

# **PORT COLORADO – SUBAREA 2**

## **Traffic Impact Analysis**

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## I. INTRODUCTION

Port Colorado, formerly TransPort Colorado, is planning to develop Subarea 2 of their master-planned business and industrial park in the City of Aurora, Colorado. Subarea 2 is an 1,860-acre parcel that is approximately bounded north-south by 56<sup>th</sup> Avenue and 32<sup>nd</sup> Avenue, and east-west by Imboden Road/Quail Run Road and Manila Road. The project will be developed with light industrial uses.

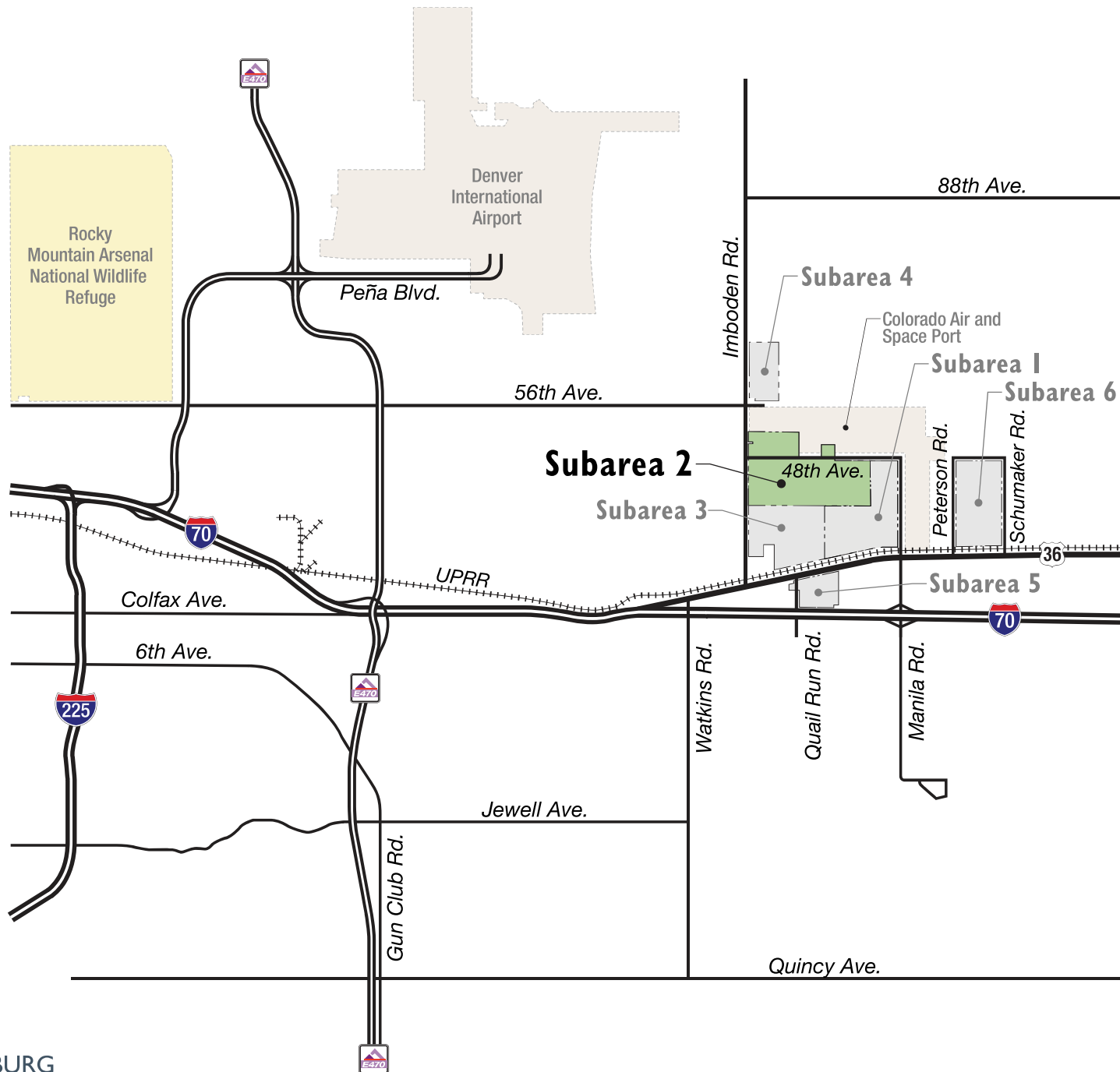
**Figure 1** provides a vicinity map of the project location, and **Figure 2** illustrates the proposed site plan.

This Traffic Impact Analysis (TIA) assesses the traffic impacts related to the development of Port Colorado Subarea 2. Specific elements of this report are based on pre-application notes provided by the City of Aurora in September 2021. Short- and Long-Term future scenarios were explored for this site. These scenarios examine the traffic impacts within the context of the year 2040 and the future regional planning horizon beyond the year 2040.

The following summarizes what is included in this report:

- Evaluation of existing operational conditions
- Trip generation estimates for the proposed land uses
- Analysis of project impacts
- Consistency with the *Northeast Aurora Transportation Study Refresh (NEATS Refresh)*
- Discussion on pedestrian trail construction adjacent Bear Gulch
- Recommendations for public improvements

This study builds from analyses provided in the *TransPort Colorado Traffic Impact Study Analysis*, July 2022, prepared by Felsburg Holt & Ullevig, which addressed transportation needs of the 5,378-acre Port Colorado Framework Development Plan (FDP).





## II. EXISTING CONDITIONS

### II.A. Land Use

The area that immediately surrounds the site is largely undeveloped with the exception of the Colorado Air and Space Port (Space Port) to the north. Residential and commercial uses exist in the Towns of Watkins and Bennett, while the Prosper residential and commercial site is developing approximately one mile to the west along the south side of I-70. The Rocky Mountain Rail Park, a rail-served property, is an approved Adams County project that abuts Subarea 6 on the west side of Peterson Road. The site itself is currently vacant.

### II.B. Roadway System

The Port Colorado Subarea 2 site will occupy nearly 3 square miles of land. Several existing roadways are spaced along one-mile land sections, although most of these roads currently have very little traffic and are somewhat discontinuous. More detailed descriptions of the primary roadways adjacent to and near the project site follow.

#### ***Interstate 70 (I-70)***

I-70 is a major interstate route that bisects the state of Colorado at its approximate north/south midpoint. Not only is this route the primary east/west corridor for interstate travel in Colorado, but this route provides access to many states outside Colorado, from Utah to Maryland. I-70 has four travel lanes for vehicle movements and is posted with a speed limit of 75 miles per hour (MPH) in the study area.

An interchange with I-70 near the project site, the Manila Road Interchange, is approximately 2 miles southeast of Port Colorado Subarea 2. However, a new interchange at the Imboden Road/Quail Run Road alignment is being proposed as the primary interstate access route for the Port Colorado Subarea 2 land uses, and it is currently proceeding through the Colorado Department of Transportation (CDOT) I60I process for interchange approval.

#### ***United States 36 (US 36)***

The southern boundary of the project lies along approximately one mile of Union Pacific Railroad (UPRR) trackage that is directly adjacent to the north side of US 36. The UPRR and US 36 parallel each other along the entire length of Port Colorado's southern boundary. The centerline-to-centerline distance between these two facilities is approximately 200 feet. US 36 is two lanes wide and has a posted speed limit of 55 MPH. Several section line roadways intersect US 36, and each intersecting roadway is controlled by stop signs at US 36. CDOT classifies US 36 as a Rural Highway (R-B) in this area.

#### ***Manila Rd, Cavanaugh Rd, Quail Run Rd, Quail Run Dr, & Imboden Road/Quail Run Road Dr***

Each of these roadways exists at one-mile intervals in or near Port Colorado Subarea 2, with each having a north/south orientation.

Manila Road provides access to the main entryway for the Space Port via 48<sup>th</sup> Avenue, and it has a posted speed of 45 MPH. Manila Road provides an interchange with I-70 and continues south into Arapahoe County.

Cavanaugh Road will provide the main entryway for the three PA-8 parcels, as well as PA-9, in Port Colorado Subarea 2. Cavanaugh Road currently does not exist in the study area but is planned to extend from 32<sup>nd</sup> Avenue to 48<sup>th</sup> Avenue just south of the Air and Space Port.

Imboden Road/Quail Run Road currently does not exist but is planned to provide access from Imboden Road/Quail Run Road to 32<sup>nd</sup> Avenue, then to the new interchange at I-70.

Quail Run Drive, similar to Cavanaugh Road, does not currently exist but will provide access to parcels 6, 7, 8A, & 9 within Port Colorado Subarea 2. It will extend from 32<sup>nd</sup> Avenue to 48<sup>th</sup> Avenue, south of the Air and Space Port.

Imboden Road/Quail Run Road is a two-lane paved roadway extending from US 36 on the south to 144<sup>th</sup> Avenue on the north. This roadway will be the main access to parcels 5 and 2 in the Subarea 2 development.

### **32<sup>nd</sup>, 42<sup>nd</sup>, 48<sup>th</sup>, & 56<sup>th</sup> Avenues**

These roadways have an east/west orientation and are separated by a one-mile distance. 32<sup>nd</sup> Avenue is a planned roadway from Manila Road to Imboden Road/Quail Run Road and will provide connectivity between Manila Road, Cavanaugh Road, Quail Run Drive, and Imboden Road/Quail Run Road.

42<sup>nd</sup> Avenue is planned to be a local roadway providing access to parcels 8A, 8B, 8C, and 9 within Subarea 2.

48<sup>th</sup> Avenue is an unmarked paved roadway with a width of 20 feet in the study area. It provides connectivity from Manila Road to Imboden Road/Quail Run Road Drive and, with the development of Subarea 2, will provide access to parcels 2, 3, 4, 5, 6, 8A, and 8B.

56<sup>th</sup> Avenue is currently an unpaved roadway from Imboden Road/Quail Run Road Drive to Imboden Road/Quail Run Road. However, in the future, this roadway is planned to be a regional connector and will provide access to E-470 to the west.

## **II.C. Rail Facility**

The UPRR parallels the southern boundary of Port Colorado. The UPRR trackage extends from the Denver metropolitan area to the east into Kansas and points beyond. There is only one track within the railroad right-of-way; approximately three trains use this track each day.

## **II.D. Traffic Volumes**

Existing traffic volumes were recorded at Imboden Road/Quail Run Road with 56<sup>th</sup> Avenue in February 2020 and traffic counts were recorded in September of 2018 and grown at a rate of two percent per year to reflect 2023 conditions. These movements were recorded during the AM and PM peak hours, the typical time periods when vehicle activity is greatest. As shown on **Figure 3**, vehicle volumes are quite low when compared to traffic volume levels in other parts of the Denver metropolitan area. The majority of movements are less than 100 vehicles per hour (vph). **Appendix A** includes the recorded traffic volume data.

## **II.E. Traffic Control**

Control of vehicle movements at intersections surrounding Port Colorado Subarea 2 is carried out via stop signs. All stop signs are used on the “minor” street intersection approaches where vehicle right-of-way assignment is necessary.



## II.F. Traffic Operations

Traffic operations within the study area were evaluated according to techniques documented in the *Highway Capacity Manual*, 6<sup>th</sup> Edition (Transportation Research Board, 2016) using the existing traffic volumes, intersection geometry, and traffic control. Level of Service (LOS) is a qualitative measure of traffic operational conditions based on roadway capacity and vehicle delay. LOS is described by a letter designation ranging from A to F, with LOS A representing almost free-flow travel, while LOS F represents congested conditions. Synchro II software was used to evaluate how well the existing intersection is operating.

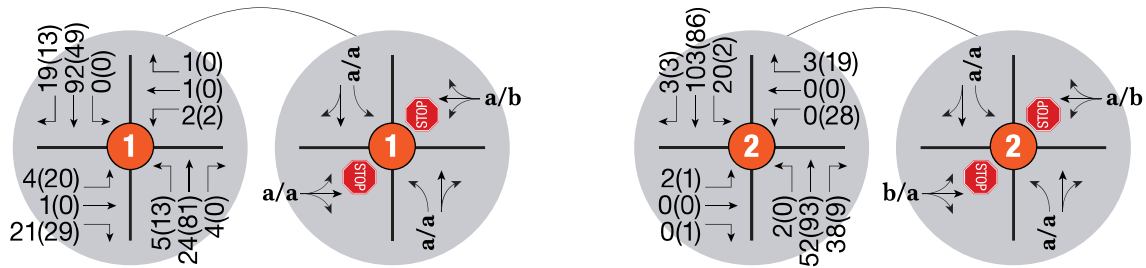
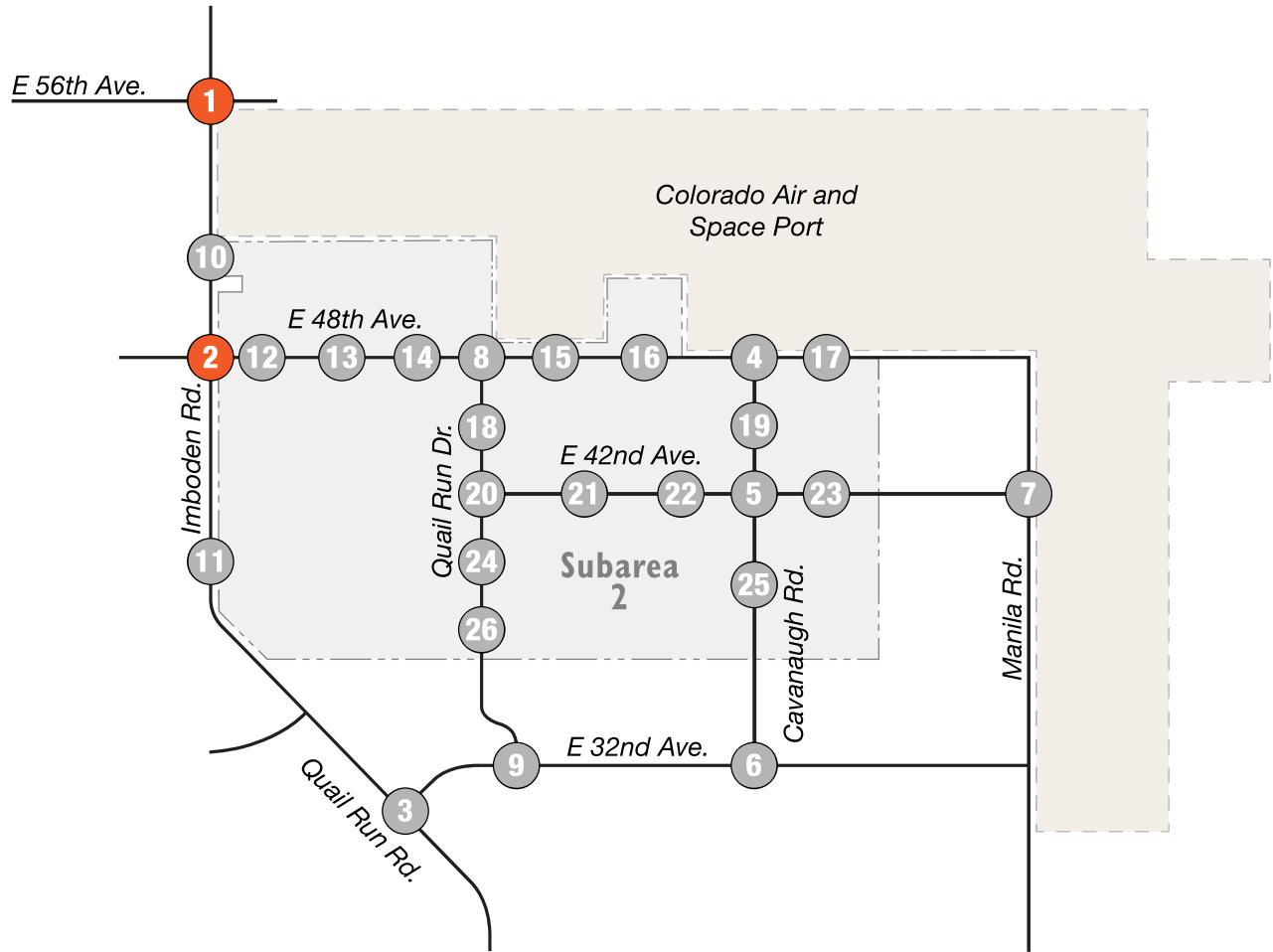
For stop-controlled intersections, LOS is calculated for each vehicle movement that must yield the right-of-way to an oncoming or crossing vehicle. In urbanized areas, LOS D is typically considered to be acceptable for peak hour traffic operations and is the standard set in the City of Aurora Traffic Impact Study guidelines.

**Figure 3** shows the existing traffic control, intersection geometry, and results of the LOS analyses. **Appendix B** includes the LOS criteria, and **Appendix C** includes the analysis worksheets. All movements currently operate within acceptable parameters, at LOS B or better during peak hours, with most movements operating at LOS A. **Table I** outlines the LOS and delay by movement for the study intersection for existing conditions.

**Table I. Existing Conditions LOS and Delay Summary**

Intersection		Movement	Existing Conditions	
			AM LOS (delay [sec])	PM LOS (delay [sec])
1	Imboden Road/Quail Run Road & 56 <sup>th</sup> Avenue	EBLTR	a (9.3)	a (9.5)
		WBLTR	a (9.6)	b (10.2)
		NBL	a (7.6)	a (7.5)
		SBL	a (0.0)	a (0.0)
2	Imboden Road/Quail Run Road & 48 <sup>th</sup> Avenue	EBLTR	b (10.5)	a (9.6)
		WBLTR	a (8.8)	b (10.0)
		NBL	a (7.6)	a (0.0)
		SBL	a (7.6)	a (7.6)

# KEY MAP



## LEGEND

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

**XXXX** = Daily Traffic Volumes

x/x = AM/PM Peak Hour Unsignalized Intersection Level of Service

= Stop Sign

= Intersection Numbers

= Future Intersection

### III. PORT COLORADO SUBAREA 2 SITE TRAFFIC

#### III.A. Site Trip Generation

Trip generation estimates for Port Colorado Subarea 2 are based on information contained in *Trip Generation*, 10<sup>th</sup> Edition, by the Institute of Transportation Engineers (ITE), 2017, and custom rates based on user provided data from other nearby developments within Aurora. Through correspondence with the City of Aurora, the Data Center and Warehouse land use categories were used for the trip generation estimates for all industrial sites. The user defined data for Data Center indicates a 1.47 million square foot facility would have 432 employees and expect 180 truck deliveries per day. It was determined that this results in a daily trip generation of 1,310 trips and equates to a rate of 0.89 trips per 1,000 SF. This is approximately a 10 percent reduction as compared to data provided by ITE for Data Center Land Use Code #160. The Warehousing uses utilize ITE provided data for High-Cube Transload and Short-Term Storage Warehouse Land Use Code #154. **Table 2** details the results of these estimates.

**Table 2. Colorado Subarea 2 Trip Generation Estimates**

Planning Area	Land Use	Developable Acreage	Potential Building Square Footage (KSF) <sup>1</sup>	Land Use % of Acreage	Land Use Size (KSF)	Daily Vehicle -Trips	AM			PM		
							In	Out	Total	In	Out	Total
PA-2a	Data Center	79.5	623.3	75%	467.5	416	23	19	42	11	26	37
	Warehouse			25%	155.8	266	20	6	26	8	20	28
	Sub Total			100%	623	683	43	25	68	19	46	65
PA-3	Data Center	149.6	1173.0	75%	879.7	783	43	36	79	21	49	70
	Warehouse			25%	293.2	501	38	12	50	15	38	53
	Sub Total			100%	1,173	1,284	81	48	129	36	87	123
PA-4	Data Center	36.8	288.5	75%	216.4	193	10	9	19	5	12	17
	Warehouse			25%	72.1	123	9	3	12	4	9	13
	Sub Total			100%	289	316	19	12	31	9	21	30
PA-5	Data Center	132.4	1038.1	75%	778.6	693	39	31	70	19	43	62
	Warehouse			25%	259.5	444	34	10	44	13	34	47
	Sub Total			100%	1,038	1,137	73	41	114	32	77	109

Planning Area	Land Use	Developable Acreage	Potential Building Square Footage (KSF) <sup>1</sup>	Land Use % of Acreage	Land Use Size (KSF)	Daily Vehicle -Trips	AM			PM		
							In	Out	Total	In	Out	Total
PA-6	Data Center	345.4	2708.2	75%	2031.2	1,808	101	82	183	49	113	162
	Warehouse			25%	677.1	1,158	89	26	115	34	88	122
	Sub Total			100%	2,708	2,965	190	108	298	83	201	284
PA-7	Data Center	72.16	565.8	75%	424.3	378	21	17	38	10	24	34
	Warehouse			25%	141.4	242	18	6	24	7	18	25
	Sub Total			100%	566	620	39	23	62	17	42	59
PA-8a	Data Center	316.1	2478.5	75%	1858.9	1,654	92	75	167	45	104	149
	Warehouse			25%	619.6	1,060	81	24	105	31	81	112
	Sub Total			100%	2,478	2,714	173	99	272	76	185	261
PA-8b	Data Center	159.1	1247.5	75%	935.6	833	46	38	84	23	52	75
	Warehouse			25%	311.9	533	41	12	53	16	40	56
	Sub Total			100%	1,247	1,366	87	50	137	39	92	131
PA-8c	Data Center	160.5	1258.4	75%	943.8	840	47	38	85	23	53	76
	Warehouse			25%	314.6	538	41	12	53	16	41	57
	Sub Total			100%	1,258	1,378	88	50	138	39	94	133
PA-9	Data Center	317.7	2491.0	75%	1868.3	1,663	92	76	168	45	105	150
	Warehouse			25%	622.8	1,065	82	24	106	31	81	112
	Sub Total			100%	2,491	2,728	174	100	274	76	186	262
Totals		1,769	13,872	100%	13,872	15,190	967	556	1,523	426	1,031	1,457

The equations and directional splits that follow were extracted from the *Trip Generation Manual*, 11<sup>th</sup> Edition, ITE, 2021 to formulate the trip generation shown on **Table 2**. Note that the Data Center rates below takes a 10 percent reduction to the rates from the manual based on the user defined data presented earlier in this section. It should be noted that the *TransPort Colorado Traffic Impact Study Analysis*, July 2022 used the 10<sup>th</sup> edition of the *Trip Generation Manual*, as that was current at the time, and rates used in this study may differ.

### **Data Center**

	<b>Average Rate</b>	<b>Split</b>
Daily:	$T=0.89 \times x$	In: 50% Out: 50%
AM Peak:	$T=0.09 \times x$	In: 55% Out: 45%
PM Peak:	$T=0.08 \times x$	In: 30% Out: 70%

### **High-Cube Transload and Short-Term Storage Warehouse**

	<b>Average Rate</b>	<b>Split</b>
Daily:	$T=1.71 \times x$	In: 50% Out: 50%
AM Peak:	$T=0.17 \times x$	In: 77% Out: 23%
PM Peak:	$T=0.18 \times x$	In: 28% Out: 72%

Due to both the large size and relative isolation of the Port Colorado development, it is estimated that there will be additional interactions that take place between the industrial land uses and the mixed-use parcels that would result in trips to the adjacent roadway network but not to the regional transportation network. An additional 9 percent of traffic to/from Subarea 5 is projected to interact with the industrial planning areas. This percentage is consistent with the interactions seen between the TAZ in the *NEATS Refresh* model that represents Subarea 5 and the other two TAZs that encompass Port Colorado. Therefore, along with the above shown trip generation estimates, an internal trip capture estimate related to movements to/from Subarea 5 of Port Colorado is included in background traffic, which will generate trips to and from parcels within Subarea 2. Subarea 5 is anticipated to be mixed use with retail, restaurants, and hotels that will have a sub-regional draw from the rest of Port Colorado beyond the internal capture within Subarea 5 itself. Although this internal capture will make trip generation from the year 2040 to the Long-Term horizon slightly different, the Long-Term trip generation is shown on **Figure 4** as a conservative representation. It was assumed that approximately 9 percent of trips generated by Subarea 5 would be to and from other parcels within Port Colorado including Subarea 2.

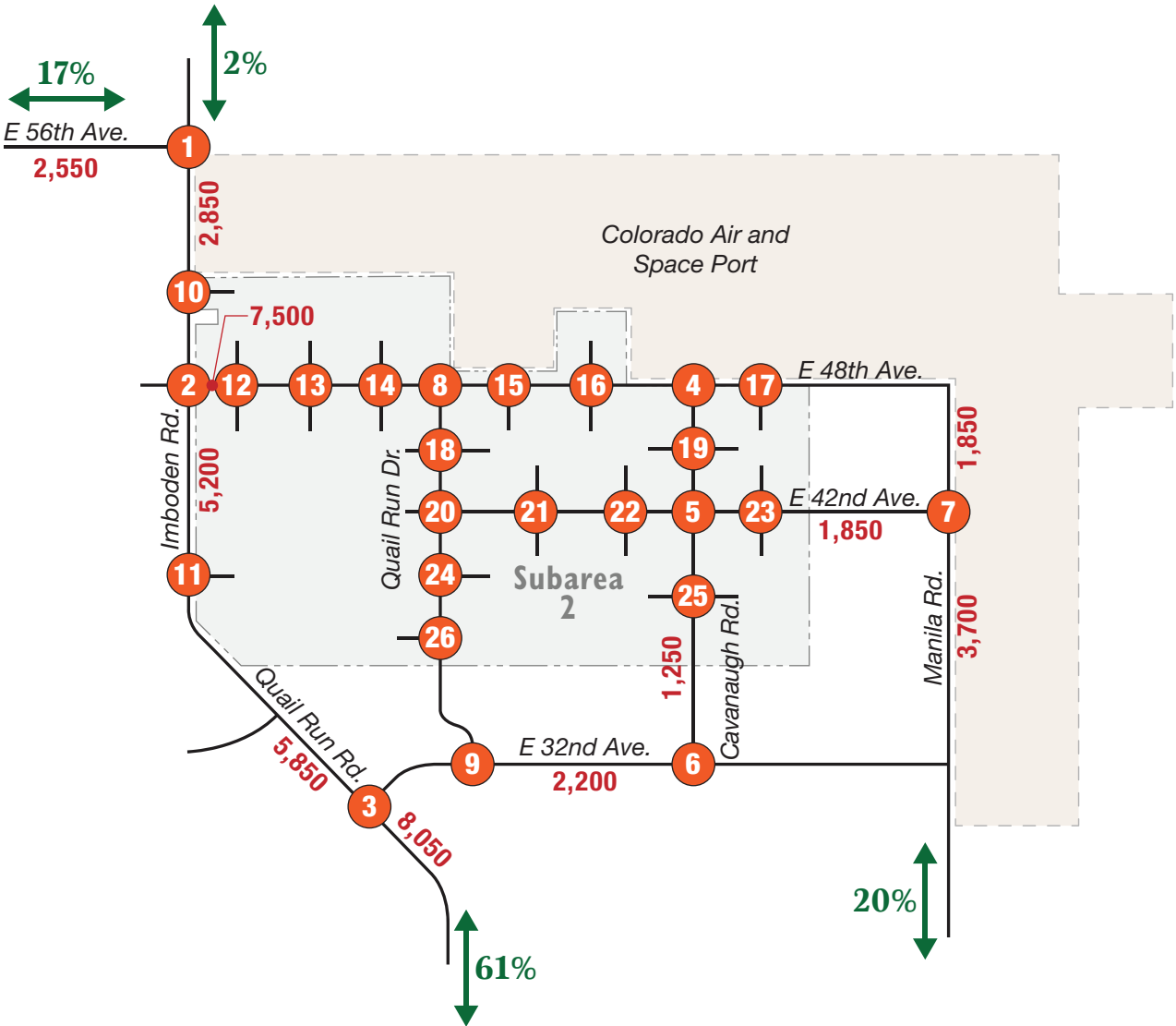
Of note, the current proposal for Subarea 2 represents a significant decrease in projected traffic when compared to the *TransPort Colorado Traffic Impact Study Analysis*, July 2022. Previous estimates of daily traffic were 18,242 trips. The current proposal represents a 17 percent daily reduction in traffic for the parcels within Subarea 2. This is largely a result of a shift to a land use mix that is 75 percent Data Center and 25 percent Warehousing as compared to the previous assumption of a 50/50 split. This change has been made at the request of the Port Colorado as market data suggests that there is a higher demand for Data Center than previously assumed.

### **III.B. Trip Distribution and Traffic Assignment**

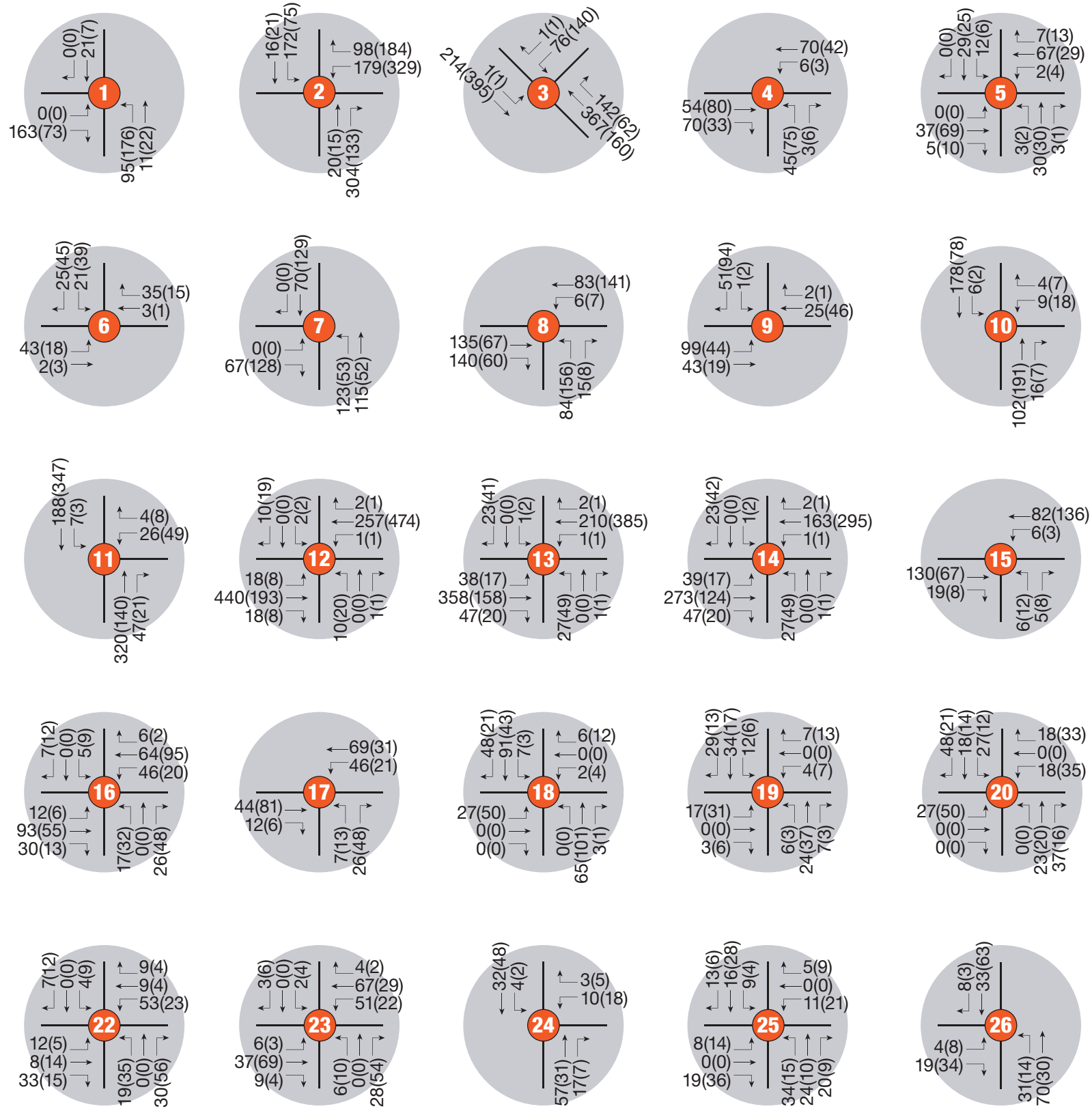
Trip distribution estimates for this site were based on those used in the master traffic study. The greatest component of site traffic will be toward Imboden Road/Quail Run Road, which will afford regional connectivity via the new interchange with I-70.

**Figure 4** shows the site-trip distribution percentages for the Short- and Long-Term scenarios and the volumes resulting from applying those percentages to the site generated traffic. Imboden Road/Quail Run Road is the primary access route to/from Subarea 2, and it sees the highest levels of site traffic at about 8,050 daily trips south of 32<sup>nd</sup> Avenue. Other notable roadways that carry large volumes of site traffic include 48<sup>th</sup> Avenue immediately east of Imboden Road/Quail Run Road at 7,500 daily trips and 32<sup>nd</sup> Avenue at 2,200 daily trips immediately east of Imboden Road/Quail Run Road.

KEY MAP



- LEGEND**
- xxx(xxx) = AM(PM) Peak Hour Traffic Volumes
  - XXXX = Daily Traffic Volumes
  - xx% = Site Trip Distribution
  - X = Intersection Numbers



NOTE: Drawing Not to Scale

**FIGURE 4**  
Site Generated Volumes and  
Trip Distribution  
Port Colorado Subarea 2 122-260-01 5/5/23

## IV. BACKGROUND CONDITIONS

### IV.A. Roadway Network Plan

The City of Aurora updated the *Northeast Area Transportation Study Refresh (NEATS Refresh)* in October 2018. This publication summarizes the buildout transportation recommendations for the *NEATS Refresh* planning area for the roadway, transit, and trail systems. The boundary for this study effort was approximately between Picadilly Road on the west, Schumaker Road on the east, Jewell Avenue and I-70 on the south, and 72<sup>nd</sup> Avenue on the north.

Besides an assessment of roadway improvement needs, future transit hubs were identified at two locations and a trail element was identified within the Port Colorado Subarea 2 study area. Relative to the Subarea 2 area, the following improvements were identified and are defined in *NEATS Refresh*:

#### Freeway Access

- New interchange constructed at the Imboden Road/Quail Run Road alignment along I-70

#### Minor Arterials

- US 36 – 2 Lanes
- Quail Run Drive – 2 lanes

#### Major Arterials

- Manila Road – 4 Lanes
- 56<sup>th</sup> Avenue – 4 Lanes
- 48<sup>th</sup> Avenue – 4 lanes
- Imboden Road/Quail Run Road – 4 lanes
- Imboden Road/Quail Run Road – 4 lanes

#### Potential UPRR Grade-Separated Crossings

- Manila Road – at US 36
- Imboden Road/Quail Run Road – at US 36

It should be noted that the above improvements are based on 2040 forecasts for the *NEATS Refresh* area; however, some of the identified improvements were made based on future planning considerations and not solely traffic volume based. Additionally, current development plans for Port Colorado were not entirely known when *NEATS Refresh* was prepared nor the neighboring site to Port Colorado Subarea 6, the Rocky Mountain Rail Park. **Appendix D** includes an illustration of these suggested improvements from *NEATS Refresh*.

### IV.B. Background Traffic Volumes

Background traffic volume projections began with information contained in *NEATS Refresh*. Anticipated regional background traffic was added to the expected volumes generated by the remainder of the Port Colorado developments to arrive at a final background scenario for both Short and Long-Term. As such, the traffic volumes represented on **Figure 5** (2040) and **Figure 6** (Long-Term) contain projected Background traffic volumes.

The *NEATS Refresh* travel demand model is considered a more accurate model for this area of Aurora since it has been modified with additional land use information given current and planned development proposals. The Denver Regional Council of Governments (DRCOG) model is not considered as accurate for these reasons.

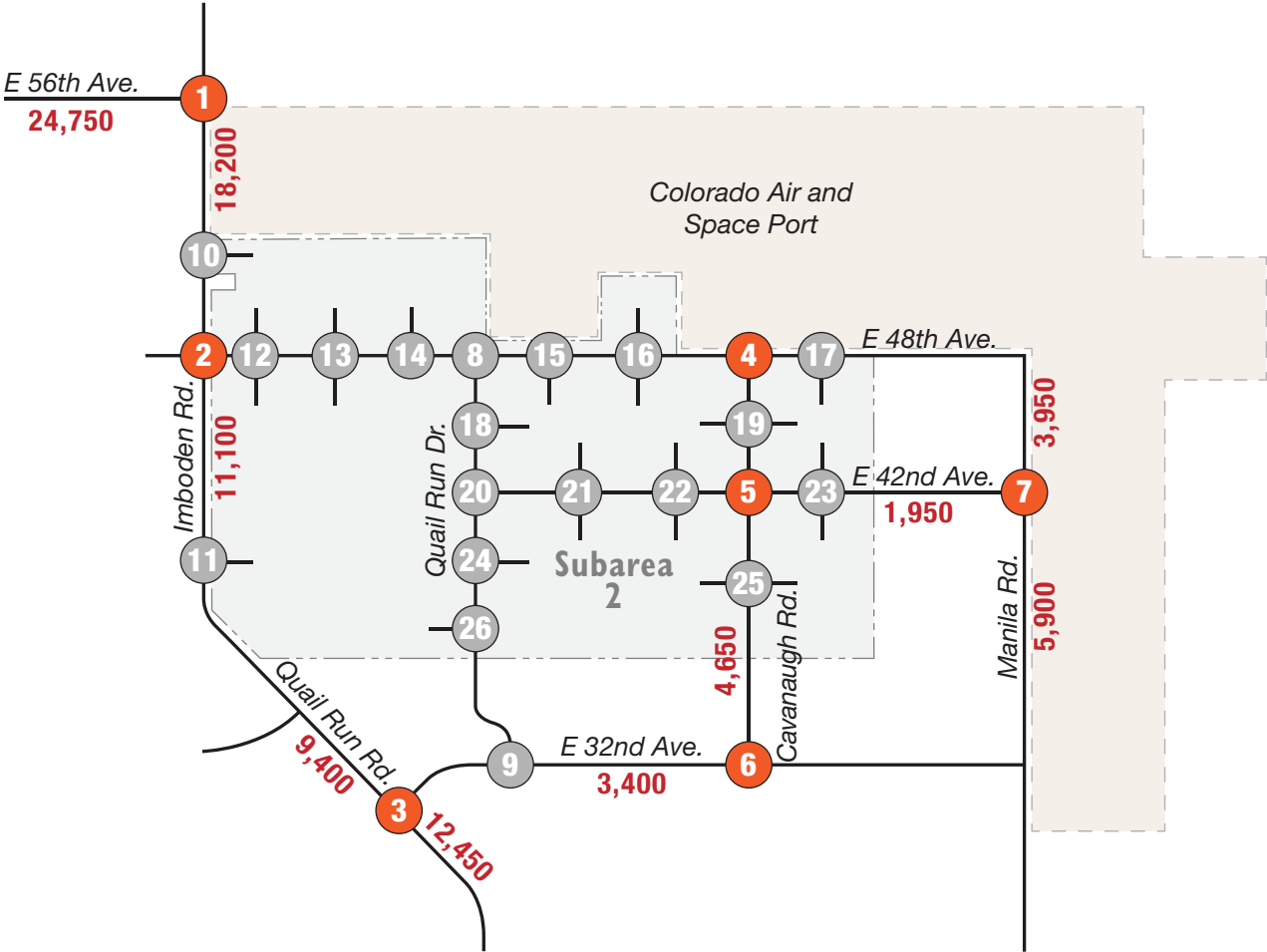
The *NEATS Refresh* traffic volumes have also been supplemented with projections contained within both the *TransPort Colorado Traffic Impact Study Analysis*, July 2022, prepared by Felsburg Holt & Ullevig, and the *Rocky Mountain Rail Park TIS*, July 2018, prepared by Kimley-Horn and Associates.



#### **IV.C. Pedestrian Trail Connection**

North of the Subarea 2 development and to the west of the Colorado Air and Space Port, a future pedestrian trail is planned adjacent to Bear Gulch. All roadways will be built to *NEATS Refresh* standards, which include bike and pedestrian amenities in the standard cross-sections.

KEY MAP



**LEGEND**

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

XXXX = Daily Traffic Volumes

X/X = AM/PM Peak Hour Signalized Intersection Level of Service

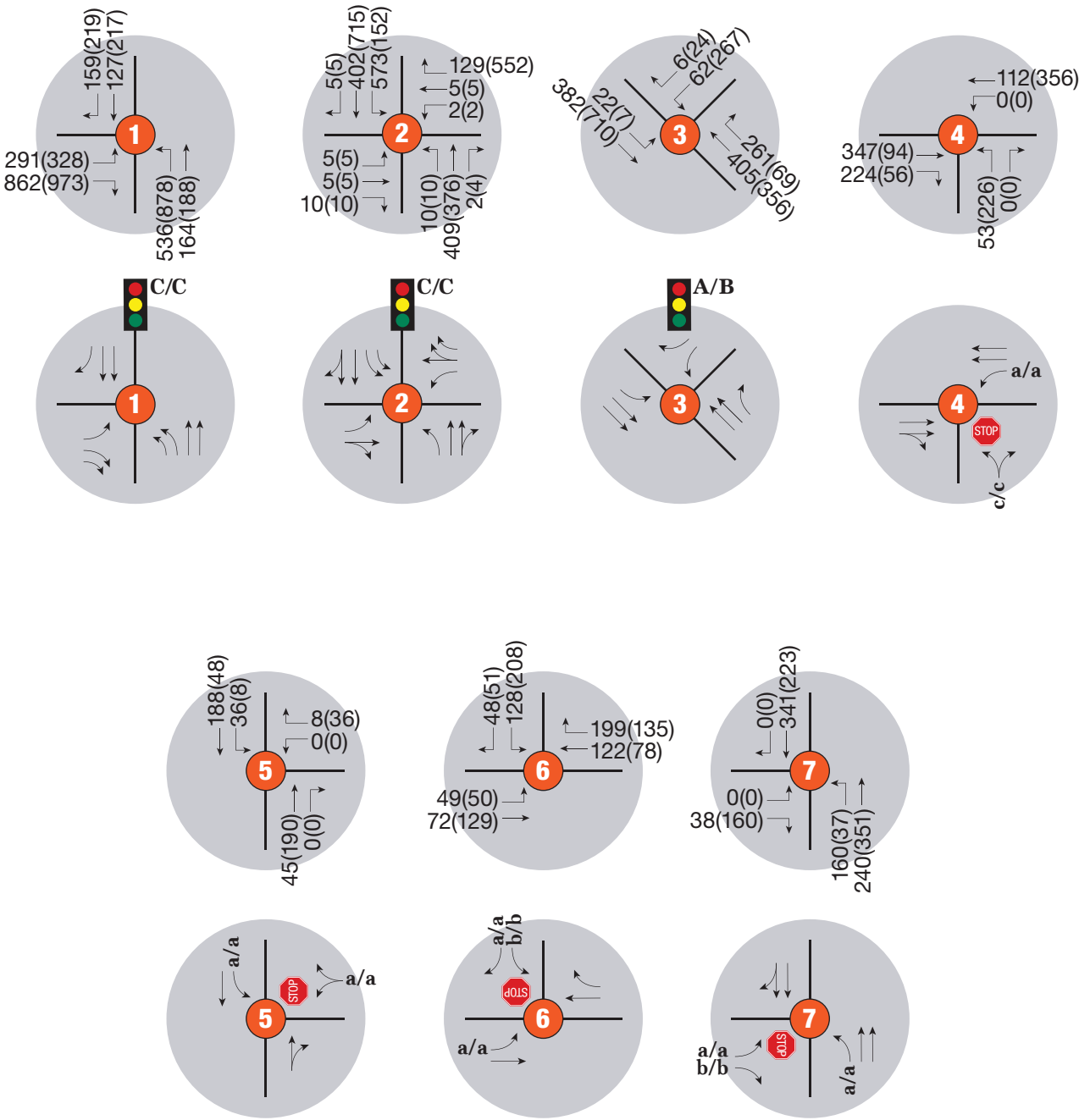
x/x = AM/PM Peak Hour Unsignalized Intersection Level of Service

STOP = Stop Sign

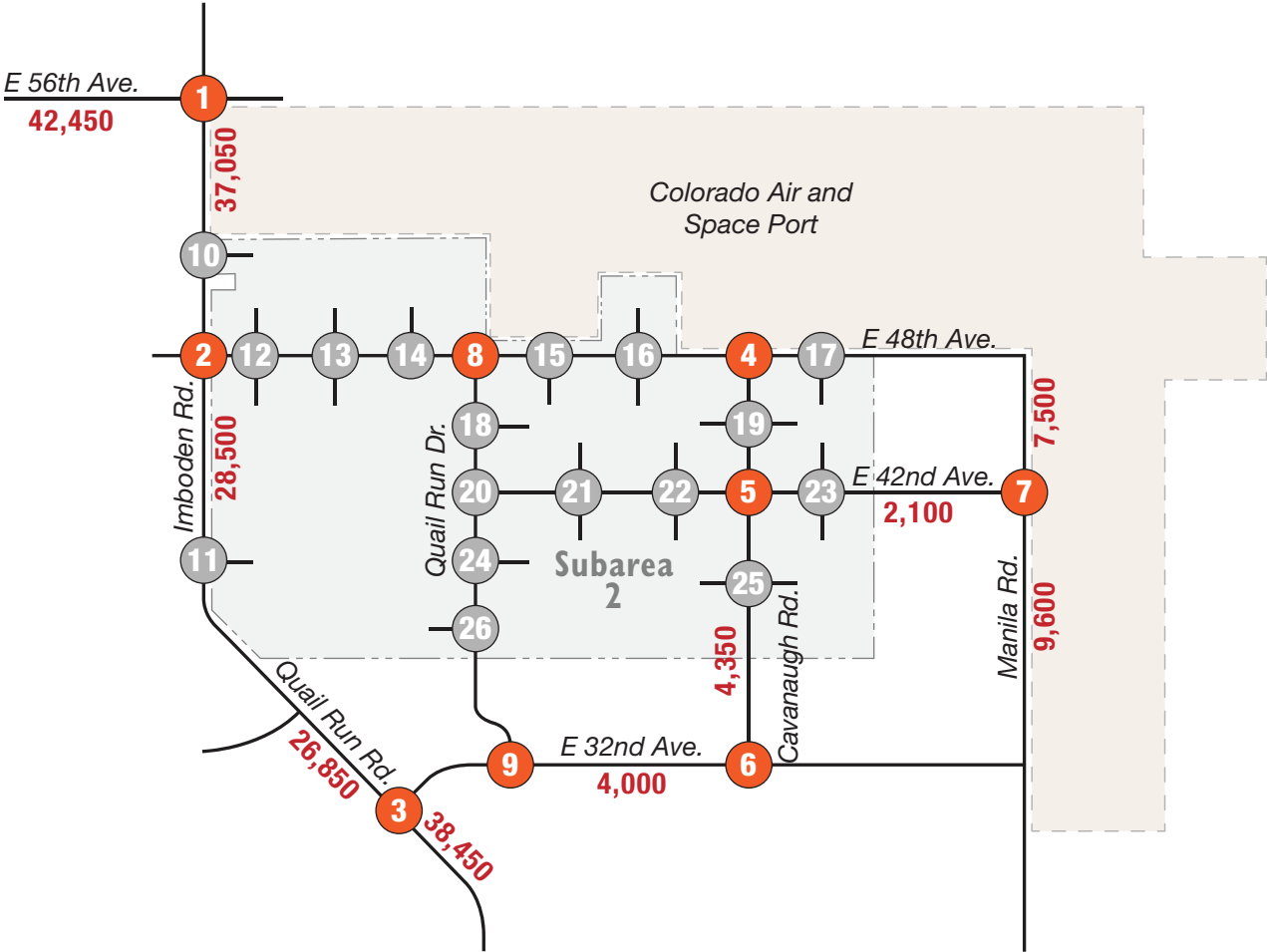
Traffic Signal = Traffic Signal

X = Intersection Numbers

X = Future Intersection



KEY MAP



**LEGEND**

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

**XXXX** = Daily Traffic Volumes

**X/X** = AM/PM Peak Hour Signalized Intersection Level of Service

**x/x** = AM/PM Peak Hour Unsignalized Intersection Level of Service

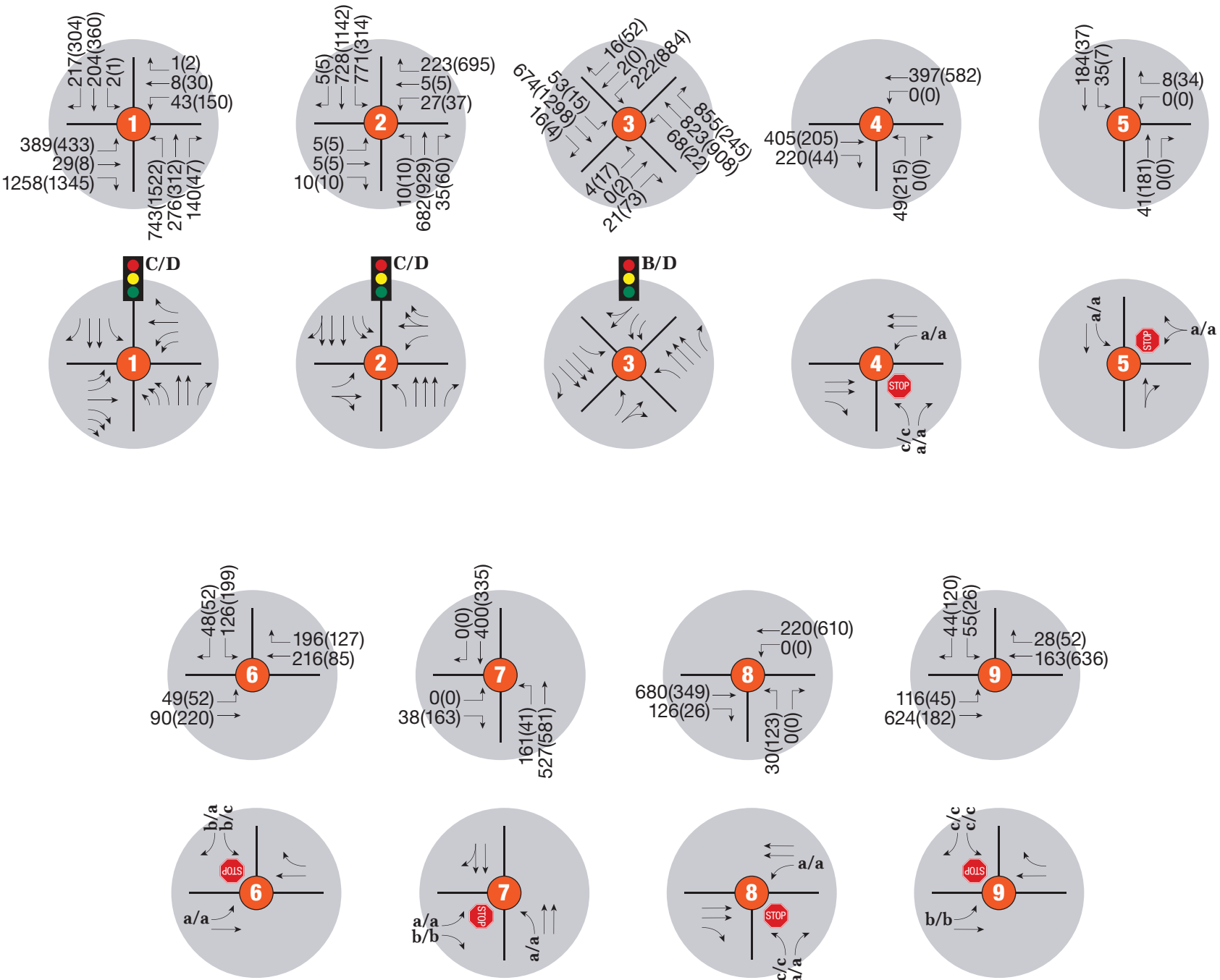
= Stop Sign

= Traffic Signal

= Intersection Numbers

= Future Intersection

NOTE: Drawing Not to Scale



#### IV.D. Background Traffic Operations

An evaluation of intersection operations was conducted for the AM and PM peak hours using the methodologies of the *Highway Capacity Manual* for unsignalized intersections and Synchro for signalized intersections. The results of these analyses find that certain improvements will be necessary to provide acceptable vehicle operations during the AM and PM peak hours. LOS D or better can be achieved with the traffic control recommendations of **Figure 5** for Short-Term operations in the year 2040 when Subarea 2 is assumed to be fully constructed and **Figure 6** for Long-Term conditions. **Table 3** and **Table 4** outline the LOS and delay by movement for each study intersection, as well as the overall LOS for signalized intersections for the Short-Term and Long-Term Background conditions.

**Table 3. Short-Term Background LOS and Delay Summary**

Intersection #	Intersection	Movement	AM LOS (Delay [sec])	PM LOS (Delay [sec])
1 – Signalized	56th Avenue & Imboden Road/Quail Run Road	EBL	d (49.7)	e (56.7)
		EBR	a (3.5)	a (7)
		NBL	d (41.7)	d (40.7)
		NBT	a (6.8)	a (9.3)
		SBT	c (33.9)	d (45.9)
		SBR	a (4.7)	b (14.4)
		Overall	C (21.5)	C (27.1)
2 – Signalized	48th Avenue & Imboden Road/Quail Run Road	WBL	d (52)	b (17)
		WBR	a (4.1)	c (21.4)
		NBTR	b (16.5)	c (32)
		SBL	d (49.2)	e (60.8)
		SBT	a (1.3)	b (19.4)
		Overall	C (23.8)	C (26.1)
3 – Signalized	32nd Avenue & Imboden Road/Quail Run Road	WBL	e (64.1)	e (57.3)
		WBR	c (27)	b (10.6)
		NBT	a (2.4)	a (8.8)
		NBR	a (0.4)	a (0.1)
		SBL	a (2.4)	a (9.3)
		SBT	a (2.4)	b (10.6)
		Overall	A (5.4)	B (18.3)
4 – TWSC	48th Avenue & Cavanaugh Road	WBL	a (0)	a (0)
		NBLR	c (15.3)	c (15.6)
5 – TWSC	42nd Avenue & Cavanaugh Road	WBL	a (8.8)	a (9.9)
		SBL	a (7.6)	a (7.9)
6 – TWSC	32nd Avenue & Cavanaugh Road	EBL	a (8.5)	a (8.1)
		SBL	b (12.8)	b (14.8)
		SBR	a (9.5)	a (9.2)
7 – TWSC	Manila Road & 42nd Avenue	EBL	a (0)	a (0)
		EBR	b (10)	b (10.4)
		NBL	a (9.2)	a (8.2)

**Table 4. Long-Term Background LOS and Delay Summary**

Intersection #	Intersection	Movement	AM LOS (Delay [sec])	PM LOS (Delay [sec])
1 – Signalized	56th Avenue & Imboden Road/Quail Run Road	EBL	d (39.2)	d (51.5)
		EBT	c (29.7)	d (38)
		EBR	a (9.1)	b (15.7)
		WBL	e (58.7)	e (75.3)
		WBT	d (44.5)	d (52.6)
		WBR	a (0)	a (0)
		NBL	d (41.8)	e (64.2)
		NBT	a (9)	a (8.3)
		NBR	a (0.7)	a (0.4)
		SBL	d (40)	d (43)
		SBT	d (42.3)	e (71.2)
		SBR	a (3.5)	b (15.5)
		Overall	C (22.3)	D (41.5)
2 – Signalized	48th Avenue & Imboden Road/Quail Run Road	WBL	e (63)	b (16.4)
		WBR	a (8.7)	c (32.3)
		NBT	c (30.4)	d (51.6)
		NBR	b (12.9)	b (18.8)
		SBL	d (43.7)	e (64.6)
		SBT	a (6.4)	c (30.2)
		Overall	C (25.6)	D (40.3)
3 – Signalized	32nd Avenue & Imboden Road/Quail Run Road	EBL	d (55)	d (51.4)
		EBTR	a (0.4)	e (57.8)
		WBL	d (44.6)	e (66.7)
		WBTR	b (10.8)	a (0.2)
		NBL	c (21.8)	d (43.8)
		NBT	b (17.1)	c (30.2)
		NBR	a (4.9)	a (1.3)
		SBL	b (12.2)	c (21.7)
		SBT	b (10.3)	c (30.4)
		SBR	a (0.1)	a (0)
		Overall	B (13.7)	D (37.7)
4 – TWSC	48th Avenue & Cavanaugh Road	WBL	a (0)	a (0)
		NBL	c (17.1)	c (23.8)
		NBR	a (0)	a (0)
5 – TWSC	42nd Avenue & Cavanaugh Road	WBL	a (8.8)	a (9.8)
		SBL	a (7.6)	a (7.9)

Intersection #	Intersection	Movement	AM LOS (Delay [sec])	PM LOS (Delay [sec])
6 – TWSC	32nd Avenue & Cavanaugh Road	EBL	a (8.8)	a (8.1)
		SBL	b (14.7)	c (17.4)
		SBR	b (10.2)	a (9.2)
7 – TWSC	Manila Road & 42nd Avenue	EBL	a (0)	a (0)
		EBR	b (10.3)	b (11.2)
		NBL	a (9.5)	a (8.6)
8 – TWSC	48th Avenue & Quail Run Drive	WBL	a (0)	a (0)
		NBL	c (21.2)	c (24)
		NBR	a (0)	a (0)
9 – TWSC	32nd Avenue & Quail Run Drive	EBL	a (8.2)	b (10)
		SBL	d (32.6)	c (22.6)
		SBR	a (9.7)	c (17.9)

The following improvements are assumed as Short-Term Background improvements in support of traffic growth, including buildout of the Rocky Mountain Rail Park and further development within Port Colorado, that would influence traffic at study area intersections:

### Short-Term (2040) Improvements

- Build 56<sup>th</sup> Avenue, 48<sup>th</sup> Avenue, Manila Road, Imboden Road/Quail Run Road, and Imboden Road/Quail Run Road with a 4-lane cross-section
- Build 32<sup>nd</sup> Avenue, 42<sup>nd</sup> Avenue, and Cavanaugh Road with a 3-lane cross-section
- Signalize the 56<sup>th</sup> Avenue/Imboden Road/Quail Run Road intersection, providing an exclusive left turn lane and dual right turn lanes on the eastbound approach, dual left turn lanes on the northbound approach, and an exclusive right turn lane on the southbound approach
- Signalize the 48<sup>th</sup> Avenue/Imboden Road/Quail Run Road intersection, providing left and right exclusive lanes on the westbound approach, as well as dual southbound left turn lanes.
- Signalize the 32<sup>nd</sup> Avenue/Imboden Road/Quail Run Road intersection, providing left and right exclusive turn lanes on the south-westbound approach, as well as an exclusive right turn lane and left turn lane on the north-westbound and south-eastbound approaches, respectively
- Implement stop control on Cavanaugh Road at its intersection with 32<sup>nd</sup> Avenue, providing exclusive left and right turn lanes on the southbound approach
- Implement stop control on Cavanaugh Road at its intersection with 48<sup>th</sup> Avenue
- Implement stop control on 42<sup>nd</sup> Avenue at its intersection with Cavanaugh Road, providing an exclusive left turn lane on the westbound approach
- Implement stop control on 42<sup>nd</sup> Avenue at its intersection with Manila Road, providing left and right turn lanes at the T-intersection, as well as a northbound left turn lane

Signalization of all above intersections is projected to be needed based on review of Warrant I Condition A, Minimum Eight-Hour Vehicular Volume; Warrant I Condition B, Interruption of Continuous Traffic; Warrant I Condition C, Minimum Eight-Hour Vehicular Volume and Interruption of Continuous Traffic; Warrant 2, Four-Hour Vehicular Volume; and Warrant 3, Peak Hour Volume, contained in the *Manual on Uniform Traffic Control Devices (MUTCD)*. Estimates have been made for hours 3–8 for the multi-hour warrants based on typical daily distributions and represent an approximation of whether warrants could be met in the future. The warrant graphs are included in **Appendix G**.

The following additional improvements are anticipated for Long-Term conditions in addition to those presented previously.

