1), s	7.3	18.1	7.8	5.4	2.6	14.8	6.2	15.2
Green Ext Time (p_c), s	0.6	8.3	0.0	0.1	0.0	3.6	0.0	0.2

Intersection Summary	
HCM 6th Ctrl Delay	20.4
HCM 6th LOS	C

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	50	0	30	15	0	160	5	755	45	175	365	20
Future Vol, veh/h	50	0	30	15	0	160	5	755	45	175	365	20
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	-	-	100	-	-	100	150	-	150	150	-	150
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	54	0	33	16	0	174	5	821	49	190	397	22

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1198	1657	199	1410	1630	411	419	0	0	870	0	0
Stage 1	777	777	-	831	831	-	-	-	-	-	-	-
Stage 2	421	880	-	579	799	-	-	-	-	-	-	-
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	192	112	*945	127	116	590	1365	-	-	770	-	-
Stage 1	485	496	-	330	383	-	-	-	-	-	-	-
Stage 2	581	363	-	660	484	-	-	-	-	-	-	-
Platoon blocked, %	1	1	1	1	1		1	-	-		-	-
Mov Cap-1 Maneuver	109	84	*945	99	87	590	1365	-	-	770	-	-
Mov Cap-2 Maneuver	109	84	-	99	87	-	-	-	-	-	-	-
Stage 1	483	373	-	329	381	-	-	-	-	-	-	-
Stage 2	408	362	-	480	364	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	45.3	16.6	0	3.5
HCM LOS	E	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1365	-	-	109	945	99	590	770	-	-
HCM Lane V/C Ratio	0.004	-	-	0.499	0.035	0.165	0.295	0.247	-	-
HCM Control Delay (s)	7.6	-	-	67.1	8.9	48.4	13.6	11.2	-	-
HCM Lane LOS	A	-	-	F	A	E	B	B	-	-
HCM 95th %tile Q(veh)	0	-	-	2.2	0.1	0.6	1.2	1	-	-

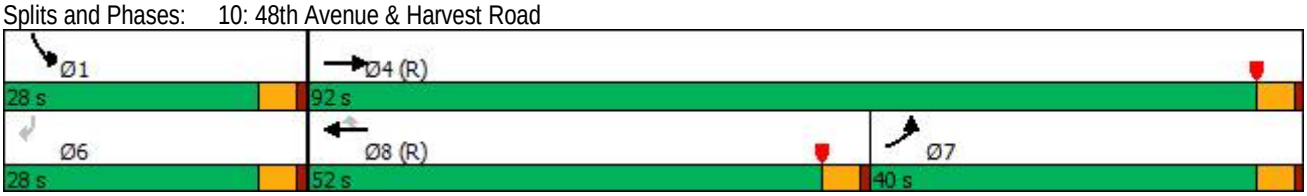
Notes

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

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	620	1595	1220	185	125	290
Future Volume (vph)	620	1595	1220	185	125	290
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		1	
Permitted Phases				8		6
Detector Phase	7	4	8	8	1	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	9.5	22.5
Total Split (s)	40.0	92.0	52.0	52.0	28.0	28.0
Total Split (%)	33.3%	76.7%	43.3%	43.3%	23.3%	23.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag		Lead	Lead		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	35.5	100.1	60.1	60.1	10.9	10.9
Actuated g/C Ratio	0.30	0.83	0.50	0.50	0.09	0.09
v/c Ratio	0.66	0.41	0.52	0.23	0.44	0.73
Control Delay	62.6	8.3	21.6	3.2	57.1	25.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.6	8.3	21.6	3.2	57.1	25.9
LOS	E	A	C	A	E	C
Approach Delay		23.5	19.2		35.3	
Approach LOS		C	B		D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 28 (23%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 23.2	Intersection LOS: C
Intersection Capacity Utilization 56.7%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 10: 48th Avenue & Harvest Road



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	674	1734	1326	201	136	315
v/c Ratio	0.66	0.41	0.52	0.23	0.44	0.73
Control Delay	62.6	8.3	21.6	3.2	57.1	25.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.6	8.3	21.6	3.2	57.1	25.9
Queue Length 50th (ft)	282	305	242	0	52	55
Queue Length 95th (ft)	m326	480	321	42	m82	m112
Internal Link Dist (ft)		649	786		1558	
Turn Bay Length (ft)	275			500	275	
Base Capacity (vph)	1015	4240	2545	892	672	563
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.41	0.52	0.23	0.20	0.56

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	620	1595	1220	185	125	290
Future Volume (veh/h)	620	1595	1220	185	125	290
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
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	674	1734	1326	0	136	0
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	1500	4429	2021		199	
Arrive On Green	0.87	1.00	0.40	0.00	0.06	0.00
Sat Flow, veh/h	3456	5274	5274	1585	3456	1585
Grp Volume(v), veh/h	674	1734	1326	0	136	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1702	1585	1728	1585
Q Serve(g_s), s	5.1	0.0	25.4	0.0	4.6	0.0
Cycle Q Clear(g_c), s	5.1	0.0	25.4	0.0	4.6	0.0
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	1500	4429	2021		199	
V/C Ratio(X)	0.45	0.39	0.66		0.68	
Avail Cap(c_a), veh/h	1500	4429	2021		677	
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.47	0.47	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	4.8	0.0	29.6	0.0	55.5	0.0
Incr Delay (d2), s/veh	0.1	0.1	1.7	0.0	4.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.1	10.6	0.0	2.1	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	4.9	0.1	31.3	0.0	59.6	0.0
LnGrp LOS	A	A	C		E	
Approach Vol, veh/h		2408	1326		136	
Approach Delay, s/veh		1.5	31.3		59.6	
Approach LOS		A	C		E	

Timer - Assigned Phs		4		6	7	8
Phs Duration (G+Y+Rc), s		108.6		11.4	56.6	52.0
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		87.5		23.5	35.5	47.5
Max Q Clear Time (g_c+I1), s		2.0		6.6	7.1	27.4
Green Ext Time (p_c), s		24.7		0.4	2.6	9.8

Intersection Summary	
HCM 6th Ctrl Delay	13.7
HCM 6th LOS	B

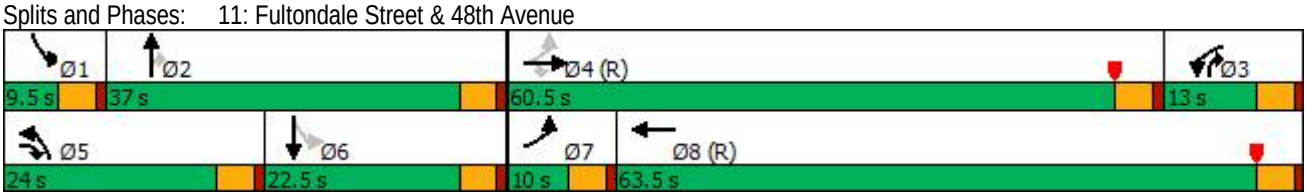
Notes

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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	30	1925	125	130	1375	420	5	265	30	10
Future Volume (vph)	30	1925	125	130	1375	420	5	265	30	10
Turn Type	pm+pt	NA	pm+ov	Prot	NA	Prot	NA	pm+ov	pm+pt	NA
Protected Phases	7	4	5	3	8	5	2	3	1	6
Permitted Phases	4		4					2	6	
Detector Phase	7	4	5	3	8	5	2	3	1	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	22.5	9.5	9.5	22.5
Total Split (s)	10.0	60.5	24.0	13.0	63.5	24.0	37.0	13.0	9.5	22.5
Total Split (%)	8.3%	50.4%	20.0%	10.8%	52.9%	20.0%	30.8%	10.8%	7.9%	18.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	None	C-Max	None	Max	None	None	Max
Act Effct Green (s)	56.0	56.0	74.9	8.5	63.0	18.9	36.3	46.6	23.6	18.6
Actuated g/C Ratio	0.47	0.47	0.62	0.07	0.52	0.16	0.30	0.39	0.20	0.16
v/c Ratio	0.23	0.88	0.13	0.58	0.56	0.85	0.01	0.43	0.11	0.33
Control Delay	12.0	24.4	0.7	56.0	20.7	64.6	32.2	18.2	28.5	14.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.0	24.4	0.7	56.0	20.7	64.6	32.2	18.2	28.5	14.2
LOS	B	C	A	E	C	E	C	B	C	B
Approach Delay		22.8			23.8		46.5			17.5
Approach LOS		C			C		D			B

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 112 (93%), Referenced to phase 4:EBTL and 8:WBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 26.7	Intersection LOS: C
Intersection Capacity Utilization 71.3%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 11: Fultondale Street & 48th Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	33	2092	136	141	1506	457	5	288	33	109
v/c Ratio	0.23	0.88	0.13	0.58	0.56	0.85	0.01	0.43	0.11	0.33
Control Delay	12.0	24.4	0.7	56.0	20.7	64.6	32.2	18.2	28.5	14.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.0	24.4	0.7	56.0	20.7	64.6	32.2	18.2	28.5	14.2
Queue Length 50th (ft)	7	576	2	43	172	178	3	92	17	8
Queue Length 95th (ft)	m9	653	m2	78	299	#254	13	160	40	61
Internal Link Dist (ft)		1760			649		394			308
Turn Bay Length (ft)	150		150	275		225		150	150	
Base Capacity (vph)	144	2373	1033	243	2667	557	563	673	291	332
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.88	0.13	0.58	0.56	0.82	0.01	0.43	0.11	0.33

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	1925	125	130	1375	10	420	5	265	30	10	90
Future Volume (veh/h)	30	1925	125	130	1375	10	420	5	265	30	10	90
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	33	2092	136	141	1495	11	457	5	288	33	11	98
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	200	2383	977	290	2734	20	516	508	564	272	24	217
Arrive On Green	0.06	0.93	0.93	0.11	0.70	0.70	0.15	0.27	0.27	0.03	0.15	0.15
Sat Flow, veh/h	1781	5106	1585	3456	5229	38	3456	1870	1585	1781	162	1447
Grp Volume(v), veh/h	33	2092	136	141	973	533	457	5	288	33	0	109
Grp Sat Flow(s),veh/h/ln	1781	1702	1585	1728	1702	1863	1728	1870	1585	1781	0	1610
Q Serve(g_s), s	1.2	18.2	0.3	4.6	16.9	16.9	15.6	0.2	5.1	1.9	0.0	7.4
Cycle Q Clear(g_c), s	1.2	18.2	0.3	4.6	16.9	16.9	15.6	0.2	5.1	1.9	0.0	7.4
Prop In Lane	1.00		1.00	1.00		0.02	1.00		1.00	1.00		0.90
Lane Grp Cap(c), veh/h	200	2383	977	290	1780	974	516	508	564	272	0	241
V/C Ratio(X)	0.16	0.88	0.14	0.49	0.55	0.55	0.88	0.01	0.51	0.12	0.00	0.45
Avail Cap(c_a), veh/h	232	2383	977	290	1780	974	562	508	564	297	0	241
HCM Platoon Ratio	2.00	2.00	2.00	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.46	0.46	0.46	0.81	0.81	0.81	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.8	2.7	0.4	50.9	11.3	11.3	50.0	31.9	20.2	41.3	0.0	46.5
Incr Delay (d2), s/veh	0.2	2.4	0.1	1.0	1.0	1.8	14.8	0.0	3.3	0.2	0.0	6.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	1.9	0.1	2.0	5.2	5.9	7.8	0.1	6.9	0.8	0.0	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.0	5.1	0.5	51.9	12.3	13.1	64.8	32.0	23.4	41.5	0.0	52.5
LnGrp LOS	B	A	A	D	B	B	E	C	C	D	A	D
Approach Vol, veh/h		2261			1647			750			142	
Approach Delay, s/veh		5.1			15.9			48.7			49.9	
Approach LOS		A			B			D			D	

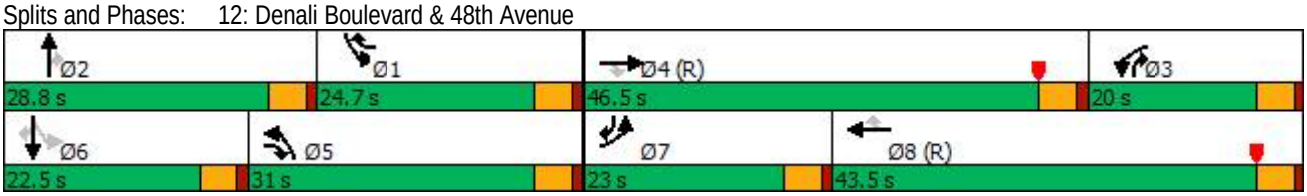
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.8	37.1	14.6	60.5	22.4	22.5	7.8	67.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.0	32.5	8.5	56.0	19.5	18.0	5.5	59.0
Max Q Clear Time (g_c+I1), s	3.9	7.1	6.6	20.2	17.6	9.4	3.2	18.9
Green Ext Time (p_c), s	0.0	1.0	0.1	24.3	0.4	0.3	0.0	14.8

Intersection Summary	
HCM 6th Ctrl Delay	16.9
HCM 6th LOS	B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	385	1415	555	370	1345	170	660	380	450	235	320	455
Future Volume (vph)	385	1415	555	370	1345	170	660	380	450	235	320	455
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	7
Permitted Phases			4			8			2	6		6
Detector Phase	7	4	5	3	8	1	5	2	3	1	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5
Total Split (s)	23.0	46.5	31.0	20.0	43.5	24.7	31.0	28.8	20.0	24.7	22.5	23.0
Total Split (%)	19.2%	38.8%	25.8%	16.7%	36.3%	20.6%	25.8%	24.0%	16.7%	20.6%	18.8%	19.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	None	C-Max	None	None	Max	None	None	Max	None
Act Effct Green (s)	17.8	42.0	73.0	15.5	39.7	59.9	26.5	24.3	44.3	38.2	18.0	35.8
Actuated g/C Ratio	0.15	0.35	0.61	0.13	0.33	0.50	0.22	0.20	0.37	0.32	0.15	0.30
v/c Ratio	0.82	0.86	0.61	0.91	0.87	0.22	0.95	0.58	0.76	0.69	0.66	0.87
Control Delay	41.6	20.4	2.4	59.1	29.1	2.1	68.2	46.9	35.3	49.3	54.7	33.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.6	20.4	2.4	59.1	29.1	2.1	68.2	46.9	35.3	49.3	54.7	33.4
LOS	D	C	A	E	C	A	E	D	D	D	D	C
Approach Delay		19.7			32.5			52.8			43.8	
Approach LOS		B			C			D			D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 49 (41%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.95	
Intersection Signal Delay: 34.2	Intersection LOS: C
Intersection Capacity Utilization 84.2%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 12: Denali Boulevard & 48th Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	418	1538	603	402	1462	185	717	413	489	255	348	495
v/c Ratio	0.82	0.86	0.61	0.91	0.87	0.22	0.95	0.58	0.76	0.69	0.66	0.87
Control Delay	41.6	20.4	2.4	59.1	29.1	2.1	68.2	46.9	35.3	49.3	54.7	33.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.6	20.4	2.4	59.1	29.1	2.1	68.2	46.9	35.3	49.3	54.7	33.4
Queue Length 50th (ft)	140	397	13	155	345	0	283	153	270	135	135	144
Queue Length 95th (ft)	m150	m449	m32	m#243	428	m38	#401	206	410	204	187	#296
Internal Link Dist (ft)		1300			1760			542			586	
Turn Bay Length (ft)	250		275	300		150	400		250	300		225
Base Capacity (vph)	529	1779	984	443	1681	837	758	716	644	372	530	576
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.86	0.61	0.91	0.87	0.22	0.95	0.58	0.76	0.69	0.66	0.86

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	385	1415	555	370	1345	170	660	380	450	235	320	455
Future Volume (veh/h)	385	1415	555	370	1345	170	660	380	450	235	320	455
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	418	1538	0	402	1462	185	717	413	0	255	348	495
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	483	1787		447	1733	805	763	720		404	533	459
Arrive On Green	0.05	0.12	0.00	0.04	0.11	0.11	0.22	0.20	0.00	0.17	0.15	0.15
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	3456	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	418	1538	0	402	1462	185	717	413	0	255	348	495
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1728	1777	1585	1781	1777	1585
Q Serve(g_s), s	14.4	35.5	0.0	13.9	33.7	3.5	24.5	12.6	0.0	8.5	11.1	18.0
Cycle Q Clear(g_c), s	14.4	35.5	0.0	13.9	33.7	3.5	24.5	12.6	0.0	8.5	11.1	18.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	483	1787		447	1733	805	763	720		404	533	459
V/C Ratio(X)	0.87	0.86		0.90	0.84	0.23	0.94	0.57		0.63	0.65	1.08
Avail Cap(c_a), veh/h	533	1787		447	1733	805	763	720		404	533	459
HCM Platoon Ratio	0.33	0.33	0.33	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.30	0.30	0.00	0.74	0.74	0.74	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.1	50.2	0.0	56.7	50.2	8.5	46.0	43.2	0.0	42.8	48.1	18.0
Incr Delay (d2), s/veh	4.4	1.8	0.0	16.5	3.9	0.5	19.4	3.3	0.0	3.2	6.1	64.4
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	7.0	16.5	0.0	7.5	16.1	1.6	12.5	5.9	0.0	7.2	5.4	14.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.5	52.0	0.0	73.2	54.1	9.0	65.4	46.5	0.0	46.0	54.2	82.4
LnGrp LOS	E	D		E	D	A	E	D		D	D	F
Approach Vol, veh/h		1956			2049			1130			1098	
Approach Delay, s/veh		53.8			53.8			58.5			65.0	
Approach LOS		D			D			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.7	28.8	20.0	46.5	31.0	22.5	21.3	45.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	20.2	24.3	15.5	42.0	26.5	18.0	18.5	39.0
Max Q Clear Time (g_c+I1), s	10.5	14.6	15.9	37.5	26.5	20.0	16.4	35.7
Green Ext Time (p_c), s	0.5	1.9	0.0	3.5	0.0	0.0	0.4	2.7

Intersection Summary	
HCM 6th Ctrl Delay	56.6
HCM 6th LOS	E

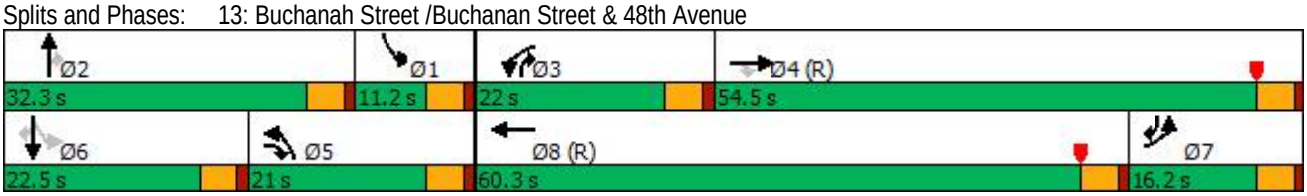
Notes

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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBR	SBL	SBT	SBR	Ø2
Lane Configurations											
Traffic Volume (vph)	265	1950	410	440	1910	400	275	135	5	140	
Future Volume (vph)	265	1950	410	440	1910	400	275	135	5	140	
Turn Type	Prot	NA	pm+ov	Prot	NA	Prot	pm+ov	pm+pt	NA	pm+ov	
Protected Phases	7	4	5	3	8	5	3	1	6	7	2
Permitted Phases			4				2	6		6	
Detector Phase	7	4	5	3	8	5	3	1	6	7	
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	9.5	22.5	9.5	22.5
Total Split (s)	16.2	54.5	21.0	22.0	60.3	21.0	22.0	11.2	22.5	16.2	32.3
Total Split (%)	13.5%	45.4%	17.5%	18.3%	50.3%	17.5%	18.3%	9.3%	18.8%	13.5%	27%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	None	C-Max	None	None	None	Max	None	Max
Act Effct Green (s)	11.7	50.0	66.5	17.5	55.8	16.5	45.3	24.7	18.0	34.2	
Actuated g/C Ratio	0.10	0.42	0.55	0.15	0.46	0.14	0.38	0.21	0.15	0.28	
v/c Ratio	0.86	1.00	0.41	0.96	0.93	0.92	0.46	0.47	0.02	0.28	
Control Delay	63.9	45.5	1.7	75.9	27.4	77.3	14.9	37.2	43.8	8.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	63.9	45.5	1.7	75.9	27.4	77.3	14.9	37.2	43.8	8.5	
LOS	E	D	A	E	C	E	B	D	D	A	
Approach Delay		40.5			36.2				23.0		
Approach LOS		D			D				C		

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 108 (90%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 120	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.00	
Intersection Signal Delay: 39.2	Intersection LOS: D
Intersection Capacity Utilization 79.6%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 13: Buchanah Street /Buchanan Street & 48th Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	288	2120	446	478	2179	435	299	147	5	152
v/c Ratio	0.86	1.00	0.41	0.96	0.93	0.92	0.46	0.47	0.02	0.28
Control Delay	63.9	45.5	1.7	75.9	27.4	77.3	14.9	37.2	43.8	8.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.9	45.5	1.7	75.9	27.4	77.3	14.9	37.2	43.8	8.5
Queue Length 50th (ft)	112	~560	16	177	637	173	88	84	3	9
Queue Length 95th (ft)	m#152	m#694	m45	m#234	m699	#270	151	138	16	60
Internal Link Dist (ft)		420			1300				543	
Turn Bay Length (ft)	275		400	275		250	300	275		
Base Capacity (vph)	334	2118	1076	500	2352	472	656	310	279	548
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	1.00	0.41	0.96	0.93	0.92	0.46	0.47	0.02	0.28

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	265	1950	410	440	1910	95	400	0	275	135	5	140
Future Volume (veh/h)	265	1950	410	440	1910	95	400	0	275	135	5	140
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	288	2120	0	478	2076	103	435	0	0	147	5	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	337	2128		504	2317	115	475	433		372	281	
Arrive On Green	0.20	0.83	0.00	0.29	0.93	0.93	0.14	0.00	0.00	0.06	0.15	0.00
Sat Flow, veh/h	3456	5106	1585	3456	4984	246	3456	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	288	2120	0	478	1415	764	435	0	0	147	5	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1826	1728	1870	1585	1781	1870	1585
Q Serve(g_s), s	9.7	49.0	0.0	16.3	20.7	21.5	14.9	0.0	0.0	0.0	0.3	0.0
Cycle Q Clear(g_c), s	9.7	49.0	0.0	16.3	20.7	21.5	14.9	0.0	0.0	0.0	0.3	0.0
Prop In Lane	1.00		1.00	1.00		0.13	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	337	2128		504	1583	849	475	433		372	281	
V/C Ratio(X)	0.85	1.00		0.95	0.89	0.90	0.92	0.00		0.40	0.02	
Avail Cap(c_a), veh/h	337	2128		504	1583	849	475	433		372	281	
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.33	0.33	0.33	1.00	0.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	47.5	9.9	0.0	42.1	3.0	3.0	51.1	0.0	0.0	42.2	43.5	0.0
Incr Delay (d2), s/veh	18.8	18.7	0.0	12.8	3.0	5.6	22.4	0.0	0.0	0.7	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.7	7.5	0.0	6.8	2.1	2.9	7.9	0.0	0.0	3.9	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.3	28.6	0.0	54.9	6.0	8.6	73.5	0.0	0.0	42.9	43.6	0.0
LnGrp LOS	E	C		D	A	A	E	A		D	D	
Approach Vol, veh/h		2408			2657			435			152	
Approach Delay, s/veh		33.1			15.5			73.5			42.9	
Approach LOS		C			B			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.2	32.3	22.0	54.5	21.0	22.5	16.2	60.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	6.7	27.8	17.5	50.0	16.5	18.0	11.7	55.8
Max Q Clear Time (g_c+I1), s	2.0	0.0	18.3	51.0	16.9	2.3	11.7	23.5
Green Ext Time (p_c), s	0.1	0.0	0.0	0.0	0.0	0.0	0.0	22.2

Intersection Summary	
HCM 6th Ctrl Delay	28.2
HCM 6th LOS	C

Notes

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

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑	↱		↱
Traffic Vol, veh/h	0	2610	2355	90	0	140
Future Vol, veh/h	0	2610	2355	90	0	140
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	300	-	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	2837	2560	98	0	152

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1280
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	*359
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*359
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	22.2
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	359
HCM Lane V/C Ratio	-	-	-	0.424
HCM Control Delay (s)	-	-	-	22.2
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	2

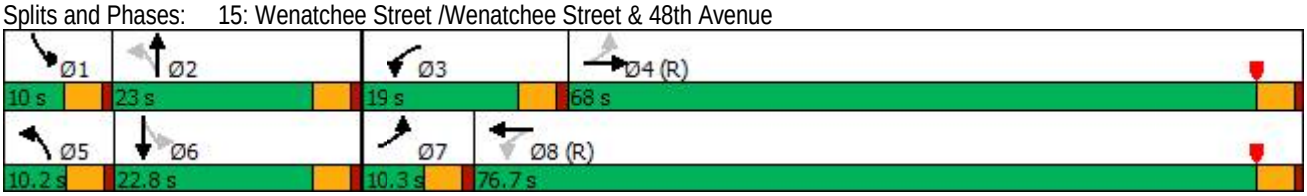
Notes

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

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	35	2240	175	1690	115	20	60	20
Future Volume (vph)	35	2240	175	1690	115	20	60	20
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	9.5	22.5	9.5	22.5
Total Split (s)	10.3	68.0	19.0	76.7	10.2	23.0	10.0	22.8
Total Split (%)	8.6%	56.7%	15.8%	63.9%	8.5%	19.2%	8.3%	19.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	Max	None	Max
Act Effct Green (s)	71.4	65.7	82.5	76.3	25.1	20.5	23.8	18.3
Actuated g/C Ratio	0.60	0.55	0.69	0.64	0.21	0.17	0.20	0.15
v/c Ratio	0.25	0.91	0.78	0.63	0.44	0.47	0.32	0.21
Control Delay	10.3	27.0	46.7	20.5	44.4	13.2	41.4	22.8
Queue Delay	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.3	27.3	46.7	20.5	44.4	13.2	41.4	22.8
LOS	B	C	D	C	D	B	D	C
Approach Delay		27.1		22.8		25.4		32.4
Approach LOS		C		C		C		C

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 25.3	Intersection LOS: C
Intersection Capacity Utilization 85.1%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 15: Wenatchee Street /Wenatchee Street & 48th Avenue



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	38	2533	190	2022	125	196	65	60
v/c Ratio	0.25	0.91	0.78	0.63	0.44	0.47	0.32	0.21
Control Delay	10.3	27.0	46.7	20.5	44.4	13.2	41.4	22.8
Queue Delay	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.3	27.3	46.7	20.5	44.4	13.2	41.4	22.8
Queue Length 50th (ft)	4	763	112	380	80	15	40	15
Queue Length 95th (ft)	m5	#801	m#188	426	136	85	79	55
Internal Link Dist (ft)		1340		538		422		321
Turn Bay Length (ft)	150		150		100		100	
Base Capacity (vph)	151	2770	275	3197	286	420	201	289
Starvation Cap Reductn	0	0	0	72	0	0	0	0
Spillback Cap Reductn	0	36	0	0	0	1	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.93	0.69	0.65	0.44	0.47	0.32	0.21

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	2240	90	175	1690	170	115	20	160	60	20	35
Future Volume (veh/h)	35	2240	90	175	1690	170	115	20	160	60	20	35
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	38	2435	98	190	1837	185	125	22	174	65	22	38
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	237	2962	118	245	2925	293	307	29	227	184	94	162
Arrive On Green	0.06	1.00	1.00	0.12	1.00	1.00	0.05	0.16	0.16	0.04	0.15	0.15
Sat Flow, veh/h	1781	5037	201	1781	4717	473	1781	181	1432	1781	616	1063
Grp Volume(v), veh/h	38	1640	893	190	1323	699	125	0	196	65	0	60
Grp Sat Flow(s),veh/h/ln	1781	1702	1834	1781	1702	1785	1781	0	1613	1781	0	1679
Q Serve(g_s), s	1.0	0.0	0.0	5.1	0.0	0.0	5.7	0.0	14.0	3.7	0.0	3.8
Cycle Q Clear(g_c), s	1.0	0.0	0.0	5.1	0.0	0.0	5.7	0.0	14.0	3.7	0.0	3.8
Prop In Lane	1.00		0.11	1.00		0.26	1.00		0.89	1.00		0.63
Lane Grp Cap(c), veh/h	237	2002	1079	245	2111	1107	307	0	255	184	0	256
V/C Ratio(X)	0.16	0.82	0.83	0.78	0.63	0.63	0.41	0.00	0.77	0.35	0.00	0.23
Avail Cap(c_a), veh/h	270	2002	1079	350	2111	1107	307	0	255	191	0	256
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.42	0.42	0.42	0.82	0.82	0.82	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.7	0.0	0.0	13.5	0.0	0.0	42.1	0.0	48.4	41.2	0.0	44.7
Incr Delay (d2), s/veh	0.1	1.7	3.2	5.6	1.2	2.3	0.9	0.0	19.7	1.2	0.0	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.5	1.0	2.3	0.3	0.7	0.1	0.0	7.0	1.7	0.0	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.8	1.7	3.2	19.1	1.2	2.3	43.0	0.0	68.1	42.4	0.0	46.8
LnGrp LOS	A	A	A	B	A	A	D	A	E	D	A	D
Approach Vol, veh/h		2571			2212			321			125	
Approach Delay, s/veh		2.3			3.0			58.3			44.5	
Approach LOS		A			A			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.5	23.5	11.9	75.1	10.2	22.8	8.1	78.9
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.5	18.5	14.5	63.5	5.7	18.3	5.8	72.2
Max Q Clear Time (g_c+I1), s	5.7	16.0	7.1	2.0	7.7	5.8	3.0	2.0
Green Ext Time (p_c), s	0.0	0.3	0.3	41.6	0.0	0.2	0.0	30.1

Intersection Summary	
HCM 6th Ctrl Delay	7.1
HCM 6th LOS	A

Intersection	
Int Delay, s/veh	2.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	105	425	10	90	380
Future Vol, veh/h	10	105	425	10	90	380
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	-	-	-	150	-
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	114	462	11	98	413

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1077	468	0	0	473	0
Stage 1	468	-	-	-	-	-
Stage 2	609	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	218	595	-	-	1089	-
Stage 1	630	-	-	-	-	-
Stage 2	566	-	-	-	-	-
Platoon blocked, %	1		-	-		-
Mov Cap-1 Maneuver	198	595	-	-	1089	-
Mov Cap-2 Maneuver	348	-	-	-	-	-
Stage 1	630	-	-	-	-	-
Stage 2	515	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.3	0	1.7
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	560	1089	-
HCM Lane V/C Ratio	-	-	0.223	0.09	-
HCM Control Delay (s)	-	-	13.3	8.6	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.8	0.3	-

