

# **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.

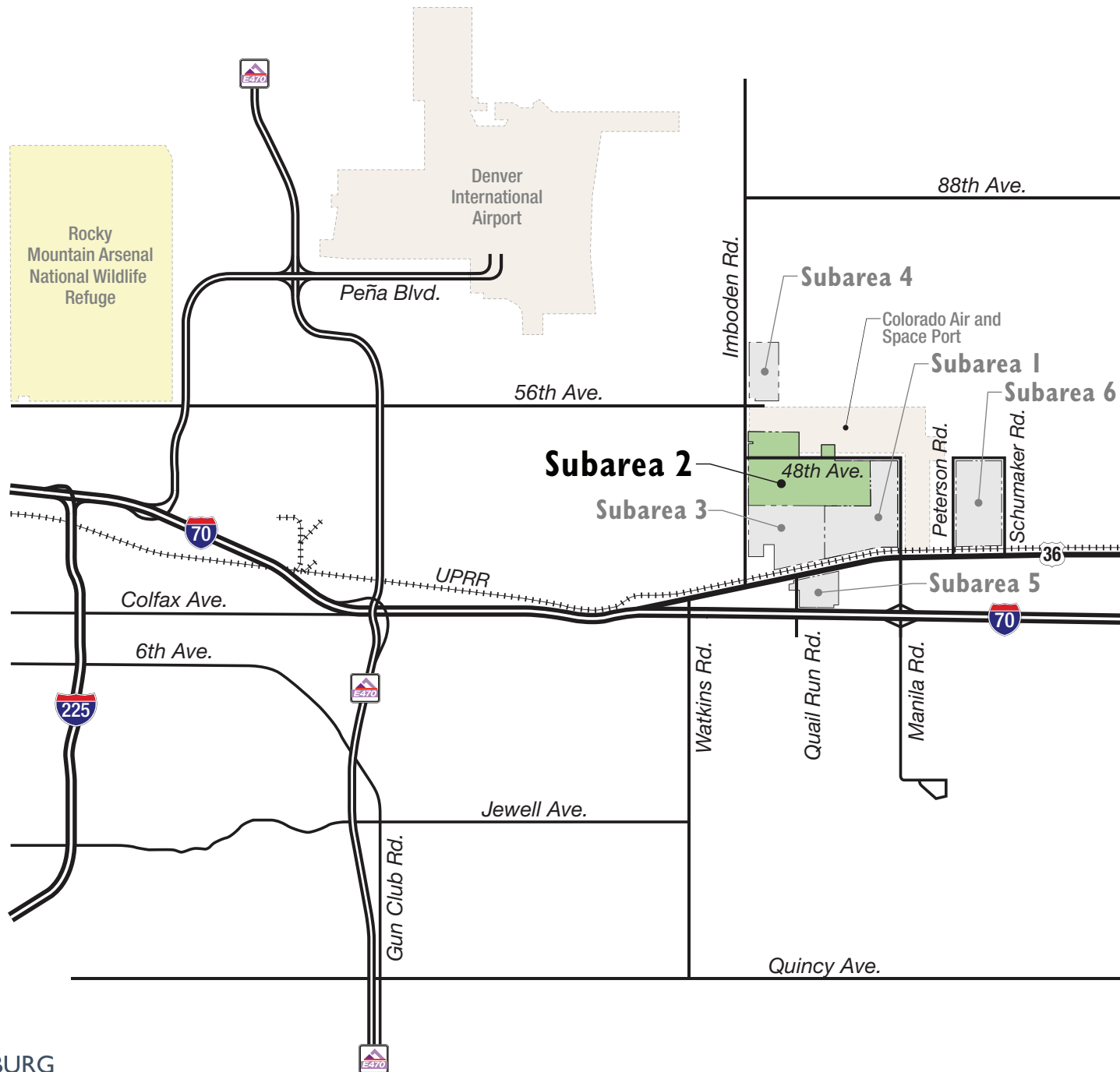
**Figure 1** provides a vicinity map of the project location, and **Figure 2** illustrates the proposed site plan.