### ***Long-Term Improvements***

- Widen Imboden Road/Quail Run Road and Imboden Road/Quail Run Road to three lanes per direction between the I-70 ramp terminal intersections and 56<sup>th</sup> Avenue
- Widen Imboden Road/Quail Run Road to a 4-lane cross-section north of 56<sup>th</sup> Avenue
- Build Quail Run Drive with a three-lane cross-section
- Provide triple rights and an exclusive left turn lane on the eastbound approach, triple lefts and an exclusive right on the northbound approach, dual lefts and an exclusive right on the westbound approach, and one exclusive left and right lane on the southbound approach of the 56<sup>th</sup> Avenue/Imboden Road/Quail Run Road intersection
- Provide dual lefts on the southbound approach and an exclusive right turn lane on the northbound approach at the intersection of Imboden Road/Quail Run Road with 48<sup>th</sup> Avenue
- Add a southwest leg to the 32<sup>nd</sup> Avenue/Imboden Road/Quail Run Road intersection and provide exclusive left and right turn lanes on the northwest and southeast approaches, a single left turn lane on the north-eastbound approach, and dual lefts on the south-westbound approach

Operational analysis worksheets for Subarea 2 background conditions are included in **Appendix E**. Heavy vehicle percentages of 25 percent were used in the AM and PM peak hours for the operational analyses. This is consistent with percentages for sites with similar land use mixes.

The noted improvements for Short-Term and Long-Term have been included in the operational analyses for the respective timeframes.

All future intersection laneage will be determined at the time of parcel platting but are expected to have one inbound and one outbound lane at each access point.

## V. TOTAL CONDITIONS

### V.A. Roadway Network Plan

Buildout roadway improvements are consistent with the *NEATS Refresh* improvements presented in **Section IV** with the exception of expansion of Quail Run Road/Imboden Road from a four-lane to a six-lane cross-section in support of development traffic. As previously stated, some of these improvements are in the context of complete construction of the *NEATS Refresh* study area, which is an undefined year beyond 2040.

Additional roadway network improvements within Port Colorado Subarea 2 include the following:

- Construction of all site accesses
- Implementation of stop signs on all site accesses approaches

### V.B. Buildout Volumes

The Short-Term and Long-Term total traffic has been estimated using the site generated traffic found on **Figure 4**, combined with background traffic for short-term on **Figure 5** and long-term on **Figure 6**. The resulting volumes can be found on **Figure 7** for short-term and **Figure 8** for long-term conditions. Imboden Road/Quail Run Road is anticipated to be the heaviest traveled roadway, with a projected daily volume of 20,450 in 2040 and 47,850 in the Long-Term just south of 32<sup>nd</sup> Avenue. The heaviest traveled roadway within Subarea 2 is anticipated to be 48<sup>th</sup> Avenue, with a projected volume of 12,700 in the Short-Term and 14,900 in the Long-Term just east of Imboden Road/Quail Run Road.

### V.C. Buildout Traffic Operations

An evaluation of buildout volumes was conducted for the volumes presented on **Figure 7** for short-term and on **Figure 8** for long-term. The results of these operational analyses are presented on **Figure 9** for short-term and on **Figure 10** for long-term.

Most site access locations are anticipated to operate acceptably at LOS D or better as side-street stop-controlled intersections with one lane approaches from the driveway and a three-lane cross-section for the roadway network internal to the site with the exception of the following:

#### Intersection 9

- Southbound left turn anticipated to operate at LOS F during the AM peak hour

#### Intersection 10

- Westbound movement anticipated to operate at LOS F during the PM peak hour

#### Intersection 13

- Northbound movement anticipated to operate at LOS F in the AM and PM peak hours

#### Intersection 14

- Northbound movement anticipated to operate at LOS F in the AM and PM peak hours

It is not uncommon for side street movements to experience excessive delay during peak hours, and these intersections are not anticipated to meet signal warrants; therefore, no improvements are recommended.

It should be noted that the current site plan assumes two accesses per parcel and may be a conservative estimate. However, given current plans the northbound approach at intersection 11 and the eastbound approach at intersection 13 should consider implementation of an exclusive right turn lane into the site due to vehicular demand.



All signalized intersections in the study area are anticipated to operate acceptably at LOS D or better during peak hours given the improvements shown on **Figure 9** and **Figure 10**. Operational analysis worksheets for Subarea 2 total conditions are included in **Appendix F. Table 5** and **Table 6** outline the LOS and delay by movement for each study intersection, as well as the overall LOS for signalized intersections for the short-term and long-term buildout conditions.

### V.D. Port Colorado Master Network Differences

The Port Colorado Master Study, *TransPort Colorado Traffic Impact Study Analysis*, July 2022, outlines the following roadway network geometry by 2040 for the Subarea 2 roadways:

#### 3-Lane Arterial

- 56<sup>th</sup> Avenue
- 48<sup>th</sup> Avenue
- 32<sup>nd</sup> Avenue
- Quail Run Drive
- Cavanaugh Road
- 42<sup>nd</sup> Avenue

#### 4-Lane Minor Arterial

- Imboden Road/Quail Run Road
- Manila Road

The following recommendations have emerged from this study:

#### 3-Lane Arterial

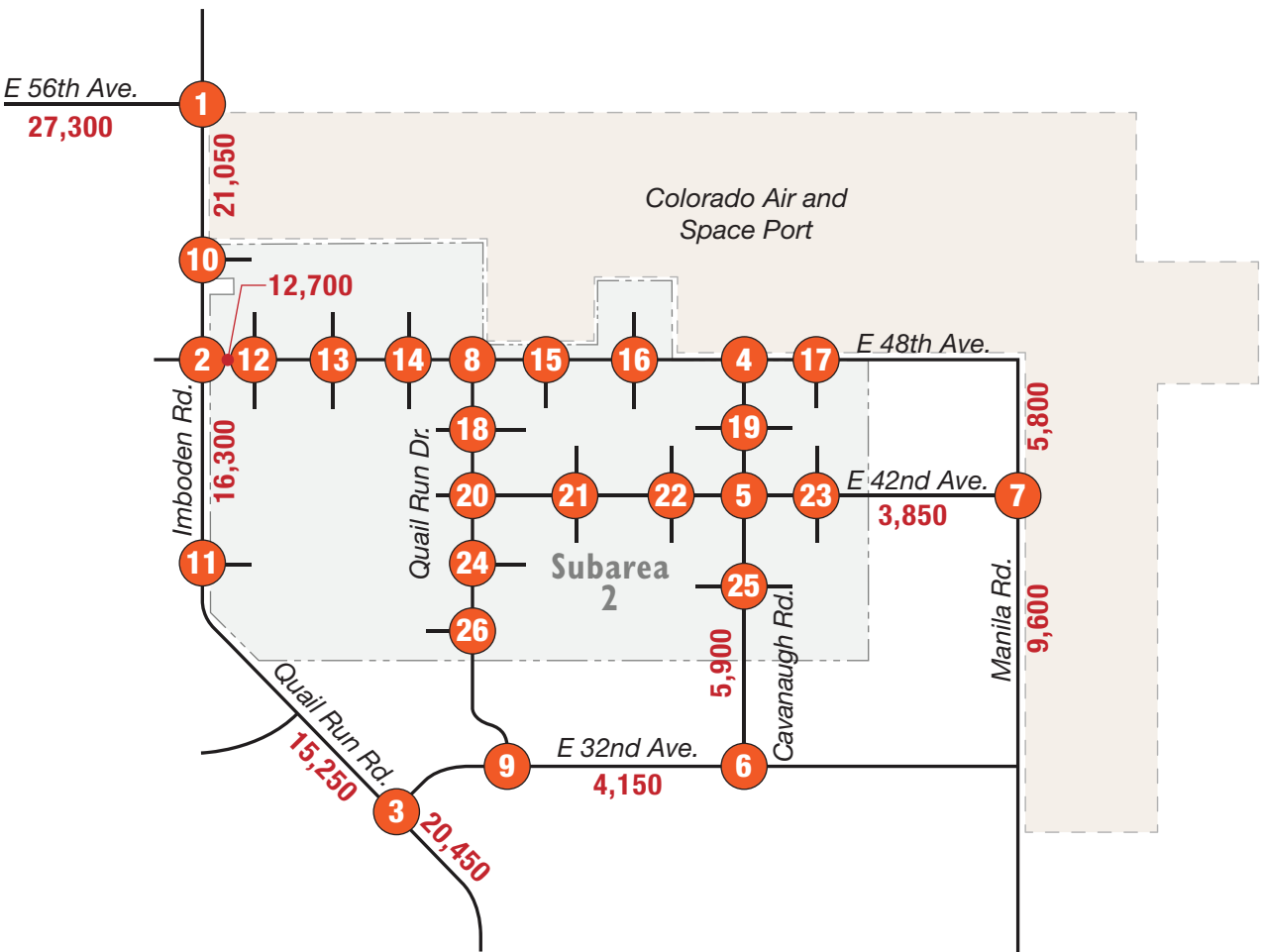
- 32<sup>nd</sup> Avenue
- Quail Run Drive
- Cavanaugh Road
- 42<sup>nd</sup> Avenue

#### 4-Lane Minor Arterial

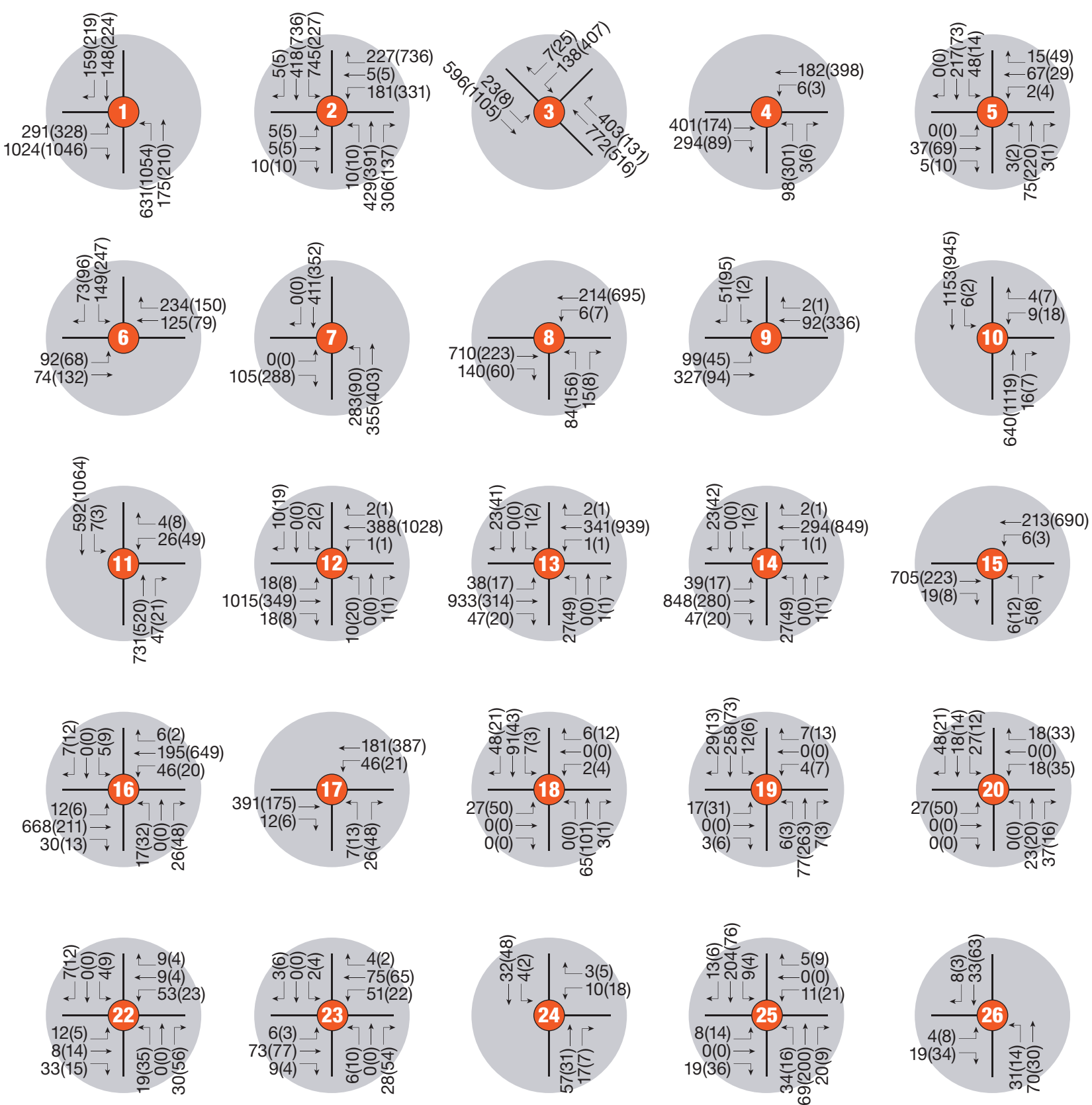
- 56<sup>th</sup> Avenue
- Imboden Road/Quail Run Road
- 48<sup>th</sup> Avenue
- Manila Road

As can be seen from the above, 56<sup>th</sup> Avenue and 48<sup>th</sup> Avenue will need to be increased from a 3-lane roadway to a 4-lane roadway in light of new anticipated surrounding development. All other roadways are anticipated to operate acceptably given the cross-sections provided in the master study. The expanded roadway cross-sections reported in this study do however remain consistent with the ultimate buildout reported in *TransPort Colorado Traffic Impact Study Analysis*, July 2022. The reason for the increases by 2040 is the result of a faster anticipated development of Subarea 2 as compared to that previous analysis.

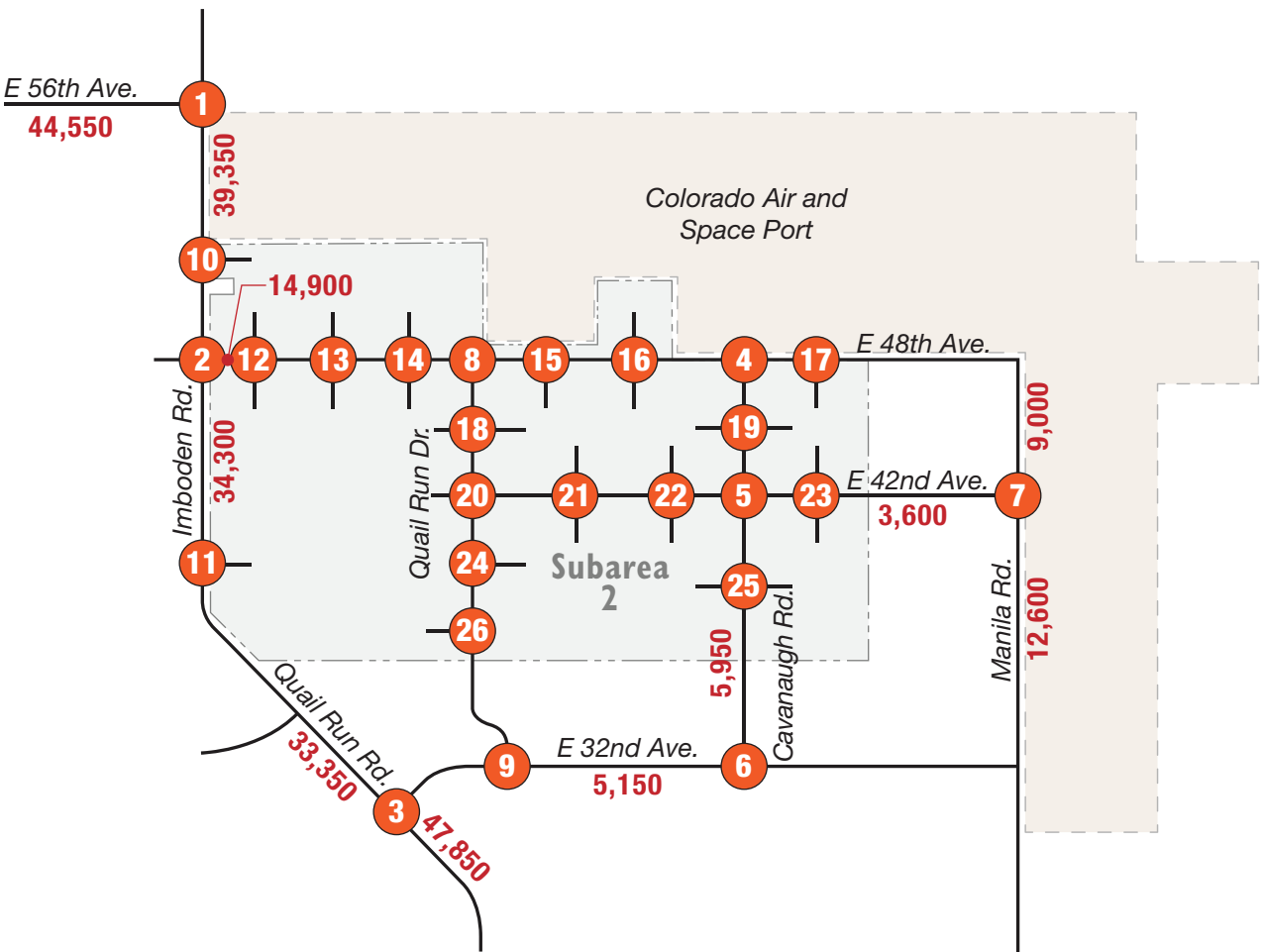
KEY MAP



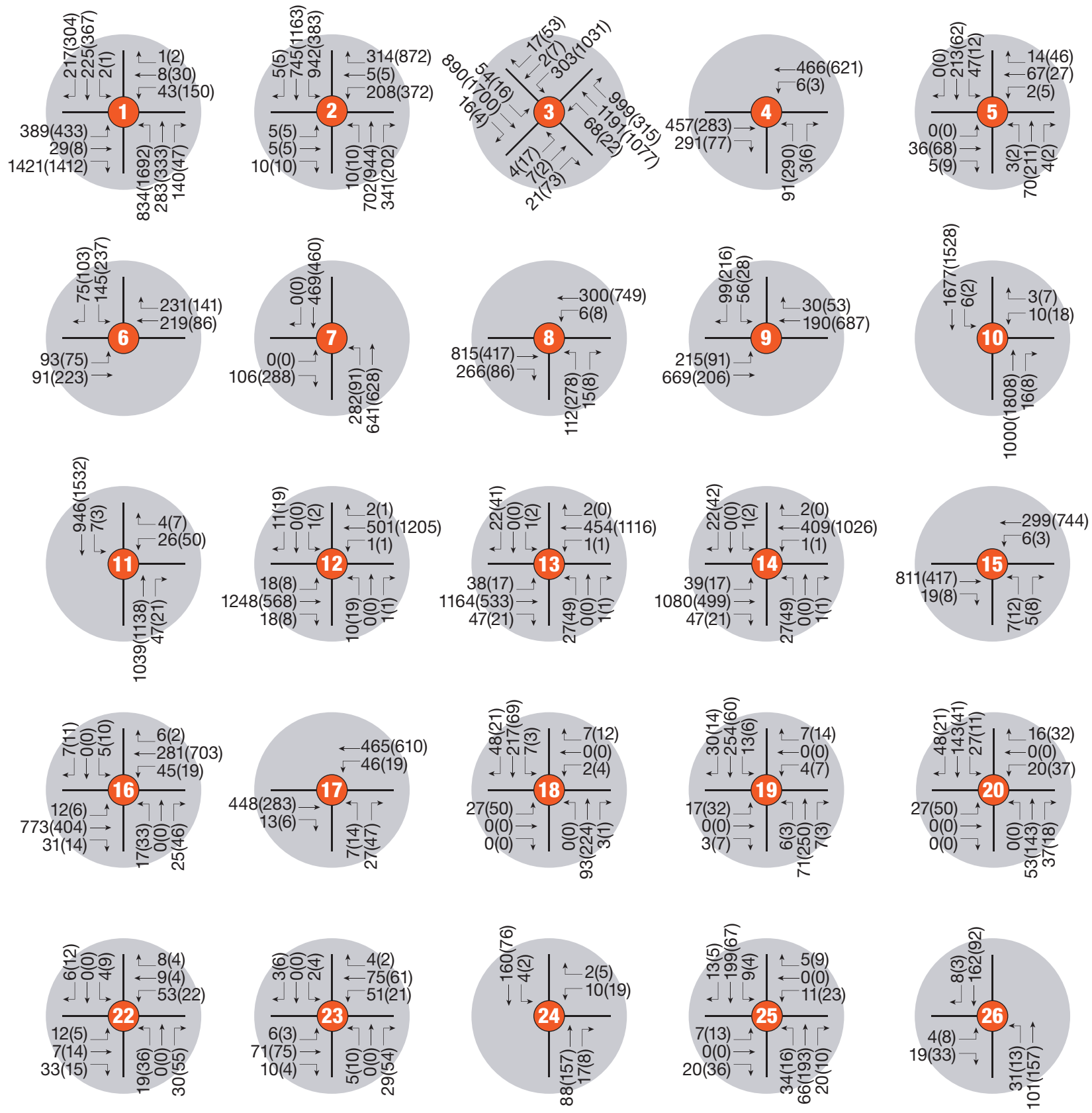
- LEGEND**
- xxx(xxx) = AM(PM) Peak Hour Traffic Volumes
  - XXXX = Daily Traffic Volumes
  - X = Intersection Numbers



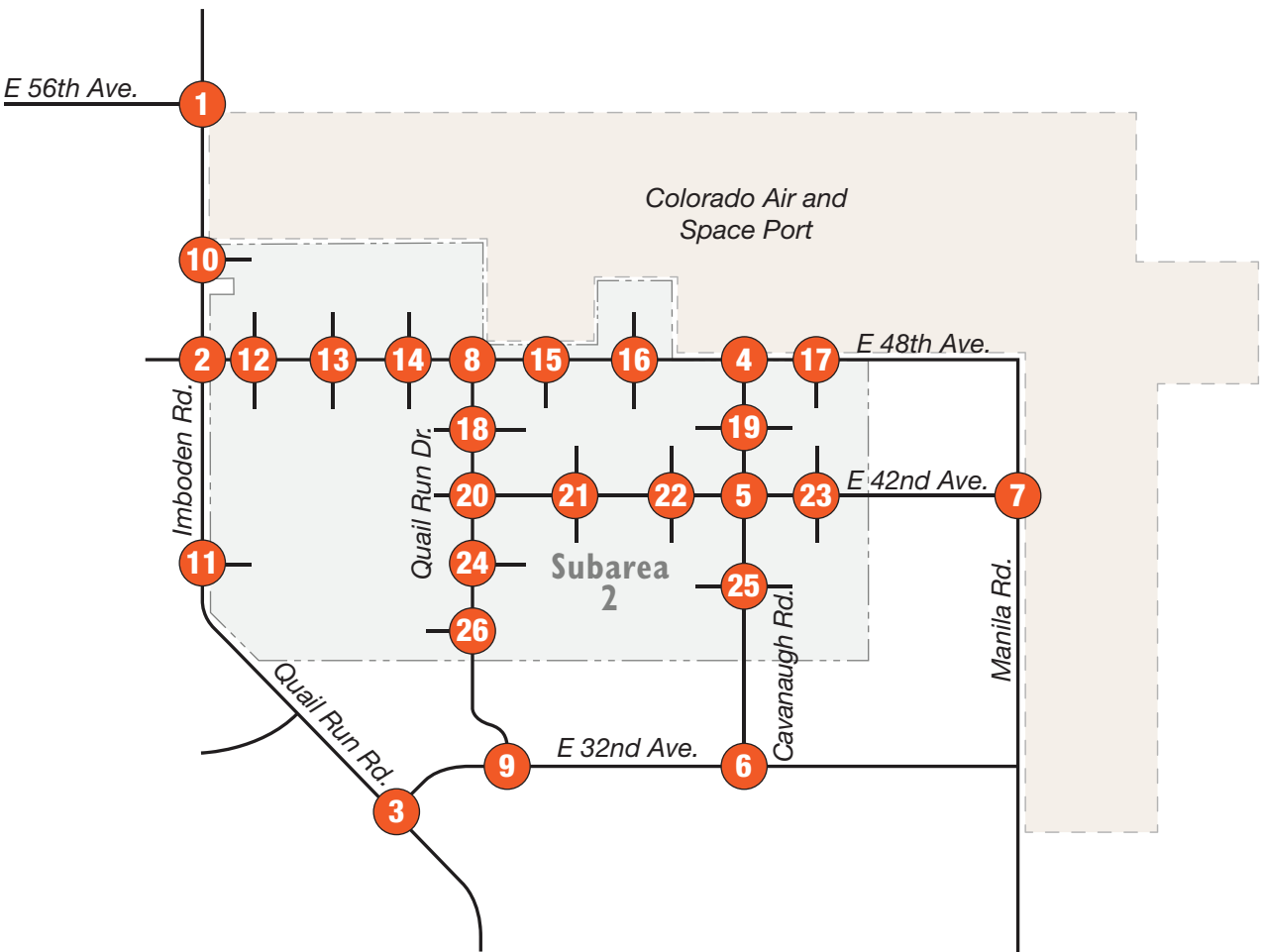
KEY MAP



- LEGEND**
- xxx(xxx) = AM(PM) Peak Hour Traffic Volumes
  - XXXX = Daily Traffic Volumes
  - X = Intersection Numbers



KEY MAP



**LEGEND**

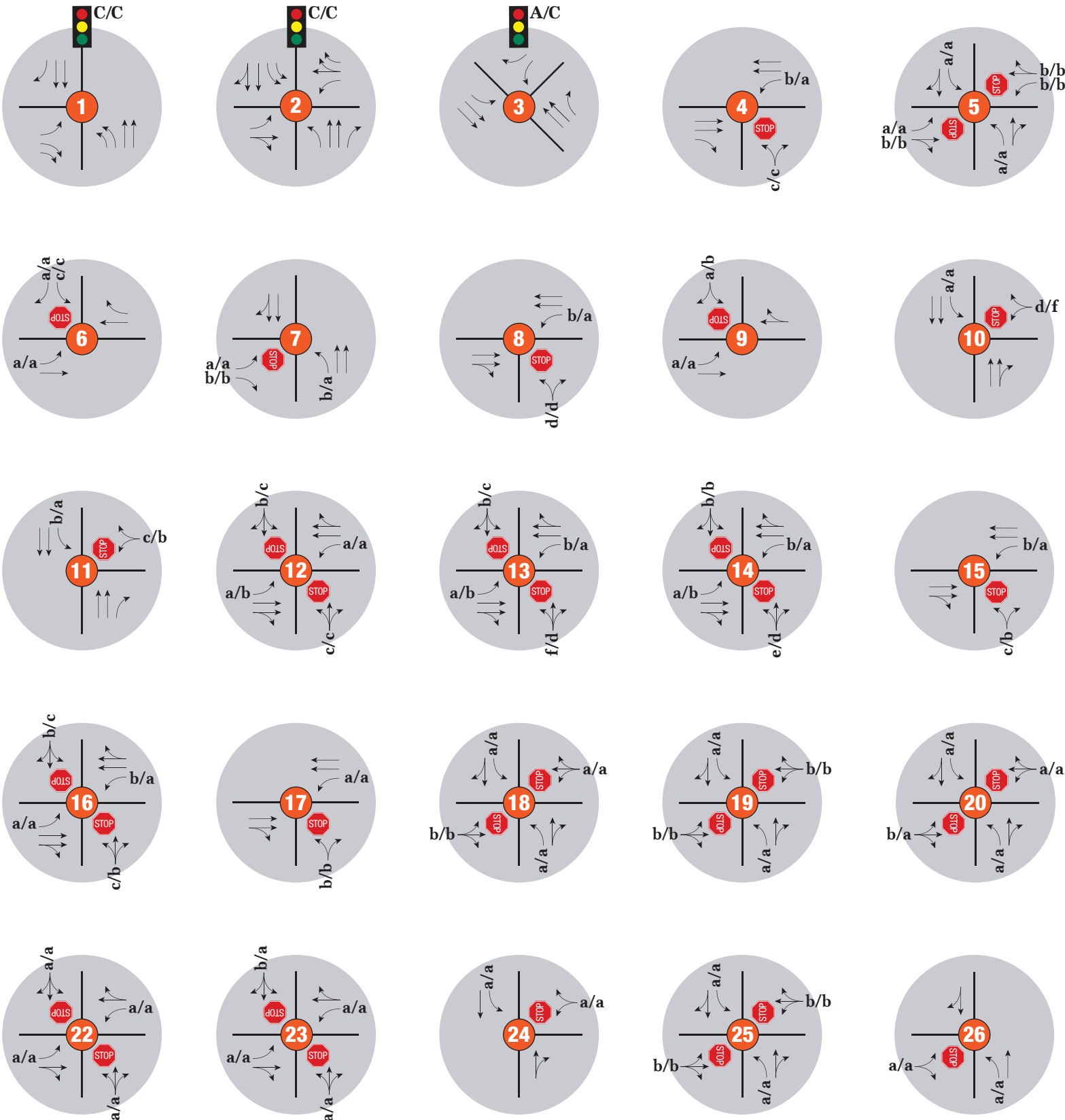
X/X = AM/PM Peak Hour Signalized Intersection Level of Service

x/x = AM/PM Peak Hour Unsignalized Intersection Level of Service

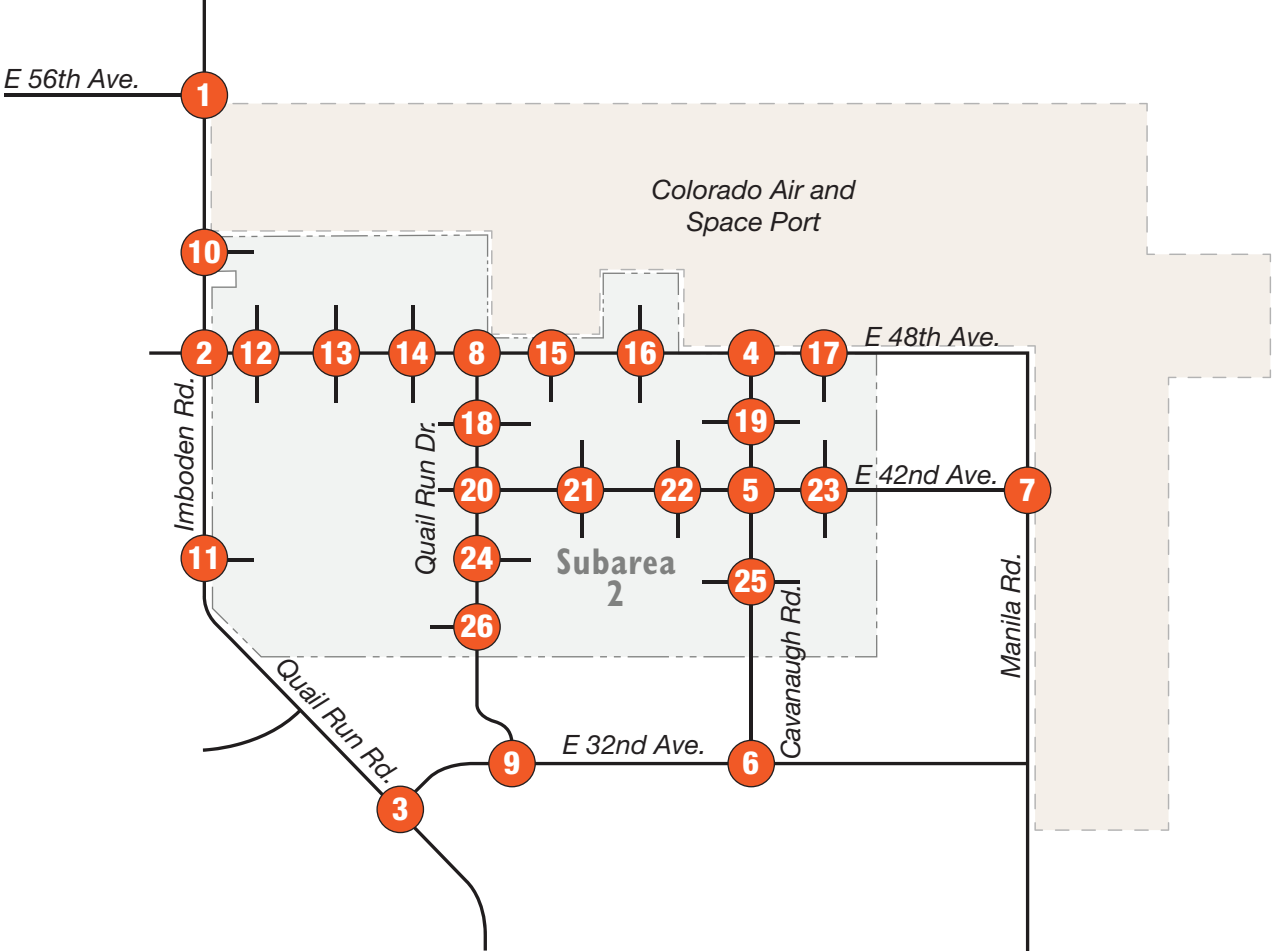
STOP = Stop Sign

🚦 = Traffic Signal

X = Intersection Numbers



KEY MAP



**LEGEND**

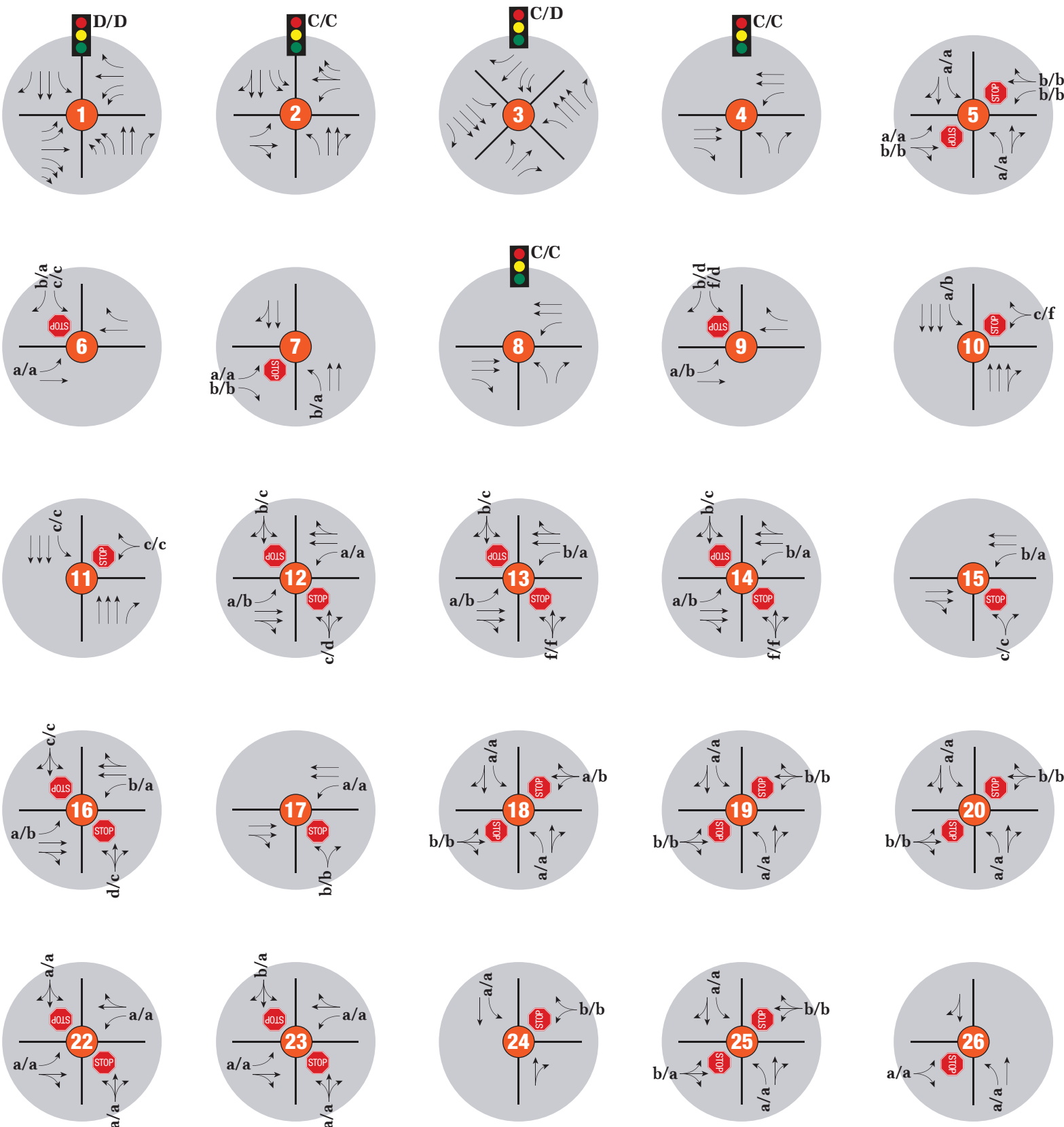
X/X = AM/PM Peak Hour Signalized Intersection Level of Service

x/x = AM/PM Peak Hour Unsignalized Intersection Level of Service

STOP = Stop Sign

Traffic Signal Icon = Traffic Signal

X = Intersection Numbers



**Table 5. Short-Term Total LOS and Delay Summary**

Short Term Total LOS Summary				
Intersection #	Intersection	Movement	AM LOS (Delay [sec])	PM LOS (Delay [sec])
1 - Signalized	56th Avenue & Imboden Road	EBL	c (34.1)	e (66)
		EBR	b (19.5)	b (13)
		NBL	d (51.8)	d (51.3)
		NBT	b (12.9)	a (8.7)
		SBT	d (37.6)	d (48.5)
		SBR	b (12.1)	c (25.2)
		Overall	C (29.8)	C (34.9)
2 - Signalized	48th Avenue & Imboden Road	EBL	e (55.5)	e (55.9)
		EBTR	e (58.4)	e (58.4)
		WBL	e (66.3)	d (47.6)
		WBTR	b (16.7)	c (28.3)
		NBL	c (24.9)	c (21)
		NBT	c (30.4)	c (24.3)
		NBR	c (26.6)	a (7.9)
		SBL	d (54.5)	e (57.8)
		SBT	a (6.2)	b (16.8)
		Overall	C (34.8)	C (28.6)
3 - Signalized	32nd Avenue & Quail Run Road	WBL	e (62.8)	e (60.5)
		WBR	d (46.8)	c (28.2)
		NBT	a (4.3)	b (13.3)
		NBR	a (1.7)	a (0.8)
		SBL	a (6.3)	b (16.1)
		SBT	a (3.8)	b (20)
		Overall	A (7.9)	C (24.9)
4 - TWSC	48th Avenue & Cavanaugh Road	WBL	b (10.1)	a (8.2)
		NBLR	c (16.8)	c (24)
5 - TWSC	42nd Avenue & Cavanaugh Road	EBL	a (0)	a (0)
		EBTR	b (13.2)	b (12.6)
		WBL	b (13.4)	b (12.9)
		WBTR	b (13.5)	b (11.4)
		NBL	a (8)	a (7.6)
		SBL	a (7.7)	a (8)
6 - TWSC	32nd Avenue & Cavanaugh Road	EBL	a (8.8)	a (8.2)
		SBL	c (15.6)	c (17.8)
		SBR	a (9.6)	a (9.5)
7 - TWSC	Manila Road & 42nd Avenue	EBL	a (0)	a (0)
		EBR	b (11)	b (13.2)
		NBL	b (10.5)	a (8.9)
8 - TWSC	48th Avenue & Quail Run Drive	WBL	b (11)	a (8.3)
		NBLR	d (34.4)	d (25.4)



Short Term Total LOS Summary				
Intersection #	Intersection	Movement	AM LOS (Delay [sec])	PM LOS (Delay [sec])
9 - TWSC	32nd Avenue & Quail Run Drive	EBL	a (7.9)	a (8.5)
		SBLR	a (9.4)	b (11.9)
10 - TWSC	PA-2 Access & Imboden	WBLR	d (30.7)	f (70.4)
		SBL	a (9.9)	a (9.3)
11 - TWSC	PA-5 Access & Imboden	WBLR	c (17.9)	b (12)
		SBL	b (10.6)	a (9.3)
12 - TWSC	PA-2 Access & 48th Avenue	EBL	a (8.7)	b (12.3)
		WBL	a (9)	a (7.8)
		NBLTR	c (16.1)	c (20.4)
		SBLTR	b (10.3)	c (16.3)
13 - TWSC	PA-3 Western Access & 48th Avenue	EBL	a (8.6)	b (11.7)
		WBL	b (11.8)	a (8.5)
		NBLTR	f (61.5)	d (33.6)
		SBLTR	b (10.7)	c (15.4)
14 - TWSC	PA-3 Eastern Access & 48th Avenue	EBL	a (8.5)	b (11.1)
		WBL	b (11.2)	a (8.3)
		NBLTR	e (47.7)	d (28.2)
		SBLTR	b (10.3)	b (14.3)
15 - TWSC	PA-8A Access & 48th Avenue	WBL	b (10.2)	a (13)
		NBLR	c (16.8)	b (8.1)
16 - TWSC	PA-4 Access & 48th Avenue	EBL	a (8)	a (9.8)
		WBL	b (10.43)	a (8.1)
		NBLTR	c (20.1)	b (14)
		SBLTR	b (13.7)	c (17.5)
17 - TWSC	PA-8B Access & 48th Avenue	WBL	a (8.9)	a (8)
		NBLR	b (11.6)	b (10.4)
18 - TWSC	PA-8A Access & Quail Run Drive	EBLTR	b (10.5)	b (10.4)
		WBLTR	a (9.3)	a (9.4)
		NBL	a (0)	a (0)
		SBL	a (7.6)	a (7.7)
19 - TWSC	PA-8B Access & Cavanaugh Road	EBLTR	b (12.3)	b (12.1)
		WBLTR	b (10.3)	b (11)
		NBL	a (8.2)	a (7.6)
		SBL	a (7.7)	a (8.1)
20 - TWSC	42nd Avenue & Quail Run Drive	EBLTR	b (10.1)	a (9.9)
		WBLTR	a (9.5)	a (9.3)
		NBL	a (0)	a (0)
		SBL	a (7.6)	a (7.5)
21 - TWSC	PA-9 Western Access & 42nd Avenue	EBL	a (7.5)	a (7.5)
		WBL	a (7.6)	a (7.5)
		NBLTR	a (9.1)	a (9.1)
		SBLTR	a (8.7)	a (8.8)

Short Term Total LOS Summary				
Intersection #	Intersection	Movement	AM LOS (Delay [sec])	PM LOS (Delay [sec])
22 - TWSC	PA-9 Eastern Access & 42nd Avenue	EBL	a (7.5)	a (7.5)
		WBL	a (7.6)	a (7.5)
		NBLTR	a (9.5)	a (9.4)
		SBLTR	a (9.3)	a (9.2)
23 - TWSC	PA-8C Access & 42nd Avenue	EBL	a (7.6)	a (7.6)
		WBL	a (7.7)	a (7.7)
		NBLTR	a (9.5)	a (9.5)
		SBLTR	b (10)	a (9.7)
24 - TWSC	PA-9 Access & Quail Run Drive	WBLR	a (9.3)	a (9.2)
		SBL	a (7.6)	a (7.5)
25 - TWSC	PA-9 Access & Cavanaugh Road	EBLTR	b (10.8)	b (10.1)
		WBLTR	b (11.6)	b (11.7)
		NBL	a (8.1)	a (7.7)
		SBL	a (7.7)	a (8)
26 - TWSC	PA-7 Access & Quail Run Drive	EBLR	a (7.6)	a (7.6)
		NBL	a (9)	a (9.2)



**Table 6. Long-Term Total LOS and Delay Summary**

Long Term Total LOS Summary				
Intersection #	Intersection	Movement	AM LOS (Delay [sec])	PM LOS (Delay [sec])
1 - Signalized	56th Avenue & Imboden Road	EBL	e (59.5)	e (64.6)
		EBT	c (28.3)	d (51.2)
		EBR	c (31.7)	c (28.5)
		WBL	e (61.2)	e (74.8)
		WBT	d (40.3)	e (69.6)
		WBR	d (40.1)	e (66.2)
		NBL	d (51.1)	f (75.7)
		NBT	b (16.5)	b (11.3)
		NBR	b (15)	a (6.5)
		SBL	d (37.2)	d (51.4)
		SBT	d (42.4)	e (71.5)
		SBR	c (31)	d (49.7)
		Overall	D (38.3)	D (53.5)
2 - Signalized	48th Avenue & Imboden Road	EBL	e (55.7)	d (50.3)
		EBTR	e (58.4)	d (51.1)
		WBL	e (57.7)	e (63.4)
		WBTR	a (0)	a (0)
		WBR	a (9.9)	c (25.4)
		NBL	d (35.9)	c (25.7)
		NBT	d (47.9)	c (34.8)
		NBR	d (43.1)	b (14.6)
		SBL	d (40.3)	e (69)
		SBT	a (7.8)	b (16.8)
		SBTR	a (8.1)	b (17.8)
		Overall	C (33.1)	C (32.5)
3 - Signalized	32nd Avenue & Quail Run Road	EBL	d (54.4)	e (73.8)
		EBT	e (56.3)	e (69.6)
		EBR	e (66.7)	f (332.5)
		WBL	d (54.7)	f (83)
		WBT	c (34.7)	c (21.7)
		WBR	d (35.2)	c (22.9)
		NBL	b (14.9)	f (96.7)
		NBT	b (10.1)	c (31.4)
		NBR	f (49.2)	a (3.1)
		SBL	d (40)	d (45.2)
		SBT	a (8.9)	d (51.1)
		SBR	a (6.7)	c (21.7)
		Overall	C (25.7)	D (54.9)
4 - Signalized	48th Avenue & Cavanaugh Road	EBT	d (45.6)	c (35)
		EBR	a (0.8)	a (0.6)
		WBL	d (53.7)	d (38.9)
		WBT	d (46)	d (42.6)
		NBL	a (6.4)	b (10.9)
		NBR	a (6)	a (8.4)
		Overall	C (33.1)	C (31)

Long Term Total LOS Summary				
Intersection #	Intersection	Movement	AM LOS (Delay [sec])	PM LOS (Delay [sec])
5 - TWSC	42nd Avenue & Cavanaugh Road	EBL	a (0)	a (0)
		EBTR	b (13)	b (12.3)
		WBL	b (13.2)	b (12.6)
		WBTR	b (13.4)	b (11.2)
		NBL	a (8)	a (7.6)
		SBL	a (7.7)	a (8)
6 - TWSC	32nd Avenue & Cavanaugh Road	EBL	a (9.2)	a (8.2)
		SBL	c (18.8)	c (22.5)
		SBR	b (10.4)	a (9.5)
7 - TWSC	Manila Road & 42nd Avenue	EBL	a (0)	a (0)
		EBR	b (11.4)	b (14.6)
		NBL	b (11)	a (9.4)
8 - Signalized	48th Avenue & Quail Run Drive	EBT	d (35.7)	c (31.6)
		EBR	a (0.8)	a (0.6)
		WBL	d (50.2)	d (37.6)
		WBT	c (26.8)	d (38.6)
		NBL	b (14.2)	b (14.1)
		NBR	b (13.1)	b (11.1)
		Overall	C (26)	C (30.1)
9 - TWSC	32nd Avenue & Quail Run Drive	EBL	a (8.7)	b (10.7)
		SBL	f (72.3)	d (31.5)
		SBR	b (10.4)	d (28.9)
10 - TWSC	PA-2 Access & Imboden	WBLR	c (20.3)	f (195.7)
		SBL	a (9.5)	b (11.3)
11 - TWSC	PA-5 Access & Imboden	WBL	c (17.2)	c (15.9)
		SBL	c (19)	c (20.2)
12 - TWSC	PA-2 Access & 48th Avenue	EBL	a (9.2)	b (13.8)
		WBL	a (9.8)	a (8.2)
		NBLTR	c (20.8)	d (30.5)
		SBLTR	b (10.8)	c (19.9)
13 - TWSC	PA-3 Western Access & 48th Avenue	EBL	a (9.1)	b (13.2)
		WBL	b (13.7)	a (9.3)
		NBLTR	f (145.1)	f (83)
		SBLTR	b (11.7)	c (18.7)
14 - TWSC	PA-3 Eastern Access & 48th Avenue	EBL	a (8.9)	b (12.4)
		WBL	b (13)	a (9.2)
		NBLTR	f (101.9)	f (63.4)
		SBLTR	b (11.3)	c (17)
15 - TWSC	PA-8A Access & 48th Avenue	WBL	b (10.9)	a (8.8)
		NBLR	c (20.5)	c (16.4)
16 - TWSC	PA-4 Access & 48th Avenue	EBL	a (8.3)	b (10.1)
		WBL	b (11.1)	a (8.8)
		NBLTR	d (25.3)	c (19.1)
		SBLTR	c (15.9)	c (22.3)

Long Term Total LOS Summary				
Intersection #	Intersection	Movement	AM LOS (Delay [sec])	PM LOS (Delay [sec])
17 - TWSC	PA-8B Access & 48th Avenue	WBL	a (9.2)	a (8.4)
		NBLR	b (12.8)	b (11.8)
18 - TWSC	PA-8A Access & Quail Run Drive	EBLTR	b (12.2)	b (12.1)
		WBLTR	a (9.7)	b (10.3)
		NBL	a (0)	a (0)
		SBL	a (7.7)	a (8)
19 - TWSC	PA-8B Access & Cavanaugh Road	EBLTR	b (12.3)	b (11.8)
		WBLTR	b (10.2)	b (10.8)
		NBL	a (8.2)	a (7.6)
		SBL	a (7.6)	a (8.1)
20 - TWSC	42nd Avenue & Quail Run Drive	EBLTR	b (11.7)	b (11.5)
		WBLTR	b (10.5)	b (10.5)
		NBL	a (0)	a (0)
		SBL	a (7.7)	a (7.9)
21 - TWSC	PA-9 Western Access & 42nd Avenue	EBL	a (7.5)	a (7.5)
		WBL	a (7.6)	a (7.5)
		NBLTR	a (9.2)	a (9.1)
		SBLTR	a (8.7)	a (8.8)
22 - TWSC	PA-9 Eastern Access & 42nd Avenue	EBL	a (7.5)	a (7.5)
		WBL	a (7.6)	a (7.5)
		NBLTR	a (9.5)	a (9.4)
		SBLTR	a (9.4)	a (9.2)
23 - TWSC	PA-8C Access & 42nd Avenue	EBL	a (7.6)	a (7.6)
		WBL	a (7.7)	a (7.7)
		NBLTR	a (9.4)	a (9.5)
		SBLTR	b (10)	a (9.7)
24 - TWSC	PA-9 Access & Quail Run Drive	WBLR	b (10.4)	b (10.3)
		SBL	a (7.7)	a (7.8)
25 - TWSC	PA-9 Access & Cavanaugh Road	EBLTR	b (10.6)	a (9.9)
		WBLTR	b (11.4)	b (11.6)
		NBL	a (8.1)	a (7.6)
		SBL	a (7.6)	a (8)
26 - TWSC	PA-7 Access & Quail Run Drive	EBLR	a (9.9)	a (9.6)
		NBL	a (7.9)	a (7.7)

## V.E. Queueing Analysis

**Appendix H** shows the 95<sup>th</sup> percentile projected queue length for the AM and PM peak hours for all study scenarios. 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 6<sup>th</sup> Edition or Synchro methodology queue calculations was reported. For unsignalized intersections, the HCM 6<sup>th</sup> 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 not required to stop.
- **Right turn movements.** The Synchro queue length was used. HCM 6<sup>th</sup> 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 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 of the study area intersection operations.

## VI. SUMMARY AND RECOMMENDATIONS

Port Colorado, formerly TransPort Colorado, is planning to develop Subarea 2 of their master-planned business and industrial park in the City of Aurora, Colorado. Subarea 2 is an 1,890-acre parcel, bounded north-south by 56<sup>th</sup> Avenue and 32<sup>nd</sup> Avenue, and east-west by Manila Road and Imboden Road/Quail Run Road. The project will be developed with light industrial land uses.

The project is located adjacent to the Colorado Air and Space Port (Space Port), formerly known as the Front Range Airport, and it is also within close proximity of Denver International Airport. The development of the Rocky Mountain Rail Park, an industrial rail-served project, is also anticipated to the west of Peterson Road.

Port Colorado will have access to I-70, a major east-west interstate highway system via a planned interchange at Imboden Road/Quail Run Road.

The existing roadway network surrounding Port Colorado Subarea 2 is somewhat limited, and numerous improvements will need to be made to support background traffic in the area even without development of Port Colorado Subarea 2. Those improvements include the following.

### *Short-Term Background Improvements*

- Build 56<sup>th</sup> Avenue, 48<sup>th</sup> Avenue, Manila Road, Imboden Road/Quail Run Road, and Imboden Road/Quail Run Road with a 4-lane cross-section
- Build 32<sup>nd</sup> Avenue, 42<sup>nd</sup> Avenue, and Cavanaugh Road with a 3-lane cross-section
- Signalize the 56<sup>th</sup> Avenue/Imboden Road/Quail Run Road intersection, providing an exclusive left turn lane and dual right turn lanes on the eastbound approach, dual left turn lanes on the northbound approach, and an exclusive right turn lane on the southbound approach
- Signalize the 48<sup>th</sup> Avenue/Imboden Road/Quail Run Road intersection, providing left and right exclusive lanes on the westbound approach, as well as a dual southbound left turn lanes.
- Signalize the 32<sup>nd</sup> Avenue/Imboden Road/Quail Run Road intersection, providing left and right exclusive turn lanes on the south-westbound approach, as well as an exclusive right turn lane and left turn lane on the north-westbound and south-eastbound approaches respectively
- Implement stop control on Cavanaugh Road at its intersection with 32<sup>nd</sup> Avenue, providing exclusive left and right turn lanes on the southbound approach
- Implement stop control on Cavanaugh Road at its intersection with 48<sup>th</sup> Avenue
- Implement stop control on 42<sup>nd</sup> Avenue at its intersection with Cavanaugh Road, providing and exclusive left turn lane on the westbound approach
- Implement stop control on 42<sup>nd</sup> Avenue at its intersection with Manila Road, providing left and right turn lanes at the T-intersection.

### *Long-Term Background Improvements*

- Widen Imboden Road/Quail Run Road and Imboden Road/Quail Run Road to three lanes per direction between I-70 ramp terminal intersections and 56<sup>th</sup> Avenue
- Widen Imboden Road/Quail Run Road to a 4-lane cross-section north of 56<sup>th</sup> Avenue
- Build Quail Run Drive with a three-lane cross-section
- Provide triple rights and an exclusive left turn lane on the eastbound approach, triple lefts and an exclusive right on the northbound approach, dual lefts, and an exclusive right on the westbound approach, and one exclusive left and right lane on the southbound approach of the 56<sup>th</sup> Avenue/Imboden Road/Quail Run Road intersection

- Provide dual lefts on the southbound approach and an exclusive right turn lane on the northbound approach at the intersection of Imboden Road/Quail Run Road with 48<sup>th</sup> Avenue
- Add a southwest leg to the 32<sup>nd</sup> Avenue/Imboden Road/Quail Run Road intersection and provide exclusive left and right turn lanes on the northwest and southeast approaches, a single left turn lane on the north-eastbound approach, and dual lefts on the south-westbound approach

The majority of roadways within the Port Colorado Subarea 2 network do not exist or are minor unpaved roadways. Port Colorado will construct new roadways that will serve the proposed land use types, and certain improvements replicate information contained in *NEATS Refresh*. The following roadway improvements will be necessary to support the Subarea 2 development.

#### *Short-Term Total Improvements*

- Add a northbound right turn lane to the intersection of 48<sup>th</sup> Avenue with Imboden Road/Quail Run Road
- Build Quail Run Drive and 42<sup>nd</sup> Avenue to a 3-lane cross-section
- Build all site access roadways and implement stop control on minor streets
- Consider adding right turn lanes at the following site access locations:
  - Northbound at intersection 11
  - Eastbound at intersection 13

#### *Long-Term Total Improvements*

- Add a second westbound right turn lane at the intersection of 48<sup>th</sup> Avenue with Imboden Road/Quail Run Road
- Add exclusive east and westbound right turn lanes at the intersection of Imboden Road/Quail Run Road with 32<sup>nd</sup> Avenue
- Signalize the intersection of 48<sup>th</sup> Avenue with Quail Run Drive when warranted
- Signalize the intersection of 48<sup>th</sup> Avenue with Cavanaugh Road when warranted
- Build Quail Run Drive and 42<sup>nd</sup> Avenue to a 3-lane cross-section
- Build all site access roadways and implement stop control on minor streets
- Consider adding right turn lanes at the following site access locations:
  - Northbound at intersection 11
  - Eastbound at intersection 13

It should be noted that 56<sup>th</sup> Avenue and 48<sup>th</sup> Avenue are anticipated to require a 4-lane cross-section by the 2040 year, as compared to the 3-lane cross-section shown in the *TransPort Colorado Traffic Impact Study Analysis*, July 2022 due to new development anticipated in the surrounding area.

The development of Port Colorado Subarea 2 will be gradual over the next decade, and traffic operational analyses will continue as parcels develop to support the confirmation and construction timeframes for infrastructure improvements. Analyses of individual parcels will confirm intersection laneage, traffic control recommendations, along with identifying the appropriate timing of such improvements.