Intersection	
Int Delay, s/veh	2.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	105	525	10	90	455
Future Vol, veh/h	10	105	525	10	90	455
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	-	-	-	150	-
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	114	571	11	98	495

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1268	577	0	0	582	0
Stage 1	577	-	-	-	-	-
Stage 2	691	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	144	516	-	-	992	-
Stage 1	562	-	-	-	-	-
Stage 2	511	-	-	-	-	-
Platoon blocked, %	1		-	-		-
Mov Cap-1 Maneuver	130	516	-	-	992	-
Mov Cap-2 Maneuver	289	-	-	-	-	-
Stage 1	562	-	-	-	-	-
Stage 2	460	-	-	-	-	-

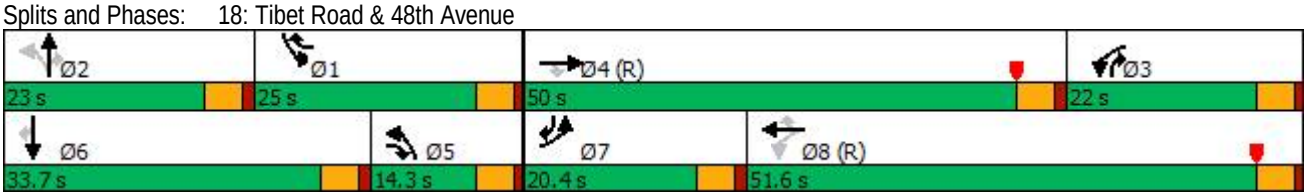
Approach	WB	NB	SB
HCM Control Delay, s	15	0	1.5
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	483	992	-
HCM Lane V/C Ratio	-	-	0.259	0.099	-
HCM Control Delay (s)	-	-	15	9	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	1	0.3	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	255	1575	150	275	1060	505	110	220	305	485	135	240
Future Volume (vph)	255	1575	150	275	1060	505	110	220	305	485	135	240
Turn Type	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA	pm+ov
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	7
Permitted Phases			4	8		8	2		2			6
Detector Phase	7	4	5	3	8	1	5	2	3	1	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5
Total Split (s)	20.4	50.0	14.3	22.0	51.6	25.0	14.3	23.0	22.0	25.0	33.7	20.4
Total Split (%)	17.0%	41.7%	11.9%	18.3%	43.0%	20.8%	11.9%	19.2%	18.3%	20.8%	28.1%	17.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	None	C-Max	None	None	Max	None	None	Max	None
Act Effct Green (s)	14.2	45.6	59.8	48.9	48.9	69.3	28.2	18.5	40.5	20.4	29.2	43.4
Actuated g/C Ratio	0.12	0.38	0.50	0.41	0.41	0.58	0.24	0.15	0.34	0.17	0.24	0.36
v/c Ratio	0.68	0.89	0.19	0.93	0.56	0.57	0.40	0.83	0.53	0.90	0.32	0.41
Control Delay	59.7	41.6	3.0	90.9	42.6	21.1	33.7	73.6	21.9	59.9	51.6	12.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.7	41.6	3.0	90.9	42.6	21.1	33.7	73.6	21.9	59.9	51.6	12.6
LOS	E	D	A	F	D	C	C	E	C	E	D	B
Approach Delay		41.0			43.9			41.8			45.4	
Approach LOS		D			D			D			D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 60 (50%), Referenced to phase 4:EBT and 8:WBTL, Start of Yellow	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.93	
Intersection Signal Delay: 42.8	Intersection LOS: D
Intersection Capacity Utilization 86.1%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 18: Tibet Road & 48th Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	277	1712	163	299	1152	549	120	239	332	527	147	261
v/c Ratio	0.68	0.89	0.19	0.93	0.56	0.57	0.40	0.83	0.53	0.90	0.32	0.41
Control Delay	59.7	41.6	3.0	90.9	42.6	21.1	33.7	73.6	21.9	59.9	51.6	12.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.7	41.6	3.0	90.9	42.6	21.1	33.7	73.6	21.9	59.9	51.6	12.6
Queue Length 50th (ft)	107	450	0	232	335	228	63	182	119	209	84	36
Queue Length 95th (ft)	152	518	35	#410	385	363	109	#317	213	#289	169	131
Internal Link Dist (ft)		947			1340			509			857	
Turn Bay Length (ft)	275		300	275		275	275		100	275		150
Base Capacity (vph)	454	1931	860	320	2072	960	298	287	624	586	453	656
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.89	0.19	0.93	0.56	0.57	0.40	0.83	0.53	0.90	0.32	0.40

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	255	1575	150	275	1060	505	110	220	305	485	135	240
Future Volume (veh/h)	255	1575	150	275	1060	505	110	220	305	485	135	240
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	277	1712	163	299	1152	549	120	239	332	527	147	261
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	340	1936	727	335	2187	947	280	288	479	584	455	542
Arrive On Green	0.10	0.38	0.38	0.05	0.14	0.14	0.08	0.15	0.15	0.06	0.08	0.08
Sat Flow, veh/h	3456	5106	1585	1781	5106	1585	1781	1870	1585	3456	1870	1585
Grp Volume(v), veh/h	277	1712	163	299	1152	549	120	239	332	527	147	261
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1781	1702	1585	1781	1870	1585	1728	1870	1585
Q Serve(g_s), s	9.4	37.6	0.0	15.1	25.1	12.1	0.0	14.9	4.5	18.2	8.9	11.8
Cycle Q Clear(g_c), s	9.4	37.6	0.0	15.1	25.1	12.1	0.0	14.9	4.5	18.2	8.9	11.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	340	1936	727	335	2187	947	280	288	479	584	455	542
V/C Ratio(X)	0.81	0.88	0.22	0.89	0.53	0.58	0.43	0.83	0.69	0.90	0.32	0.48
Avail Cap(c_a), veh/h	458	1936	727	335	2187	947	284	288	479	590	455	542
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	0.75	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.0	34.8	19.6	53.9	40.2	10.9	47.7	49.2	37.0	55.7	45.8	20.4
Incr Delay (d2), s/veh	8.0	6.3	0.7	19.7	0.7	1.9	1.0	23.2	8.1	17.1	1.9	3.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.5	16.4	2.9	11.4	11.6	6.5	3.4	8.8	9.6	9.9	4.6	5.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	61.0	41.1	20.3	73.6	40.9	12.8	48.7	72.4	45.0	72.8	47.7	23.5
LnGrp LOS	E	D	C	E	D	B	D	E	D	E	D	C
Approach Vol, veh/h		2152			2000			691			935	
Approach Delay, s/veh		42.1			38.1			55.2			55.1	
Approach LOS		D			D			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.8	23.0	22.2	50.0	14.1	33.7	16.3	55.9
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	20.5	18.5	17.5	45.5	9.8	29.2	15.9	47.1
Max Q Clear Time (g_c+I1), s	20.2	16.9	17.1	39.6	2.0	13.8	11.4	27.1
Green Ext Time (p_c), s	0.1	0.5	0.0	4.9	0.2	1.5	0.4	10.8

Intersection Summary	
HCM 6th Ctrl Delay	44.4
HCM 6th LOS	D

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	0	15	20	0	15	5	860	110	80	820	5
Future Vol, veh/h	5	0	15	20	0	15	5	860	110	80	820	5
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	150	-	150	150	-	-
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	5	0	16	22	0	16	5	935	120	87	891	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1546	2133	448	1565	2015	468	896	0	0	1055	0	0
Stage 1	1068	1068	-	945	945	-	-	-	-	-	-	-
Stage 2	478	1065	-	620	1070	-	-	-	-	-	-	-
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	*430	110	*737	*430	*161	*737	*1102	-	-	980	-	-
Stage 1	*562	520	-	*695	*609	-	-	-	-	-	-	-
Stage 2	*695	522	-	*695	*518	-	-	-	-	-	-	-
Platoon blocked, %	1	1	1	1	1	1	1	-	-	1	-	-
Mov Cap-1 Maneuver	*390	100	*737	*390	*146	*737	*1102	-	-	980	-	-
Mov Cap-2 Maneuver	*390	100	-	*390	*146	-	-	-	-	-	-	-
Stage 1	*559	474	-	*691	*606	-	-	-	-	-	-	-
Stage 2	*676	520	-	*619	*472	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.2	12.7	0	0.8
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	* 1102	-	-	603	390	737	980	-	-
HCM Lane V/C Ratio	0.005	-	-	0.036	0.056	0.022	0.089	-	-
HCM Control Delay (s)	8.3	-	-	11.2	14.8	10	9	-	-
HCM Lane LOS	A	-	-	B	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.2	0.1	0.3	-	-

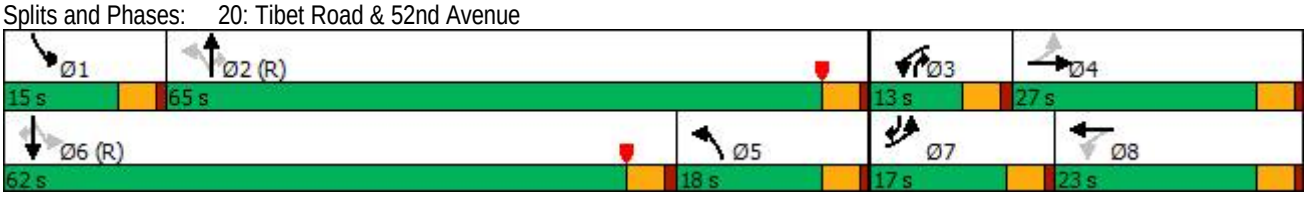
Notes

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

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	95	0	20	0	115	655	110	80	765	100
Future Volume (vph)	95	0	20	0	115	655	110	80	765	100
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	7	4	3	8	5	2	3	1	6	7
Permitted Phases	4		8		2		2	6		6
Detector Phase	7	4	3	8	5	2	3	1	6	7
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	9.5	22.5	9.5	9.5	22.5	9.5
Total Split (s)	17.0	27.0	13.0	23.0	18.0	65.0	13.0	15.0	62.0	17.0
Total Split (%)	14.2%	22.5%	10.8%	19.2%	15.0%	54.2%	10.8%	12.5%	51.7%	14.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	None	None	C-Max	None
Act Effct Green (s)	18.6	7.3	9.1	5.5	79.9	79.9	91.2	74.3	74.3	91.7
Actuated g/C Ratio	0.16	0.06	0.08	0.05	0.67	0.67	0.76	0.62	0.62	0.76
v/c Ratio	0.41	0.27	0.16	0.04	0.23	0.30	0.10	0.20	0.38	0.09
Control Delay	49.7	1.5	47.0	0.2	10.8	9.5	2.4	10.9	12.4	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.7	1.5	47.0	0.2	10.8	9.5	2.4	10.9	12.4	0.7
LOS	D	A	D	A	B	A	A	B	B	A
Approach Delay		23.2		27.3		8.8			11.0	
Approach LOS		C		C		A			B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.41	
Intersection Signal Delay: 11.6	Intersection LOS: B
Intersection Capacity Utilization 50.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 20: Tibet Road & 52nd Avenue



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	103	125	22	16	125	712	120	87	832	109
v/c Ratio	0.41	0.27	0.16	0.04	0.23	0.30	0.10	0.20	0.38	0.09
Control Delay	49.7	1.5	47.0	0.2	10.8	9.5	2.4	10.9	12.4	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.7	1.5	47.0	0.2	10.8	9.5	2.4	10.9	12.4	0.7
Queue Length 50th (ft)	74	0	17	0	29	109	6	24	150	0
Queue Length 95th (ft)	123	0	38	0	m58	m166	m14	51	216	9
Internal Link Dist (ft)		437		683		1723			253	
Turn Bay Length (ft)	150		150		150		150	150		150
Base Capacity (vph)	252	608	159	539	548	2355	1252	466	2191	1235
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.21	0.14	0.03	0.23	0.30	0.10	0.19	0.38	0.09

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	95	0	115	20	0	15	115	655	110	80	765	100
Future Volume (veh/h)	95	0	115	20	0	15	115	655	110	80	765	100
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	103	0	125	22	0	16	125	712	120	87	832	109
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	239	0	155	124	0	81	689	2445	1125	384	1703	867
Arrive On Green	0.07	0.00	0.10	0.02	0.00	0.05	0.33	0.92	0.92	0.04	0.48	0.48
Sat Flow, veh/h	1781	0	1585	1781	0	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	103	0	125	22	0	16	125	712	120	87	832	109
Grp Sat Flow(s),veh/h/ln	1781	0	1585	1781	0	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	6.4	0.0	9.3	1.4	0.0	1.2	0.0	2.8	0.8	3.3	19.1	0.8
Cycle Q Clear(g_c), s	6.4	0.0	9.3	1.4	0.0	1.2	0.0	2.8	0.8	3.3	19.1	0.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	239	0	155	124	0	81	689	2445	1125	384	1703	867
V/C Ratio(X)	0.43	0.00	0.81	0.18	0.00	0.20	0.18	0.29	0.11	0.23	0.49	0.13
Avail Cap(c_a), veh/h	304	0	297	212	0	244	689	2445	1125	464	1703	867
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	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	47.6	0.0	53.0	52.3	0.0	54.6	13.0	1.7	1.4	18.6	21.3	5.9
Incr Delay (d2), s/veh	1.2	0.0	9.5	0.7	0.0	1.2	0.1	0.3	0.2	0.3	1.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	0.0	4.1	0.6	0.0	0.5	1.7	0.9	0.3	1.4	8.1	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	48.8	0.0	62.5	52.9	0.0	55.7	13.1	2.0	1.6	18.9	22.3	6.2
LnGrp LOS	D	A	E	D	A	E	B	A	A	B	C	A
Approach Vol, veh/h		228			38			957			1028	
Approach Delay, s/veh		56.3			54.1			3.4			20.3	
Approach LOS		E			D			A			C	

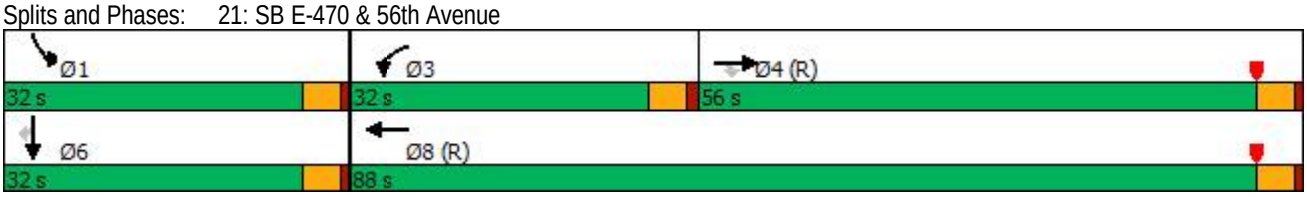
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	87.1	7.1	16.2	34.7	62.0	12.7	10.7
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	10.5	60.5	8.5	22.5	13.5	57.5	12.5	18.5
Max Q Clear Time (g_c+I1), s	5.3	4.8	3.4	11.3	2.0	21.1	8.4	3.2
Green Ext Time (p_c), s	0.1	6.4	0.0	0.5	0.2	7.4	0.1	0.0

Intersection Summary	
HCM 6th Ctrl Delay	17.3
HCM 6th LOS	B

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	1055	165	320	1190	270	0	130
Future Volume (vph)	1055	165	320	1190	270	0	130
Turn Type	NA	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	4		3	8	1	6	
Permitted Phases		4					6
Detector Phase	4	4	3	8	1	6	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	9.5	22.5	9.5	22.5	22.5
Total Split (s)	56.0	56.0	32.0	88.0	32.0	32.0	32.0
Total Split (%)	46.7%	46.7%	26.7%	73.3%	26.7%	26.7%	26.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lag	Lead				
Lead-Lag Optimize?	Yes	Yes	Yes				
Recall Mode	C-Max	C-Max	None	C-Max	None	Max	Max
Act Effct Green (s)	61.6	61.6	17.4	83.5	27.5	27.5	27.5
Actuated g/C Ratio	0.51	0.51	0.14	0.70	0.23	0.23	0.23
v/c Ratio	0.44	0.20	0.70	0.37	0.38	0.38	0.32
Control Delay	19.4	3.0	79.9	2.0	49.3	49.3	23.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.4	3.0	79.9	2.0	49.3	49.3	23.9
LOS	B	A	E	A	D	D	C
Approach Delay	17.2			18.5		41.1	
Approach LOS	B			B		D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 117 (98%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 20.9	Intersection LOS: C
Intersection Capacity Utilization 48.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 21: SB E-470 & 56th Avenue



Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	1147	179	348	1293	146	147	141
v/c Ratio	0.44	0.20	0.70	0.37	0.38	0.38	0.32
Control Delay	19.4	3.0	79.9	2.0	49.3	49.3	23.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.4	3.0	79.9	2.0	49.3	49.3	23.9
Queue Length 50th (ft)	197	0	135	35	111	112	39
Queue Length 95th (ft)	254	38	163	37	182	182	97
Internal Link Dist (ft)	4670			560		1605	
Turn Bay Length (ft)		275	275		400		400
Base Capacity (vph)	2609	899	786	3538	385	385	434
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.20	0.44	0.37	0.38	0.38	0.32

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1055	165	320	1190	0	0	0	0	270	0	130
Future Volume (veh/h)	0	1055	165	320	1190	0	0	0	0	270	0	130
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0				1870	1870	1870
Adj Flow Rate, veh/h	0	1147	0	348	1293	0				293	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	3362		431	4190	0				372	0	
Arrive On Green	0.00	0.66	0.00	0.04	0.27	0.00				0.10	0.00	0.00
Sat Flow, veh/h	0	5274	1585	3456	5274	0				3563	0	1585
Grp Volume(v), veh/h	0	1147	0	348	1293	0				293	0	0
Grp Sat Flow(s),veh/h/ln	0	1702	1585	1728	1702	0				1781	0	1585
Q Serve(g_s), s	0.0	11.9	0.0	12.0	24.2	0.0				9.6	0.0	0.0
Cycle Q Clear(g_c), s	0.0	11.9	0.0	12.0	24.2	0.0				9.6	0.0	0.0
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	3362		431	4190	0				372	0	
V/C Ratio(X)	0.00	0.34		0.81	0.31	0.00				0.79	0.00	
Avail Cap(c_a), veh/h	0	3362		792	4190	0				816	0	
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	0.79	0.79	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	9.0	0.0	56.1	16.7	0.0				52.4	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.3	0.0	2.9	0.2	0.0				3.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.9	0.0	5.7	11.0	0.0				4.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	9.3	0.0	59.0	16.8	0.0				56.2	0.0	0.0
LnGrp LOS	A	A		E	B	A				E	A	
Approach Vol, veh/h		1147			1641						293	
Approach Delay, s/veh		9.3			25.8						56.2	
Approach LOS		A			C						E	

Timer - Assigned Phs		3	4		6		8					
Phs Duration (G+Y+Rc), s		19.5	83.5		17.0		103.0					
Change Period (Y+Rc), s		4.5	4.5		4.5		4.5					
Max Green Setting (Gmax), s		27.5	51.5		27.5		83.5					
Max Q Clear Time (g_c+I1), s		14.0	13.9		11.6		26.2					
Green Ext Time (p_c), s		1.0	9.2		0.9		11.6					

Intersection Summary	
HCM 6th Ctrl Delay	22.5
HCM 6th LOS	C

Notes

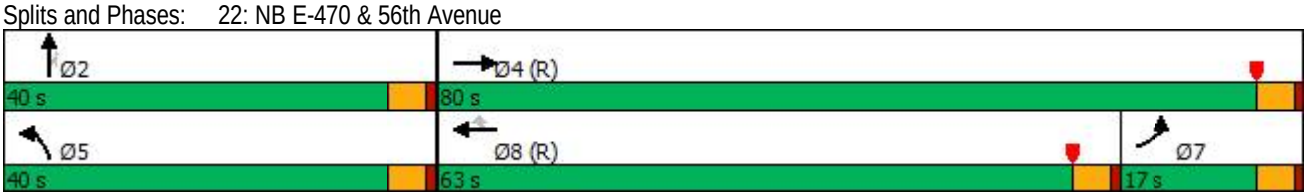
User approved volume balancing among the lanes for turning movement.

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

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Configurations							
Traffic Volume (vph)	135	1185	1375	245	140	0	245
Future Volume (vph)	135	1185	1375	245	140	0	245
Turn Type	Prot	NA	NA	Perm	Prot	NA	Perm
Protected Phases	7	4	8		5	2	
Permitted Phases				8			2
Detector Phase	7	4	8	8	5	2	2
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	17.0	80.0	63.0	63.0	40.0	40.0	40.0
Total Split (%)	14.2%	66.7%	52.5%	52.5%	33.3%	33.3%	33.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag		Lead	Lead			
Lead-Lag Optimize?	Yes		Yes	Yes			
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None
Act Effct Green (s)	12.5	75.5	58.5	58.5	29.7	28.4	35.5
Actuated g/C Ratio	0.10	0.63	0.49	0.49	0.25	0.24	0.30
v/c Ratio	0.41	0.40	0.60	0.29	0.18	0.19	0.51
Control Delay	45.5	9.2	21.5	1.8	12.1	11.1	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.5	9.2	21.5	1.8	12.1	11.1	6.7
LOS	D	A	C	A	B	B	A
Approach Delay		12.9	18.6			8.5	
Approach LOS		B	B			A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 96 (80%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.60	
Intersection Signal Delay: 15.2	Intersection LOS: B
Intersection Capacity Utilization 48.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 22: NB E-470 & 56th Avenue



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	147	1288	1495	266	76	76	266
v/c Ratio	0.41	0.40	0.60	0.29	0.18	0.19	0.51
Control Delay	45.5	9.2	21.5	1.8	12.1	11.1	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.5	9.2	21.5	1.8	12.1	11.1	6.7
Queue Length 50th (ft)	57	116	310	0	14	14	11
Queue Length 95th (ft)	91	130	360	19	24	24	22
Internal Link Dist (ft)		560	670			1780	
Turn Bay Length (ft)	175			275	275		300
Base Capacity (vph)	357	3199	2478	908	497	398	518
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.40	0.60	0.29	0.15	0.19	0.51

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	135	1185	0	0	1375	245	140	0	245	0	0	0
Future Volume (veh/h)	135	1185	0	0	1375	245	140	0	245	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1870	1870	1870	1870	1870			
Adj Flow Rate, veh/h	147	1288	0	0	1495	0	152	0	0			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	1167	4406	0	0	2489		222	0				
Arrive On Green	0.11	0.28	0.00	0.00	0.98	0.00	0.06	0.00	0.00			
Sat Flow, veh/h	3456	5274	0	0	5274	1585	3563	0	1585			
Grp Volume(v), veh/h	147	1288	0	0	1495	0	152	0	0			
Grp Sat Flow(s),veh/h/ln	1728	1702	0	0	1702	1585	1781	0	1585			
Q Serve(g_s), s	4.6	23.6	0.0	0.0	2.1	0.0	5.0	0.0	0.0			
Cycle Q Clear(g_c), s	4.6	23.6	0.0	0.0	2.1	0.0	5.0	0.0	0.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	1167	4406	0	0	2489		222	0				
V/C Ratio(X)	0.13	0.29	0.00	0.00	0.60		0.69	0.00				
Avail Cap(c_a), veh/h	1167	4406	0	0	2489		1054	0				
HCM Platoon Ratio	0.33	0.33	1.00	1.00	2.00	2.00	1.00	1.00	1.00			
Upstream Filter(I)	0.90	0.90	0.00	0.00	0.92	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	37.3	14.3	0.0	0.0	0.8	0.0	55.1	0.0	0.0			
Incr Delay (d2), s/veh	0.0	0.2	0.0	0.0	1.0	0.0	3.7	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.9	10.7	0.0	0.0	0.6	0.0	2.4	0.0	0.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.4	14.5	0.0	0.0	1.8	0.0	58.9	0.0	0.0			
LnGrp LOS	D	B	A	A	A		E	A				
Approach Vol, veh/h		1435			1495			152				
Approach Delay, s/veh		16.8			1.8			58.9				
Approach LOS		B			A			E				

Timer - Assigned Phs	2	4	7	8
Phs Duration (G+Y+Rc), s	12.0	108.0	45.0	63.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	35.5	75.5	12.5	58.5
Max Q Clear Time (g_c+I1), s	7.0	25.6	6.6	4.1
Green Ext Time (p_c), s	0.5	11.4	0.2	14.7

Intersection Summary	
HCM 6th Ctrl Delay	11.6
HCM 6th LOS	B

Notes

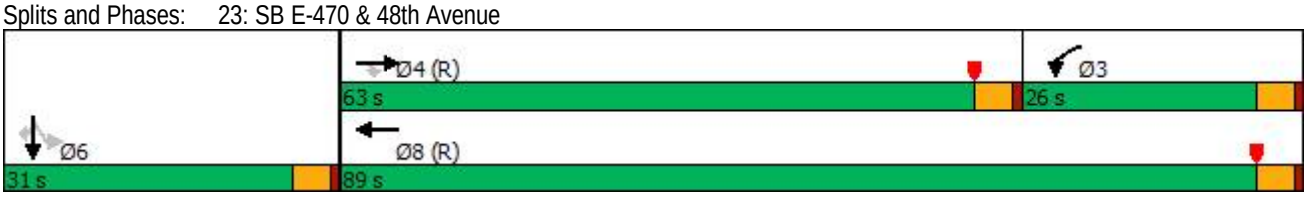
User approved volume balancing among the lanes for turning movement.

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

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	1990	465	460	1790	320	0	245
Future Volume (vph)	1990	465	460	1790	320	0	245
Turn Type	NA	Perm	Prot	NA	Perm	NA	Perm
Protected Phases	4		3	8		6	
Permitted Phases		4			6		6
Detector Phase	4	4	3	8	6	6	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	9.5	22.5	22.5	22.5	22.5
Total Split (s)	63.0	63.0	26.0	89.0	31.0	31.0	31.0
Total Split (%)	52.5%	52.5%	21.7%	74.2%	25.8%	25.8%	25.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes				
Recall Mode	C-Max	C-Max	None	C-Max	None	None	None
Act Effct Green (s)	63.5	63.5	21.5	89.5	21.5	21.5	21.5
Actuated g/C Ratio	0.53	0.53	0.18	0.75	0.18	0.18	0.18
v/c Ratio	0.80	0.48	0.81	0.51	0.58	0.58	0.81
Control Delay	21.2	6.2	31.3	3.1	42.2	42.2	43.4
Queue Delay	0.4	0.2	0.0	0.0	0.0	0.0	0.0
Total Delay	21.5	6.4	31.3	3.2	42.2	42.2	43.4
LOS	C	A	C	A	D	D	D
Approach Delay	18.7			8.9		42.7	
Approach LOS	B			A		D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 108 (90%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 17.1	Intersection LOS: B
Intersection Capacity Utilization 81.8%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 23: SB E-470 & 48th Avenue



Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	2163	505	500	1946	174	174	266
v/c Ratio	0.80	0.48	0.81	0.51	0.58	0.58	0.81
Control Delay	21.2	6.2	31.3	3.1	42.2	42.2	43.4
Queue Delay	0.4	0.2	0.0	0.0	0.0	0.0	0.0
Total Delay	21.5	6.4	31.3	3.2	42.2	42.2	43.4
Queue Length 50th (ft)	262	75	171	70	124	124	151
Queue Length 95th (ft)	319	m97	m181	m79	m175	m175	m185
Internal Link Dist (ft)	538			585		1090	
Turn Bay Length (ft)		275	275		275		300
Base Capacity (vph)	2690	1048	615	3792	371	371	392
Starvation Cap Reductn	141	126	0	327	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.55	0.81	0.56	0.47	0.47	0.68

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1990	465	460	1790	0	0	0	0	320	0	245
Future Volume (veh/h)	0	1990	465	460	1790	0	0	0	0	320	0	245
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0				1870	1870	1870
Adj Flow Rate, veh/h	0	2163	0	500	1946	0				348	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	2489		961	4100	0				434	0	
Arrive On Green	0.00	0.98	0.00	0.09	0.27	0.00				0.04	0.00	0.00
Sat Flow, veh/h	0	5274	1585	3456	5274	0				3563	0	1585
Grp Volume(v), veh/h	0	2163	0	500	1946	0				348	0	0
Grp Sat Flow(s),veh/h/ln	0	1702	1585	1728	1702	0				1781	0	1585
Q Serve(g_s), s	0.0	8.3	0.0	16.6	38.4	0.0				11.6	0.0	0.0
Cycle Q Clear(g_c), s	0.0	8.3	0.0	16.6	38.4	0.0				11.6	0.0	0.0
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2489		961	4100	0				434	0	
V/C Ratio(X)	0.00	0.87		0.52	0.47	0.00				0.80	0.00	
Avail Cap(c_a), veh/h	0	2489		961	4100	0				787	0	
HCM Platoon Ratio	1.00	2.00	2.00	0.33	0.33	1.00				0.33	0.33	0.33
Upstream Filter(I)	0.00	0.31	0.00	0.29	0.29	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.9	0.0	46.9	22.8	0.0				56.1	0.0	0.0
Incr Delay (d2), s/veh	0.0	1.5	0.0	0.1	0.1	0.0				3.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.8	0.0	7.7	17.6	0.0				5.8	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	2.3	0.0	47.0	22.9	0.0				59.6	0.0	0.0
LnGrp LOS	A	A		D	C	A				E	A	
Approach Vol, veh/h		2163			2446						348	
Approach Delay, s/veh		2.3			27.9						59.6	
Approach LOS		A			C						E	

Timer - Assigned Phs		3	4		6		8					
Phs Duration (G+Y+Rc), s		37.9	63.0		19.1		100.9					
Change Period (Y+Rc), s		4.5	4.5		4.5		4.5					
Max Green Setting (Gmax), s		21.5	58.5		26.5		84.5					
Max Q Clear Time (g_c+I1), s		18.6	10.3		13.6		40.4					
Green Ext Time (p_c), s		0.6	29.7		1.0		24.2					

Intersection Summary	
HCM 6th Ctrl Delay	18.9
HCM 6th LOS	B

Notes

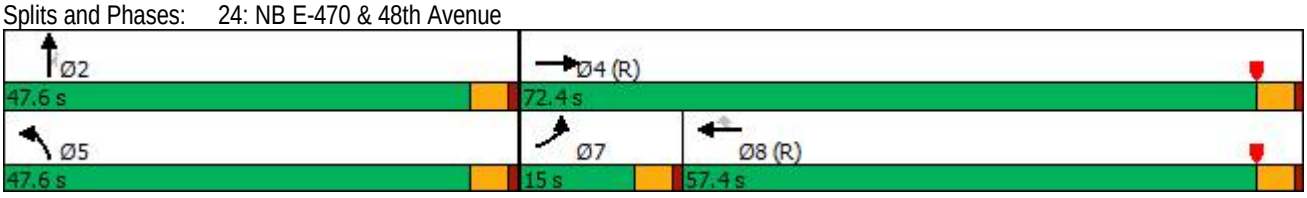
User approved volume balancing among the lanes for turning movement.