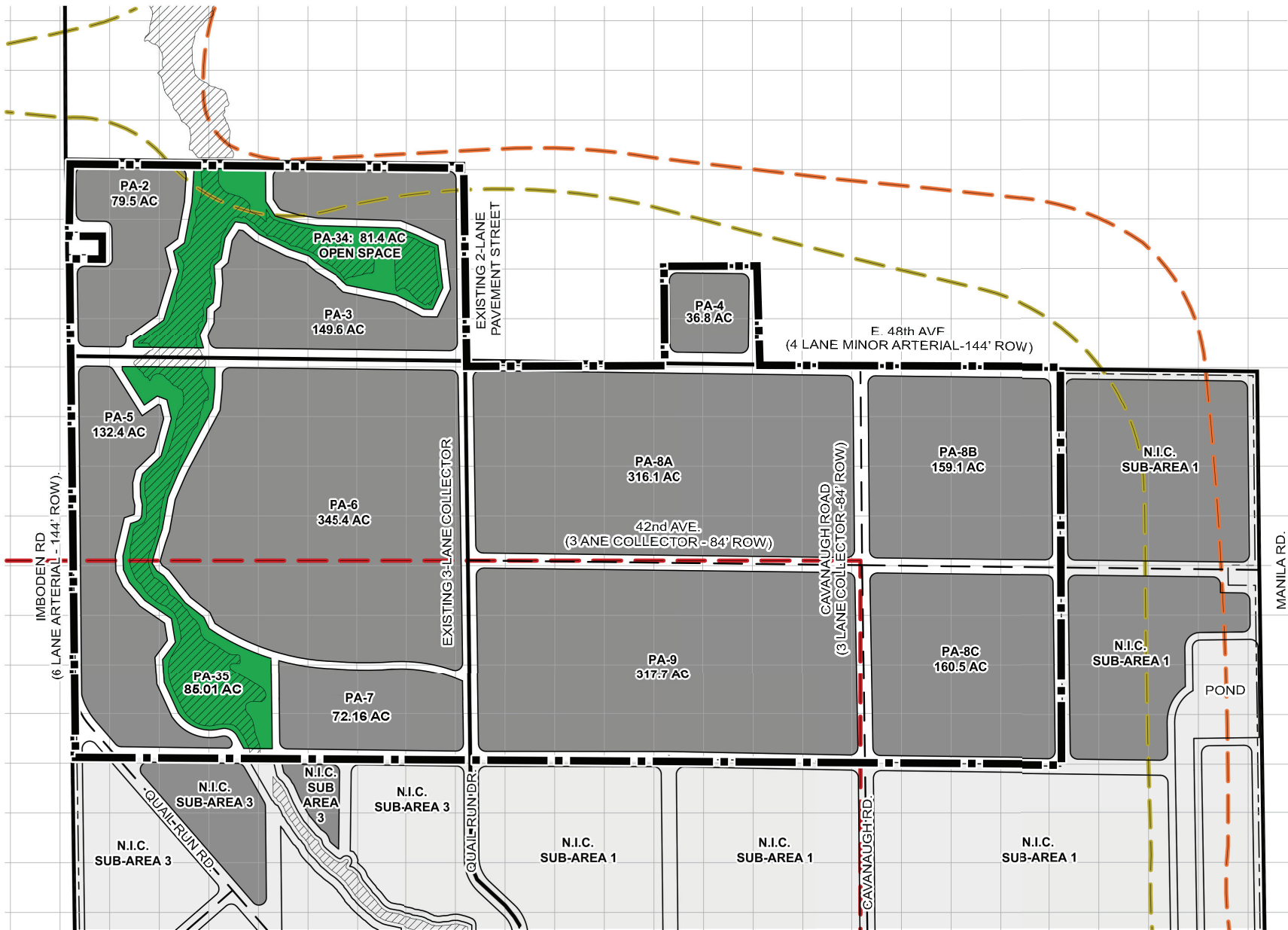
This Traffic Impact Analysis (TIA) assesses the traffic impacts related to the development of Port Colorado Subarea 2. Specific elements of this report are based on pre-application notes provided by the City of Aurora in September 2021. Short- and Long-Term future scenarios were explored for this site.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

Interchanges with I-70 near the project site include the Manila Road Interchange, approximately 2 miles southeast and the Watkins Road interchange approximately 5 miles south west 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) 1601 process for interchange approval.

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

The southern boundary of the Port Colorado Subarea 2 project lies along approximately one-half mile north 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, notably at Imboden Road and Manila Road adjacent to the Port Colorado site. 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.