## APPENDIX A. TRAFFIC COUNTS



(303) 216-2439  
www.alltrafficdata.net

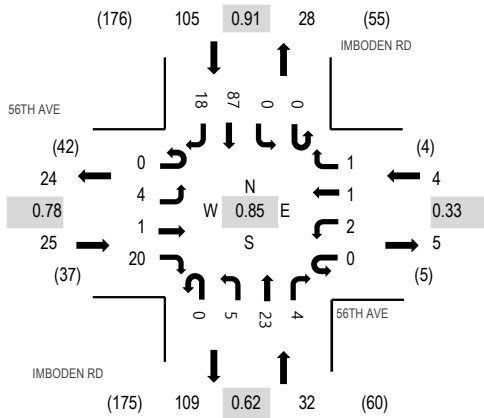
**Location:** 1 IMBODEN RD & 56TH AVE AM

**Date:** Thursday, February 6, 2020

**Peak Hour:** 06:30 AM - 07:30 AM

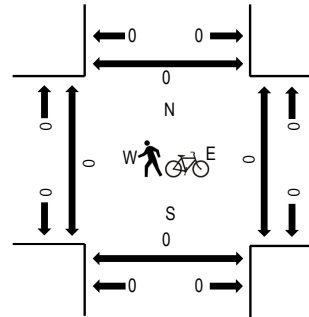
**Peak 15-Minutes:** 06:45 AM - 07:00 AM

### 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				IMBODEN RD Northbound				IMBODEN RD 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
6:30 AM	0	1	0	5	0	0	0	1	0	2	4	3	0	0	25	4	45	166	0	0	0	0
6:45 AM	0	1	1	6	0	0	0	0	0	2	10	1	0	0	23	5	49	140	0	0	0	0
7:00 AM	0	1	0	6	0	2	1	0	0	1	5	0	0	0	23	5	44	118	0	0	0	0
7:15 AM	0	1	0	3	0	0	0	0	0	0	4	0	0	0	16	4	28	111	0	0	0	0
7:30 AM	0	0	0	2	0	0	0	0	0	0	4	0	0	0	10	3	19	111	0	0	0	0
7:45 AM	0	0	0	1	0	0	0	0	0	2	10	0	0	0	11	3	27		0	0	0	0
8:00 AM	0	3	0	4	0	0	0	0	0	0	4	0	0	0	20	6	37		0	0	0	0
8:15 AM	0	0	0	2	0	0	0	0	0	2	6	0	0	0	16	2	28		0	0	0	0
Count Total	0	7	1	29	0	2	1	1	0	9	47	4	0	0	144	32	277		0	0	0	0
Peak Hour	0	4	1	20	0	2	1	1	0	5	23	4	0	0	87	18	166		0	0	0	0





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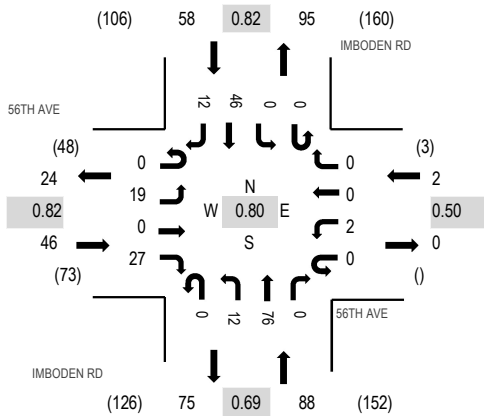
**Location:** 1 IMBODEN RD & 56TH AVE PM

**Date:** Thursday, February 6, 2020

**Peak Hour:** 04:15 PM - 05:15 PM

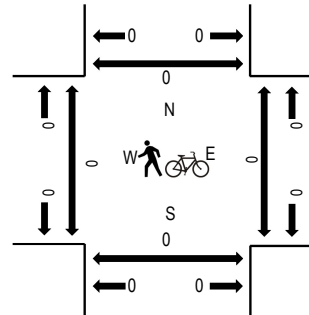
**Peak 15-Minutes:** 05:00 PM - 05:15 PM

### 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				IMBODEN RD Northbound				IMBODEN RD 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	2	0	5	0	0	0	0	0	2	10	0	0	0	9	2	30	163	0	0	0	0
4:15 PM	0	3	0	5	0	1	0	0	0	3	14	0	0	0	12	4	42	194	0	0	0	0
4:30 PM	0	5	0	9	0	0	0	0	0	4	16	0	0	0	7	1	42	193	0	0	0	0
4:45 PM	0	6	0	8	0	0	0	0	0	2	17	0	0	0	12	4	49	183	0	0	0	0
5:00 PM	0	5	0	5	0	1	0	0	0	3	29	0	0	0	15	3	61	171	0	0	0	0
5:15 PM	0	3	0	5	0	0	0	1	0	2	14	0	0	0	10	6	41		0	0	0	0
5:30 PM	0	2	0	2	0	0	0	0	0	5	14	0	0	0	7	2	32		0	0	0	0
5:45 PM	0	4	0	4	0	0	0	0	0	2	15	0	0	0	9	3	37		0	0	0	0
Count Total	0	30	0	43	0	2	0	1	0	23	129	0	0	0	81	25	334		0	0	0	0
Peak Hour	0	19	0	27	0	2	0	0	0	12	76	0	0	0	46	12	194		0	0	0	0



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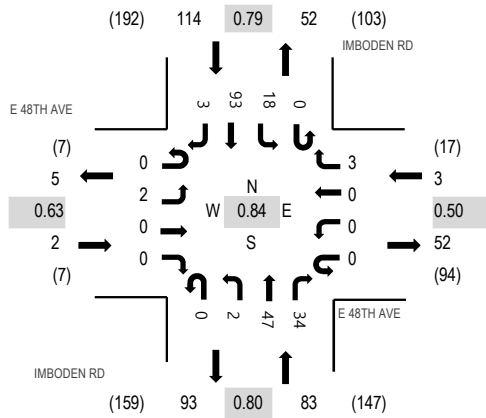
**Location:** 2 IMBODEN RD & E 48TH AVE AM

**Date:** Thursday, September 6, 2018

**Peak Hour:** 06:30 AM - 07:30 AM

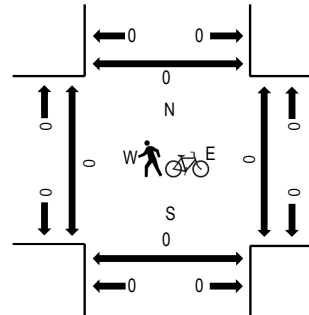
**Peak 15-Minutes:** 06:45 AM - 07:00 AM

### Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

### Peak Hour - Pedestrians/Bicycles on Crosswalk



### Traffic Counts

Interval Start Time	E 48TH AVE Eastbound				E 48TH AVE Westbound				IMBODEN RD Northbound				IMBODEN RD 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
6:30 AM	0	0	0	0	0	0	0	2	0	0	9	12	0	5	30	1	59	202	0	0	0	0
6:45 AM	0	0	0	0	0	0	0	0	0	2	13	9	0	5	29	2	60	178	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0	0	0	17	9	0	5	14	0	45	160	0	0	0	0
7:15 AM	0	2	0	0	0	0	0	1	0	0	8	4	0	3	20	0	38	150	0	0	0	0
7:30 AM	0	2	0	0	0	1	0	1	0	0	12	3	0	4	12	0	35	161	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	3	0	0	10	8	0	6	14	1	42		0	0	0	0
8:00 AM	0	0	0	1	0	2	0	0	0	1	5	5	0	5	16	0	35		0	0	0	0
8:15 AM	0	2	0	0	0	6	0	1	0	0	15	5	0	6	14	0	49		0	0	0	0
Count Total	0	6	0	1	0	9	0	8	0	3	89	55	0	39	149	4	363		0	0	0	0
Peak Hour	0	2	0	0	0	0	0	3	0	2	47	34	0	18	93	3	202		0	0	0	0



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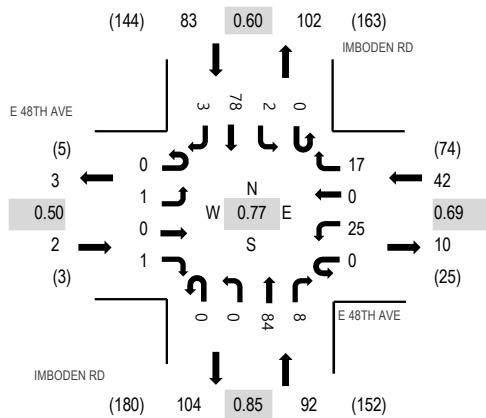
**Location:** 2 IMBODEN RD & E 48TH AVE PM

**Date:** Thursday, September 6, 2018

**Peak Hour:** 04:30 PM - 05:30 PM

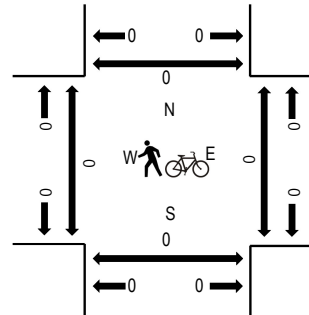
**Peak 15-Minutes:** 04:45 PM - 05:00 PM

### Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

### Peak Hour - Pedestrians/Bicycles on Crosswalk



### Traffic Counts

Interval Start Time	E 48TH AVE Eastbound				E 48TH AVE Westbound				IMBODEN RD Northbound				IMBODEN RD 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	0	0	0	4	0	1	0	0	11	4	0	4	12	1	37	196	0	0	0	0
4:15 PM	0	0	0	0	0	11	0	2	0	0	7	2	0	0	17	0	39	215	0	0	0	0
4:30 PM	0	0	0	0	0	7	0	3	0	0	23	0	0	1	14	1	49	219	0	0	0	0
4:45 PM	0	0	0	1	0	5	0	2	0	0	23	4	0	1	34	1	71	212	0	0	0	0
5:00 PM	0	0	0	0	0	8	0	9	0	0	25	2	0	0	11	1	56	177	0	0	0	0
5:15 PM	0	1	0	0	0	5	0	3	0	0	13	2	0	0	19	0	43		0	0	0	0
5:30 PM	0	0	0	0	0	2	0	3	0	0	19	3	0	2	13	0	42		0	0	0	0
5:45 PM	0	1	0	0	0	5	0	4	0	1	13	0	0	0	12	0	36		0	0	0	0
Count Total	0	2	0	1	0	47	0	27	0	1	134	17	0	8	132	4	373		0	0	0	0
Peak Hour	0	1	0	1	0	25	0	17	0	0	84	8	0	2	78	3	219		0	0	0	0

## APPENDIX B. LEVEL OF SERVICE CRITERIA

**TABLE B1**  
**LEVEL OF SERVICE CRITERIA FOR**  
**TWO-WAY STOP CONTROLLED (TWSC) INTERSECTIONS AND ROUNDABOUTS**

Level of Service	Delay Range (sec/veh)
A	0.0 – 10.0
B	>10.0 – 15.0
C	>15.0 – 25.0
D	>25.0 – 35.0
E	>35.0 – 50.0
F	> 50.0

Adapted from *Highway Capacity Manual*, Transportation Research Board, 2010.

**TABLE B2**  
**LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS**

Level of Service	Control Delay (sec/veh)	Qualitative Description
A	$\leq 10.0$	Good progression, short cycles, very few vehicle-stops.
B	>10.0 – 20.0	Good progression, and/or short cycle lengths, more vehicle-stops.
C	>20.0 – 35.0	Fair progression and/or longer cycle lengths, some individual cycle failures, many vehicle-stops
D	>35.0 – 55.0	Noticeable congestion and cycle failures, unfavorable progression, high v/c ratios, several stops.
E	>55.0 – 80.0	Limit of acceptable delay, poor progression, long cycles, high v/c ratios, frequent cycle failures.
F	> 80.0	Delay is unacceptable to most drivers, volume exceeds capacity, breakdown of traffic flow.

Adapted from *Highway Capacity Manual*, Transportation Research Board, 2010.

## APPENDIX C. ANALYSIS WORKSHEETS – EXISTING CONDITIONS

HCM 6th TWSC  
1: Imboden Rd & 56th Avenue

Existing Conditions  
AM Peak

Intersection												
Int Delay, s/veh	1.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	4	1	21	2	1	1	5	24	4	0	92	19
Future Vol, veh/h	4	1	21	2	1	1	5	24	4	0	92	19
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	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	11	11	11	11	11	11	11	11	11	11	11	11
Mvmt Flow	5	1	25	2	1	1	6	29	5	0	110	23

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	167	168	122	179	177	32	133	0	0	34	0	0
Stage 1	122	122	-	44	44	-	-	-	-	-	-	-
Stage 2	45	46	-	135	133	-	-	-	-	-	-	-
Critical Hdwy	7.21	6.61	6.31	7.21	6.61	6.31	4.21	-	-	4.21	-	-
Critical Hdwy Stg 1	6.21	5.61	-	6.21	5.61	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.21	5.61	-	6.21	5.61	-	-	-	-	-	-	-
Follow-up Hdwy	3.599	4.099	3.399	3.599	4.099	3.399	2.299	-	-	2.299	-	-
Pot Cap-1 Maneuver	777	709	905	763	701	1017	1398	-	-	1521	-	-
Stage 1	861	778	-	948	841	-	-	-	-	-	-	-
Stage 2	947	839	-	847	769	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	772	706	905	739	698	1017	1398	-	-	1521	-	-
Mov Cap-2 Maneuver	772	706	-	739	698	-	-	-	-	-	-	-
Stage 1	858	778	-	944	838	-	-	-	-	-	-	-
Stage 2	940	836	-	822	769	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	9.3		9.6		1.1		0	
HCM LOS	A		A					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1398	-	-	872 781	1521	-	-
HCM Lane V/C Ratio	0.004	-	-	0.035 0.006	-	-	-
HCM Control Delay (s)	7.6	-	-	9.3 9.6	0	-	-
HCM Lane LOS	A	-	-	A A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1 0	0	-	-

HCM 6th TWSC  
2: Imboden Rd & 48th Avenue

Existing Conditions  
AM Peak

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	2	0	0	0	0	3	2	52	38	20	103	3
Future Vol, veh/h	2	0	0	0	0	3	2	52	38	20	103	3
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	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	11	11	11	11	11	11	11	11	11	11	11	11
Mvmt Flow	2	0	0	0	0	4	2	62	45	24	123	4

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	264	284	125	262	264	85	127	0	0	107	0	0
Stage 1	173	173	-	89	89	-	-	-	-	-	-	-
Stage 2	91	111	-	173	175	-	-	-	-	-	-	-
Critical Hdwy	7.21	6.61	6.31	7.21	6.61	6.31	4.21	-	-	4.21	-	-
Critical Hdwy Stg 1	6.21	5.61	-	6.21	5.61	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.21	5.61	-	6.21	5.61	-	-	-	-	-	-	-
Follow-up Hdwy	3.599	4.099	3.399	3.599	4.099	3.399	2.299	-	-	2.299	-	-
Pot Cap-1 Maneuver	671	610	902	673	626	950	1405	-	-	1429	-	-
Stage 1	808	739	-	897	804	-	-	-	-	-	-	-
Stage 2	894	786	-	808	737	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	659	599	902	664	615	950	1405	-	-	1429	-	-
Mov Cap-2 Maneuver	659	599	-	664	615	-	-	-	-	-	-	-
Stage 1	807	726	-	896	803	-	-	-	-	-	-	-
Stage 2	889	785	-	794	724	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	10.5		8.8		0.2		1.2	
HCM LOS	B		A					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1405	-	-	659 950	1429	-	-
HCM Lane V/C Ratio	0.002	-	-	0.004 0.004	0.017	-	-
HCM Control Delay (s)	7.6	-	-	10.5 8.8	7.6	-	-
HCM Lane LOS	A	-	-	B A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0 0	0.1	-	-

HCM 6th TWSC  
1: Imboden Rd & 56th Avenue

Existing Conditions  
PM Peak

Intersection												
Int Delay, s/veh	2.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	20	0	29	2	0	0	13	81	0	0	49	13
Future Vol, veh/h	20	0	29	2	0	0	13	81	0	0	49	13
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	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	11	11	11	11	11	11	11	11	11	11	11	11
Mvmt Flow	24	0	35	2	0	0	15	96	0	0	58	15

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	192	192	66	209	199	96	73	0	0	96	0	0
Stage 1	66	66	-	126	126	-	-	-	-	-	-	-
Stage 2	126	126	-	83	73	-	-	-	-	-	-	-
Critical Hdwy	7.21	6.61	6.31	7.21	6.61	6.31	4.21	-	-	4.21	-	-
Critical Hdwy Stg 1	6.21	5.61	-	6.21	5.61	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.21	5.61	-	6.21	5.61	-	-	-	-	-	-	-
Follow-up Hdwy	3.599	4.099	3.399	3.599	4.099	3.399	2.299	-	-	2.299	-	-
Pot Cap-1 Maneuver	748	687	973	729	681	936	1472	-	-	1443	-	-
Stage 1	922	823	-	857	775	-	-	-	-	-	-	-
Stage 2	857	775	-	903	817	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	742	680	973	698	674	936	1472	-	-	1443	-	-
Mov Cap-2 Maneuver	742	680	-	698	674	-	-	-	-	-	-	-
Stage 1	913	823	-	848	767	-	-	-	-	-	-	-
Stage 2	848	767	-	871	817	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.5	10.2	1	0
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1472	-	-	863 698	1443	-	-
HCM Lane V/C Ratio	0.011	-	-	0.068 0.003	-	-	-
HCM Control Delay (s)	7.5	-	-	9.5 10.2	0	-	-
HCM Lane LOS	A	-	-	A B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2 0	0	-	-



HCM 6th TWSC  
2: Imboden Rd & 48th Avenue

Existing Conditions  
PM Peak

Intersection												
Int Delay, s/veh	2.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	1	0	1	28	0	19	0	93	9	2	86	3
Future Vol, veh/h	1	0	1	28	0	19	0	93	9	2	86	3
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	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	11	11	11	11	11	11	11	11	11	11	11	11
Mvmt Flow	1	0	1	33	0	23	0	111	11	2	102	4

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	236	230	104	226	227	117	106	0	0	122	0	0
Stage 1	108	108	-	117	117	-	-	-	-	-	-	-
Stage 2	128	122	-	109	110	-	-	-	-	-	-	-
Critical Hdwy	7.21	6.61	6.31	7.21	6.61	6.31	4.21	-	-	4.21	-	-
Critical Hdwy Stg 1	6.21	5.61	-	6.21	5.61	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.21	5.61	-	6.21	5.61	-	-	-	-	-	-	-
Follow-up Hdwy	3.599	4.099	3.399	3.599	4.099	3.399	2.299	-	-	2.299	-	-
Pot Cap-1 Maneuver	700	654	927	711	657	911	1431	-	-	1411	-	-
Stage 1	876	789	-	866	782	-	-	-	-	-	-	-
Stage 2	855	778	-	875	787	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	682	653	927	710	656	911	1431	-	-	1411	-	-
Mov Cap-2 Maneuver	682	653	-	710	656	-	-	-	-	-	-	-
Stage 1	876	788	-	866	782	-	-	-	-	-	-	-
Stage 2	834	778	-	873	786	-	-	-	-	-	-	-

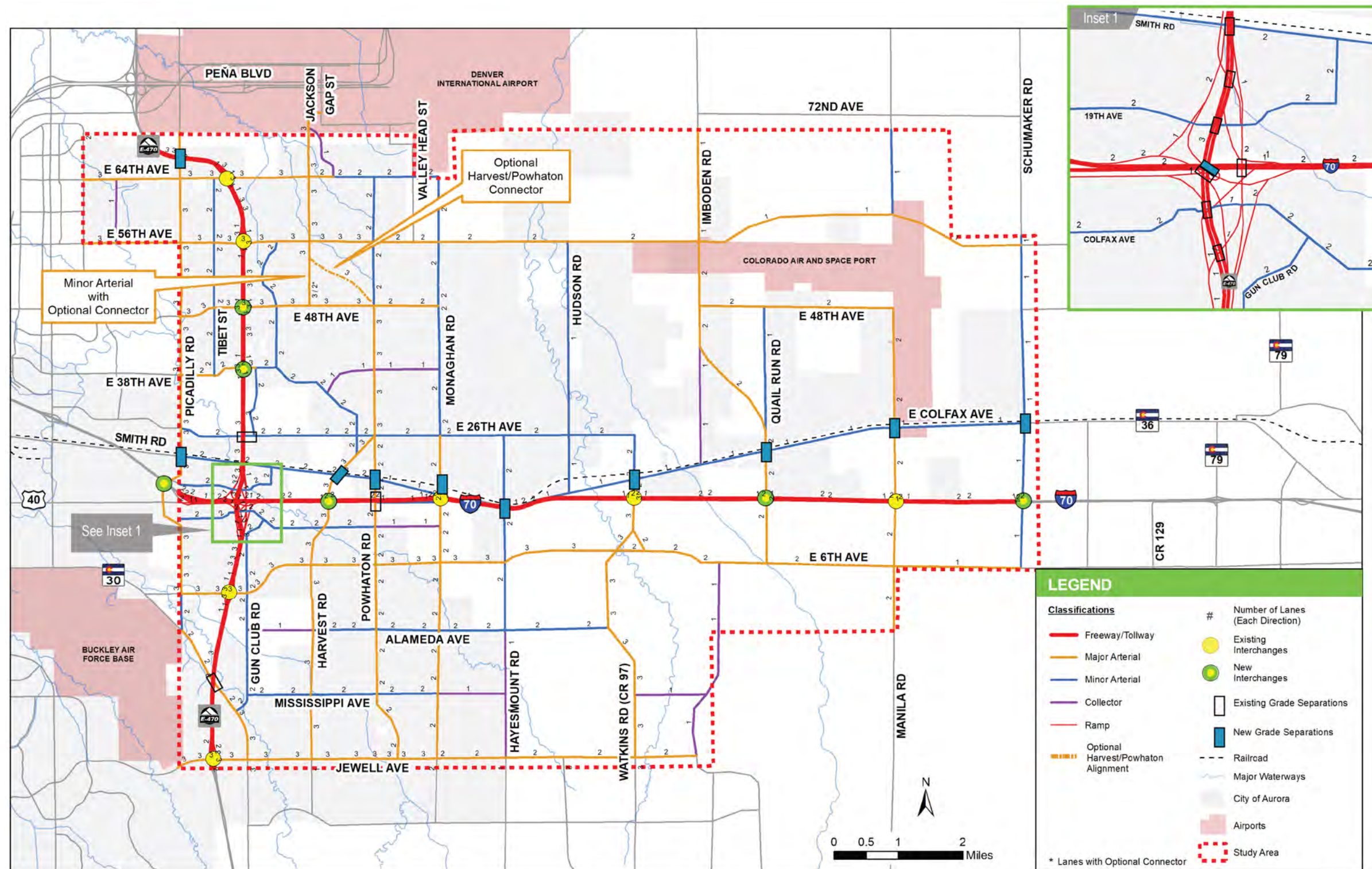
Approach	EB		WB		NB		SB	
HCM Control Delay, s	9.6		10		0		0.2	
HCM LOS	A		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1431	-	-	786 780	1411	-	-
HCM Lane V/C Ratio	-	-	-	0.003 0.072	0.002	-	-
HCM Control Delay (s)	0	-	-	9.6 10	7.6	-	-
HCM Lane LOS	A	-	-	A B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0 0.2	0	-	-

## APPENDIX D.      NEATS REFRESH RECOMMENDED ROADWAY NETWORK















Figure ES-3.  
Recommended Roadway Network



## APPENDIX E. ANALYSIS WORKSHEETS – BACKGROUND CONDITIONS

# Timings 1: Imboden Rd & 56th Avenue

2040 Background  
AM Peak

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	291	862	536	164	127	159
Future Volume (vph)	291	862	536	164	127	159
Turn Type	Prot	pt+ov	Prot	NA	NA	pm+ov
Protected Phases	4	4 5	5	2	6	4
Permitted Phases						6
Detector Phase	4	4 5	5	2	6	4
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	23.5		10.5	23.5	23.5	23.5
Total Split (s)	50.0		44.0	70.0	26.0	50.0
Total Split (%)	41.7%		36.7%	58.3%	21.7%	41.7%
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5		5.5	5.5	5.5	5.5
Lead/Lag			Lead	Lag		
Lead-Lag Optimize?			Yes	Yes		
Recall Mode	None		None	C-Max	C-Max	None
Act Effct Green (s)	34.5	72.6	32.6	74.5	36.4	76.4
Actuated g/C Ratio	0.29	0.60	0.27	0.62	0.30	0.64
v/c Ratio	0.76	0.57	0.77	0.10	0.16	0.20
Control Delay	50.4	3.9	38.7	6.9	35.7	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.4	3.9	38.7	6.9	35.7	5.3
LOS	D	A	D	A	D	A
Approach Delay	15.6			31.2	18.7	
Approach LOS	B			C	B	

## Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 20.5 (17%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 21.2

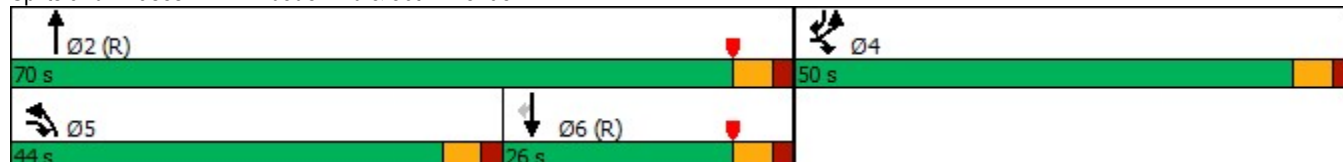
Intersection LOS: C

Intersection Capacity Utilization 49.3%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 1: Imboden Rd & 56th Avenue

















# HCM 6th Signalized Intersection Summary



















## 1: Imboden Rd & 56th Avenue

2040 Background  
AM Peak

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	291	862	536	164	127	159
Future Volume (veh/h)	291	862	536	164	127	159
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	1530	1530	1530	1530	1530	1530
Adj Flow Rate, veh/h	316	937	583	178	138	173
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	25	25	25	25	25	25
Cap, veh/h	497	1307	656	1649	841	817
Arrive On Green	0.34	0.34	0.23	0.57	0.29	0.29
Sat Flow, veh/h	1457	2281	2826	2983	2983	1296
Grp Volume(v), veh/h	316	937	583	178	138	173
Grp Sat Flow(s),veh/h/ln	1457	1141	1413	1453	1453	1296
Q Serve(g_s), s	21.9	35.7	23.9	3.4	4.3	6.8
Cycle Q Clear(g_c), s	21.9	35.7	23.9	3.4	4.3	6.8
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	497	1307	656	1649	841	817
V/C Ratio(X)	0.64	0.72	0.89	0.11	0.16	0.21
Avail Cap(c_a), veh/h	540	1376	907	1649	841	817
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.97	0.97	1.00	1.00
Uniform Delay (d), s/veh	33.3	18.6	44.6	12.0	31.8	9.5
Incr Delay (d2), s/veh	2.2	1.7	8.0	0.1	0.4	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	12.6	30.4	13.9	2.0	2.8	7.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	35.5	20.3	52.6	12.1	32.2	10.1
LnGrp LOS	D	C	D	B	C	B
Approach Vol, veh/h	1253			761	311	
Approach Delay, s/veh	24.1			43.1	19.9	
Approach LOS	C			D	B	
Timer - Assigned Phs	2		4		5	6
Phs Duration (G+Y+Rc), s	73.6		46.4		33.4	40.2
Change Period (Y+Rc), s	5.5		5.5		5.5	5.5
Max Green Setting (Gmax), s	64.5		44.5		38.5	20.5
Max Q Clear Time (g_c+l1), s	5.4		37.7		25.9	8.8
Green Ext Time (p_c), s	1.3		3.2		1.9	1.1
Intersection Summary						
HCM 6th Ctrl Delay			29.8			
HCM 6th LOS			C			

# Timings 2: Imboden Rd & 48th Avenue

2040 Background  
AM Peak

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	5	5	2	5	129	10	409	573	402
Future Volume (vph)	5	5	2	5	129	10	409	573	402
Turn Type	Perm	NA	Perm	NA	pm+ov	Perm	NA	Prot	NA
Protected Phases		4		8	1		2	1	6
Permitted Phases	4		8		8	2			
Detector Phase	4	4	8	8	1	2	2	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
Minimum Split (s)	23.5	23.5	23.5	23.5	10.5	23.5	23.5	10.5	23.5
Total Split (s)	25.0	25.0	25.0	25.0	52.0	43.0	43.0	52.0	95.0
Total Split (%)	20.8%	20.8%	20.8%	20.8%	43.3%	35.8%	35.8%	43.3%	79.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag					Lead	Lag	Lag	Lead	
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max
Act Effect Green (s)	7.5	7.5	7.5	7.5	43.6	65.4	65.4	32.9	104.8
Actuated g/C Ratio	0.06	0.06	0.06	0.06	0.36	0.54	0.54	0.27	0.87
v/c Ratio	0.08	0.17	0.03	0.52	0.15	0.03	0.28	0.81	0.18
Control Delay	53.2	34.4	51.5	27.3	4.8	18.0	17.5	52.0	1.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.2	34.4	51.5	27.3	4.8	18.0	17.5	52.0	1.5
LOS	D	C	D	C	A	B	B	D	A
Approach Delay		38.9		16.5			17.5		31.1
Approach LOS		D		B			B		C

## Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 37.5 (31%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 26.2

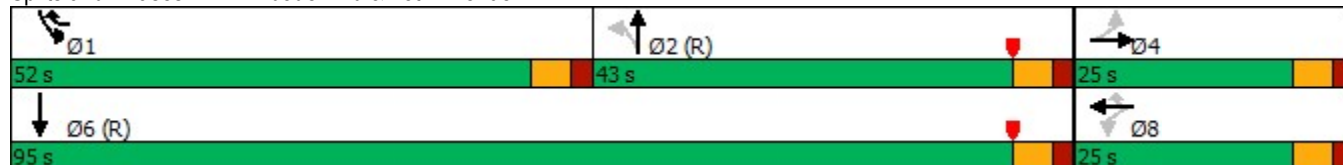
Intersection LOS: C

Intersection Capacity Utilization 45.6%

ICU Level of Service A

Analysis Period (min) 15























Splits and Phases: 2: Imboden Rd & 48th Avenue



# HCM 6th Signalized Intersection Summary

## 2: Imboden Rd & 48th Avenue













2040 Background  
AM Peak

																						
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR										
Lane Configurations																						
Traffic Volume (veh/h)	5	5	10	2	5	129	10	409	2	573	402	5										
Future Volume (veh/h)	5	5	10	2	5	129	10	409	2	573	402	5										
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0										
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		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	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530										
Adj Flow Rate, veh/h	5	5	11	2	0	143	11	445	2	623	437	5										
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, %	25	25	25	25	25	25	25	25	25	25	25	25										
Cap, veh/h	121	26	56	116	0	801	489	1643	7	703	2496	29										
Arrive On Green	0.06	0.06	0.06	0.06	0.00	0.06	0.55	0.55	0.55	0.25	0.85	0.85										
Sat Flow, veh/h	1018	425	936	1143	0	2592	775	2967	13	2826	2943	34										
Grp Volume(v), veh/h	5	0	16	2	0	143	11	218	229	623	216	226										
Grp Sat Flow(s),veh/h/ln	1018	0	1361	1143	0	1296	775	1453	1527	1413	1453	1523										
Q Serve(g_s), s	0.6	0.0	1.3	0.2	0.0	4.8	0.8	9.4	9.5	25.5	3.2	3.2										
Cycle Q Clear(g_c), s	0.6	0.0	1.3	1.5	0.0	4.8	0.8	9.4	9.5	25.5	3.2	3.2										
Prop In Lane	1.00		0.69	1.00		1.00	1.00		0.01	1.00		0.02										
Lane Grp Cap(c), veh/h	121	0	82	116	0	801	489	804	845	703	1233	1292										
V/C Ratio(X)	0.04	0.00	0.20	0.02	0.00	0.18	0.02	0.27	0.27	0.89	0.17	0.18										
Avail Cap(c_a), veh/h	225	0	221	233	0	1066	489	804	845	1095	1233	1292										
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00										
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.84	0.84	0.84										
Uniform Delay (d), s/veh	53.3	0.0	53.6	54.4	0.0	30.3	12.1	14.1	14.1	43.4	1.6	1.6										
Incr Delay (d2), s/veh	0.1	0.0	1.2	0.1	0.0	0.1	0.1	0.8	0.8	4.9	0.3	0.2										
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0										
%ile BackOfQ(95%),veh/ln	0.3	0.0	0.9	0.1	0.0	2.8	0.3	5.9	6.2	13.9	1.2	1.2										
Unsig. Movement Delay, s/veh																						
LnGrp Delay(d),s/veh	53.4	0.0	54.8	54.4	0.0	30.4	12.2	14.9	14.9	48.4	1.9	1.9										
LnGrp LOS	D	A	D	D	A	C	B	B	B	D	A	A										
Approach Vol, veh/h	21		145				458				1065											
Approach Delay, s/veh	54.5		30.8				14.8				29.1											
Approach LOS	D		C				B				C											
Timer - Assigned Phs	1	2	4		6		8															
Phs Duration (G+Y+Rc), s	35.4	71.9	12.7		107.3		12.7															
Change Period (Y+Rc), s	5.5	5.5	5.5		5.5		5.5															
Max Green Setting (Gmax), s	46.5	37.5	19.5		89.5		19.5															
Max Q Clear Time (g_c+I1), s	27.5	11.5	3.3		5.2		6.8															
Green Ext Time (p_c), s	2.4	2.9	0.0		3.0		0.4															
Intersection Summary																						
HCM 6th Ctrl Delay													25.7									
HCM 6th LOS													C									
Notes																						
User approved volume balancing among the lanes for turning movement.																						



# Timings 3: Quail Run Rd & 32nd Avenue

2040 Background  
AM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	62	6	405	261	22	382
Future Volume (vph)	62	6	405	261	22	382
Turn Type	Prot	Prot	NA	pm+ov	Perm	NA
Protected Phases	3	3	2	3		6
Permitted Phases				2	6	
Detector Phase	3	3	2	3	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.5	10.5	23.5	10.5	23.5	23.5
Total Split (s)	53.0	53.0	67.0	53.0	67.0	67.0
Total Split (%)	44.2%	44.2%	55.8%	44.2%	55.8%	55.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	None	C-Max	C-Max
Act Effect Green (s)	11.0	11.0	98.0	120.0	98.0	98.0
Actuated g/C Ratio	0.09	0.09	0.82	1.00	0.82	0.82
v/c Ratio	0.51	0.06	0.19	0.22	0.04	0.18
Control Delay	64.1	27.0	2.8	0.4	2.8	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	64.1	27.0	2.8	0.4	2.8	2.8
LOS	E	C	A	A	A	A
Approach Delay	60.6		1.9			2.8
Approach LOS	E		A			A

## Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 61.5 (51%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 40

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.51

Intersection Signal Delay: 5.7

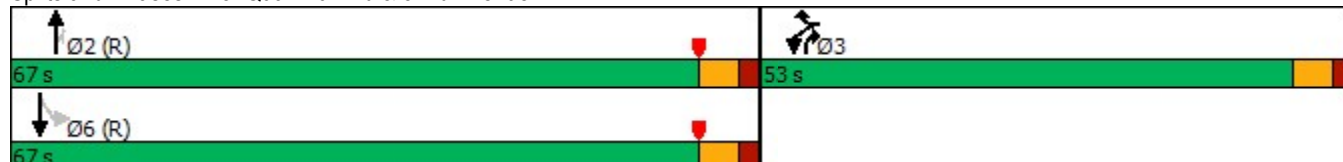
Intersection LOS: A

Intersection Capacity Utilization 31.6%

ICU Level of Service A

Analysis Period (min) 15













Splits and Phases: 3: Quail Run Rd & 32nd Avenue



# HCM 6th Signalized Intersection Summary

## 3: Quail Run Rd & 32nd Avenue

2040 Background  
AM Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	62	6	405	261	22	382
Future Volume (veh/h)	62	6	405	261	22	382
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	1530	1530	1530	1530	1530	1530
Adj Flow Rate, veh/h	67	7	440	284	24	415
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	25	25	25	25	25	25
Cap, veh/h	85	76	2470	1177	551	2470
Arrive On Green	0.06	0.06	0.85	0.85	0.85	0.85
Sat Flow, veh/h	1457	1296	2983	1296	597	2983
Grp Volume(v), veh/h	67	7	440	284	24	415
Grp Sat Flow(s),veh/h/ln	1457	1296	1453	1296	597	1453
Q Serve(g_s), s	5.4	0.6	3.2	3.1	0.9	3.0
Cycle Q Clear(g_c), s	5.4	0.6	3.2	3.1	4.1	3.0
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	85	76	2470	1177	551	2470
V/C Ratio(X)	0.79	0.09	0.18	0.24	0.04	0.17
Avail Cap(c_a), veh/h	577	513	2470	1177	551	2470
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	55.8	53.5	1.6	0.6	2.0	1.6
Incr Delay (d2), s/veh	14.7	0.5	0.2	0.5	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.2	0.4	1.1	0.4	0.2	1.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	70.5	54.0	1.7	1.1	2.1	1.7
LnGrp LOS	E	D	A	A	A	A
Approach Vol, veh/h	74		724			439
Approach Delay, s/veh	68.9		1.5			1.7
Approach LOS	E		A			A
Timer - Assigned Phs	2		6		8	
Phs Duration (G+Y+Rc), s	107.5		107.5		12.5	
Change Period (Y+Rc), s	5.5		5.5		5.5	
Max Green Setting (Gmax), s	61.5		61.5		47.5	
Max Q Clear Time (g_c+l1), s	5.2		6.1		7.4	
Green Ext Time (p_c), s	4.6		3.5		0.2	
Intersection Summary						
HCM 6th Ctrl Delay			5.6			
HCM 6th LOS			A			





HCM 6th TWSC  
4: Cavanaugh Road & 48th Avenue







2040 Background  
AM Peak







Intersection						
Int Delay, s/veh	1.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	
Traffic Vol, veh/h	347	224	0	112	53	0
Future Vol, veh/h	347	224	0	112	53	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	377	243	0	122	58	0
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	620	0	560	310
Stage 1	-	-	-	-	499	-
Stage 2	-	-	-	-	61	-
Critical Hdwy	-	-	4.6	-	7.3	7.4
Critical Hdwy Stg 1	-	-	-	-	6.3	-
Critical Hdwy Stg 2	-	-	-	-	6.3	-
Follow-up Hdwy	-	-	2.45	-	3.75	3.55
Pot Cap-1 Maneuver	-	-	816	-	407	622
Stage 1	-	-	-	-	514	-
Stage 2	-	-	-	-	891	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	816	-	407	622
Mov Cap-2 Maneuver	-	-	-	-	407	-
Stage 1	-	-	-	-	514	-
Stage 2	-	-	-	-	891	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		15.3	
HCM LOS					C	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	407	-	-	816	-	
HCM Lane V/C Ratio	0.142	-	-	-	-	
HCM Control Delay (s)	15.3	-	-	0	-	
HCM Lane LOS	C	-	-	A	-	
HCM 95th %tile Q(veh)	0.5	-	-	0	-	

HCM 6th TWSC  
5: Cavanaugh Road & 42nd Avenue

2040 Background  
AM Peak

Intersection						
Int Delay, s/veh	1.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	8	45	0	36	188
Future Vol, veh/h	0	8	45	0	36	188
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	0	9	49	0	39	204
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	331	49	0	0	49	0
Stage 1	49	-	-	-	-	-
Stage 2	282	-	-	-	-	-
Critical Hdwy	6.65	6.45	-	-	4.35	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	-	-	2.425	-
Pot Cap-1 Maneuver	619	958	-	-	1422	-
Stage 1	918	-	-	-	-	-
Stage 2	716	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	602	958	-	-	1422	-
Mov Cap-2 Maneuver	602	-	-	-	-	-
Stage 1	918	-	-	-	-	-
Stage 2	697	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	8.8	0		1.2		
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBL	SBT	
Capacity (veh/h)	-	- 958		1422	-	
HCM Lane V/C Ratio	-	- 0.009		0.028	-	
HCM Control Delay (s)	-	- 8.8		7.6	-	
HCM Lane LOS	-	- A		A	-	
HCM 95th %tile Q(veh)	-	- 0		0.1	-	













Intersection						
Int Delay, s/veh	4.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	49	72	122	199	128	48
Future Vol, veh/h	49	72	122	199	128	48
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	100	100	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	53	78	133	216	139	52
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	349	0	-	0	317	133
Stage 1	-	-	-	-	133	-
Stage 2	-	-	-	-	184	-
Critical Hdwy	4.35	-	-	-	6.65	6.45
Critical Hdwy Stg 1	-	-	-	-	5.65	-
Critical Hdwy Stg 2	-	-	-	-	5.65	-
Follow-up Hdwy	2.425	-	-	-	3.725	3.525
Pot Cap-1 Maneuver	1093	-	-	-	631	858
Stage 1	-	-	-	-	840	-
Stage 2	-	-	-	-	795	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1093	-	-	-	601	858
Mov Cap-2 Maneuver	-	-	-	-	601	-
Stage 1	-	-	-	-	800	-
Stage 2	-	-	-	-	795	-
Approach	EB	WB		SB		
HCM Control Delay, s	3.4	0		11.9		
HCM LOS	B					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1093	-	-	-	601	858
HCM Lane V/C Ratio	0.049	-	-	-	0.231	0.061
HCM Control Delay (s)	8.5	-	-	-	12.8	9.5
HCM Lane LOS	A	-	-	-	B	A
HCM 95th %tile Q(veh)	0.2	-	-	-	0.9	0.2

Intersection						
Int Delay, s/veh	2.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	38	160	240	341	0
Future Vol, veh/h	0	38	160	240	341	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	100	0	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	0	41	174	261	371	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	850	186	371	0	-	0
Stage 1	371	-	-	-	-	-
Stage 2	479	-	-	-	-	-
Critical Hdwy	7.3	7.4	4.6	-	-	-
Critical Hdwy Stg 1	6.3	-	-	-	-	-
Critical Hdwy Stg 2	6.3	-	-	-	-	-
Follow-up Hdwy	3.75	3.55	2.45	-	-	-
Pot Cap-1 Maneuver	258	757	1035	-	-	-
Stage 1	605	-	-	-	-	-
Stage 2	527	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	215	757	1035	-	-	-
Mov Cap-2 Maneuver	215	-	-	-	-	-
Stage 1	503	-	-	-	-	-
Stage 2	527	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	10	3.7		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1035	-	-	757	-	-
HCM Lane V/C Ratio	0.168	-	-	0.055	-	-
HCM Control Delay (s)	9.2	-	0	10	-	-
HCM Lane LOS	A	-	A	B	-	-
HCM 95th %tile Q(veh)	0.6	-	-	0.2	-	-

# Timings

## 1: Imboden Rd & 56th Avenue

2040 Background  
PM Peak

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	328	973	878	188	217	219
Future Volume (vph)	328	973	878	188	217	219
Turn Type	Prot	pt+ov	Prot	NA	NA	pm+ov
Protected Phases	4	4 5	5	2	6	4
Permitted Phases						6
Detector Phase	4	4 5	5	2	6	4
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	23.5		10.5	23.5	23.5	23.5
Total Split (s)	43.0		53.0	77.0	24.0	43.0
Total Split (%)	35.8%		44.2%	64.2%	20.0%	35.8%
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5		5.5	5.5	5.5	5.5
Lead/Lag			Lead	Lag		
Lead-Lag Optimize?			Yes	Yes		
Recall Mode	None		None	C-Max	C-Max	None
Act Effct Green (s)	35.1	86.6	46.0	73.9	22.4	63.0
Actuated g/C Ratio	0.29	0.72	0.38	0.62	0.19	0.52
v/c Ratio	0.85	0.62	0.89	0.11	0.44	0.34
Control Delay	58.7	7.4	44.2	10.4	47.8	15.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.7	7.4	44.2	10.4	47.8	15.3
LOS	E	A	D	B	D	B
Approach Delay	20.3			38.3	31.5	
Approach LOS	C			D	C	

### Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 18.5 (15%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 28.9

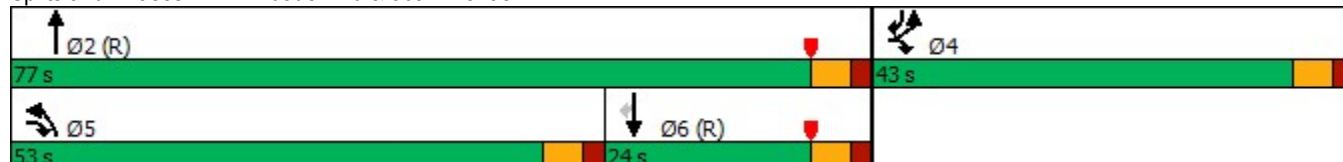
Intersection LOS: C

Intersection Capacity Utilization 63.0%

ICU Level of Service B

Analysis Period (min) 15













Splits and Phases: 1: Imboden Rd & 56th Avenue



# HCM 6th Signalized Intersection Summary

## 1: Imboden Rd & 56th Avenue



















2040 Background  
PM Peak

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	328	973	878	188	217	219
Future Volume (veh/h)	328	973	878	188	217	219
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	1530	1530	1530	1530	1530	1530
Adj Flow Rate, veh/h	357	1058	954	204	236	238
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	25	25	25	25	25	25
Cap, veh/h	450	1529	1022	1742	558	649
Arrive On Green	0.31	0.31	0.36	0.60	0.19	0.19
Sat Flow, veh/h	1457	2281	2826	2983	2983	1296
Grp Volume(v), veh/h	357	1058	954	204	236	238
Grp Sat Flow(s),veh/h/ln	1457	1141	1413	1453	1453	1296
Q Serve(g_s), s	26.9	34.2	39.0	3.6	8.6	13.5
Cycle Q Clear(g_c), s	26.9	34.2	39.0	3.6	8.6	13.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	450	1529	1022	1742	558	649
V/C Ratio(X)	0.79	0.69	0.93	0.12	0.42	0.37
Avail Cap(c_a), veh/h	455	1538	1119	1742	558	649
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.91	0.91	1.00	1.00
Uniform Delay (d), s/veh	38.0	12.2	36.9	10.4	42.6	18.3
Incr Delay (d2), s/veh	9.2	1.3	12.3	0.1	2.3	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	16.0	31.7	21.1	2.1	5.9	11.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	47.2	13.5	49.2	10.5	45.0	19.9
LnGrp LOS	D	B	D	B	D	B
Approach Vol, veh/h	1415			1158	474	
Approach Delay, s/veh	22.0			42.4	32.4	
Approach LOS	C			D	C	
Timer - Assigned Phs	2		4		5	6
Phs Duration (G+Y+Rc), s	77.4		42.6		48.9	28.5
Change Period (Y+Rc), s	5.5		5.5		5.5	5.5
Max Green Setting (Gmax), s	71.5		37.5		47.5	18.5
Max Q Clear Time (g_c+l1), s	5.6		36.2		41.0	15.5
Green Ext Time (p_c), s	1.5		0.9		2.3	0.7
Intersection Summary						
HCM 6th Ctrl Delay			31.4			
HCM 6th LOS			C			



# Timings 2: Imboden Rd & 48th Avenue

2040 Background  
PM Peak

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	5	5	2	5	552	10	376	152	715
Future Volume (vph)	5	5	2	5	552	10	376	152	715
Turn Type	Perm	NA	Perm	NA	pm+ov	Perm	NA	Prot	NA
Protected Phases		4		8	1		2	1	6
Permitted Phases	4		8		8	2			
Detector Phase	4	4	8	8	1	2	2	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
Minimum Split (s)	23.5	23.5	23.5	23.5	10.5	23.5	23.5	10.5	23.5
Total Split (s)	47.0	47.0	47.0	47.0	33.0	40.0	40.0	33.0	73.0
Total Split (%)	39.2%	39.2%	39.2%	39.2%	27.5%	33.3%	33.3%	27.5%	60.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag					Lead	Lag	Lag	Lead	
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max
Act Effect Green (s)	10.4	10.4	10.4	10.4	28.6	80.4	80.4	12.7	98.6
Actuated g/C Ratio	0.09	0.09	0.09	0.09	0.24	0.67	0.67	0.11	0.82
v/c Ratio	0.10	0.13	0.02	0.80	0.71	0.03	0.21	0.56	0.33
Control Delay	49.4	28.6	44.5	22.2	26.4	10.4	9.3	55.3	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.4	28.6	44.5	22.2	26.4	10.4	9.3	55.3	3.5
LOS	D	C	D	C	C	B	A	E	A
Approach Delay		33.6		24.4			9.3		12.5
Approach LOS		C		C			A		B

## Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 34.5 (29%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 15.6

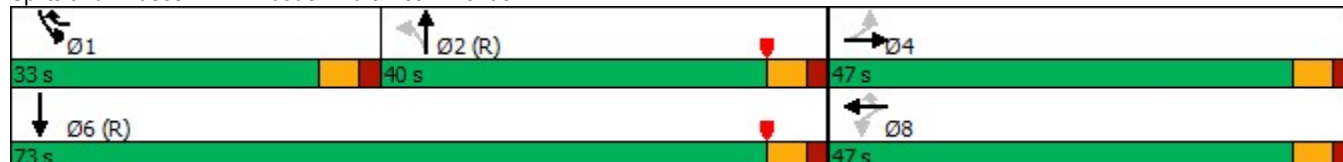
Intersection LOS: B

Intersection Capacity Utilization 51.2%

ICU Level of Service A

Analysis Period (min) 15
























Splits and Phases: 2: Imboden Rd & 48th Avenue



# HCM 6th Signalized Intersection Summary













## 2: Imboden Rd & 48th Avenue

2040 Background  
PM Peak

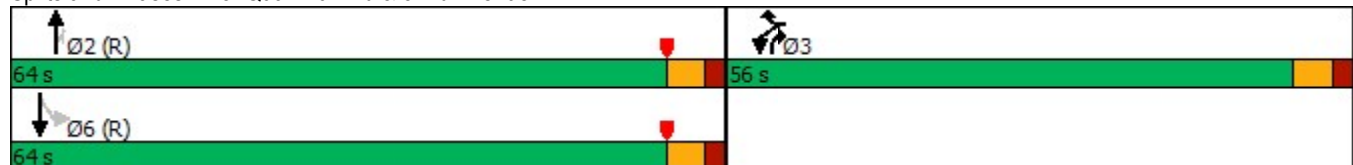
																						
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR										
Lane Configurations																						
Traffic Volume (veh/h)	5	5	10	2	5	552	10	376	4	152	715	5										
Future Volume (veh/h)	5	5	10	2	5	552	10	376	4	152	715	5										
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0										
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		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	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530										
Adj Flow Rate, veh/h	5	5	11	2	0	603	11	409	4	165	777	5										
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, %	25	25	25	25	25	25	25	25	25	25	25	25										
Cap, veh/h	341	103	227	327	0	830	367	1599	16	220	1971	13										
Arrive On Green	0.24	0.24	0.24	0.24	0.00	0.24	0.54	0.54	0.54	0.08	0.67	0.67										
Sat Flow, veh/h	1159	425	936	1143	0	2592	565	2949	29	2826	2960	19										
Grp Volume(v), veh/h	5	0	16	2	0	603	11	201	212	165	381	401										
Grp Sat Flow(s),veh/h/ln	1159	0	1361	1143	0	1296	565	1453	1524	1413	1453	1526										
Q Serve(g_s), s	0.4	0.0	1.1	0.2	0.0	24.7	1.1	8.8	8.9	6.9	14.3	14.3										
Cycle Q Clear(g_c), s	0.4	0.0	1.1	1.2	0.0	24.7	1.1	8.8	8.9	6.9	14.3	14.3										
Prop In Lane	1.00		0.69	1.00		1.00	1.00		0.02	1.00		0.01										
Lane Grp Cap(c), veh/h	341	0	330	327	0	830	367	788	827	220	967	1016										
V/C Ratio(X)	0.01	0.00	0.05	0.01	0.00	0.73	0.03	0.26	0.26	0.75	0.39	0.39										
Avail Cap(c_a), veh/h	461	0	471	445	0	1098	367	788	827	648	967	1016										
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00										
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.78	0.78	0.78										
Uniform Delay (d), s/veh	34.6	0.0	34.8	35.3	0.0	36.1	12.8	14.6	14.6	54.2	9.1	9.1										
Incr Delay (d2), s/veh	0.0	0.0	0.1	0.0	0.0	1.7	0.2	0.8	0.7	4.0	0.9	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(95%),veh/ln	0.2	0.0	0.7	0.1	0.0	12.6	0.3	5.5	5.8	4.6	7.6	7.9										
Unsig. Movement Delay, s/veh																						
LnGrp Delay(d),s/veh	34.6	0.0	34.9	35.3	0.0	37.8	13.0	15.4	15.3	58.2	10.0	10.0										
LnGrp LOS	C	A	C	D	A	D	B	B	B	E	B	A										
Approach Vol, veh/h	21				605				424													
Approach Delay, s/veh	34.8				37.8				15.3													
Approach LOS	C				D				B													
Timer - Assigned Phs	1	2	4		6		8															
Phs Duration (G+Y+Rc), s	14.8	70.6	34.6		85.4		34.6															
Change Period (Y+Rc), s	5.5	5.5	5.5		5.5		5.5															
Max Green Setting (Gmax), s	27.5	34.5	41.5		67.5		41.5															
Max Q Clear Time (g_c+I1), s	8.9	10.9	3.1		16.3		26.7															
Green Ext Time (p_c), s	0.5	2.7	0.1		6.1		2.4															
Intersection Summary																						
HCM 6th Ctrl Delay													23.8									
HCM 6th LOS													C									
Notes																						
User approved volume balancing among the lanes for turning movement.																						

# Timings 3: Quail Run Rd & 32nd Avenue

2040 Background  
PM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	267	24	356	69	7	710
Future Volume (vph)	267	24	356	69	7	710
Turn Type	Prot	Prot	NA	pm+ov	Perm	NA
Protected Phases	3	3	2	3		6
Permitted Phases				2	6	
Detector Phase	3	3	2	3	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.5	10.5	23.5	10.5	23.5	23.5
Total Split (s)	56.0	56.0	64.0	56.0	64.0	64.0
Total Split (%)	46.7%	46.7%	53.3%	46.7%	53.3%	53.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	None	C-Max	C-Max
Act Effct Green (s)	30.2	30.2	78.8	120.0	78.8	78.8
Actuated g/C Ratio	0.25	0.25	0.66	1.00	0.66	0.66
v/c Ratio	0.80	0.08	0.20	0.06	0.02	0.41
Control Delay	57.5	10.7	9.5	0.1	10.0	11.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.5	10.7	9.5	0.1	10.0	11.5
LOS	E	B	A	A	A	B
Approach Delay	53.7		8.0			11.5
Approach LOS	D		A			B
Intersection Summary						
Cycle Length: 120						
Actuated Cycle Length: 120						
Offset: 58.5 (49%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow						
Natural Cycle: 45						
Control Type: Actuated-Coordinated						
Maximum v/c Ratio: 0.80						
Intersection Signal Delay: 19.0				Intersection LOS: B		
Intersection Capacity Utilization 43.6%				ICU Level of Service A		
Analysis Period (min) 15						













Splits and Phases: 3: Quail Run Rd & 32nd Avenue



# HCM 6th Signalized Intersection Summary

## 3: Quail Run Rd & 32nd Avenue

2040 Background  
PM Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	267	24	356	69	7	710
Future Volume (veh/h)	267	24	356	69	7	710
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	1530	1530	1530	1530	1530	1530
Adj Flow Rate, veh/h	290	26	387	75	8	772
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	25	25	25	25	25	25
Cap, veh/h	319	284	2003	1177	583	2003
Arrive On Green	0.22	0.22	0.69	0.69	0.69	0.69
Sat Flow, veh/h	1457	1296	2983	1296	815	2983
Grp Volume(v), veh/h	290	26	387	75	8	772
Grp Sat Flow(s),veh/h/ln	1457	1296	1453	1296	815	1453
Q Serve(g_s), s	23.3	1.9	5.7	0.7	0.4	13.5
Cycle Q Clear(g_c), s	23.3	1.9	5.7	0.7	6.2	13.5
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	319	284	2003	1177	583	2003
V/C Ratio(X)	0.91	0.09	0.19	0.06	0.01	0.39
Avail Cap(c_a), veh/h	613	545	2003	1177	583	2003
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	45.7	37.3	6.7	0.5	7.8	7.9
Incr Delay (d2), s/veh	9.8	0.1	0.2	0.1	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	14.2	1.1	3.1	0.1	0.1	7.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	55.5	37.5	6.9	0.6	7.8	8.5
LnGrp LOS	E	D	A	A	A	A
Approach Vol, veh/h	316		462			780
Approach Delay, s/veh	54.0		5.9			8.4
Approach LOS	D		A			A
Timer - Assigned Phs	2		6		8	
Phs Duration (G+Y+Rc), s	88.2		88.2		31.8	
Change Period (Y+Rc), s	5.5		5.5		5.5	
Max Green Setting (Gmax), s	58.5		58.5		50.5	
Max Q Clear Time (g_c+l1), s	7.7		15.5		25.3	
Green Ext Time (p_c), s	3.2		6.8		1.0	
Intersection Summary						
HCM 6th Ctrl Delay	16.9					
HCM 6th LOS	B					





HCM 6th TWSC  
4: Cavanaugh Road & 48th Avenue

2040 Background  
PM Peak

Intersection						
Int Delay, s/veh	4.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	
Traffic Vol, veh/h	94	56	0	356	226	0
Future Vol, veh/h	94	56	0	356	226	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	102	61	0	387	246	0
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	163	0	327	82
Stage 1	-	-	-	-	133	-
Stage 2	-	-	-	-	194	-
Critical Hdwy	-	-	4.6	-	7.3	7.4
Critical Hdwy Stg 1	-	-	-	-	6.3	-
Critical Hdwy Stg 2	-	-	-	-	6.3	-
Follow-up Hdwy	-	-	2.45	-	3.75	3.55
Pot Cap-1 Maneuver	-	-	1261	-	584	892
Stage 1	-	-	-	-	815	-
Stage 2	-	-	-	-	755	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1261	-	584	892
Mov Cap-2 Maneuver	-	-	-	-	584	-
Stage 1	-	-	-	-	815	-
Stage 2	-	-	-	-	755	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		15.6	
HCM LOS	C					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	584	-	-	1261	-	
HCM Lane V/C Ratio	0.421	-	-	-	-	
HCM Control Delay (s)	15.6	-	-	0	-	
HCM Lane LOS	C	-	-	A	-	
HCM 95th %tile Q(veh)	2.1	-	-	0	-	

HCM 6th TWSC  
5: Cavanaugh Road & 42nd Avenue







2040 Background  
PM Peak







Intersection						
Int Delay, s/veh	1.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	36	190	0	8	48
Future Vol, veh/h	0	36	190	0	8	48
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	0	39	207	0	9	52

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	277	207	0
Stage 1	207	-	-
Stage 2	70	-	-
Critical Hdwy	6.65	6.45	-
Critical Hdwy Stg 1	5.65	-	-
Critical Hdwy Stg 2	5.65	-	-
Follow-up Hdwy	3.725	3.525	-
Pot Cap-1 Maneuver	666	779	-
Stage 1	776	-	-
Stage 2	898	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	661	779	-
Mov Cap-2 Maneuver	661	-	-
Stage 1	776	-	-
Stage 2	892	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.9	0	1.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	779	1238
HCM Lane V/C Ratio	-	-	0.05	0.007
HCM Control Delay (s)	-	-	9.9	7.9
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0

Intersection						
Int Delay, s/veh	6.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	50	129	78	135	208	51
Future Vol, veh/h	50	129	78	135	208	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	100	100	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	54	140	85	147	226	55
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	232	0	-	0	333	85
Stage 1	-	-	-	-	85	-
Stage 2	-	-	-	-	248	-
Critical Hdwy	4.35	-	-	-	6.65	6.45
Critical Hdwy Stg 1	-	-	-	-	5.65	-
Critical Hdwy Stg 2	-	-	-	-	5.65	-
Follow-up Hdwy	2.425	-	-	-	3.725	3.525
Pot Cap-1 Maneuver	1212	-	-	-	618	914
Stage 1	-	-	-	-	883	-
Stage 2	-	-	-	-	742	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1212	-	-	-	590	914
Mov Cap-2 Maneuver	-	-	-	-	590	-
Stage 1	-	-	-	-	843	-
Stage 2	-	-	-	-	742	-
Approach	EB		WB		SB	
HCM Control Delay, s	2.3		0		13.7	
HCM LOS	B					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1212	-	-	-	590	914
HCM Lane V/C Ratio	0.045	-	-	-	0.383	0.061
HCM Control Delay (s)	8.1	-	-	-	14.8	9.2
HCM Lane LOS	A	-	-	-	B	A
HCM 95th %tile Q(veh)	0.1	-	-	-	1.8	0.2

























Intersection						
Int Delay, s/veh	2.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	160	37	351	223	0
Future Vol, veh/h	0	160	37	351	223	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	100	0	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	0	174	40	382	242	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	513	121	242	0	-	0
Stage 1	242	-	-	-	-	-
Stage 2	271	-	-	-	-	-
Critical Hdwy	7.3	7.4	4.6	-	-	-
Critical Hdwy Stg 1	6.3	-	-	-	-	-
Critical Hdwy Stg 2	6.3	-	-	-	-	-
Follow-up Hdwy	3.75	3.55	2.45	-	-	-
Pot Cap-1 Maneuver	438	839	1170	-	-	-
Stage 1	711	-	-	-	-	-
Stage 2	686	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	423	839	1170	-	-	-
Mov Cap-2 Maneuver	423	-	-	-	-	-
Stage 1	687	-	-	-	-	-
Stage 2	686	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	10.4	0.8		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1170	-	-	839	-	-
HCM Lane V/C Ratio	0.034	-	-	0.207	-	-
HCM Control Delay (s)	8.2	-	0	10.4	-	-
HCM Lane LOS	A	-	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.8	-	-



# Timings

## 1: Imboden Rd & 56th Avenue

Long Term Background  
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	389	29	1258	43	8	1	743	276	140	2	204	217
Future Volume (vph)	389	29	1258	43	8	1	743	276	140	2	204	217
Turn Type	Prot	NA	pt+ov	Prot	NA	Perm	Prot	NA	pm+ov	Perm	NA	pm+ov
Protected Phases	7	4	4 5	3	8		5	2	3		6	7
Permitted Phases						8			2	6		6
Detector Phase	7	4	4 5	3	8	8	5	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)	10.5	23.5		10.5	23.5	23.5	10.5	23.5	10.5	23.5	23.5	10.5
Total Split (s)	32.0	43.0		12.0	23.5	23.5	38.0	65.0	12.0	27.0	27.0	32.0
Total Split (%)	26.6%	35.7%		10.0%	19.5%	19.5%	31.5%	53.9%	10.0%	22.4%	22.4%	26.6%
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)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
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)	5.5	5.5		5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead		Lead	Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None	None	None	C-Max	None	C-Max	C-Max	None
Act Effect Green (s)	37.1	35.7	72.9	6.3	11.6	11.6	31.8	62.0	73.8	24.8	24.8	67.4
Actuated g/C Ratio	0.31	0.30	0.60	0.05	0.10	0.10	0.26	0.51	0.61	0.21	0.21	0.56
v/c Ratio	0.49	0.07	0.68	0.32	0.06	0.00	0.75	0.20	0.18	0.01	0.37	0.29
Control Delay	38.7	29.8	10.2	61.0	45.4	0.0	45.8	16.8	2.1	41.0	44.7	3.6
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	38.7	29.8	10.2	61.0	45.4	0.0	45.8	16.8	2.1	41.0	44.7	3.6
LOS	D	C	B	E	D	A	D	B	A	D	D	A
Approach Delay		17.1			57.5			33.6			23.6	
Approach LOS		B			E			C			C	