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

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Configurations							
Traffic Volume (vph)	245	2065	1975	520	270	0	555
Future Volume (vph)	245	2065	1975	520	270	0	555
Turn Type	Prot	NA	NA	Perm	Prot	NA	Perm
Protected Phases	7	4	8		5	2	
Permitted Phases				8			2
Detector Phase	7	4	8	8	5	2	2
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	15.0	72.4	57.4	57.4	47.6	47.6	47.6
Total Split (%)	12.5%	60.3%	47.8%	47.8%	39.7%	39.7%	39.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead		Lag	Lag			
Lead-Lag Optimize?	Yes		Yes	Yes			
Recall Mode	None	C-Max	C-Max	C-Max	None	Max	Max
Act Effct Green (s)	10.5	67.9	52.9	52.9	43.1	43.1	43.1
Actuated g/C Ratio	0.09	0.57	0.44	0.44	0.36	0.36	0.36
v/c Ratio	0.89	0.78	0.96	0.59	0.24	0.24	1.00
Control Delay	90.1	6.5	24.0	3.2	43.4	43.4	81.9
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Total Delay	90.1	6.7	24.0	3.2	43.4	43.4	81.9
LOS	F	A	C	A	D	D	F
Approach Delay		15.5	19.7			69.3	
Approach LOS		B	B			E	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.00	
Intersection Signal Delay: 25.2	Intersection LOS: C
Intersection Capacity Utilization 81.8%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 24: NB E-470 & 48th Avenue



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	266	2245	2147	565	146	147	603
v/c Ratio	0.89	0.78	0.96	0.59	0.24	0.24	1.00
Control Delay	90.1	6.5	24.0	3.2	43.4	43.4	81.9
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Total Delay	90.1	6.7	24.0	3.2	43.4	43.4	81.9
Queue Length 50th (ft)	110	123	311	19	100	101	370
Queue Length 95th (ft)	m#160	131	#686	m50	m144	m144	#687
Internal Link Dist (ft)		585	565			1471	
Turn Bay Length (ft)	225			275	225		225
Base Capacity (vph)	300	2877	2241	956	603	603	603
Starvation Cap Reductn	0	86	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.89	0.80	0.96	0.59	0.24	0.24	1.00

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	245	2065	0	0	1975	520	270	0	555	0	0	0
Future Volume (veh/h)	245	2065	0	0	1975	520	270	0	555	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1870	1870	1870	1870	1870			
Adj Flow Rate, veh/h	266	2245	0	0	2147	0	293	0	0			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	302	4184	0	0	3546		376	0				
Arrive On Green	0.03	0.27	0.00	0.00	0.92	0.00	0.11	0.00	0.00			
Sat Flow, veh/h	3456	5274	0	0	5274	1585	3563	0	1585			
Grp Volume(v), veh/h	266	2245	0	0	2147	0	293	0	0			
Grp Sat Flow(s),veh/h/ln	1728	1702	0	0	1702	1585	1781	0	1585			
Q Serve(g_s), s	9.2	45.0	0.0	0.0	8.7	0.0	9.6	0.0	0.0			
Cycle Q Clear(g_c), s	9.2	45.0	0.0	0.0	8.7	0.0	9.6	0.0	0.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	302	4184	0	0	3546		376	0				
V/C Ratio(X)	0.88	0.54	0.00	0.00	0.61		0.78	0.00				
Avail Cap(c_a), veh/h	302	4184	0	0	3546		1280	0				
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.33	1.33	1.00	1.00	1.00			
Upstream Filter(I)	0.52	0.52	0.00	0.00	1.00	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	57.6	24.3	0.0	0.0	1.7	0.0	52.3	0.0	0.0			
Incr Delay (d2), s/veh	14.5	0.3	0.0	0.0	0.8	0.0	3.5	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	4.9	20.6	0.0	0.0	1.7	0.0	4.5	0.0	0.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	72.1	24.6	0.0	0.0	2.5	0.0	55.8	0.0	0.0			
LnGrp LOS	E	C	A	A	A		E	A				
Approach Vol, veh/h		2511			2147			293				
Approach Delay, s/veh		29.6			2.5			55.8				
Approach LOS		C			A			E				

Timer - Assigned Phs	2	4	7	8
Phs Duration (G+Y+Rc), s	17.2	102.8	15.0	87.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	43.1	67.9	10.5	52.9
Max Q Clear Time (g_c+I1), s	11.6	47.0	11.2	10.7
Green Ext Time (p_c), s	1.0	16.8	0.0	27.1

Intersection Summary	
HCM 6th Ctrl Delay	19.4
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

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

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	15	15	30	10	50	20	750	10	20	640	15
Future Vol, veh/h	25	15	15	30	10	50	20	750	10	20	640	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	-	-	-	-	-	-	150	-	-	150	-	-
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	27	16	16	33	11	54	22	815	11	22	696	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1205	1618	356	1265	1621	413	712	0	0	826	0	0
Stage 1	748	748	-	865	865	-	-	-	-	-	-	-
Stage 2	457	870	-	400	756	-	-	-	-	-	-	-
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	283	145	*815	*248	144	588	*1219	-	-	800	-	-
Stage 1	762	669	-	*315	369	-	-	-	-	-	-	-
Stage 2	553	367	-	*768	662	-	-	-	-	-	-	-
Platoon blocked, %	1	1	1	1	1		1	-	-		-	-
Mov Cap-1 Maneuver	233	139	*815	*213	138	588	*1219	-	-	800	-	-
Mov Cap-2 Maneuver	233	139	-	*213	138	-	-	-	-	-	-	-
Stage 1	749	651	-	*309	362	-	-	-	-	-	-	-
Stage 2	478	360	-	*714	644	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	25.5	22.5	0.2	0.3
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	* 1219	-	-	235	302	800	-	-
HCM Lane V/C Ratio	0.018	-	-	0.254	0.324	0.027	-	-
HCM Control Delay (s)	8	-	-	25.5	22.5	9.6	-	-
HCM Lane LOS	A	-	-	D	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	1	1.4	0.1	-	-

Notes

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

Intersection	
Int Delay, s/veh	9.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	55	85	80	40	0	0	0	0	30	700	25
Future Vol, veh/h	0	55	85	80	40	0	0	0	0	30	700	25
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	-	-	-	-	-	-	-	-	-	-	-	-
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	0	60	92	87	43	0	0	0	0	33	761	27

Major/Minor	Minor2			Minor1					Major2		
Conflicting Flow All	-	841	775	917	854	-			0	0	0
Stage 1	-	841	-	0	0	-			-	-	-
Stage 2	-	0	-	917	854	-			-	-	-
Critical Hdwy	-	6.52	6.22	7.12	6.52	-			4.12	-	-
Critical Hdwy Stg 1	-	5.52	-	-	-	-			-	-	-
Critical Hdwy Stg 2	-	-	-	6.12	5.52	-			-	-	-
Follow-up Hdwy	-	4.018	3.318	3.518	4.018	-			2.218	-	-
Pot Cap-1 Maneuver	0	301	398	253	296	0			-	-	-
Stage 1	0	380	-	-	-	0			-	-	-
Stage 2	0	-	-	326	375	0			-	-	-
Platoon blocked, %										-	-
Mov Cap-1 Maneuver	-	301	398	165	296	-			-	-	-
Mov Cap-2 Maneuver	-	301	-	165	296	-			-	-	-
Stage 1	-	380	-	-	-	-			-	-	-
Stage 2	-	-	-	211	375	-			-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	22.7	55	
HCM LOS	C	F	

Minor Lane/Major Mvmt	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	353	194	-	-	-
HCM Lane V/C Ratio	0.431	0.672	-	-	-
HCM Control Delay (s)	22.7	55	-	-	-
HCM Lane LOS	C	F	-	-	-
HCM 95th %tile Q(veh)	2.1	4.1	-	-	-

Intersection	
Int Delay, s/veh	5.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	45	35	0	0	80	55	35	630	35	0	0	0
Future Vol, veh/h	45	35	0	0	80	55	35	630	35	0	0	0
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	-	-	-	-	-	-	-	-	-	-	-	-
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	49	38	0	0	87	60	38	685	38	0	0	0

Major/Minor	Minor2		Minor1		Major1				
Conflicting Flow All	854	799	-	-	780	704	0	0	0
Stage 1	0	0	-	-	780	-	-	-	-
Stage 2	854	799	-	-	0	-	-	-	-
Critical Hdwy	7.12	6.52	-	-	6.52	6.22	4.12	-	-
Critical Hdwy Stg 1	-	-	-	-	5.52	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	-	-	4.018	3.318	2.218	-	-
Pot Cap-1 Maneuver	279	319	0	0	327	437	-	-	-
Stage 1	-	-	0	0	406	-	-	-	-
Stage 2	353	398	0	0	-	-	-	-	-
Platoon blocked, %								-	-
Mov Cap-1 Maneuver	191	319	-	-	327	437	-	-	-
Mov Cap-2 Maneuver	191	319	-	-	327	-	-	-	-
Stage 1	-	-	-	-	406	-	-	-	-
Stage 2	239	398	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	29.5	21.4	
HCM LOS	D	C	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1
Capacity (veh/h)	-	-	-	232	364
HCM Lane V/C Ratio	-	-	-	0.375	0.403
HCM Control Delay (s)	-	-	-	29.5	21.4
HCM Lane LOS	-	-	-	D	C
HCM 95th %tile Q(veh)	-	-	-	1.6	1.9

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	10	20	30	10	45	20	800	10	20	625	20
Future Vol, veh/h	30	10	20	30	10	45	20	800	10	20	625	20
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	-	-	-	-	-	-	150	-	-	150	-	-
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	33	11	22	33	11	49	22	870	11	22	679	22

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1219	1659	351	1309	1665	441	701	0	0	881	0	0
Stage 1	734	734	-	920	920	-	-	-	-	-	-	-
Stage 2	485	925	-	389	745	-	-	-	-	-	-	-
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	250	129	*841	*207	127	564	1218	-	-	763	-	-
Stage 1	712	641	-	*292	348	-	-	-	-	-	-	-
Stage 2	532	346	-	*793	633	-	-	-	-	-	-	-
Platoon blocked, %	1	1	1	1	1		1	-	-		-	-
Mov Cap-1 Maneuver	205	123	*841	*181	121	564	1218	-	-	763	-	-
Mov Cap-2 Maneuver	205	123	-	*181	121	-	-	-	-	-	-	-
Stage 1	699	623	-	*287	342	-	-	-	-	-	-	-
Stage 2	462	340	-	*737	615	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	25.6	26.4	0.2	0.3
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1218	-	-	239	259	763	-	-
HCM Lane V/C Ratio	0.018	-	-	0.273	0.357	0.028	-	-
HCM Control Delay (s)	8	-	-	25.6	26.4	9.9	-	-
HCM Lane LOS	A	-	-	D	D	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	1.1	1.5	0.1	-	-

Notes

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

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Configurations					
Traffic Volume (vph)	1805	25	1720	115	25
Future Volume (vph)	1805	25	1720	115	25
Turn Type	NA	pm+pt	NA	Prot	Perm
Protected Phases	4	3	8	2	
Permitted Phases		8			2
Detector Phase	4	3	8	2	2
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	9.5	22.5	22.5	22.5
Total Split (s)	81.0	12.0	93.0	27.0	27.0
Total Split (%)	67.5%	10.0%	77.5%	22.5%	22.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	None
Act Effct Green (s)	90.9	97.2	97.2	13.8	13.8
Actuated g/C Ratio	0.76	0.81	0.81	0.12	0.12
v/c Ratio	0.56	0.16	0.45	0.62	0.13
Control Delay	12.6	4.7	4.1	63.1	17.0
Queue Delay	0.3	0.0	0.0	0.0	0.0
Total Delay	12.9	4.7	4.1	63.1	17.0
LOS	B	A	A	E	B
Approach Delay	12.9		4.1	54.9	
Approach LOS	B		A	D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBTL, Start of Yellow	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.62	
Intersection Signal Delay: 10.4	Intersection LOS: B
Intersection Capacity Utilization 52.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Drive 1 & 56th Avenue

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	2125	27	1870	125	27
v/c Ratio	0.56	0.16	0.45	0.62	0.13
Control Delay	12.6	4.7	4.1	63.1	17.0
Queue Delay	0.3	0.0	0.0	0.0	0.0
Total Delay	12.9	4.7	4.1	63.1	17.0
Queue Length 50th (ft)	537	3	126	94	0
Queue Length 95th (ft)	598	11	189	151	27
Internal Link Dist (ft)	670		1090	351	
Turn Bay Length (ft)		250		275	150
Base Capacity (vph)	3809	196	4120	331	318
Starvation Cap Reductn	892	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.73	0.14	0.45	0.38	0.08

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1805	150	25	1720	115	25
Future Volume (veh/h)	1805	150	25	1720	115	25
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
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	1962	163	27	1870	125	27
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	3726	308	252	4276	156	139
Arrive On Green	1.00	1.00	0.02	0.84	0.09	0.09
Sat Flow, veh/h	4974	397	1781	5274	1781	1585
Grp Volume(v), veh/h	1386	739	27	1870	125	27
Grp Sat Flow(s),veh/h/ln	1702	1799	1781	1702	1781	1585
Q Serve(g_s), s	0.0	0.0	0.3	11.3	8.3	1.9
Cycle Q Clear(g_c), s	0.0	0.0	0.3	11.3	8.3	1.9
Prop In Lane		0.22	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2639	1395	252	4276	156	139
V/C Ratio(X)	0.53	0.53	0.11	0.44	0.80	0.19
Avail Cap(c_a), veh/h	2639	1395	319	4276	334	297
HCM Platoon Ratio	1.33	1.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.78	0.78	0.90	0.90	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	2.1	2.5	53.7	50.8
Incr Delay (d2), s/veh	0.6	1.1	0.2	0.3	9.2	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.4	0.1	1.9	4.1	0.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.6	1.1	2.2	2.8	62.9	51.5
LnGrp LOS	A	A	A	A	E	D
Approach Vol, veh/h	2125			1897	152	
Approach Delay, s/veh	0.8			2.8	60.9	
Approach LOS	A			A	E	

Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		15.0	7.5	97.5		105.0
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		22.5	7.5	76.5		88.5
Max Q Clear Time (g_c+I1), s		10.3	2.3	2.0		13.3
Green Ext Time (p_c), s		0.3	0.0	28.5		23.7

Intersection Summary	
HCM 6th Ctrl Delay	3.9
HCM 6th LOS	A

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Configurations					
Traffic Volume (vph)	1675	40	1655	95	35
Future Volume (vph)	1675	40	1655	95	35
Turn Type	NA	pm+pt	NA	Prot	Perm
Protected Phases	4	3	8	2	
Permitted Phases		8			2
Detector Phase	4	3	8	2	2
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	9.5	22.5	22.5	22.5
Total Split (s)	96.8	9.5	96.8	23.2	23.2
Total Split (%)	74.7%	7.3%	74.7%	17.9%	17.9%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	None
Act Effct Green (s)	99.3	107.7	107.7	12.8	12.8
Actuated g/C Ratio	0.77	0.83	0.83	0.10	0.10
v/c Ratio	0.51	0.22	0.43	0.59	0.20
Control Delay	7.0	5.0	3.4	68.8	17.6
Queue Delay	0.0	0.0	0.3	0.0	0.0
Total Delay	7.0	5.0	3.7	68.8	17.6
LOS	A	A	A	E	B
Approach Delay	7.0		3.7	55.0	
Approach LOS	A		A	E	

Intersection Summary	
Cycle Length: 129.5	
Actuated Cycle Length: 129.5	
Offset: 94 (73%), Referenced to phase 4:EBT and 8:WBTL, Start of Yellow	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.59	
Intersection Signal Delay: 7.2	Intersection LOS: A
Intersection Capacity Utilization 48.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Drive 2 & 56th Avenue

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1979	43	1799	103	38
v/c Ratio	0.51	0.22	0.43	0.59	0.20
Control Delay	7.0	5.0	3.4	68.8	17.6
Queue Delay	0.0	0.0	0.3	0.0	0.0
Total Delay	7.0	5.0	3.7	68.8	17.6
Queue Length 50th (ft)	215	5	111	84	0
Queue Length 95th (ft)	289	14	167	140	33
Internal Link Dist (ft)	1090		546	340	
Turn Bay Length (ft)		150			100
Base Capacity (vph)	3858	192	4228	255	261
Starvation Cap Reductn	0	0	1516	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.51	0.22	0.66	0.40	0.15

Intersection Summary

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1675	145	40	1655	95	35
Future Volume (veh/h)	1675	145	40	1655	95	35
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
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	1821	158	43	1799	103	38
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	3792	328	255	4377	131	117
Arrive On Green	0.79	0.79	0.03	0.86	0.07	0.07
Sat Flow, veh/h	4954	414	1781	5274	1781	1585
Grp Volume(v), veh/h	1293	686	43	1799	103	38
Grp Sat Flow(s),veh/h/ln	1702	1796	1781	1702	1781	1585
Q Serve(g_s), s	16.5	16.7	0.5	10.1	7.4	3.0
Cycle Q Clear(g_c), s	16.5	16.7	0.5	10.1	7.4	3.0
Prop In Lane		0.23	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2697	1423	255	4377	131	117
V/C Ratio(X)	0.48	0.48	0.17	0.41	0.79	0.33
Avail Cap(c_a), veh/h	2697	1423	270	4377	256	228
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.81	0.81	0.89	0.89	1.00	1.00
Uniform Delay (d), s/veh	4.5	4.5	3.4	2.0	59.2	57.2
Incr Delay (d2), s/veh	0.5	0.9	0.3	0.3	9.9	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	5.5	0.1	2.2	3.7	1.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	5.0	5.5	3.7	2.3	69.1	58.8
LnGrp LOS	A	A	A	A	E	E
Approach Vol, veh/h	1979			1842	141	
Approach Delay, s/veh	5.2			2.3	66.3	
Approach LOS	A			A	E	

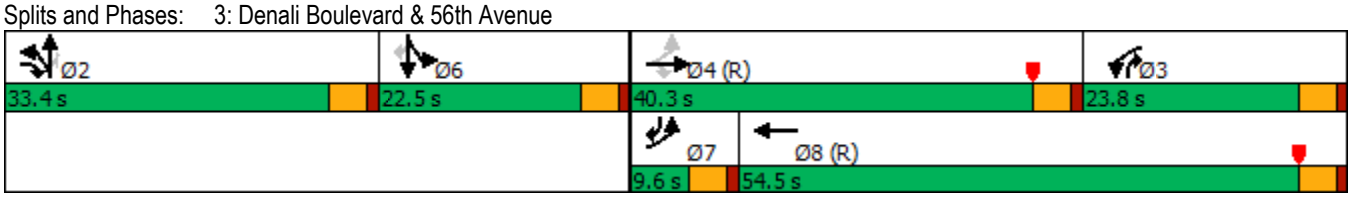
Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		14.1	8.4	107.5		115.9
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		18.7	5.0	92.3		92.3
Max Q Clear Time (g_c+I1), s		9.4	2.5	18.7		12.1
Green Ext Time (p_c), s		0.2	0.0	29.2		26.3

Intersection Summary	
HCM 6th Ctrl Delay	6.0
HCM 6th LOS	A

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	20	1045	590	335	1155	415	10	195	30	5	50
Future Volume (vph)	20	1045	590	335	1155	415	10	195	30	5	50
Turn Type	pm+pt	NA	pm+ov	Prot	NA	Split	NA	pm+ov	Split	NA	pm+ov
Protected Phases	7	4	2	3	8	2	2	3	6	6	7
Permitted Phases	4		4					2			6
Detector Phase	7	4	2	3	8	2	2	3	6	6	7
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	22.5	9.5	22.5	22.5	9.5
Total Split (s)	9.6	40.3	33.4	23.8	54.5	33.4	33.4	23.8	22.5	22.5	9.6
Total Split (%)	8.0%	33.6%	27.8%	19.8%	45.4%	27.8%	27.8%	19.8%	18.8%	18.8%	8.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lead		Lag	Lag			Lag			Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes			Yes			Yes
Recall Mode	None	C-Max	None	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)	54.6	54.6	81.0	19.3	69.4	24.5	24.5	48.3	7.7	7.7	14.5
Actuated g/C Ratio	0.46	0.46	0.68	0.16	0.58	0.20	0.20	0.40	0.06	0.06	0.12
v/c Ratio	0.12	0.49	0.52	0.66	0.43	0.67	0.67	0.28	0.29	0.04	0.20
Control Delay	24.5	25.8	2.7	51.6	15.8	53.3	53.4	3.6	59.3	52.0	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.5	25.8	2.7	51.6	15.8	53.3	53.4	3.6	59.3	52.0	3.2
LOS	C	C	A	D	B	D	D	A	E	D	A
Approach Delay		17.6			23.8		37.7			26.0	
Approach LOS		B			C		D			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBT, Start of Yellow	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay: 23.4	Intersection LOS: C
Intersection Capacity Utilization 61.5%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Denali Boulevard & 56th Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	22	1136	641	364	1266	230	232	212	33	5	54
v/c Ratio	0.12	0.49	0.52	0.66	0.43	0.67	0.67	0.28	0.29	0.04	0.20
Control Delay	24.5	25.8	2.7	51.6	15.8	53.3	53.4	3.6	59.3	52.0	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.5	25.8	2.7	51.6	15.8	53.3	53.4	3.6	59.3	52.0	3.2
Queue Length 50th (ft)	10	244	18	146	154	169	171	0	25	4	0
Queue Length 95th (ft)	29	312	46	m193	317	255	256	44	58	17	8
Internal Link Dist (ft)		546			823		622			214	
Turn Bay Length (ft)	150		350	275		275			100		100
Base Capacity (vph)	189	2314	1245	552	2939	404	407	764	265	279	275
Starvation Cap Reductn	0	0	2	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.49	0.52	0.66	0.43	0.57	0.57	0.28	0.12	0.02	0.20

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	1045	590	335	1155	10	415	10	195	30	5	50
Future Volume (veh/h)	20	1045	590	335	1155	10	415	10	195	30	5	50
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	22	1136	641	364	1255	11	459	0	212	33	5	54
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	112	1523	723	1193	3246	28	563	0	798	86	91	111
Arrive On Green	0.02	0.30	0.30	0.11	0.21	0.21	0.16	0.00	0.16	0.05	0.05	0.05
Sat Flow, veh/h	1781	5106	1585	3456	5220	46	3563	0	1585	1781	1870	1585
Grp Volume(v), veh/h	22	1136	641	364	818	448	459	0	212	33	5	54
Grp Sat Flow(s),veh/h/ln	1781	1702	1585	1728	1702	1862	1781	0	1585	1781	1870	1585
Q Serve(g_s), s	1.1	24.1	35.8	11.6	24.9	24.9	14.9	0.0	0.0	2.2	0.3	3.9
Cycle Q Clear(g_c), s	1.1	24.1	35.8	11.6	24.9	24.9	14.9	0.0	0.0	2.2	0.3	3.9
Prop In Lane	1.00		1.00	1.00		0.02	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	112	1523	723	1193	2117	1158	563	0	798	86	91	111
V/C Ratio(X)	0.20	0.75	0.89	0.31	0.39	0.39	0.81	0.00	0.27	0.38	0.06	0.49
Avail Cap(c_a), veh/h	150	1523	723	1193	2117	1158	858	0	929	267	281	272
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.85	0.85	0.85	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.9	38.0	27.5	40.0	27.9	27.9	48.8	0.0	17.1	55.4	54.5	53.7
Incr Delay (d2), s/veh	0.7	2.9	13.1	0.1	0.5	1.0	3.6	0.0	0.2	2.8	0.3	3.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	10.4	22.1	5.4	11.5	12.7	6.9	0.0	3.4	1.0	0.2	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.6	40.9	40.5	40.1	28.5	28.9	52.5	0.0	17.3	58.1	54.7	57.0
LnGrp LOS	D	D	D	D	C	C	D	A	B	E	D	E
Approach Vol, veh/h		1799			1630			671			92	
Approach Delay, s/veh		40.7			31.2			41.3			57.3	
Approach LOS		D			C			D			E	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		23.5	45.9	40.3		10.3	7.1	79.1				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		28.9	19.3	35.8		18.0	5.1	50.0				
Max Q Clear Time (g_c+I1), s		16.9	13.6	37.8		5.9	3.1	26.9				
Green Ext Time (p_c), s		2.0	0.7	0.0		0.2	0.0	9.5				

Intersection Summary	
HCM 6th Ctrl Delay	37.5
HCM 6th LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1290	80	30	1545	45	20
Future Vol, veh/h	1290	80	30	1545	45	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	150	-	0	100
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	1402	87	33	1679	49	22

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1489	0	2184	745
Stage 1	-	-	-	-	1446	-
Stage 2	-	-	-	-	738	-
Critical Hdwy	-	-	5.34	-	5.74	7.14
Critical Hdwy Stg 1	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	-	-	3.12	-	3.82	3.92
Pot Cap-1 Maneuver	-	-	726	-	*271	*624
Stage 1	-	-	-	-	*632	-
Stage 2	-	-	-	-	*572	-
Platoon blocked, %	-	-	1	-	1	1
Mov Cap-1 Maneuver	-	-	726	-	*259	*624
Mov Cap-2 Maneuver	-	-	-	-	*259	-
Stage 1	-	-	-	-	*632	-
Stage 2	-	-	-	-	*547	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	18.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	259	624	-	-	726	-
HCM Lane V/C Ratio	0.189	0.035	-	-	0.045	-
HCM Control Delay (s)	22.1	11	-	-	10.2	-
HCM Lane LOS	C	B	-	-	B	-
HCM 95th %tile Q(veh)	0.7	0.1	-	-	0.1	-

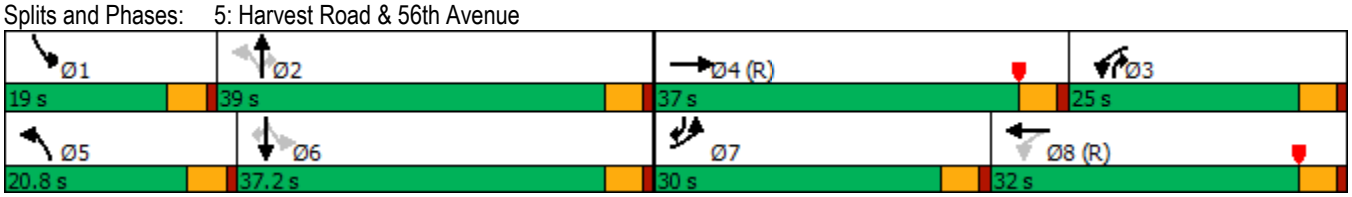
Notes

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

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	555	435	250	705	230	760	290	220	595	635
Future Volume (vph)	555	435	250	705	230	760	290	220	595	635
Turn Type	Prot	NA	pm+pt	NA	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	7	4	3	8	5	2	3	1	6	7
Permitted Phases			8		2		2	6		6
Detector Phase	7	4	3	8	5	2	3	1	6	7
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	9.5	22.5	9.5	9.5	22.5	9.5
Total Split (s)	30.0	37.0	25.0	32.0	20.8	39.0	25.0	19.0	37.2	30.0
Total Split (%)	25.0%	30.8%	20.8%	26.7%	17.3%	32.5%	20.8%	15.8%	31.0%	25.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)	24.7	34.7	30.4	30.4	47.7	32.5	53.0	46.0	31.7	60.9
Actuated g/C Ratio	0.21	0.29	0.25	0.25	0.40	0.27	0.44	0.38	0.26	0.51
v/c Ratio	0.85	0.54	0.75	0.72	0.78	0.86	0.41	0.88	0.69	0.81
Control Delay	52.3	19.5	58.2	43.9	58.0	60.8	16.3	61.2	44.1	29.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.3	19.5	58.2	43.9	58.0	60.8	16.3	61.2	44.1	29.8
LOS	D	B	E	D	E	E	B	E	D	C
Approach Delay		33.7		47.2		50.2			40.4	
Approach LOS		C		D		D			D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 34 (28%), Referenced to phase 4:EBT and 8:WBTL, Start of Yellow	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 42.6	Intersection LOS: D
Intersection Capacity Utilization 80.9%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 5: Harvest Road & 56th Avenue



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	603	799	272	924	250	826	315	239	647	690
v/c Ratio	0.85	0.54	0.75	0.72	0.78	0.86	0.41	0.88	0.69	0.81
Control Delay	52.3	19.5	58.2	43.9	58.0	60.8	16.3	61.2	44.1	29.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.3	19.5	58.2	43.9	58.0	60.8	16.3	61.2	44.1	29.8
Queue Length 50th (ft)	117	49	193	239	167	291	121	129	235	369
Queue Length 95th (ft)	#219	108	#322	293	#258	363	195	#272	301	549
Internal Link Dist (ft)		1540		4791		759			2985	
Turn Bay Length (ft)	300		275		275		275	275		600
Base Capacity (vph)	730	1480	364	1281	338	1017	767	275	964	860
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.54	0.75	0.72	0.74	0.81	0.41	0.87	0.67	0.80