### Intersection Summary

Cycle Length: 120.5

Actuated Cycle Length: 120.5

Offset: 21.5 (18%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 24.4

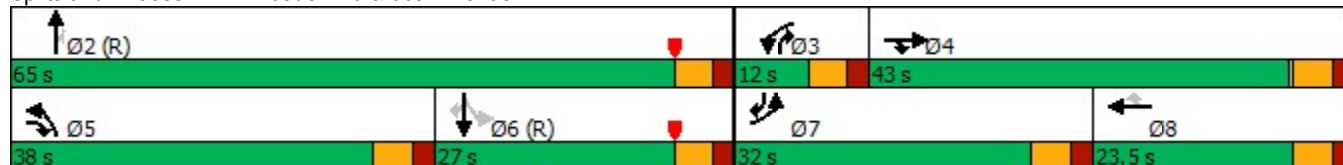
Intersection LOS: C

Intersection Capacity Utilization 52.9%

ICU Level of Service A

Analysis Period (min) 15

























Splits and Phases: 1: Imboden Rd & 56th Avenue



# HCM 6th Signalized Intersection Summary





















## 1: Imboden Rd & 56th Avenue

Long Term Background  
AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	389	29	1258	43	8	1	743	276	140	2	204	217
Future Volume (veh/h)	389	29	1258	43	8	1	743	276	140	2	204	217
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	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530
Adj Flow Rate, veh/h	423	32	1367	47	9	1	808	300	152	2	222	236
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Cap, veh/h	482	478	1588	93	267	227	924	1503	713	249	716	541
Arrive On Green	0.17	0.31	0.31	0.03	0.17	0.17	0.22	0.52	0.52	0.25	0.25	0.25
Sat Flow, veh/h	2826	1530	2955	2826	1530	1296	4108	2906	1296	768	2906	1296
Grp Volume(v), veh/h	423	32	1367	47	9	1	808	300	152	2	222	236
Grp Sat Flow(s),veh/h/ln	1413	1530	985	1413	1530	1296	1369	1453	1296	768	1453	1296
Q Serve(g_s), s	17.5	1.8	37.5	2.0	0.6	0.1	22.8	6.7	7.2	0.2	7.5	15.6
Cycle Q Clear(g_c), s	17.5	1.8	37.5	2.0	0.6	0.1	22.8	6.7	7.2	0.2	7.5	15.6
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	482	478	1588	93	267	227	924	1503	713	249	716	541
V/C Ratio(X)	0.88	0.07	0.86	0.50	0.03	0.00	0.87	0.20	0.21	0.01	0.31	0.44
Avail Cap(c_a), veh/h	624	478	1588	153	267	227	1113	1503	713	249	716	541
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.92	0.92	0.92	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.5	29.0	23.9	57.1	41.1	40.9	44.9	15.6	13.8	34.2	36.9	24.9
Incr Delay (d2), s/veh	11.0	0.1	5.1	4.2	0.1	0.0	6.4	0.3	0.6	0.1	1.1	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	11.2	1.2	16.9	1.4	0.4	0.0	12.8	4.1	4.0	0.1	5.0	8.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	59.5	29.0	29.0	61.2	41.1	40.9	51.3	15.9	14.4	34.2	38.0	27.5
LnGrp LOS	E	C	C	E	D	D	D	B	B	C	D	C
Approach Vol, veh/h	1822			57			1260			460		
Approach Delay, s/veh	36.1			57.7			38.4			32.6		
Approach LOS	D			E			D			C		
Timer - Assigned Phs	2			3			4			5		
Phs Duration (G+Y+Rc), s	67.5			9.5			43.0			32.5		
Change Period (Y+Rc), s	5.5			5.5			5.5			5.5		
Max Green Setting (Gmax), s	59.5			6.5			37.5			21.5		
Max Q Clear Time (g_c+l1), s	9.2			4.0			39.5			24.8		
Green Ext Time (p_c), s	2.8			0.0			0.0			2.2		
Intersection Summary												
HCM 6th Ctrl Delay	36.8											
HCM 6th LOS	D											

# Timings 2: Imboden Rd & 48th Avenue

Long Term Background  
AM Peak

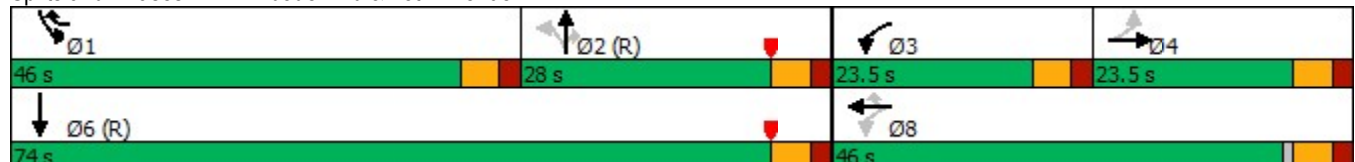
										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	5	5	27	5	223	10	682	35	771	728
Future Volume (vph)	5	5	27	5	223	10	682	35	771	728
Turn Type	Perm	NA	pm+pt	NA	pm+ov	Perm	NA	Perm	Prot	NA
Protected Phases		4	3	8	1		2		1	6
Permitted Phases	4		8		8	2		2		
Detector Phase	4	4	3	8	1	2	2	2	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)	23.5	23.5	23.5	23.5	10.5	23.5	23.5	23.5	10.5	23.5
Total Split (s)	23.5	23.5	23.5	46.0	46.0	28.0	28.0	28.0	46.0	74.0
Total Split (%)	19.4%	19.4%	19.4%	38.0%	38.0%	23.1%	23.1%	23.1%	38.0%	61.2%
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
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)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lag	Lag	Lead		Lead	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max	None	C-Max
Act Effect Green (s)	6.4	6.4	13.0	12.7	59.9	50.1	50.1	50.1	41.7	97.3
Actuated g/C Ratio	0.05	0.05	0.11	0.10	0.50	0.41	0.41	0.41	0.34	0.80
v/c Ratio	0.08	0.20	0.25	0.53	0.20	0.05	0.43	0.06	0.87	0.24
Control Delay	56.4	37.0	50.1	16.7	12.3	30.1	28.9	0.2	47.3	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.4	37.0	50.1	16.7	12.3	30.1	28.9	0.2	47.3	3.8
LOS	E	D	D	B	B	C	C	A	D	A
Approach Delay		41.6		18.3			27.5			26.1
Approach LOS		D		B			C			C

## Intersection Summary

Cycle Length: 121  
 Actuated Cycle Length: 121  
 Offset: 22.5 (19%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow  
 Natural Cycle: 105  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.87  
 Intersection Signal Delay: 25.8  
 Intersection Capacity Utilization 57.1%  
 Analysis Period (min) 15

Intersection LOS: C  
 ICU Level of Service B
























## Splits and Phases: 2: Imboden Rd & 48th Avenue



# HCM 6th Signalized Intersection Summary

## 2: Imboden Rd & 48th Avenue





















Long Term Background  
AM Peak

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	5	5	10	27	5	223	10	682	35	771	728	5	
Future Volume (veh/h)	5	5	10	27	5	223	10	682	35	771	728	5	
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		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	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	
Adj Flow Rate, veh/h	5	5	11	29	0	245	11	741	38	838	791	5	
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, %	25	25	25	25	25	25	25	25	25	25	25	25	
Cap, veh/h	107	18	39	154	0	1151	294	1752	544	893	3344	21	
Arrive On Green	0.04	0.04	0.04	0.04	0.00	0.13	0.42	0.42	0.42	0.32	0.78	0.78	
Sat Flow, veh/h	1159	425	936	1457	0	2592	558	4176	1296	2826	4281	27	
Grp Volume(v), veh/h	5	0	16	29	0	245	11	741	38	838	514	282	
Grp Sat Flow(s),veh/h/ln	1159	0	1361	1457	0	1296	558	1392	1296	1413	1392	1525	
Q Serve(g_s), s	0.5	0.0	1.4	2.2	0.0	7.0	1.4	15.1	2.1	34.9	6.0	6.0	
Cycle Q Clear(g_c), s	0.5	0.0	1.4	2.2	0.0	7.0	1.4	15.1	2.1	34.9	6.0	6.0	
Prop In Lane	1.00		0.69	1.00		1.00	1.00		1.00	1.00		0.02	
Lane Grp Cap(c), veh/h	107	0	56	154	0	1151	294	1752	544	893	2174	1191	
V/C Ratio(X)	0.05	0.00	0.28	0.19	0.00	0.21	0.04	0.42	0.07	0.94	0.24	0.24	
Avail Cap(c_a), veh/h	232	0	202	310	0	1687	294	1752	544	946	2174	1191	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.74	0.74	0.74	
Uniform Delay (d), s/veh	55.8	0.0	56.3	50.1	0.0	20.7	20.8	24.8	21.0	40.3	3.6	3.6	
Incr Delay (d2), s/veh	0.2	0.0	2.7	0.6	0.0	0.1	0.2	0.8	0.2	12.8	0.2	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(95%),veh/ln	0.3	0.0	0.9	1.5	0.0	3.9	0.4	8.8	1.2	18.8	2.6	3.0	
Unsig. Movement Delay, s/veh													
LnGrp Delay(d),s/veh	56.0	0.0	59.0	50.7	0.0	20.7	21.0	25.5	21.2	53.1	3.7	3.9	
LnGrp LOS	E	A	E	D	A	C	C	C	C	D	A	A	
Approach Vol, veh/h	21			274				790				1634	
Approach Delay, s/veh	58.3			23.9				25.3				29.1	
Approach LOS	E			C				C				C	
Timer - Assigned Phs	1	2	3	4	6				8				
Phs Duration (G+Y+Rc), s	43.7	56.3	10.5	10.5	100.0				21.0				
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5				5.5				
Max Green Setting (Gmax), s	40.5	22.5	18.0	18.0	68.5				40.5				
Max Q Clear Time (g_c+I1), s	36.9	17.1	4.2	3.4	8.0				9.0				
Green Ext Time (p_c), s	1.3	2.5	0.0	0.0	6.5				1.0				
Intersection Summary													
HCM 6th Ctrl Delay			27.7										
HCM 6th LOS			C										
Notes													

# Timings

## 3: Quail Run Rd & 32nd Avenue

Long Term Background  
AM Peak

										
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	4	0	222	2	68	823	855	53	674	16
Future Volume (vph)	4	0	222	2	68	823	855	53	674	16
Turn Type	Perm	NA	Prot	NA	Perm	NA	pm+ov	pm+pt	NA	Perm
Protected Phases		4	3	8		2	3	1	6	
Permitted Phases	4				2		2	6		6
Detector Phase	4	4	3	8	2	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
Minimum Split (s)	23.5	23.5	10.5	23.5	23.5	23.5	10.5	10.5	23.5	23.5
Total Split (s)	23.5	23.5	50.0	72.0	36.0	36.0	50.0	12.0	48.0	48.0
Total Split (%)	19.3%	19.3%	41.2%	59.3%	29.6%	29.6%	41.2%	9.9%	39.5%	39.5%
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
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)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lag	Lag	Lead		Lag	Lag	Lead	Lead		
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes		
Recall Mode	None	None	None	None	C-Max	C-Max	None	None	C-Max	C-Max
Act Effect Green (s)	6.1	6.1	22.1	29.4	70.3	70.3	99.0	81.1	81.1	81.1
Actuated g/C Ratio	0.05	0.05	0.18	0.24	0.58	0.58	0.81	0.67	0.67	0.67
v/c Ratio	0.05	0.07	0.47	0.06	0.23	0.37	0.76	0.18	0.26	0.02
Control Delay	55.8	0.4	45.7	10.6	23.9	18.9	5.1	13.2	11.2	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	55.8	0.4	45.7	10.6	23.9	18.9	5.1	13.2	11.2	0.1
LOS	E	A	D	B	C	B	A	B	B	A
Approach Delay		8.6		43.2		12.3			11.1	
Approach LOS		A		D		B			B	

### Intersection Summary

Cycle Length: 121.5

Actuated Cycle Length: 121.5

Offset: 30.5 (25%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 14.7

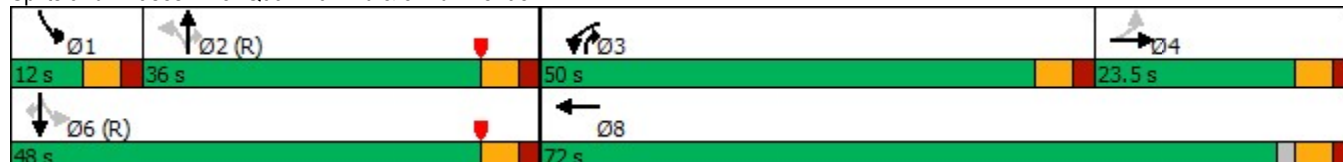
Intersection LOS: B

Intersection Capacity Utilization 75.0%

ICU Level of Service D

Analysis Period (min) 15




























Splits and Phases: 3: Quail Run Rd & 32nd Avenue



# HCM 6th Signalized Intersection Summary

## 3: Quail Run Rd & 32nd Avenue

Long Term Background  
AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				 				  			  	
Traffic Volume (veh/h)	4	0	21	222	2	16	68	823	855	53	674	16
Future Volume (veh/h)	4	0	21	222	2	16	68	823	855	53	674	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530
Adj Flow Rate, veh/h	4	0	23	241	2	17	74	895	929	58	733	17
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Cap, veh/h	96	0	42	302	26	217	435	2694	975	225	3029	940
Arrive On Green	0.03	0.00	0.03	0.11	0.18	0.18	0.65	0.65	0.65	0.04	0.73	0.73
Sat Flow, veh/h	1139	0	1296	2826	139	1179	582	4176	1296	1457	4176	1296
Grp Volume(v), veh/h	4	0	23	241	0	19	74	895	929	58	733	17
Grp Sat Flow(s),veh/h/ln	1139	0	1296	1413	0	1317	582	1392	1296	1457	1392	1296
Q Serve(g_s), s	0.4	0.0	2.1	10.2	0.0	1.5	6.3	11.8	76.5	1.5	7.1	0.4
Cycle Q Clear(g_c), s	0.4	0.0	2.1	10.2	0.0	1.5	6.3	11.8	76.5	1.5	7.1	0.4
Prop In Lane	1.00		1.00	1.00		0.89	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	96	0	42	302	0	243	435	2694	975	225	3029	940
V/C Ratio(X)	0.04	0.00	0.55	0.80	0.00	0.08	0.17	0.33	0.95	0.26	0.24	0.02
Avail Cap(c_a), veh/h	227	0	191	1031	0	718	435	2694	975	251	3029	940
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.3	0.0	58.1	53.2	0.0	41.2	8.8	9.8	13.2	6.9	5.6	4.7
Incr Delay (d2), s/veh	0.2	0.0	10.7	4.8	0.0	0.1	0.8	0.3	19.5	0.6	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(95%),veh/ln	0.2	0.0	1.5	6.9	0.0	0.9	1.6	6.4	31.3	0.9	3.5	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.5	0.0	68.8	58.0	0.0	41.3	9.6	10.1	32.7	7.5	5.8	4.7
LnGrp LOS	E	A	E	E	A	D	A	B	C	A	A	A
Approach Vol, veh/h	27			260			1898			808		
Approach Delay, s/veh	67.2			56.8			21.2			5.9		
Approach LOS	E			E			C			A		
Timer - Assigned Phs	1	2	3	4	6		8					
Phs Duration (G+Y+Rc), s	9.8	84.2	18.5	9.4	94.0		28.0					
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5		5.5					
Max Green Setting (Gmax), s	6.5	30.5	44.5	18.0	42.5		66.5					
Max Q Clear Time (g_c+I1), s	3.5	78.5	12.2	4.1	9.1		3.5					
Green Ext Time (p_c), s	0.0	0.0	0.9	0.1	6.1		0.1					
Intersection Summary												
HCM 6th Ctrl Delay	20.5											
HCM 6th LOS	C											
Notes												

HCM 6th TWSC  
4: Cavanaugh Road & 48t Avenue/48th Avenue

Long Term Background  
AM Peak

Intersection						
Int Delay, s/veh	0.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Vol, veh/h	405	220	0	397	49	0
Future Vol, veh/h	405	220	0	397	49	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	100	-	100	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	440	239	0	432	53	0





Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	679
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.6
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.45
Pot Cap-1 Maneuver	-	-	771
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	771
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	17.1
HCM LOS			C







Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	350	-	-	-	771	-
HCM Lane V/C Ratio	0.152	-	-	-	-	-
HCM Control Delay (s)	17.1	0	-	-	0	-
HCM Lane LOS	C	A	-	-	A	-
HCM 95th %tile Q(veh)	0.5	-	-	-	0	-







HCM 6th TWSC  
5: Cavanaugh Road & 42nd Avenue

Long Term Background  
AM Peak

Intersection						
Int Delay, s/veh	1.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	8	41	0	35	184
Future Vol, veh/h	0	8	41	0	35	184
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	0	9	45	0	38	200
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	321	45	0	0	45	0
Stage 1	45	-	-	-	-	-
Stage 2	276	-	-	-	-	-
Critical Hdwy	6.65	6.45	-	-	4.35	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	-	-	2.425	-
Pot Cap-1 Maneuver	628	963	-	-	1427	-
Stage 1	922	-	-	-	-	-
Stage 2	720	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	611	963	-	-	1427	-
Mov Cap-2 Maneuver	611	-	-	-	-	-
Stage 1	922	-	-	-	-	-
Stage 2	701	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	8.8	0		1.2		
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBL	SBT	
Capacity (veh/h)	-	- 963		1427	-	
HCM Lane V/C Ratio	-	- 0.009		0.027	-	
HCM Control Delay (s)	-	- 8.8		7.6	-	
HCM Lane LOS	-	- A		A	-	
HCM 95th %tile Q(veh)	-	- 0		0.1	-	



Intersection						
Int Delay, s/veh	3.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	49	90	216	196	126	48
Future Vol, veh/h	49	90	216	196	126	48
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	100	100	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	53	98	235	213	137	52
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	448	0	-	0	439	235
Stage 1	-	-	-	-	235	-
Stage 2	-	-	-	-	204	-
Critical Hdwy	4.35	-	-	-	6.65	6.45
Critical Hdwy Stg 1	-	-	-	-	5.65	-
Critical Hdwy Stg 2	-	-	-	-	5.65	-
Follow-up Hdwy	2.425	-	-	-	3.725	3.525
Pot Cap-1 Maneuver	1001	-	-	-	534	750
Stage 1	-	-	-	-	753	-
Stage 2	-	-	-	-	778	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1001	-	-	-	506	750
Mov Cap-2 Maneuver	-	-	-	-	506	-
Stage 1	-	-	-	-	713	-
Stage 2	-	-	-	-	778	-
Approach	EB	WB		SB		
HCM Control Delay, s	3.1	0		13.5		
HCM LOS	B					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1001	-	-	-	506	750
HCM Lane V/C Ratio	0.053	-	-	-	0.271	0.07
HCM Control Delay (s)	8.8	-	-	-	14.7	10.2
HCM Lane LOS	A	-	-	-	B	B
HCM 95th %tile Q(veh)	0.2	-	-	-	1.1	0.2







Intersection						
Int Delay, s/veh	1.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	38	161	527	400	0
Future Vol, veh/h	0	38	161	527	400	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	100	0	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	0	41	175	573	435	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1072	218	435	0	-	0
Stage 1	435	-	-	-	-	-
Stage 2	637	-	-	-	-	-
Critical Hdwy	7.3	7.4	4.6	-	-	-
Critical Hdwy Stg 1	6.3	-	-	-	-	-
Critical Hdwy Stg 2	6.3	-	-	-	-	-
Follow-up Hdwy	3.75	3.55	2.45	-	-	-
Pot Cap-1 Maneuver	181	720	974	-	-	-
Stage 1	558	-	-	-	-	-
Stage 2	431	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	148	720	974	-	-	-
Mov Cap-2 Maneuver	148	-	-	-	-	-
Stage 1	458	-	-	-	-	-
Stage 2	431	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	10.3	2.2		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	974	-	-	720	-	-
HCM Lane V/C Ratio	0.18	-	-	0.057	-	-
HCM Control Delay (s)	9.5	-	0	10.3	-	-
HCM Lane LOS	A	-	A	B	-	-
HCM 95th %tile Q(veh)	0.7	-	-	0.2	-	-

Intersection						
Int Delay, s/veh	0.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Vol, veh/h	680	126	0	220	30	0
Future Vol, veh/h	680	126	0	220	30	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	100	-	100	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	739	137	0	239	33	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	876
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.6
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.45
Pot Cap-1 Maneuver	-	-	637
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	637
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	21.2
HCM LOS			C

























Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	255	-	-	-	637	-
HCM Lane V/C Ratio	0.128	-	-	-	-	-
HCM Control Delay (s)	21.2	0	-	-	0	-
HCM Lane LOS	C	A	-	-	A	-
HCM 95th %tile Q(veh)	0.4	-	-	-	0	-

Intersection						
Int Delay, s/veh	3.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	116	624	163	28	55	44
Future Vol, veh/h	116	624	163	28	55	44
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	100	100	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	126	678	177	30	60	48
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	207	0	-	0	1107	177
Stage 1	-	-	-	-	177	-
Stage 2	-	-	-	-	930	-
Critical Hdwy	4.35	-	-	-	6.65	6.45
Critical Hdwy Stg 1	-	-	-	-	5.65	-
Critical Hdwy Stg 2	-	-	-	-	5.65	-
Follow-up Hdwy	2.425	-	-	-	3.725	3.525
Pot Cap-1 Maneuver	1238	-	-	-	210	810
Stage 1	-	-	-	-	801	-
Stage 2	-	-	-	-	350	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1238	-	-	-	189	810
Mov Cap-2 Maneuver	-	-	-	-	189	-
Stage 1	-	-	-	-	719	-
Stage 2	-	-	-	-	350	-
Approach	EB	WB		SB		
HCM Control Delay, s	1.3	0		22.4		
HCM LOS	C					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1238	-	-	-	189	810
HCM Lane V/C Ratio	0.102	-	-	-	0.316	0.059
HCM Control Delay (s)	8.2	-	-	-	32.6	9.7
HCM Lane LOS	A	-	-	-	D	A
HCM 95th %tile Q(veh)	0.3	-	-	-	1.3	0.2

# Timings

## 1: Imboden Rd & 56th Avenue

Long Term Background  
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	433	8	1345	150	30	2	1522	312	47	1	360	304
Future Volume (vph)	433	8	1345	150	30	2	1522	312	47	1	360	304
Turn Type	Prot	NA	pt+ov	Prot	NA	Perm	Prot	NA	pm+ov	Perm	NA	pm+ov
Protected Phases	7	4	4 5	3	8		5	2	3		6	7
Permitted Phases						8			2	6		6
Detector Phase	7	4	4 5	3	8	8	5	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)	10.5	23.5		10.5	23.5	23.5	10.5	23.5	10.5	23.5	23.5	10.5
Total Split (s)	25.0	30.0		14.0	23.5	23.5	53.0	76.0	14.0	23.5	23.5	25.0
Total Split (%)	20.0%	24.0%		11.2%	18.8%	18.8%	42.4%	60.8%	11.2%	18.8%	18.8%	20.0%
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)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
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)	5.5	5.5		5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead		Lead	Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None	None	None	C-Max	None	C-Max	C-Max	None
Act Effect Green (s)	28.9	29.0	82.0	8.5	13.3	13.3	47.5	71.0	85.0	18.0	18.0	52.4
Actuated g/C Ratio	0.23	0.23	0.66	0.07	0.11	0.11	0.38	0.57	0.68	0.14	0.14	0.42
v/c Ratio	0.73	0.03	0.75	0.86	0.21	0.01	1.07	0.21	0.06	0.01	0.94	0.49
Control Delay	54.0	37.5	16.7	94.2	51.3	0.0	81.4	13.6	0.9	46.0	84.9	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	54.0	37.5	16.7	94.2	51.3	0.0	81.4	13.6	0.9	46.0	84.9	12.6
LOS	D	D	B	F	D	A	F	B	A	D	F	B
Approach Delay		25.8			86.1			68.2			51.8	
Approach LOS		C			F			E			D	

### Intersection Summary

Cycle Length: 125

Actuated Cycle Length: 125

Offset: 18 (14%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 140

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.07

Intersection Signal Delay: 49.7

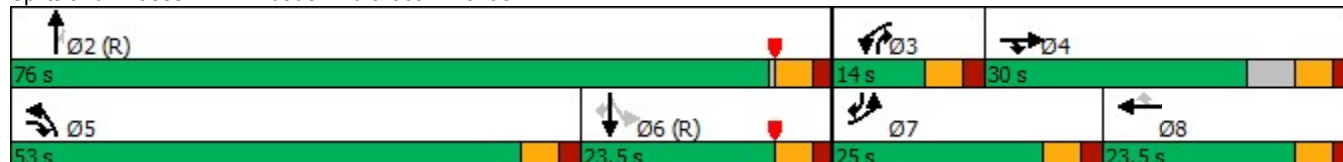
Intersection LOS: D

Intersection Capacity Utilization 71.7%

ICU Level of Service C

Analysis Period (min) 15

























Splits and Phases: 1: Imboden Rd & 56th Avenue



# HCM 6th Signalized Intersection Summary





















## 1: Imboden Rd & 56th Avenue

Long Term Background  
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	433	8	1345	150	30	2	1522	312	47	1	360	304
Future Volume (veh/h)	433	8	1345	150	30	2	1522	312	47	1	360	304
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	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530
Adj Flow Rate, veh/h	471	9	1462	163	33	2	1654	339	51	1	391	330
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Cap, veh/h	441	300	1702	192	165	140	1561	1755	871	211	523	436
Arrive On Green	0.16	0.20	0.20	0.07	0.11	0.11	0.38	0.60	0.60	0.18	0.18	0.18
Sat Flow, veh/h	2826	1530	2955	2826	1530	1296	4108	2906	1296	852	2906	1296
Grp Volume(v), veh/h	471	9	1462	163	33	2	1654	339	51	1	391	330
Grp Sat Flow(s),veh/h/ln	1413	1530	985	1413	1530	1296	1369	1453	1296	852	1453	1296
Q Serve(g_s), s	19.5	0.6	24.5	7.1	2.5	0.2	47.5	6.5	1.7	0.1	15.9	22.5
Cycle Q Clear(g_c), s	19.5	0.6	24.5	7.1	2.5	0.2	47.5	6.5	1.7	0.1	15.9	22.5
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	441	300	1702	192	165	140	1561	1755	871	211	523	436
V/C Ratio(X)	1.07	0.03	0.86	0.85	0.20	0.01	1.06	0.19	0.06	0.00	0.75	0.76
Avail Cap(c_a), veh/h	441	300	1702	192	220	187	1561	1755	871	211	523	436
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.82	0.82	0.82	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.8	40.6	22.2	57.6	50.8	49.8	38.8	11.1	7.0	42.1	48.6	37.0
Incr Delay (d2), s/veh	62.3	0.0	4.7	28.2	0.6	0.0	38.5	0.2	0.1	0.0	9.4	11.7
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(95%),veh/ln	16.6	0.4	17.9	5.9	1.8	0.1	29.2	3.8	0.9	0.1	10.6	15.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	115.0	40.7	26.9	85.8	51.4	49.8	77.3	11.3	7.1	42.1	58.0	48.6
LnGrp LOS	F	D	C	F	D	D	F	B	A	D	E	D
Approach Vol, veh/h	1942			198			2044			722		
Approach Delay, s/veh	48.3			79.7			64.6			53.7		
Approach LOS	D			E			E			D		
Timer - Assigned Phs	2			3			4			5		
Phs Duration (G+Y+Rc), s	81.0			14.0			30.0			53.0		
Change Period (Y+Rc), s	5.5			5.5			5.5			5.5		
Max Green Setting (Gmax), s	70.5			8.5			24.5			47.5		
Max Q Clear Time (g_c+I1), s	8.5			9.1			26.5			49.5		
Green Ext Time (p_c), s	2.8			0.0			0.0			0.0		
Intersection Summary												
HCM 6th Ctrl Delay	57.2											
HCM 6th LOS	E											

# Timings 2: Imboden Rd & 48th Avenue

Long Term Background  
PM Peak

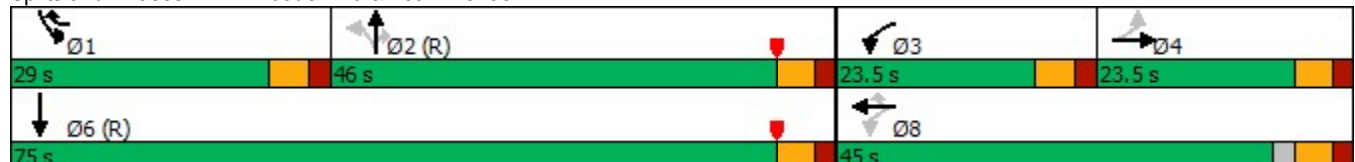
										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	5	5	37	5	695	10	929	60	314	1142
Future Volume (vph)	5	5	37	5	695	10	929	60	314	1142
Turn Type	Perm	NA	pm+pt	NA	pm+ov	Perm	NA	Perm	Prot	NA
Protected Phases		4	3	8	1		2		1	6
Permitted Phases	4		8		8	2		2		
Detector Phase	4	4	3	8	1	2	2	2	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)	23.5	23.5	23.5	23.5	10.5	23.5	23.5	23.5	10.5	23.5
Total Split (s)	23.5	23.5	23.5	45.0	29.0	46.0	46.0	46.0	29.0	75.0
Total Split (%)	19.3%	19.3%	19.3%	36.9%	23.8%	37.7%	37.7%	37.7%	23.8%	61.5%
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
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)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lag	Lag	Lead		Lead	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max	None	C-Max
Act Effect Green (s)	6.7	6.7	14.0	14.0	48.0	63.0	63.0	63.0	28.5	97.0
Actuated g/C Ratio	0.05	0.05	0.11	0.11	0.39	0.52	0.52	0.52	0.23	0.80
v/c Ratio	0.07	0.19	0.31	0.81	0.76	0.07	0.47	0.09	0.52	0.38
Control Delay	55.4	36.5	51.2	18.5	39.4	21.0	21.4	0.2	44.0	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.4	36.5	51.2	18.5	39.4	21.0	21.4	0.2	44.0	5.0
LOS	E	D	D	B	D	C	C	A	D	A
Approach Delay		41.0		30.0			20.1			13.3
Approach LOS		D		C			C			B

## Intersection Summary

Cycle Length: 122  
 Actuated Cycle Length: 122  
 Offset: 40.5 (33%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow  
 Natural Cycle: 85  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.81  
 Intersection Signal Delay: 19.4  
 Intersection Capacity Utilization 64.6%  
 Analysis Period (min) 15

Intersection LOS: B  
 ICU Level of Service C
























## Splits and Phases: 2: Imboden Rd & 48th Avenue



# HCM 6th Signalized Intersection Summary

## 2: Imboden Rd & 48th Avenue

Long Term Background  
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	5	10	37	5	695	10	929	60	314	1142	5
Future Volume (veh/h)	5	5	10	37	5	695	10	929	60	314	1142	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		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	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530
Adj Flow Rate, veh/h	5	5	11	40	0	758	11	1010	65	341	1241	5
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Cap, veh/h	169	81	178	325	0	1080	223	1871	581	397	2720	11
Arrive On Green	0.19	0.19	0.19	0.04	0.00	0.28	0.45	0.45	0.45	0.14	0.63	0.63
Sat Flow, veh/h	578	425	936	1457	0	2592	365	4176	1296	2826	4293	17
Grp Volume(v), veh/h	5	0	16	40	0	758	11	1010	65	341	805	441
Grp Sat Flow(s),veh/h/ln	578	0	1361	1457	0	1296	365	1392	1296	1413	1392	1526
Q Serve(g_s), s	0.9	0.0	1.2	2.6	0.0	29.4	2.1	21.5	3.6	14.4	18.2	18.2
Cycle Q Clear(g_c), s	0.9	0.0	1.2	2.6	0.0	29.4	2.1	21.5	3.6	14.4	18.2	18.2
Prop In Lane	1.00		0.69	1.00		1.00	1.00		1.00	1.00		0.01
Lane Grp Cap(c), veh/h	169	0	259	325	0	1080	223	1871	581	397	1764	967
V/C Ratio(X)	0.03	0.00	0.06	0.12	0.00	0.70	0.05	0.54	0.11	0.86	0.46	0.46
Avail Cap(c_a), veh/h	169	0	259	480	0	1203	223	1871	581	544	1764	967
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.51	0.51	0.51
Uniform Delay (d), s/veh	40.4	0.0	40.5	35.6	0.0	29.3	19.2	24.5	19.6	51.3	11.5	11.5
Incr Delay (d2), s/veh	0.1	0.0	0.1	0.2	0.0	1.6	0.4	1.1	0.4	5.4	0.4	0.8
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(95%),veh/ln	0.2	0.0	0.7	1.7	0.0	14.3	0.4	11.6	2.1	8.1	8.3	9.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.4	0.0	40.6	35.7	0.0	31.0	19.6	25.6	20.0	56.6	12.0	12.3
LnGrp LOS	D	A	D	D	A	C	B	C	B	E	B	B
Approach Vol, veh/h	21				798				1086			
Approach Delay, s/veh	40.5				31.2				25.2			
Approach LOS	D				C				C			
Timer - Assigned Phs	1	2	3	4		6		8				
Phs Duration (G+Y+Rc), s	22.6	60.2	10.5	28.7		82.8		39.2				
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5		5.5		5.5				
Max Green Setting (Gmax), s	23.5	40.5	18.0	18.0		69.5		39.5				
Max Q Clear Time (g_c+I1), s	16.4	23.5	4.6	3.2		20.2		31.4				
Green Ext Time (p_c), s	0.7	7.3	0.0	0.0		12.1		2.3				

### Intersection Summary

HCM 6th Ctrl Delay	25.1
HCM 6th LOS	C





















### Notes

User approved pedestrian interval to be less than phase max green.  
User approved volume balancing among the lanes for turning movement.



# Timings 3: Quail Run Rd & 32nd Avenue

Long Term Background  
PM Peak

										
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	17	2	884	0	22	908	245	15	1298	4
Future Volume (vph)	17	2	884	0	22	908	245	15	1298	4
Turn Type	Perm	NA	Prot	NA	Perm	NA	pm+ov	pm+pt	NA	Perm
Protected Phases		4	3	8		2	3	1	6	
Permitted Phases	4				2		2	6		6
Detector Phase	4	4	3	8	2	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
Minimum Split (s)	23.5	23.5	10.5	23.5	23.5	23.5	10.5	10.5	23.5	23.5
Total Split (s)	23.5	23.5	46.0	69.0	39.0	39.0	46.0	12.0	51.0	51.0
Total Split (%)	19.5%	19.5%	38.2%	57.3%	32.4%	32.4%	38.2%	10.0%	42.3%	42.3%
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
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)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lag	Lag	Lead		Lag	Lag	Lead	Lead		
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes		
Recall Mode	None	None	None	None	C-Max	C-Max	None	None	C-Max	C-Max
Act Effect Green (s)	11.6	11.6	40.5	55.3	49.2	49.2	96.3	54.2	54.2	54.2
Actuated g/C Ratio	0.10	0.10	0.34	0.46	0.41	0.41	0.80	0.45	0.45	0.45
v/c Ratio	0.17	0.59	1.02	0.08	0.31	0.58	0.25	0.09	0.76	0.01
Control Delay	51.4	59.2	74.6	0.2	46.5	32.2	1.4	23.0	32.4	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.4	59.2	74.6	0.2	46.5	32.2	1.4	23.0	32.4	0.0
LOS	D	E	E	A	D	C	A	C	C	A
Approach Delay		57.8		70.4		26.1			32.2	
Approach LOS		E		E		C			C	

## Intersection Summary

Cycle Length: 120.5

Actuated Cycle Length: 120.5

Offset: 33.5 (28%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.02

Intersection Signal Delay: 41.0

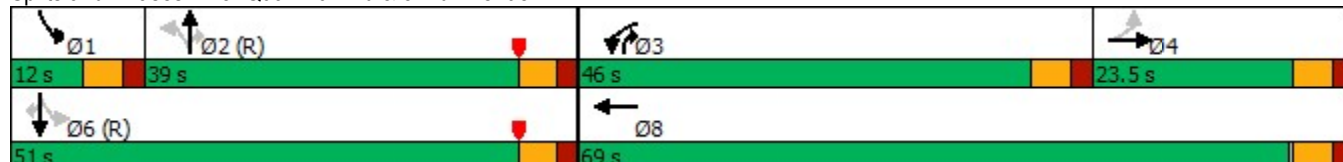
Intersection LOS: D

Intersection Capacity Utilization 66.1%

ICU Level of Service C

Analysis Period (min) 15






















## Splits and Phases: 3: Quail Run Rd & 32nd Avenue



# HCM 6th Signalized Intersection Summary

## 3: Quail Run Rd & 32nd Avenue

Long Term Background  
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	2	73	884	0	52	22	908	245	15	1298	4
Future Volume (veh/h)	17	2	73	884	0	52	22	908	245	15	1298	4
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	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530
Adj Flow Rate, veh/h	18	2	79	961	0	57	24	987	266	16	1411	4
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Cap, veh/h	148	3	101	954	0	600	111	1597	933	174	1860	577
Arrive On Green	0.08	0.08	0.08	0.34	0.00	0.46	0.38	0.38	0.38	0.02	0.45	0.45
Sat Flow, veh/h	1101	32	1269	2826	0	1296	312	4176	1296	1457	4176	1296
Grp Volume(v), veh/h	18	0	81	961	0	57	24	987	266	16	1411	4
Grp Sat Flow(s),veh/h/ln	1101	0	1301	1413	0	1296	312	1392	1296	1457	1392	1296
Q Serve(g_s), s	1.8	0.0	7.3	40.5	0.0	3.0	8.4	22.9	8.7	0.8	34.0	0.2
Cycle Q Clear(g_c), s	1.8	0.0	7.3	40.5	0.0	3.0	34.8	22.9	8.7	0.8	34.0	0.2
Prop In Lane	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	148	0	103	954	0	600	111	1597	933	174	1860	577
V/C Ratio(X)	0.12	0.00	0.78	1.01	0.00	0.10	0.22	0.62	0.29	0.09	0.76	0.01
Avail Cap(c_a), veh/h	225	0	195	954	0	686	111	1597	933	228	1860	577
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.7	0.0	54.2	39.8	0.0	18.1	45.6	30.0	5.9	23.4	27.9	18.5
Incr Delay (d2), s/veh	0.4	0.0	12.1	31.0	0.0	0.1	4.4	1.8	0.8	0.2	3.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.9	0.0	4.9	25.0	0.0	1.6	1.4	12.5	4.2	0.5	17.2	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.1	0.0	66.3	70.8	0.0	18.2	50.0	31.8	6.7	23.6	30.8	18.5
LnGrp LOS	D	A	E	F	A	B	D	C	A	C	C	B
Approach Vol, veh/h	99			1018			1277			1431		
Approach Delay, s/veh	63.7			67.8			26.9			30.7		
Approach LOS	E			E			C			C		
Timer - Assigned Phs	1	2	3	4	6			8				
Phs Duration (G+Y+Rc), s	7.6	51.4	46.0	15.0	59.0			61.0				
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5			5.5				
Max Green Setting (Gmax), s	6.5	33.5	40.5	18.0	45.5			63.5				
Max Q Clear Time (g_c+I1), s	2.8	36.8	42.5	9.3	36.0			5.0				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.3	6.4			0.4				
Intersection Summary												
HCM 6th Ctrl Delay	40.2											
HCM 6th LOS	D											

HCM 6th TWSC  
4: Cavanaugh Road & 48t Avenue/48th Avenue

Long Term Background  
PM Peak

Intersection						
Int Delay, s/veh	4.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Vol, veh/h	205	44	0	582	215	0
Future Vol, veh/h	205	44	0	582	215	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	100	-	100	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	223	48	0	633	234	0





Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	271
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.6
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.45
Pot Cap-1 Maneuver	-	-	1138
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1138
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-







Approach	EB	WB	NB
HCM Control Delay, s	0	0	23.8
HCM LOS			C







Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	420	-	-	-	1138	-
HCM Lane V/C Ratio	0.556	-	-	-	-	-
HCM Control Delay (s)	23.8	0	-	-	0	-
HCM Lane LOS	C	A	-	-	A	-
HCM 95th %tile Q(veh)	3.3	-	-	-	0	-

HCM 6th TWSC  
5: Cavanaugh Road & 42nd Avenue







Long Term Background  
PM Peak

Intersection						
Int Delay, s/veh	1.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	34	181	0	7	37
Future Vol, veh/h	0	34	181	0	7	37
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	0	37	197	0	8	40
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	253	197	0	0	197	0
Stage 1	197	-	-	-	-	-
Stage 2	56	-	-	-	-	-
Critical Hdwy	6.65	6.45	-	-	4.35	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	-	-	2.425	-
Pot Cap-1 Maneuver	688	789	-	-	1249	-
Stage 1	784	-	-	-	-	-
Stage 2	911	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	684	789	-	-	1249	-
Mov Cap-2 Maneuver	684	-	-	-	-	-
Stage 1	784	-	-	-	-	-
Stage 2	906	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	9.8	0	1.3			
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	789	1249	-	
HCM Lane V/C Ratio	-	-	0.047	0.006	-	
HCM Control Delay (s)	-	-	9.8	7.9	-	
HCM Lane LOS	-	-	A	A	-	
HCM 95th %tile Q(veh)	-	-	0.1	0	-	

Intersection						
Int Delay, s/veh	6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	52	220	85	127	199	52
Future Vol, veh/h	52	220	85	127	199	52
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	100	100	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	57	239	92	138	216	57
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	230	0	-	0	445	92
Stage 1	-	-	-	-	92	-
Stage 2	-	-	-	-	353	-
Critical Hdwy	4.35	-	-	-	6.65	6.45
Critical Hdwy Stg 1	-	-	-	-	5.65	-
Critical Hdwy Stg 2	-	-	-	-	5.65	-
Follow-up Hdwy	2.425	-	-	-	3.725	3.525
Pot Cap-1 Maneuver	1214	-	-	-	530	906
Stage 1	-	-	-	-	877	-
Stage 2	-	-	-	-	663	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1214	-	-	-	505	906
Mov Cap-2 Maneuver	-	-	-	-	505	-
Stage 1	-	-	-	-	836	-
Stage 2	-	-	-	-	663	-
Approach	EB	WB		SB		
HCM Control Delay, s	1.6	0		15.7		
HCM LOS	C					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1214	-	-	-	505	906
HCM Lane V/C Ratio	0.047	-	-	-	0.428	0.062
HCM Control Delay (s)	8.1	-	-	-	17.4	9.2
HCM Lane LOS	A	-	-	-	C	A
HCM 95th %tile Q(veh)	0.1	-	-	-	2.1	0.2

Intersection						
Int Delay, s/veh	2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	163	41	581	335	0
Future Vol, veh/h	0	163	41	581	335	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	100	0	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	0	177	45	632	364	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	770	182	364	0	-	0
Stage 1	364	-	-	-	-	-
Stage 2	406	-	-	-	-	-
Critical Hdwy	7.3	7.4	4.6	-	-	-
Critical Hdwy Stg 1	6.3	-	-	-	-	-
Critical Hdwy Stg 2	6.3	-	-	-	-	-
Follow-up Hdwy	3.75	3.55	2.45	-	-	-
Pot Cap-1 Maneuver	293	762	1042	-	-	-
Stage 1	610	-	-	-	-	-
Stage 2	579	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	280	762	1042	-	-	-
Mov Cap-2 Maneuver	280	-	-	-	-	-
Stage 1	584	-	-	-	-	-
Stage 2	579	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	11.2	0.6		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1042	-	-	762	-	-
HCM Lane V/C Ratio	0.043	-	-	0.233	-	-
HCM Control Delay (s)	8.6	-	0	11.2	-	-
HCM Lane LOS	A	-	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.9	-	-

Intersection						
Int Delay, s/veh	2.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Vol, veh/h	349	26	0	610	123	0
Future Vol, veh/h	349	26	0	610	123	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	100	-	100	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	379	28	0	663	134	0
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	407	0	711	190
Stage 1	-	-	-	-	379	-
Stage 2	-	-	-	-	332	-
Critical Hdwy	-	-	4.6	-	7.3	7.4
Critical Hdwy Stg 1	-	-	-	-	6.3	-
Critical Hdwy Stg 2	-	-	-	-	6.3	-
Follow-up Hdwy	-	-	2.45	-	3.75	3.55
Pot Cap-1 Maneuver	-	-	1000	-	321	753
Stage 1	-	-	-	-	599	-
Stage 2	-	-	-	-	635	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1000	-	321	753
Mov Cap-2 Maneuver	-	-	-	-	321	-
Stage 1	-	-	-	-	599	-
Stage 2	-	-	-	-	635	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		24	
HCM LOS					C	
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	321	-	-	-	1000	-
HCM Lane V/C Ratio	0.416	-	-	-	-	-
HCM Control Delay (s)	24	0	-	-	0	-
HCM Lane LOS	C	A	-	-	A	-
HCM 95th %tile Q(veh)	2	-	-	-	0	-














Intersection						
Int Delay, s/veh	3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	45	182	636	52	26	120
Future Vol, veh/h	45	182	636	52	26	120
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	100	100	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	49	198	691	57	28	130
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	748	0	-	0	987	691
Stage 1	-	-	-	-	691	-
Stage 2	-	-	-	-	296	-
Critical Hdwy	4.35	-	-	-	6.65	6.45
Critical Hdwy Stg 1	-	-	-	-	5.65	-
Critical Hdwy Stg 2	-	-	-	-	5.65	-
Follow-up Hdwy	2.425	-	-	-	3.725	3.525
Pot Cap-1 Maneuver	765	-	-	-	249	408
Stage 1	-	-	-	-	457	-
Stage 2	-	-	-	-	705	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	765	-	-	-	233	408
Mov Cap-2 Maneuver	-	-	-	-	233	-
Stage 1	-	-	-	-	428	-
Stage 2	-	-	-	-	705	-
Approach	EB	WB		SB		
HCM Control Delay, s	2	0		18.7		
HCM LOS	C					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	765	-	-	-	233	408
HCM Lane V/C Ratio	0.064	-	-	-	0.121	0.32
HCM Control Delay (s)	10	-	-	-	22.6	17.9
HCM Lane LOS	B	-	-	-	C	C
HCM 95th %tile Q(veh)	0.2	-	-	-	0.4	1.4



## APPENDIX F. ANALYSIS WORKSHEETS – TOTAL CONDITIONS

# Timings 1: Imboden Rd & 56th Avenue

2040 Total  
AM Peak

														
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR								
Lane Configurations														
Traffic Volume (vph)	291	1024	631	175	148	159								
Future Volume (vph)	291	1024	631	175	148	159								
Lane Group Flow (vph)	316	1113	686	190	161	173								
Turn Type	Prot	pt+ov	Prot	NA	NA	pm+ov								
Protected Phases	4	4 5	5	2	6	4								
Permitted Phases						6								
Detector Phase	4	4 5	5	2	6	4								
Switch Phase														
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0								
Minimum Split (s)	23.5		10.5	23.5	23.5	23.5								
Total Split (s)	48.0		47.0	72.0	25.0	48.0								
Total Split (%)	40.0%		39.2%	60.0%	20.8%	40.0%								
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5								
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0								
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0								
Total Lost Time (s)	5.5		5.5	5.5	5.5	5.5								
Lead/Lag			Lead		Lag									
Lead-Lag Optimize?			Yes		Yes									
Recall Mode	None		None	C-Max	C-Max	None								
v/c Ratio	0.76	0.67	0.78	0.11	0.21	0.22								
Control Delay	50.1	7.5	36.5	5.3	39.6	7.5								
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0								
Total Delay	50.1	7.5	36.5	5.3	39.6	7.5								
Queue Length 50th (ft)	220	128	142	14	53	31								
Queue Length 95th (ft)	302	134	235	26	93	71								
Internal Link Dist (ft)	22583			3921	12432									
Turn Bay Length (ft)		100	100			100								
Base Capacity (vph)	511	1712	974	1787	749	878								
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	0.62	0.65	0.70	0.11	0.21	0.20								

## Intersection Summary

Cycle Length: 120

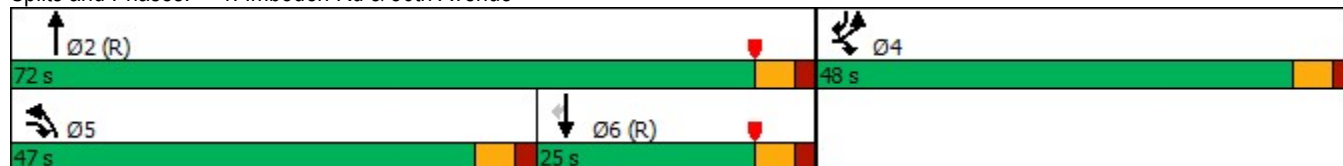
Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 80

Control Type: Actuated-Coordinated

Splits and Phases: 1: Imboden Rd & 56th Avenue









# HCM 6th Signalized Intersection Summary

## 1: Imboden Rd & 56th Avenue

2040 Total  
AM Peak























Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	291	1024	631	175	148	159
Future Volume (veh/h)	291	1024	631	175	148	159
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	1530	1530	1530	1530	1530	1530
Adj Flow Rate, veh/h	316	1113	686	190	161	173
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	25	25	25	25	25	25
Cap, veh/h	516	1422	761	1610	694	769
Arrive On Green	0.35	0.35	0.27	0.55	0.24	0.24
Sat Flow, veh/h	1457	2281	2826	2983	2983	1296
Grp Volume(v), veh/h	316	1113	686	190	161	173
Grp Sat Flow(s),veh/h/ln	1457	1141	1413	1453	1453	1296
Q Serve(g_s), s	21.5	42.5	28.1	3.7	5.4	7.5
Cycle Q Clear(g_c), s	21.5	42.5	28.1	3.7	5.4	7.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	516	1422	761	1610	694	769
V/C Ratio(X)	0.61	0.78	0.90	0.12	0.23	0.23
Avail Cap(c_a), veh/h	516	1422	977	1610	694	769
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.0	16.6	42.3	12.8	36.8	11.5
Incr Delay (d2), s/veh	2.1	2.9	9.5	0.1	0.8	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	12.4	34.5	16.1	2.2	3.6	8.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	34.1	19.5	51.8	12.9	37.6	12.1
LnGrp LOS	C	B	D	B	D	B
Approach Vol, veh/h	1429			876	334	
Approach Delay, s/veh	22.7			43.3	24.4	
Approach LOS	C			D	C	
Timer - Assigned Phs	2			4	5	6
Phs Duration (G+Y+Rc), s	72.0			48.0	37.8	34.2
Change Period (Y+Rc), s	5.5			5.5	5.5	5.5
Max Green Setting (Gmax), s	66.5			42.5	41.5	19.5
Max Q Clear Time (g_c+l1), s	5.7			44.5	30.1	9.5
Green Ext Time (p_c), s	1.4			0.0	2.2	1.1
Intersection Summary						
HCM 6th Ctrl Delay			29.8			
HCM 6th LOS			C			

### Notes

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

# Timings 2: Imboden Rd & 48th Avenue

2040 Total  
AM Peak

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	5	5	181	5	227	10	429	306	745	418
Future Volume (vph)	5	5	181	5	227	10	429	306	745	418
Lane Group Flow (vph)	5	16	197	126	126	11	466	333	810	459
Turn Type	Perm	NA	pm+pt	NA	pm+ov	Perm	NA	pm+ov	Prot	NA
Protected Phases		4	3	8	1		2	3	1	6
Permitted Phases	4		8		8	2		2		
Detector Phase	4	4	3	8	1	2	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)	23.5	23.5	10.5	23.5	10.5	23.5	23.5	10.5	10.5	23.5
Total Split (s)	24.0	24.0	18.0	42.0	46.0	32.0	32.0	18.0	46.0	78.0
Total Split (%)	20.0%	20.0%	15.0%	35.0%	38.3%	26.7%	26.7%	15.0%	38.3%	65.0%
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
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)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lag	Lag	Lead		Lead	Lag	Lag	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	None	C-Max
v/c Ratio	0.06	0.19	1.09	0.44	0.18	0.04	0.43	0.40	0.85	0.21
Control Delay	54.6	37.1	138.3	12.8	6.0	32.2	32.3	4.4	45.6	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.6	37.1	138.3	12.8	6.0	32.2	32.3	4.4	45.6	7.4
Queue Length 50th (ft)	4	4	~196	4	26	5	129	3	307	56
Queue Length 95th (ft)	17	27	#282	57	37	23	234	68	356	105
Internal Link Dist (ft)		1288		382			2909			761
Turn Bay Length (ft)	100		100			100		100	100	
Base Capacity (vph)	234	219	181	460	705	278	1085	832	1000	2192
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	0.02	0.07	1.09	0.27	0.18	0.04	0.43	0.40	0.81	0.21

## 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: 90

Control Type: Actuated-Coordinated

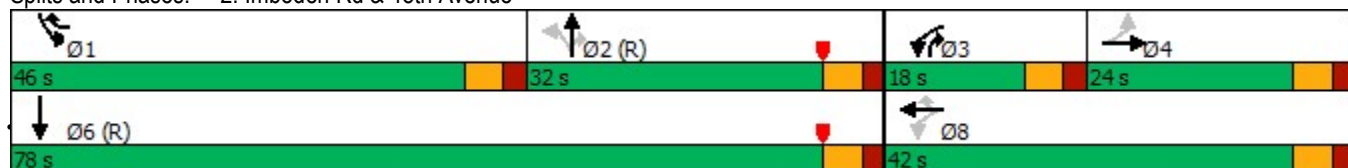
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Imboden Rd & 48th Avenue


























FHU

# HCM 6th Signalized Intersection Summary













## 2: Imboden Rd & 48th Avenue

2040 Total  
AM Peak

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	5	5	10	181	5	227	10	429	306	745	418	5	
Future Volume (veh/h)	5	5	10	181	5	227	10	429	306	745	418	5	
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		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	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	
Adj Flow Rate, veh/h	5	5	11	197	0	250	11	466	333	810	454	5	
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, %	25	25	25	25	25	25	25	25	25	25	25	25	
Cap, veh/h	108	18	39	246	0	1297	336	1053	605	872	2110	23	
Arrive On Green	0.04	0.04	0.04	0.10	0.00	0.19	0.36	0.36	0.36	0.31	0.72	0.72	
Sat Flow, veh/h	1159	425	936	1457	0	2592	763	2906	1296	2826	2944	32	
Grp Volume(v), veh/h	5	0	16	197	0	250	11	466	333	810	224	235	
Grp Sat Flow(s),veh/h/ln	1159	0	1361	1457	0	1296	763	1453	1296	1413	1453	1524	
Q Serve(g_s), s	0.5	0.0	1.4	12.5	0.0	6.4	1.1	14.6	22.1	33.3	6.2	6.2	
Cycle Q Clear(g_c), s	0.5	0.0	1.4	12.5	0.0	6.4	1.1	14.6	22.1	33.3	6.2	6.2	
Prop In Lane	1.00		0.69	1.00		1.00	1.00		1.00	1.00		0.02	
Lane Grp Cap(c), veh/h	108	0	57	246	0	1297	336	1053	605	872	1041	1092	
V/C Ratio(X)	0.05	0.00	0.28	0.80	0.00	0.19	0.03	0.44	0.55	0.93	0.22	0.22	
Avail Cap(c_a), veh/h	239	0	210	246	0	1588	336	1053	605	954	1041	1092	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Uniform Delay (d), s/veh	55.3	0.0	55.8	49.5	0.0	16.6	24.8	29.1	23.0	40.2	5.7	5.7	
Incr Delay (d2), s/veh	0.2	0.0	2.7	16.9	0.0	0.1	0.2	1.3	3.6	14.3	0.5	0.5	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(95%),veh/ln	0.3	0.0	0.9	3.7	0.0	0.0	0.4	9.1	11.7	19.1	3.4	3.5	
Unsig. Movement Delay, s/veh													
LnGrp Delay(d),s/veh	55.5	0.0	58.4	66.3	0.0	16.7	24.9	30.4	26.6	54.5	6.2	6.1	
LnGrp LOS	E	A	E	E	A	B	C	C	C	D	A	A	
Approach Vol, veh/h	21			447				810				1269	
Approach Delay, s/veh	57.7			38.6				28.8				37.0	
Approach LOS	E			D				C				D	
Timer - Assigned Phs	1	2	3	4	6				8				
Phs Duration (G+Y+Rc), s	42.5	49.0	18.0	10.5	91.5				28.5				
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5				5.5				
Max Green Setting (Gmax), s	40.5	26.5	12.5	18.5	72.5				36.5				
Max Q Clear Time (g_c+I1), s	35.3	24.1	14.5	3.4	8.2				8.4				
Green Ext Time (p_c), s	1.7	1.1	0.0	0.0	3.2				1.0				
Intersection Summary													
HCM 6th Ctrl Delay	34.8												
HCM 6th LOS	C												
Notes													
User approved pedestrian interval to be less than phase max green.													
User approved volume balancing among the lanes for turning movement.													

# Timings 3: Quail Run Rd & 32nd Avenue

2040 Total  
AM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	138	7	772	403	23	596
Future Volume (vph)	138	7	772	403	23	596
Lane Group Flow (vph)	150	8	839	438	25	648
Turn Type	Prot	Prot	NA	pm+ov	Perm	NA
Protected Phases	3	3	2	3		6
Permitted Phases				2	6	
Detector Phase	3	3	2	3	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.5	10.5	23.5	10.5	23.5	23.5
Total Split (s)	43.0	43.0	77.0	43.0	77.0	77.0
Total Split (%)	35.8%	35.8%	64.2%	35.8%	64.2%	64.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	None	C-Max	C-Max
v/c Ratio	0.69	0.04	0.38	0.34	0.07	0.30
Control Delay	64.0	21.1	6.1	0.7	5.4	5.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	64.0	21.1	6.1	0.7	5.4	5.5
Queue Length 50th (ft)	112	0	99	0	4	70
Queue Length 95th (ft)	171	14	170	0	16	122
Internal Link Dist (ft)	1393		912			5621
Turn Bay Length (ft)	100			100	100	
Base Capacity (vph)	451	409	2188	1292	370	2188
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	0.33	0.02	0.38	0.34	0.07	0.30

## Intersection Summary

Cycle Length: 120

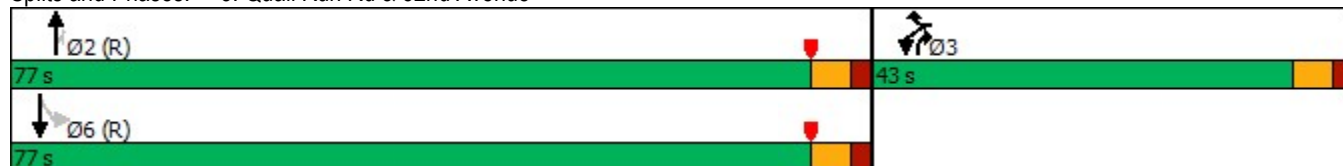
Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 40













Control Type: Actuated-Coordinated

Splits and Phases: 3: Quail Run Rd & 32nd Avenue



# HCM 6th Signalized Intersection Summary 3: Quail Run Rd & 32nd Avenue

2040 Total  
AM Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	138	7	772	403	23	596
Future Volume (veh/h)	138	7	772	403	23	596
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	1530	1530	1530	1530	1530	1530
Adj Flow Rate, veh/h	150	8	839	438	25	648
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	25	25	25	25	25	25
Cap, veh/h	176	156	2289	1177	309	2289
Arrive On Green	0.12	0.12	0.79	0.79	0.79	0.79
Sat Flow, veh/h	1457	1296	2983	1296	354	2983
Grp Volume(v), veh/h	150	8	839	438	25	648
Grp Sat Flow(s),veh/h/ln	1457	1296	1453	1296	354	1453
Q Serve(g_s), s	12.1	0.7	10.3	5.6	2.7	7.3
Cycle Q Clear(g_c), s	12.1	0.7	10.3	5.6	13.1	7.3
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	176	156	2289	1177	309	2289
V/C Ratio(X)	0.85	0.05	0.37	0.37	0.08	0.28
Avail Cap(c_a), veh/h	455	405	2289	1177	309	2289
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	51.7	46.7	3.8	0.8	5.7	3.5
Incr Delay (d2), s/veh	11.1	0.1	0.5	0.9	0.5	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	8.6	0.4	4.7	0.7	0.4	3.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	62.8	46.8	4.3	1.7	6.3	3.8
LnGrp LOS	E	D	A	A	A	A
Approach Vol, veh/h	158		1277			673
Approach Delay, s/veh	62.0		3.4			3.9
Approach LOS	E		A			A
Timer - Assigned Phs	2		6		8	
Phs Duration (G+Y+Rc), s	100.0		100.0		20.0	
Change Period (Y+Rc), s	5.5		5.5		5.5	
Max Green Setting (Gmax), s	71.5		71.5		37.5	
Max Q Clear Time (g_c+l1), s	12.3		15.1		14.1	
Green Ext Time (p_c), s	10.5		6.2		0.4	
Intersection Summary						
HCM 6th Ctrl Delay			7.9			
HCM 6th LOS			A			

HCM 6th TWSC  
4: Cavanaugh Road & 48t Avenue/48th Avenue









2040 Total  
AM Peak

Intersection						
Int Delay, s/veh	1.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	
Traffic Vol, veh/h	401	294	6	182	98	3
Future Vol, veh/h	401	294	6	182	98	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	436	320	7	198	107	3
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	756	0	549	218
Stage 1	-	-	-	-	436	-
Stage 2	-	-	-	-	113	-
Critical Hdwy	-	-	4.6	-	7.3	7.4
Critical Hdwy Stg 1	-	-	-	-	6.3	-
Critical Hdwy Stg 2	-	-	-	-	6.3	-
Follow-up Hdwy	-	-	2.45	-	3.75	3.55
Pot Cap-1 Maneuver	-	-	715	-	414	720
Stage 1	-	-	-	-	557	-
Stage 2	-	-	-	-	835	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	715	-	410	720
Mov Cap-2 Maneuver	-	-	-	-	410	-
Stage 1	-	-	-	-	557	-
Stage 2	-	-	-	-	827	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.3		16.8	
HCM LOS					C	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	415	-	-	715	-	
HCM Lane V/C Ratio	0.265	-	-	0.009	-	
HCM Control Delay (s)	16.8	-	-	10.1	-	
HCM Lane LOS	C	-	-	B	-	
HCM 95th %tile Q(veh)	1.1	-	-	0	-	



HCM 6th TWSC  
5: Cavanaugh Road & 42nd Avenue

2040 Total  
AM Peak

Intersection												
Int Delay, s/veh	4.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	37	5	2	67	15	3	75	3	48	217	0
Future Vol, veh/h	0	37	5	2	67	15	3	75	3	48	217	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	100	-	-	100	-	-	100	-	-	100	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	0	40	5	2	73	16	3	82	3	52	236	0







Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	474	431	236	453	430	84	236	0	0	85	0	0
Stage 1	340	340	-	90	90	-	-	-	-	-	-	-
Stage 2	134	91	-	363	340	-	-	-	-	-	-	-
Critical Hdwy	7.35	6.75	6.45	7.35	6.75	6.45	4.35	-	-	4.35	-	-
Critical Hdwy Stg 1	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.725	4.225	3.525	3.725	4.225	3.525	2.425	-	-	2.425	-	-
Pot Cap-1 Maneuver	465	484	749	480	485	915	1207	-	-	1378	-	-
Stage 1	629	600	-	864	778	-	-	-	-	-	-	-
Stage 2	817	777	-	611	600	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	390	465	749	432	466	915	1207	-	-	1378	-	-
Mov Cap-2 Maneuver	390	465	-	432	466	-	-	-	-	-	-	-
Stage 1	628	577	-	862	776	-	-	-	-	-	-	-
Stage 2	725	775	-	543	577	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	13.2		13.5		0.3		1.4	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1207	-	-	-	487	432	512	1378	-	-
HCM Lane V/C Ratio	0.003	-	-	-	0.094	0.005	0.174	0.038	-	-
HCM Control Delay (s)	8	-	-	0	13.2	13.4	13.5	7.7	-	-
HCM Lane LOS	A	-	-	A	B	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	0.3	0	0.6	0.1	-	-







HCM 6th TWSC  
6: 32nd Avenue & Cavanaugh Road

2040 Total  
AM Peak

Intersection						
Int Delay, s/veh	5.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	92	74	125	234	149	73
Future Vol, veh/h	92	74	125	234	149	73
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	100	100	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	100	80	136	254	162	79
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	390	0	-	0	416	136
Stage 1	-	-	-	-	136	-
Stage 2	-	-	-	-	280	-
Critical Hdwy	4.35	-	-	-	6.65	6.45
Critical Hdwy Stg 1	-	-	-	-	5.65	-
Critical Hdwy Stg 2	-	-	-	-	5.65	-
Follow-up Hdwy	2.425	-	-	-	3.725	3.525
Pot Cap-1 Maneuver	1054	-	-	-	552	855
Stage 1	-	-	-	-	837	-
Stage 2	-	-	-	-	717	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1054	-	-	-	500	855
Mov Cap-2 Maneuver	-	-	-	-	500	-
Stage 1	-	-	-	-	757	-
Stage 2	-	-	-	-	717	-
Approach	EB	WB		SB		
HCM Control Delay, s	4.9	0		13.6		
HCM LOS	B					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1054	-	-	-	500	855
HCM Lane V/C Ratio	0.095	-	-	-	0.324	0.093
HCM Control Delay (s)	8.8	-	-	-	15.6	9.6
HCM Lane LOS	A	-	-	-	C	A
HCM 95th %tile Q(veh)	0.3	-	-	-	1.4	0.3

HCM 6th TWSC  
7: Manila Road & 42nd Avenue

2040 Total  
AM Peak

Intersection						
Int Delay, s/veh	3.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	105	283	355	411	0
Future Vol, veh/h	0	105	283	355	411	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	100	0	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	0	114	308	386	447	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1256	224	447	0	-	0
Stage 1	447	-	-	-	-	-
Stage 2	809	-	-	-	-	-
Critical Hdwy	7.3	7.4	4.6	-	-	-
Critical Hdwy Stg 1	6.3	-	-	-	-	-
Critical Hdwy Stg 2	6.3	-	-	-	-	-
Follow-up Hdwy	3.75	3.55	2.45	-	-	-
Pot Cap-1 Maneuver	135	713	963	-	-	-
Stage 1	549	-	-	-	-	-
Stage 2	345	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	92	713	963	-	-	-
Mov Cap-2 Maneuver	92	-	-	-	-	-
Stage 1	373	-	-	-	-	-
Stage 2	345	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	11	4.6		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	963	-	-	713	-	-
HCM Lane V/C Ratio	0.319	-	-	0.16	-	-
HCM Control Delay (s)	10.5	-	0	11	-	-
HCM Lane LOS	B	-	A	B	-	-
HCM 95th %tile Q(veh)	1.4	-	-	0.6	-	-





HCM 6th TWSC  
8: Quail Run Drive & 48th Avenue

2040 Total  
AM Peak

Intersection						
Int Delay, s/veh	3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	
Traffic Vol, veh/h	710	140	6	214	84	15
Future Vol, veh/h	710	140	6	214	84	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	772	152	7	233	91	16
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	924	0	979	462
Stage 1	-	-	-	-	848	-
Stage 2	-	-	-	-	131	-
Critical Hdwy	-	-	4.6	-	7.3	7.4
Critical Hdwy Stg 1	-	-	-	-	6.3	-
Critical Hdwy Stg 2	-	-	-	-	6.3	-
Follow-up Hdwy	-	-	2.45	-	3.75	3.55
Pot Cap-1 Maneuver	-	-	608	-	210	488
Stage 1	-	-	-	-	328	-
Stage 2	-	-	-	-	817	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	608	-	207	488
Mov Cap-2 Maneuver	-	-	-	-	207	-
Stage 1	-	-	-	-	328	-
Stage 2	-	-	-	-	807	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.3		34.4	
HCM LOS					D	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	227	-	-	608	-	
HCM Lane V/C Ratio	0.474	-	-	0.011	-	
HCM Control Delay (s)	34.4	-	-	11	-	
HCM Lane LOS	D	-	-	B	-	
HCM 95th %tile Q(veh)	2.3	-	-	0	-	





HCM 6th TWSC  
9: 32nd Avenue & Quail Run Drive

2040 Total  
AM Peak

Intersection						
Int Delay, s/veh	2.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	99	327	92	2	1	51
Future Vol, veh/h	99	327	92	2	1	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	108	355	100	2	1	55
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	102	0	-	0	672	101
Stage 1	-	-	-	-	101	-
Stage 2	-	-	-	-	571	-
Critical Hdwy	4.35	-	-	-	6.65	6.45
Critical Hdwy Stg 1	-	-	-	-	5.65	-
Critical Hdwy Stg 2	-	-	-	-	5.65	-
Follow-up Hdwy	2.425	-	-	-	3.725	3.525
Pot Cap-1 Maneuver	1358	-	-	-	388	895
Stage 1	-	-	-	-	869	-
Stage 2	-	-	-	-	522	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1358	-	-	-	357	895
Mov Cap-2 Maneuver	-	-	-	-	357	-
Stage 1	-	-	-	-	799	-
Stage 2	-	-	-	-	522	-
Approach	EB	WB		SB		
HCM Control Delay, s	1.8	0		9.4		
HCM LOS	A					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1358	-	-	-	870	
HCM Lane V/C Ratio	0.079	-	-	-	0.065	
HCM Control Delay (s)	7.9	-	-	-	9.4	
HCM Lane LOS	A	-	-	-	A	
HCM 95th %tile Q(veh)	0.3	-	-	-	0.2	






HCM 6th TWSC  
10: Imboden Rd & PA-2 Access

2040 Total  
AM Peak

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	4	640	16	6	1153
Future Vol, veh/h	9	4	640	16	6	1153
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	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	10	4	696	17	7	1253
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1346	357	0	0	713	0
Stage 1	705	-	-	-	-	-
Stage 2	641	-	-	-	-	-
Critical Hdwy	7.3	7.4	-	-	4.6	-
Critical Hdwy Stg 1	6.3	-	-	-	-	-
Critical Hdwy Stg 2	6.3	-	-	-	-	-
Follow-up Hdwy	3.75	3.55	-	-	2.45	-
Pot Cap-1 Maneuver	117	578	-	-	746	-
Stage 1	395	-	-	-	-	-
Stage 2	429	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	116	578	-	-	746	-
Mov Cap-2 Maneuver	116	-	-	-	-	-
Stage 1	395	-	-	-	-	-
Stage 2	425	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	30.7	0	0.1			
HCM LOS	D					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	154	746	-	
HCM Lane V/C Ratio	-	-	0.092	0.009	-	
HCM Control Delay (s)	-	-	30.7	9.9	-	
HCM Lane LOS	-	-	D	A	-	
HCM 95th %tile Q(veh)	-	-	0.3	0	-	







HCM 6th TWSC  
11: Imboden Rd & PA-5 Access

2040 Total  
AM Peak

Intersection						
Int Delay, s/veh	0.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	26	4	731	47	7	592
Future Vol, veh/h	26	4	731	47	7	592
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	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	28	4	795	51	8	643
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	1133	398	0	0	846	0
Stage 1	795	-	-	-	-	-
Stage 2	338	-	-	-	-	-
Critical Hdwy	7.3	7.4	-	-	4.6	-
Critical Hdwy Stg 1	6.3	-	-	-	-	-
Critical Hdwy Stg 2	6.3	-	-	-	-	-
Follow-up Hdwy	3.75	3.55	-	-	2.45	-
Pot Cap-1 Maneuver	*299	541	-	-	656	-
Stage 1	*351	-	-	-	-	-
Stage 2	*745	-	-	-	-	-
Platoon blocked, %	1		-	-		-
Mov Cap-1 Maneuver	*295	541	-	-	656	-
Mov Cap-2 Maneuver	*295	-	-	-	-	-
Stage 1	*351	-	-	-	-	-
Stage 2	*736	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	17.8	0		0.1		
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBL	SBT	
Capacity (veh/h)		-	-	314	656	-
HCM Lane V/C Ratio		-	-	0.104	0.012	-
HCM Control Delay (s)		-	-	17.8	10.6	-
HCM Lane LOS		-	-	C	B	-
HCM 95th %tile Q(veh)		-	-	0.3	0	-
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

HCM 6th TWSC  
12: PA-5 Access/PA-2 Access & 48th Avenue

2040 Total  
AM Peak

Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	18	1015	18	1	388	2	10	0	1	2	0	10
Future Vol, veh/h	18	1015	18	1	388	2	10	0	1	2	0	10
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	20	1103	20	1	422	2	11	0	1	2	0	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	424	0	0	1123	0	0	1366	1579	562	1017	1588	212
Stage 1	-	-	-	-	-	-	1153	1153	-	425	425	-
Stage 2	-	-	-	-	-	-	213	426	-	592	1163	-
Critical Hdwy	4.6	-	-	4.6	-	-	8	7	7.4	8	7	7.4
Critical Hdwy Stg 1	-	-	-	-	-	-	7	6	-	7	6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7	6	-	7	6	-
Follow-up Hdwy	2.45	-	-	2.45	-	-	3.75	4.25	3.55	3.75	4.25	3.55
Pot Cap-1 Maneuver	984	-	-	*893	-	-	*341	*204	*616	*583	*200	727
Stage 1	-	-	-	-	-	-	*583	*515	-	*520	*531	-
Stage 2	-	-	-	-	-	-	*707	*530	-	*583	*515	-
Platoon blocked, %		-	-	1	-	-	1	1	1	1	1	
Mov Cap-1 Maneuver	984	-	-	*893	-	-	*331	*200	*616	*572	*196	727
Mov Cap-2 Maneuver	-	-	-	-	-	-	*331	*200	-	*572	*196	-
Stage 1	-	-	-	-	-	-	*572	*504	-	*510	*530	-
Stage 2	-	-	-	-	-	-	*696	*529	-	*570	*504	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	15.8	10.3
HCM LOS			C	B







Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	346	984	-	-	* 893	-	-	696
HCM Lane V/C Ratio	0.035	0.02	-	-	0.001	-	-	0.019
HCM Control Delay (s)	15.8	8.7	-	-	9	-	-	10.3
HCM Lane LOS	C	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	0.1

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



HCM 6th TWSC  
13: PA-6 Western Access/PA-3 Western Access & 48th Avenue

2040 Total  
AM Peak

Intersection												
Int Delay, s/veh	1.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	38	933	47	1	341	2	27	0	1	1	0	23
Future Vol, veh/h	38	933	47	1	341	2	27	0	1	1	0	23
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	41	1014	51	1	371	2	29	0	1	1	0	25







Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	373	0	0	1065	0	0	1310	1497	533	963	1521	187
Stage 1	-	-	-	-	-	-	1122	1122	-	374	374	-
Stage 2	-	-	-	-	-	-	188	375	-	589	1147	-
Critical Hdwy	4.6	-	-	4.6	-	-	8	7	7.4	8	7	7.4
Critical Hdwy Stg 1	-	-	-	-	-	-	7	6	-	7	6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7	6	-	7	6	-
Follow-up Hdwy	2.45	-	-	2.45	-	-	3.75	4.25	3.55	3.75	4.25	3.55
Pot Cap-1 Maneuver	1033	-	-	530	-	-	96	98	436	179	95	756
Stage 1	-	-	-	-	-	-	184	236	-	560	562	-
Stage 2	-	-	-	-	-	-	733	561	-	409	229	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1033	-	-	530	-	-	90	94	436	173	91	756
Mov Cap-2 Maneuver	-	-	-	-	-	-	90	94	-	173	91	-
Stage 1	-	-	-	-	-	-	177	227	-	538	561	-
Stage 2	-	-	-	-	-	-	707	560	-	392	220	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0	61.5	10.7
HCM LOS			F	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	93	1033	-	-	530	-	-	663
HCM Lane V/C Ratio	0.327	0.04	-	-	0.002	-	-	0.039
HCM Control Delay (s)	61.5	8.6	-	-	11.8	-	-	10.7
HCM Lane LOS	F	A	-	-	B	-	-	B
HCM 95th %tile Q(veh)	1.3	0.1	-	-	0	-	-	0.1

HCM 6th TWSC  
14: 48th Avenue & PA-3 Eastern Access

2040 Total  
AM Peak

Intersection												
Int Delay, s/veh	1.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	39	848	47	1	294	2	27	0	1	1	0	23
Future Vol, veh/h	39	848	47	1	294	2	27	0	1	1	0	23
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	100	-	-	0	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	42	922	51	1	320	2	29	0	1	1	0	25

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	322	0	0	973	0	0	1194	1356	487	868	1380	161
Stage 1	-	-	-	-	-	-	1032	1032	-	323	323	-
Stage 2	-	-	-	-	-	-	162	324	-	545	1057	-
Critical Hdwy	4.6	-	-	4.6	-	-	8	7	7.4	8	7	7.4
Critical Hdwy Stg 1	-	-	-	-	-	-	7	6	-	7	6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7	6	-	7	6	-
Follow-up Hdwy	2.45	-	-	2.45	-	-	3.75	4.25	3.55	3.75	4.25	3.55
Pot Cap-1 Maneuver	1084	-	-	580	-	-	118	122	469	212	117	788
Stage 1	-	-	-	-	-	-	211	262	-	603	595	-
Stage 2	-	-	-	-	-	-	761	594	-	436	255	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1084	-	-	580	-	-	111	117	469	205	112	788
Mov Cap-2 Maneuver	-	-	-	-	-	-	111	117	-	205	112	-
Stage 1	-	-	-	-	-	-	203	252	-	579	594	-
Stage 2	-	-	-	-	-	-	736	593	-	418	245	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0	47.7	10.3
HCM LOS			E	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	114	1084	-	-	580	-	-	705
HCM Lane V/C Ratio	0.267	0.039	-	-	0.002	-	-	0.037
HCM Control Delay (s)	47.7	8.5	-	-	11.2	-	-	10.3
HCM Lane LOS	E	A	-	-	B	-	-	B
HCM 95th %tile Q(veh)	1	0.1	-	-	0	-	-	0.1

HCM 6th TWSC  
15: PA-8A Access & 48th Avenue

2040 Total  
AM Peak

Intersection						
Int Delay, s/veh	0.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	
Traffic Vol, veh/h	705	19	6	213	6	5
Future Vol, veh/h	705	19	6	213	6	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	766	21	7	232	7	5







Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	787
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.6
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.45
Pot Cap-1 Maneuver	-	-	694
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	694
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	16.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	316	-	-	694	-
HCM Lane V/C Ratio	0.038	-	-	0.009	-
HCM Control Delay (s)	16.8	-	-	10.2	-
HCM Lane LOS	C	-	-	B	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

HCM 6th TWSC  
16: PA-8A Access/PA-4 Access & 48th Avenue

2040 Total  
AM Peak

Intersection												
Int Delay, s/veh	1.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	668	30	46	195	6	17	0	26	5	0	7
Future Vol, veh/h	12	668	30	46	195	6	17	0	26	5	0	7
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	13	726	33	50	212	7	18	0	28	5	0	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	219	0	0	759	0	0	975	1088	380	705	1101	110
Stage 1	-	-	-	-	-	-	769	769	-	316	316	-
Stage 2	-	-	-	-	-	-	206	319	-	389	785	-
Critical Hdwy	4.6	-	-	4.6	-	-	8	7	7.4	8	7	7.4
Critical Hdwy Stg 1	-	-	-	-	-	-	7	6	-	7	6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7	6	-	7	6	-
Follow-up Hdwy	2.45	-	-	2.45	-	-	3.75	4.25	3.55	3.75	4.25	3.55
Pot Cap-1 Maneuver	1196	-	-	713	-	-	175	181	557	283	178	854
Stage 1	-	-	-	-	-	-	313	358	-	609	599	-
Stage 2	-	-	-	-	-	-	715	597	-	548	351	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1196	-	-	713	-	-	163	167	557	252	164	854
Mov Cap-2 Maneuver	-	-	-	-	-	-	163	167	-	252	164	-
Stage 1	-	-	-	-	-	-	310	354	-	602	557	-
Stage 2	-	-	-	-	-	-	659	555	-	515	347	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			1.9			20.1			13.7		
HCM LOS							C			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	285	1196	-	-	713	-	-	428
HCM Lane V/C Ratio	0.164	0.011	-	-	0.07	-	-	0.03
HCM Control Delay (s)	20.1	8	-	-	10.4	-	-	13.7
HCM Lane LOS	C	A	-	-	B	-	-	B
HCM 95th %tile Q(veh)	0.6	0	-	-	0.2	-	-	0.1







HCM 6th TWSC  
17: PA-8B Access & 48th Avenue

2040 Total  
AM Peak

Intersection						
Int Delay, s/veh	1.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↘	
Traffic Vol, veh/h	391	12	46	181	7	26
Future Vol, veh/h	391	12	46	181	7	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	425	13	50	197	8	28
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	438	0	631	219
Stage 1	-	-	-	-	432	-
Stage 2	-	-	-	-	199	-
Critical Hdwy	-	-	4.6	-	7.3	7.4
Critical Hdwy Stg 1	-	-	-	-	6.3	-
Critical Hdwy Stg 2	-	-	-	-	6.3	-
Follow-up Hdwy	-	-	2.45	-	3.75	3.55
Pot Cap-1 Maneuver	-	-	971	-	364	719
Stage 1	-	-	-	-	560	-
Stage 2	-	-	-	-	750	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	971	-	345	719
Mov Cap-2 Maneuver	-	-	-	-	345	-
Stage 1	-	-	-	-	560	-
Stage 2	-	-	-	-	712	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		1.8		11.6	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	585	-	-	971	-	
HCM Lane V/C Ratio	0.061	-	-	0.051	-	
HCM Control Delay (s)	11.6	-	-	8.9	-	
HCM Lane LOS	B	-	-	A	-	
HCM 95th %tile Q(veh)	0.2	-	-	0.2	-	

HCM 6th TWSC  
18: Quail Run Drive & PA-8A Access

2040 Total  
AM Peak

Intersection												
Int Delay, s/veh	1.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	27	0	0	2	0	6	0	65	3	7	91	48
Future Vol, veh/h	27	0	0	2	0	6	0	65	3	7	91	48
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	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	29	0	0	2	0	7	0	71	3	8	99	52
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	217	215	125	214	240	73	151	0	0	74	0	0
Stage 1	141	141	-	73	73	-	-	-	-	-	-	-
Stage 2	76	74	-	141	167	-	-	-	-	-	-	-
Critical Hdwy	7.35	6.75	6.45	7.35	6.75	6.45	4.35	-	-	4.35	-	-
Critical Hdwy Stg 1	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.725	4.225	3.525	3.725	4.225	3.525	2.425	-	-	2.425	-	-
Pot Cap-1 Maneuver	693	644	867	696	623	928	1301	-	-	1392	-	-
Stage 1	810	738	-	882	791	-	-	-	-	-	-	-
Stage 2	879	790	-	810	719	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	685	640	867	693	619	928	1301	-	-	1392	-	-
Mov Cap-2 Maneuver	685	640	-	693	619	-	-	-	-	-	-	-
Stage 1	810	734	-	882	791	-	-	-	-	-	-	-
Stage 2	873	790	-	805	715	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	10.5		9.3			0			0.4			
HCM LOS	B		A									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	1301	-	-	685	855	1392	-	-				
HCM Lane V/C Ratio	-	-	-	0.043	0.01	0.005	-	-				
HCM Control Delay (s)	0	-	-	10.5	9.3	7.6	-	-				
HCM Lane LOS	A	-	-	B	A	A	-	-				
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-				

HCM 6th TWSC  
19: Cavanaugh Road & PA-8A Access/PA-8B Access

2040 Total  
AM Peak

Intersection												
Int Delay, s/veh	1.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	17	0	3	4	0	7	6	77	7	12	258	29
Future Vol, veh/h	17	0	3	4	0	7	6	77	7	12	258	29
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	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	18	0	3	4	0	8	7	84	8	13	280	32

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	428	428	296	426	440	88	312	0	0	92	0	0
Stage 1	322	322	-	102	102	-	-	-	-	-	-	-
Stage 2	106	106	-	324	338	-	-	-	-	-	-	-
Critical Hdwy	7.35	6.75	6.45	7.35	6.75	6.45	4.35	-	-	4.35	-	-
Critical Hdwy Stg 1	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.725	4.225	3.525	3.725	4.225	3.525	2.425	-	-	2.425	-	-
Pot Cap-1 Maneuver	499	486	692	501	478	910	1129	-	-	1370	-	-
Stage 1	644	612	-	851	768	-	-	-	-	-	-	-
Stage 2	846	765	-	642	602	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	489	479	692	492	471	910	1129	-	-	1370	-	-
Mov Cap-2 Maneuver	489	479	-	492	471	-	-	-	-	-	-	-
Stage 1	640	606	-	846	763	-	-	-	-	-	-	-
Stage 2	834	760	-	633	597	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	12.3		10.3		0.5		0.3	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1129	-	-	512 695	1370	-	-
HCM Lane V/C Ratio	0.006	-	-	0.042 0.017	0.01	-	-
HCM Control Delay (s)	8.2	-	-	12.3 10.3	7.7	-	-
HCM Lane LOS	A	-	-	B B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1 0.1	0	-	-

HCM 6th TWSC  
20: Quail Run Drive & 42nd Avenue

2040 Total  
AM Peak

Intersection												
Int Delay, s/veh	3.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	27	0	0	18	0	18	0	23	37	27	18	48
Future Vol, veh/h	27	0	0	18	0	18	0	23	37	27	18	48
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	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	29	0	0	20	0	20	0	25	40	29	20	52

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	159	169	46	149	175	45	72	0	0	65	0	0
Stage 1	104	104	-	45	45	-	-	-	-	-	-	-
Stage 2	55	65	-	104	130	-	-	-	-	-	-	-
Critical Hdwy	7.35	6.75	6.45	7.35	6.75	6.45	4.35	-	-	4.35	-	-
Critical Hdwy Stg 1	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.725	4.225	3.525	3.725	4.225	3.525	2.425	-	-	2.425	-	-
Pot Cap-1 Maneuver	758	684	962	769	679	963	1394	-	-	1403	-	-
Stage 1	849	767	-	914	814	-	-	-	-	-	-	-
Stage 2	902	798	-	849	746	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	731	670	962	757	665	963	1394	-	-	1403	-	-
Mov Cap-2 Maneuver	731	670	-	757	665	-	-	-	-	-	-	-
Stage 1	849	751	-	914	814	-	-	-	-	-	-	-
Stage 2	884	798	-	831	730	-	-	-	-	-	-	-







Approach	EB		WB		NB		SB	
HCM Control Delay, s	10.1		9.5		0		2.2	
HCM LOS	B		A					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1394	-	-	731 848	1403	-	-
HCM Lane V/C Ratio	-	-	-	0.04 0.046	0.021	-	-
HCM Control Delay (s)	0	-	-	10.1 9.5	7.6	-	-
HCM Lane LOS	A	-	-	B A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1 0.1	0.1	-	-



HCM 6th TWSC  
21: PA-9 Access/PA-8A Access & 42nd Avenue

2040 Total  
AM Peak

Intersection												
Int Delay, s/veh	2.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	44	13	9	26	0	5	0	8	0	0	5
Future Vol, veh/h	6	44	13	9	26	0	5	0	8	0	0	5
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	7	48	14	10	28	0	5	0	9	0	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	28	0	0	62	0	0	120	117	55	122	124	28
Stage 1	-	-	-	-	-	-	69	69	-	48	48	-
Stage 2	-	-	-	-	-	-	51	48	-	74	76	-
Critical Hdwy	4.35	-	-	4.35	-	-	7.35	6.75	6.45	7.35	6.75	6.45
Critical Hdwy Stg 1	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Follow-up Hdwy	2.425	-	-	2.425	-	-	3.725	4.225	3.525	3.725	4.225	3.525
Pot Cap-1 Maneuver	1449	-	-	1406	-	-	804	732	951	802	726	985
Stage 1	-	-	-	-	-	-	887	794	-	910	812	-
Stage 2	-	-	-	-	-	-	907	812	-	881	789	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1449	-	-	1406	-	-	792	723	951	788	717	985
Mov Cap-2 Maneuver	-	-	-	-	-	-	792	723	-	788	717	-
Stage 1	-	-	-	-	-	-	883	790	-	905	806	-
Stage 2	-	-	-	-	-	-	896	806	-	869	785	-







Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.7			1.9			9.1			8.7		
HCM LOS							A			A		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	883	1449	-	-	1406	-	-	985
HCM Lane V/C Ratio	0.016	0.005	-	-	0.007	-	-	0.006
HCM Control Delay (s)	9.1	7.5	-	-	7.6	-	-	8.7
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0

HCM 6th TWSC  
22: PA-9 Access/PA-8A Access & 42nd Avenue

2040 Total  
AM Peak

Intersection												
Int Delay, s/veh	5.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	8	33	53	9	9	19	0	30	4	0	7
Future Vol, veh/h	12	8	33	53	9	9	19	0	30	4	0	7
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	13	9	36	58	10	10	21	0	33	4	0	8







Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	20	0	0	45	0	0	188	189	27	201	202	15
Stage 1	-	-	-	-	-	-	53	53	-	131	131	-
Stage 2	-	-	-	-	-	-	135	136	-	70	71	-
Critical Hdwy	4.35	-	-	4.35	-	-	7.35	6.75	6.45	7.35	6.75	6.45
Critical Hdwy Stg 1	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Follow-up Hdwy	2.425	-	-	2.425	-	-	3.725	4.225	3.525	3.725	4.225	3.525
Pot Cap-1 Maneuver	1459	-	-	1427	-	-	724	667	986	710	655	1002
Stage 1	-	-	-	-	-	-	905	808	-	820	746	-
Stage 2	-	-	-	-	-	-	816	742	-	885	793	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1459	-	-	1427	-	-	691	634	986	661	622	1002
Mov Cap-2 Maneuver	-	-	-	-	-	-	691	634	-	661	622	-
Stage 1	-	-	-	-	-	-	897	801	-	813	715	-
Stage 2	-	-	-	-	-	-	777	712	-	848	786	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.7			5.7			9.5			9.3		
HCM LOS							A			A		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	846	1459	-	-	1427	-	-	844
HCM Lane V/C Ratio	0.063	0.009	-	-	0.04	-	-	0.014
HCM Control Delay (s)	9.5	7.5	-	-	7.6	-	-	9.3
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0

HCM 6th TWSC  
23: PA-8C Access/PA-8B Access & 42nd Avenue

2040 Total  
AM Peak

Intersection												
Int Delay, s/veh	3.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	73	9	51	75	4	6	0	28	2	0	3
Future Vol, veh/h	6	73	9	51	75	4	6	0	28	2	0	3
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	7	79	10	55	82	4	7	0	30	2	0	3





Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	86	0	0	89	0	0	294	294	84	307	297	84
Stage 1	-	-	-	-	-	-	98	98	-	194	194	-
Stage 2	-	-	-	-	-	-	196	196	-	113	103	-
Critical Hdwy	4.35	-	-	4.35	-	-	7.35	6.75	6.45	7.35	6.75	6.45
Critical Hdwy Stg 1	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Follow-up Hdwy	2.425	-	-	2.425	-	-	3.725	4.225	3.525	3.725	4.225	3.525
Pot Cap-1 Maneuver	1377	-	-	1374	-	-	615	581	915	603	578	915
Stage 1	-	-	-	-	-	-	855	771	-	758	699	-
Stage 2	-	-	-	-	-	-	756	697	-	839	767	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1377	-	-	1374	-	-	592	555	915	563	552	915
Mov Cap-2 Maneuver	-	-	-	-	-	-	592	555	-	563	552	-
Stage 1	-	-	-	-	-	-	851	767	-	754	671	-
Stage 2	-	-	-	-	-	-	723	669	-	807	763	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	3	9.5	10
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	835	1377	-	-	1374	-	-	732
HCM Lane V/C Ratio	0.044	0.005	-	-	0.04	-	-	0.007
HCM Control Delay (s)	9.5	7.6	-	-	7.7	-	-	10
HCM Lane LOS	A	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0.1	-	-	0

HCM 6th TWSC  
24: Quail Run Drive & PA-9 Access

2040 Total  
AM Peak

Intersection						
Int Delay, s/veh	1.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	3	57	17	4	32
Future Vol, veh/h	10	3	57	17	4	32
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	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	11	3	62	18	4	35
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	114	71	0	0	80	0
Stage 1	71	-	-	-	-	-
Stage 2	43	-	-	-	-	-
Critical Hdwy	6.65	6.45	-	-	4.35	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	-	-	2.425	-
Pot Cap-1 Maneuver	830	931	-	-	1384	-
Stage 1	897	-	-	-	-	-
Stage 2	924	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	828	931	-	-	1384	-
Mov Cap-2 Maneuver	828	-	-	-	-	-
Stage 1	897	-	-	-	-	-
Stage 2	921	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	9.3	0		0.8		
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	850	1384	-	
HCM Lane V/C Ratio	-	-	0.017	0.003	-	
HCM Control Delay (s)	-	-	9.3	7.6	-	
HCM Lane LOS	-	-	A	A	-	
HCM 95th %tile Q(veh)	-	-	0.1	0	-	

HCM 6th TWSC  
25: Cavanaugh Road & PA-9 Access/PA-8C Access

2040 Total  
AM Peak

Intersection												
Int Delay, s/veh	2.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Vol, veh/h	8	0	19	11	0	5	34	69	20	9	204	13
Future Vol, veh/h	8	0	19	11	0	5	34	69	20	9	204	13
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	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	9	0	21	12	0	5	37	75	22	10	222	14






Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	412	420	229	420	416	86	236	0	0	97	0	0
Stage 1	249	249	-	160	160	-	-	-	-	-	-	-
Stage 2	163	171	-	260	256	-	-	-	-	-	-	-
Critical Hdwy	7.35	6.75	6.45	7.35	6.75	6.45	4.35	-	-	4.35	-	-
Critical Hdwy Stg 1	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.725	4.225	3.525	3.725	4.225	3.525	2.425	-	-	2.425	-	-
Pot Cap-1 Maneuver	512	491	756	506	494	913	1207	-	-	1364	-	-
Stage 1	707	660	-	791	724	-	-	-	-	-	-	-
Stage 2	788	716	-	697	655	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	494	472	756	478	475	913	1207	-	-	1364	-	-
Mov Cap-2 Maneuver	494	472	-	478	475	-	-	-	-	-	-	-
Stage 1	685	655	-	766	702	-	-	-	-	-	-	-
Stage 2	759	694	-	673	650	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	10.8		11.6		2.2		0.3	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1207	-	-	653	562	1364	-
HCM Lane V/C Ratio	0.031	-	-	0.045	0.031	0.007	-
HCM Control Delay (s)	8.1	-	-	10.8	11.6	7.7	-
HCM Lane LOS	A	-	-	B	B	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0.1	0	-













HCM 6th TWSC  
26: Quail Run Drive & PA-7 Access

2040 Total  
AM Peak

Intersection						
Int Delay, s/veh	2.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	19	31	70	33	8
Future Vol, veh/h	4	19	31	70	33	8
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	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	4	21	34	76	36	9
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	185	41	45	0	-	0
Stage 1	41	-	-	-	-	-
Stage 2	144	-	-	-	-	-
Critical Hdwy	6.65	6.45	4.35	-	-	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	2.425	-	-	-
Pot Cap-1 Maneuver	755	968	1427	-	-	-
Stage 1	926	-	-	-	-	-
Stage 2	830	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	737	968	1427	-	-	-
Mov Cap-2 Maneuver	737	-	-	-	-	-
Stage 1	904	-	-	-	-	-
Stage 2	830	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9	2.3		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1427	-	918	-	-	
HCM Lane V/C Ratio	0.024	-	0.027	-	-	
HCM Control Delay (s)	7.6	-	9	-	-	
HCM Lane LOS	A	-	A	-	-	
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-	

# Timings 1: Imboden Rd & 56th Avenue

2040 Total  
PM Peak

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	328	1046	1054	210	224	219
Future Volume (vph)	328	1046	1054	210	224	219
Lane Group Flow (vph)	357	1137	1146	228	243	238
Turn Type	Prot	pt+ov	Prot	NA	NA	pm+ov
Protected Phases	4	4 5	5	2	6	4
Permitted Phases						6
Detector Phase	4	4 5	5	2	6	4
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	23.5		10.5	23.5	23.5	23.5
Total Split (s)	38.0		57.0	82.0	25.0	38.0
Total Split (%)	31.7%		47.5%	68.3%	20.8%	31.7%
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5		5.5	5.5	5.5	5.5
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None		None	C-Max	C-Max	None
v/c Ratio	0.93	0.65	0.95	0.12	0.50	0.37
Control Delay	74.5	7.5	47.5	9.6	49.8	19.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	74.5	7.5	47.5	9.6	49.8	19.3
Queue Length 50th (ft)	269	155	454	34	91	99
Queue Length 95th (ft)	#449	217	#585	52	135	163
Internal Link Dist (ft)	22583			3921	12432	
Turn Bay Length (ft)		100	100			100
Base Capacity (vph)	391	1746	1202	1854	484	640
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	0.91	0.65	0.95	0.12	0.50	0.37

## Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

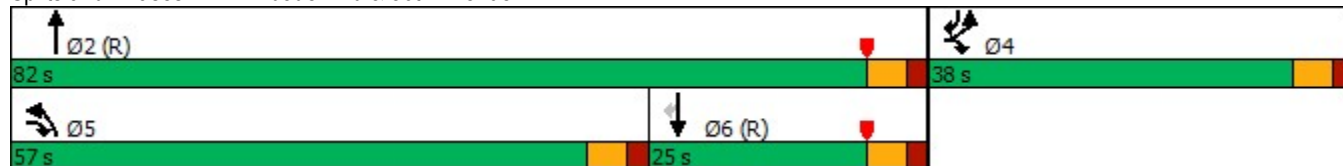
Natural Cycle: 100

Control Type: Actuated-Coordinated

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.













Splits and Phases: 1: Imboden Rd & 56th Avenue



# HCM 6th Signalized Intersection Summary

## 1: Imboden Rd & 56th Avenue





















2040 Total  
PM Peak

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	328	1046	1054	210	224	219
Future Volume (veh/h)	328	1046	1054	210	224	219
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	1530	1530	1530	1530	1530	1530
Adj Flow Rate, veh/h	357	1137	1146	228	243	238
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	25	25	25	25	25	25
Cap, veh/h	395	1579	1190	1853	496	572
Arrive On Green	0.27	0.27	0.42	0.64	0.17	0.17
Sat Flow, veh/h	1457	2281	2826	2983	2983	1296
Grp Volume(v), veh/h	357	1137	1146	228	243	238
Grp Sat Flow(s),veh/h/ln	1457	1141	1413	1453	1453	1296
Q Serve(g_s), s	28.4	32.5	47.4	3.7	9.1	15.1
Cycle Q Clear(g_c), s	28.4	32.5	47.4	3.7	9.1	15.1
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	395	1579	1190	1853	496	572
V/C Ratio(X)	0.90	0.72	0.96	0.12	0.49	0.42
Avail Cap(c_a), veh/h	395	1579	1213	1853	496	572
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	42.3	11.4	33.8	8.6	45.0	22.9
Incr Delay (d2), s/veh	23.8	1.6	17.5	0.1	3.4	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	18.6	33.3	25.8	2.1	6.3	12.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	66.0	13.0	51.3	8.7	48.5	25.2
LnGrp LOS	E	B	D	A	D	C
Approach Vol, veh/h	1494			1374	481	
Approach Delay, s/veh	25.7			44.3	36.9	
Approach LOS	C			D	D	
Timer - Assigned Phs	2		4		5	6
Phs Duration (G+Y+Rc), s	82.0		38.0		56.0	26.0
Change Period (Y+Rc), s	5.5		5.5		5.5	5.5
Max Green Setting (Gmax), s	76.5		32.5		51.5	19.5
Max Q Clear Time (g_c+l1), s	5.7		34.5		49.4	17.1
Green Ext Time (p_c), s	1.7		0.0		1.1	0.6
Intersection Summary						
HCM 6th Ctrl Delay			34.9			
HCM 6th LOS			C			



# Timings 2: Imboden Rd & 48th Avenue

2040 Total  
PM Peak

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	5	5	331	5	736	10	391	137	227	736
Future Volume (vph)	5	5	331	5	736	10	391	137	227	736
Lane Group Flow (vph)	5	16	360	405	400	11	425	149	247	805
Turn Type	Perm	NA	pm+pt	NA	pm+ov	Perm	NA	pm+ov	Prot	NA
Protected Phases		4	3	8	1		2	3	1	6
Permitted Phases	4		8		8	2		2		
Detector Phase	4	4	3	8	1	2	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)	23.5	23.5	10.5	23.5	10.5	23.5	23.5	10.5	10.5	23.5
Total Split (s)	24.0	24.0	36.0	60.0	27.0	33.0	33.0	36.0	27.0	60.0
Total Split (%)	20.0%	20.0%	30.0%	50.0%	22.5%	27.5%	27.5%	30.0%	22.5%	50.0%
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
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)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lag	Lag	Lead		Lead	Lag	Lag	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	None	C-Max
v/c Ratio	0.06	0.19	0.94	0.63	0.64	0.05	0.34	0.15	0.66	0.45
Control Delay	54.4	36.8	72.5	7.7	21.6	27.0	25.7	1.8	56.1	18.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.4	36.8	72.5	7.7	21.6	27.0	25.7	1.8	56.1	18.2
Queue Length 50th (ft)	4	4	278	3	201	4	103	0	97	170
Queue Length 95th (ft)	17	27	#339	82	226	21	189	25	136	281
Internal Link Dist (ft)		1288		382			2909			761
Turn Bay Length (ft)	100		100			100		100	100	
Base Capacity (vph)	234	219	398	776	675	232	1268	993	501	1787
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	0.02	0.07	0.90	0.52	0.59	0.05	0.34	0.15	0.49	0.45

## Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow

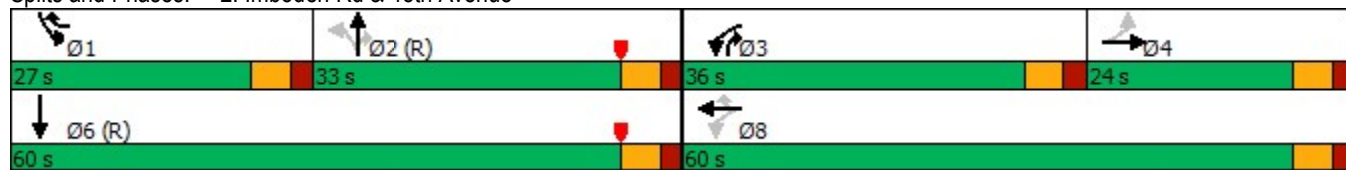
Natural Cycle: 80

Control Type: Actuated-Coordinated

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.
























## Splits and Phases: 2: Imboden Rd & 48th Avenue



# HCM 6th Signalized Intersection Summary

## 2: Imboden Rd & 48th Avenue

2040 Total  
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	5	10	331	5	736	10	391	137	227	736	5
Future Volume (veh/h)	5	5	10	331	5	736	10	391	137	227	736	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		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	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530
Adj Flow Rate, veh/h	5	5	11	360	0	803	11	425	149	247	800	5
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Cap, veh/h	83	18	39	453	0	1143	291	1226	866	302	1701	11
Arrive On Green	0.04	0.04	0.04	0.25	0.00	0.33	0.42	0.42	0.42	0.11	0.57	0.57
Sat Flow, veh/h	554	425	936	1457	0	2592	553	2906	1296	2826	2961	19
Grp Volume(v), veh/h	5	0	16	360	0	803	11	425	149	247	393	412
Grp Sat Flow(s),veh/h/ln	554	0	1361	1457	0	1296	553	1453	1296	1413	1453	1526
Q Serve(g_s), s	1.0	0.0	1.4	27.4	0.0	30.1	1.4	11.9	5.2	10.3	18.9	18.9
Cycle Q Clear(g_c), s	1.0	0.0	1.4	27.4	0.0	30.1	2.0	11.9	5.2	10.3	18.9	18.9
Prop In Lane	1.00		0.69	1.00		1.00	1.00		1.00	1.00		0.01
Lane Grp Cap(c), veh/h	83	0	57	453	0	1143	291	1226	866	302	835	877
V/C Ratio(X)	0.06	0.00	0.28	0.79	0.00	0.70	0.04	0.35	0.17	0.82	0.47	0.47
Avail Cap(c_a), veh/h	145	0	210	465	0	1455	291	1226	866	506	835	877
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.6	0.0	55.8	38.6	0.0	27.2	20.8	23.5	7.5	52.4	14.9	14.9
Incr Delay (d2), s/veh	0.3	0.0	2.7	9.0	0.0	1.1	0.2	0.8	0.4	5.4	1.9	1.8
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(95%),veh/ln	0.3	0.0	0.9	16.2	0.0	14.3	0.4	7.6	2.7	7.0	10.7	11.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	55.9	0.0	58.4	47.6	0.0	28.3	21.0	24.3	7.9	57.8	16.8	16.7
LnGrp LOS	E	A	E	D	A	C	C	C	A	E	B	B
Approach Vol, veh/h					1163				585			
Approach Delay, s/veh	57.8				34.3				20.0			
Approach LOS	E				C				C			
Timer - Assigned Phs	1	2	3	4	6				8			
Phs Duration (G+Y+Rc), s	18.3	56.1	35.0	10.5	74.5				45.5			
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5				5.5			
Max Green Setting (Gmax), s	21.5	27.5	30.5	18.5	54.5				54.5			
Max Q Clear Time (g_c+I1), s	12.3	13.9	29.4	3.4	20.9				32.1			
Green Ext Time (p_c), s	0.6	3.0	0.2	0.0	6.0				3.8			

### Intersection Summary













HCM 6th Ctrl Delay	28.6
HCM 6th LOS	C

### Notes

User approved pedestrian interval to be less than phase max green.  
User approved volume balancing among the lanes for turning movement.

# Timings 3: Quail Run Rd & 32nd Avenue

2040 Total  
PM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	407	25	516	131	8	1105
Future Volume (vph)	407	25	516	131	8	1105
Lane Group Flow (vph)	442	27	561	142	9	1201
Turn Type	Prot	Prot	NA	pm+ov	Perm	NA
Protected Phases	3	3	2	3		6
Permitted Phases				2	6	
Detector Phase	3	3	2	3	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.5	10.5	23.5	10.5	23.5	23.5
Total Split (s)	54.0	54.0	66.0	54.0	66.0	66.0
Total Split (%)	45.0%	45.0%	55.0%	45.0%	55.0%	55.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	None	C-Max	C-Max
v/c Ratio	0.89	0.06	0.35	0.11	0.03	0.74
Control Delay	56.6	8.0	16.1	0.2	14.9	24.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.6	8.0	16.1	0.2	14.9	24.6
Queue Length 50th (ft)	315	0	121	0	3	359
Queue Length 95th (ft)	426	19	179	0	13	504
Internal Link Dist (ft)	1393		912			5621
Turn Bay Length (ft)	100			100	100	
Base Capacity (vph)	583	538	1624	1282	350	1624
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	0.76	0.05	0.35	0.11	0.03	0.74

## Intersection Summary

Cycle Length: 120

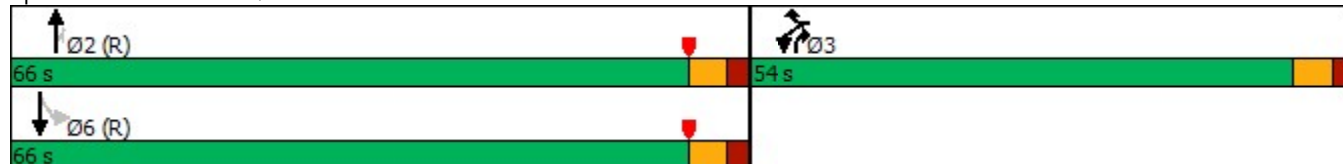
Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 70













Control Type: Actuated-Coordinated

Splits and Phases: 3: Quail Run Rd & 32nd Avenue



# HCM 6th Signalized Intersection Summary 3: Quail Run Rd & 32nd Avenue

2040 Total  
PM Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	407	25	516	131	8	1105
Future Volume (veh/h)	407	25	516	131	8	1105
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	1530	1530	1530	1530	1530	1530
Adj Flow Rate, veh/h	442	27	561	142	9	1201
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	25	25	25	25	25	25
Cap, veh/h	470	418	1703	1177	398	1703
Arrive On Green	0.32	0.32	0.59	0.59	0.59	0.59
Sat Flow, veh/h	1457	1296	2983	1296	694	2983
Grp Volume(v), veh/h	442	27	561	142	9	1201
Grp Sat Flow(s),veh/h/ln	1457	1296	1453	1296	694	1453
Q Serve(g_s), s	35.4	1.7	11.9	1.4	0.8	35.0
Cycle Q Clear(g_c), s	35.4	1.7	11.9	1.4	12.7	35.0
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	470	418	1703	1177	398	1703
V/C Ratio(X)	0.94	0.06	0.33	0.12	0.02	0.71
Avail Cap(c_a), veh/h	589	524	1703	1177	398	1703
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	39.6	28.1	12.7	0.6	16.0	17.5
Incr Delay (d2), s/veh	20.9	0.1	0.5	0.2	0.1	2.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	21.6	1.0	7.1	0.2	0.3	17.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	60.5	28.2	13.3	0.8	16.1	20.0
LnGrp LOS	E	C	B	A	B	C
Approach Vol, veh/h	469		703			1210
Approach Delay, s/veh	58.6		10.7			20.0
Approach LOS	E		B			B
Timer - Assigned Phs	2		6		8	
Phs Duration (G+Y+Rc), s	75.8		75.8		44.2	
Change Period (Y+Rc), s	5.5		5.5		5.5	
Max Green Setting (Gmax), s	60.5		60.5		48.5	
Max Q Clear Time (g_c+l1), s	13.9		37.0		37.4	
Green Ext Time (p_c), s	5.1		10.2		1.3	
Intersection Summary						
HCM 6th Ctrl Delay			24.9			
HCM 6th LOS			C			









HCM 6th TWSC  
4: Cavanaugh Road & 48t Avenue/48th Avenue

2040 Total  
PM Peak

Intersection						
Int Delay, s/veh	7.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗	↖	↑↑	↘	
Traffic Vol, veh/h	174	89	3	398	301	6
Future Vol, veh/h	174	89	3	398	301	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	189	97	3	433	327	7
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	286	0	412	95
Stage 1	-	-	-	-	189	-
Stage 2	-	-	-	-	223	-
Critical Hdwy	-	-	4.6	-	7.3	7.4
Critical Hdwy Stg 1	-	-	-	-	6.3	-
Critical Hdwy Stg 2	-	-	-	-	6.3	-
Follow-up Hdwy	-	-	2.45	-	3.75	3.55
Pot Cap-1 Maneuver	-	-	1122	-	512	874
Stage 1	-	-	-	-	760	-
Stage 2	-	-	-	-	728	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1122	-	510	874
Mov Cap-2 Maneuver	-	-	-	-	510	-
Stage 1	-	-	-	-	760	-
Stage 2	-	-	-	-	726	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.1		24	
HCM LOS					C	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	514	-	-	1122	-	
HCM Lane V/C Ratio	0.649	-	-	0.003	-	
HCM Control Delay (s)	24	-	-	8.2	-	
HCM Lane LOS	C	-	-	A	-	
HCM 95th %tile Q(veh)	4.6	-	-	0	-	

HCM 6th TWSC  
5: Cavanaugh Road & 42nd Avenue

2040 Total  
PM Peak

Intersection												
Int Delay, s/veh	4.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	69	10	4	29	49	2	220	1	14	73	0
Future Vol, veh/h	0	69	10	4	29	49	2	220	1	14	73	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	100	-	-	100	-	-	100	-	-	100	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	0	75	11	4	32	53	2	239	1	15	79	0







Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	395	353	79	396	353	240	79	0	0	240	0	0
Stage 1	109	109	-	244	244	-	-	-	-	-	-	-
Stage 2	286	244	-	152	109	-	-	-	-	-	-	-
Critical Hdwy	7.35	6.75	6.45	7.35	6.75	6.45	4.35	-	-	4.35	-	-
Critical Hdwy Stg 1	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.725	4.225	3.525	3.725	4.225	3.525	2.425	-	-	2.425	-	-
Pot Cap-1 Maneuver	526	537	921	525	537	745	1386	-	-	1203	-	-
Stage 1	843	763	-	711	664	-	-	-	-	-	-	-
Stage 2	674	664	-	799	763	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	461	530	921	458	530	745	1386	-	-	1203	-	-
Mov Cap-2 Maneuver	461	530	-	458	530	-	-	-	-	-	-	-
Stage 1	842	754	-	710	663	-	-	-	-	-	-	-
Stage 2	595	663	-	702	754	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	12.6		11.5		0.1		1.3	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1386	-	-	-	560	458	647	1203	-	-
HCM Lane V/C Ratio	0.002	-	-	-	0.153	0.009	0.131	0.013	-	-
HCM Control Delay (s)	7.6	-	-	0	12.6	12.9	11.4	8	-	-
HCM Lane LOS	A	-	-	A	B	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	0.5	0	0.5	0	-	-

HCM 6th TWSC  
6: 32nd Avenue & Cavanaugh Road

2040 Total  
PM Peak

Intersection						
Int Delay, s/veh	7.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	68	132	79	150	247	96
Future Vol, veh/h	68	132	79	150	247	96
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	100	100	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	74	143	86	163	268	104







Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	249	0	-	0	377 86
Stage 1	-	-	-	-	86 -
Stage 2	-	-	-	-	291 -
Critical Hdwy	4.35	-	-	-	6.65 6.45
Critical Hdwy Stg 1	-	-	-	-	5.65 -
Critical Hdwy Stg 2	-	-	-	-	5.65 -
Follow-up Hdwy	2.425	-	-	-	3.725 3.525
Pot Cap-1 Maneuver	1194	-	-	-	582 913
Stage 1	-	-	-	-	883 -
Stage 2	-	-	-	-	709 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1194	-	-	-	546 913
Mov Cap-2 Maneuver	-	-	-	-	546 -
Stage 1	-	-	-	-	828 -
Stage 2	-	-	-	-	709 -

Approach	EB	WB	SB
HCM Control Delay, s	2.8	0	15.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1194	-	-	-	546	913
HCM Lane V/C Ratio	0.062	-	-	-	0.492	0.114
HCM Control Delay (s)	8.2	-	-	-	17.8	9.5
HCM Lane LOS	A	-	-	-	C	A
HCM 95th %tile Q(veh)	0.2	-	-	-	2.7	0.4

HCM 6th TWSC  
7: Manila Road & 42nd Avenue

2040 Total  
PM Peak

Intersection						
Int Delay, s/veh	4.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	288	90	403	352	0
Future Vol, veh/h	0	288	90	403	352	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	100	0	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	0	313	98	438	383	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	798	192	383	0	-	0
Stage 1	383	-	-	-	-	-
Stage 2	415	-	-	-	-	-
Critical Hdwy	7.3	7.4	4.6	-	-	-
Critical Hdwy Stg 1	6.3	-	-	-	-	-
Critical Hdwy Stg 2	6.3	-	-	-	-	-
Follow-up Hdwy	3.75	3.55	2.45	-	-	-
Pot Cap-1 Maneuver	280	750	1023	-	-	-
Stage 1	596	-	-	-	-	-
Stage 2	572	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	253	750	1023	-	-	-
Mov Cap-2 Maneuver	253	-	-	-	-	-
Stage 1	539	-	-	-	-	-
Stage 2	572	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	13.2	1.6		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1023	-	-	750	-	-
HCM Lane V/C Ratio	0.096	-	-	0.417	-	-
HCM Control Delay (s)	8.9	-	0	13.2	-	-
HCM Lane LOS	A	-	A	B	-	-
HCM 95th %tile Q(veh)	0.3	-	-	2.1	-	-








HCM 6th TWSC  
8: Quail Run Drive & 48th Avenue

2040 Total  
PM Peak

Intersection						
Int Delay, s/veh	3.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↱	↑↑	↱	
Traffic Vol, veh/h	223	60	7	695	156	8
Future Vol, veh/h	223	60	7	695	156	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	242	65	8	755	170	9
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	307	0	669	154
Stage 1	-	-	-	-	275	-
Stage 2	-	-	-	-	394	-
Critical Hdwy	-	-	4.6	-	7.3	7.4
Critical Hdwy Stg 1	-	-	-	-	6.3	-
Critical Hdwy Stg 2	-	-	-	-	6.3	-
Follow-up Hdwy	-	-	2.45	-	3.75	3.55
Pot Cap-1 Maneuver	-	-	1100	-	343	796
Stage 1	-	-	-	-	682	-
Stage 2	-	-	-	-	587	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1100	-	341	796
Mov Cap-2 Maneuver	-	-	-	-	341	-
Stage 1	-	-	-	-	682	-
Stage 2	-	-	-	-	583	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.1		25.4	
HCM LOS	D					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	351	-	-	1100	-	
HCM Lane V/C Ratio	0.508	-	-	0.007	-	
HCM Control Delay (s)	25.4	-	-	8.3	-	
HCM Lane LOS	D	-	-	A	-	
HCM 95th %tile Q(veh)	2.7	-	-	0	-	





HCM 6th TWSC  
9: 32nd Avenue & Quail Run Drive

2040 Total  
PM Peak

Intersection						
Int Delay, s/veh	2.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	45	94	336	1	2	95
Future Vol, veh/h	45	94	336	1	2	95
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	49	102	365	1	2	103
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	366	0	-	0	566	366
Stage 1	-	-	-	-	366	-
Stage 2	-	-	-	-	200	-
Critical Hdwy	4.35	-	-	-	6.65	6.45
Critical Hdwy Stg 1	-	-	-	-	5.65	-
Critical Hdwy Stg 2	-	-	-	-	5.65	-
Follow-up Hdwy	2.425	-	-	-	3.725	3.525
Pot Cap-1 Maneuver	1076	-	-	-	449	631
Stage 1	-	-	-	-	654	-
Stage 2	-	-	-	-	782	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1076	-	-	-	428	631
Mov Cap-2 Maneuver	-	-	-	-	428	-
Stage 1	-	-	-	-	624	-
Stage 2	-	-	-	-	782	-
Approach	EB	WB		SB		
HCM Control Delay, s	2.8	0		11.9		
HCM LOS	B					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1076	-	-	-	625	
HCM Lane V/C Ratio	0.045	-	-	-	0.169	
HCM Control Delay (s)	8.5	-	-	-	11.9	
HCM Lane LOS	A	-	-	-	B	
HCM 95th %tile Q(veh)	0.1	-	-	-	0.6	

HCM 6th TWSC  
10: Imboden Rd & PA-2 Access

2040 Total  
PM Peak

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	18	7	1119	7	2	945
Future Vol, veh/h	18	7	1119	7	2	945
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	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	20	8	1216	8	2	1027

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1738	612	0
Stage 1	1220	-	-
Stage 2	518	-	-
Critical Hdwy	7.3	7.4	-
Critical Hdwy Stg 1	6.3	-	-
Critical Hdwy Stg 2	6.3	-	-
Follow-up Hdwy	3.75	3.55	-
Pot Cap-1 Maneuver	*170	*567	-
Stage 1	*537	-	-
Stage 2	*502	-	-
Platoon blocked, %	1	1	-
Mov Cap-1 Maneuver	*170	*567	-
Mov Cap-2 Maneuver	*170	-	-
Stage 1	*537	-	-
Stage 2	*501	-	-

Approach	WB	NB	SB
HCM Control Delay, s	24.6	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	211	* 822
HCM Lane V/C Ratio	-	-	0.129	0.003
HCM Control Delay (s)	-	-	24.6	9.4
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.4	0