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	555	435	300	250	705	145	230	760	290	220	595	635
Future Volume (veh/h)	555	435	300	250	705	145	230	760	290	220	595	635
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	603	473	326	272	766	158	250	826	315	239	647	690
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	661	922	429	417	1148	235	312	981	740	284	968	735
Arrive On Green	0.32	0.45	0.45	0.19	0.27	0.27	0.04	0.09	0.09	0.11	0.27	0.27
Sat Flow, veh/h	3456	3404	1585	1781	4249	869	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	603	473	326	272	612	312	250	826	315	239	647	690
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1781	1702	1714	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	20.1	11.9	20.6	11.4	19.2	19.5	11.7	27.5	4.8	11.4	19.4	32.7
Cycle Q Clear(g_c), s	20.1	11.9	20.6	11.4	19.2	19.5	11.7	27.5	4.8	11.4	19.4	32.7
Prop In Lane	1.00		1.00	1.00		0.51	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	661	922	429	417	919	463	312	981	740	284	968	735
V/C Ratio(X)	0.91	0.51	0.76	0.65	0.67	0.67	0.80	0.84	0.43	0.84	0.67	0.94
Avail Cap(c_a), veh/h	734	922	429	417	919	463	347	1022	758	299	968	735
HCM Platoon Ratio	1.67	1.67	1.67	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.9	27.2	29.6	42.2	39.0	39.1	32.0	52.0	11.7	30.4	38.8	30.6
Incr Delay (d2), s/veh	14.8	2.0	11.9	3.6	3.8	7.6	11.6	6.3	0.4	18.5	1.8	19.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.0	4.5	8.1	7.7	8.5	9.1	6.6	14.0	4.0	6.3	8.7	22.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.7	29.3	41.5	45.8	42.8	46.7	43.5	58.3	12.1	48.8	40.6	50.3
LnGrp LOS	D	C	D	D	D	D	D	E	B	D	D	D
Approach Vol, veh/h		1402			1196			1391			1576	
Approach Delay, s/veh		43.0			44.5			45.1			46.1	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.0	37.6	27.4	37.0	18.4	37.2	27.5	36.9
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	14.5	34.5	20.5	32.5	16.3	32.7	25.5	27.5
Max Q Clear Time (g_c+I1), s	13.4	29.5	13.4	22.6	13.7	34.7	22.1	21.5
Green Ext Time (p_c), s	0.1	2.9	0.5	3.8	0.2	0.0	0.8	3.0

Intersection Summary	
HCM 6th Ctrl Delay	44.7
HCM 6th LOS	D

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	0	15	15	0	160	20	1105	85	120	985	35
Future Vol, veh/h	10	0	15	15	0	160	20	1105	85	120	985	35
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	-	-	100	-	-	100	150	-	150	150	-	150
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	11	0	16	16	0	174	22	1201	92	130	1071	38

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1976	2668	536	2041	2614	601	1109	0	0	1293	0	0
Stage 1	1331	1331	-	1245	1245	-	-	-	-	-	-	-
Stage 2	645	1337	-	796	1369	-	-	-	-	-	-	-
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	*68	19	*685	*57	*21	*633	1017	-	-	887	-	-
Stage 1	*399	395	-	*596	*523	-	-	-	-	-	-	-
Stage 2	*596	450	-	*645	*372	-	-	-	-	-	-	-
Platoon blocked, %	1	1	1	1	1	1	1	-	-	1	-	-
Mov Cap-1 Maneuver	*43	15	*685	*48	*18	*633	1017	-	-	887	-	-
Mov Cap-2 Maneuver	*43	15	-	*48	*18	-	-	-	-	-	-	-
Stage 1	*390	337	-	*583	*511	-	-	-	-	-	-	-
Stage 2	*423	440	-	*538	*317	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	52.2	21.5	0.1	1
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1017	-	-	43	685	48	633	887	-	-
HCM Lane V/C Ratio	0.021	-	-	0.253	0.024	0.34	0.275	0.147	-	-
HCM Control Delay (s)	8.6	-	-	115	10.4	114.6	12.8	9.8	-	-
HCM Lane LOS	A	-	-	F	B	F	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.8	0.1	1.2	1.1	0.5	-	-

Notes

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

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	15	30	30	1195	1005	10
Future Vol, veh/h	15	30	30	1195	1005	10
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	100	150	-	-	-
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	16	33	33	1299	1092	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1814	552	1103	0	-	0
Stage 1	1098	-	-	-	-	-
Stage 2	716	-	-	-	-	-
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	*158	*659	*985	-	-	-
Stage 1	*622	-	-	-	-	-
Stage 2	*548	-	-	-	-	-
Platoon blocked, %	1	1	1	-	-	-
Mov Cap-1 Maneuver	*153	*659	*985	-	-	-
Mov Cap-2 Maneuver	*153	-	-	-	-	-
Stage 1	*600	-	-	-	-	-
Stage 2	*548	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.6	0.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	* 985	-	153	659	-	-
HCM Lane V/C Ratio	0.033	-	0.107	0.049	-	-
HCM Control Delay (s)	8.8	-	31.3	10.7	-	-
HCM Lane LOS	A	-	D	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.4	0.2	-	-

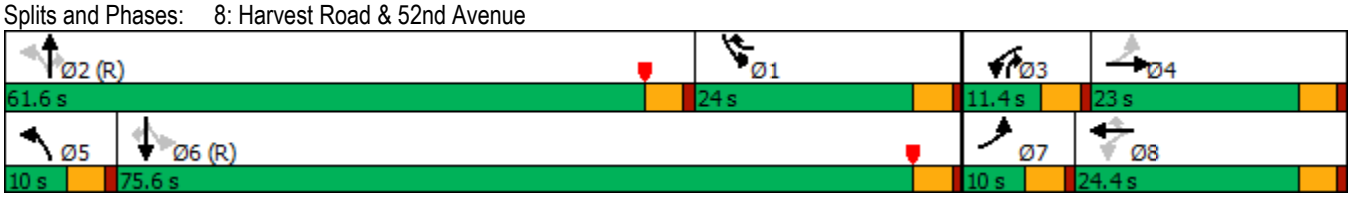
Notes

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

Lane Group	EBL	EBT	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø8
Lane Configurations											
Traffic Volume (vph)	35	0	80	160	40	1030	105	205	770	60	
Future Volume (vph)	35	0	80	160	40	1030	105	205	770	60	
Turn Type	pm+pt	NA	pm+pt	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	Perm	
Protected Phases	7	4	3	1	5	2	3	1	6		8
Permitted Phases	4		8	8	2		2	6		6	
Detector Phase	7	4	3	1	5	2	3	1	6	6	
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	9.5	22.5	9.5	9.5	22.5	22.5	22.5
Total Split (s)	10.0	23.0	11.4	24.0	10.0	61.6	11.4	24.0	75.6	75.6	24.4
Total Split (%)	8.3%	19.2%	9.5%	20.0%	8.3%	51.3%	9.5%	20.0%	63.0%	63.0%	20%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	None	None	C-Max	C-Max	None
Act Effct Green (s)	12.3	5.5	6.9	24.1	74.1	74.1	82.8	88.9	88.9	88.9	
Actuated g/C Ratio	0.10	0.05	0.06	0.20	0.62	0.62	0.69	0.74	0.74	0.74	
v/c Ratio	0.21	0.11	0.84	0.42	0.11	0.51	0.10	0.43	0.32	0.05	
Control Delay	49.5	0.7	109.6	19.8	10.0	18.6	1.9	32.0	14.9	5.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	49.5	0.7	109.6	19.8	10.0	18.6	1.9	32.0	14.9	5.8	
LOS	D	A	F	B	A	B	A	C	B	A	
Approach Delay		25.1				16.8			17.8		
Approach LOS		C				B			B		

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 20.6	Intersection LOS: C
Intersection Capacity Utilization 62.2%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 8: Harvest Road & 52nd Avenue



Lane Group	EBL	EBT	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	38	38	87	174	43	1120	114	223	837	65
v/c Ratio	0.21	0.11	0.84	0.42	0.11	0.51	0.10	0.43	0.32	0.05
Control Delay	49.5	0.7	109.6	19.8	10.0	18.6	1.9	32.0	14.9	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.5	0.7	109.6	19.8	10.0	18.6	1.9	32.0	14.9	5.8
Queue Length 50th (ft)	26	0	68	39	19	397	17	99	214	8
Queue Length 95th (ft)	60	0	#166	110	m27	440	m22	m157	275	m19
Internal Link Dist (ft)		999				1101			640	
Turn Bay Length (ft)	150		200	200	150		150	175		
Base Capacity (vph)	182	474	103	411	385	2185	1118	516	2621	1196
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.08	0.84	0.42	0.11	0.51	0.10	0.43	0.32	0.05

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	0	35	80	0	160	40	1030	105	205	770	60
Future Volume (veh/h)	35	0	35	80	0	160	40	1030	105	205	770	60
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	38	0	38	87	0	174	43	1120	114	223	837	65
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	164	0	66	187	129	546	368	1691	845	648	2556	1140
Arrive On Green	0.03	0.00	0.04	0.06	0.00	0.07	0.03	0.48	0.48	0.55	1.00	1.00
Sat Flow, veh/h	1781	0	1585	1781	1870	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	38	0	38	87	0	174	43	1120	114	223	837	65
Grp Sat Flow(s),veh/h/ln	1781	0	1585	1781	1870	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	2.4	0.0	2.8	5.5	0.0	1.0	1.6	28.9	0.7	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.4	0.0	2.8	5.5	0.0	1.0	1.6	28.9	0.7	0.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	164	0	66	187	129	546	368	1691	845	648	2556	1140
V/C Ratio(X)	0.23	0.00	0.58	0.46	0.00	0.32	0.12	0.66	0.13	0.34	0.33	0.06
Avail Cap(c_a), veh/h	192	0	244	187	310	699	393	1691	845	648	2556	1140
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.8	0.0	56.5	50.5	0.0	18.1	18.3	24.1	6.7	13.8	0.0	0.0
Incr Delay (d2), s/veh	0.7	0.0	7.7	1.8	0.0	0.3	0.1	2.1	0.3	0.3	0.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	1.3	2.5	0.0	2.8	0.7	12.4	1.0	2.9	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.6	0.0	64.1	52.3	0.0	18.4	18.4	26.1	7.1	14.1	0.3	0.1
LnGrp LOS	D	A	E	D	A	B	B	C	A	B	A	A
Approach Vol, veh/h		76			261			1277			1125	
Approach Delay, s/veh		58.8			29.7			24.2			3.1	
Approach LOS		E			C			C			A	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	37.5	61.6	11.4	9.5	8.3	90.8	8.1	12.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	19.5	57.1	6.9	18.5	5.5	71.1	5.5	19.9
Max Q Clear Time (g_c+I1), s	2.0	30.9	7.5	4.8	3.6	2.0	4.4	3.0
Green Ext Time (p_c), s	0.6	9.9	0.0	0.1	0.0	7.7	0.0	0.5

Intersection Summary	
HCM 6th Ctrl Delay	17.0
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	113.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	60	0	35	15	15	140	15	1095	0	175	775	50
Future Vol, veh/h	60	0	35	15	15	140	15	1095	0	175	775	50
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	-	-	100	-	-	100	150	-	150	150	-	150
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	65	0	38	16	16	152	16	1190	0	190	842	54

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1857	2444	421	2023	2498	595	896	0	0	1190	0	0
Stage 1	1222	1222	-	1222	1222	-	-	-	-	-	-	-
Stage 2	635	1222	-	801	1276	-	-	-	-	-	-	-
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	73	31	*763	*49	27	447	1130	-	-	582	-	-
Stage 1	380	391	-	*190	250	-	-	-	-	-	-	-
Stage 2	433	250	-	*719	361	-	-	-	-	-	-	-
Platoon blocked, %	1	1	1	1	1		1	-	-		-	-
Mov Cap-1 Maneuver	~ 8	21	*763	*34	18	447	1130	-	-	582	-	-
Mov Cap-2 Maneuver	~ 8	21	-	*34	18	-	-	-	-	-	-	-
Stage 1	374	263	-	*187	247	-	-	-	-	-	-	-
Stage 2	263	247	-	*460	244	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s $	2608	111.1	0.1	2.5
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1130	-	-	8	763	24	447	582	-	-
HCM Lane V/C Ratio	0.014	-	-	8.152	0.05	1.359	0.34	0.327	-	-
HCM Control Delay (s)	8.2	-	$	4123.5	10	$ 549.1	17.2	14.2	-	-
HCM Lane LOS	A	-	-	F	B	F	C	B	-	-
HCM 95th %tile Q(veh)	0	-	-	9.7	0.2	4.1	1.5	1.4	-	-

Notes

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

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	655	1415	1545	470	340	455
Future Volume (vph)	655	1415	1545	470	340	455
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		1	
Permitted Phases				8		6
Detector Phase	7	4	8	8	1	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	9.5	22.5
Total Split (s)	35.0	88.0	53.0	53.0	32.0	32.0
Total Split (%)	29.2%	73.3%	44.2%	44.2%	26.7%	26.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag		Lead	Lead		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	30.5	91.9	56.9	56.9	19.1	19.1
Actuated g/C Ratio	0.25	0.77	0.47	0.47	0.16	0.16
v/c Ratio	0.82	0.40	0.70	0.50	0.68	0.82
Control Delay	32.0	0.7	27.5	3.8	46.3	19.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.0	0.7	27.5	3.8	46.3	19.8
LOS	C	A	C	A	D	B
Approach Delay		10.6	22.0		31.1	
Approach LOS		B	C		C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 80 (67%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 18.7	Intersection LOS: B
Intersection Capacity Utilization 69.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 10: 48th Avenue & Harvest Road

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	712	1538	1679	511	370	495
v/c Ratio	0.82	0.40	0.70	0.50	0.68	0.82
Control Delay	32.0	0.7	27.5	3.8	46.3	19.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.0	0.7	27.5	3.8	46.3	19.8
Queue Length 50th (ft)	273	7	358	0	103	64
Queue Length 95th (ft)	360	18	481	66	m112	m85
Internal Link Dist (ft)		649	786		1558	
Turn Bay Length (ft)	275			500	275	
Base Capacity (vph)	872	3893	2410	1019	786	688
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.82	0.40	0.70	0.50	0.47	0.72

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	655	1415	1545	470	340	455
Future Volume (veh/h)	655	1415	1545	470	340	455
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
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	712	1538	1679	0	370	0
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	1221	4059	2064		449	
Arrive On Green	0.71	1.00	0.40	0.00	0.13	0.00
Sat Flow, veh/h	3456	5274	5274	1585	3456	1585
Grp Volume(v), veh/h	712	1538	1679	0	370	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1702	1585	1728	1585
Q Serve(g_s), s	12.3	0.0	35.0	0.0	12.5	0.0
Cycle Q Clear(g_c), s	12.3	0.0	35.0	0.0	12.5	0.0
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	1221	4059	2064		449	
V/C Ratio(X)	0.58	0.38	0.81		0.82	
Avail Cap(c_a), veh/h	1221	4059	2064		792	
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.68	0.68	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	13.2	0.0	31.7	0.0	50.9	0.0
Incr Delay (d2), s/veh	0.5	0.2	3.6	0.0	3.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	0.1	14.8	0.0	5.6	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	13.7	0.2	35.4	0.0	54.7	0.0
LnGrp LOS	B	A	D		D	
Approach Vol, veh/h		2250	1679		370	
Approach Delay, s/veh		4.5	35.4		54.7	
Approach LOS		A	D		D	

Timer - Assigned Phs	4	6	7	8
Phs Duration (G+Y+Rc), s	99.9	20.1	46.9	53.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	83.5	27.5	30.5	48.5
Max Q Clear Time (g_c+I1), s	2.0	14.5	14.3	37.0
Green Ext Time (p_c), s	19.3	1.1	2.5	8.3

Intersection Summary	
HCM 6th Ctrl Delay	20.9
HCM 6th LOS	C

Notes

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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	85	1885	390	315	1665	215	5	135	20	10
Future Volume (vph)	85	1885	390	315	1665	215	5	135	20	10
Turn Type	pm+pt	NA	pm+ov	Prot	NA	Prot	NA	pm+ov	pm+pt	NA
Protected Phases	7	4	5	3	8	5	2	3	1	6
Permitted Phases	4		4					2	6	
Detector Phase	7	4	5	3	8	5	2	3	1	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	22.5	9.5	9.5	22.5
Total Split (s)	14.6	61.3	16.2	20.0	66.7	16.2	29.2	20.0	9.5	22.5
Total Split (%)	12.2%	51.1%	13.5%	16.7%	55.6%	13.5%	24.3%	16.7%	7.9%	18.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	None	C-Max	None	None	None	None	None
Act Effct Green (s)	77.6	68.0	86.3	15.0	73.4	13.8	17.2	33.6	9.8	7.2
Actuated g/C Ratio	0.65	0.57	0.72	0.12	0.61	0.12	0.14	0.28	0.08	0.06
v/c Ratio	0.43	0.71	0.35	0.80	0.59	0.59	0.02	0.30	0.15	0.46
Control Delay	19.2	7.9	0.4	52.4	3.3	56.3	43.6	21.1	52.6	26.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.2	7.9	0.4	52.4	3.3	56.3	43.6	21.1	52.6	26.9
LOS	B	A	A	D	A	E	D	C	D	C
Approach Delay		7.1			10.9		42.7			33.0
Approach LOS		A			B		D			C

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 89 (74%), Referenced to phase 4:EBTL and 8:WBT, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 11.8	Intersection LOS: B
Intersection Capacity Utilization 69.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 11: Fultondale Street & 48th Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	92	2049	424	342	1843	234	5	147	22	71
v/c Ratio	0.43	0.71	0.35	0.80	0.59	0.59	0.02	0.30	0.15	0.46
Control Delay	19.2	7.9	0.4	52.4	3.3	56.3	43.6	21.1	52.6	26.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.2	7.9	0.4	52.4	3.3	56.3	43.6	21.1	52.6	26.9
Queue Length 50th (ft)	18	151	1	144	38	90	3	47	17	8
Queue Length 95th (ft)	m26	m173	m0	#202	74	127	15	84	45	54
Internal Link Dist (ft)		1760			649		394			308
Turn Bay Length (ft)	150		150	275		225		150	150	
Base Capacity (vph)	221	2880	1218	443	3101	406	383	478	144	294
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.71	0.35	0.77	0.59	0.58	0.01	0.31	0.15	0.24

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	85	1885	390	315	1665	30	215	5	135	20	10	55
Future Volume (veh/h)	85	1885	390	315	1665	30	215	5	135	20	10	55
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	92	2049	424	342	1810	33	234	5	147	22	11	60
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	510	2417	884	799	2676	49	291	232	563	99	15	84
Arrive On Green	0.19	0.47	0.47	0.46	1.00	1.00	0.08	0.12	0.12	0.02	0.06	0.06
Sat Flow, veh/h	1781	5106	1585	3456	5163	94	3456	1870	1585	1781	252	1372
Grp Volume(v), veh/h	92	2049	424	342	1193	650	234	5	147	22	0	71
Grp Sat Flow(s),veh/h/ln	1781	1702	1585	1728	1702	1853	1728	1870	1585	1781	0	1623
Q Serve(g_s), s	0.0	42.4	9.3	8.0	0.0	0.0	8.0	0.3	0.7	1.4	0.0	5.2
Cycle Q Clear(g_c), s	0.0	42.4	9.3	8.0	0.0	0.0	8.0	0.3	0.7	1.4	0.0	5.2
Prop In Lane	1.00		1.00	1.00		0.05	1.00		1.00	1.00		0.85
Lane Grp Cap(c), veh/h	510	2417	884	799	1764	961	291	232	563	99	0	99
V/C Ratio(X)	0.18	0.85	0.48	0.43	0.68	0.68	0.80	0.02	0.26	0.22	0.00	0.71
Avail Cap(c_a), veh/h	510	2417	884	799	1764	961	337	385	693	134	0	244
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.22	0.22	0.22	0.62	0.62	0.62	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.0	27.8	16.0	26.9	0.0	0.0	54.0	46.2	17.5	56.0	0.0	55.3
Incr Delay (d2), s/veh	0.0	0.9	0.4	0.2	1.3	2.4	11.6	0.0	0.2	1.1	0.0	9.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	16.9	2.5	2.9	0.3	0.6	3.9	0.1	2.3	0.7	0.0	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.0	28.7	16.4	27.2	1.3	2.4	65.6	46.2	17.7	57.1	0.0	64.4
LnGrp LOS	B	C	B	C	A	A	E	D	B	E	A	E
Approach Vol, veh/h		2565			2185			386			93	
Approach Delay, s/veh		26.0			5.7			47.1			62.7	
Approach LOS		C			A			D			E	

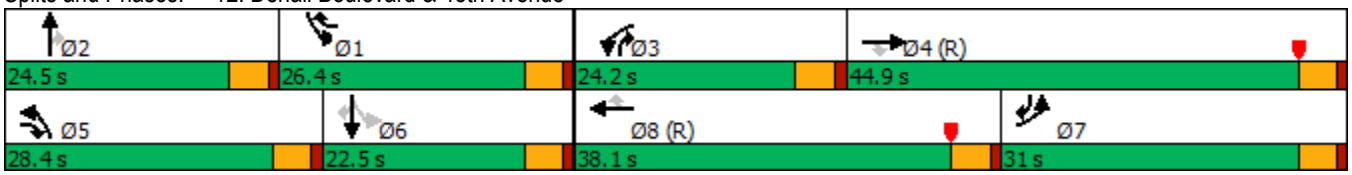
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.1	19.4	32.2	61.3	14.6	11.8	26.8	66.7
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.0	24.7	15.5	56.8	11.7	18.0	10.1	62.2
Max Q Clear Time (g_c+I1), s	3.4	2.7	10.0	44.4	10.0	7.2	2.0	2.0
Green Ext Time (p_c), s	0.0	0.4	0.6	10.7	0.1	0.2	0.1	23.6

Intersection Summary	
HCM 6th Ctrl Delay	19.7
HCM 6th LOS	B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	670	1590	780	525	1110	245	615	205	460	205	155	440
Future Volume (vph)	670	1590	780	525	1110	245	615	205	460	205	155	440
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	7
Permitted Phases			4			8			2	6		6
Detector Phase	7	4	5	3	8	1	5	2	3	1	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5
Total Split (s)	31.0	44.9	28.4	24.2	38.1	26.4	28.4	24.5	24.2	26.4	22.5	31.0
Total Split (%)	25.8%	37.4%	23.7%	20.2%	31.8%	22.0%	23.7%	20.4%	20.2%	22.0%	18.8%	25.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lag	Lead	Lead	Lead	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	None	C-Max	None	None	None	None	None	None	None
Act Effct Green (s)	26.5	41.0	69.4	25.1	39.5	67.1	23.9	12.9	37.9	23.1	12.1	38.6
Actuated g/C Ratio	0.22	0.34	0.58	0.21	0.33	0.56	0.20	0.11	0.32	0.19	0.10	0.32
v/c Ratio	0.96	1.00	0.88	0.80	0.72	0.29	0.98	0.59	0.88	0.66	0.47	0.83
Control Delay	55.3	48.1	16.9	38.8	22.8	2.4	77.5	57.2	39.9	54.7	54.6	29.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.3	48.1	16.9	38.8	22.8	2.4	77.5	57.2	39.9	54.7	54.6	29.3
LOS	E	D	B	D	C	A	E	E	D	D	D	C
Approach Delay		41.7			24.6			60.8			40.7	
Approach LOS		D			C			E			D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 16 (13%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 130	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.00	
Intersection Signal Delay: 40.5	Intersection LOS: D
Intersection Capacity Utilization 82.5%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 12: Denali Boulevard & 48th Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	728	1728	848	571	1207	266	668	223	500	223	168	478
v/c Ratio	0.96	1.00	0.88	0.80	0.72	0.29	0.98	0.59	0.88	0.66	0.47	0.83
Control Delay	55.3	48.1	16.9	38.8	22.8	2.4	77.5	57.2	39.9	54.7	54.6	29.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.3	48.1	16.9	38.8	22.8	2.4	77.5	57.2	39.9	54.7	54.6	29.3
Queue Length 50th (ft)	280	~481	413	202	309	6	267	87	173	163	66	165
Queue Length 95th (ft)	m#357	m#542	m93	#346	331	16	#389	126	#387	242	97	206
Internal Link Dist (ft)		1300			1760			542			586	
Turn Bay Length (ft)	250		275	300		150	400		250	300		225
Base Capacity (vph)	758	1735	967	717	1675	924	683	589	565	340	530	573
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.96	1.00	0.88	0.80	0.72	0.29	0.98	0.38	0.88	0.66	0.32	0.83

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	670	1590	780	525	1110	245	615	205	460	205	155	440
Future Volume (veh/h)	670	1590	780	525	1110	245	615	205	460	205	155	440
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	728	1728	0	571	1207	266	668	223	0	223	168	478
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	839	1831		567	1430	827	688	304		490	455	588
Arrive On Green	0.49	0.72	0.00	0.05	0.09	0.09	0.20	0.09	0.00	0.24	0.13	0.13
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	3456	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	728	1728	0	571	1207	266	668	223	0	223	168	478
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1728	1777	1585	1781	1777	1585
Q Serve(g_s), s	22.5	35.5	0.0	19.7	27.9	0.0	23.0	7.3	0.0	8.4	5.2	12.3
Cycle Q Clear(g_c), s	22.5	35.5	0.0	19.7	27.9	0.0	23.0	7.3	0.0	8.4	5.2	12.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	839	1831		567	1430	827	688	304		490	455	588
V/C Ratio(X)	0.87	0.94		1.01	0.84	0.32	0.97	0.73		0.45	0.37	0.81
Avail Cap(c_a), veh/h	839	1831		567	1430	827	688	592		490	533	623
HCM Platoon Ratio	2.00	2.00	2.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.27	0.27	0.00	0.77	0.77	0.77	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.2	15.9	0.0	56.7	51.9	22.0	47.7	53.5	0.0	36.6	47.9	13.5
Incr Delay (d2), s/veh	2.9	3.9	0.0	34.8	4.9	0.8	27.0	3.4	0.0	0.7	0.5	7.8
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	7.5	7.1	0.0	11.9	13.4	5.7	12.4	3.4	0.0	5.5	2.3	6.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.0	19.8	0.0	91.5	56.8	22.7	74.7	56.9	0.0	37.2	48.4	21.2
LnGrp LOS	C	B		F	E	C	E	E		D	D	C
Approach Vol, veh/h		2456			2044			891			869	
Approach Delay, s/veh		23.4			62.1			70.3			30.6	
Approach LOS		C			E			E			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	33.5	14.8	24.2	47.5	28.4	19.9	33.6	38.1
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	21.9	20.0	19.7	40.4	23.9	18.0	26.5	33.6
Max Q Clear Time (g_c+I1), s	10.4	9.3	21.7	37.5	25.0	14.3	24.5	29.9
Green Ext Time (p_c), s	0.5	0.9	0.0	2.4	0.0	1.1	0.7	2.7

Intersection Summary	
HCM 6th Ctrl Delay	43.7
HCM 6th LOS	D

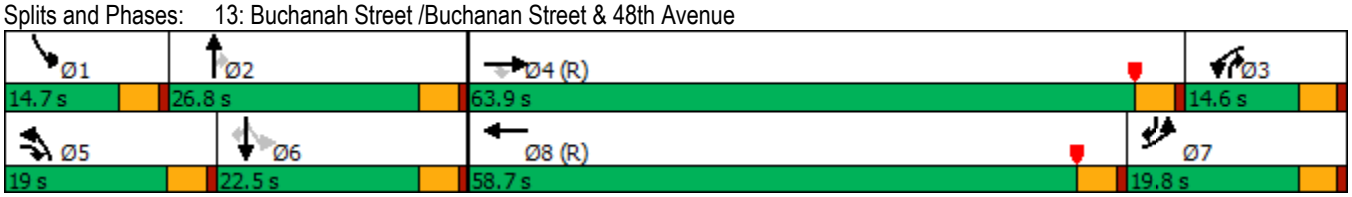
Notes

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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	365	2515	450	245	1885	360	5	375	195	5	270
Future Volume (vph)	365	2515	450	245	1885	360	5	375	195	5	270
Turn Type	Prot	NA	pm+ov	Prot	NA	Prot	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	7	4	5	3	8	5	2	3	1	6	7
Permitted Phases			4					2	6		6
Detector Phase	7	4	5	3	8	5	2	3	1	6	7
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	22.5	9.5	9.5	22.5	9.5
Total Split (s)	19.8	63.9	19.0	14.6	58.7	19.0	26.8	14.6	14.7	22.5	19.8
Total Split (%)	16.5%	53.3%	15.8%	12.2%	48.9%	15.8%	22.3%	12.2%	12.3%	18.8%	16.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)	15.3	79.6	97.7	10.1	74.4	14.5	6.8	12.3	15.0	5.9	16.7
Actuated g/C Ratio	0.13	0.66	0.81	0.08	0.62	0.12	0.06	0.10	0.12	0.05	0.14
v/c Ratio	0.91	0.81	0.35	0.92	0.70	0.94	0.05	1.65	0.95	0.05	1.10
Control Delay	49.6	5.1	0.1	75.9	10.1	84.9	52.8	335.2	101.5	55.2	120.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.6	5.1	0.1	75.9	10.1	84.9	52.8	335.2	101.5	55.2	120.5
LOS	D	A	A	E	B	F	D	F	F	E	F
Approach Delay		9.3			17.2		211.7			111.9	
Approach LOS		A			B		F			F	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 35 (29%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.65	
Intersection Signal Delay: 41.1	Intersection LOS: D
Intersection Capacity Utilization 93.9%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 13: Buchanah Street /Buchanan Street & 48th Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	397	2734	489	266	2190	391	5	408	212	5	293
v/c Ratio	0.91	0.81	0.35	0.92	0.70	0.94	0.05	1.65	0.95	0.05	1.10
Control Delay	49.6	5.1	0.1	75.9	10.1	84.9	52.8	335.2	101.5	55.2	120.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.6	5.1	0.1	75.9	10.1	84.9	52.8	335.2	101.5	55.2	120.5
Queue Length 50th (ft)	164	128	0	111	115	157	4	~413	166	4	~232
Queue Length 95th (ft)	m155	m163	m0	m#161	m441	#253	17	#520	#277	17	#267
Internal Link Dist (ft)		420			1300		548			543	
Turn Bay Length (ft)	275		400	275		250		300	275		
Base Capacity (vph)	437	3374	1379	288	3126	414	346	247	222	279	266
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.91	0.81	0.35	0.92	0.70	0.94	0.01	1.65	0.95	0.02	1.10