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

HCM 6th TWSC  
11: Imboden Rd & PA-5 Access

2040 Total  
PM Peak

Intersection						
Int Delay, s/veh	0.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↵↵		↵↵	↵	↵	↵↵
Traffic Vol, veh/h	49	8	520	21	3	1064
Future Vol, veh/h	49	8	520	21	3	1064
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	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	53	9	565	23	3	1157

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1150	283	0	0	588
Stage 1	565	-	-	-	-
Stage 2	585	-	-	-	-
Critical Hdwy	7.3	7.4	-	-	4.6
Critical Hdwy Stg 1	6.3	-	-	-	-
Critical Hdwy Stg 2	6.3	-	-	-	-
Follow-up Hdwy	3.75	3.55	-	-	2.45
Pot Cap-1 Maneuver	*560	650	-	-	841
Stage 1	*473	-	-	-	-
Stage 2	*560	-	-	-	-
Platoon blocked, %	1	-	-	-	-
Mov Cap-1 Maneuver	*558	650	-	-	841
Mov Cap-2 Maneuver	*558	-	-	-	-
Stage 1	*473	-	-	-	-
Stage 2	*558	-	-	-	-







Approach	WB	NB	SB
HCM Control Delay, s	12.1	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	569	841
HCM Lane V/C Ratio	-	-	0.109	0.004
HCM Control Delay (s)	-	-	12.1	9.3
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.4	0

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

HCM 6th TWSC  
12: PA-5 Access/PA-2 Access & 48th Avenue

2040 Total  
PM Peak

Intersection												
Int Delay, s/veh	0.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	349	8	1	1028	1	20	0	1	2	0	19
Future Vol, veh/h	8	349	8	1	1028	1	20	0	1	2	0	19
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	9	379	9	1	1117	1	22	0	1	2	0	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1118	0	0	388	0	0	963	1522	194	1328	1526	559
Stage 1	-	-	-	-	-	-	402	402	-	1120	1120	-
Stage 2	-	-	-	-	-	-	561	1120	-	208	406	-
Critical Hdwy	4.6	-	-	4.6	-	-	8	7	7.4	8	7	7.4
Critical Hdwy Stg 1	-	-	-	-	-	-	7	6	-	7	6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7	6	-	7	6	-
Follow-up Hdwy	2.45	-	-	2.45	-	-	3.75	4.25	3.55	3.75	4.25	3.55
Pot Cap-1 Maneuver	503	-	-	1273	-	-	264	114	*884	*126	113	418
Stage 1	-	-	-	-	-	-	811	721	-	*184	236	-
Stage 2	-	-	-	-	-	-	426	236	-	*837	717	-
Platoon blocked, %		-	-	1	-	-	1	1	1	1	1	
Mov Cap-1 Maneuver	503	-	-	1273	-	-	248	112	*884	*124	111	418
Mov Cap-2 Maneuver	-	-	-	-	-	-	248	112	-	*124	111	-
Stage 1	-	-	-	-	-	-	796	708	-	*181	236	-
Stage 2	-	-	-	-	-	-	405	236	-	*821	705	-







Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0	20.4	16.3
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	257	503	-	-	1273	-	-	341
HCM Lane V/C Ratio	0.089	0.017	-	-	0.001	-	-	0.067
HCM Control Delay (s)	20.4	12.3	-	-	7.8	-	-	16.3
HCM Lane LOS	C	B	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0	-	-	0.2

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

HCM 6th TWSC  
13: PA-6 Western Access/PA-3 Western Access & 48th Avenue

2040 Total  
PM Peak

Intersection												
Int Delay, s/veh	1.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	314	20	1	939	1	49	0	1	2	0	41
Future Vol, veh/h	17	314	20	1	939	1	49	0	1	2	0	41
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	18	341	22	1	1021	1	53	0	1	2	0	45







Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1022	0	0	363	0	0	901	1412	182	1231	1423	511
Stage 1	-	-	-	-	-	-	388	388	-	1024	1024	-
Stage 2	-	-	-	-	-	-	513	1024	-	207	399	-
Critical Hdwy	4.6	-	-	4.6	-	-	8	7	7.4	8	7	7.4
Critical Hdwy Stg 1	-	-	-	-	-	-	7	6	-	7	6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7	6	-	7	6	-
Follow-up Hdwy	2.45	-	-	2.45	-	-	3.75	4.25	3.55	3.75	4.25	3.55
Pot Cap-1 Maneuver	552	-	-	1043	-	-	200	112	762	110	110	452
Stage 1	-	-	-	-	-	-	549	553	-	213	265	-
Stage 2	-	-	-	-	-	-	457	265	-	714	546	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	552	-	-	1043	-	-	176	108	762	107	106	452
Mov Cap-2 Maneuver	-	-	-	-	-	-	176	108	-	107	106	-
Stage 1	-	-	-	-	-	-	531	535	-	206	265	-
Stage 2	-	-	-	-	-	-	412	265	-	690	528	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0	33.6	15.4
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	179	552	-	-	1043	-	-	393
HCM Lane V/C Ratio	0.304	0.033	-	-	0.001	-	-	0.119
HCM Control Delay (s)	33.6	11.7	-	-	8.5	-	-	15.4
HCM Lane LOS	D	B	-	-	A	-	-	C
HCM 95th %tile Q(veh)	1.2	0.1	-	-	0	-	-	0.4

HCM 6th TWSC  
14: 48th Avenue & PA-3 Eastern Access

2040 Total  
PM Peak

Intersection												
Int Delay, s/veh	1.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	280	20	1	849	1	49	0	1	2	0	42
Future Vol, veh/h	17	280	20	1	849	1	49	0	1	2	0	42
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	100	-	-	0	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	18	304	22	1	923	1	53	0	1	2	0	46

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	924	0	0	326	0	0	815	1277	163	1114	1288	462
Stage 1	-	-	-	-	-	-	351	351	-	926	926	-
Stage 2	-	-	-	-	-	-	464	926	-	188	362	-
Critical Hdwy	4.6	-	-	4.6	-	-	8	7	7.4	8	7	7.4
Critical Hdwy Stg 1	-	-	-	-	-	-	7	6	-	7	6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7	6	-	7	6	-
Follow-up Hdwy	2.45	-	-	2.45	-	-	3.75	4.25	3.55	3.75	4.25	3.55
Pot Cap-1 Maneuver	608	-	-	1080	-	-	233	137	785	136	135	488
Stage 1	-	-	-	-	-	-	579	576	-	247	298	-
Stage 2	-	-	-	-	-	-	491	298	-	733	569	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	608	-	-	1080	-	-	206	133	785	133	131	488
Mov Cap-2 Maneuver	-	-	-	-	-	-	206	133	-	133	131	-
Stage 1	-	-	-	-	-	-	562	559	-	240	298	-
Stage 2	-	-	-	-	-	-	445	298	-	710	552	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0	28.2	14.3
HCM LOS			D	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	209	608	-	-	1080	-	-	435
HCM Lane V/C Ratio	0.26	0.03	-	-	0.001	-	-	0.11
HCM Control Delay (s)	28.2	11.1	-	-	8.3	-	-	14.3
HCM Lane LOS	D	B	-	-	A	-	-	B
HCM 95th %tile Q(veh)	1	0.1	-	-	0	-	-	0.4

HCM 6th TWSC  
15: PA-8A Access & 48th Avenue

2040 Total  
PM Peak

Intersection						
Int Delay, s/veh	0.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↘	
Traffic Vol, veh/h	223	8	3	690	12	8
Future Vol, veh/h	223	8	3	690	12	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	242	9	3	750	13	9

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	251	0	628
Stage 1	-	-	-	-	247
Stage 2	-	-	-	-	381
Critical Hdwy	-	-	4.6	-	7.3
Critical Hdwy Stg 1	-	-	-	-	6.3
Critical Hdwy Stg 2	-	-	-	-	6.3
Follow-up Hdwy	-	-	2.45	-	3.75
Pot Cap-1 Maneuver	-	-	1160	-	366
Stage 1	-	-	-	-	707
Stage 2	-	-	-	-	597
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1160	-	365
Mov Cap-2 Maneuver	-	-	-	-	365
Stage 1	-	-	-	-	707
Stage 2	-	-	-	-	595







Approach	EB	WB	NB
HCM Control Delay, s	0	0	13
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	471	-	-	1160	-
HCM Lane V/C Ratio	0.046	-	-	0.003	-
HCM Control Delay (s)	13	-	-	8.1	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-



HCM 6th TWSC  
16: PA-8A Access/PA-4 Access & 48th Avenue

2040 Total  
PM Peak

Intersection												
Int Delay, s/veh	1.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	211	13	20	649	2	32	0	48	9	0	12
Future Vol, veh/h	6	211	13	20	649	2	32	0	48	9	0	12
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	7	229	14	22	705	2	35	0	52	10	0	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	707	0	0	243	0	0	647	1001	122	879	1007	354
Stage 1	-	-	-	-	-	-	250	250	-	750	750	-
Stage 2	-	-	-	-	-	-	397	751	-	129	257	-
Critical Hdwy	4.6	-	-	4.6	-	-	8	7	7.4	8	7	7.4
Critical Hdwy Stg 1	-	-	-	-	-	-	7	6	-	7	6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7	6	-	7	6	-
Follow-up Hdwy	2.45	-	-	2.45	-	-	3.75	4.25	3.55	3.75	4.25	3.55
Pot Cap-1 Maneuver	750	-	-	1169	-	-	313	206	838	208	204	580
Stage 1	-	-	-	-	-	-	671	645	-	322	366	-
Stage 2	-	-	-	-	-	-	542	365	-	798	640	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	750	-	-	1169	-	-	300	200	838	191	198	580
Mov Cap-2 Maneuver	-	-	-	-	-	-	300	200	-	191	198	-
Stage 1	-	-	-	-	-	-	665	639	-	319	359	-
Stage 2	-	-	-	-	-	-	520	358	-	741	634	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.3			0.2			14			17.5		
HCM LOS							B			C		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	488	750	-	-	1169	-	-	310
HCM Lane V/C Ratio	0.178	0.009	-	-	0.019	-	-	0.074
HCM Control Delay (s)	14	9.8	-	-	8.1	-	-	17.5
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.6	0	-	-	0.1	-	-	0.2







HCM 6th TWSC  
17: PA-8B Access & 48th Avenue

2040 Total  
PM Peak

Intersection						
Int Delay, s/veh	1.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↘	
Traffic Vol, veh/h	175	6	21	387	13	48
Future Vol, veh/h	175	6	21	387	13	48
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	190	7	23	421	14	52
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	197	0	451	99
Stage 1	-	-	-	-	194	-
Stage 2	-	-	-	-	257	-
Critical Hdwy	-	-	4.6	-	7.3	7.4
Critical Hdwy Stg 1	-	-	-	-	6.3	-
Critical Hdwy Stg 2	-	-	-	-	6.3	-
Follow-up Hdwy	-	-	2.45	-	3.75	3.55
Pot Cap-1 Maneuver	-	-	1221	-	482	868
Stage 1	-	-	-	-	755	-
Stage 2	-	-	-	-	698	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1221	-	473	868
Mov Cap-2 Maneuver	-	-	-	-	473	-
Stage 1	-	-	-	-	755	-
Stage 2	-	-	-	-	685	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.4		10.4	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	737	-	-	1221	-	
HCM Lane V/C Ratio	0.09	-	-	0.019	-	
HCM Control Delay (s)	10.4	-	-	8	-	
HCM Lane LOS	B	-	-	A	-	
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-	

HCM 6th TWSC  
18: Quail Run Drive & PA-8A Access

2040 Total  
PM Peak

Intersection												
Int Delay, s/veh	2.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	50	0	0	4	0	12	0	101	1	3	43	21
Future Vol, veh/h	50	0	0	4	0	12	0	101	1	3	43	21
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	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	54	0	0	4	0	13	0	110	1	3	47	23
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	182	176	59	176	187	111	70	0	0	111	0	0
Stage 1	65	65	-	111	111	-	-	-	-	-	-	-
Stage 2	117	111	-	65	76	-	-	-	-	-	-	-
Critical Hdwy	7.35	6.75	6.45	7.35	6.75	6.45	4.35	-	-	4.35	-	-
Critical Hdwy Stg 1	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.725	4.225	3.525	3.725	4.225	3.525	2.425	-	-	2.425	-	-
Pot Cap-1 Maneuver	731	678	946	738	668	883	1397	-	-	1347	-	-
Stage 1	891	798	-	841	761	-	-	-	-	-	-	-
Stage 2	835	761	-	891	789	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	719	677	946	737	667	883	1397	-	-	1347	-	-
Mov Cap-2 Maneuver	719	677	-	737	667	-	-	-	-	-	-	-
Stage 1	891	796	-	841	761	-	-	-	-	-	-	-
Stage 2	823	761	-	889	787	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	10.4		9.4		0		0.3					
HCM LOS	B		A									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	1397	-	-	719	841	1347	-	-				
HCM Lane V/C Ratio	-	-	-	0.076	0.021	0.002	-	-				
HCM Control Delay (s)	0	-	-	10.4	9.4	7.7	-	-				
HCM Lane LOS	A	-	-	B	A	A	-	-				
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-				

HCM 6th TWSC  
19: Cavanaugh Road & PA-8A Access/PA-8B Access

2040 Total  
PM Peak

Intersection												
Int Delay, s/veh	1.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	31	0	6	7	0	13	3	263	3	6	73	13
Future Vol, veh/h	31	0	6	7	0	13	3	263	3	6	73	13
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	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	34	0	7	8	0	14	3	286	3	7	79	14







Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	401	395	86	398	401	288	93	0	0	289	0	0
Stage 1	100	100	-	294	294	-	-	-	-	-	-	-
Stage 2	301	295	-	104	107	-	-	-	-	-	-	-
Critical Hdwy	7.35	6.75	6.45	7.35	6.75	6.45	4.35	-	-	4.35	-	-
Critical Hdwy Stg 1	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.725	4.225	3.525	3.725	4.225	3.525	2.425	-	-	2.425	-	-
Pot Cap-1 Maneuver	521	508	913	523	504	700	1369	-	-	1152	-	-
Stage 1	853	770	-	667	630	-	-	-	-	-	-	-
Stage 2	661	629	-	849	764	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	507	504	913	516	500	700	1369	-	-	1152	-	-
Mov Cap-2 Maneuver	507	504	-	516	500	-	-	-	-	-	-	-
Stage 1	851	765	-	666	629	-	-	-	-	-	-	-
Stage 2	646	628	-	838	759	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	12.1		11		0.1		0.5	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1369	-	-	546 622	1152	-	-
HCM Lane V/C Ratio	0.002	-	-	0.074 0.035	0.006	-	-
HCM Control Delay (s)	7.6	-	-	12.1 11	8.1	-	-
HCM Lane LOS	A	-	-	B B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2 0.1	0	-	-







HCM 6th TWSC  
20: Quail Run Drive & 42nd Avenue

2040 Total  
PM Peak

Intersection												
Int Delay, s/veh	6.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	50	0	0	35	0	33	0	20	16	12	14	21
Future Vol, veh/h	50	0	0	35	0	33	0	20	16	12	14	21
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	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	54	0	0	38	0	36	0	22	17	13	15	23
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	102	92	27	84	95	31	38	0	0	39	0	0
Stage 1	53	53	-	31	31	-	-	-	-	-	-	-
Stage 2	49	39	-	53	64	-	-	-	-	-	-	-
Critical Hdwy	7.35	6.75	6.45	7.35	6.75	6.45	4.35	-	-	4.35	-	-
Critical Hdwy Stg 1	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.725	4.225	3.525	3.725	4.225	3.525	2.425	-	-	2.425	-	-
Pot Cap-1 Maneuver	827	756	986	850	754	981	1436	-	-	1435	-	-
Stage 1	905	808	-	930	826	-	-	-	-	-	-	-
Stage 2	909	819	-	905	799	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	791	749	986	844	747	981	1436	-	-	1435	-	-
Mov Cap-2 Maneuver	791	749	-	844	747	-	-	-	-	-	-	-
Stage 1	905	801	-	930	826	-	-	-	-	-	-	-
Stage 2	876	819	-	897	792	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	9.9		9.3			0			1.9			
HCM LOS	A		A									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	1436	-	-	791	905	1435	-	-				
HCM Lane V/C Ratio	-	-	-	0.069	0.082	0.009	-	-				
HCM Control Delay (s)	0	-	-	9.9	9.3	7.5	-	-				
HCM Lane LOS	A	-	-	A	A	A	-	-				
HCM 95th %tile Q(veh)	0	-	-	0.2	0.3	0	-	-				

HCM 6th TWSC  
21: PA-9 Access/PA-8A Access & 42nd Avenue

2040 Total  
PM Peak

Intersection												
Int Delay, s/veh	3.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	20	6	4	47	0	10	0	14	0	0	10
Future Vol, veh/h	3	20	6	4	47	0	10	0	14	0	0	10
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	3	22	7	4	51	0	11	0	15	0	0	11







Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	51	0	0	29	0	0	97	91	26	98	94	51
Stage 1	-	-	-	-	-	-	32	32	-	59	59	-
Stage 2	-	-	-	-	-	-	65	59	-	39	35	-
Critical Hdwy	4.35	-	-	4.35	-	-	7.35	6.75	6.45	7.35	6.75	6.45
Critical Hdwy Stg 1	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Follow-up Hdwy	2.425	-	-	2.425	-	-	3.725	4.225	3.525	3.725	4.225	3.525
Pot Cap-1 Maneuver	1420	-	-	1447	-	-	833	757	987	832	755	956
Stage 1	-	-	-	-	-	-	929	825	-	898	803	-
Stage 2	-	-	-	-	-	-	891	803	-	921	822	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1420	-	-	1447	-	-	821	753	987	816	751	956
Mov Cap-2 Maneuver	-	-	-	-	-	-	821	753	-	816	751	-
Stage 1	-	-	-	-	-	-	927	823	-	896	801	-
Stage 2	-	-	-	-	-	-	878	801	-	905	820	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.8			0.6			9.1			8.8		
HCM LOS							A			A		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	910	1420	-	-	1447	-	-	956
HCM Lane V/C Ratio	0.029	0.002	-	-	0.003	-	-	0.011
HCM Control Delay (s)	9.1	7.5	-	-	7.5	-	-	8.8
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0

HCM 6th TWSC  
22: PA-9 Access/PA-8A Access & 42nd Avenue

2040 Total  
PM Peak

Intersection												
Int Delay, s/veh	7.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	14	15	23	4	4	35	0	56	9	0	12
Future Vol, veh/h	5	14	15	23	4	4	35	0	56	9	0	12
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	5	15	16	25	4	4	38	0	61	10	0	13







Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	8	0	0	31	0	0	96	91	23	120	97	6
Stage 1	-	-	-	-	-	-	33	33	-	56	56	-
Stage 2	-	-	-	-	-	-	63	58	-	64	41	-
Critical Hdwy	4.35	-	-	4.35	-	-	7.35	6.75	6.45	7.35	6.75	6.45
Critical Hdwy Stg 1	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Follow-up Hdwy	2.425	-	-	2.425	-	-	3.725	4.225	3.525	3.725	4.225	3.525
Pot Cap-1 Maneuver	1474	-	-	1445	-	-	835	757	991	804	752	1013
Stage 1	-	-	-	-	-	-	927	824	-	901	805	-
Stage 2	-	-	-	-	-	-	893	803	-	892	817	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1474	-	-	1445	-	-	812	742	991	743	737	1013
Mov Cap-2 Maneuver	-	-	-	-	-	-	812	742	-	743	737	-
Stage 1	-	-	-	-	-	-	924	822	-	898	791	-
Stage 2	-	-	-	-	-	-	866	789	-	834	815	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.1			5.6			9.4			9.2		
HCM LOS							A			A		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	914	1474	-	-	1445	-	-	876
HCM Lane V/C Ratio	0.108	0.004	-	-	0.017	-	-	0.026
HCM Control Delay (s)	9.4	7.5	-	-	7.5	-	-	9.2
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.4	0	-	-	0.1	-	-	0.1

HCM 6th TWSC  
23: PA-8C Access/PA-8B Access & 42nd Avenue

2040 Total  
PM Peak

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	3	77	4	22	65	2	10	0	54	4	0	6
Future Vol, veh/h	3	77	4	22	65	2	10	0	54	4	0	6
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	3	84	4	24	71	2	11	0	59	4	0	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	73	0	0	88	0	0	216	213	86	242	214	72
Stage 1	-	-	-	-	-	-	92	92	-	120	120	-
Stage 2	-	-	-	-	-	-	124	121	-	122	94	-
Critical Hdwy	4.35	-	-	4.35	-	-	7.35	6.75	6.45	7.35	6.75	6.45
Critical Hdwy Stg 1	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Follow-up Hdwy	2.425	-	-	2.425	-	-	3.725	4.225	3.525	3.725	4.225	3.525
Pot Cap-1 Maneuver	1393	-	-	1375	-	-	694	646	913	667	645	930
Stage 1	-	-	-	-	-	-	861	776	-	832	754	-
Stage 2	-	-	-	-	-	-	827	753	-	830	774	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1393	-	-	1375	-	-	679	634	913	615	633	930
Mov Cap-2 Maneuver	-	-	-	-	-	-	679	634	-	615	633	-
Stage 1	-	-	-	-	-	-	859	774	-	830	741	-
Stage 2	-	-	-	-	-	-	807	740	-	775	772	-





Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.3			1.9			9.5			9.7		
HCM LOS							A			A		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	866	1393	-	-	1375	-	-	772
HCM Lane V/C Ratio	0.08	0.002	-	-	0.017	-	-	0.014
HCM Control Delay (s)	9.5	7.6	-	-	7.7	-	-	9.7
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0



HCM 6th TWSC  
24: Quail Run Drive & PA-9 Access

2040 Total  
PM Peak

Intersection						
Int Delay, s/veh	2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	18	5	31	7	2	48
Future Vol, veh/h	18	5	31	7	2	48
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	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	20	5	34	8	2	52
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	94	38	0	0	42	0
Stage 1	38	-	-	-	-	-
Stage 2	56	-	-	-	-	-
Critical Hdwy	6.65	6.45	-	-	4.35	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	-	-	2.425	-
Pot Cap-1 Maneuver	853	972	-	-	1431	-
Stage 1	929	-	-	-	-	-
Stage 2	911	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	852	972	-	-	1431	-
Mov Cap-2 Maneuver	852	-	-	-	-	-
Stage 1	929	-	-	-	-	-
Stage 2	910	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	9.2	0		0.3		
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBL	SBT	
Capacity (veh/h)	-	- 875		1431	-	
HCM Lane V/C Ratio	-	- 0.029		0.002	-	
HCM Control Delay (s)	-	- 9.2		7.5	-	
HCM Lane LOS	-	- A		A	-	
HCM 95th %tile Q(veh)	-	- 0.1		0	-	

HCM 6th TWSC  
25: Cavanaugh Road & PA-9 Access/PA-8C Access

2040 Total  
PM Peak

Intersection												
Int Delay, s/veh	2.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↖	↗		↖	↗	
Traffic Vol, veh/h	14	0	36	21	0	9	16	200	9	4	76	6
Future Vol, veh/h	14	0	36	21	0	9	16	200	9	4	76	6
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	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	15	0	39	23	0	10	17	217	10	4	83	7






Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	356	356	87	370	354	222	90	0	0	227	0	0
Stage 1	95	95	-	256	256	-	-	-	-	-	-	-
Stage 2	261	261	-	114	98	-	-	-	-	-	-	-
Critical Hdwy	7.35	6.75	6.45	7.35	6.75	6.45	4.35	-	-	4.35	-	-
Critical Hdwy Stg 1	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.725	4.225	3.525	3.725	4.225	3.525	2.425	-	-	2.425	-	-
Pot Cap-1 Maneuver	559	535	912	546	536	763	1372	-	-	1217	-	-
Stage 1	858	774	-	700	655	-	-	-	-	-	-	-
Stage 2	696	652	-	838	771	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	545	527	912	517	528	763	1372	-	-	1217	-	-
Mov Cap-2 Maneuver	545	527	-	517	528	-	-	-	-	-	-	-
Stage 1	848	772	-	692	647	-	-	-	-	-	-	-
Stage 2	679	644	-	799	769	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	10.1		11.7		0.5		0.4	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1372	-	-	767 572	1217	-	-
HCM Lane V/C Ratio	0.013	-	-	0.071 0.057	0.004	-	-
HCM Control Delay (s)	7.7	-	-	10.1 11.7	8	-	-
HCM Lane LOS	A	-	-	B B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2 0.2	0	-	-

























HCM 6th TWSC  
26: Quail Run Drive & PA-7 Access

2040 Total  
PM Peak

Intersection						
Int Delay, s/veh	3.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	34	14	30	63	3
Future Vol, veh/h	8	34	14	30	63	3
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	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	9	37	15	33	68	3
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	133	70	71	0	-	0
Stage 1	70	-	-	-	-	-
Stage 2	63	-	-	-	-	-
Critical Hdwy	6.65	6.45	4.35	-	-	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	2.425	-	-	-
Pot Cap-1 Maneuver	809	932	1395	-	-	-
Stage 1	898	-	-	-	-	-
Stage 2	904	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	800	932	1395	-	-	-
Mov Cap-2 Maneuver	800	-	-	-	-	-
Stage 1	888	-	-	-	-	-
Stage 2	904	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9.2	2.4		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1395	-	904	-	-	
HCM Lane V/C Ratio	0.011	-	0.051	-	-	
HCM Control Delay (s)	7.6	-	9.2	-	-	
HCM Lane LOS	A	-	A	-	-	
HCM 95th %tile Q(veh)	0	-	0.2	-	-	

# Timings 1: Imboden Rd & 56th Avenue

Long Term Total  
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	389	29	1421	43	8	1	834	283	140	2	225	217
Future Volume (vph)	389	29	1421	43	8	1	834	283	140	2	225	217
Lane Group Flow (vph)	423	32	1545	47	9	1	907	308	152	2	245	236
Turn Type	Prot	NA	pt+ov	Prot	NA	Perm	Prot	NA	pm+ov	Perm	NA	pm+ov
Protected Phases	7	4	4 5	3	8		5	2	3		6	7
Permitted Phases						8			2	6		6
Detector Phase	7	4	4 5	3	8	8	5	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)	10.5	23.5		10.5	23.5	23.5	10.5	23.5	10.5	23.5	23.5	10.5
Total Split (s)	32.0	44.0		12.0	24.0	24.0	40.0	64.0	12.0	24.0	24.0	32.0
Total Split (%)	26.7%	36.7%		10.0%	20.0%	20.0%	33.3%	53.3%	10.0%	20.0%	20.0%	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	3.5
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
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)	5.5	5.5		5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead		Lead	Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None	None	None	C-Max	None	C-Max	C-Max	None
v/c Ratio	0.46	0.07	0.75	0.32	0.06	0.00	0.79	0.22	0.18	0.01	0.53	0.29
Control Delay	36.8	28.9	12.3	60.7	44.8	0.0	53.7	9.2	0.8	43.5	51.3	3.9
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	36.8	28.9	12.3	60.7	44.8	0.0	53.7	9.2	0.8	43.5	51.3	3.9
Queue Length 50th (ft)	113	17	235	18	7	0	195	33	0	1	93	0
Queue Length 95th (ft)	212	41	309	39	22	0	304	m41	m6	9	137	48
Internal Link Dist (ft)		8849			6426			4305			2093	
Turn Bay Length (ft)	100		100	100		100	100		100	100		100
Base Capacity (vph)	947	487	2054	151	247	355	1170	1414	824	137	463	811
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	0.45	0.07	0.75	0.31	0.04	0.00	0.78	0.22	0.18	0.01	0.53	0.29

## Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

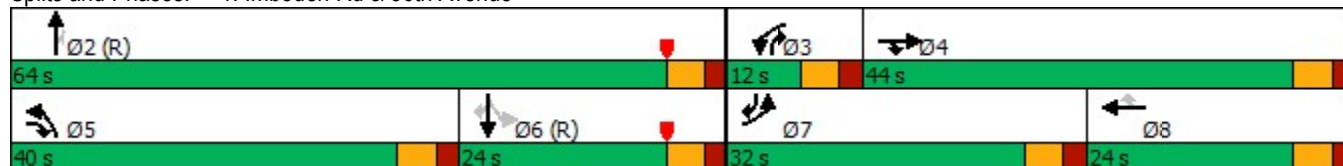
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

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
























## Splits and Phases: 1: Imboden Rd & 56th Avenue



# HCM 6th Signalized Intersection Summary

## 1: Imboden Rd & 56th Avenue





















Long Term Total  
AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	389	29	1421	43	8	1	834	283	140	2	225	217
Future Volume (veh/h)	389	29	1421	43	8	1	834	283	140	2	225	217
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	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530
Adj Flow Rate, veh/h	423	32	1545	47	9	1	907	308	152	2	245	236
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Cap, veh/h	482	491	1684	93	280	237	1023	1478	702	247	622	498
Arrive On Green	0.17	0.32	0.32	0.03	0.18	0.18	0.25	0.51	0.51	0.21	0.21	0.21
Sat Flow, veh/h	2826	1530	2955	2826	1530	1296	4108	2906	1296	876	2906	1296
Grp Volume(v), veh/h	423	32	1545	47	9	1	907	308	152	2	245	236
Grp Sat Flow(s),veh/h/ln	1413	1530	985	1413	1530	1296	1369	1453	1296	876	1453	1296
Q Serve(g_s), s	17.5	1.7	38.5	2.0	0.6	0.1	25.5	7.0	7.3	0.2	8.7	16.4
Cycle Q Clear(g_c), s	17.5	1.7	38.5	2.0	0.6	0.1	25.5	7.0	7.3	0.2	8.7	16.4
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	482	491	1684	93	280	237	1023	1478	702	247	622	498
V/C Ratio(X)	0.88	0.07	0.92	0.50	0.03	0.00	0.89	0.21	0.22	0.01	0.39	0.47
Avail Cap(c_a), veh/h	624	491	1684	153	280	237	1181	1478	702	247	622	498
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.5	28.3	23.3	57.1	40.3	40.1	43.4	16.2	14.3	37.2	40.5	27.8
Incr Delay (d2), s/veh	11.0	0.1	8.4	4.2	0.0	0.0	7.6	0.3	0.7	0.1	1.9	3.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	11.2	1.2	19.7	1.4	0.4	0.0	14.3	4.3	4.1	0.1	5.9	9.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	59.5	28.3	31.7	61.2	40.3	40.1	51.1	16.5	15.0	37.2	42.4	31.0
LnGrp LOS	E	C	C	E	D	D	D	B	B	D	D	C
Approach Vol, veh/h	2000			57			1367			483		
Approach Delay, s/veh	37.5			57.6			39.3			36.8		
Approach LOS	D			E			D			D		
Timer - Assigned Phs	2			3			4			5		
Phs Duration (G+Y+Rc), s	66.5			9.5			44.0			35.4		
Change Period (Y+Rc), s	5.5			5.5			5.5			5.5		
Max Green Setting (Gmax), s	58.5			6.5			38.5			34.5		
Max Q Clear Time (g_c+I1), s	9.3			4.0			40.5			27.5		
Green Ext Time (p_c), s	2.8			0.0			0.0			2.3		
Intersection Summary												
HCM 6th Ctrl Delay	38.3											
HCM 6th LOS	D											
Notes												

# Timings

## 2: Imboden Rd & 48th Avenue

Long Term Total  
AM Peak

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	5	5	208	5	314	10	702	341	942	745
Future Volume (vph)	5	5	208	5	314	10	702	341	942	745
Lane Group Flow (vph)	5	16	226	172	174	11	763	371	1024	815
Turn Type	Perm	NA	pm+pt	NA	pm+ov	Perm	NA	pm+ov	Prot	NA
Protected Phases		4	3	8	1		2	3	1	6
Permitted Phases	4		8		8	2		2		
Detector Phase	4	4	3	8	1	2	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)	23.5	23.5	10.5	23.5	10.5	23.5	23.5	10.5	10.5	23.5
Total Split (s)	12.0	12.0	22.0	34.0	74.0	12.0	12.0	22.0	74.0	86.0
Total Split (%)	10.0%	10.0%	18.3%	28.3%	61.7%	10.0%	10.0%	18.3%	61.7%	71.7%
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
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)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lag	Lag	Lead		Lead	Lag	Lag	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	None	C-Max
v/c Ratio	0.07	0.21	0.99	0.48	0.21	0.10	0.82	0.59	0.79	0.27
Control Delay	56.0	38.6	110.0	21.6	2.3	50.5	53.9	21.4	29.3	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.0	38.6	110.0	21.6	2.3	50.5	53.9	21.4	29.3	5.0
Queue Length 50th (ft)	4	4	~197	37	15	6	197	105	360	46
Queue Length 95th (ft)	17	28	#248	94	18	29	#441	#306	401	107
Internal Link Dist (ft)		885		382			2909			761
Turn Bay Length (ft)	100		100		100	100		100	100	
Base Capacity (vph)	82	84	228	420	979	112	925	629	1598	3029
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	0.06	0.19	0.99	0.41	0.18	0.10	0.82	0.59	0.64	0.27

### 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: 100

Control Type: Actuated-Coordinated

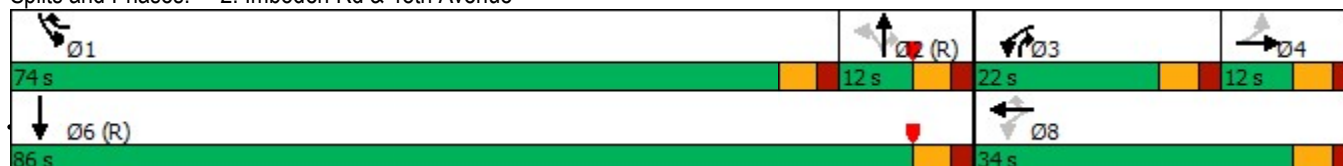
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 2: Imboden Rd & 48th Avenue


























FHU

# HCM 6th Signalized Intersection Summary

























## 2: Imboden Rd & 48th Avenue

Long Term Total  
AM Peak

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	5	5	10	208	5	314	10	702	341	942	745	5	
Future Volume (veh/h)	5	5	10	208	5	314	10	702	341	942	745	5	
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		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	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	
Adj Flow Rate, veh/h	5	5	11	226	0	344	11	763	371	1024	810	5	
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, %	25	25	25	25	25	25	25	25	25	25	25	25	
Cap, veh/h	95	18	39	295	0	1614	192	1002	489	1123	2926	18	
Arrive On Green	0.04	0.04	0.04	0.14	0.00	0.22	0.24	0.24	0.24	0.40	0.68	0.68	
Sat Flow, veh/h	848	425	936	1457	0	2592	548	4176	1296	2826	4282	26	
Grp Volume(v), veh/h	5	0	16	226	0	344	11	763	371	1024	526	289	
Grp Sat Flow(s),veh/h/ln	848	0	1361	1457	0	1296	548	1392	1296	1413	1392	1525	
Q Serve(g_s), s	0.7	0.0	1.4	16.5	0.0	6.9	1.9	20.4	28.8	41.1	8.9	8.9	
Cycle Q Clear(g_c), s	0.7	0.0	1.4	16.5	0.0	6.9	1.9	20.4	28.8	41.1	8.9	8.9	
Prop In Lane	1.00		0.69	1.00		1.00	1.00		1.00	1.00		0.02	
Lane Grp Cap(c), veh/h	95	0	57	295	0	1614	192	1002	489	1123	1902	1042	
V/C Ratio(X)	0.05	0.00	0.28	0.77	0.00	0.21	0.06	0.76	0.76	0.91	0.28	0.28	
Avail Cap(c_a), veh/h	106	0	74	295	0	1646	192	1002	489	1613	1902	1042	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Uniform Delay (d), s/veh	55.4	0.0	55.8	46.2	0.0	9.9	35.4	42.4	32.6	34.2	7.4	7.4	
Incr Delay (d2), s/veh	0.2	0.0	2.7	11.4	0.0	0.1	0.6	5.5	10.5	6.1	0.4	0.7	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(95%),veh/ln	0.3	0.0	0.9	11.8	0.0	3.5	0.5	12.0	16.1	21.1	4.6	5.2	
Unsig. Movement Delay, s/veh													
LnGrp Delay(d),s/veh	55.7	0.0	58.4	57.7	0.0	9.9	35.9	47.9	43.1	40.3	7.8	8.1	
LnGrp LOS	E	A	E	E	A	A	D	D	D	D	A	A	
Approach Vol, veh/h	21			570				1145				1839	
Approach Delay, s/veh	57.8			28.9				46.2				25.9	
Approach LOS	E			C				D				C	
Timer - Assigned Phs	1	2	3	4	6			8					
Phs Duration (G+Y+Rc), s	53.2	34.3	22.0	10.5	87.5			32.5					
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5			5.5					
Max Green Setting (Gmax), s	68.5	6.5	16.5	6.5	80.5			28.5					
Max Q Clear Time (g_c+I1), s	43.1	30.8	18.5	3.4	10.9			8.9					
Green Ext Time (p_c), s	4.6	0.0	0.0	0.0	6.7			1.4					
Intersection Summary													
HCM 6th Ctrl Delay	33.1												
HCM 6th LOS	C												
Notes													
User approved pedestrian interval to be less than phase max green.													
User approved volume balancing among the lanes for turning movement.													
User approved changes to right turn type.													

# Timings 3: Quail Run Rd & 32nd Avenue

Long Term Total  
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	7	21	303	2	17	68	1191	999	54	890	16
Future Volume (vph)	4	7	21	303	2	17	68	1191	999	54	890	16
Lane Group Flow (vph)	4	8	23	329	2	18	74	1295	1086	59	967	17
Turn Type	Perm	NA	Perm	Prot	NA	Perm	Perm	NA	pm+ov	Perm	NA	Perm
Protected Phases		4		3	8			2	3		6	
Permitted Phases	4		4			8	2		2	6		6
Detector Phase	4	4	4	3	8	8	2	2	3	6	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	5.0
Minimum Split (s)	23.5	23.5	23.5	10.5	23.5	23.5	23.5	23.5	10.5	23.5	23.5	23.5
Total Split (s)	12.0	12.0	12.0	52.0	64.0	64.0	56.0	56.0	52.0	56.0	56.0	56.0
Total Split (%)	10.0%	10.0%	10.0%	43.3%	53.3%	53.3%	46.7%	46.7%	43.3%	46.7%	46.7%	46.7%
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
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)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lag	Lag	Lag	Lead					Lead			
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					Yes			
Recall Mode	Max	Max	Max	None	None	None	C-Max	C-Max	None	C-Max	C-Max	C-Max
v/c Ratio	0.02	0.03	0.08	0.45	0.00	0.03	0.53	0.74	0.92	0.75	0.55	0.03
Control Delay	52.2	51.9	0.5	37.6	16.0	5.1	42.5	32.5	14.7	82.7	27.7	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.2	51.9	0.5	37.6	16.0	5.1	42.5	32.5	14.7	82.7	27.7	0.1
Queue Length 50th (ft)	2	5	0	117	1	0	42	304	47	38	203	0
Queue Length 95th (ft)	15	23	0	127	5	11	103	363	#48	#122	248	0
Internal Link Dist (ft)		387			1393			912			5621	
Turn Bay Length (ft)	100		100	100		100	100		100	100		100
Base Capacity (vph)	210	278	296	1085	741	641	140	1746	1235	79	1746	585
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	0.02	0.03	0.08	0.30	0.00	0.03	0.53	0.74	0.88	0.75	0.55	0.03

## Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

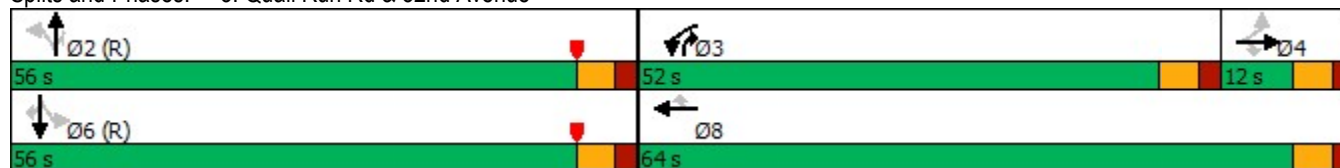
Natural Cycle: 80

Control Type: Actuated-Coordinated

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3: Quail Run Rd & 32nd Avenue





























# HCM 6th Signalized Intersection Summary

## 3: Quail Run Rd & 32nd Avenue

Long Term Total  
AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	7	21	303	2	17	68	1191	999	54	890	16
Future Volume (veh/h)	4	7	21	303	2	17	68	1191	999	54	890	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530
Adj Flow Rate, veh/h	4	8	23	329	2	18	74	1295	1086	59	967	17
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Cap, veh/h	122	83	70	397	368	311	326	2789	1048	123	2789	866
Arrive On Green	0.05	0.05	0.05	0.14	0.24	0.24	0.67	0.67	0.67	0.67	0.67	0.67
Sat Flow, veh/h	1138	1530	1296	2826	1530	1296	468	4176	1296	121	4176	1296
Grp Volume(v), veh/h	4	8	23	329	2	18	74	1295	1086	59	967	17
Grp Sat Flow(s),veh/h/ln	1138	1530	1296	1413	1530	1296	468	1392	1296	121	1392	1296
Q Serve(g_s), s	0.4	0.6	2.1	13.6	0.1	1.3	9.7	17.9	80.2	55.1	12.0	0.5
Cycle Q Clear(g_c), s	0.4	0.6	2.1	13.6	0.1	1.3	21.8	17.9	80.2	73.0	12.0	0.5
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	122	83	70	397	368	311	326	2789	1048	123	2789	866
V/C Ratio(X)	0.03	0.10	0.33	0.83	0.01	0.06	0.23	0.46	1.04	0.48	0.35	0.02
Avail Cap(c_a), veh/h	122	83	70	1095	746	632	326	2789	1048	123	2789	866
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.9	54.0	54.6	50.2	34.7	35.1	13.3	9.6	11.5	27.1	8.6	6.7
Incr Delay (d2), s/veh	0.5	2.3	12.0	4.5	0.0	0.1	1.6	0.6	37.7	12.9	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(95%),veh/ln	0.2	0.5	1.6	8.7	0.1	0.7	2.1	9.0	40.3	3.5	6.3	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.4	56.3	66.7	54.7	34.7	35.2	14.9	10.1	49.2	40.0	8.9	6.7
LnGrp LOS	D	E	E	D	C	D	B	B	F	D	A	A
Approach Vol, veh/h	35			349			2455			1043		
Approach Delay, s/veh	62.9			53.6			27.6			10.7		
Approach LOS	E			D			C			B		
Timer - Assigned Phs	2		3	4		6		8				
Phs Duration (G+Y+Rc), s	85.7		22.3	12.0		85.7		34.3				
Change Period (Y+Rc), s	5.5		5.5	5.5		5.5		5.5				
Max Green Setting (Gmax), s	50.5		46.5	6.5		50.5		58.5				
Max Q Clear Time (g_c+I1), s	82.2		15.6	4.1		75.0		3.3				
Green Ext Time (p_c), s	0.0		1.2	0.0		0.0		0.1				
Intersection Summary												
HCM 6th Ctrl Delay	25.7											
HCM 6th LOS	C											

# Timings

## 4: Cavanaugh Road & 48th Avenue

Long Term Total

AM Peak

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘	↑
Traffic Volume (vph)	457	291	6	466	91	3
Future Volume (vph)	457	291	6	466	91	3
Lane Group Flow (vph)	497	316	7	507	99	3
Turn Type	NA	pm+ov	Perm	NA	Prot	Prot
Protected Phases	4	5		8	5	5
Permitted Phases		4	8			
Detector Phase	4	5	8	8	5	5
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.5	10.5	23.5	23.5	10.5	10.5
Total Split (s)	67.0	53.0	67.0	67.0	53.0	53.0
Total Split (%)	55.8%	44.2%	55.8%	55.8%	44.2%	44.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	None	None	None	None
v/c Ratio	0.73	0.24	0.06	0.75	0.10	0.00
Control Delay	29.5	0.4	33.7	49.2	8.4	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.5	0.4	33.7	49.2	8.4	6.0
Queue Length 50th (ft)	143	0	4	192	24	0
Queue Length 95th (ft)	178	0	16	232	m52	m3
Internal Link Dist (ft)	580			1365	114	
Turn Bay Length (ft)		100	100		100	
Base Capacity (vph)	1480	1292	235	1480	971	870
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	0.34	0.24	0.03	0.34	0.10	0.00

### Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

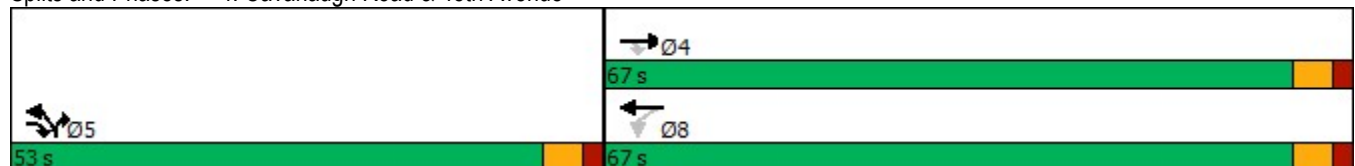
Offset: 49 (41%), Referenced to phase 2: and 6:, Start of Yellow

Natural Cycle: 40

Control Type: Actuated-Coordinated

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

Splits and Phases: 4: Cavanaugh Road & 48th Avenue











# HCM 6th Signalized Intersection Summary 4: Cavanaugh Road & 48th Avenue

Long Term Total  
AM Peak

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗	↙	↑↑	↙	↗
Traffic Volume (veh/h)	457	291	6	466	91	3
Future Volume (veh/h)	457	291	6	466	91	3
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	1530	1530	1530	1530	1530	1530
Adj Flow Rate, veh/h	497	316	7	507	99	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	25	25	25	25	25	25
Cap, veh/h	648	1177	94	648	998	888
Arrive On Green	0.22	0.22	0.22	0.22	0.69	0.69
Sat Flow, veh/h	2983	1296	549	2983	1457	1296
Grp Volume(v), veh/h	497	316	7	507	99	3
Grp Sat Flow(s),veh/h/ln	1453	1296	549	1453	1457	1296
Q Serve(g_s), s	19.2	3.5	1.5	19.7	2.8	0.1
Cycle Q Clear(g_c), s	19.2	3.5	20.7	19.7	2.8	0.1
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	648	1177	94	648	998	888
V/C Ratio(X)	0.77	0.27	0.07	0.78	0.10	0.00
Avail Cap(c_a), veh/h	1489	1553	253	1489	998	888
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	43.7	0.7	53.4	43.9	6.4	6.0
Incr Delay (d2), s/veh	1.9	0.1	0.3	2.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	11.4	0.2	0.4	11.7	1.5	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	45.6	0.8	53.7	46.0	6.4	6.0
LnGrp LOS	D	A	D	D	A	A
Approach Vol, veh/h	813			514	102	
Approach Delay, s/veh	28.2			46.1	6.4	
Approach LOS	C			D	A	
Timer - Assigned Phs	2		4		8	
Phs Duration (G+Y+Rc), s	87.7		32.3		32.3	
Change Period (Y+Rc), s	5.5		5.5		5.5	
Max Green Setting (Gmax), s	47.5		61.5		61.5	
Max Q Clear Time (g_c+I1), s	4.8		21.2		22.7	
Green Ext Time (p_c), s	0.3		5.3		4.1	
Intersection Summary						
HCM 6th Ctrl Delay			33.1			
HCM 6th LOS			C			

HCM 6th TWSC  
5: Cavanaugh Road & 42nd Avenue

Long Term Total  
AM Peak

Intersection												
Int Delay, s/veh	4.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	36	5	2	67	14	3	70	4	47	213	0
Future Vol, veh/h	0	36	5	2	67	14	3	70	4	47	213	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	100	-	-	100	-	-	100	-	-	100	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	0	39	5	2	73	15	3	76	4	51	232	0







Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	462	420	232	440	418	78	232	0	0	80	0	0
Stage 1	334	334	-	84	84	-	-	-	-	-	-	-
Stage 2	128	86	-	356	334	-	-	-	-	-	-	-
Critical Hdwy	7.35	6.75	6.45	7.35	6.75	6.45	4.35	-	-	4.35	-	-
Critical Hdwy Stg 1	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.725	4.225	3.525	3.725	4.225	3.525	2.425	-	-	2.425	-	-
Pot Cap-1 Maneuver	473	491	753	490	492	922	1212	-	-	1384	-	-
Stage 1	634	604	-	870	782	-	-	-	-	-	-	-
Stage 2	823	781	-	617	604	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	398	472	753	442	473	922	1212	-	-	1384	-	-
Mov Cap-2 Maneuver	398	472	-	442	473	-	-	-	-	-	-	-
Stage 1	633	582	-	868	780	-	-	-	-	-	-	-
Stage 2	732	779	-	550	582	-	-	-	-	-	-	-







Approach	EB		WB		NB		SB	
HCM Control Delay, s	13		13.4		0.3		1.4	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1212	-	-	-	495	442	516	1384	-	-
HCM Lane V/C Ratio	0.003	-	-	-	0.09	0.005	0.171	0.037	-	-
HCM Control Delay (s)	8	-	-	0	13	13.2	13.4	7.7	-	-
HCM Lane LOS	A	-	-	A	B	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	0.3	0	0.6	0.1	-	-

HCM 6th TWSC  
6: 32nd Avenue & Cavanaugh Road

Long Term Total  
AM Peak

Intersection						
Int Delay, s/veh	5.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	93	91	219	231	145	75
Future Vol, veh/h	93	91	219	231	145	75
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	100	100	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	101	99	238	251	158	82
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	489	0	-	0	539	238
Stage 1	-	-	-	-	238	-
Stage 2	-	-	-	-	301	-
Critical Hdwy	4.35	-	-	-	6.65	6.45
Critical Hdwy Stg 1	-	-	-	-	5.65	-
Critical Hdwy Stg 2	-	-	-	-	5.65	-
Follow-up Hdwy	2.425	-	-	-	3.725	3.525
Pot Cap-1 Maneuver	965	-	-	-	466	747
Stage 1	-	-	-	-	750	-
Stage 2	-	-	-	-	701	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	965	-	-	-	417	747
Mov Cap-2 Maneuver	-	-	-	-	417	-
Stage 1	-	-	-	-	671	-
Stage 2	-	-	-	-	701	-
Approach	EB	WB		SB		
HCM Control Delay, s	4.6	0		15.9		
HCM LOS	C					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	965	-	-	-	417	747
HCM Lane V/C Ratio	0.105	-	-	-	0.378	0.109
HCM Control Delay (s)	9.2	-	-	-	18.8	10.4
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.3	-	-	-	1.7	0.4

Intersection						
Int Delay, s/veh	2.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	106	282	641	469	0
Future Vol, veh/h	0	106	282	641	469	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	100	0	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	0	115	307	697	510	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1473	255	510	0	-	0
Stage 1	510	-	-	-	-	-
Stage 2	963	-	-	-	-	-
Critical Hdwy	7.3	7.4	4.6	-	-	-
Critical Hdwy Stg 1	6.3	-	-	-	-	-
Critical Hdwy Stg 2	6.3	-	-	-	-	-
Follow-up Hdwy	3.75	3.55	2.45	-	-	-
Pot Cap-1 Maneuver	95	679	906	-	-	-
Stage 1	507	-	-	-	-	-
Stage 2	282	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	63	679	906	-	-	-
Mov Cap-2 Maneuver	63	-	-	-	-	-
Stage 1	335	-	-	-	-	-
Stage 2	282	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	11.4	3.4		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	906	-	-	679	-	-
HCM Lane V/C Ratio	0.338	-	-	0.17	-	-
HCM Control Delay (s)	11	-	0	11.4	-	-
HCM Lane LOS	B	-	A	B	-	-
HCM 95th %tile Q(veh)	1.5	-	-	0.6	-	-

# Timings 8: Quail Run Drive & 48th Avenue

Long Term Total  
AM Peak

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘	↗
Traffic Volume (vph)	815	266	6	300	112	15
Future Volume (vph)	815	266	6	300	112	15
Lane Group Flow (vph)	886	289	7	326	122	16
Turn Type	NA	pm+ov	Perm	NA	Prot	Prot
Protected Phases	4	5		8	5	5
Permitted Phases		4	8			
Detector Phase	4	5	8	8	5	5
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.5	10.5	23.5	23.5	10.5	10.5
Total Split (s)	81.0	39.0	81.0	81.0	39.0	39.0
Total Split (%)	67.5%	32.5%	67.5%	67.5%	32.5%	32.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	None	None	None	None
v/c Ratio	0.74	0.22	0.06	0.27	0.17	0.02
Control Delay	43.3	0.3	8.5	11.6	20.0	9.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.3	0.3	8.5	11.6	20.0	9.2
Queue Length 50th (ft)	261	0	1	30	49	0
Queue Length 95th (ft)	255	0	m3	32	m93	m10
Internal Link Dist (ft)	798			1247	1347	
Turn Bay Length (ft)		100	100		100	
Base Capacity (vph)	1817	1292	190	1817	710	644
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	0.49	0.22	0.04	0.18	0.17	0.02

## Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

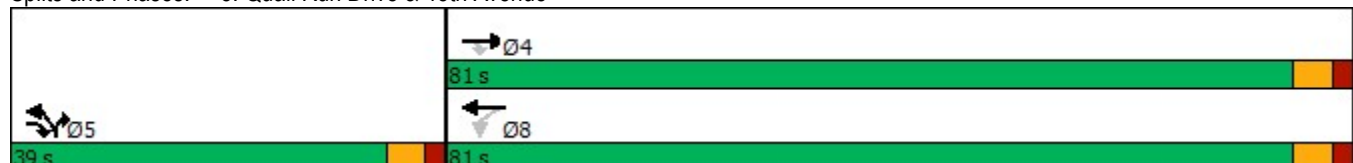
Offset: 16 (13%), Referenced to phase 2: and 6:, Start of Yellow

Natural Cycle: 40

Control Type: Actuated-Coordinated

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

Splits and Phases: 8: Quail Run Drive & 48th Avenue









# HCM 6th Signalized Intersection Summary 8: Quail Run Drive & 48th Avenue

Long Term Total  
AM Peak

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗	↙	↑↑	↙	↗
Traffic Volume (veh/h)	815	266	6	300	112	15
Future Volume (veh/h)	815	266	6	300	112	15
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	1530	1530	1530	1530	1530	1530
Adj Flow Rate, veh/h	886	289	7	326	122	16
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	25	25	25	25	25	25
Cap, veh/h	1081	1177	98	1081	781	695
Arrive On Green	0.37	0.37	0.37	0.37	0.54	0.54
Sat Flow, veh/h	2983	1296	390	2983	1457	1296
Grp Volume(v), veh/h	886	289	7	326	122	16
Grp Sat Flow(s),veh/h/ln	1453	1296	390	1453	1457	1296
Q Serve(g_s), s	33.1	3.2	2.0	9.5	5.1	0.7
Cycle Q Clear(g_c), s	33.1	3.2	35.0	9.5	5.1	0.7
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1081	1177	98	1081	781	695
V/C Ratio(X)	0.82	0.25	0.07	0.30	0.16	0.02
Avail Cap(c_a), veh/h	1828	1511	198	1828	781	695
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	34.1	0.6	49.9	26.7	14.1	13.1
Incr Delay (d2), s/veh	1.6	0.1	0.3	0.2	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	17.4	0.1	0.4	6.0	3.0	0.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	35.7	0.8	50.2	26.8	14.2	13.1
LnGrp LOS	D	A	D	C	B	B
Approach Vol, veh/h	1175			333	138	
Approach Delay, s/veh	27.1			27.3	14.0	
Approach LOS	C			C	B	
Timer - Assigned Phs	2		4		8	
Phs Duration (G+Y+Rc), s	69.9		50.1		50.1	
Change Period (Y+Rc), s	5.5		5.5		5.5	
Max Green Setting (Gmax), s	33.5		75.5		75.5	
Max Q Clear Time (g_c+l1), s	7.1		35.1		37.0	
Green Ext Time (p_c), s	0.4		9.6		2.6	
Intersection Summary						
HCM 6th Ctrl Delay			26.0			
HCM 6th LOS			C			



Intersection						
Int Delay, s/veh	5.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	215	669	190	30	56	99
Future Vol, veh/h	215	669	190	30	56	99
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	100	100	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	234	727	207	33	61	108
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	240	0	-	0	1402	207
Stage 1	-	-	-	-	207	-
Stage 2	-	-	-	-	1195	-
Critical Hdwy	4.35	-	-	-	6.65	6.45
Critical Hdwy Stg 1	-	-	-	-	5.65	-
Critical Hdwy Stg 2	-	-	-	-	5.65	-
Follow-up Hdwy	2.425	-	-	-	3.725	3.525
Pot Cap-1 Maneuver	1203	-	-	-	137	779
Stage 1	-	-	-	-	776	-
Stage 2	-	-	-	-	258	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1203	-	-	-	110	779
Mov Cap-2 Maneuver	-	-	-	-	110	-
Stage 1	-	-	-	-	625	-
Stage 2	-	-	-	-	258	-
Approach	EB	WB		SB		
HCM Control Delay, s	2.1	0		32.8		
HCM LOS	D					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1203	-	-	-	110	779
HCM Lane V/C Ratio	0.194	-	-	-	0.553	0.138
HCM Control Delay (s)	8.7	-	-	-	72.3	10.4
HCM Lane LOS	A	-	-	-	F	B
HCM 95th %tile Q(veh)	0.7	-	-	-	2.6	0.5

HCM 6th TWSC  
10: Imboden Rd & PA-2 Access

Long Term Total  
AM Peak

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔↔		↑↑↑↑	↑	↔	↑↑↑↑
Traffic Vol, veh/h	10	3	1000	16	6	1677
Future Vol, veh/h	10	3	1000	16	6	1677
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	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	11	3	1087	17	7	1823

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1830	544	0	0	1104	0
Stage 1	1087	-	-	-	-	-
Stage 2	743	-	-	-	-	-
Critical Hdwy	6.2	7.6	-	-	5.8	-
Critical Hdwy Stg 1	7.1	-	-	-	-	-
Critical Hdwy Stg 2	6.5	-	-	-	-	-
Follow-up Hdwy	4.05	4.15	-	-	3.35	-
Pot Cap-1 Maneuver	*211	*652	-	-	*807	-
Stage 1	*668	-	-	-	-	-
Stage 2	*343	-	-	-	-	-
Platoon blocked, %	1	1	-	-	1	-
Mov Cap-1 Maneuver	*210	*652	-	-	*807	-
Mov Cap-2 Maneuver	*210	-	-	-	-	-
Stage 1	*668	-	-	-	-	-
Stage 2	*340	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20.3	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	249	* 807
HCM Lane V/C Ratio	-	-	0.057	0.008
HCM Control Delay (s)	-	-	20.3	9.5
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.2	0

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

HCM 6th TWSC  
11: Imboden Rd & PA-5 Access

Long Term Total  
AM Peak

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	🚗		🚗🚗🚗	🚗	🚗	🚗🚗🚗
Traffic Vol, veh/h	26	4	1039	47	7	946
Future Vol, veh/h	26	4	1039	47	7	946
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	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	28	4	1129	51	8	1028

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1556	565	0	0	1180	0
Stage 1	1129	-	-	-	-	-
Stage 2	427	-	-	-	-	-
Critical Hdwy	6.2	7.6	-	-	5.8	-
Critical Hdwy Stg 1	7.1	-	-	-	-	-
Critical Hdwy Stg 2	6.5	-	-	-	-	-
Follow-up Hdwy	4.05	4.15	-	-	3.35	-
Pot Cap-1 Maneuver	*333	358	-	-	265	-
Stage 1	*169	-	-	-	-	-
Stage 2	*668	-	-	-	-	-
Platoon blocked, %	1	-	-	-	-	-
Mov Cap-1 Maneuver	*323	358	-	-	265	-
Mov Cap-2 Maneuver	*323	-	-	-	-	-
Stage 1	*169	-	-	-	-	-
Stage 2	*648	-	-	-	-	-







Approach	WB	NB	SB
HCM Control Delay, s	17.2	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	327	265
HCM Lane V/C Ratio	-	-	0.1	0.029
HCM Control Delay (s)	-	-	17.2	19
HCM Lane LOS	-	-	C	C
HCM 95th %tile Q(veh)	-	-	0.3	0.1

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

HCM 6th TWSC  
12: PA-5 Access/PA-2 Access & 48th Avenue

Long Term Total  
AM Peak

Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	18	1248	18	1	501	2	10	0	1	1	0	11
Future Vol, veh/h	18	1248	18	1	501	2	10	0	1	1	0	11
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	20	1357	20	1	545	2	11	0	1	1	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	547	0	0	1377	0	0	1682	1956	689	1267	1965	274
Stage 1	-	-	-	-	-	-	1407	1407	-	548	548	-
Stage 2	-	-	-	-	-	-	275	549	-	719	1417	-
Critical Hdwy	4.6	-	-	4.6	-	-	8	7	7.4	8	7	7.4
Critical Hdwy Stg 1	-	-	-	-	-	-	7	6	-	7	6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7	6	-	7	6	-
Follow-up Hdwy	2.45	-	-	2.45	-	-	3.75	4.25	3.55	3.75	4.25	3.55
Pot Cap-1 Maneuver	875	-	-	*752	-	-	*237	*112	*519	*490	*109	659
Stage 1	-	-	-	-	-	-	*491	*433	-	*434	*462	-
Stage 2	-	-	-	-	-	-	*647	*461	-	*491	*433	-
Platoon blocked, %		-	-	1	-	-	1	1	1	1	1	
Mov Cap-1 Maneuver	875	-	-	*752	-	-	*228	*109	*519	*481	*106	659
Mov Cap-2 Maneuver	-	-	-	-	-	-	*228	*109	-	*481	*106	-
Stage 1	-	-	-	-	-	-	*480	*423	-	*424	*462	-
Stage 2	-	-	-	-	-	-	*634	*461	-	*479	*423	-







Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0			20.8			10.8		
HCM LOS							C			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	240	875	-	-	*752	-	-	639
HCM Lane V/C Ratio	0.05	0.022	-	-	0.001	-	-	0.02
HCM Control Delay (s)	20.8	9.2	-	-	9.8	-	-	10.8
HCM Lane LOS	C	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0	-	-	0.1

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

HCM 6th TWSC  
13: PA-6 Western Access/PA-3 Western Access & 48th Avenue

Long Term Total  
AM Peak

Intersection												
Int Delay, s/veh	2.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	38	1164	47	1	454	2	27	0	1	1	0	22
Future Vol, veh/h	38	1164	47	1	454	2	27	0	1	1	0	22
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	41	1265	51	1	493	2	29	0	1	1	0	24







Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	495	0	0	1316	0	0	1622	1870	658	1211	1894	248
Stage 1	-	-	-	-	-	-	1373	1373	-	496	496	-
Stage 2	-	-	-	-	-	-	249	497	-	715	1398	-
Critical Hdwy	4.6	-	-	4.6	-	-	8	7	7.4	8	7	7.4
Critical Hdwy Stg 1	-	-	-	-	-	-	7	6	-	7	6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7	6	-	7	6	-
Follow-up Hdwy	2.45	-	-	2.45	-	-	3.75	4.25	3.55	3.75	4.25	3.55
Pot Cap-1 Maneuver	919	-	-	414	-	-	54	55	356	115	53	687
Stage 1	-	-	-	-	-	-	125	174	-	469	490	-
Stage 2	-	-	-	-	-	-	672	489	-	339	168	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	919	-	-	414	-	-	50	52	356	111	51	687
Mov Cap-2 Maneuver	-	-	-	-	-	-	50	52	-	111	51	-
Stage 1	-	-	-	-	-	-	119	166	-	448	489	-
Stage 2	-	-	-	-	-	-	647	488	-	323	160	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0	145.1	11.7
HCM LOS			F	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	52	919	-	-	414	-	-	561
HCM Lane V/C Ratio	0.585	0.045	-	-	0.003	-	-	0.045
HCM Control Delay (s)	145.1	9.1	-	-	13.7	-	-	11.7
HCM Lane LOS	F	A	-	-	B	-	-	B
HCM 95th %tile Q(veh)	2.3	0.1	-	-	0	-	-	0.1

HCM 6th TWSC  
14: 48th Avenue & PA-3 Eastern Access

Long Term Total  
AM Peak

Intersection												
Int Delay, s/veh	2.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	39	1080	47	1	409	2	27	0	1	1	0	22
Future Vol, veh/h	39	1080	47	1	409	2	27	0	1	1	0	22
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	42	1174	51	1	445	2	29	0	1	1	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	447	0	0	1225	0	0	1509	1733	613	1119	1757	224
Stage 1	-	-	-	-	-	-	1284	1284	-	448	448	-
Stage 2	-	-	-	-	-	-	225	449	-	671	1309	-
Critical Hdwy	4.6	-	-	4.6	-	-	8	7	7.4	8	7	7.4
Critical Hdwy Stg 1	-	-	-	-	-	-	7	6	-	7	6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7	6	-	7	6	-
Follow-up Hdwy	2.45	-	-	2.45	-	-	3.75	4.25	3.55	3.75	4.25	3.55
Pot Cap-1 Maneuver	963	-	-	453	-	-	67	68	383	135	66	713
Stage 1	-	-	-	-	-	-	143	194	-	503	517	-
Stage 2	-	-	-	-	-	-	695	516	-	362	188	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	963	-	-	453	-	-	63	65	383	130	63	713
Mov Cap-2 Maneuver	-	-	-	-	-	-	63	65	-	130	63	-
Stage 1	-	-	-	-	-	-	137	185	-	481	516	-
Stage 2	-	-	-	-	-	-	670	515	-	345	180	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0	101.9	11.3
HCM LOS			F	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	65	963	-	-	453	-	-	597
HCM Lane V/C Ratio	0.468	0.044	-	-	0.002	-	-	0.042
HCM Control Delay (s)	101.9	8.9	-	-	13	-	-	11.3
HCM Lane LOS	F	A	-	-	B	-	-	B
HCM 95th %tile Q(veh)	1.9	0.1	-	-	0	-	-	0.1

HCM 6th TWSC  
15: PA-8A Access & 48th Avenue

Long Term Total  
AM Peak

Intersection						
Int Delay, s/veh	0.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↘	
Traffic Vol, veh/h	811	19	6	299	7	5
Future Vol, veh/h	811	19	6	299	7	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	882	21	7	325	8	5







Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	903	0	1070
Stage 1	-	-	-	-	893
Stage 2	-	-	-	-	177
Critical Hdwy	-	-	4.6	-	7.3
Critical Hdwy Stg 1	-	-	-	-	6.3
Critical Hdwy Stg 2	-	-	-	-	6.3
Follow-up Hdwy	-	-	2.45	-	3.75
Pot Cap-1 Maneuver	-	-	620	-	182
Stage 1	-	-	-	-	309
Stage 2	-	-	-	-	771
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	620	-	180
Mov Cap-2 Maneuver	-	-	-	-	180
Stage 1	-	-	-	-	309
Stage 2	-	-	-	-	763

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	20.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	245	-	-	620	-
HCM Lane V/C Ratio	0.053	-	-	0.011	-
HCM Control Delay (s)	20.5	-	-	10.9	-
HCM Lane LOS	C	-	-	B	-
HCM 95th %tile Q(veh)	0.2	-	-	0	-

HCM 6th TWSC  
16: PA-8A Access/PA-4 Access & 48th Avenue

Long Term Total  
AM Peak

Intersection												
Int Delay, s/veh	1.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	773	31	45	281	6	17	0	25	5	0	7
Future Vol, veh/h	12	773	31	45	281	6	17	0	25	5	0	7
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	13	840	34	49	305	7	18	0	27	5	0	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	312	0	0	874	0	0	1134	1293	437	853	1307	156
Stage 1	-	-	-	-	-	-	883	883	-	407	407	-
Stage 2	-	-	-	-	-	-	251	410	-	446	900	-
Critical Hdwy	4.6	-	-	4.6	-	-	8	7	7.4	8	7	7.4
Critical Hdwy Stg 1	-	-	-	-	-	-	7	6	-	7	6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7	6	-	7	6	-
Follow-up Hdwy	2.45	-	-	2.45	-	-	3.75	4.25	3.55	3.75	4.25	3.55
Pot Cap-1 Maneuver	1095	-	-	638	-	-	132	134	508	218	131	794
Stage 1	-	-	-	-	-	-	264	313	-	534	541	-
Stage 2	-	-	-	-	-	-	670	540	-	504	307	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1095	-	-	638	-	-	122	122	508	192	119	794
Mov Cap-2 Maneuver	-	-	-	-	-	-	122	122	-	192	119	-
Stage 1	-	-	-	-	-	-	261	309	-	528	499	-
Stage 2	-	-	-	-	-	-	613	498	-	471	303	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			1.5			25.3			15.9		
HCM LOS							D			C		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	223	1095	-	-	638	-	-	344
HCM Lane V/C Ratio	0.205	0.012	-	-	0.077	-	-	0.038
HCM Control Delay (s)	25.3	8.3	-	-	11.1	-	-	15.9
HCM Lane LOS	D	A	-	-	B	-	-	C
HCM 95th %tile Q(veh)	0.7	0	-	-	0.2	-	-	0.1



HCM 6th TWSC  
17: PA-8B Access & 48th Avenue

Long Term Total  
AM Peak

Intersection						
Int Delay, s/veh	0.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↵	↑↑	↵	
Traffic Vol, veh/h	448	13	46	465	7	27
Future Vol, veh/h	448	13	46	465	7	27
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	487	14	50	505	8	29

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	501	0	847
Stage 1	-	-	-	-	494
Stage 2	-	-	-	-	353
Critical Hdwy	-	-	4.6	-	7.3
Critical Hdwy Stg 1	-	-	-	-	6.3
Critical Hdwy Stg 2	-	-	-	-	6.3
Follow-up Hdwy	-	-	2.45	-	3.75
Pot Cap-1 Maneuver	-	-	914	-	259
Stage 1	-	-	-	-	517
Stage 2	-	-	-	-	619
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	914	-	245
Mov Cap-2 Maneuver	-	-	-	-	245
Stage 1	-	-	-	-	517
Stage 2	-	-	-	-	585

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	12.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	499	-	-	914	-
HCM Lane V/C Ratio	0.074	-	-	0.055	-
HCM Control Delay (s)	12.8	-	-	9.2	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.2	-

HCM 6th TWSC  
18: Quail Run Drive & PA-8A Access

Long Term Total  
AM Peak

Intersection												
Int Delay, s/veh	1.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	27	0	0	2	0	7	0	93	3	7	217	48
Future Vol, veh/h	27	0	0	2	0	7	0	93	3	7	217	48
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	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	29	0	0	2	0	8	0	101	3	8	236	52







Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	385	382	262	381	407	103	288	0	0	104	0	0
Stage 1	278	278	-	103	103	-	-	-	-	-	-	-
Stage 2	107	104	-	278	304	-	-	-	-	-	-	-
Critical Hdwy	7.35	6.75	6.45	7.35	6.75	6.45	4.35	-	-	4.35	-	-
Critical Hdwy Stg 1	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.725	4.225	3.525	3.725	4.225	3.525	2.425	-	-	2.425	-	-
Pot Cap-1 Maneuver	534	517	724	537	500	893	1153	-	-	1356	-	-
Stage 1	681	641	-	850	767	-	-	-	-	-	-	-
Stage 2	845	767	-	681	623	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	527	514	724	535	497	893	1153	-	-	1356	-	-
Mov Cap-2 Maneuver	527	514	-	535	497	-	-	-	-	-	-	-
Stage 1	681	637	-	850	767	-	-	-	-	-	-	-
Stage 2	838	767	-	677	619	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	12.2		9.7		0		0.2	
HCM LOS	B		A					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1153	-	-	527 777	1356	-	-
HCM Lane V/C Ratio	-	-	-	0.056 0.013	0.006	-	-
HCM Control Delay (s)	0	-	-	12.2 9.7	7.7	-	-
HCM Lane LOS	A	-	-	B A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2 0	0	-	-

HCM 6th TWSC  
19: Cavanaugh Road & PA-8A Access/PA-8B Access

Long Term Total  
AM Peak

Intersection												
Int Delay, s/veh	1.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	0	3	4	0	7	6	71	7	13	254	30
Future Vol, veh/h	17	0	3	4	0	7	6	71	7	13	254	30
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	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	18	0	3	4	0	8	7	77	8	14	276	33
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	420	420	293	417	432	81	309	0	0	85	0	0
Stage 1	321	321	-	95	95	-	-	-	-	-	-	-
Stage 2	99	99	-	322	337	-	-	-	-	-	-	-
Critical Hdwy	7.35	6.75	6.45	7.35	6.75	6.45	4.35	-	-	4.35	-	-
Critical Hdwy Stg 1	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.725	4.225	3.525	3.725	4.225	3.525	2.425	-	-	2.425	-	-
Pot Cap-1 Maneuver	506	491	695	508	483	919	1132	-	-	1378	-	-
Stage 1	645	612	-	858	774	-	-	-	-	-	-	-
Stage 2	854	771	-	644	602	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	495	483	695	499	475	919	1132	-	-	1378	-	-
Mov Cap-2 Maneuver	495	483	-	499	475	-	-	-	-	-	-	-
Stage 1	641	606	-	853	769	-	-	-	-	-	-	-
Stage 2	842	766	-	634	596	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	12.3		10.2		0.6		0.3					
HCM LOS	B		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	1132	-	-	517	704	1378	-	-				
HCM Lane V/C Ratio	0.006	-	-	0.042	0.017	0.01	-	-				
HCM Control Delay (s)	8.2	-	-	12.3	10.2	7.6	-	-				
HCM Lane LOS	A	-	-	B	B	A	-	-				
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0	-	-				

HCM 6th TWSC  
20: Quail Run Drive & 42nd Avenue

Long Term Total  
AM Peak

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	27	0	0	20	0	16	0	53	37	27	143	48
Future Vol, veh/h	27	0	0	20	0	16	0	53	37	27	143	48
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	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	29	0	0	22	0	17	0	58	40	29	155	52







Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	326	337	181	317	343	78	207	0	0	98	0	0
Stage 1	239	239	-	78	78	-	-	-	-	-	-	-
Stage 2	87	98	-	239	265	-	-	-	-	-	-	-
Critical Hdwy	7.35	6.75	6.45	7.35	6.75	6.45	4.35	-	-	4.35	-	-
Critical Hdwy Stg 1	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.725	4.225	3.525	3.725	4.225	3.525	2.425	-	-	2.425	-	-
Pot Cap-1 Maneuver	585	548	806	593	544	922	1238	-	-	1363	-	-
Stage 1	716	667	-	877	787	-	-	-	-	-	-	-
Stage 2	867	771	-	716	649	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	565	536	806	584	533	922	1238	-	-	1363	-	-
Mov Cap-2 Maneuver	565	536	-	584	533	-	-	-	-	-	-	-
Stage 1	716	653	-	877	787	-	-	-	-	-	-	-
Stage 2	851	771	-	701	635	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	11.7		10.5		0		1	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1238	-	-	565 698	1363	-	-
HCM Lane V/C Ratio	-	-	-	0.052 0.056	0.022	-	-
HCM Control Delay (s)	0	-	-	11.7 10.5	7.7	-	-
HCM Lane LOS	A	-	-	B B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2 0.2	0.1	-	-

HCM 6th TWSC  
21: PA-9 Access/PA-8A Access & 42nd Avenue

Long Term Total  
AM Peak

Intersection												
Int Delay, s/veh	2.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	45	13	9	26	0	5	0	7	0	0	5
Future Vol, veh/h	6	45	13	9	26	0	5	0	7	0	0	5
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	7	49	14	10	28	0	5	0	8	0	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	28	0	0	63	0	0	121	118	56	122	125	28
Stage 1	-	-	-	-	-	-	70	70	-	48	48	-
Stage 2	-	-	-	-	-	-	51	48	-	74	77	-
Critical Hdwy	4.35	-	-	4.35	-	-	7.35	6.75	6.45	7.35	6.75	6.45
Critical Hdwy Stg 1	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Follow-up Hdwy	2.425	-	-	2.425	-	-	3.725	4.225	3.525	3.725	4.225	3.525
Pot Cap-1 Maneuver	1449	-	-	1405	-	-	803	731	949	802	725	985
Stage 1	-	-	-	-	-	-	885	794	-	910	812	-
Stage 2	-	-	-	-	-	-	907	812	-	881	788	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1449	-	-	1405	-	-	791	722	949	788	716	985
Mov Cap-2 Maneuver	-	-	-	-	-	-	791	722	-	788	716	-
Stage 1	-	-	-	-	-	-	881	790	-	905	806	-
Stage 2	-	-	-	-	-	-	896	806	-	870	784	-







Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.7			1.9			9.2			8.7		
HCM LOS							A			A		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	876	1449	-	-	1405	-	-	985
HCM Lane V/C Ratio	0.015	0.005	-	-	0.007	-	-	0.006
HCM Control Delay (s)	9.2	7.5	-	-	7.6	-	-	8.7
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0







HCM 6th TWSC  
22: PA-9 Access/PA-8A Access & 42nd Avenue

Long Term Total  
AM Peak

Intersection												
Int Delay, s/veh	5.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	7	33	53	9	8	19	0	30	4	0	6
Future Vol, veh/h	12	7	33	53	9	8	19	0	30	4	0	6
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	13	8	36	58	10	9	21	0	33	4	0	7
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	19	0	0	44	0	0	186	187	26	200	201	15
Stage 1	-	-	-	-	-	-	52	52	-	131	131	-
Stage 2	-	-	-	-	-	-	134	135	-	69	70	-
Critical Hdwy	4.35	-	-	4.35	-	-	7.35	6.75	6.45	7.35	6.75	6.45
Critical Hdwy Stg 1	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Follow-up Hdwy	2.425	-	-	2.425	-	-	3.725	4.225	3.525	3.725	4.225	3.525
Pot Cap-1 Maneuver	1460	-	-	1429	-	-	727	668	987	711	656	1002
Stage 1	-	-	-	-	-	-	906	808	-	820	746	-
Stage 2	-	-	-	-	-	-	817	743	-	887	794	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1460	-	-	1429	-	-	695	635	987	662	623	1002
Mov Cap-2 Maneuver	-	-	-	-	-	-	695	635	-	662	623	-
Stage 1	-	-	-	-	-	-	898	801	-	813	715	-
Stage 2	-	-	-	-	-	-	779	713	-	850	787	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.7			5.8			9.5			9.4		
HCM LOS							A			A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	849	1460	-	-	1429	-	-	831				
HCM Lane V/C Ratio	0.063	0.009	-	-	0.04	-	-	0.013				
HCM Control Delay (s)	9.5	7.5	-	-	7.6	-	-	9.4				
HCM Lane LOS	A	A	-	-	A	-	-	A				
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0				

HCM 6th TWSC  
23: PA-8C Access/PA-8B Access & 42nd Avenue

Long Term Total  
AM Peak

Intersection												
Int Delay, s/veh	3.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	71	10	51	75	4	5	0	29	2	0	3
Future Vol, veh/h	6	71	10	51	75	4	5	0	29	2	0	3
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	7	77	11	55	82	4	5	0	32	2	0	3





Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	86	0	0	88	0	0	293	293	83	307	296	84
Stage 1	-	-	-	-	-	-	97	97	-	194	194	-
Stage 2	-	-	-	-	-	-	196	196	-	113	102	-
Critical Hdwy	4.35	-	-	4.35	-	-	7.35	6.75	6.45	7.35	6.75	6.45
Critical Hdwy Stg 1	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Follow-up Hdwy	2.425	-	-	2.425	-	-	3.725	4.225	3.525	3.725	4.225	3.525
Pot Cap-1 Maneuver	1377	-	-	1375	-	-	616	581	916	603	579	915
Stage 1	-	-	-	-	-	-	856	772	-	758	699	-
Stage 2	-	-	-	-	-	-	756	697	-	839	768	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1377	-	-	1375	-	-	593	555	916	562	553	915
Mov Cap-2 Maneuver	-	-	-	-	-	-	593	555	-	562	553	-
Stage 1	-	-	-	-	-	-	852	768	-	754	671	-
Stage 2	-	-	-	-	-	-	723	669	-	806	764	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	3	9.4	10
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	848	1377	-	-	1375	-	-	731
HCM Lane V/C Ratio	0.044	0.005	-	-	0.04	-	-	0.007
HCM Control Delay (s)	9.4	7.6	-	-	7.7	-	-	10
HCM Lane LOS	A	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0.1	-	-	0

HCM 6th TWSC  
24: Quail Run Drive & PA-9 Access

Long Term Total  
AM Peak

Intersection						
Int Delay, s/veh	0.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	2	88	17	4	160
Future Vol, veh/h	10	2	88	17	4	160
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	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	11	2	96	18	4	174

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	287	105	0
Stage 1	105	-	-
Stage 2	182	-	-
Critical Hdwy	6.65	6.45	-
Critical Hdwy Stg 1	5.65	-	-
Critical Hdwy Stg 2	5.65	-	-
Follow-up Hdwy	3.725	3.525	-
Pot Cap-1 Maneuver	657	890	-
Stage 1	865	-	-
Stage 2	797	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	655	890	-
Mov Cap-2 Maneuver	655	-	-
Stage 1	865	-	-
Stage 2	795	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.4	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	685	1344
HCM Lane V/C Ratio	-	-	0.019	0.003
HCM Control Delay (s)	-	-	10.4	7.7
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0



HCM 6th TWSC  
25: Cavanaugh Road & PA-9 Access/PA-8C Access

Long Term Total  
AM Peak

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	7	0	20	11	0	5	34	66	2	9	199	13
Future Vol, veh/h	7	0	20	11	0	5	34	66	2	9	199	13
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	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	8	0	22	12	0	5	37	72	2	10	216	14






Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	393	391	223	401	397	73	230	0	0	74	0	0
Stage 1	243	243	-	147	147	-	-	-	-	-	-	-
Stage 2	150	148	-	254	250	-	-	-	-	-	-	-
Critical Hdwy	7.35	6.75	6.45	7.35	6.75	6.45	4.35	-	-	4.35	-	-
Critical Hdwy Stg 1	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.725	4.225	3.525	3.725	4.225	3.525	2.425	-	-	2.425	-	-
Pot Cap-1 Maneuver	527	510	762	521	506	928	1214	-	-	1392	-	-
Stage 1	712	664	-	804	734	-	-	-	-	-	-	-
Stage 2	801	733	-	702	659	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	509	491	762	492	487	928	1214	-	-	1392	-	-
Mov Cap-2 Maneuver	509	491	-	492	487	-	-	-	-	-	-	-
Stage 1	691	659	-	780	712	-	-	-	-	-	-	-
Stage 2	772	711	-	677	654	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	10.6		11.4		2.7		0.3	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1214	-	-	675	577	1392	-
HCM Lane V/C Ratio	0.03	-	-	0.043	0.03	0.007	-
HCM Control Delay (s)	8.1	-	-	10.6	11.4	7.6	-
HCM Lane LOS	A	-	-	B	B	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0.1	0	-

HCM 6th TWSC  
26: Quail Run Drive & PA-7 Access

























Long Term Total  
AM Peak

Intersection						
Int Delay, s/veh	1.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	19	31	101	162	8
Future Vol, veh/h	4	19	31	101	162	8
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	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	4	21	34	110	176	9
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	359	181	185	0	-	0
Stage 1	181	-	-	-	-	-
Stage 2	178	-	-	-	-	-
Critical Hdwy	6.65	6.45	4.35	-	-	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	2.425	-	-	-
Pot Cap-1 Maneuver	596	806	1263	-	-	-
Stage 1	798	-	-	-	-	-
Stage 2	800	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	580	806	1263	-	-	-
Mov Cap-2 Maneuver	580	-	-	-	-	-
Stage 1	776	-	-	-	-	-
Stage 2	800	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9.9	1.9		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1263	-	755	-	-	
HCM Lane V/C Ratio	0.027	-	0.033	-	-	
HCM Control Delay (s)	7.9	-	9.9	-	-	
HCM Lane LOS	A	-	A	-	-	
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-	

# Timings

## 1: Imboden Rd & 56th Avenue

Long Term Total  
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	433	8	1412	150	30	2	1692	333	47	1	367	304
Future Volume (vph)	433	8	1412	150	30	2	1692	333	47	1	367	304
Lane Group Flow (vph)	471	9	1535	163	33	2	1839	362	51	1	399	330
Turn Type	Prot	NA	pt+ov	Prot	NA	Perm	Prot	NA	pm+ov	Perm	NA	pm+ov
Protected Phases	7	4	4 5	3	8		5	2	3		6	7
Permitted Phases						8			2	6		6
Detector Phase	7	4	4 5	3	8	8	5	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)	10.5	23.5		10.5	23.5	23.5	10.5	23.5	10.5	23.5	23.5	10.5
Total Split (s)	56.0	32.0		36.0	12.0	12.0	70.0	82.0	36.0	12.0	12.0	56.0
Total Split (%)	37.3%	21.3%		24.0%	8.0%	8.0%	46.7%	54.7%	24.0%	8.0%	8.0%	37.3%
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)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
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)	5.5	5.5		5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead		Lead	Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None	None	None	C-Max	None	C-Max	C-Max	None
v/c Ratio	0.67	0.03	0.64	0.62	0.23	0.01	0.94	0.22	0.06	0.02	3.19	0.71
Control Delay	55.6	41.4	5.5	75.5	66.8	0.0	48.2	18.3	1.8	70.0	1026.9	44.6
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	55.6	41.4	5.5	75.5	66.8	0.0	48.2	18.3	1.8	70.0	1026.9	44.6
Queue Length 50th (ft)	223	7	132	80	29	0	~631	97	0	1	~358	246
Queue Length 95th (ft)	254	22	201	117	69	0	#785	136	13	8	#471	322
Internal Link Dist (ft)		8849			6426			4305			2093	
Turn Bay Length (ft)	100		100	100		100	100		100	100		100
Base Capacity (vph)	943	362	2387	569	144	248	1954	1617	1045	48	125	572
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	0.50	0.02	0.64	0.29	0.23	0.01	0.94	0.22	0.05	0.02	3.19	0.58

### Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

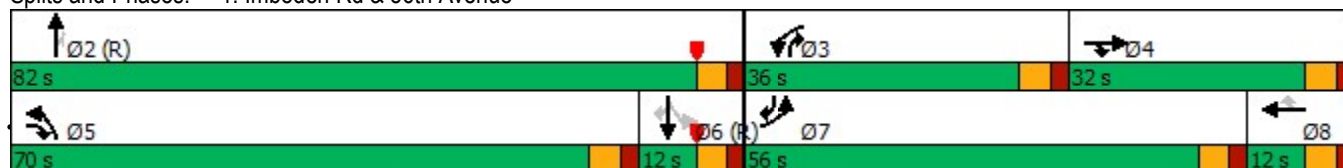
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.
























Splits and Phases: 1: Imboden Rd & 56th Avenue



# HCM 6th Signalized Intersection Summary





















## 1: Imboden Rd & 56th Avenue

Long Term Total  
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	433	8	1412	150	30	2	1692	333	47	1	367	304
Future Volume (veh/h)	433	8	1412	150	30	2	1692	333	47	1	367	304
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	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530
Adj Flow Rate, veh/h	471	9	1535	163	33	2	1839	362	51	1	399	330
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Cap, veh/h	531	270	1793	207	95	81	1766	1860	925	186	504	468
Arrive On Green	0.19	0.18	0.18	0.07	0.06	0.06	0.43	0.64	0.64	0.17	0.17	0.17
Sat Flow, veh/h	2826	1530	2955	2826	1530	1296	4108	2906	1296	796	2906	1296
Grp Volume(v), veh/h	471	9	1535	163	33	2	1839	362	51	1	399	330
Grp Sat Flow(s),veh/h/ln	1413	1530	985	1413	1530	1296	1369	1453	1296	796	1453	1296
Q Serve(g_s), s	24.4	0.7	26.5	8.5	3.1	0.2	64.5	7.7	1.8	0.2	19.7	26.0
Cycle Q Clear(g_c), s	24.4	0.7	26.5	8.5	3.1	0.2	64.5	7.7	1.8	0.2	19.7	26.0
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	531	270	1793	207	95	81	1766	1860	925	186	504	468
V/C Ratio(X)	0.89	0.03	0.86	0.79	0.35	0.02	1.04	0.19	0.06	0.01	0.79	0.71
Avail Cap(c_a), veh/h	951	270	1793	575	95	81	1766	1860	925	186	504	468
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	59.4	51.1	24.1	68.3	67.4	66.1	42.8	11.1	6.4	51.3	59.4	41.1
Incr Delay (d2), s/veh	5.2	0.0	4.3	6.5	2.2	0.1	33.0	0.2	0.1	0.1	12.1	8.6
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(95%),veh/ln	14.1	0.5	21.5	5.9	2.3	0.1	36.5	4.6	0.9	0.1	12.8	17.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	64.6	51.2	28.5	74.8	69.6	66.2	75.7	11.3	6.5	51.4	71.5	49.7
LnGrp LOS	E	D	C	E	E	E	F	B	A	D	E	D
Approach Vol, veh/h	2015			198			2252			730		
Approach Delay, s/veh	37.0			73.9			63.8			61.6		
Approach LOS	D			E			E			E		
Timer - Assigned Phs	2			3			4			5		
Phs Duration (G+Y+Rc), s	101.5			16.5			32.0			70.0		
Change Period (Y+Rc), s	5.5			5.5			5.5			5.5		
Max Green Setting (Gmax), s	76.5			30.5			64.5			6.5		
Max Q Clear Time (g_c+I1), s	9.7			10.5			28.5			26.4		
Green Ext Time (p_c), s	2.9			0.5			0.0			1.8		
Intersection Summary												
HCM 6th Ctrl Delay	53.5											
HCM 6th LOS	D											

# Timings 2: Imboden Rd & 48th Avenue

Long Term Total  
PM Peak

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	5	5	372	5	872	10	944	202	383	1163
Future Volume (vph)	5	5	372	5	872	10	944	202	383	1163
Lane Group Flow (vph)	5	16	404	479	474	11	1026	220	416	1269
Turn Type	Perm	NA	pm+pt	NA	pm+ov	Perm	NA	pm+ov	Prot	NA
Protected Phases		4	3	8	1		2	3	1	6
Permitted Phases	4		8		8	2		2		
Detector Phase	4	4	3	8	1	2	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)	23.5	23.5	10.5	23.5	10.5	23.5	23.5	10.5	10.5	23.5
Total Split (s)	24.0	24.0	30.0	54.0	26.0	40.0	40.0	30.0	26.0	66.0
Total Split (%)	20.0%	20.0%	25.0%	45.0%	21.7%	33.3%	33.3%	25.0%	21.7%	55.0%
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
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)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lag	Lag	Lead		Lead	Lag	Lag	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	None	C-Max
v/c Ratio	0.06	0.19	1.24	0.78	0.76	0.09	0.61	0.24	0.72	0.46
Control Delay	54.2	36.6	180.2	33.1	22.8	31.2	32.0	3.3	51.6	11.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.2	36.6	180.2	33.1	22.8	31.2	32.0	3.3	51.6	11.6
Queue Length 50th (ft)	4	4	~424	186	193	5	209	7	155	137
Queue Length 95th (ft)	17	27	#488	240	188	23	335	49	201	243
Internal Link Dist (ft)		885		382			2909			761
Turn Bay Length (ft)	100		100		100	100		100	100	
Base Capacity (vph)	234	219	326	742	630	128	1691	914	587	2732
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	0.02	0.07	1.24	0.65	0.75	0.09	0.61	0.24	0.71	0.46

## 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: 90

Control Type: Actuated-Coordinated

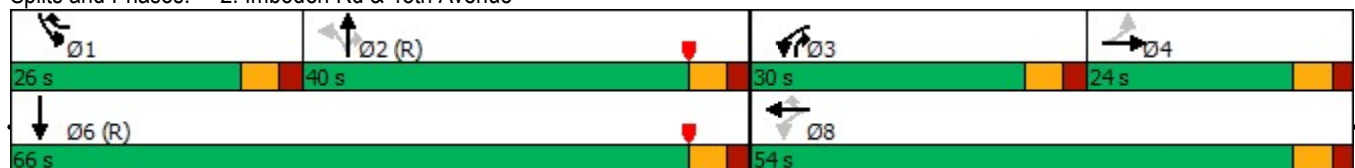
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.
























Splits and Phases: 2: Imboden Rd & 48th Avenue



FHU

























# HCM 6th Signalized Intersection Summary 2: Imboden Rd & 48th Avenue

Long Term Total  
PM Peak

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	5	5	10	372	5	872	10	944	202	383	1163	5	
Future Volume (veh/h)	5	5	10	372	5	872	10	944	202	383	1163	5	
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		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	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	
Adj Flow Rate, veh/h	5	5	11	404	0	951	11	1026	220	416	1264	5	
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, %	25	25	25	25	25	25	25	25	25	25	25	25	
Cap, veh/h	161	37	81	444	0	1296	189	1515	735	461	2454	10	
Arrive On Green	0.09	0.09	0.09	0.20	0.00	0.34	0.36	0.36	0.36	0.16	0.57	0.57	
Sat Flow, veh/h	1159	425	936	1457	0	2592	357	4176	1296	2826	4293	17	
Grp Volume(v), veh/h	5	0	16	404	0	951	11	1026	220	416	820	449	
Grp Sat Flow(s),veh/h/ln	1159	0	1361	1457	0	1296	357	1392	1296	1413	1392	1526	
Q Serve(g_s), s	0.5	0.0	1.3	24.5	0.0	34.8	2.4	24.9	10.6	17.3	21.5	21.5	
Cycle Q Clear(g_c), s	0.5	0.0	1.3	24.5	0.0	34.8	2.4	24.9	10.6	17.3	21.5	21.5	
Prop In Lane	1.00		0.69	1.00		1.00	1.00		1.00	1.00		0.01	
Lane Grp Cap(c), veh/h	161	0	118	444	0	1296	189	1515	735	461	1591	872	
V/C Ratio(X)	0.03	0.00	0.14	0.91	0.00	0.73	0.06	0.68	0.30	0.90	0.52	0.52	
Avail Cap(c_a), veh/h	239	0	210	444	0	1470	189	1515	735	483	1591	872	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Uniform Delay (d), s/veh	50.3	0.0	50.6	40.9	0.0	23.7	25.1	32.3	13.6	49.3	15.6	15.6	
Incr Delay (d2), s/veh	0.1	0.0	0.5	22.5	0.0	1.7	0.6	2.5	1.0	19.7	1.2	2.2	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(95%),veh/ln	0.3	0.0	0.8	8.5	0.0	16.0	0.4	13.5	5.9	11.8	11.2	12.4	
Unsig. Movement Delay, s/veh													
LnGrp Delay(d),s/veh	50.3	0.0	51.1	63.4	0.0	25.4	25.7	34.8	14.6	69.0	16.8	17.8	
LnGrp LOS	D	A	D	E	A	C	C	C	B	E	B	B	
Approach Vol, veh/h	21			1355				1257				1685	
Approach Delay, s/veh	51.0			36.7				31.1				29.9	
Approach LOS	D			D				C				C	
Timer - Assigned Phs	1	2	3	4	6			8					
Phs Duration (G+Y+Rc), s	25.1	49.0	30.0	15.9	74.1			45.9					
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5			5.5					
Max Green Setting (Gmax), s	20.5	34.5	24.5	18.5	60.5			48.5					
Max Q Clear Time (g_c+I1), s	19.3	26.9	26.5	3.3	23.5			36.8					
Green Ext Time (p_c), s	0.2	4.6	0.0	0.0	11.7			3.6					
Intersection Summary													
HCM 6th Ctrl Delay	32.5												
HCM 6th LOS	C												
Notes													
User approved pedestrian interval to be less than phase max green.													
User approved volume balancing among the lanes for turning movement.													

# Timings 3: Quail Run Rd & 32nd Avenue

Long Term Total  
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	2	73	1031	7	53	22	1077	315	16	1700	4
Future Volume (vph)	17	2	73	1031	7	53	22	1077	315	16	1700	4
Lane Group Flow (vph)	18	2	79	1121	8	58	24	1171	342	17	1848	4
Turn Type	Perm	NA	Perm	Prot	NA	Perm	Perm	NA	pm+ov	Perm	NA	Perm
Protected Phases		4		3	8			2	3		6	
Permitted Phases	4		4			8	2		2	6		6
Detector Phase	4	4	4	3	8	8	2	2	3	6	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	5.0
Minimum Split (s)	23.5	23.5	23.5	10.5	23.5	23.5	23.5	23.5	10.5	23.5	23.5	23.5
Total Split (s)	12.0	12.0	12.0	63.0	75.0	75.0	75.0	75.0	63.0	75.0	75.0	75.0
Total Split (%)	8.0%	8.0%	8.0%	42.0%	50.0%	50.0%	50.0%	50.0%	42.0%	50.0%	50.0%	50.0%
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
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)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lag	Lag	Lag	Lead					Lead			
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					Yes			
Recall Mode	Max	Max	Max	None	Max	Max	C-Max	C-Max	None	C-Max	C-Max	C-Max
v/c Ratio	0.37	0.03	0.71	1.04	0.01	0.09	0.60	0.61	0.29	0.15	0.96	0.01
Control Delay	90.6	70.0	57.0	84.4	21.9	10.9	90.5	31.8	0.7	27.5	52.2	0.0
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	90.6	70.0	57.0	84.4	21.9	10.9	90.5	31.8	0.7	27.5	52.2	0.0
Queue Length 50th (ft)	18	2	20	~610	4	12	17	309	0	9	631	0
Queue Length 95th (ft)	47	12	#106	#747	15	39	#74	359	9	28	#753	0
Internal Link Dist (ft)		387			1393			912			5621	
Turn Bay Length (ft)	100		100	100		100	100		100	100		100
Base Capacity (vph)	49	65	111	1073	704	617	40	1922	1181	115	1922	629
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	0.37	0.03	0.71	1.04	0.01	0.09	0.60	0.61	0.29	0.15	0.96	0.01

## Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

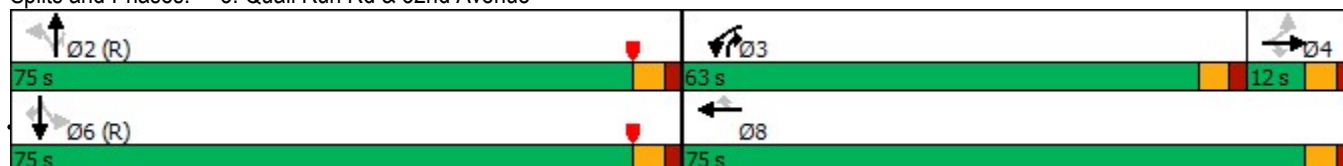
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3: Quail Run Rd & 32nd Avenue





























# HCM 6th Signalized Intersection Summary

## 3: Quail Run Rd & 32nd Avenue

Long Term Total  
PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	2	73	1031	7	53	22	1077	315	16	1700	4
Future Volume (veh/h)	17	2	73	1031	7	53	22	1077	315	16	1700	4
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	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530	1530
Adj Flow Rate, veh/h	18	2	79	1121	8	58	24	1171	342	17	1848	4
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Cap, veh/h	98	66	56	1083	709	601	56	1935	1097	148	1935	601
Arrive On Green	0.04	0.04	0.04	0.38	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
Sat Flow, veh/h	1151	1530	1296	2826	1530	1296	204	4176	1296	392	4176	1296
Grp Volume(v), veh/h	18	2	79	1121	8	58	24	1171	342	17	1848	4
Grp Sat Flow(s),veh/h/ln	1151	1530	1296	1413	1530	1296	204	1392	1296	392	1392	1296
Q Serve(g_s), s	2.3	0.2	6.5	57.5	0.4	3.8	5.6	31.4	8.2	5.1	63.9	0.2
Cycle Q Clear(g_c), s	2.3	0.2	6.5	57.5	0.4	3.8	69.5	31.4	8.2	36.4	63.9	0.2
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	98	66	56	1083	709	601	56	1935	1097	148	1935	601
V/C Ratio(X)	0.18	0.03	1.41	1.03	0.01	0.10	0.43	0.61	0.31	0.12	0.96	0.01
Avail Cap(c_a), veh/h	98	66	56	1083	709	601	56	1935	1097	148	1935	601
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	69.7	68.7	71.8	46.2	21.7	22.6	74.1	30.0	2.4	43.6	38.8	21.7
Incr Delay (d2), s/veh	4.1	0.8	260.7	36.7	0.0	0.3	22.6	1.4	0.7	1.6	12.3	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(95%),veh/ln	1.4	0.2	11.2	34.7	0.3	2.2	2.3	16.2	3.3	1.0	31.7	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	73.8	69.6	332.5	83.0	21.7	22.9	96.7	31.4	3.1	45.2	51.1	21.7
LnGrp LOS	E	E	F	F	C	C	F	C	A	D	D	C
Approach Vol, veh/h	99			1187			1537			1869		
Approach Delay, s/veh	280.1			79.6			26.2			51.0		
Approach LOS	F			E			C			D		
Timer - Assigned Phs	2		3	4		6		8				
Phs Duration (G+Y+Rc), s	75.0		63.0	12.0		75.0		75.0				
Change Period (Y+Rc), s	5.5		5.5	5.5		5.5		5.5				
Max Green Setting (Gmax), s	69.5		57.5	6.5		69.5		69.5				
Max Q Clear Time (g_c+I1), s	71.5		59.5	8.5		65.9		5.8				
Green Ext Time (p_c), s	0.0		0.0	0.0		3.2		0.2				
Intersection Summary												
HCM 6th Ctrl Delay	54.9											
HCM 6th LOS	D											



# Timings

## 4: Cavanaugh Road & 48th Avenue

Long Term Total

PM Peak

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘	↑
Traffic Volume (vph)	283	77	3	621	290	6
Future Volume (vph)	283	77	3	621	290	6
Lane Group Flow (vph)	308	84	3	675	315	7
Turn Type	NA	pm+ov	Perm	NA	Prot	Prot
Protected Phases	4	5		8	5	5
Permitted Phases		4	8			
Detector Phase	4	5	8	8	5	5
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.5	10.5	23.5	23.5	10.5	10.5
Total Split (s)	75.0	45.0	75.0	75.0	45.0	45.0
Total Split (%)	62.5%	37.5%	62.5%	62.5%	37.5%	37.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	None	None	None	None
v/c Ratio	0.34	0.07	0.01	0.75	0.37	0.01
Control Delay	43.7	0.1	24.3	42.0	15.5	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.7	0.1	24.3	42.0	15.5	7.7
Queue Length 50th (ft)	86	0	2	246	119	0
Queue Length 95th (ft)	96	0	8	278	220	8
Internal Link Dist (ft)	580			1365	114	
Turn Bay Length (ft)		100	100		100	
Base Capacity (vph)	1672	1292	461	1672	860	772
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	0.18	0.07	0.01	0.40	0.37	0.01

### Intersection Summary

Cycle Length: 120

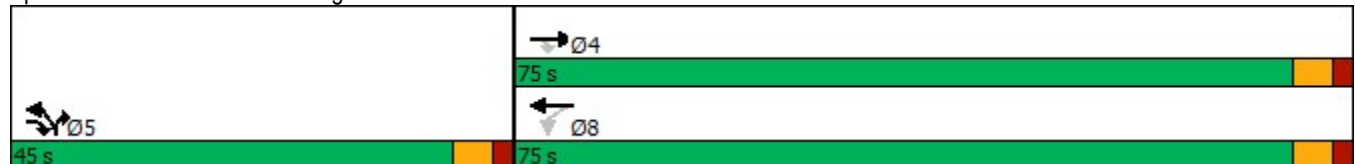
Actuated Cycle Length: 120

Offset: 39.5 (33%), Referenced to phase 2: and 6:, Start of Yellow

Natural Cycle: 45

Control Type: Actuated-Coordinated

Splits and Phases: 4: Cavanaugh Road & 48th Avenue



# HCM 6th Signalized Intersection Summary









## 4: Cavanaugh Road & 48th Avenue

Long Term Total  
PM Peak

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗	↙	↑↑	↙	↗
Traffic Volume (veh/h)	283	77	3	621	290	6
Future Volume (veh/h)	283	77	3	621	290	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1530	1530	1530	1530	1530	1530
Adj Flow Rate, veh/h	308	84	3	675	315	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	25	25	25	25	25	25
Cap, veh/h	817	1177	232	817	913	813
Arrive On Green	0.28	0.28	0.28	0.28	0.63	0.63
Sat Flow, veh/h	2983	1296	876	2983	1457	1296
Grp Volume(v), veh/h	308	84	3	675	315	7
Grp Sat Flow(s),veh/h/ln	1453	1296	876	1453	1457	1296
Q Serve(g_s), s	10.2	0.8	0.3	26.1	12.3	0.2
Cycle Q Clear(g_c), s	10.2	0.8	10.6	26.1	12.3	0.2
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	817	1177	232	817	913	813
V/C Ratio(X)	0.38	0.07	0.01	0.83	0.34	0.01
Avail Cap(c_a), veh/h	1683	1564	493	1683	913	813
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	34.7	0.5	38.9	40.4	10.6	8.4
Incr Delay (d2), s/veh	0.3	0.0	0.0	2.2	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	6.6	0.0	0.1	14.6	7.0	0.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	35.0	0.6	38.9	42.6	10.9	8.4
LnGrp LOS	C	A	D	D	B	A
Approach Vol, veh/h	392			678	322	
Approach Delay, s/veh	27.6			42.6	10.8	
Approach LOS	C			D	B	
Timer - Assigned Phs	2		4		8	
Phs Duration (G+Y+Rc), s	80.8		39.2		39.2	
Change Period (Y+Rc), s	5.5		5.5		5.5	
Max Green Setting (Gmax), s	39.5		69.5		69.5	
Max Q Clear Time (g_c+I1), s	14.3		12.2		28.1	
Green Ext Time (p_c), s	1.0		2.6		5.7	
Intersection Summary						
HCM 6th Ctrl Delay			31.0			
HCM 6th LOS			C			

HCM 6th TWSC  
5: Cavanaugh Road & 42nd Avenue

Long Term Total  
PM Peak

Intersection												
Int Delay, s/veh	4.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	68	9	5	27	46	2	211	2	12	62	0
Future Vol, veh/h	0	68	9	5	27	46	2	211	2	12	62	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	100	-	-	100	-	-	100	-	-	100	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	0	74	10	5	29	50	2	229	2	13	67	0







Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	367	328	67	369	327	230	67	0	0	231	0	0
Stage 1	93	93	-	234	234	-	-	-	-	-	-	-
Stage 2	274	235	-	135	93	-	-	-	-	-	-	-
Critical Hdwy	7.35	6.75	6.45	7.35	6.75	6.45	4.35	-	-	4.35	-	-
Critical Hdwy Stg 1	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.725	4.225	3.525	3.725	4.225	3.525	2.425	-	-	2.425	-	-
Pot Cap-1 Maneuver	549	555	936	547	556	755	1400	-	-	1213	-	-
Stage 1	860	775	-	720	671	-	-	-	-	-	-	-
Stage 2	685	670	-	816	775	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	487	548	936	481	549	755	1400	-	-	1213	-	-
Mov Cap-2 Maneuver	487	548	-	481	549	-	-	-	-	-	-	-
Stage 1	859	766	-	719	670	-	-	-	-	-	-	-
Stage 2	611	669	-	722	766	-	-	-	-	-	-	-







Approach	EB		WB		NB		SB	
HCM Control Delay, s	12.3		11.3		0.1		1.3	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1400	-	-	-	576	481	663	1213	-	-
HCM Lane V/C Ratio	0.002	-	-	-	0.145	0.011	0.12	0.011	-	-
HCM Control Delay (s)	7.6	-	-	0	12.3	12.6	11.2	8	-	-
HCM Lane LOS	A	-	-	A	B	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	0.5	0	0.4	0	-	-

HCM 6th TWSC  
6: 32nd Avenue & Cavanaugh Road

Long Term Total  
PM Peak

Intersection						
Int Delay, s/veh	8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	75	223	86	141	237	103
Future Vol, veh/h	75	223	86	141	237	103
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	100	100	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	82	242	93	153	258	112
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	246	0	-	0	499	93
Stage 1	-	-	-	-	93	-
Stage 2	-	-	-	-	406	-
Critical Hdwy	4.35	-	-	-	6.65	6.45
Critical Hdwy Stg 1	-	-	-	-	5.65	-
Critical Hdwy Stg 2	-	-	-	-	5.65	-
Follow-up Hdwy	2.425	-	-	-	3.725	3.525
Pot Cap-1 Maneuver	1197	-	-	-	492	904
Stage 1	-	-	-	-	876	-
Stage 2	-	-	-	-	626	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1197	-	-	-	458	904
Mov Cap-2 Maneuver	-	-	-	-	458	-
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	626	-
Approach	EB	WB		SB		
HCM Control Delay, s	2.1	0		18.6		
HCM LOS	C					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1197	-	-	-	458	904
HCM Lane V/C Ratio	0.068	-	-	-	0.562	0.124
HCM Control Delay (s)	8.2	-	-	-	22.5	9.5
HCM Lane LOS	A	-	-	-	C	A
HCM 95th %tile Q(veh)	0.2	-	-	-	3.4	0.4

Intersection						
Int Delay, s/veh	3.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	288	91	628	460	0
Future Vol, veh/h	0	288	91	628	460	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	100	0	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	0	313	99	683	500	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1040	250	500	0	-	0
Stage 1	500	-	-	-	-	-
Stage 2	540	-	-	-	-	-
Critical Hdwy	7.3	7.4	4.6	-	-	-
Critical Hdwy Stg 1	6.3	-	-	-	-	-
Critical Hdwy Stg 2	6.3	-	-	-	-	-
Follow-up Hdwy	3.75	3.55	2.45	-	-	-
Pot Cap-1 Maneuver	191	684	915	-	-	-
Stage 1	513	-	-	-	-	-
Stage 2	488	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	170	684	915	-	-	-
Mov Cap-2 Maneuver	170	-	-	-	-	-
Stage 1	458	-	-	-	-	-
Stage 2	488	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	14.6	1.2		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	915	-	-	684	-	-
HCM Lane V/C Ratio	0.108	-	-	0.458	-	-
HCM Control Delay (s)	9.4	-	0	14.6	-	-
HCM Lane LOS	A	-	A	B	-	-
HCM 95th %tile Q(veh)	0.4	-	-	2.4	-	-

# Timings 8: Quail Run Drive & 48th Avenue

Long Term Total  
PM Peak

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘	↑
Traffic Volume (vph)	417	86	8	749	278	8
Future Volume (vph)	417	86	8	749	278	8
Lane Group Flow (vph)	453	93	9	814	302	9
Turn Type	NA	pm+ov	Perm	NA	Prot	Prot
Protected Phases	4	5		8	5	5
Permitted Phases		4	8			
Detector Phase	4	5	8	8	5	5
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.5	10.5	23.5	23.5	10.5	10.5
Total Split (s)	88.0	32.0	88.0	88.0	32.0	32.0
Total Split (%)	73.3%	26.7%	73.3%	73.3%	26.7%	26.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	None	None	None	None
v/c Ratio	0.40	0.07	0.04	0.72	0.41	0.01
Control Delay	12.7	0.1	13.8	21.8	22.1	10.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.7	0.1	13.8	21.8	22.1	10.4
Queue Length 50th (ft)	45	0	3	122	138	0
Queue Length 95th (ft)	63	m0	m6	142	259	11
Internal Link Dist (ft)	798			1247	1347	
Turn Bay Length (ft)		100	100		100	
Base Capacity (vph)	1985	1292	451	1985	744	670
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	0.23	0.07	0.02	0.41	0.41	0.01

## Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

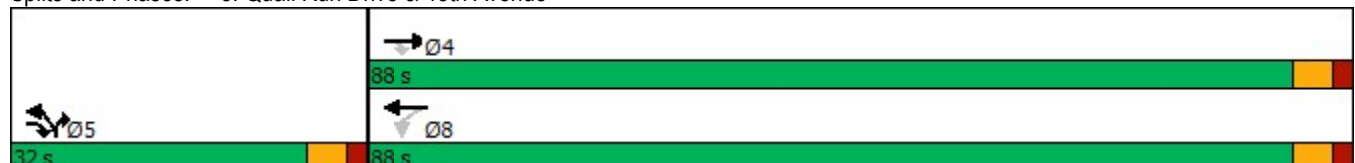
Offset: 26.5 (22%), Referenced to phase 2: and 6:, Start of Yellow

Natural Cycle: 40

Control Type: Actuated-Coordinated

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







Splits and Phases: 8: Quail Run Drive & 48th Avenue



# HCM 6th Signalized Intersection Summary 8: Quail Run Drive & 48th Avenue

Long Term Total  
PM Peak

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗	↙	↑↑	↙	↗
Traffic Volume (veh/h)	417	86	8	749	278	8
Future Volume (veh/h)	417	86	8	749	278	8
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	1530	1530	1530	1530	1530	1530
Adj Flow Rate, veh/h	453	93	9	814	302	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	25	25	25	25	25	25
Cap, veh/h	978	1177	224	978	833	741
Arrive On Green	0.34	0.34	0.34	0.34	0.57	0.57
Sat Flow, veh/h	2983	1296	767	2983	1457	1296
Grp Volume(v), veh/h	453	93	9	814	302	9
Grp Sat Flow(s),veh/h/ln	1453	1296	767	1453	1457	1296
Q Serve(g_s), s	14.7	0.9	1.1	31.0	13.4	0.4
Cycle Q Clear(g_c), s	14.7	0.9	15.8	31.0	13.4	0.4
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	978	1177	224	978	833	741
V/C Ratio(X)	0.46	0.08	0.04	0.83	0.36	0.01
Avail Cap(c_a), veh/h	1998	1632	493	1998	833	741
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	31.3	0.5	37.5	36.7	13.9	11.1
Incr Delay (d2), s/veh	0.3	0.0	0.1	1.9	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	8.9	0.0	0.4	16.6	7.8	0.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	31.6	0.6	37.6	38.6	14.1	11.1
LnGrp LOS	C	A	D	D	B	B
Approach Vol, veh/h	546			823	311	
Approach Delay, s/veh	26.4			38.6	14.0	
Approach LOS	C			D	B	
Timer - Assigned Phs	2		4		8	
Phs Duration (G+Y+Rc), s	74.1		45.9		45.9	
Change Period (Y+Rc), s	5.5		5.5		5.5	
Max Green Setting (Gmax), s	26.5		82.5		82.5	
Max Q Clear Time (g_c+I1), s	15.4		16.7		33.0	
Green Ext Time (p_c), s	0.8		3.9		7.4	
Intersection Summary						
HCM 6th Ctrl Delay			30.1			
HCM 6th LOS			C			

Intersection						
Int Delay, s/veh	6.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	91	206	687	53	28	216
Future Vol, veh/h	91	206	687	53	28	216
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	100	100	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	99	224	747	58	30	235
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	805	0	-	0	1169	747
Stage 1	-	-	-	-	747	-
Stage 2	-	-	-	-	422	-
Critical Hdwy	4.35	-	-	-	6.65	6.45
Critical Hdwy Stg 1	-	-	-	-	5.65	-
Critical Hdwy Stg 2	-	-	-	-	5.65	-
Follow-up Hdwy	2.425	-	-	-	3.725	3.525
Pot Cap-1 Maneuver	727	-	-	-	192	378
Stage 1	-	-	-	-	430	-
Stage 2	-	-	-	-	615	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	727	-	-	-	166	378
Mov Cap-2 Maneuver	-	-	-	-	166	-
Stage 1	-	-	-	-	372	-
Stage 2	-	-	-	-	615	-
Approach	EB	WB		SB		
HCM Control Delay, s	3.3	0		29.2		
HCM LOS	D					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	727	-	-	-	166	378
HCM Lane V/C Ratio	0.136	-	-	-	0.183	0.621
HCM Control Delay (s)	10.7	-	-	-	31.5	28.9
HCM Lane LOS	B	-	-	-	D	D
HCM 95th %tile Q(veh)	0.5	-	-	-	0.6	4



Intersection						
Int Delay, s/veh	1.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		U	U	W	U
Traffic Vol, veh/h	18	7	1808	8	2	1528
Future Vol, veh/h	18	7	1808	8	2	1528
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	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	20	8	1965	9	2	1661

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	2633	983	0	0	1974
Stage 1	1965	-	-	-	-
Stage 2	668	-	-	-	-
Critical Hdwy	6.2	7.6	-	-	5.8
Critical Hdwy Stg 1	7.1	-	-	-	-
Critical Hdwy Stg 2	6.5	-	-	-	-
Follow-up Hdwy	4.05	4.15	-	-	3.35
Pot Cap-1 Maneuver	*30	*464	-	-	*575
Stage 1	*476	-	-	-	-
Stage 2	*378	-	-	-	-
Platoon blocked, %		1	-	-	1
Mov Cap-1 Maneuver	*30	*464	-	-	*575
Mov Cap-2 Maneuver	*30	-	-	-	-
Stage 1	*476	-	-	-	-
Stage 2	*377	-	-	-	-






Approach	WB	NB	SB
HCM Control Delay, s	195.7	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	41	* 575
HCM Lane V/C Ratio	-	-	0.663	0.004
HCM Control Delay (s)	-	-	195.7	11.3
HCM Lane LOS	-	-	F	B
HCM 95th %tile Q(veh)	-	-	2.4	0

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







HCM 6th TWSC  
11: Imboden Rd & PA-5 Access

Long Term Total  
PM Peak

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	50	7	1138	21	3	1532
Future Vol, veh/h	50	7	1138	21	3	1532
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	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	54	8	1237	23	3	1665
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	1909	619	0	0	1260	0
Stage 1	1237	-	-	-	-	-
Stage 2	672	-	-	-	-	-
Critical Hdwy	6.2	7.6	-	-	5.8	-
Critical Hdwy Stg 1	7.1	-	-	-	-	-
Critical Hdwy Stg 2	6.5	-	-	-	-	-
Follow-up Hdwy	4.05	4.15	-	-	3.35	-
Pot Cap-1 Maneuver	*408	328	-	-	240	-
Stage 1	*144	-	-	-	-	-
Stage 2	*540	-	-	-	-	-
Platoon blocked, %	1		-	-		-
Mov Cap-1 Maneuver	*403	328	-	-	240	-
Mov Cap-2 Maneuver	*403	-	-	-	-	-
Stage 1	*144	-	-	-	-	-
Stage 2	*534	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	15.9	0		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBL	SBT	
Capacity (veh/h)	-	-	392	240	-	
HCM Lane V/C Ratio	-	-	0.158	0.014	-	
HCM Control Delay (s)	-	-	15.9	20.2	-	
HCM Lane LOS	-	-	C	C	-	
HCM 95th %tile Q(veh)	-	-	0.6	0	-	
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

HCM 6th TWSC  
12: PA-5 Access/PA-2 Access & 48th Avenue

Long Term Total  
PM Peak

Intersection												
Int Delay, s/veh	0.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	568	8	1	1205	1	19	0	1	2	0	19
Future Vol, veh/h	8	568	8	1	1205	1	19	0	1	2	0	19
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	9	617	9	1	1310	1	21	0	1	2	0	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1311	0	0	626	0	0	1297	1953	313	1640	1957	656
Stage 1	-	-	-	-	-	-	640	640	-	1313	1313	-
Stage 2	-	-	-	-	-	-	657	1313	-	327	644	-
Critical Hdwy	4.6	-	-	4.6	-	-	8	7	7.4	8	7	7.4
Critical Hdwy Stg 1	-	-	-	-	-	-	7	6	-	7	6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7	6	-	7	6	-
Follow-up Hdwy	2.45	-	-	2.45	-	-	3.75	4.25	3.55	3.75	4.25	3.55
Pot Cap-1 Maneuver	416	-	-	1138	-	-	168	58	*811	*78	58	358
Stage 1	-	-	-	-	-	-	713	641	-	*137	187	-
Stage 2	-	-	-	-	-	-	370	187	-	*768	637	-
Platoon blocked, %		-	-	1	-	-	1	1	1	1	1	
Mov Cap-1 Maneuver	416	-	-	1138	-	-	156	57	*811	*76	56	358
Mov Cap-2 Maneuver	-	-	-	-	-	-	156	57	-	*76	56	-
Stage 1	-	-	-	-	-	-	698	627	-	*134	187	-
Stage 2	-	-	-	-	-	-	348	187	-	*750	623	-







Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0	30.5	19.9
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	163	416	-	-	1138	-	-	265
HCM Lane V/C Ratio	0.133	0.021	-	-	0.001	-	-	0.086
HCM Control Delay (s)	30.5	13.8	-	-	8.2	-	-	19.9
HCM Lane LOS	D	B	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.5	0.1	-	-	0	-	-	0.3