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	365	2515	450	245	1885	130	360	5	375	195	5	270
Future Volume (veh/h)	365	2515	450	245	1885	130	360	5	375	195	5	270
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	397	2734	0	266	2049	141	391	5	0	212	5	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	815	2528		665	2204	151	418	145		270	78	
Arrive On Green	0.47	0.99	0.00	0.06	0.15	0.15	0.12	0.08	0.00	0.09	0.04	0.00
Sat Flow, veh/h	3456	5106	1585	3456	4880	334	3456	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	397	2734	0	266	1426	764	391	5	0	212	5	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1810	1728	1870	1585	1781	1870	1585
Q Serve(g_s), s	9.5	59.4	0.0	8.9	49.6	50.1	13.5	0.3	0.0	10.2	0.3	0.0
Cycle Q Clear(g_c), s	9.5	59.4	0.0	8.9	49.6	50.1	13.5	0.3	0.0	10.2	0.3	0.0
Prop In Lane	1.00		1.00	1.00		0.18	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	815	2528		665	1537	818	418	145		270	78	
V/C Ratio(X)	0.49	1.08		0.40	0.93	0.93	0.94	0.03		0.78	0.06	
Avail Cap(c_a), veh/h	815	2528		665	1537	818	418	348		270	281	
HCM Platoon Ratio	2.00	2.00	2.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.47	0.47	0.47	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	26.7	0.6	0.0	49.5	49.1	49.3	52.3	51.2	0.0	52.1	55.3	0.0
Incr Delay (d2), s/veh	0.5	44.5	0.0	0.2	5.9	10.8	28.6	0.1	0.0	14.0	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	10.7	0.0	4.1	23.9	26.8	7.5	0.1	0.0	7.4	0.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.2	45.1	0.0	49.7	55.0	60.1	80.9	51.3	0.0	66.1	55.6	0.0
LnGrp LOS	C	F		D	E	E	F	D		E	E	
Approach Vol, veh/h		3131			2456			396			217	
Approach Delay, s/veh		42.9			56.1			80.5			65.9	
Approach LOS		D			E			F			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.7	13.8	27.6	63.9	19.0	9.5	32.8	58.7
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	10.2	22.3	10.1	59.4	14.5	18.0	15.3	54.2
Max Q Clear Time (g_c+I1), s	12.2	2.3	10.9	61.4	15.5	2.3	11.5	52.1
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	0.0	0.6	2.0

Intersection Summary	
HCM 6th Ctrl Delay	51.3
HCM 6th LOS	D

Notes

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

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑	↱		↱
Traffic Vol, veh/h	0	3320	2385	125	0	270
Future Vol, veh/h	0	3320	2385	125	0	270
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	300	-	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	3609	2592	136	0	293

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1296
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	*337
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		1
Mov Cap-1 Maneuver	-	-	-	-	-	*337
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	57.6
HCM LOS			F

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	337
HCM Lane V/C Ratio	-	-	-	0.871
HCM Control Delay (s)	-	-	-	57.6
HCM Lane LOS	-	-	-	F
HCM 95th %tile Q(veh)	-	-	-	8.1

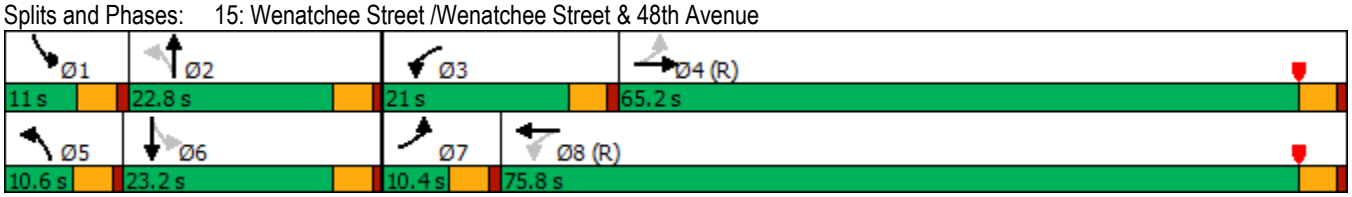
Notes

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

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	35	2285	245	1950	90	45	105	50
Future Volume (vph)	35	2285	245	1950	90	45	105	50
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	9.5	22.5	9.5	22.5
Total Split (s)	10.4	65.2	21.0	75.8	10.6	22.8	11.0	23.2
Total Split (%)	8.7%	54.3%	17.5%	63.2%	8.8%	19.0%	9.2%	19.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	C-Max	None	None	None	None
Act Effct Green (s)	71.4	65.5	86.8	80.4	19.3	13.2	20.1	13.6
Actuated g/C Ratio	0.60	0.55	0.72	0.67	0.16	0.11	0.17	0.11
v/c Ratio	0.25	0.95	0.86	0.66	0.46	0.83	0.72	0.46
Control Delay	13.2	17.6	46.1	23.7	46.9	42.6	66.3	39.2
Queue Delay	0.0	19.9	0.0	0.0	0.0	0.3	0.0	0.0
Total Delay	13.2	37.4	46.1	23.8	46.9	42.8	66.3	39.2
LOS	B	D	D	C	D	D	E	D
Approach Delay		37.1		26.2		43.9		53.5
Approach LOS		D		C		D		D

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Yellow	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.95	
Intersection Signal Delay: 33.4	Intersection LOS: C
Intersection Capacity Utilization 95.8%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 15: Wenatchee Street /Wenatchee Street & 48th Avenue



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	38	2609	266	2234	98	266	114	103
v/c Ratio	0.25	0.95	0.86	0.66	0.46	0.83	0.72	0.46
Control Delay	13.2	17.6	46.1	23.7	46.9	42.6	66.3	39.2
Queue Delay	0.0	19.9	0.0	0.0	0.0	0.3	0.0	0.0
Total Delay	13.2	37.4	46.1	23.8	46.9	42.8	66.3	39.2
Queue Length 50th (ft)	5	~792	163	482	64	82	75	51
Queue Length 95th (ft)	m4	m#873	m#292	m612	109	177	#131	104
Internal Link Dist (ft)		1340		538		422		321
Turn Bay Length (ft)	150		150		100		100	
Base Capacity (vph)	151	2759	319	3383	214	382	158	296
Starvation Cap Reductn	0	0	0	110	0	0	0	0
Spillback Cap Reductn	0	253	0	0	0	7	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	1.04	0.83	0.68	0.46	0.71	0.72	0.35

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	2285	115	245	1950	105	90	45	200	105	50	45
Future Volume (veh/h)	35	2285	115	245	1950	105	90	45	200	105	50	45
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	38	2484	125	266	2120	114	98	49	217	114	54	49
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	207	2740	136	291	3043	163	282	46	203	156	141	128
Arrive On Green	0.06	1.00	1.00	0.19	1.00	1.00	0.05	0.15	0.15	0.05	0.16	0.16
Sat Flow, veh/h	1781	4982	248	1781	4961	265	1781	300	1330	1781	903	820
Grp Volume(v), veh/h	38	1689	920	266	1451	783	98	0	266	114	0	103
Grp Sat Flow(s),veh/h/ln	1781	1702	1826	1781	1702	1823	1781	0	1631	1781	0	1723
Q Serve(g_s), s	1.1	0.0	0.0	8.8	0.0	0.0	5.6	0.0	18.3	6.5	0.0	6.4
Cycle Q Clear(g_c), s	1.1	0.0	0.0	8.8	0.0	0.0	5.6	0.0	18.3	6.5	0.0	6.4
Prop In Lane	1.00		0.14	1.00		0.15	1.00		0.82	1.00		0.48
Lane Grp Cap(c), veh/h	207	1872	1004	291	2088	1118	282	0	249	156	0	268
V/C Ratio(X)	0.18	0.90	0.92	0.91	0.70	0.70	0.35	0.00	1.07	0.73	0.00	0.38
Avail Cap(c_a), veh/h	242	1872	1004	370	2088	1118	282	0	249	156	0	268
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.31	0.31	0.31	0.71	0.71	0.71	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.5	0.0	0.0	18.6	0.0	0.0	40.5	0.0	50.9	41.8	0.0	45.5
Incr Delay (d2), s/veh	0.1	2.6	5.3	18.0	1.4	2.6	0.7	0.0	76.7	15.7	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.7	1.5	4.7	0.4	0.8	2.5	0.0	12.7	3.5	0.0	2.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.6	2.6	5.3	36.6	1.4	2.6	41.2	0.0	127.5	57.5	0.0	46.4
LnGrp LOS	B	A	A	D	A	A	D	A	F	E	A	D
Approach Vol, veh/h		2647			2500			364			217	
Approach Delay, s/veh		3.6			5.5			104.3			52.2	
Approach LOS		A			A			F			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	22.8	15.7	70.5	10.6	23.2	8.1	78.1
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	6.5	18.3	16.5	60.7	6.1	18.7	5.9	71.3
Max Q Clear Time (g_c+I1), s	8.5	20.3	10.8	2.0	7.6	8.4	3.1	2.0
Green Ext Time (p_c), s	0.0	0.0	0.4	42.0	0.0	0.3	0.0	36.0

Intersection Summary	
HCM 6th Ctrl Delay	12.7
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	2.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	90	505	10	105	405
Future Vol, veh/h	10	90	505	10	105	405
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	-	-	-	150	-
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	98	549	11	114	440

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1223	555	0	0	560	0
Stage 1	555	-	-	-	-	-
Stage 2	668	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	161	531	-	-	1011	-
Stage 1	575	-	-	-	-	-
Stage 2	524	-	-	-	-	-
Platoon blocked, %	1		-	-		-
Mov Cap-1 Maneuver	143	531	-	-	1011	-
Mov Cap-2 Maneuver	299	-	-	-	-	-
Stage 1	575	-	-	-	-	-
Stage 2	465	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.4	0	1.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	493	1011	-
HCM Lane V/C Ratio	-	-	0.22	0.113	-
HCM Control Delay (s)	-	-	14.4	9	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.8	0.4	-

Intersection	
Int Delay, s/veh	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	90	585	10	105	500
Future Vol, veh/h	10	90	585	10	105	500
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	-	-	-	150	-
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	98	636	11	114	543

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1413	642	0	0	647	0
Stage 1	642	-	-	-	-	-
Stage 2	771	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	100	474	-	-	939	-
Stage 1	524	-	-	-	-	-
Stage 2	457	-	-	-	-	-
Platoon blocked, %	1		-	-		-
Mov Cap-1 Maneuver	88	474	-	-	939	-
Mov Cap-2 Maneuver	247	-	-	-	-	-
Stage 1	524	-	-	-	-	-
Stage 2	401	-	-	-	-	-

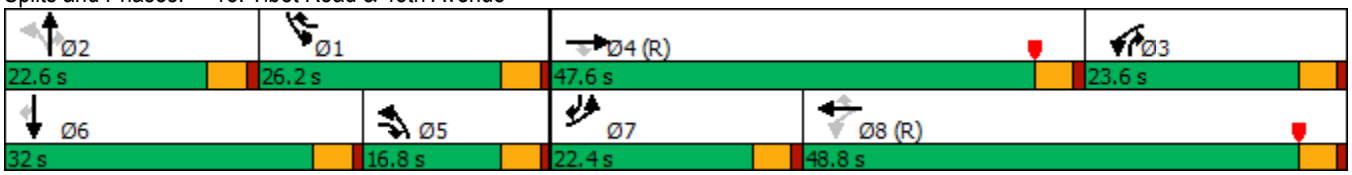
Approach	WB	NB	SB
HCM Control Delay, s	16	0	1.6
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	434	939	-
HCM Lane V/C Ratio	-	-	0.25	0.122	-
HCM Control Delay (s)	-	-	16	9.4	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	1	0.4	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	265	1600	110	330	1065	680	135	255	280	555	170	345
Future Volume (vph)	265	1600	110	330	1065	680	135	255	280	555	170	345
Turn Type	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA	pm+ov
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	7
Permitted Phases			4	8		8	2		2			6
Detector Phase	7	4	5	3	8	1	5	2	3	1	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5	9.5
Total Split (s)	22.4	47.6	16.8	23.6	48.8	26.2	16.8	22.6	23.6	26.2	32.0	22.4
Total Split (%)	18.7%	39.7%	14.0%	19.7%	40.7%	21.8%	14.0%	18.8%	19.7%	21.8%	26.7%	18.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	None	C-Max	None	None	None	None	None	None	None
Act Effct Green (s)	15.2	43.1	70.2	47.0	47.0	68.7	40.2	18.1	41.7	21.7	17.2	32.3
Actuated g/C Ratio	0.13	0.36	0.58	0.39	0.39	0.57	0.34	0.15	0.35	0.18	0.14	0.27
v/c Ratio	0.67	0.95	0.12	1.05	0.58	0.78	0.34	0.99	0.48	0.97	0.70	0.76
Control Delay	57.5	50.2	2.6	98.8	31.7	20.8	34.6	101.4	19.1	65.9	85.4	34.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.5	50.2	2.6	98.8	31.7	20.8	34.6	101.4	19.1	65.9	85.4	34.9
LOS	E	D	A	F	C	C	C	F	B	E	F	C
Approach Delay		48.5			38.8			53.6			59.0	
Approach LOS		D			D			D			E	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 76 (63%), Referenced to phase 4:EBT and 8:WBTL, Start of Yellow	
Natural Cycle: 120	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.05	
Intersection Signal Delay: 47.6	Intersection LOS: D
Intersection Capacity Utilization 93.5%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 18: Tibet Road & 48th Avenue



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	288	1739	120	359	1158	739	147	277	304	603	185	375
v/c Ratio	0.67	0.95	0.12	1.05	0.58	0.78	0.34	0.99	0.48	0.97	0.70	0.76
Control Delay	57.5	50.2	2.6	98.8	31.7	20.8	34.6	101.4	19.1	65.9	85.4	34.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.5	50.2	2.6	98.8	31.7	20.8	34.6	101.4	19.1	65.9	85.4	34.9
Queue Length 50th (ft)	111	476	0	~240	212	231	78	217	97	242	146	188
Queue Length 95th (ft)	154	#584	28	#412	287	488	128	#392	182	#344	209	258
Internal Link Dist (ft)		947			1340			509			857	
Turn Bay Length (ft)	275		300	275		275	275		100	275		150
Base Capacity (vph)	512	1826	976	343	1993	945	438	281	638	620	426	530
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.95	0.12	1.05	0.58	0.78	0.34	0.99	0.48	0.97	0.43	0.71

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	265	1600	110	330	1065	680	135	255	280	555	170	345
Future Volume (veh/h)	265	1600	110	330	1065	680	135	255	280	555	170	345
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	288	1739	120	359	1158	739	147	277	304	603	185	375
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	354	1834	837	346	2123	946	406	282	491	625	305	421
Arrive On Green	0.10	0.36	0.36	0.21	0.55	0.55	0.17	0.15	0.15	0.06	0.05	0.05
Sat Flow, veh/h	3456	5106	1585	1781	5106	1585	1781	1870	1585	3456	1870	1585
Grp Volume(v), veh/h	288	1739	120	359	1158	739	147	277	304	603	185	375
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1781	1702	1585	1781	1870	1585	1728	1870	1585
Q Serve(g_s), s	9.8	39.7	0.0	19.1	17.4	15.8	1.2	17.7	0.5	20.9	11.6	15.8
Cycle Q Clear(g_c), s	9.8	39.7	0.0	19.1	17.4	15.8	1.2	17.7	0.5	20.9	11.6	15.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	354	1834	837	346	2123	946	406	282	491	625	305	421
V/C Ratio(X)	0.81	0.95	0.14	1.04	0.55	0.78	0.36	0.98	0.62	0.96	0.61	0.89
Avail Cap(c_a), veh/h	515	1834	837	346	2123	946	406	282	491	625	429	526
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	0.71	0.71	0.71	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.7	37.4	14.5	45.6	19.6	4.3	40.5	50.8	35.3	56.0	53.0	21.9
Incr Delay (d2), s/veh	6.3	11.9	0.4	50.5	0.7	4.6	0.5	48.4	2.4	27.4	1.9	14.8
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	18.3	1.8	14.6	6.3	4.2	3.7	12.1	7.9	12.1	6.0	8.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	59.0	49.3	14.8	96.0	20.3	8.9	41.1	99.2	37.7	83.4	55.0	36.7
LnGrp LOS	E	D	B	F	C	A	D	F	D	F	D	D
Approach Vol, veh/h		2147			2256			728			1163	
Approach Delay, s/veh		48.6			28.6			61.8			63.8	
Approach LOS		D			C			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	26.2	22.6	23.6	47.6	24.7	24.1	16.8	54.4
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	21.7	18.1	19.1	43.1	12.3	27.5	17.9	44.3
Max Q Clear Time (g_c+I1), s	22.9	19.7	21.1	41.7	3.2	17.8	11.8	19.4
Green Ext Time (p_c), s	0.0	0.0	0.0	1.2	0.2	1.8	0.5	13.5

Intersection Summary	
HCM 6th Ctrl Delay	45.8
HCM 6th LOS	D

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	0	10	55	0	40	15	1165	15	10	990	5
Future Vol, veh/h	5	0	10	55	0	40	15	1165	15	10	990	5
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	150	-	150	150	-	-
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	5	0	11	60	0	43	16	1266	16	11	1076	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1766	2415	541	1858	2401	633	1081	0	0	1282	0	0
Stage 1	1101	1101	-	1298	1298	-	-	-	-	-	-	-
Stage 2	665	1314	-	560	1103	-	-	-	-	-	-	-
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	*172	*150	*659	*172	*150	*607	*985	-	-	*907	-	-
Stage 1	*621	*544	-	*572	*501	-	-	-	-	-	-	-
Stage 2	*572	*501	-	*621	*544	-	-	-	-	-	-	-
Platoon blocked, %	1	1	1	1	1	1	1	-	-	1	-	-
Mov Cap-1 Maneuver	*156	*146	*659	*165	*146	*607	*985	-	-	*907	-	-
Mov Cap-2 Maneuver	*156	*146	-	*165	*146	-	-	-	-	-	-	-
Stage 1	*611	*538	-	*563	*493	-	-	-	-	-	-	-
Stage 2	*522	*493	-	*603	*538	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.9	27.2	0.1	0.1
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	* 985	-	-	318	165	607	* 907	-	-
HCM Lane V/C Ratio	0.017	-	-	0.051	0.362	0.072	0.012	-	-
HCM Control Delay (s)	8.7	-	-	16.9	38.7	11.4	9	-	-
HCM Lane LOS	A	-	-	C	E	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.2	1.5	0.2	0	-	-

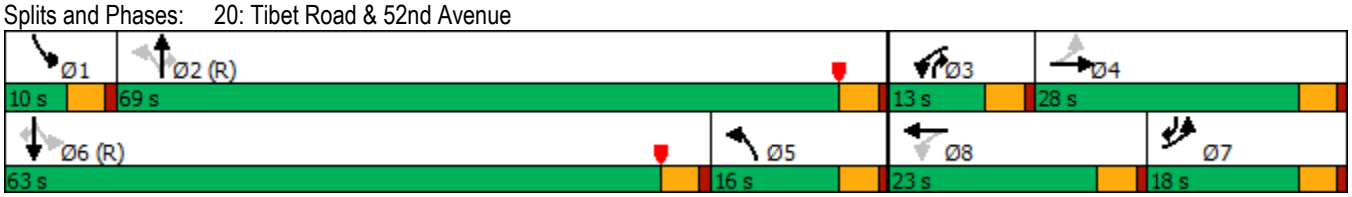
Notes

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

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	115	0	55	0	130	1065	15	10	800	110
Future Volume (vph)	115	0	55	0	130	1065	15	10	800	110
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	7	4	3	8	5	2	3	1	6	7
Permitted Phases	4		8		2		2	6		6
Detector Phase	7	4	3	8	5	2	3	1	6	7
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	9.5	22.5	9.5	22.5	9.5	9.5	22.5	9.5
Total Split (s)	18.0	28.0	13.0	23.0	16.0	69.0	13.0	10.0	63.0	18.0
Total Split (%)	15.0%	23.3%	10.8%	19.2%	13.3%	57.5%	10.8%	8.3%	52.5%	15.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	Max	None	C-Max	None	None	C-Max	None
Act Effct Green (s)	22.5	22.5	18.5	18.5	76.3	76.3	88.6	62.3	62.3	76.5
Actuated g/C Ratio	0.19	0.19	0.15	0.15	0.64	0.64	0.74	0.52	0.52	0.64
v/c Ratio	0.43	0.31	0.35	0.10	0.33	0.51	0.01	0.05	0.47	0.11
Control Delay	49.6	1.5	50.7	0.5	15.5	13.4	0.0	15.9	19.9	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.6	1.5	50.7	0.5	15.5	13.4	0.0	15.9	19.9	1.7
LOS	D	A	D	A	B	B	A	B	B	A
Approach Delay		22.0		29.7		13.4			17.7	
Approach LOS		C		C		B			B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.51	
Intersection Signal Delay: 16.6	Intersection LOS: B
Intersection Capacity Utilization 62.4%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 20: Tibet Road & 52nd Avenue



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	125	168	60	43	141	1158	16	11	870	120
v/c Ratio	0.43	0.31	0.35	0.10	0.33	0.51	0.01	0.05	0.47	0.11
Control Delay	49.6	1.5	50.7	0.5	15.5	13.4	0.0	15.9	19.9	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.6	1.5	50.7	0.5	15.5	13.4	0.0	15.9	19.9	1.7
Queue Length 50th (ft)	88	0	41	0	39	235	0	4	218	0
Queue Length 95th (ft)	144	0	83	0	m69	m349	m0	15	291	21
Internal Link Dist (ft)		437		683		1723			253	
Turn Bay Length (ft)	150		150		150		150	150		150
Base Capacity (vph)	343	564	177	410	432	2249	1201	205	1836	1043
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.30	0.34	0.10	0.33	0.51	0.01	0.05	0.47	0.12

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	115	0	155	55	0	40	130	1065	15	10	800	110
Future Volume (veh/h)	115	0	155	55	0	40	130	1065	15	10	800	110
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	125	0	168	60	0	43	141	1158	16	11	870	120
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	214	0	245	132	0	244	531	2282	1082	154	1732	838
Arrive On Green	0.04	0.00	0.15	0.04	0.00	0.15	0.06	0.21	0.21	0.01	0.49	0.49
Sat Flow, veh/h	1781	0	1585	1781	0	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	125	0	168	60	0	43	141	1158	16	11	870	120
Grp Sat Flow(s),veh/h/ln	1781	0	1585	1781	0	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	0.0	0.0	12.0	3.6	0.0	2.8	0.0	34.5	0.8	0.4	19.9	0.0
Cycle Q Clear(g_c), s	0.0	0.0	12.0	3.6	0.0	2.8	0.0	34.5	0.8	0.4	19.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	214	0	245	132	0	244	531	2282	1082	154	1732	838
V/C Ratio(X)	0.58	0.00	0.69	0.45	0.00	0.18	0.27	0.51	0.01	0.07	0.50	0.14
Avail Cap(c_a), veh/h	341	0	310	186	0	244	531	2282	1082	213	1732	838
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	52.9	0.0	48.0	47.2	0.0	44.1	26.4	30.5	13.6	22.9	20.9	14.4
Incr Delay (d2), s/veh	2.5	0.0	4.4	2.4	0.0	1.6	0.3	0.8	0.0	0.2	1.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	0.0	5.1	1.7	0.0	1.2	3.3	16.7	0.3	0.2	8.4	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	55.4	0.0	52.4	49.6	0.0	45.7	26.7	31.3	13.6	23.1	21.9	14.8
LnGrp LOS	E	A	D	D	A	D	C	C	B	C	C	B
Approach Vol, veh/h		293			103			1315			1001	
Approach Delay, s/veh		53.7			47.9			30.6			21.1	
Approach LOS		D			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.0	81.5	9.4	23.0	24.6	63.0	9.4	23.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.5	64.5	8.5	23.5	11.5	58.5	13.5	18.5
Max Q Clear Time (g_c+I1), s	2.4	36.5	5.6	14.0	2.0	21.9	2.0	4.8
Green Ext Time (p_c), s	0.0	10.2	0.0	0.6	0.2	7.9	0.2	0.1

Intersection Summary	
HCM 6th Ctrl Delay	30.2
HCM 6th LOS	C

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	1500	215	280	1470	295	0	280
Future Volume (vph)	1500	215	280	1470	295	0	280
Turn Type	NA	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	4		3	8	1	6	
Permitted Phases		4					6
Detector Phase	4	4	3	8	1	6	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	9.5	22.5	9.5	22.5	22.5
Total Split (s)	58.0	58.0	23.0	81.0	39.0	39.0	39.0
Total Split (%)	48.3%	48.3%	19.2%	67.5%	32.5%	32.5%	32.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes				
Recall Mode	C-Max	C-Max	None	C-Max	None	None	None
Act Effct Green (s)	53.5	53.5	18.5	76.5	34.5	34.5	34.5
Actuated g/C Ratio	0.45	0.45	0.15	0.64	0.29	0.29	0.29
v/c Ratio	0.72	0.28	0.57	0.49	0.33	0.33	0.62
Control Delay	29.4	3.4	36.0	0.9	34.1	34.2	34.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.4	3.4	36.0	0.9	34.1	34.2	34.0
LOS	C	A	D	A	C	C	C
Approach Delay	26.1			6.5		34.1	
Approach LOS	C			A		C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 64 (53%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 18.7	Intersection LOS: B
Intersection Capacity Utilization 58.8%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 21: SB E-470 & 56th Avenue

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	1630	234	304	1598	160	161	304
v/c Ratio	0.72	0.28	0.57	0.49	0.33	0.33	0.62
Control Delay	29.4	3.4	36.0	0.9	34.1	34.2	34.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.4	3.4	36.0	0.9	34.1	34.2	34.0
Queue Length 50th (ft)	369	0	117	6	108	109	172
Queue Length 95th (ft)	426	45	160	10	183	185	271
Internal Link Dist (ft)	4670			560		1605	
Turn Bay Length (ft)		275	275		400		400
Base Capacity (vph)	2267	835	529	3241	483	483	494
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.28	0.57	0.49	0.33	0.33	0.62

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1500	215	280	1470	0	0	0	0	295	0	280
Future Volume (veh/h)	0	1500	215	280	1470	0	0	0	0	295	0	280
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0				1870	1870	1870
Adj Flow Rate, veh/h	0	1630	0	304	1598	0				321	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	2276		1134	4143	0				405	0	
Arrive On Green	0.00	0.45	0.00	0.11	0.27	0.00				0.11	0.00	0.00
Sat Flow, veh/h	0	5274	1585	3456	5274	0				3563	0	1585
Grp Volume(v), veh/h	0	1630	0	304	1598	0				321	0	0
Grp Sat Flow(s),veh/h/ln	0	1702	1585	1728	1702	0				1781	0	1585
Q Serve(g_s), s	0.0	31.2	0.0	9.7	30.7	0.0				10.5	0.0	0.0
Cycle Q Clear(g_c), s	0.0	31.2	0.0	9.7	30.7	0.0				10.5	0.0	0.0
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2276		1134	4143	0				405	0	
V/C Ratio(X)	0.00	0.72		0.27	0.39	0.00				0.79	0.00	
Avail Cap(c_a), veh/h	0	2276		1134	4143	0				1024	0	
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	0.68	0.68	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	27.1	0.0	40.3	19.5	0.0				51.8	0.0	0.0
Incr Delay (d2), s/veh	0.0	2.0	0.0	0.1	0.2	0.0				3.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	12.3	0.0	4.3	13.9	0.0				4.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	29.0	0.0	40.4	19.7	0.0				55.4	0.0	0.0
LnGrp LOS	A	C		D	B	A				E	A	
Approach Vol, veh/h		1630			1902						321	
Approach Delay, s/veh		29.0			23.0						55.4	
Approach LOS		C			C						E	

Timer - Assigned Phs		3	4		6		8					
Phs Duration (G+Y+Rc), s		43.9	58.0		18.1		101.9					
Change Period (Y+Rc), s		4.5	4.5		4.5		4.5					
Max Green Setting (Gmax), s		18.5	53.5		34.5		76.5					
Max Q Clear Time (g_c+I1), s		11.7	33.2		12.5		32.7					
Green Ext Time (p_c), s		0.6	11.3		1.1		15.6					

Intersection Summary	
HCM 6th Ctrl Delay	28.2
HCM 6th LOS	C

Notes

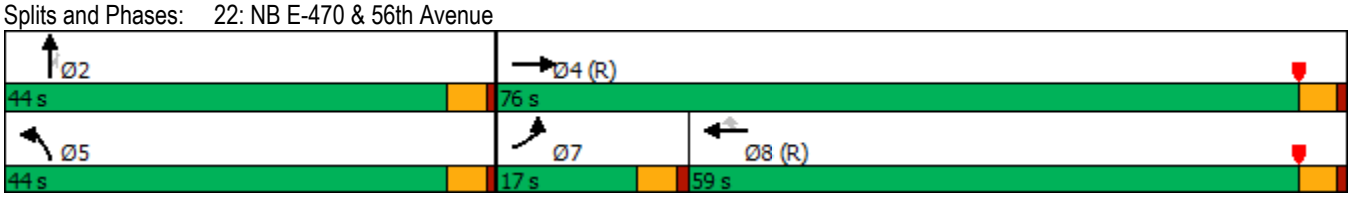
User approved volume balancing among the lanes for turning movement.