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

HCM 6th TWSC  
13: PA-6 Western Access/PA-3 Western Access & 48th Avenue

Long Term Total  
PM Peak

Intersection												
Int Delay, s/veh	2.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	533	21	1	1116	0	49	0	1	2	0	41
Future Vol, veh/h	17	533	21	1	1116	0	49	0	1	2	0	41
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	18	579	23	1	1213	0	53	0	1	2	0	45







Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1213	0	0	602	0	0	1236	1842	301	1541	1853	607
Stage 1	-	-	-	-	-	-	627	627	-	1215	1215	-
Stage 2	-	-	-	-	-	-	609	1215	-	326	638	-
Critical Hdwy	4.6	-	-	4.6	-	-	8	7	7.4	8	7	7.4
Critical Hdwy Stg 1	-	-	-	-	-	-	7	6	-	7	6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7	6	-	7	6	-
Follow-up Hdwy	2.45	-	-	2.45	-	-	3.75	4.25	3.55	3.75	4.25	3.55
Pot Cap-1 Maneuver	458	-	-	830	-	-	109	58	631	63	57	387
Stage 1	-	-	-	-	-	-	386	422	-	159	211	-
Stage 2	-	-	-	-	-	-	397	211	-	601	416	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	458	-	-	830	-	-	94	56	631	61	55	387
Mov Cap-2 Maneuver	-	-	-	-	-	-	94	56	-	61	55	-
Stage 1	-	-	-	-	-	-	371	406	-	153	211	-
Stage 2	-	-	-	-	-	-	351	211	-	576	400	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0	83	18.7
HCM LOS			F	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	96	458	-	-	830	-	-	310
HCM Lane V/C Ratio	0.566	0.04	-	-	0.001	-	-	0.151
HCM Control Delay (s)	83	13.2	-	-	9.3	-	-	18.7
HCM Lane LOS	F	B	-	-	A	-	-	C
HCM 95th %tile Q(veh)	2.6	0.1	-	-	0	-	-	0.5

HCM 6th TWSC  
14: 48th Avenue & PA-3 Eastern Access

Long Term Total  
PM Peak

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	17	499	21	1	1026	0	49	0	1	2	0	42
Future Vol, veh/h	17	499	21	1	1026	0	49	0	1	2	0	42
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	18	542	23	1	1115	0	53	0	1	2	0	46

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1115	0	0	565	0	0	1150	1707	283	1424	1718	558
Stage 1	-	-	-	-	-	-	590	590	-	1117	1117	-
Stage 2	-	-	-	-	-	-	560	1117	-	307	601	-
Critical Hdwy	4.6	-	-	4.6	-	-	8	7	7.4	8	7	7.4
Critical Hdwy Stg 1	-	-	-	-	-	-	7	6	-	7	6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7	6	-	7	6	-
Follow-up Hdwy	2.45	-	-	2.45	-	-	3.75	4.25	3.55	3.75	4.25	3.55
Pot Cap-1 Maneuver	504	-	-	860	-	-	128	71	650	78	70	419
Stage 1	-	-	-	-	-	-	408	440	-	185	237	-
Stage 2	-	-	-	-	-	-	426	237	-	617	434	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	504	-	-	860	-	-	111	68	650	76	67	419
Mov Cap-2 Maneuver	-	-	-	-	-	-	111	68	-	76	67	-
Stage 1	-	-	-	-	-	-	393	424	-	178	237	-
Stage 2	-	-	-	-	-	-	379	237	-	594	418	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0	63.4	17
HCM LOS			F	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	113	504	-	-	860	-	-	348
HCM Lane V/C Ratio	0.481	0.037	-	-	0.001	-	-	0.137
HCM Control Delay (s)	63.4	12.4	-	-	9.2	-	-	17
HCM Lane LOS	F	B	-	-	A	-	-	C
HCM 95th %tile Q(veh)	2.1	0.1	-	-	0	-	-	0.5







HCM 6th TWSC  
15: PA-8A Access & 48th Avenue

Long Term Total  
PM Peak

Intersection						
Int Delay, s/veh	0.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↖	
Traffic Vol, veh/h	417	8	3	744	12	8
Future Vol, veh/h	417	8	3	744	12	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	453	9	3	809	13	9
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	462	0	869	231
Stage 1	-	-	-	-	458	-
Stage 2	-	-	-	-	411	-
Critical Hdwy	-	-	4.6	-	7.3	7.4
Critical Hdwy Stg 1	-	-	-	-	6.3	-
Critical Hdwy Stg 2	-	-	-	-	6.3	-
Follow-up Hdwy	-	-	2.45	-	3.75	3.55
Pot Cap-1 Maneuver	-	-	949	-	251	705
Stage 1	-	-	-	-	542	-
Stage 2	-	-	-	-	575	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	949	-	250	705
Mov Cap-2 Maneuver	-	-	-	-	250	-
Stage 1	-	-	-	-	542	-
Stage 2	-	-	-	-	573	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		16.4	
HCM LOS	C					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	337	-	-	949	-	
HCM Lane V/C Ratio	0.065	-	-	0.003	-	
HCM Control Delay (s)	16.4	-	-	8.8	-	
HCM Lane LOS	C	-	-	A	-	
HCM 95th %tile Q(veh)	0.2	-	-	0	-	

HCM 6th TWSC  
16: PA-8A Access/PA-4 Access & 48th Avenue

Long Term Total  
PM Peak

Intersection												
Int Delay, s/veh	1.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	404	14	19	703	2	33	0	46	10	0	11
Future Vol, veh/h	6	404	14	19	703	2	33	0	46	10	0	11
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	7	439	15	21	764	2	36	0	50	11	0	12
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	766	0	0	454	0	0	885	1269	227	1041	1275	383
Stage 1	-	-	-	-	-	-	461	461	-	807	807	-
Stage 2	-	-	-	-	-	-	424	808	-	234	468	-
Critical Hdwy	4.6	-	-	4.6	-	-	8	7	7.4	8	7	7.4
Critical Hdwy Stg 1	-	-	-	-	-	-	7	6	-	7	6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7	6	-	7	6	-
Follow-up Hdwy	2.45	-	-	2.45	-	-	3.75	4.25	3.55	3.75	4.25	3.55
Pot Cap-1 Maneuver	709	-	-	956	-	-	206	139	710	156	137	554
Stage 1	-	-	-	-	-	-	493	509	-	296	342	-
Stage 2	-	-	-	-	-	-	521	342	-	686	505	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	709	-	-	956	-	-	197	135	710	141	133	554
Mov Cap-2 Maneuver	-	-	-	-	-	-	197	135	-	141	133	-
Stage 1	-	-	-	-	-	-	488	504	-	293	334	-
Stage 2	-	-	-	-	-	-	499	334	-	631	500	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0.2			19.1			22.3		
HCM LOS							C			C		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	340	709	-	-	956	-	-	231				
HCM Lane V/C Ratio	0.253	0.009	-	-	0.022	-	-	0.099				
HCM Control Delay (s)	19.1	10.1	-	-	8.8	-	-	22.3				
HCM Lane LOS	C	B	-	-	A	-	-	C				
HCM 95th %tile Q(veh)	1	0	-	-	0.1	-	-	0.3				

HCM 6th TWSC  
17: PA-8B Access & 48th Avenue

Long Term Total  
PM Peak

Intersection						
Int Delay, s/veh	0.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↘	
Traffic Vol, veh/h	283	6	19	610	14	47
Future Vol, veh/h	283	6	19	610	14	47
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	308	7	21	663	15	51

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	315	0	686
Stage 1	-	-	-	-	312
Stage 2	-	-	-	-	374
Critical Hdwy	-	-	4.6	-	7.3
Critical Hdwy Stg 1	-	-	-	-	6.3
Critical Hdwy Stg 2	-	-	-	-	6.3
Follow-up Hdwy	-	-	2.45	-	3.75
Pot Cap-1 Maneuver	-	-	1092	-	334
Stage 1	-	-	-	-	651
Stage 2	-	-	-	-	602
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1092	-	328
Mov Cap-2 Maneuver	-	-	-	-	328
Stage 1	-	-	-	-	651
Stage 2	-	-	-	-	591







Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	11.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	597	-	-	1092	-
HCM Lane V/C Ratio	0.111	-	-	0.019	-
HCM Control Delay (s)	11.8	-	-	8.4	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-



HCM 6th TWSC  
18: Quail Run Drive & PA-8A Access

Long Term Total  
PM Peak

Intersection												
Int Delay, s/veh	2.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	50	0	0	4	0	12	0	224	1	3	69	21
Future Vol, veh/h	50	0	0	4	0	12	0	224	1	3	69	21
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	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	54	0	0	4	0	13	0	243	1	3	75	23
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	343	337	87	337	348	244	98	0	0	244	0	0
Stage 1	93	93	-	244	244	-	-	-	-	-	-	-
Stage 2	250	244	-	93	104	-	-	-	-	-	-	-
Critical Hdwy	7.35	6.75	6.45	7.35	6.75	6.45	4.35	-	-	4.35	-	-
Critical Hdwy Stg 1	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.725	4.225	3.525	3.725	4.225	3.525	2.425	-	-	2.425	-	-
Pot Cap-1 Maneuver	570	548	912	575	540	742	1363	-	-	1199	-	-
Stage 1	860	775	-	711	664	-	-	-	-	-	-	-
Stage 2	706	664	-	860	767	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	559	546	912	574	538	742	1363	-	-	1199	-	-
Mov Cap-2 Maneuver	559	546	-	574	538	-	-	-	-	-	-	-
Stage 1	860	773	-	711	664	-	-	-	-	-	-	-
Stage 2	694	664	-	858	765	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	12.1		10.3			0			0.3			
HCM LOS	B		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	1363	-	-	559 691	1199	-	-					
HCM Lane V/C Ratio	-	-	-	0.097 0.025	0.003	-	-					
HCM Control Delay (s)	0	-	-	12.1 10.3	8	-	-					
HCM Lane LOS	A	-	-	B B	A	-	-					
HCM 95th %tile Q(veh)	0	-	-	0.3 0.1	0	-	-					

HCM 6th TWSC  
19: Cavanaugh Road & PA-8A Access/PA-8B Access

Long Term Total  
PM Peak

Intersection												
Int Delay, s/veh	1.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	32	0	7	7	0	14	3	250	3	6	60	14
Future Vol, veh/h	32	0	7	7	0	14	3	250	3	6	60	14
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	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	35	0	8	8	0	15	3	272	3	7	65	15
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	374	368	73	371	374	274	80	0	0	275	0	0
Stage 1	87	87	-	280	280	-	-	-	-	-	-	-
Stage 2	287	281	-	91	94	-	-	-	-	-	-	-
Critical Hdwy	7.35	6.75	6.45	7.35	6.75	6.45	4.35	-	-	4.35	-	-
Critical Hdwy Stg 1	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.725	4.225	3.525	3.725	4.225	3.525	2.425	-	-	2.425	-	-
Pot Cap-1 Maneuver	543	526	928	546	522	713	1384	-	-	1166	-	-
Stage 1	867	780	-	679	639	-	-	-	-	-	-	-
Stage 2	673	639	-	862	774	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	528	522	928	538	518	713	1384	-	-	1166	-	-
Mov Cap-2 Maneuver	528	522	-	538	518	-	-	-	-	-	-	-
Stage 1	865	775	-	678	638	-	-	-	-	-	-	-
Stage 2	657	638	-	850	769	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	11.8		10.8		0.1		0.6					
HCM LOS	B		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	1384	-	-	572 643	1166	-	-					
HCM Lane V/C Ratio	0.002	-	-	0.074 0.035	0.006	-	-					
HCM Control Delay (s)	7.6	-	-	11.8 10.8	8.1	-	-					
HCM Lane LOS	A	-	-	B B	A	-	-					
HCM 95th %tile Q(veh)	0	-	-	0.2 0.1	0	-	-					

HCM 6th TWSC  
20: Quail Run Drive & 42nd Avenue

Long Term Total  
PM Peak

Intersection												
Int Delay, s/veh	3.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	50	0	0	37	0	32	0	143	18	11	41	21
Future Vol, veh/h	50	0	0	37	0	32	0	143	18	11	41	21
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	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	54	0	0	40	0	35	0	155	20	12	45	23







Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	264	256	57	246	257	165	68	0	0	175	0	0
Stage 1	81	81	-	165	165	-	-	-	-	-	-	-
Stage 2	183	175	-	81	92	-	-	-	-	-	-	-
Critical Hdwy	7.35	6.75	6.45	7.35	6.75	6.45	4.35	-	-	4.35	-	-
Critical Hdwy Stg 1	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.725	4.225	3.525	3.725	4.225	3.525	2.425	-	-	2.425	-	-
Pot Cap-1 Maneuver	644	610	948	662	610	823	1399	-	-	1274	-	-
Stage 1	873	785	-	786	720	-	-	-	-	-	-	-
Stage 2	768	713	-	873	776	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	612	605	948	657	605	823	1399	-	-	1274	-	-
Mov Cap-2 Maneuver	612	605	-	657	605	-	-	-	-	-	-	-
Stage 1	873	778	-	786	720	-	-	-	-	-	-	-
Stage 2	736	713	-	865	769	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	11.5		10.5		0		1.2	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1399	-	-	612 725	1274	-	-
HCM Lane V/C Ratio	-	-	-	0.089 0.103	0.009	-	-
HCM Control Delay (s)	0	-	-	11.5 10.5	7.9	-	-
HCM Lane LOS	A	-	-	B B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.3 0.3	0	-	-

HCM 6th TWSC  
21: PA-9 Access/PA-8A Access & 42nd Avenue

Long Term Total  
PM Peak

Intersection												
Int Delay, s/veh	3.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	20	6	4	48	0	11	0	13	0	0	10
Future Vol, veh/h	3	20	6	4	48	0	11	0	13	0	0	10
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	3	22	7	4	52	0	12	0	14	0	0	11







Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	52	0	0	29	0	0	98	92	26	99	95	52
Stage 1	-	-	-	-	-	-	32	32	-	60	60	-
Stage 2	-	-	-	-	-	-	66	60	-	39	35	-
Critical Hdwy	4.35	-	-	4.35	-	-	7.35	6.75	6.45	7.35	6.75	6.45
Critical Hdwy Stg 1	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Follow-up Hdwy	2.425	-	-	2.425	-	-	3.725	4.225	3.525	3.725	4.225	3.525
Pot Cap-1 Maneuver	1419	-	-	1447	-	-	832	756	987	831	754	954
Stage 1	-	-	-	-	-	-	929	825	-	897	802	-
Stage 2	-	-	-	-	-	-	890	802	-	921	822	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1419	-	-	1447	-	-	820	752	987	816	750	954
Mov Cap-2 Maneuver	-	-	-	-	-	-	820	752	-	816	750	-
Stage 1	-	-	-	-	-	-	927	823	-	895	800	-
Stage 2	-	-	-	-	-	-	877	800	-	906	820	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.8			0.6			9.1			8.8		
HCM LOS							A			A		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	903	1419	-	-	1447	-	-	954
HCM Lane V/C Ratio	0.029	0.002	-	-	0.003	-	-	0.011
HCM Control Delay (s)	9.1	7.5	-	-	7.5	-	-	8.8
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0







HCM 6th TWSC  
22: PA-9 Access/PA-8A Access & 42nd Avenue

Long Term Total  
PM Peak

Intersection												
Int Delay, s/veh	7.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	14	15	22	4	4	36	0	55	9	0	12
Future Vol, veh/h	5	14	15	22	4	4	36	0	55	9	0	12
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	5	15	16	24	4	4	39	0	60	10	0	13
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	8	0	0	31	0	0	94	89	23	117	95	6
Stage 1	-	-	-	-	-	-	33	33	-	54	54	-
Stage 2	-	-	-	-	-	-	61	56	-	63	41	-
Critical Hdwy	4.35	-	-	4.35	-	-	7.35	6.75	6.45	7.35	6.75	6.45
Critical Hdwy Stg 1	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Follow-up Hdwy	2.425	-	-	2.425	-	-	3.725	4.225	3.525	3.725	4.225	3.525
Pot Cap-1 Maneuver	1474	-	-	1445	-	-	837	759	991	808	754	1013
Stage 1	-	-	-	-	-	-	927	824	-	903	807	-
Stage 2	-	-	-	-	-	-	896	805	-	893	817	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1474	-	-	1445	-	-	814	744	991	747	739	1013
Mov Cap-2 Maneuver	-	-	-	-	-	-	814	744	-	747	739	-
Stage 1	-	-	-	-	-	-	924	822	-	900	793	-
Stage 2	-	-	-	-	-	-	870	791	-	836	815	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.1			5.5			9.4			9.2		
HCM LOS							A			A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	913	1474	-	-	1445	-	-	879				
HCM Lane V/C Ratio	0.108	0.004	-	-	0.017	-	-	0.026				
HCM Control Delay (s)	9.4	7.5	-	-	7.5	-	-	9.2				
HCM Lane LOS	A	A	-	-	A	-	-	A				
HCM 95th %tile Q(veh)	0.4	0	-	-	0.1	-	-	0.1				

HCM 6th TWSC  
23: PA-8C Access/PA-8B Access & 42nd Avenue

Long Term Total  
PM Peak

Intersection												
Int Delay, s/veh	3.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	75	4	21	61	2	10	0	54	4	0	6
Future Vol, veh/h	3	75	4	21	61	2	10	0	54	4	0	6
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	100	-	-	100	-	-	-	-	-	-	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	3	82	4	23	66	2	11	0	59	4	0	7





Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	68	0	0	86	0	0	207	204	84	233	205	67
Stage 1	-	-	-	-	-	-	90	90	-	113	113	-
Stage 2	-	-	-	-	-	-	117	114	-	120	92	-
Critical Hdwy	4.35	-	-	4.35	-	-	7.35	6.75	6.45	7.35	6.75	6.45
Critical Hdwy Stg 1	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.35	5.75	-	6.35	5.75	-
Follow-up Hdwy	2.425	-	-	2.425	-	-	3.725	4.225	3.525	3.725	4.225	3.525
Pot Cap-1 Maneuver	1399	-	-	1377	-	-	704	654	915	676	653	936
Stage 1	-	-	-	-	-	-	864	778	-	839	760	-
Stage 2	-	-	-	-	-	-	835	759	-	832	776	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1399	-	-	1377	-	-	689	642	915	623	641	936
Mov Cap-2 Maneuver	-	-	-	-	-	-	689	642	-	623	641	-
Stage 1	-	-	-	-	-	-	862	776	-	837	747	-
Stage 2	-	-	-	-	-	-	815	746	-	777	774	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	1.9	9.5	9.7
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	870	1399	-	-	1377	-	-	779
HCM Lane V/C Ratio	0.08	0.002	-	-	0.017	-	-	0.014
HCM Control Delay (s)	9.5	7.6	-	-	7.7	-	-	9.7
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0

HCM 6th TWSC  
24: Quail Run Drive & PA-9 Access

Long Term Total  
PM Peak

Intersection						
Int Delay, s/veh	1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	19	5	157	8	2	76
Future Vol, veh/h	19	5	157	8	2	76
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	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	21	5	171	9	2	83
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	263	176	0	0	180	0
Stage 1	176	-	-	-	-	-
Stage 2	87	-	-	-	-	-
Critical Hdwy	6.65	6.45	-	-	4.35	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	-	-	2.425	-
Pot Cap-1 Maneuver	679	811	-	-	1268	-
Stage 1	802	-	-	-	-	-
Stage 2	882	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	678	811	-	-	1268	-
Mov Cap-2 Maneuver	678	-	-	-	-	-
Stage 1	802	-	-	-	-	-
Stage 2	880	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	10.3	0		0.2		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	702	1268	-	
HCM Lane V/C Ratio	-	-	0.037	0.002	-	
HCM Control Delay (s)	-	-	10.3	7.8	-	
HCM Lane LOS	-	-	B	A	-	
HCM 95th %tile Q(veh)	-	-	0.1	0	-	

HCM 6th TWSC  
25: Cavanaugh Road & PA-9 Access/PA-8C Access

Long Term Total  
PM Peak

Intersection												
Int Delay, s/veh	2.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Vol, veh/h	13	0	36	23	0	9	16	193	10	4	67	5
Future Vol, veh/h	13	0	36	23	0	9	16	193	10	4	67	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	-	-	-	-	-	-	100	-	-	100	-	-
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, %	25	25	25	25	25	25	25	25	25	25	25	25
Mvmt Flow	14	0	39	25	0	10	17	210	11	4	73	5

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	339	339	76	353	336	216	78	0	0	221	0	0
Stage 1	84	84	-	250	250	-	-	-	-	-	-	-
Stage 2	255	255	-	103	86	-	-	-	-	-	-	-
Critical Hdwy	7.35	6.75	6.45	7.35	6.75	6.45	4.35	-	-	4.35	-	-
Critical Hdwy Stg 1	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.35	5.75	-	6.35	5.75	-	-	-	-	-	-	-
Follow-up Hdwy	3.725	4.225	3.525	3.725	4.225	3.525	2.425	-	-	2.425	-	-
Pot Cap-1 Maneuver	574	547	925	561	549	769	1387	-	-	1223	-	-
Stage 1	870	782	-	706	659	-	-	-	-	-	-	-
Stage 2	701	656	-	850	781	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	560	539	925	531	541	769	1387	-	-	1223	-	-
Mov Cap-2 Maneuver	560	539	-	531	541	-	-	-	-	-	-	-
Stage 1	860	780	-	698	651	-	-	-	-	-	-	-
Stage 2	684	648	-	811	779	-	-	-	-	-	-	-






Approach	EB		WB		NB		SB	
HCM Control Delay, s	9.9		11.6		0.6		0.4	
HCM LOS	A		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1387	-	-	789	582	1223	-
HCM Lane V/C Ratio	0.013	-	-	0.068	0.06	0.004	-
HCM Control Delay (s)	7.6	-	-	9.9	11.6	8	-
HCM Lane LOS	A	-	-	A	B	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.2	0	-



HCM 6th TWSC  
26: Quail Run Drive & PA-7 Access

Long Term Total  
PM Peak

Intersection						
Int Delay, s/veh	1.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	33	13	157	92	3
Future Vol, veh/h	8	33	13	157	92	3
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	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	9	36	14	171	100	3
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	301	102	103	0	-	0
Stage 1	102	-	-	-	-	-
Stage 2	199	-	-	-	-	-
Critical Hdwy	6.65	6.45	4.35	-	-	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	2.425	-	-	-
Pot Cap-1 Maneuver	645	894	1357	-	-	-
Stage 1	868	-	-	-	-	-
Stage 2	782	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	639	894	1357	-	-	-
Mov Cap-2 Maneuver	639	-	-	-	-	-
Stage 1	859	-	-	-	-	-
Stage 2	782	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9.6	0.6		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1357	-	829	-	-	
HCM Lane V/C Ratio	0.01	-	0.054	-	-	
HCM Control Delay (s)	7.7	-	9.6	-	-	
HCM Lane LOS	A	-	A	-	-	
HCM 95th %tile Q(veh)	0	-	0.2	-	-	

## APPENDIX G. SIGNAL WARRANT WORKSHEETS

**MUTCD Volume-based Warrant Evaluation - 2040 Background Conditions with 50% RTR**  
**32nd Avenue / Quail Run Road**

Major Street: Quail Run Road  
 Minor Street: 32nd Avenue  
 Major Street Approach Speed: 35 MPH  
 Option: Rural Community



**WARRANT 1, Condition A - Minimum Vehicular Volume**

70% Satisfied Yes

	Number of lanes moving traffic	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	2 or more	420 (336)	1108	1040	972	904	836	768	700	632
Highest Apprch. Minor Street	2 or more	140 (112)	279	262	245	228	211	194	176	159

**WARRANT 1, Condition B - Interruption of Continuous Traffic**

70% Satisfied Yes

	Number of lanes moving traffic	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	2 or more	630 (504)	1108	1040	972	904	836	768	700	632
Highest Apprch. Minor Street	2 or more	70 (56)	279	262	245	228	211	194	176	159

**WARRANT 1, Condition A and Condition B**

56% Satisfied Yes

**WARRANT 2, Four Hour Volume**

70% Satisfied Yes

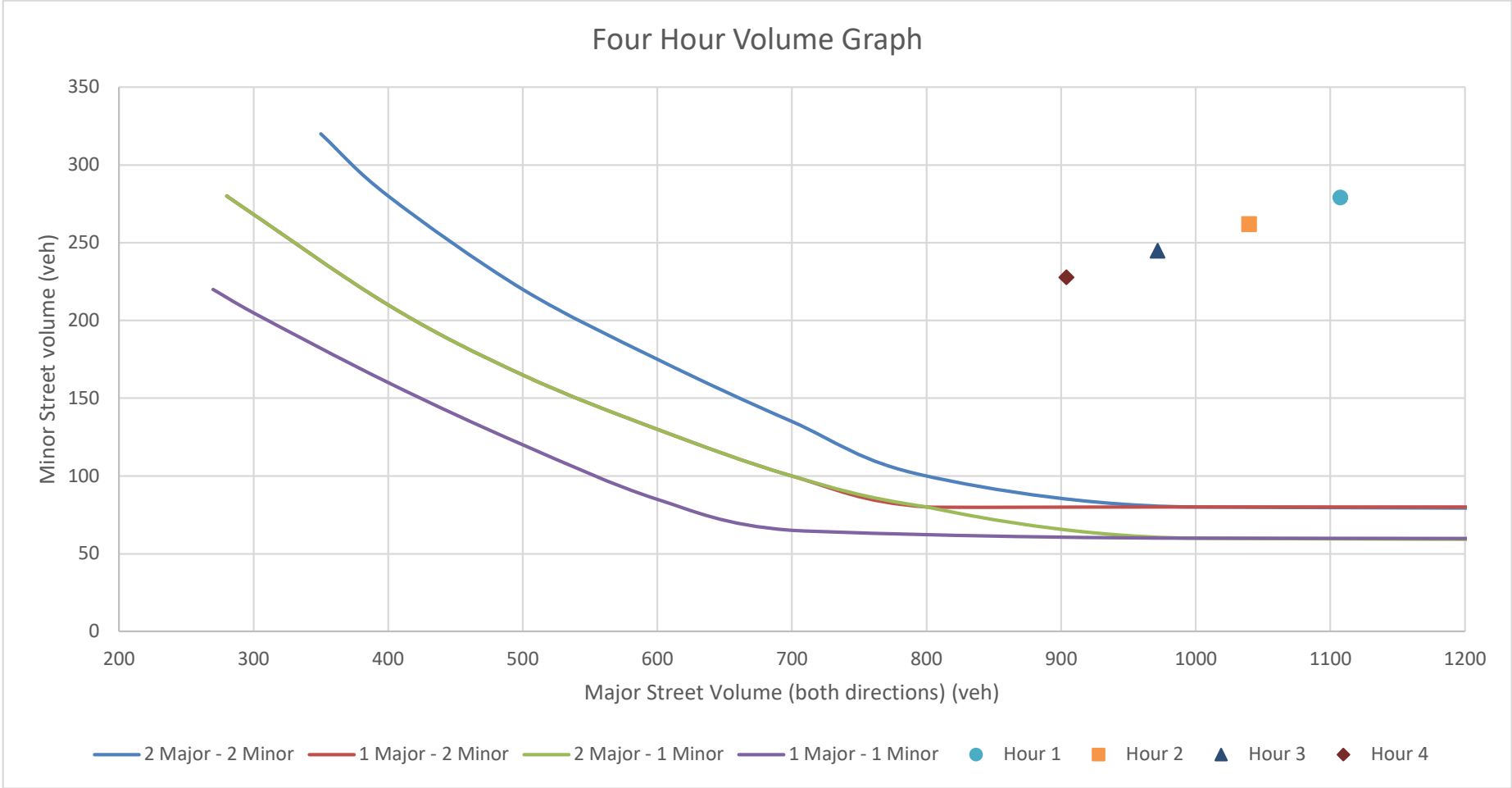
	Number of lanes moving traffic	Peak Hour	2nd Highest	3rd Highest	4th Highest
Both Apprchs. Major Street	2 or more	1108	1040	972	904
Highest Apprch. Minor Street	2 or more	279	262	245	228

**WARRANT 3, Peak Hour Volume**

70% Satisfied Yes

	Number of lanes moving traffic	Peak Hour
Both Apprchs. Major Street	2 or more	1108
Highest Apprch. Minor Street	2 or more	279

Four Hour Volume Graph



**MUTCD Volume-based Warrant Evaluation - 2040 Background Conditions with 50% RTR**  
**48th Avenue / Imboden Road**

Major Street: Imboden Road  
 Minor Street: 48th Avenue  
 Major Street Approach Speed: 35 MPH  
 Option: Rural Community



**WARRANT 1, Condition A - Minimum Vehicular Volume**

70% Satisfied Yes

	Number of lanes moving traffic	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	2 or more	420 (336)	1245	1169	1092	1016	940	863	787	711
Highest Apprch. Minor Street	2 or more	140 (112)	278	261	244	227	210	193	176	159

**WARRANT 1, Condition B - Interruption of Continuous Traffic**

70% Satisfied Yes

	Number of lanes moving traffic	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	2 or more	630 (504)	1245	1169	1092	1016	940	863	787	711
Highest Apprch. Minor Street	2 or more	70 (56)	278	261	244	227	210	193	176	159

**WARRANT 1, Condition A and Condition B**

56% Satisfied Yes

**WARRANT 2, Four Hour Volume**

70% Satisfied Yes

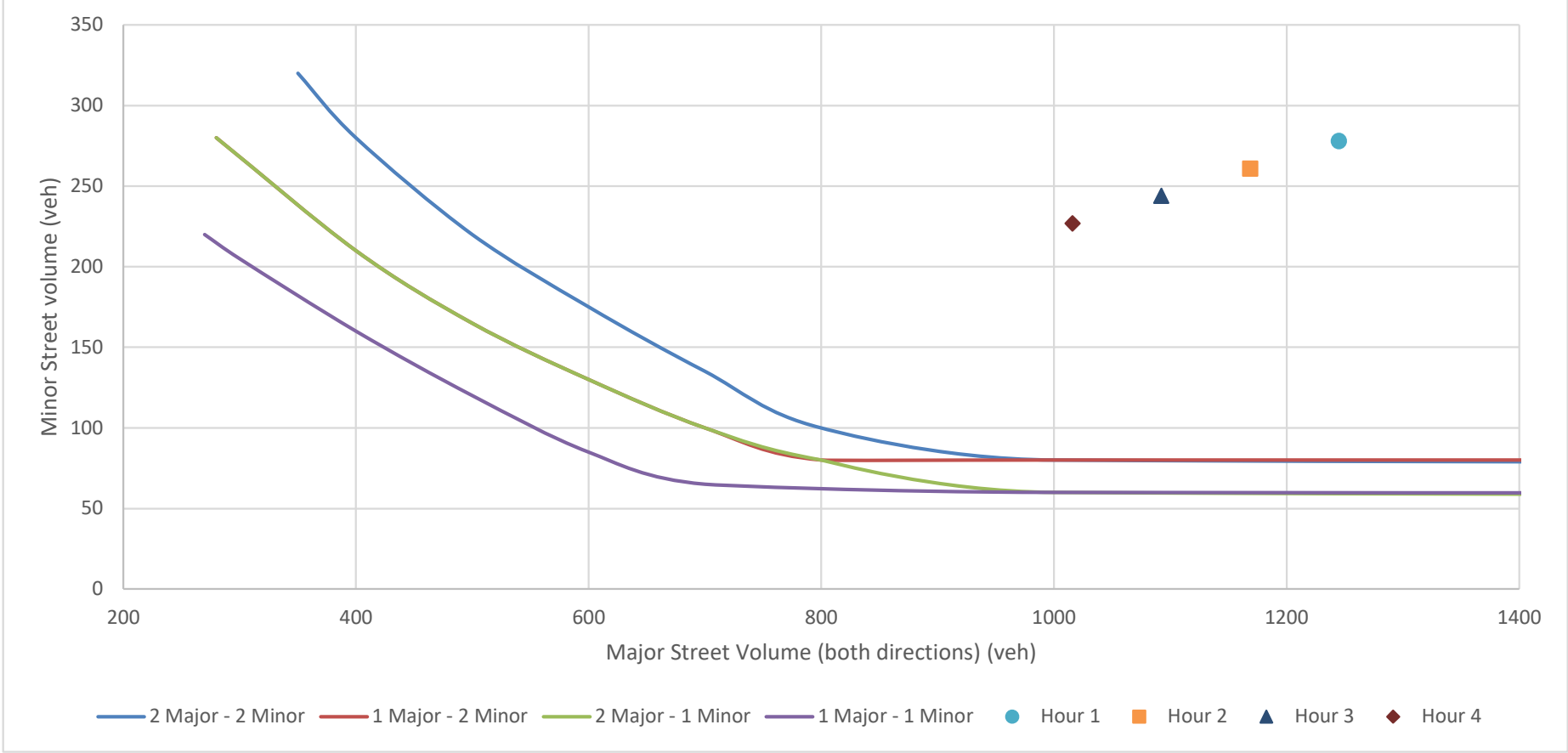
	Number of lanes moving traffic	Peak Hour	2nd Highest	3rd Highest	4th Highest
Both Apprchs. Major Street	2 or more	1245	1169	1092	1016
Highest Apprch. Minor Street	2 or more	278	261	244	227

**WARRANT 3, Peak Hour Volume**

70% Satisfied Yes

	Number of lanes moving traffic	Peak Hour
Both Apprchs. Major Street	2 or more	1245
Highest Apprch. Minor Street	2 or more	278

Four Hour Volume Graph



**MUTCD Volume-based Warrant Evaluation - 2040 Background Conditions with 50% RTR**  
**56th Avenue / Imboden Road**

Major Street: Imboden Road  
 Minor Street: 56th Avenue  
 Major Street Approach Speed: 35 MPH  
 Option: Rural Community



**WARRANT 1, Condition A - Minimum Vehicular Volume**

70% Satisfied Yes

	Number of lanes moving traffic	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	2 or more	420 (336)	1393	1307	1222	1136	1051	966	880	795
Highest Apprch. Minor Street	2 or more	140 (112)	815	765	715	665	615	565	515	465

**WARRANT 1, Condition B - Interruption of Continuous Traffic**

70% Satisfied Yes

	Number of lanes moving traffic	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	2 or more	630 (504)	1393	1307	1222	1136	1051	966	880	795
Highest Apprch. Minor Street	2 or more	70 (56)	815	765	715	665	615	565	515	465

**WARRANT 1, Condition A and Condition B**

56% Satisfied Yes

**WARRANT 2, Four Hour Volume**

70% Satisfied Yes

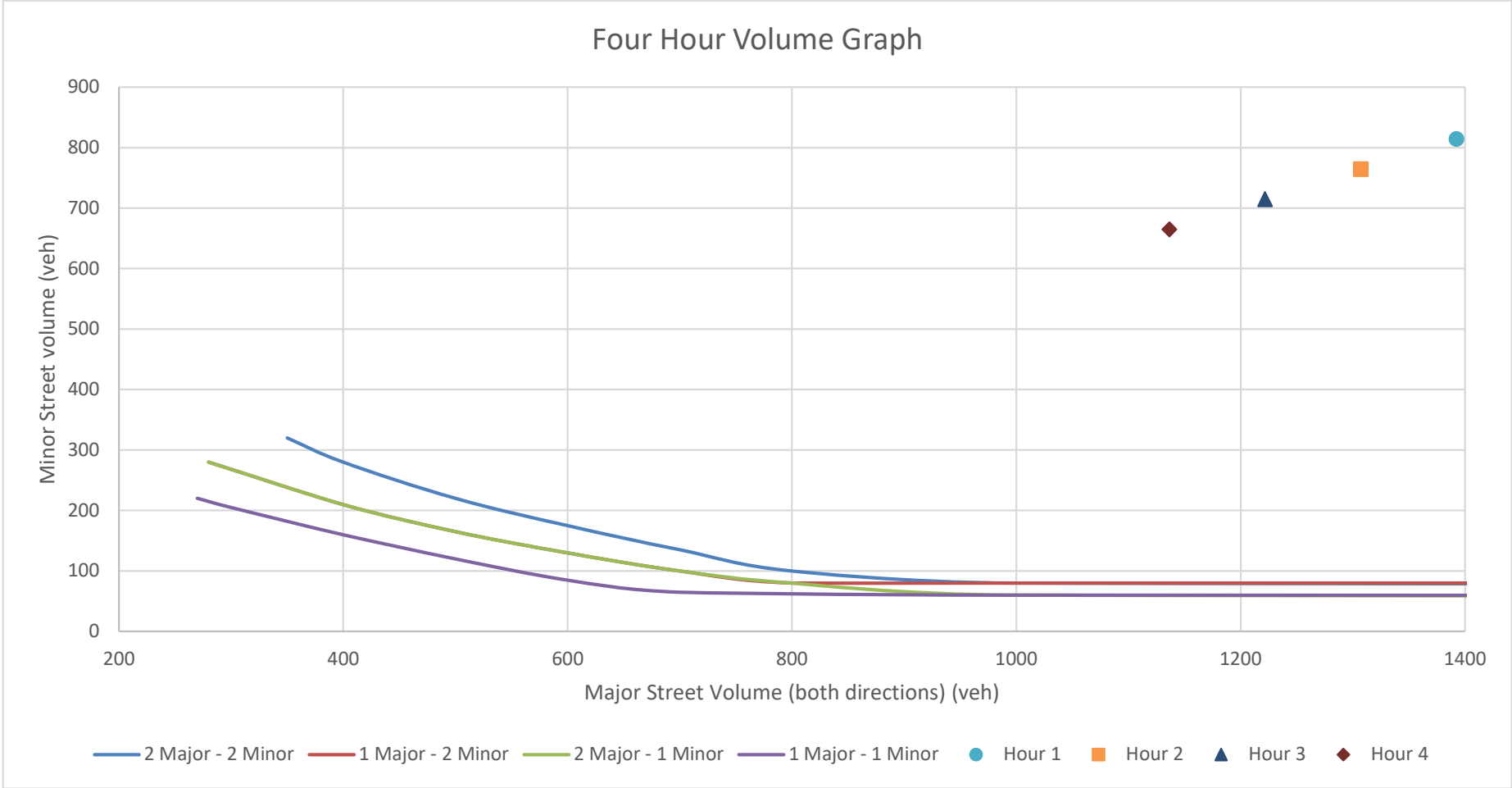
	Number of lanes moving traffic	Peak Hour	2nd Highest	3rd Highest	4th Highest
Both Apprchs. Major Street	2 or more	1393	1307	1222	1136
Highest Apprch. Minor Street	2 or more	815	765	715	665

**WARRANT 3, Peak Hour Volume**

70% Satisfied Yes

	Number of lanes moving traffic	Peak Hour
Both Apprchs. Major Street	2 or more	1393
Highest Apprch. Minor Street	2 or more	815

Four Hour Volume Graph





**MUTCD Volume-based Warrant Evaluation**  
**Cavanaugh Road & 48th Avenue**  
**Long Term Total**



Major Street: 48th Avenue  
 Lanes Moving Traffic: 2 or more  
 Approach Speed: 30 MPH  
 Option: Low speed, urban community

Minor Street: Cavanaugh Road  
 Lanes Moving Traffic: 2 or more  
 Right Turn Volume Included: 0% NB

**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)	1220	1145	1070	996	921	846	771	697
Highest Apprch. Minor Street	200 (160)	296	278	260	242	223	205	187	169

**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)	1220	1145	1070	996	921	846	771	697
Highest Apprch. Minor Street	100 (80)	296	278	260	242	223	205	187	169

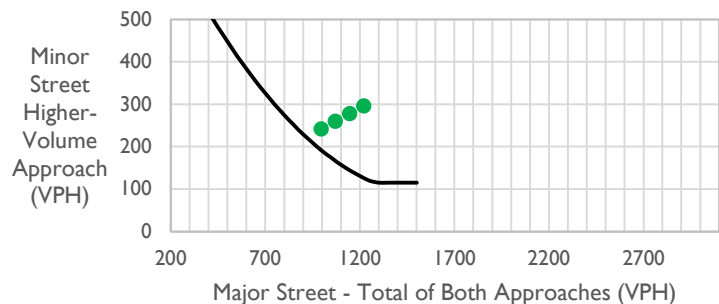
**WARRANT 1, Condition A and Condition B**

**80% Satisfied** No

**WARRANT 2, Four Hour Volume**

**100% Satisfied** Yes

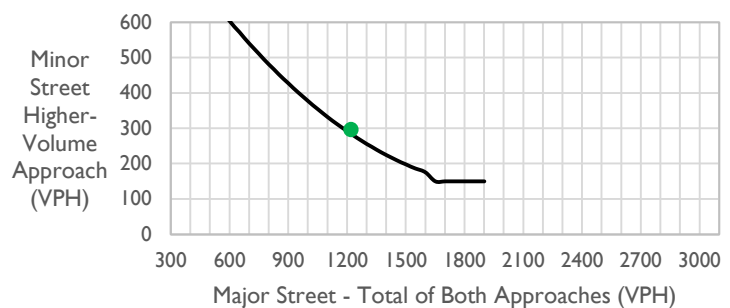
	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1220	296
2nd Highest	1145	278
3rd Highest	1070	260
4th Highest	996	242



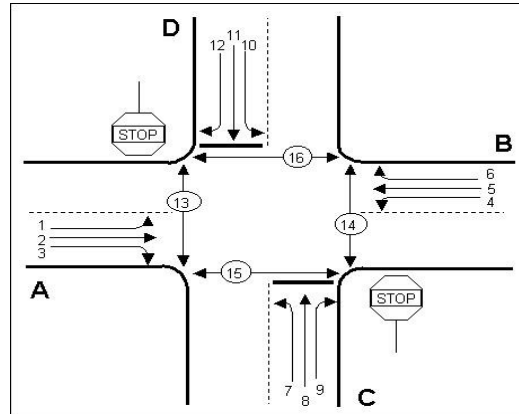
**WARRANT 3, Peak Hour Volume**

**100% Satisfied** Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1220	296



**Figure 2 - 11. Minor-road right-turn volume reduction for warrant check.**  
**Cavanaugh Road & 48th Avenue**  
**Long Term Total**



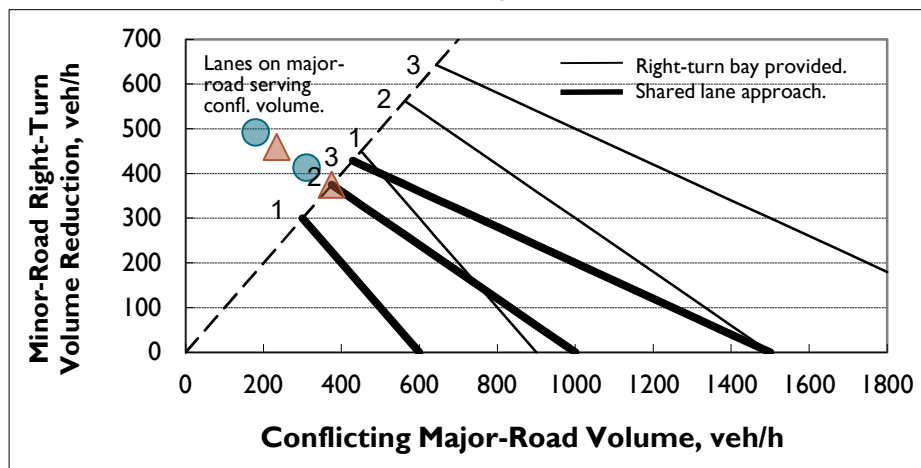
**INPUT**

Number of lanes on major-road approach:			2	
Right-turn geometry on minor-road:			Shared-lane approach	
Approach	Number	Movement	Volume (veh/hr)	
Major A	2	Through	457	283
	3	Right	291	77
Major B	5	Through	466	621
	6	Right	0	0
Minor C	7	Left	91	290
	8	Through	0	0
	9	Right	3	6
Minor D	10	Left	0	0
	11	Through	0	0
	12	Right	0	0

**OUTPUT**

Variable	Volume (veh/hr)	
	AM	PM
Conflicting major-road volume (Vc9):	374	180
Conflicting major-road volume (Vc12):	233	311
Right-turn volume reduction (Vr9):	376	492
Right-turn volume reduction (Vr12):	460	414
Adjusted right-turn volume reduction (Vr9):	3	6
Adjusted right-turn volume reduction (Vr12):	0	0
Adjusted minor-road volume:	91	290

Chart Legend:



Source: NCHRP Report 457

**MUTCD Volume-based Warrant Evaluation**  
**Quail Run Drive & 48th Avenue**  
**Long Term Total**



Major Street: 48th Avenue  
 Lanes Moving Traffic: 2 or more  
 Approach Speed: 30 MPH  
 Option: Low speed, urban community

Minor Street: Quail Run Drive  
 Lanes Moving Traffic: 2 or more  
 Right Turn Volume Included: 0% NB

**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)	1387	1302	1217	1132	1047	962	877	792
Highest Apprch. Minor Street	200 (160)	286	268	251	233	216	198	181	163

**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)	1387	1302	1217	1132	1047	962	877	792
Highest Apprch. Minor Street	100 (80)	286	268	251	233	216	198	181	163

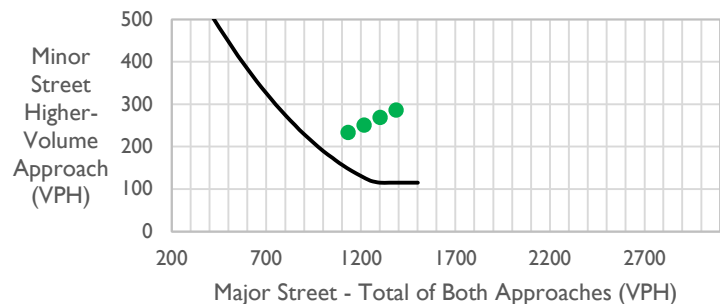
**WARRANT 1, Condition A and Condition B**

**80% Satisfied** Yes

**WARRANT 2, Four Hour Volume**

**100% Satisfied** Yes

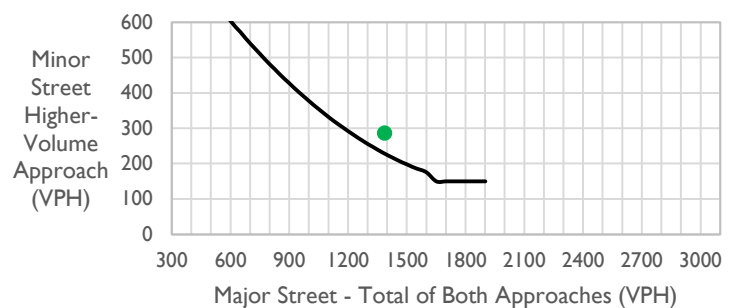
	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1387	286
2nd Highest	1302	268
3rd Highest	1217	251
4th Highest	1132	233



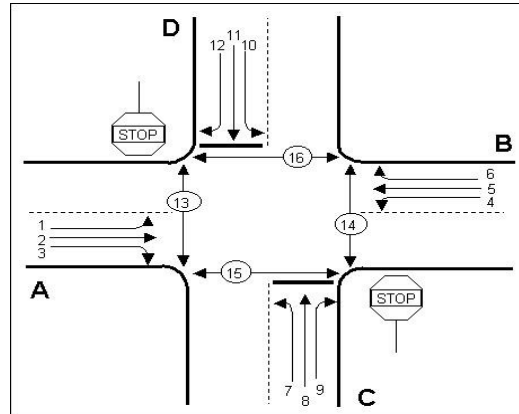
**WARRANT 3, Peak Hour Volume**

**100% Satisfied** Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1387	286



**Figure 2 - 11. Minor-road right-turn volume reduction for warrant check.**  
**Quail Run Drive & 48th Avenue**  
**Long Term Total**



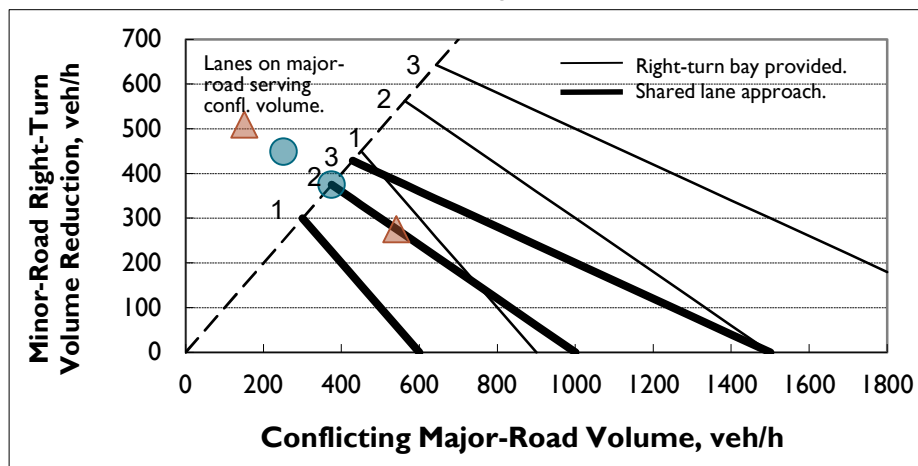
**INPUT**

Number of lanes on major-road approach:			2	
Right-turn geometry on minor-road:			Shared-lane approach	
Approach	Number	Movement	Volume (veh/hr)	
Major A	2	Through	815	417
	3	Right	266	86
Major B	5	Through	300	749
	6	Right	0	0
Minor C	7	Left	112	278
	8	Through	0	0
	9	Right	15	8
Minor D	10	Left	0	0
	11	Through	0	0
	12	Right	0	0

**OUTPUT**

Variable	Volume (veh/hr)	
	AM	PM
Conflicting major-road volume (Vc9):	541	252
Conflicting major-road volume (Vc12):	150	375
Right-turn volume reduction (Vr9):	276	449
Right-turn volume reduction (Vr12):	510	375
Adjusted right-turn volume reduction (Vr9):	15	8
Adjusted right-turn volume reduction (Vr12):	0	0
Adjusted minor-road volume:	112	278

Chart Legend:



Source: NCHRP Report 457

## APPENDIX H. QUEUEING TABLE

Intersection #	Intersection	Movement	Existing AM(PM)	2040 Background AM (PM)	2040 Total AM (PM)	Long Term Background AM (PM)	Long Term Total AM (PM)
1	56th Avenue & Imboden Road	EBL	25 (25)	325 (400)	325 (475)	300 (375)	300 (400)
		EBT	N/A	N/A	N/A	41 (20)	41 (25)
		EBR	N/A	44 (163)	134 (217)	189 (362)	309 (314)
		WBL	0 (0)	N/A	N/A	50 (150)	50 (175)
		WBT	N/A	N/A	N/A	22 (56)	22 (77)
		WBR	N/A	N/A	N/A	0 (0)	0 (0)
		NBL	0 (0)	350 (525)	425 (650)	325 (#553)	375 (750)
		NBT	N/A	30 (m43)	26 (52)	50 (m51)	m41 (100)
		NBR	N/A	N/A	N/A	4 (m0)	m6 (9)
		SBL	0 (0)	N/A	N/A	25 (6)	25 (25)
2	48th Avenue & Imboden Road	SBT	N/A	80 (131)	93 (135)	120 (#245)	137 (#471)
		SBR	N/A	54 (140)	71 (163)	45 (187)	48 (385)
		EBL	0 (0)	25 (25)	25 (25)	25 (25)	25 (25)
		EBTR	N/A	26 (25)	27 (27)	27 (27)	28 (27)
		WBL	0 (25)	25 (25)	#282 (425)	51 (54)	300 (#488)
		WBTR	N/A	51 (97)	57 (82)	73 (88)	94 (240)
		WBR	N/A	75 (325)	37 (375)	100 (350)	100 (400)
		NBL	0 (0)	25 (25)	25 (25)	25 (25)	29 (25)
		NBT	N/A	157 (150)	250 (200)	225 (275)	#441 (350)
		NBR	N/A	N/A	300 (75)	50 (50)	425 (150)
3	32nd Avenue & Quail Run Road	SBL	25 (0)	350 (125)	500 (175)	475 (200)	550 (300)
		SBTR	N/A	32 (200)	105 (300)	120 (225)	150 (325)
		EBL	N/A	N/A	N/A	25 (35)	25 (50)
		EBT	N/A	N/A	N/A	0 (98)	23 (12)
		EBR	N/A	N/A	N/A	N/A	0 (106)
		WBL	N/A	125 (375)	225 (550)	175 (600)	225 (875)
		WBT	N/A	15 (21)	14 (19)	14 (0)	5 (#15)
		WBR	N/A	N/A	N/A	N/A	11 (39)
		NBL	N/A	N/A	N/A	96 (53)	#103 (75)
		NBT	N/A	48 (98)	170 (179)	270 (314)	363 (359)
4	48th Avenue & Cavanaugh Road	NBR	N/A	0 (0)	0 (0)	32 (26)	#48 (9)
		SBL	N/A	25 (25)	25 (25)	52 (25)	#122 (28)
		SBT	N/A	45 (215)	122 (504)	171 (427)	248 (#753)
		SBR	N/A	N/A	N/A	0 (0)	0 (0)
		EBT	N/A	N/A	N/A	N/A	178 (78)
		EBR	N/A	N/A	N/A	N/A	0 (0)
5	42nd Avenue & Cavanaugh Road	WBL	N/A	0 (0)	0 (0)	0 (0)	25 (25)
		WBT	N/A	N/A	N/A	N/A	232 (278)
		NBL	N/A	25 (75)	50 (125)	25 (100)	m52 (220)
		NBR	N/A	N/A	N/A	0 (0)	m3 (8)
		EBL	N/A	N/A	0 (0)	N/A	0 (0)
		EBTR	N/A	N/A	25 (25)	N/A	25 (25)
6	32nd Avenue & Cavanaugh Road	WBL	N/A	0 (25)	0 (0)	0 (25)	0 (0)
		WBTR	N/A	N/A	25 (25)	N/A	25 (25)
		NBL	N/A	N/A	0 (0)	N/A	0 (0)
		SBL	N/A	25 (0)	25 (0)	25 (0)	25 (0)
		EBL	N/A	25 (25)	25 (25)	25 (25)	25 (25)
		SBL	N/A	25 (50)	50 (75)	50 (75)	50 (75)
7	Manila Road & 42nd Avenue	SBR	N/A	25 (25)	25 (25)	25 (25)	25 (25)
		EBL	N/A	0 (0)	0 (0)	0 (0)	0 (0)
		EBR	N/A	25 (25)	25 (75)	25 (25)	25 (75)
8	48th Avenue & Quail Run Drive	NBL	N/A	25 (25)	50 (25)	25 (25)	50 (25)
		EBT	N/A	N/A	N/A	N/A	261 (63)
		EBR	N/A	N/A	N/A	N/A	0 (m0)
		WBL	N/A	N/A	0 (0)	0 (0)	25 (25)
		WBT	N/A	N/A	N/A	N/A	32 (142)
		NBL	N/A	N/A	75 (75)	25 (50)	m93 (259)
9	32nd Avenue & Quail Run Drive	NBR	N/A	N/A	N/A	0 (0)	m10 (11)
		EBL	N/A	N/A	25 (25)	25 (25)	m25 (25)
		SBL	N/A	N/A	25 (25)	50 (25)	75 (25)
10	PA-2 Access & Imboden	SBR	N/A	N/A	N/A	25 (50)	25 (100)
		WBLR	N/A	N/A	25 (25)	N/A	25 (75)
11	PA-5 Access & Imboden	SBL	N/A	N/A	0 (0)	N/A	0 (0)
		WBL	N/A	N/A	25 (25)	N/A	25 (25)
12	PA-2 Access & 48th Avenue	SBL	N/A	N/A	0 (0)	N/A	25 (0)
		EBL	N/A	N/A	25 (25)	N/A	25 (25)
		WBL	N/A	N/A	0 (0)	N/A	0 (0)
		NBLTR	N/A	N/A	25 (25)	N/A	25 (25)
13	PA-3 Western Access & 48th Avenue	SBLTR	N/A	N/A	25 (25)	N/A	25 (25)
		EBL	N/A	N/A	25 (25)	N/A	25 (25)
		WBL	N/A	N/A	0 (0)	N/A	0 (0)
		NBLTR	N/A	N/A	50 (50)	N/A	75 (75)

		SBLTR	N/A	N/A	25 (25)	N/A	25 (25)
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14	PA-3 Eastern Access & 48th Avenue	EBL	N/A	N/A	25 (25)	N/A	25 (25)
		WBL	N/A	N/A	0 (0)	N/A	0 (0)
		NBLTR	N/A	N/A	25 (25)	N/A	50 (75)
		SBLTR	N/A	N/A	25 (25)	N/A	25 (25)
15	PA-8A Access & 48th Avenue	WBL	N/A	N/A	0 (0)	N/A	0 (0)
		NBLR	N/A	N/A	25 (25)	N/A	25 (25)
16	PA-4 Access & 48th Avenue	EBL	N/A	N/A	0 (0)	N/A	0 (0)
		WBL	N/A	N/A	25 (25)	N/A	25 (25)
		NBLTR	N/A	N/A	25 (25)	N/A	25 (25)
		SBLTR	N/A	N/A	25 (25)	N/A	25 (25)
17	PA-8B Access & 48th Avenue	WBL	N/A	N/A	25 (25)	N/A	25 (25)
		NBLR	N/A	N/A	25 (25)	N/A	25 (25)
18	PA-8A Access & Quail Run Drive	EBLTR	N/A	N/A	25 (25)	N/A	25 (25)
		WBLTR	N/A	N/A	0 (25)	N/A	0 (25)
		NBL	N/A	N/A	0 (0)	N/A	0 (0)
		SBL	N/A	N/A	0 (0)	N/A	0 (0)
19	PA-8B Access & Cavanaugh Road	EBLTR	N/A	N/A	25 (25)	N/A	25 (25)
		WBLTR	N/A	N/A	25 (25)	N/A	25 (25)
		NBL	N/A	N/A	0 (0)	N/A	0 (0)
		SBL	N/A	N/A	0 (0)	N/A	0 (0)
20	42nd Avenue & Quail Run Drive	EBL	N/A	N/A	25 (25)	N/A	25 (25)
		WBL	N/A	N/A	25 (25)	N/A	25 (25)
		NBL	N/A	N/A	0 (0)	N/A	0 (0)
		SBL	N/A	N/A	25 (0)	N/A	25 (0)
21	PA-9 Western Access & 42nd Avenue	EBL	N/A	N/A	0 (0)	N/A	0 (0)
		WBL	N/A	N/A	0 (0)	N/A	0 (0)
		NBLTR	N/A	N/A	0 (25)	N/A	0 (25)
		SBLTR	N/A	N/A	0 (0)	N/A	0 (0)
22	PA-9 Eastern Access & 42nd Avenue	EBL	N/A	N/A	0 (0)	N/A	0 (0)
		WBL	N/A	N/A	25 (25)	N/A	25 (25)
		NBLTR	N/A	N/A	25 (25)	N/A	25 (25)
		SBLTR	N/A	N/A	0 (25)	N/A	0 (25)
23	PA-8C Access & 42nd Avenue	EBL	N/A	N/A	0 (0)	N/A	0 (0)
		WBL	N/A	N/A	25 (25)	N/A	25 (25)
		NBLTR	N/A	N/A	25 (25)	N/A	25 (25)
		SBLTR	N/A	N/A	0 (0)	N/A	0 (0)
24	PA-9 Access & Quail Run Drive	WBLR	N/A	N/A	25 (25)	N/A	25 (25)
		SBL	N/A	N/A	0 (0)	N/A	0 (0)
25	PA-9 Access & Cavanaugh Road	EBLTR	N/A	N/A	25 (25)	N/A	25 (25)
		WBLTR	N/A	N/A	25 (25)	N/A	25 (25)
		NBL	N/A	N/A	25 (0)	N/A	25 (0)
		SBL	N/A	N/A	0 (0)	N/A	0 (0)
26	PA-7 Access & Quail Run Drive	EBLR	N/A	N/A	25 (25)	N/A	25 (25)
		NBL	N/A	N/A	25 (0)	N/A	25 (0)

\*m delineates that queue is metered by an upstream signal

\*\* delineates that volume for the 95th percentile cycle exceeds capacity