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

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Configurations							
Traffic Volume (vph)	165	1630	1540	295	205	0	320
Future Volume (vph)	165	1630	1540	295	205	0	320
Turn Type	Prot	NA	NA	Perm	Prot	NA	Perm
Protected Phases	7	4	8		5	2	
Permitted Phases				8			2
Detector Phase	7	4	8	8	5	2	2
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	17.0	76.0	59.0	59.0	44.0	44.0	44.0
Total Split (%)	14.2%	63.3%	49.2%	49.2%	36.7%	36.7%	36.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead		Lag	Lag			
Lead-Lag Optimize?	Yes		Yes	Yes			
Recall Mode	None	C-Max	C-Max	C-Max	None	Max	Max
Act Effct Green (s)	11.1	71.5	55.9	55.9	39.5	39.5	39.5
Actuated g/C Ratio	0.09	0.60	0.47	0.47	0.33	0.33	0.33
v/c Ratio	0.57	0.59	0.71	0.35	0.20	0.20	0.62
Control Delay	68.8	5.9	24.2	2.5	30.3	30.4	35.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.8	5.9	24.2	2.5	30.3	30.4	35.2
LOS	E	A	C	A	C	C	D
Approach Delay		11.7	20.7			33.3	
Approach LOS		B	C			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 61 (51%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.71	
Intersection Signal Delay: 18.4	Intersection LOS: B
Intersection Capacity Utilization 58.8%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 22: NB E-470 & 56th Avenue



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	179	1772	1674	321	111	112	348
v/c Ratio	0.57	0.59	0.71	0.35	0.20	0.20	0.62
Control Delay	68.8	5.9	24.2	2.5	30.3	30.4	35.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.8	5.9	24.2	2.5	30.3	30.4	35.2
Queue Length 50th (ft)	75	120	310	0	82	83	232
Queue Length 95th (ft)	m103	112	335	38	133	133	306
Internal Link Dist (ft)		560	670			1780	
Turn Bay Length (ft)	175			275	275		300
Base Capacity (vph)	357	3029	2370	909	553	553	557
Starvation Cap Reductn	0	97	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.60	0.71	0.35	0.20	0.20	0.62

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	165	1630	0	0	1540	295	205	0	320	0	0	0
Future Volume (veh/h)	165	1630	0	0	1540	295	205	0	320	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1870	1870	1870	1870	1870			
Adj Flow Rate, veh/h	179	1772	0	0	1674	0	223	0	0			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	241	4293	0	0	3746		300	0				
Arrive On Green	0.02	0.28	0.00	0.00	0.73	0.00	0.08	0.00	0.00			
Sat Flow, veh/h	3456	5274	0	0	5274	1585	3563	0	1585			
Grp Volume(v), veh/h	179	1772	0	0	1674	0	223	0	0			
Grp Sat Flow(s),veh/h/ln	1728	1702	0	0	1702	1585	1781	0	1585			
Q Serve(g_s), s	6.2	34.0	0.0	0.0	15.6	0.0	7.3	0.0	0.0			
Cycle Q Clear(g_c), s	6.2	34.0	0.0	0.0	15.6	0.0	7.3	0.0	0.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	241	4293	0	0	3746		300	0				
V/C Ratio(X)	0.74	0.41	0.00	0.00	0.45		0.74	0.00				
Avail Cap(c_a), veh/h	360	4293	0	0	3746		1173	0				
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.67	0.67	0.00	0.00	0.88	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	57.6	19.2	0.0	0.0	6.3	0.0	53.7	0.0	0.0			
Incr Delay (d2), s/veh	3.1	0.2	0.0	0.0	0.3	0.0	3.6	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	2.8	15.4	0.0	0.0	4.5	0.0	3.4	0.0	0.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.6	19.4	0.0	0.0	6.7	0.0	57.3	0.0	0.0			
LnGrp LOS	E	B	A	A	A		E	A				
Approach Vol, veh/h		1951			1674			223				
Approach Delay, s/veh		23.2			6.7			57.3				
Approach LOS		C			A			E				

Timer - Assigned Phs		2		4			7	8				
Phs Duration (G+Y+Rc), s		14.6		105.4			12.9	92.5				
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5				
Max Green Setting (Gmax), s		39.5		71.5			12.5	54.5				
Max Q Clear Time (g_c+I1), s		9.3		36.0			8.2	17.6				
Green Ext Time (p_c), s		0.8		16.9			0.2	15.8				

Intersection Summary	
HCM 6th Ctrl Delay	18.0
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

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

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	2300	285	575	1930	540	0	365
Future Volume (vph)	2300	285	575	1930	540	0	365
Turn Type	NA	Perm	Prot	NA	Perm	NA	Perm
Protected Phases	4		3	8		6	
Permitted Phases		4			6		6
Detector Phase	4	4	3	8	6	6	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	9.5	22.5	22.5	22.5	22.5
Total Split (s)	61.7	61.7	26.0	87.7	32.3	32.3	32.3
Total Split (%)	51.4%	51.4%	21.7%	73.1%	26.9%	26.9%	26.9%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes				
Recall Mode	C-Max	C-Max	None	C-Max	None	None	None
Act Effct Green (s)	57.2	57.2	21.5	83.2	27.8	27.8	27.8
Actuated g/C Ratio	0.48	0.48	0.18	0.69	0.23	0.23	0.23
v/c Ratio	1.03	0.35	1.02	0.60	0.75	0.76	0.97
Control Delay	37.3	2.8	57.1	4.4	48.8	49.0	69.8
Queue Delay	28.0	0.0	0.0	0.1	0.0	0.0	0.5
Total Delay	65.3	2.8	57.1	4.5	48.8	49.0	70.2
LOS	E	A	E	A	D	D	E
Approach Delay	58.4			16.5		57.5	
Approach LOS	E			B		E	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 2 (2%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.03	
Intersection Signal Delay: 40.8	Intersection LOS: D
Intersection Capacity Utilization 99.1%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 23: SB E-470 & 48th Avenue

Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	2500	310	625	2098	293	294	397
v/c Ratio	1.03	0.35	1.02	0.60	0.75	0.76	0.97
Control Delay	37.3	2.8	57.1	4.4	48.8	49.0	69.8
Queue Delay	28.0	0.0	0.0	0.1	0.0	0.0	0.5
Total Delay	65.3	2.8	57.1	4.5	48.8	49.0	70.2
Queue Length 50th (ft)	~742	17	~239	96	220	221	270
Queue Length 95th (ft)	m#829	m20	m#265	m95	m312	m314	m#447
Internal Link Dist (ft)	538			585		1090	
Turn Bay Length (ft)		275	275		275		300
Base Capacity (vph)	2423	876	615	3525	389	389	408
Starvation Cap Reductn	73	0	0	333	0	0	0
Spillback Cap Reductn	238	0	0	182	0	0	1
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.14	0.35	1.02	0.66	0.75	0.76	0.98

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	2300	285	575	1930	0	0	0	0	540	0	365
Future Volume (veh/h)	0	2300	285	575	1930	0	0	0	0	540	0	365
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0				1870	1870	1870
Adj Flow Rate, veh/h	0	2500	0	625	2098	0				587	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	2434		761	3750	0				679	0	
Arrive On Green	0.00	0.95	0.00	0.07	0.24	0.00				0.06	0.00	0.00
Sat Flow, veh/h	0	5274	1585	3456	5274	0				3563	0	1585
Grp Volume(v), veh/h	0	2500	0	625	2098	0				587	0	0
Grp Sat Flow(s),veh/h/ln	0	1702	1585	1728	1702	0				1781	0	1585
Q Serve(g_s), s	0.0	57.2	0.0	21.4	43.2	0.0				19.6	0.0	0.0
Cycle Q Clear(g_c), s	0.0	57.2	0.0	21.4	43.2	0.0				19.6	0.0	0.0
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	2434		761	3750	0				679	0	
V/C Ratio(X)	0.00	1.03		0.82	0.56	0.00				0.86	0.00	
Avail Cap(c_a), veh/h	0	2434		761	3750	0				825	0	
HCM Platoon Ratio	1.00	2.00	2.00	0.33	0.33	1.00				0.33	0.33	0.33
Upstream Filter(I)	0.00	0.24	0.00	0.18	0.18	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	2.8	0.0	53.3	28.4	0.0				54.7	0.0	0.0
Incr Delay (d2), s/veh	0.0	17.0	0.0	1.4	0.1	0.0				8.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	4.9	0.0	10.1	19.7	0.0				10.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	19.8	0.0	54.7	28.6	0.0				62.9	0.0	0.0
LnGrp LOS	A	F		D	C	A				E	A	
Approach Vol, veh/h		2500			2723						587	
Approach Delay, s/veh		19.8			34.6						62.9	
Approach LOS		B			C						E	

Timer - Assigned Phs		3	4		6		8					
Phs Duration (G+Y+Rc), s		30.9	61.7		27.4		92.6					
Change Period (Y+Rc), s		4.5	4.5		4.5		4.5					
Max Green Setting (Gmax), s		21.5	57.2		27.8		83.2					
Max Q Clear Time (g_c+I1), s		23.4	59.2		21.6		45.2					
Green Ext Time (p_c), s		0.0	0.0		1.3		24.6					

Intersection Summary	
HCM 6th Ctrl Delay	31.1
HCM 6th LOS	C

Notes

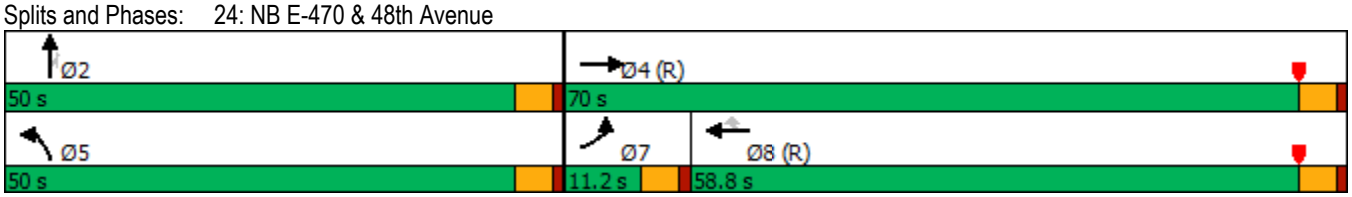
User approved volume balancing among the lanes for turning movement.

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

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Configurations							
Traffic Volume (vph)	165	2675	2150	505	360	0	645
Future Volume (vph)	165	2675	2150	505	360	0	645
Turn Type	Prot	NA	NA	Perm	Prot	NA	Perm
Protected Phases	7	4	8		5	2	
Permitted Phases				8			2
Detector Phase	7	4	8	8	5	2	2
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	11.2	70.0	58.8	58.8	50.0	50.0	50.0
Total Split (%)	9.3%	58.3%	49.0%	49.0%	41.7%	41.7%	41.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead		Lag	Lag			
Lead-Lag Optimize?	Yes		Yes	Yes			
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None
Act Effct Green (s)	6.7	65.5	54.3	54.3	45.5	45.5	45.5
Actuated g/C Ratio	0.06	0.55	0.45	0.45	0.38	0.38	0.38
v/c Ratio	0.94	1.05	1.02	0.58	0.31	0.31	1.11
Control Delay	90.3	34.6	50.2	9.2	43.7	43.7	110.5
Queue Delay	0.0	6.7	0.0	0.0	0.0	0.0	0.0
Total Delay	90.3	41.4	50.2	9.2	43.7	43.7	110.5
LOS	F	D	D	A	D	D	F
Approach Delay		44.2	42.4			86.6	
Approach LOS		D	D			F	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 14 (12%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow	
Natural Cycle: 130	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.11	
Intersection Signal Delay: 50.0	Intersection LOS: D
Intersection Capacity Utilization 99.1%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 24: NB E-470 & 48th Avenue



Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR
Lane Group Flow (vph)	179	2908	2337	549	195	196	701
v/c Ratio	0.94	1.05	1.02	0.58	0.31	0.31	1.11
Control Delay	90.3	34.6	50.2	9.2	43.7	43.7	110.5
Queue Delay	0.0	6.7	0.0	0.0	0.0	0.0	0.0
Total Delay	90.3	41.4	50.2	9.2	43.7	43.7	110.5
Queue Length 50th (ft)	76	~879	~708	80	133	134	~601
Queue Length 95th (ft)	m76	m#853	m#762	m153	m163	m163	m#691
Internal Link Dist (ft)		585	565			1471	
Turn Bay Length (ft)	225			275	225		225
Base Capacity (vph)	191	2775	2300	947	637	637	634
Starvation Cap Reductn	0	43	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.94	1.06	1.02	0.58	0.31	0.31	1.11

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	165	2675	0	0	2150	505	360	0	645	0	0	0
Future Volume (veh/h)	165	2675	0	0	2150	505	360	0	645	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	0	0	1870	1870	1870	1870	1870			
Adj Flow Rate, veh/h	179	2908	0	0	2337	0	391	0	0			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	193	4033	0	0	3556		482	0				
Arrive On Green	0.02	0.26	0.00	0.00	0.47	0.00	0.14	0.00	0.00			
Sat Flow, veh/h	3456	5274	0	0	5274	1585	3563	0	1585			
Grp Volume(v), veh/h	179	2908	0	0	2337	0	391	0	0			
Grp Sat Flow(s),veh/h/ln	1728	1702	0	0	1702	1585	1781	0	1585			
Q Serve(g_s), s	6.2	62.2	0.0	0.0	42.3	0.0	12.8	0.0	0.0			
Cycle Q Clear(g_c), s	6.2	62.2	0.0	0.0	42.3	0.0	12.8	0.0	0.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	193	4033	0	0	3556		482	0				
V/C Ratio(X)	0.93	0.72	0.00	0.00	0.66		0.81	0.00				
Avail Cap(c_a), veh/h	193	4033	0	0	3556		1351	0				
HCM Platoon Ratio	0.33	0.33	1.00	1.00	0.67	0.67	1.00	1.00	1.00			
Upstream Filter(I)	0.09	0.09	0.00	0.00	1.00	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	58.7	32.3	0.0	0.0	21.0	0.0	50.4	0.0	0.0			
Incr Delay (d2), s/veh	7.7	0.1	0.0	0.0	1.0	0.0	3.3	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	3.0	28.4	0.0	0.0	18.2	0.0	5.9	0.0	0.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.4	32.4	0.0	0.0	21.9	0.0	53.7	0.0	0.0			
LnGrp LOS	E	C	A	A	C		D	A				
Approach Vol, veh/h		3087			2337			391				
Approach Delay, s/veh		34.4			21.9			53.7				
Approach LOS		C			C			D				

Timer - Assigned Phs		2		4			7	8				
Phs Duration (G+Y+Rc), s		20.7		99.3			11.2	88.1				
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5				
Max Green Setting (Gmax), s		45.5		65.5			6.7	54.3				
Max Q Clear Time (g_c+I1), s		14.8		64.2			8.2	44.3				
Green Ext Time (p_c), s		1.4		1.3			0.0	9.0				

Intersection Summary	
HCM 6th Ctrl Delay	30.7
HCM 6th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

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

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	50	15	35	20	20	25	60	415	25	40	795	55
Future Vol, veh/h	50	15	35	20	20	25	60	415	25	40	795	55
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	-	-	-	-	-	-	150	-	-	150	-	-
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	54	16	38	22	22	27	65	451	27	43	864	60

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1347	1588	462	1121	1605	239	924	0	0	478	0	0
Stage 1	980	980	-	595	595	-	-	-	-	-	-	-
Stage 2	367	608	-	526	1010	-	-	-	-	-	-	-
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	248	171	*763	*421	166	762	1093	-	-	1081	-	-
Stage 1	604	554	-	*458	491	-	-	-	-	-	-	-
Stage 2	625	484	-	*719	530	-	-	-	-	-	-	-
Platoon blocked, %	1	1	1	1	1		1	-	-		-	-
Mov Cap-1 Maneuver	197	155	*763	*341	149	762	1093	-	-	1081	-	-
Mov Cap-2 Maneuver	197	155	-	*341	149	-	-	-	-	-	-	-
Stage 1	568	532	-	*431	462	-	-	-	-	-	-	-
Stage 2	540	455	-	*636	509	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	29.7	21.5	1	0.4
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1093	-	-	252	288	1081	-	-
HCM Lane V/C Ratio	0.06	-	-	0.431	0.245	0.04	-	-
HCM Control Delay (s)	8.5	-	-	29.7	21.5	8.5	-	-
HCM Lane LOS	A	-	-	D	C	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	2	0.9	0.1	-	-

Notes

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

Intersection	
Int Delay, s/veh	40.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	65	90	65	125	0	0	0	0	75	765	75
Future Vol, veh/h	0	65	90	65	125	0	0	0	0	75	765	75
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	-	-	-	-	-	-	-	-	-	-	-	-
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	0	71	98	71	136	0	0	0	0	82	832	82

Major/Minor	Minor2			Minor1				Major2		
Conflicting Flow All	-	1037	873	1122	1078	-		0	0	0
Stage 1	-	1037	-	0	0	-		-	-	-
Stage 2	-	0	-	1122	1078	-		-	-	-
Critical Hdwy	-	6.52	6.22	7.12	6.52	-		4.12	-	-
Critical Hdwy Stg 1	-	5.52	-	-	-	-		-	-	-
Critical Hdwy Stg 2	-	-	-	6.12	5.52	-		-	-	-
Follow-up Hdwy	-	4.018	3.318	3.518	4.018	-		2.218	-	-
Pot Cap-1 Maneuver	0	231	349	183	219	0		-	-	-
Stage 1	0	308	-	-	-	0		-	-	-
Stage 2	0	-	-	250	295	0		-	-	-
Platoon blocked, %									-	-
Mov Cap-1 Maneuver	-	231	349	100	219	-		-	-	-
Mov Cap-2 Maneuver	-	231	-	100	219	-		-	-	-
Stage 1	-	308	-	-	-	-		-	-	-
Stage 2	-	-	-	139	295	-		-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	33.9	239	
HCM LOS	D	F	

Minor Lane/Major Mvmt	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	287	156	-	-	-
HCM Lane V/C Ratio	0.587	1.324	-	-	-
HCM Control Delay (s)	33.9	239	-	-	-
HCM Lane LOS	D	F	-	-	-
HCM 95th %tile Q(veh)	3.5	12.5	-	-	-

Intersection	
Int Delay, s/veh	7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	105	0	0	75	30	115	445	95	0	0	0
Future Vol, veh/h	30	105	0	0	75	30	115	445	95	0	0	0
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	-	-	-	-	-	-	-	-	-	-	-	-
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	33	114	0	0	82	33	125	484	103	0	0	0

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	843	837	-	-	786	536	0	0	0
Stage 1	0	0	-	-	786	-	-	-	-
Stage 2	843	837	-	-	0	-	-	-	-
Critical Hdwy	7.12	6.52	-	-	6.52	6.22	4.12	-	-
Critical Hdwy Stg 1	-	-	-	-	5.52	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	-	-	4.018	3.318	2.218	-	-
Pot Cap-1 Maneuver	284	303	0	0	324	545	-	-	-
Stage 1	-	-	0	0	403	-	-	-	-
Stage 2	358	382	0	0	-	-	-	-	-
Platoon blocked, %								-	-
Mov Cap-1 Maneuver	215	303	-	-	324	545	-	-	-
Mov Cap-2 Maneuver	215	303	-	-	324	-	-	-	-
Stage 1	-	-	-	-	403	-	-	-	-
Stage 2	268	382	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	31.6	19.2	
HCM LOS	D	C	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1
Capacity (veh/h)	-	-	-	278	366
HCM Lane V/C Ratio	-	-	-	0.528	0.312
HCM Control Delay (s)	-	-	-	31.6	19.2
HCM Lane LOS	-	-	-	D	C
HCM 95th %tile Q(veh)	-	-	-	2.9	1.3

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	55	15	35	25	20	40	60	405	20	40	830	60
Future Vol, veh/h	55	15	35	25	20	40	60	405	20	40	830	60
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	-	-	-	-	-	-	150	-	-	150	-	-
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	60	16	38	27	22	43	65	440	22	43	902	65

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1382	1613	484	1126	1634	231	967	0	0	462	0	0
Stage 1	1021	1021	-	581	581	-	-	-	-	-	-	-
Stage 2	361	592	-	545	1053	-	-	-	-	-	-	-
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	252	173	*737	*468	166	771	1093	-	-	1095	-	-
Stage 1	616	557	-	*467	498	-	-	-	-	-	-	-
Stage 2	630	492	-	*695	531	-	-	-	-	-	-	-
Platoon blocked, %	1	1	1	1	1		1	-	-		-	-
Mov Cap-1 Maneuver	196	157	*737	*379	150	771	1093	-	-	1095	-	-
Mov Cap-2 Maneuver	196	157	-	*379	150	-	-	-	-	-	-	-
Stage 1	580	535	-	*439	469	-	-	-	-	-	-	-
Stage 2	533	463	-	*614	511	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	31.3	19.6	1.1	0.4
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1093	-	-	248	338	1095	-	-
HCM Lane V/C Ratio	0.06	-	-	0.46	0.273	0.04	-	-
HCM Control Delay (s)	8.5	-	-	31.3	19.6	8.4	-	-
HCM Lane LOS	A	-	-	D	C	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	2.3	1.1	0.1	-	-

Notes

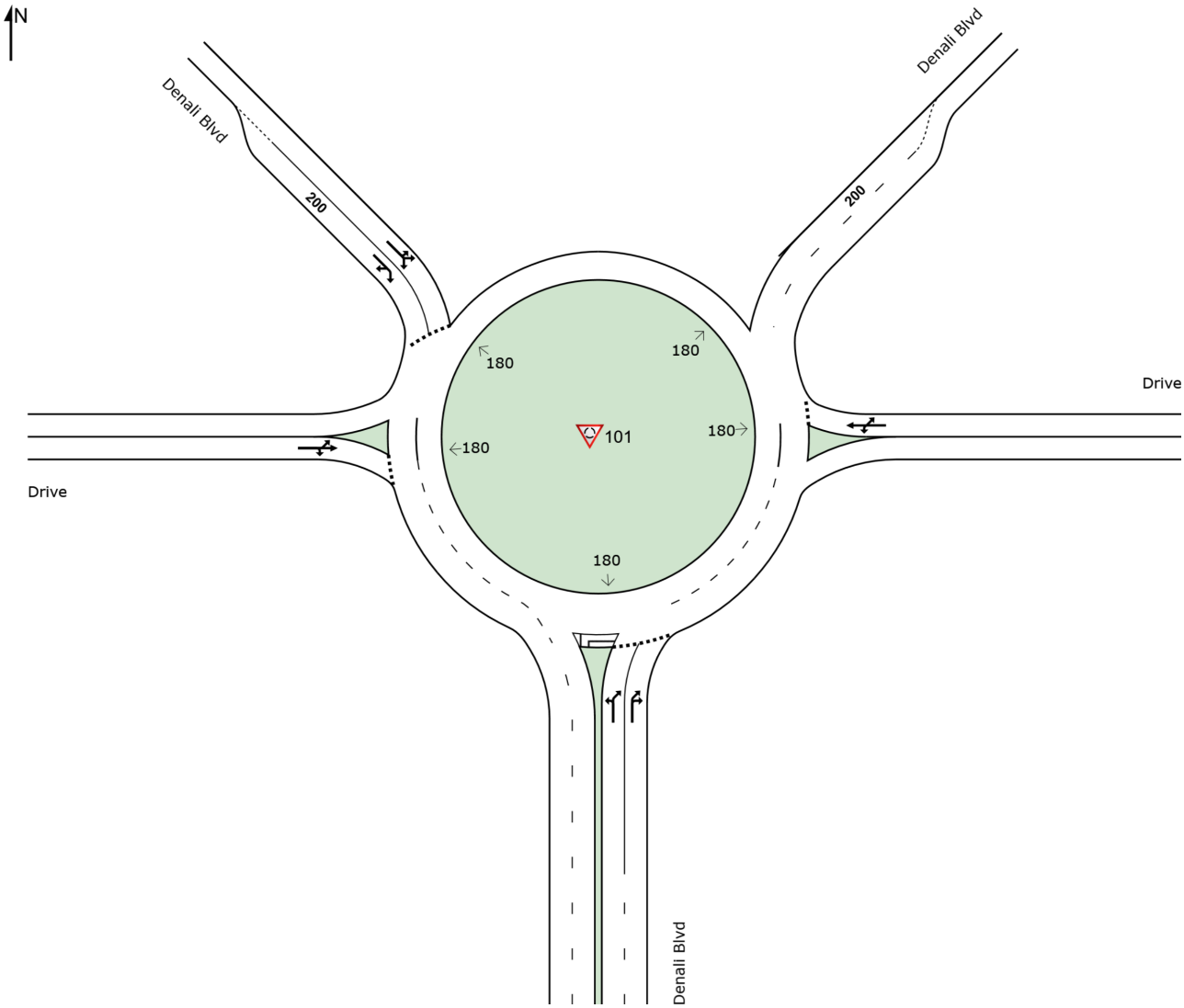
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

SITE LAYOUT

Site: 101 [AM_2040_Future Total_2-lane (Site Folder: INT # 103 - Denali Blvd)]

Intersection #103
AM Peak Hour
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [AM_2040_Future Total_2-lane (Site Folder: INT # 103 - Denali Blvd)]

Intersection #103
AM Peak Hour
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Denali Blvd														
3	L2	210	2.0	228	2.0	0.280	5.4	LOS A	1.4	35.3	0.28	0.15	0.28	35.1
18a	R1	690	2.0	750	2.0	0.528	8.8	LOS A	3.7	94.2	0.38	0.22	0.38	34.5
18	R2	35	2.0	38	2.0	0.528	8.7	LOS A	3.7	94.2	0.40	0.23	0.40	33.7
Approach		935	2.0	1016	2.0	0.528	8.1	LOS A	3.7	94.2	0.36	0.20	0.36	34.6
East: Drive														
1	L2	100	2.0	109	2.0	0.218	9.4	LOS A	0.8	19.2	0.66	0.66	0.66	32.3
6	T1	5	2.0	5	2.0	0.218	9.4	LOS A	0.8	19.2	0.66	0.66	0.66	31.8
16b	R3	5	2.0	5	2.0	0.218	9.4	LOS A	0.8	19.2	0.66	0.66	0.66	30.1
Approach		110	2.0	120	2.0	0.218	9.4	LOS A	0.8	19.2	0.66	0.66	0.66	32.2
NorthWest: Denali Blvd														
7x	L2	1	1.9	1	1.9	0.489	13.7	LOS B	3.2	80.4	0.60	0.56	0.68	35.5
7ax	L1	5	2.0	5	2.0	0.489	9.3	LOS A	3.2	80.4	0.60	0.56	0.68	34.8
14ax	R1	750	2.0	815	2.0	0.489	9.3	LOS A	3.2	80.4	0.60	0.56	0.68	34.3
14bx	R3	155	2.0	168	2.0	0.489	9.3	LOS A	3.2	80.4	0.60	0.56	0.68	32.6
Approach		911	2.0	990	2.0	0.489	9.3	LOS A	3.2	80.4	0.60	0.56	0.68	34.0
West: Drive														
5a	L1	85	2.0	92	2.0	0.446	17.0	LOS C	2.2	56.3	0.71	0.80	1.02	32.0
2	T1	10	2.0	11	2.0	0.446	12.6	LOS B	2.2	56.3	0.71	0.80	1.02	32.0
12	R2	160	2.0	174	2.0	0.446	12.6	LOS B	2.2	56.3	0.71	0.80	1.02	30.8
Approach		255	2.0	277	2.0	0.446	14.1	LOS B	2.2	56.3	0.71	0.80	1.02	31.2
All Vehicles		2211	2.0	2403	2.0	0.528	9.3	LOS A	3.7	94.2	0.51	0.44	0.58	33.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [PM_2040_Future Total_2-lane (Site Folder: INT # 103 - Denali Blvd)]

Intersection #103
PM Peak Hour
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Denali Blvd														
3	L2	300	2.0	326	2.0	0.358	6.5	LOS A	1.9	48.0	0.39	0.26	0.39	34.1
18a	R1	730	2.0	793	2.0	0.676	12.3	LOS B	7.1	179.1	0.60	0.45	0.66	32.8
18	R2	95	2.0	103	2.0	0.676	12.5	LOS B	7.1	179.1	0.63	0.48	0.70	31.8
Approach		1125	2.0	1223	2.0	0.676	10.8	LOS B	7.1	179.1	0.55	0.40	0.59	33.0
East: Drive														
1	L2	65	2.0	71	2.0	0.172	10.1	LOS B	0.6	14.5	0.70	0.70	0.70	32.2
6	T1	5	2.0	5	2.0	0.172	10.1	LOS B	0.6	14.5	0.70	0.70	0.70	31.6
16b	R3	5	2.0	5	2.0	0.172	10.1	LOS B	0.6	14.5	0.70	0.70	0.70	30.0
Approach		75	2.0	82	2.0	0.172	10.1	LOS B	0.6	14.5	0.70	0.70	0.70	32.0
NorthWest: Denali Blvd														
7x	L2	1	1.9	1	1.9	0.420	13.2	LOS B	2.2	55.4	0.59	0.54	0.61	36.0
7ax	L1	5	2.0	5	2.0	0.420	8.6	LOS A	2.2	55.4	0.59	0.54	0.61	35.3
14ax	R1	515	2.0	560	2.0	0.420	8.6	LOS A	2.2	55.4	0.59	0.54	0.61	34.7
14bx	R3	220	2.0	239	2.0	0.420	8.6	LOS A	2.2	55.4	0.59	0.54	0.61	32.9
Approach		741	2.0	805	2.0	0.420	8.6	LOS A	2.2	55.4	0.59	0.54	0.61	34.1
West: Drive														
5a	L1	115	2.0	125	2.0	0.604	18.7	LOS C	4.8	122.5	0.75	0.93	1.28	31.6
2	T1	40	2.0	43	2.0	0.604	14.1	LOS B	4.8	122.5	0.75	0.93	1.28	31.6
12	R2	290	2.0	315	2.0	0.604	14.1	LOS B	4.8	122.5	0.75	0.93	1.28	30.4
Approach		445	2.0	484	2.0	0.604	15.3	LOS C	4.8	122.5	0.75	0.93	1.28	30.8
All Vehicles		2386	2.0	2593	2.0	0.676	10.9	LOS B	7.1	179.1	0.60	0.55	0.73	32.9

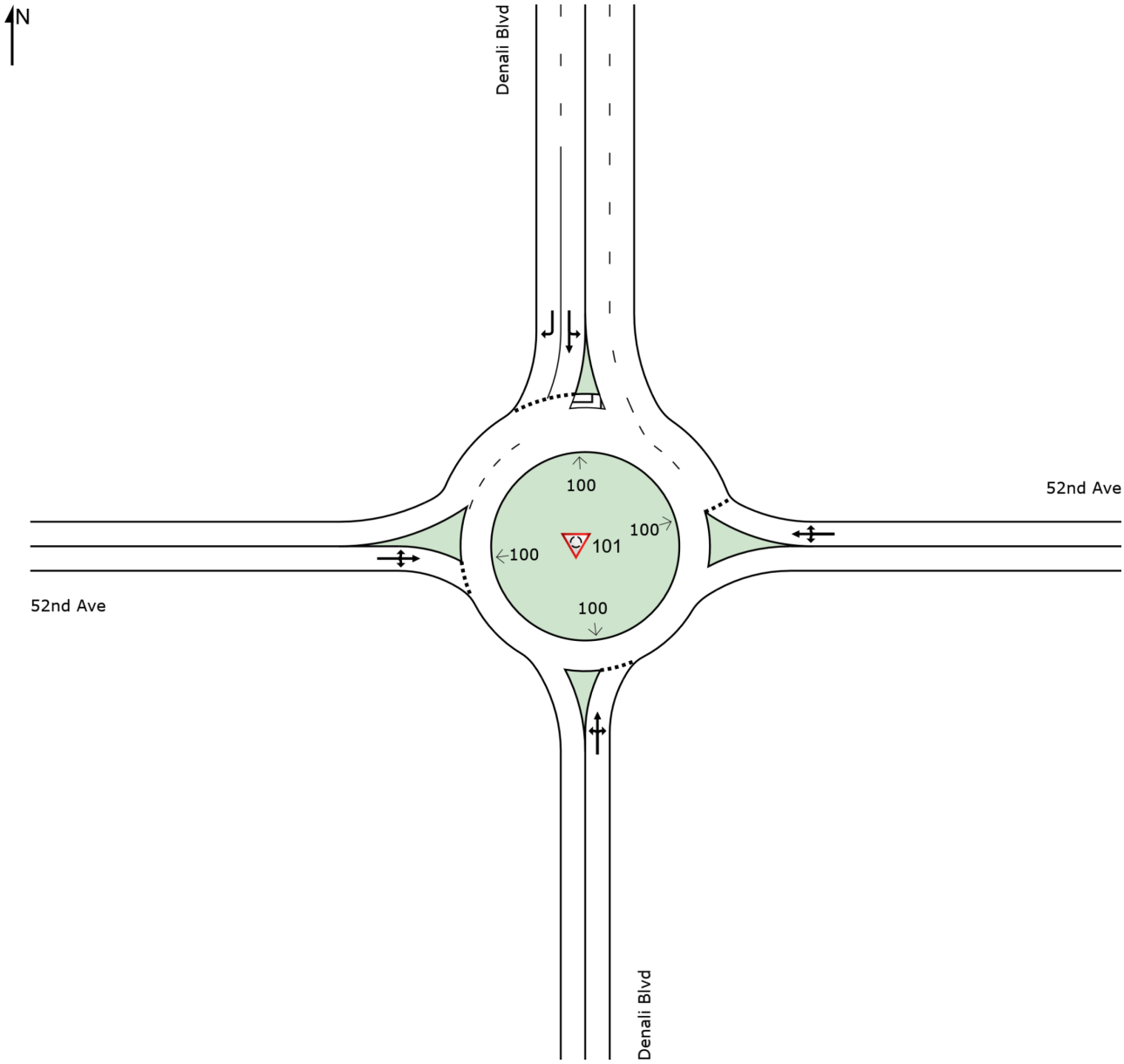
Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 101 [AM_2040_Future Total (Site Folder: INT # 102 - 52nd Ave & Denali Blvd)]

Intersection #102
AM Peak Hour
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [AM_2040_Future Total (Site Folder: INT # 102 - 52nd Ave & Denali Blvd)]

Intersection #102
AM Peak Hour
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Denali Blvd														
3	L2	45	2.0	49	2.0	0.673	12.4	LOS B	6.4	163.8	0.60	0.37	0.60	31.7
8	T1	660	2.0	717	2.0	0.673	12.4	LOS B	6.4	163.8	0.60	0.37	0.60	31.6
18	R2	30	2.0	33	2.0	0.673	12.4	LOS B	6.4	163.8	0.60	0.37	0.60	30.8
Approach		735	2.0	799	2.0	0.673	12.4	LOS B	6.4	163.8	0.60	0.37	0.60	31.6
East: 52nd Ave														
1	L2	60	2.0	65	2.0	0.215	9.3	LOS A	0.8	21.4	0.67	0.67	0.67	31.7
6	T1	10	2.0	11	2.0	0.215	9.3	LOS A	0.8	21.4	0.67	0.67	0.67	31.6
16	R2	40	2.0	43	2.0	0.215	9.3	LOS A	0.8	21.4	0.67	0.67	0.67	30.8
Approach		110	2.0	120	2.0	0.215	9.3	LOS A	0.8	21.4	0.67	0.67	0.67	31.3
North: Denali Blvd														
7	L2	20	2.0	22	2.0	0.570	9.5	LOS A	4.2	107.4	0.45	0.28	0.45	32.9
4	T1	630	2.0	685	2.0	0.570	9.5	LOS A	4.2	107.4	0.45	0.28	0.45	32.8
14	R2	35	2.0	38	2.0	0.031	3.1	LOS A	0.1	3.0	0.23	0.11	0.23	34.8
Approach		685	2.0	745	2.0	0.570	9.2	LOS A	4.2	107.4	0.44	0.27	0.44	32.9
West: 52nd Ave														
5	L2	80	2.0	87	2.0	0.287	9.7	LOS A	1.2	30.3	0.68	0.68	0.68	31.7
2	T1	15	2.0	16	2.0	0.287	9.7	LOS A	1.2	30.3	0.68	0.68	0.68	31.6
12	R2	65	2.0	71	2.0	0.287	9.7	LOS A	1.2	30.3	0.68	0.68	0.68	30.7
Approach		160	2.0	174	2.0	0.287	9.7	LOS A	1.2	30.3	0.68	0.68	0.68	31.3
All Vehicles		1690	2.0	1837	2.0	0.673	10.6	LOS B	6.4	163.8	0.55	0.38	0.55	32.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [PM_2040_Future Total (Site Folder: INT # 102 - 52nd Ave & Denali Blvd)]

Intersection #102
PM Peak Hour
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Denali Blvd														
3	L2	120	2.0	130	2.0	0.511	9.1	LOS A	3.5	88.6	0.53	0.37	0.53	32.7
8	T1	350	2.0	380	2.0	0.511	9.1	LOS A	3.5	88.6	0.53	0.37	0.53	32.7
18	R2	55	2.0	60	2.0	0.511	9.1	LOS A	3.5	88.6	0.53	0.37	0.53	31.8
Approach		525	2.0	571	2.0	0.511	9.1	LOS A	3.5	88.6	0.53	0.37	0.53	32.6
East: 52nd Ave														
1	L2	70	2.0	76	2.0	0.199	7.3	LOS A	0.8	21.0	0.61	0.60	0.61	32.6
6	T1	30	2.0	33	2.0	0.199	7.3	LOS A	0.8	21.0	0.61	0.60	0.61	32.5
16	R2	30	2.0	33	2.0	0.199	7.3	LOS A	0.8	21.0	0.61	0.60	0.61	31.6
Approach		130	2.0	141	2.0	0.199	7.3	LOS A	0.8	21.0	0.61	0.60	0.61	32.3
North: Denali Blvd														
7	L2	40	2.0	43	2.0	0.721	14.7	LOS B	12.4	314.3	0.75	0.82	1.20	30.6
4	T1	700	2.0	761	2.0	0.721	14.7	LOS B	12.4	314.3	0.75	0.82	1.20	30.4
14	R2	115	2.0	125	2.0	0.112	4.2	LOS A	0.5	11.5	0.36	0.24	0.36	34.3
Approach		855	2.0	929	2.0	0.721	13.3	LOS B	12.4	314.3	0.70	0.74	1.09	30.9
West: 52nd Ave														
5	L2	100	2.0	109	2.0	0.552	17.3	LOS C	3.4	86.6	0.79	0.95	1.29	28.9
2	T1	30	2.0	33	2.0	0.552	17.3	LOS C	3.4	86.6	0.79	0.95	1.29	28.8
12	R2	145	2.0	158	2.0	0.552	17.3	LOS C	3.4	86.6	0.79	0.95	1.29	28.1
Approach		275	2.0	299	2.0	0.552	17.3	LOS C	3.4	86.6	0.79	0.95	1.29	28.5
All Vehicles		1785	2.0	1940	2.0	0.721	12.2	LOS B	12.4	314.3	0.66	0.65	0.92	31.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX F. SIGNAL WARRANTS

MUTCD Volume-based Warrant Evaluation
0 & 56th Avenue
Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: 56th Avenue
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: 0
Lanes Moving Traffic: 2 or more
Right Turn Volume Reduced: 75% NB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	3700	3473	3246	3020	2793	2566	2339	2113
Highest Apprch. Minor Street	140 (112)	121	114	106	99	91	84	77	69

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	3700	3473	3246	3020	2793	2566	2339	2113
Highest Apprch. Minor Street	70 (56)	121	114	106	99	91	84	77	69

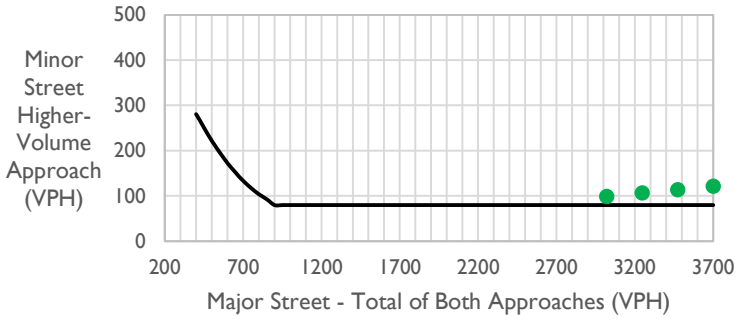
WARRANT 1, Condition A and Condition B

56% Satisfied	No

WARRANT 2, Four Hour Volume

70% Satisfied	Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	3700	121
2nd Highest	3473	114
3rd Highest	3246	106
4th Highest	3020	99



MUTCD Volume-based Warrant Evaluation
Drive 2 & 56th Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: 56th Avenue
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: Drive 2
Lanes Moving Traffic: 2 or more
Right Turn Volume Reduced: 75% NB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	3515	3300	3084	2869	2653	2438	2222	2007
Highest Apprch. Minor Street	140 (112)	104	98	91	85	79	72	66	59

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	3515	3300	3084	2869	2653	2438	2222	2007
Highest Apprch. Minor Street	70 (56)	104	98	91	85	79	72	66	59

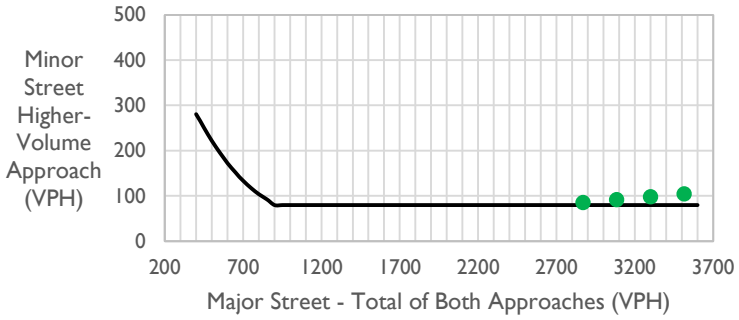
WARRANT 1, Condition A and Condition B

56% Satisfied	No

WARRANT 2, Four Hour Volume

70% Satisfied	Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	3515	104
2nd Highest	3300	98
3rd Highest	3084	91
4th Highest	2869	85



MUTCD Volume-based Warrant Evaluation
Denali Boulevard & 56th Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: 56th Avenue
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: Denali Boulevard
Lanes Moving Traffic: 2 or more
Right Turn Volume Reduced: 75% SB, 75% NB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	3155	2962	2768	2575	2382	2188	1995	1802
Highest Apprch. Minor Street	140 (112)	645	605	566	526	487	447	408	368

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	3155	2962	2768	2575	2382	2188	1995	1802
Highest Apprch. Minor Street	70 (56)	645	605	566	526	487	447	408	368

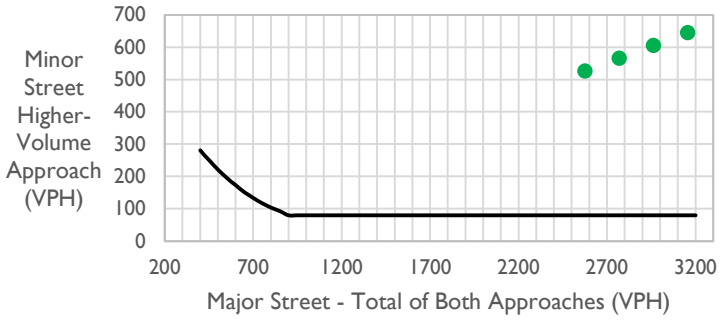
WARRANT 1, Condition A and Condition B

56% Satisfied	Yes

WARRANT 2, Four Hour Volume

70% Satisfied	Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	3155	645
2nd Highest	2962	605
3rd Highest	2768	566
4th Highest	2575	526



MUTCD Volume-based Warrant Evaluation
Fultondale Street & 56th Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: 56th Avenue
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: Fultondale Street
Lanes Moving Traffic: 2 or more
Right Turn Volume Reduced: 75% NB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	2945	2765	2584	2404	2223	2043	1862	1682
Highest Apprch. Minor Street	140 (112)	84	79	74	69	63	58	53	48

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	2945	2765	2584	2404	2223	2043	1862	1682
Highest Apprch. Minor Street	70 (56)	84	79	74	69	63	58	53	48

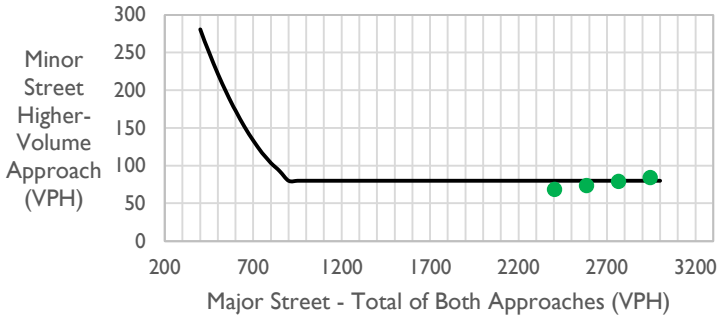
WARRANT 1, Condition A and Condition B

56% Satisfied	No

WARRANT 2, Four Hour Volume

70% Satisfied	No

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	2945	84
2nd Highest	2765	79
3rd Highest	2584	74
4th Highest	2404	69



MUTCD Volume-based Warrant Evaluation
Harvest Road & 56th Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: Harvest Road
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: 56th Avenue
Lanes Moving Traffic: 2 or more
Right Turn Volume Reduced: 25% EB, 25% WB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	2730	2563	2395	2228	2061	1893	1726	1559
Highest Apprch. Minor Street	140 (112)	1296	1217	1137	1058	978	899	819	740

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	2730	2563	2395	2228	2061	1893	1726	1559
Highest Apprch. Minor Street	70 (56)	1296	1217	1137	1058	978	899	819	740

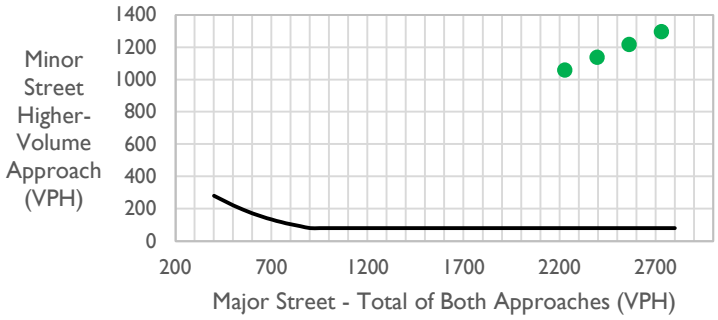
WARRANT 1, Condition A and Condition B

56% Satisfied	Yes

WARRANT 2, Four Hour Volume

70% Satisfied	Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	2730	1296
2nd Highest	2563	1217
3rd Highest	2395	1137
4th Highest	2228	1058



MUTCD Volume-based Warrant Evaluation
Harvest Road & 55th Aveune
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: Harvest Road
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: 55th Aveune
Lanes Moving Traffic: 2 or more
Right Turn Volume Reduced: 75% EB, 75% WB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	2350	2206	2062	1918	1774	1630	1486	1342
Highest Apprch. Minor Street	140 (112)	63	59	55	51	48	44	40	36

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	2350	2206	2062	1918	1774	1630	1486	1342
Highest Apprch. Minor Street	70 (56)	63	59	55	51	48	44	40	36

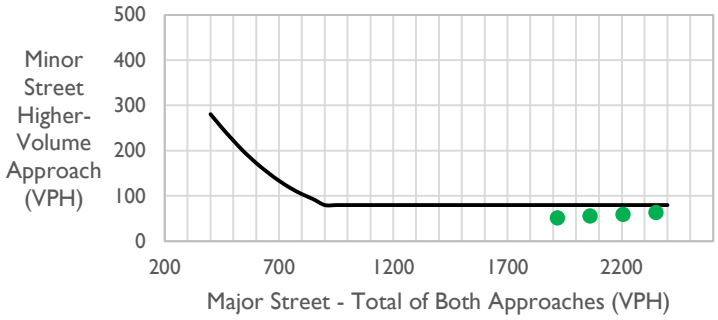
WARRANT 1, Condition A and Condition B

56% Satisfied	No

WARRANT 2, Four Hour Volume

70% Satisfied	No

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	2350	63
2nd Highest	2206	59
3rd Highest	2062	55
4th Highest	1918	51



MUTCD Volume-based Warrant Evaluation
Harvest Road & 53rd Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: Harvest Road
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: 53rd Avenue
Lanes Moving Traffic: 2 or more
Right Turn Volume Reduced: 75% EB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	2240	2103	1965	1828	1691	1554	1416	1279
Highest Apprch. Minor Street	140 (112)	35	33	31	29	26	24	22	20

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	2240	2103	1965	1828	1691	1554	1416	1279
Highest Apprch. Minor Street	70 (56)	35	33	31	29	26	24	22	20

WARRANT 1, Condition A and Condition B

56% Satisfied	No

WARRANT 2, Four Hour Volume

70% Satisfied	No

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	2240	35
2nd Highest	2103	33
3rd Highest	1965	31
4th Highest	1828	29

MUTCD Volume-based Warrant Evaluation
Harvest Road & 52nd Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: Harvest Road
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: 52nd Avenue
Lanes Moving Traffic: 2 or more
Right Turn Volume Reduced: 25% EB, 25% WB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	2210	2075	1939	1804	1668	1533	1397	1262
Highest Apprch. Minor Street	140 (112)	221	207	194	180	167	153	140	126

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	2210	2075	1939	1804	1668	1533	1397	1262
Highest Apprch. Minor Street	70 (56)	221	207	194	180	167	153	140	126

WARRANT 1, Condition A and Condition B

56% Satisfied	Yes

WARRANT 2, Four Hour Volume

70% Satisfied	Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	2210	221
2nd Highest	2075	207
3rd Highest	1939	194
4th Highest	1804	180

MUTCD Volume-based Warrant Evaluation
Harvest Road & Drive 5
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: Harvest Road
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: Drive 5
Lanes Moving Traffic: 2 or more
Right Turn Volume Reduced: 50% EB, 50% WB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	1935	1816	1698	1579	1461	1342	1223	1105
Highest Apprch. Minor Street	140 (112)	95	89	83	78	72	66	60	54

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	1935	1816	1698	1579	1461	1342	1223	1105
Highest Apprch. Minor Street	70 (56)	95	89	83	78	72	66	60	54

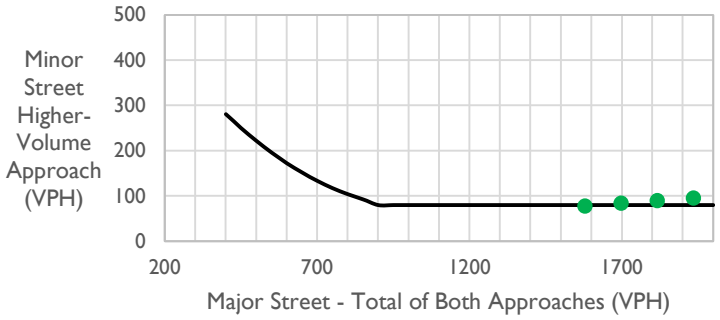
WARRANT 1, Condition A and Condition B

56% Satisfied	No

WARRANT 2, Four Hour Volume

70% Satisfied	No

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1935	95
2nd Highest	1816	89
3rd Highest	1698	83
4th Highest	1579	78



MUTCD Volume-based Warrant Evaluation
Harvest Road & 48th Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: 48th Avenue
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: Harvest Road
Lanes Moving Traffic: 2 or more
Right Turn Volume Reduced: 75% SB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	4085	3835	3584	3334	3084	2833	2583	2333
Highest Apprch. Minor Street	140 (112)	454	426	398	371	343	315	287	259

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	4085	3835	3584	3334	3084	2833	2583	2333
Highest Apprch. Minor Street	70 (56)	454	426	398	371	343	315	287	259

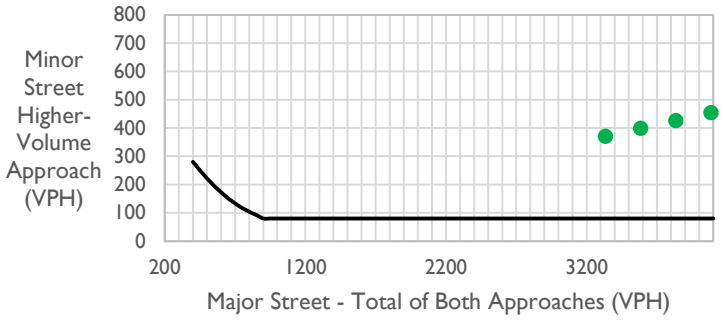
WARRANT 1, Condition A and Condition B

56% Satisfied	Yes

WARRANT 2, Four Hour Volume

70% Satisfied	Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	4085	454
2nd Highest	3835	426
3rd Highest	3584	398
4th Highest	3334	371



MUTCD Volume-based Warrant Evaluation
Fultondale Street & 48th Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: 48th Avenue
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: Fultondale Street
Lanes Moving Traffic: 2 or more
Right Turn Volume Reduced: 25% SB, 25% NB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	4370	4102	3834	3567	3299	3031	2763	2495
Highest Apprch. Minor Street	140 (112)	624	586	548	509	471	433	395	356

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	4370	4102	3834	3567	3299	3031	2763	2495
Highest Apprch. Minor Street	70 (56)	624	586	548	509	471	433	395	356

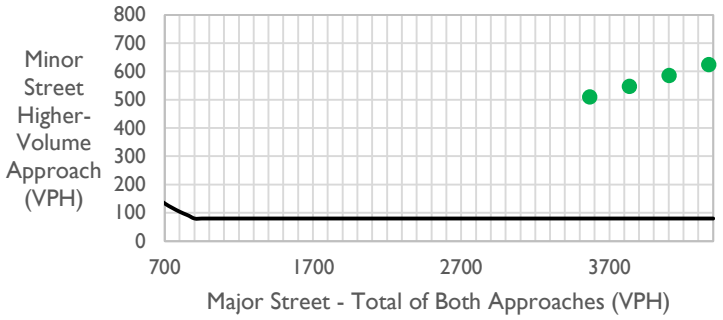
WARRANT 1, Condition A and Condition B

56% Satisfied	Yes

WARRANT 2, Four Hour Volume

70% Satisfied	Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	4370	624
2nd Highest	4102	586
3rd Highest	3834	548
4th Highest	3567	509



MUTCD Volume-based Warrant Evaluation
Denali Boulevard & 48th Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: 48th Avenue
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: Denali Boulevard
Lanes Moving Traffic: 2 or more
Right Turn Volume Reduced: 75% SB, 75% NB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	4920	4618	4317	4015	3714	3412	3111	2809
Highest Apprch. Minor Street	140 (112)	1153	1082	1012	941	870	800	729	658

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	4920	4618	4317	4015	3714	3412	3111	2809
Highest Apprch. Minor Street	70 (56)	1153	1082	1012	941	870	800	729	658

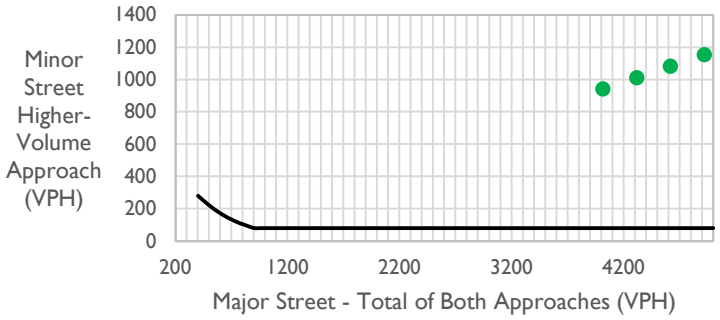
WARRANT 1, Condition A and Condition B

56% Satisfied	Yes

WARRANT 2, Four Hour Volume

70% Satisfied	Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	4920	1153
2nd Highest	4618	1082
3rd Highest	4317	1012
4th Highest	4015	941



MUTCD Volume-based Warrant Evaluation
Buchanan Street & 48th Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: 48th Avenue
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: Buchanan Street
Lanes Moving Traffic: 2 or more
Right Turn Volume Reduced: 50% SB, 50% NB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	5590	5247	4905	4562	4220	3877	3534	3192
Highest Apprch. Minor Street	140 (112)	553	519	485	451	417	384	350	316

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	5590	5247	4905	4562	4220	3877	3534	3192
Highest Apprch. Minor Street	70 (56)	553	519	485	451	417	384	350	316

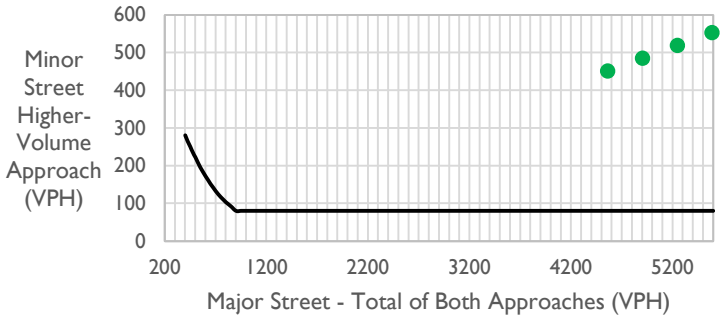
WARRANT 1, Condition A and Condition B

56% Satisfied	Yes

WARRANT 2, Four Hour Volume

70% Satisfied	Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	5590	553
2nd Highest	5247	519
3rd Highest	4905	485
4th Highest	4562	451



MUTCD Volume-based Warrant Evaluation
Drive 7 & 48th Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: 48th Avenue
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: Drive 7
Lanes Moving Traffic: 1
Right Turn Volume Reduced: 75% SB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	5830	5473	5115	4758	4401	4044	3686	3329
Highest Apprch. Minor Street	105 (84)	68	64	60	55	51	47	43	39

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	5830	5473	5115	4758	4401	4044	3686	3329
Highest Apprch. Minor Street	53 (42)	68	64	60	55	51	47	43	39

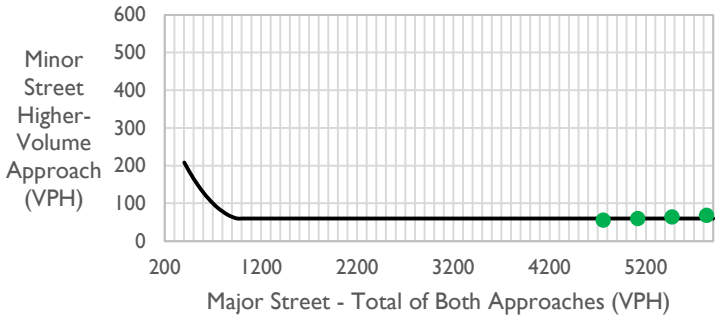
WARRANT 1, Condition A and Condition B

56% Satisfied	No

WARRANT 2, Four Hour Volume

70% Satisfied	No

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	5830	68
2nd Highest	5473	64
3rd Highest	5115	60
4th Highest	4758	55



MUTCD Volume-based Warrant Evaluation
Wenatchee Street & 48th Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: 48th Avenue
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: Wenatchee Street
Lanes Moving Traffic: 1
Right Turn Volume Reduced: 25% SB, 25% NB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	4735	4445	4155	3864	3574	3284	2994	2704
Highest Apprch. Minor Street	105 (84)	285	268	250	233	215	198	180	163

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	4735	4445	4155	3864	3574	3284	2994	2704
Highest Apprch. Minor Street	53 (42)	285	268	250	233	215	198	180	163

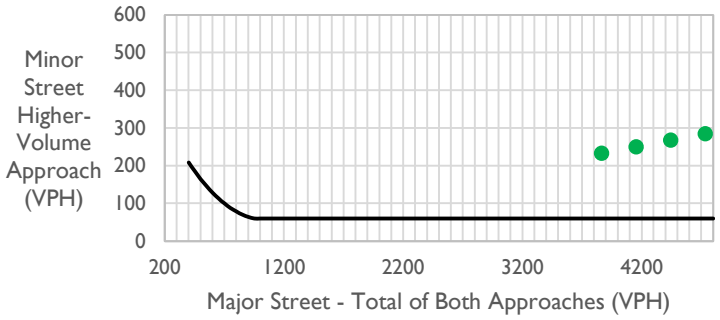
WARRANT 1, Condition A and Condition B

56% Satisfied	Yes

WARRANT 2, Four Hour Volume

70% Satisfied	Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	4735	285
2nd Highest	4445	268
3rd Highest	4155	250
4th Highest	3864	233



MUTCD Volume-based Warrant Evaluation
Tibet Road & 45th Plaza
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: Tibet Road
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: 45th Plaza
Lanes Moving Traffic: 1
Right Turn Volume Reduced: 25% WB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	1025	962	899	837	774	711	648	585
Highest Apprch. Minor Street	105 (84)	89	84	78	73	67	62	56	51

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	1025	962	899	837	774	711	648	585
Highest Apprch. Minor Street	53 (42)	89	84	78	73	67	62	56	51

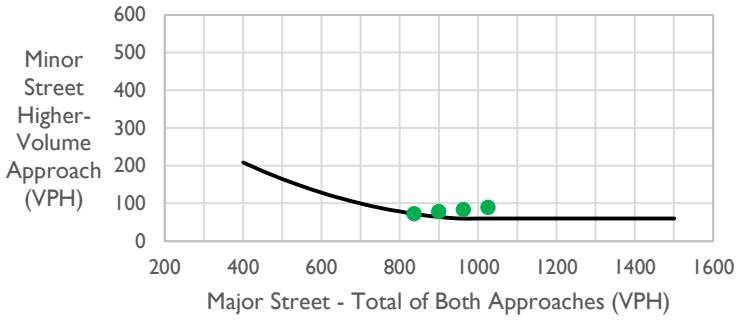
WARRANT 1, Condition A and Condition B

56% Satisfied	No

WARRANT 2, Four Hour Volume

70% Satisfied	No

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1025	89
2nd Highest	962	84
3rd Highest	899	78
4th Highest	837	73



MUTCD Volume-based Warrant Evaluation
Tibet Road & 47th Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: Tibet Road
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: 47th Avenue
Lanes Moving Traffic: 1
Right Turn Volume Reduced: 25% WB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	1200	1126	1053	979	906	832	759	685
Highest Apprch. Minor Street	105 (84)	89	84	78	73	67	62	56	51

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	1200	1126	1053	979	906	832	759	685
Highest Apprch. Minor Street	53 (42)	89	84	78	73	67	62	56	51

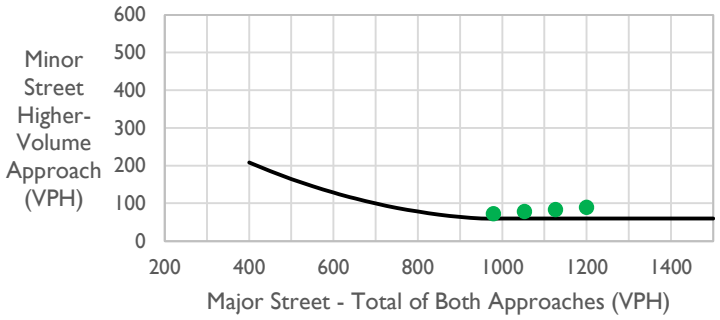
WARRANT 1, Condition A and Condition B

56% Satisfied	No

WARRANT 2, Four Hour Volume

70% Satisfied	Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1200	89
2nd Highest	1126	84
3rd Highest	1053	78
4th Highest	979	73



MUTCD Volume-based Warrant Evaluation
Tibet Road & 48th Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: 48th Avenue
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: Tibet Road
Lanes Moving Traffic: 2 or more
Right Turn Volume Reduced: 50% SB, 50% NB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	4050	3802	3554	3305	3057	2809	2561	2313
Highest Apprch. Minor Street	140 (112)	898	843	788	733	678	623	568	513

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	4050	3802	3554	3305	3057	2809	2561	2313
Highest Apprch. Minor Street	70 (56)	898	843	788	733	678	623	568	513

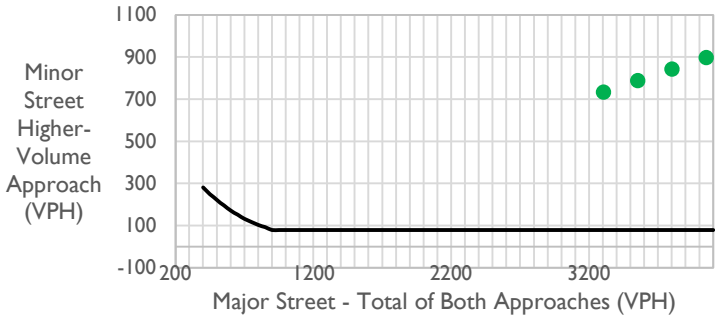
WARRANT 1, Condition A and Condition B

56% Satisfied	Yes

WARRANT 2, Four Hour Volume

70% Satisfied	Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	4050	898
2nd Highest	3802	843
3rd Highest	3554	788
4th Highest	3305	733



MUTCD Volume-based Warrant Evaluation
Tibet Road & Drive 8
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: Tibet Road
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: Drive 8
Lanes Moving Traffic: 2 or more
Right Turn Volume Reduced: 25% EB, 25% WB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	2200	2065	1930	1796	1661	1526	1391	1256
Highest Apprch. Minor Street	140 (112)	85	80	75	69	64	59	54	49

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	2200	2065	1930	1796	1661	1526	1391	1256
Highest Apprch. Minor Street	70 (56)	85	80	75	69	64	59	54	49

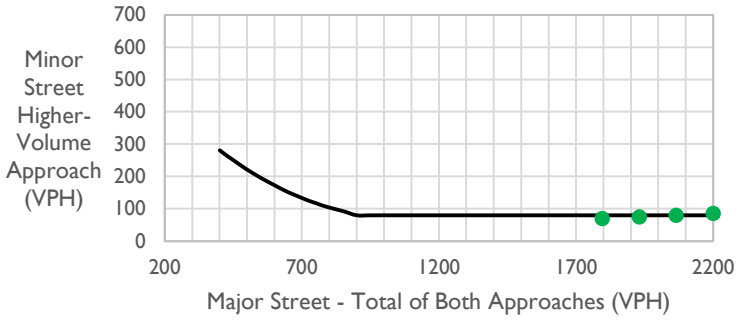
WARRANT 1, Condition A and Condition B

56% Satisfied	No

WARRANT 2, Four Hour Volume

70% Satisfied	No

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	2200	85
2nd Highest	2065	80
3rd Highest	1930	75
4th Highest	1796	69



MUTCD Volume-based Warrant Evaluation
Tibet Road & 52nd Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: Tibet Road
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: 52nd Avenue
Lanes Moving Traffic: 2 or more
Right Turn Volume Reduced: 25% EB, 25% WB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	2130	1999	1869	1738	1608	1477	1347	1216
Highest Apprch. Minor Street	140 (112)	231	217	203	189	174	160	146	132

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	2130	1999	1869	1738	1608	1477	1347	1216
Highest Apprch. Minor Street	70 (56)	231	217	203	189	174	160	146	132

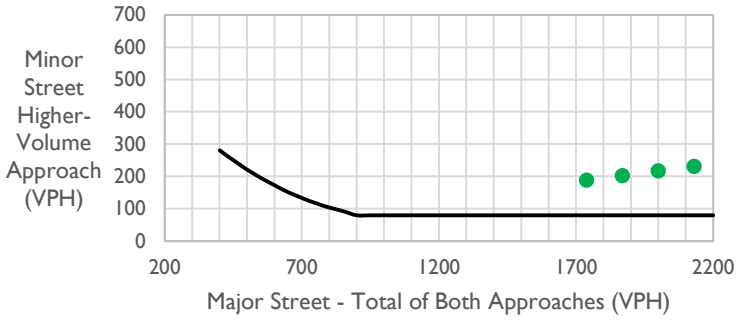
WARRANT 1, Condition A and Condition B

56% Satisfied	Yes

WARRANT 2, Four Hour Volume

70% Satisfied	Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	2130	231
2nd Highest	1999	217
3rd Highest	1869	203
4th Highest	1738	189



MUTCD Volume-based Warrant Evaluation
SB E-470 & 56th Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: 56th Avenue
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: SB E-470
Lanes Moving Traffic: 2 or more
Right Turn Volume Reduced: 75% SB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	3465	3253	3040	2828	2616	2403	2191	1979
Highest Apprch. Minor Street	140 (112)	365	343	320	298	276	253	231	208

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	3465	3253	3040	2828	2616	2403	2191	1979
Highest Apprch. Minor Street	70 (56)	365	343	320	298	276	253	231	208

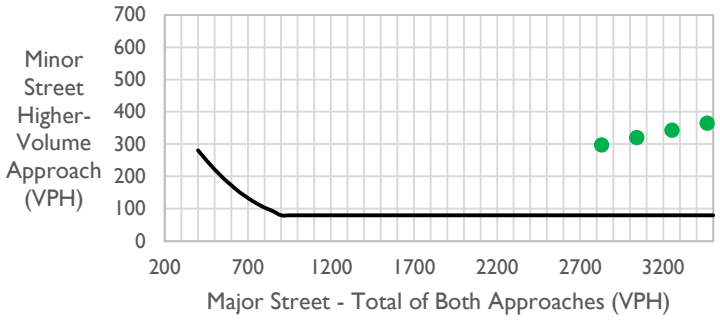
WARRANT 1, Condition A and Condition B

56% Satisfied	Yes

WARRANT 2, Four Hour Volume

70% Satisfied	Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	3465	365
2nd Highest	3253	343
3rd Highest	3040	320
4th Highest	2828	298



MUTCD Volume-based Warrant Evaluation
NB E-470 & 56th Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: 56th Avenue
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: NB E-470
Lanes Moving Traffic: 2 or more
Right Turn Volume Reduced: 75% NB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	3630	3408	3185	2963	2740	2518	2295	2073
Highest Apprch. Minor Street	140 (112)	285	268	250	233	215	198	180	163

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	3630	3408	3185	2963	2740	2518	2295	2073
Highest Apprch. Minor Street	70 (56)	285	268	250	233	215	198	180	163

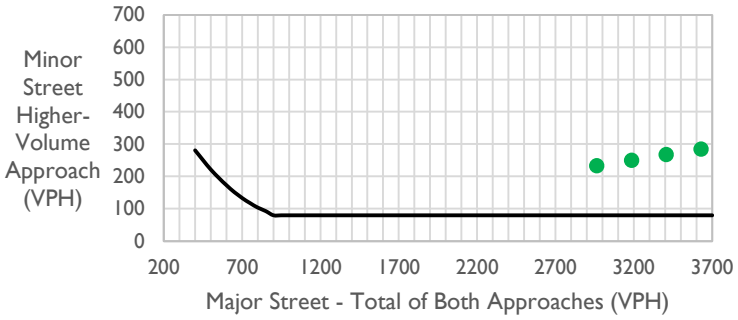
WARRANT 1, Condition A and Condition B

56% Satisfied	Yes

WARRANT 2, Four Hour Volume

70% Satisfied	Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	3630	285
2nd Highest	3408	268
3rd Highest	3185	250
4th Highest	2963	233



MUTCD Volume-based Warrant Evaluation
SB E-470 & 48th Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: 48th Avenue
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: SB E-470
Lanes Moving Traffic: 2 or more
Right Turn Volume Reduced: 75% SB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	5090	4778	4466	4154	3842	3530	3218	2906
Highest Apprch. Minor Street	140 (112)	631	592	554	515	476	438	399	360

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	5090	4778	4466	4154	3842	3530	3218	2906
Highest Apprch. Minor Street	70 (56)	631	592	554	515	476	438	399	360

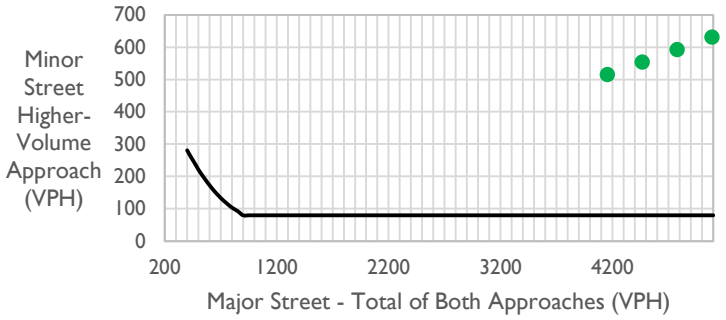
WARRANT 1, Condition A and Condition B

56% Satisfied	Yes

WARRANT 2, Four Hour Volume

70% Satisfied	Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	5090	631
2nd Highest	4778	592
3rd Highest	4466	554
4th Highest	4154	515



MUTCD Volume-based Warrant Evaluation
NB E-470 & 48th Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: 48th Avenue
Lanes Moving Traffic: 2 or more
Approach Speed: 45 MPH
Option: High speed major-street

Minor Street: NB E-470
Lanes Moving Traffic: 2 or more
Right Turn Volume Reduced: 75% NB

WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	5495	5158	4821	4485	4148	3811	3474	3138
Highest Apprch. Minor Street	140 (112)	521	489	457	425	393	361	329	297

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied	Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	5495	5158	4821	4485	4148	3811	3474	3138
Highest Apprch. Minor Street	70 (56)	521	489	457	425	393	361	329	297

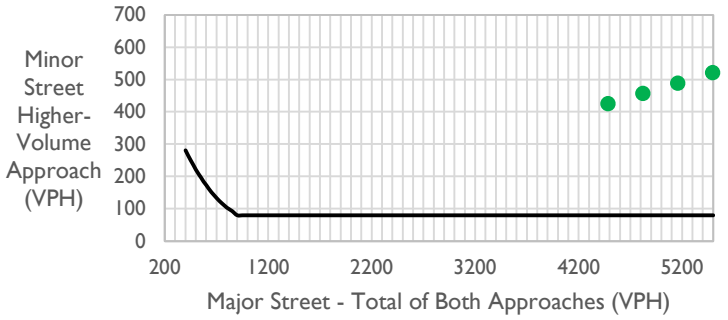
WARRANT 1, Condition A and Condition B

56% Satisfied	Yes

WARRANT 2, Four Hour Volume

70% Satisfied	Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	5495	521
2nd Highest	5158	489
3rd Highest	4821	457
4th Highest	4485	425



MUTCD Volume-based Warrant Evaluation
Denali Boulevard & 54th Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: Denali Boulevard
Lanes Moving Traffic: 2 or more
Approach Speed: 30 MPH
Option: Low speed, urban community

Minor Street: 54th Avenue
Lanes Moving Traffic: 1
Right Turn Volume Reduced: 25% EB, 25% WB

WARRANT 1, Condition A - Minimum Vehicular Volume

100% Satisfied	No

	Vehicles per hour 100% (80%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	600 (480)	1185	1112	1040	967	895	822	749	677
Highest Apprch. Minor Street	150 (120)	91	85	80	74	69	63	58	52

WARRANT 1, Condition B - Interruption of Continuous Traffic

100% Satisfied	No

	Vehicles per hour 100% (80%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	900 (720)	1185	1112	1040	967	895	822	749	677
Highest Apprch. Minor Street	75 (60)	91	85	80	74	69	63	58	52

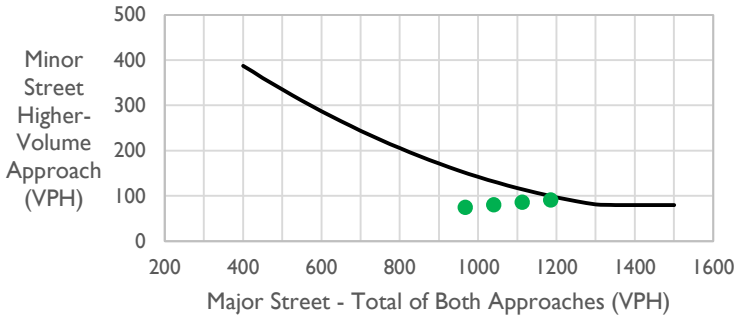
WARRANT 1, Condition A and Condition B

80% Satisfied	No

WARRANT 2, Four Hour Volume

100% Satisfied	No

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1185	91
2nd Highest	1112	85
3rd Highest	1040	80
4th Highest	967	74



MUTCD Volume-based Warrant Evaluation
Denali Boulevard & 53rd Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: Denali Boulevard
Lanes Moving Traffic: 2 or more
Approach Speed: 30 MPH
Option: Low speed, urban community

Minor Street: 53rd Avenue
Lanes Moving Traffic: 1
Right Turn Volume Reduced: 25% EB, 25% WB

WARRANT 1, Condition A - Minimum Vehicular Volume

100% Satisfied	No

	Vehicles per hour 100% (80%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	600 (480)	1125	1056	987	918	849	780	711	642
Highest Apprch. Minor Street	150 (120)	239	224	210	195	180	166	151	136

WARRANT 1, Condition B - Interruption of Continuous Traffic

100% Satisfied	No

	Vehicles per hour 100% (80%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	900 (720)	1125	1056	987	918	849	780	711	642
Highest Apprch. Minor Street	75 (60)	239	224	210	195	180	166	151	136

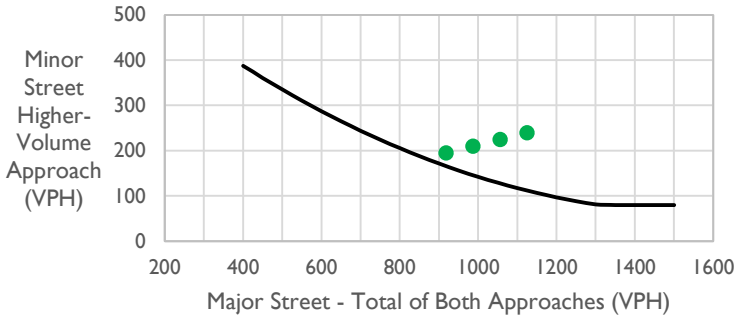
WARRANT 1, Condition A and Condition B

80% Satisfied	No

WARRANT 2, Four Hour Volume

100% Satisfied	Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1125	239
2nd Highest	1056	224
3rd Highest	987	210
4th Highest	918	195



MUTCD Volume-based Warrant Evaluation
SB Denali Boulevard & Drive 9
Future Total (2040)

Major Street:	SB Denali Boulevard	Minor Street:	Drive 9
Lanes Moving Traffic:	2 or more	Lanes Moving Traffic:	1
Approach Speed:	30 MPH	Right Turn Volume Reduced:	25% EB, 25% WB
Option:	Low speed, urban community		

WARRANT 1, Condition A - Minimum Vehicular Volume

100% Satisfied	Yes

	Vehicles per hour 100% (80%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	600 (480)	1605	1507	1408	1310	1212	1113	1015	916
Highest Apprch. Minor Street	150 (120)	373	350	327	304	282	259	236	213

WARRANT 1, Condition B - Interruption of Continuous Traffic

100% Satisfied	Yes

	Vehicles per hour 100% (80%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	900 (720)	1605	1507	1408	1310	1212	1113	1015	916
Highest Apprch. Minor Street	75 (60)	373	350	327	304	282	259	236	213

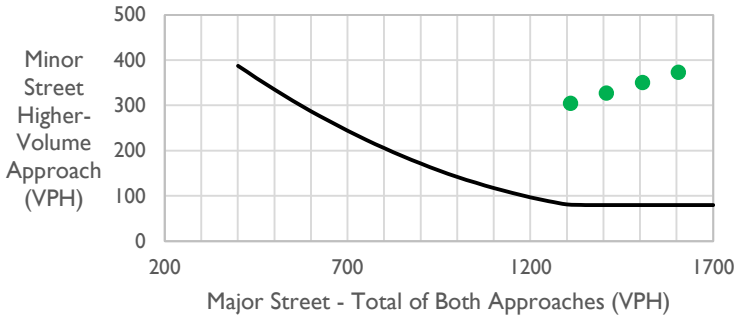
WARRANT 1, Condition A and Condition B

80% Satisfied	Yes

WARRANT 2, Four Hour Volume

100% Satisfied	Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1605	373
2nd Highest	1507	350
3rd Highest	1408	327
4th Highest	1310	304



MUTCD Volume-based Warrant Evaluation
SB Denali Boulevard & 52nd Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: SB Denali Boulevard
Lanes Moving Traffic: 1
Approach Speed: 30 MPH
Option: Low speed, urban community

Minor Street: 52nd Avenue
Lanes Moving Traffic: 1
Right Turn Volume Reduced: 25% EB, 25% WB

WARRANT 1, Condition A - Minimum Vehicular Volume

100% Satisfied	No

	Vehicles per hour 100% (80%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	500 (400)	565	530	496	461	426	392	357	323
Highest Apprch. Minor Street	150 (120)	190	178	167	155	143	132	120	108

WARRANT 1, Condition B - Interruption of Continuous Traffic

100% Satisfied	No

	Vehicles per hour 100% (80%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	750 (600)	565	530	496	461	426	392	357	323
Highest Apprch. Minor Street	75 (60)	190	178	167	155	143	132	120	108

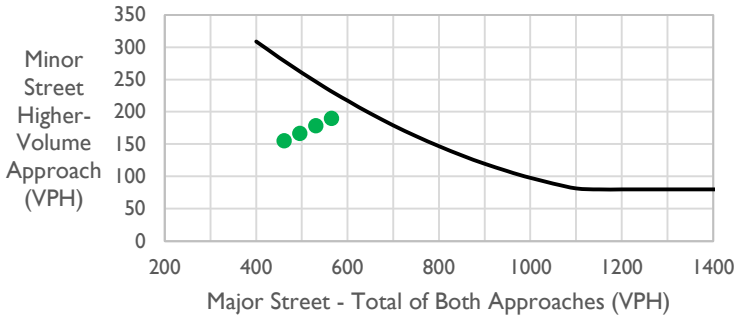
WARRANT 1, Condition A and Condition B

80% Satisfied	No

WARRANT 2, Four Hour Volume

100% Satisfied	No

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	565	190
2nd Highest	530	178
3rd Highest	496	167
4th Highest	461	155



MUTCD Volume-based Warrant Evaluation
NB Denali Boulevard & 52nd Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: NB Denali Boulevard
Lanes Moving Traffic: 1
Approach Speed: 30 MPH
Option: Low speed, urban community

Minor Street: 52nd Avenue
Lanes Moving Traffic: 1
Right Turn Volume Reduced: 25% EB, 25% WB

WARRANT 1, Condition A - Minimum Vehicular Volume

100% Satisfied	No

	Vehicles per hour 100% (80%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	500 (400)	655	615	575	535	494	454	414	374
Highest Apprch. Minor Street	150 (120)	135	127	118	110	102	94	85	77

WARRANT 1, Condition B - Interruption of Continuous Traffic

100% Satisfied	No

	Vehicles per hour 100% (80%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	750 (600)	655	615	575	535	494	454	414	374
Highest Apprch. Minor Street	75 (60)	135	127	118	110	102	94	85	77

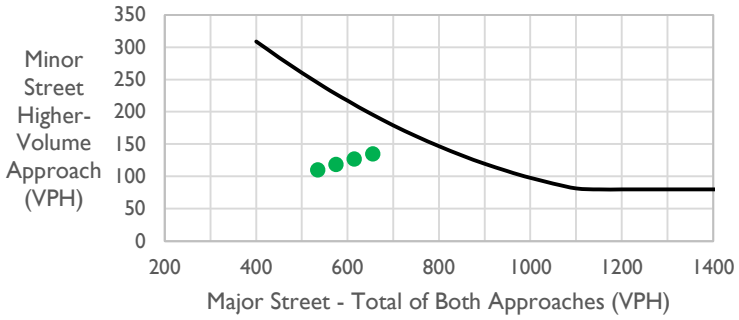
WARRANT 1, Condition A and Condition B

80% Satisfied	No

WARRANT 2, Four Hour Volume

100% Satisfied	No

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	655	135
2nd Highest	615	127
3rd Highest	575	118
4th Highest	535	110



MUTCD Volume-based Warrant Evaluation
Denali Boulevard & 55th Avenue
Future Total (2040)

FELSBURG HOLT & ULLEVIG

Major Street: Denali Boulevard
Lanes Moving Traffic: 2 or more
Approach Speed: 30 MPH
Option: Low speed, urban community

Minor Street: 55th Avenue
Lanes Moving Traffic: 1
Right Turn Volume Reduced: 25% EB, 25% WB

WARRANT 1, Condition A - Minimum Vehicular Volume

100% Satisfied	No

	Vehicles per hour 100% (80%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	600 (480)	1260	1183	1106	1028	951	874	797	719
Highest Apprch. Minor Street	150 (120)	96	90	84	78	72	67	61	55

WARRANT 1, Condition B - Interruption of Continuous Traffic

100% Satisfied	No

	Vehicles per hour 100% (80%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	900 (720)	1260	1183	1106	1028	951	874	797	719
Highest Apprch. Minor Street	75 (60)	96	90	84	78	72	67	61	55

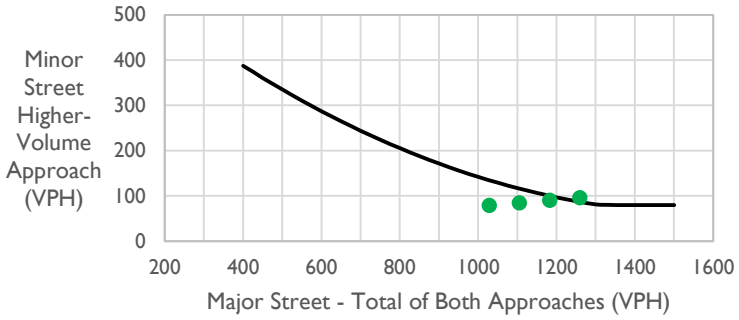
WARRANT 1, Condition A and Condition B

80% Satisfied	No

WARRANT 2, Four Hour Volume

100% Satisfied	No

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1260	96
2nd Highest	1183	90
3rd Highest	1106	84
4th Highest	1028	78



APPENDIX G. LOS/DELAY SUMMARY TABLE

Future (2040) LOS/Delay Summary Table

Location	Approach	Movement	Level of Service (AM / PM)		Delay (s) (AM / PM)	
#1 - Drive 1 & 56th Avenue	Eastbound	Signalized	A	A	2.1	12.9
	Westbound		A	A	3.1	4.1
	Northbound		A	A	52.6	54.9
	Total		**A**	**A**	**4.4**	**10.4**
#2 - Drive 2 & 56th Avenue	Eastbound	Signalized	A	A	4.5	7
	Westbound		A	A	3.2	3.7
	Northbound		A	A	55.2	55
	Total		**A**	**A**	**5.8**	**7.2**
#3 - Denali Boulevard & 56th Avenue	Eastbound	Signalized	C	B	20.8	17.6
	Westbound		C	C	22.9	23.8
	Northbound		C	D	32.2	37.7
	Southbound		C	C	25.3	26.0
	Total		**C**	**D**	**24.5**	**23.4**
#4 - Fultondale Street & 56th Avenue	Westbound	Left	a	b	0.01	0.2
	Northbound	Left	c	c	21.3	22.5
		Right	b	b	21.3	22.5
#5 - Harvest Road & 56th Avenue	Eastbound	Signalized	D	D	25.8	33.7
	Westbound		D	D	41.7	47.2
	Northbound		C	D	49.5	50.2
	Southbound		C	D	27.3	40.4
	Total		**D**	**D**	**36.3**	**42.6**
#6 - Harvest Road & 55th Avenue	Eastbound	Thru/left	c	f	29.5	25.3
		Right	a	b	29.5	25.3
	Westbound	Thru/left	c	f	18.1	19.3
		Right	b	b	18.8	19.3
	Northbound	Left	a	a	0.1	0.2
	Southbound	Left	a	a	2.2	1.5
#7 - Harvest Road & 53rd Avenue	Eastbound	Left	c	d	12.3	15.3
		Right	a	b	12.3	15.3
	Northbound	Left	a	a	0.1	0.3
#8 - Harvest Road & 52nd Avenue	Eastbound	Signalized	D	E	29.1	25.1
	Westbound		D	C	49	49.7
	Northbound		B	C	5.6	16.8
	Southbound		B	A	5.6	18.6
	Total		**C**	**B**	**13.6**	**20.9**
#9 - Harvest Road & Drive 5	Eastbound	Thru/left	f	f	24.2	179.6
		Right	a	b	24.2	179.6
	Westbound	Thru/left	e	f	14.3	21.5
		Right	b	c	14.3	21.5
	Northbound	Left	a	a	0	0.1
	Southbound	Left	b	b	3.5	2.5
#10 - Harvest Road & 48th Avenue	Eastbound	Signalized	A	A	23.5	10.6
	Westbound		C	D	19.2	22
	Southbound		A	A	35.1	31.9
	Total		**B**	**C**	**23.2**	**18.8**
#11 - Fultondale Street & 48th Avenue	Eastbound	Signalized	A	C	22.8	7.1
	Westbound		B	A	23.8	11
	Northbound		D	D	46.5	42.7
	Southbound		D	E	17.5	33
	Total		**B**	**B**	**26.7**	**11.8**

Location	Approach	Movement	Level of Service (AM / PM)		Delay (s) (AM / PM)	
#12 - Denali Boulevard & 48th Avenue	Eastbound	Signalized	D	C	19.7	41.7
	Westbound		D	E	32.5	24.6
	Northbound		E	E	52.8	60.8
	Southbound		E	C	43.8	40.7
	Total		**E**	**D**	**34.2**	**40.5**
#13 - Buchanan Street & 48th Avenue	Eastbound	Signalized	D	D	41.6	9.3
	Westbound		B	E	36.2	17.2
	Northbound		E	F	51.9	211.7
	Southbound		D	E	23	111.9
	Total		**C**	**D**	**39.7**	**41.1**
#14 - Drive 7 & 48th Avenue	Southbound	Right	c	f	12.3	12.9
#15 - Wenatchee Street & 48th Avenue	Eastbound	Signalized	A	A	27.1	36.8
	Westbound		A	A	24.8	27.1
	Northbound		E	F	25.4	43.9
	Southbound		D	D	32.4	53.5
	Total		**A**	**B**	**26.1**	**33.6**
#16 - Tibet Road & 45th Plaza	Westbound	Left/Right	b	b	13	13.9
	Southbound	Left	a	a	1.7	1.9
#17 - Tibet Road & 47th Avenue	Westbound	Left/Right	c	c	14.6	15.5
	Southbound	Left	a	a	1.5	1.6
#18 - Tibet Road & 48th Avenue	Eastbound	Signalized	D	D	40.6	49.7
	Westbound		C	C	45.9	39
	Northbound		E	E	41.8	51.2
	Southbound		E	E	45.2	58.5
	Total		**D**	**D**	**43.3**	**47.7**
#19 - Tibet Road & Drive 8	Eastbound	Left/thru/right	b	c	25	41.4
	Westbound	Left	b	e	88.9	442.1
		Thru/right	b	b	11.8	14.5
	Northbound	Left	a	a	0	0.1
	Southbound	Left	a	a	1	0.1
#20 - Tibet Road & 52nd Avenue	Eastbound	Signalized	E	D	23.2	22
	Westbound		D	D	27.3	29.7
	Northbound		A	C	9	13.8
	Southbound		C	C	11	17.7
	Total		**B**	**C**	**11.7**	**16.7**
#21 - SB E-470 & 56th Avenue	Eastbound	Signalized	A	C	17.2	26.1
	Westbound		C	C	18	7.7
	Southbound		E	E	41.1	34.1
	Total		**C**	**C**	**20.6**	**19.3**
#22 - NB E-470 & 56th Avenue	Eastbound	Signalized	B	C	12.9	11.7
	Westbound		A	B	18.6	20.7
	Northbound		E	E		
	Total		**B**	**B**		

Location	Approach	Movement	Level of Service (AM / PM)		Delay (s) (AM / PM)	
#23 - SB E-470 & 48th Avenue	Eastbound	Signalized	A	B	18.7	58.4
	Westbound		C	C	10.7	16.4
	Southbound		E	E	41.3	55.9
	Total		**B**	**C**	**17.7**	**40.3**
#24 - NB E-470 & 48th Avenue	Eastbound	Signalized	D	C	12.5	42.9
	Westbound		D	C	23.1	51.8
	Northbound		C	D	77.7	86.6
	Total		**B**	**C**	**26.8**	**53.3**
#101 - Denali Boulevard & 54th Avenue	Eastbound	Left/thru/right	d	d	54.2	147.2
	Westbound	Left/thru/right	c	c	45.1	49.2
	Northbound	Left	a	a	0.2	1.2
	Southbound	Left	a	a	0.3	0.4
#102 - Denali Boulevard & 53rd Avenue	Eastbound	Left/thru/right	a	c	9.7	17.3
	Westbound	Left/thru/right	a	a	9.3	7.3
	Northbound	Left/thru/right	b	a	12.4	9.1
	Southbound	Thru/left	a	b	9.5	14.7
		Right	a	a	3.1	4.2
#103 - Denali Boulevard & Drive 9	Eastbound	Left/thru/right	b	c	14.1	15.3
	Westbound	Left/thru/right	a	b	9.4	10.1
	Northbound	Left/thru	a	a	5.4	6.5
		Thru/Right	a	b	8.8	12.5
	Southbound	Thru/left	b	b	13.7	13.2
		Thruu/Right	a	a	9.3	8.6
#104 - SB Denali Boulevard & 52nd Avenue	Eastbound	Thru/left	c	d	23	35.7
	Westbound	Thru/right	f	f	65.5	299.6
#105 - NB Denali Boulevard & 52nd Avenue	Eastbound	Thru/right	d	d	31.9	37
	Westbound	Thru/left	c	c	21.8	20.6
#106 - Denali Boulevard & 55th Avenue	Eastbound	Left/thru/right	d	d	54.1	219
	Westbound	Left/thru/right	d	c	50.5	51.1
	Northbound	Left	a	a	0.2	1.3
	Southbound	Left	a	a	0.3	0.4