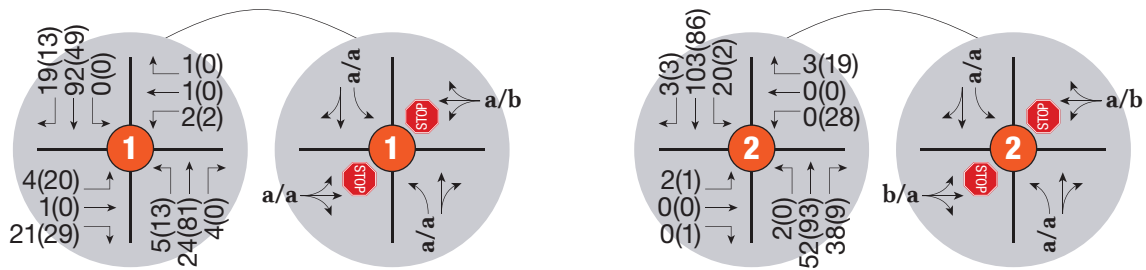
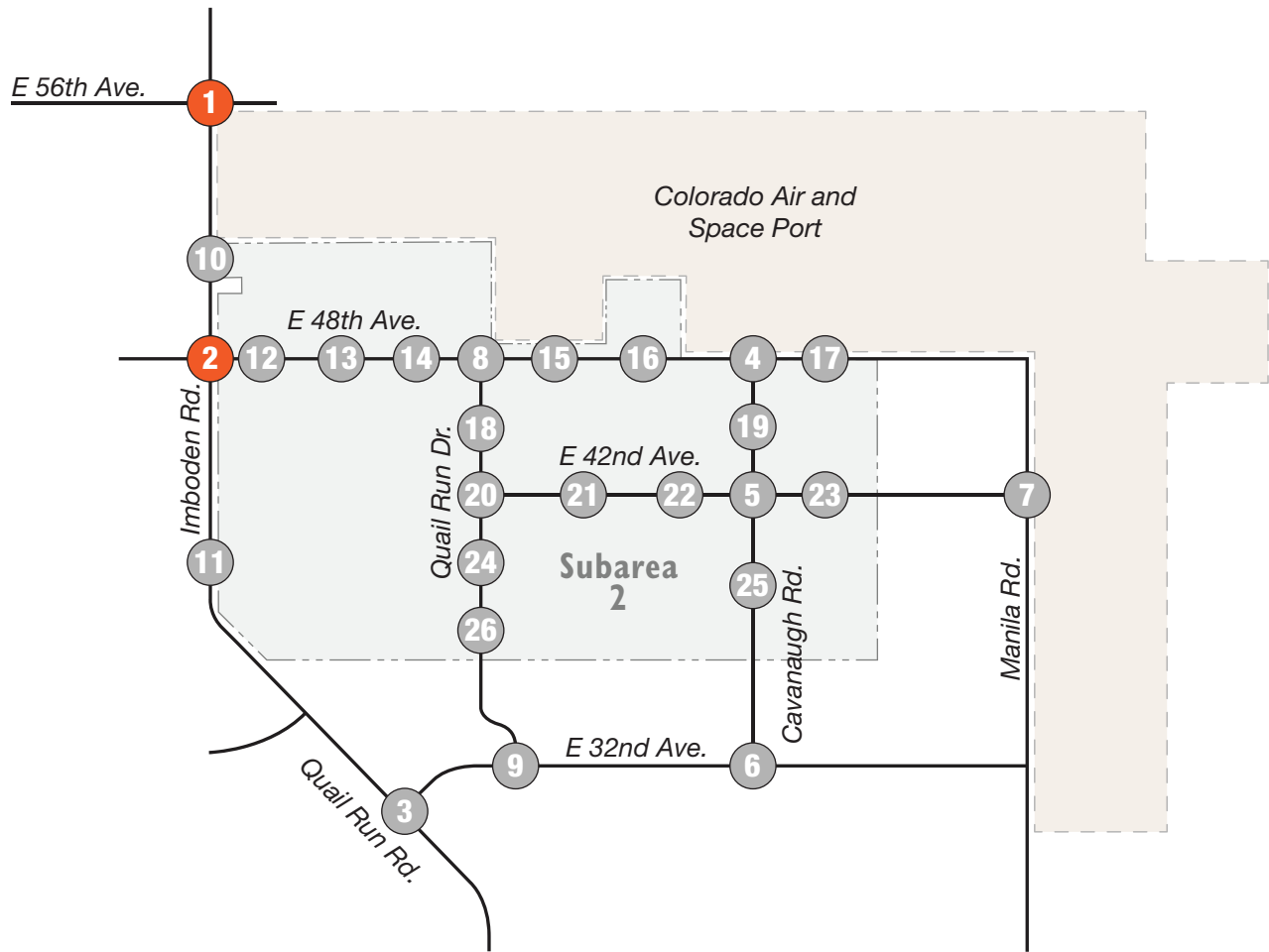
For stop-controlled intersections, LOS is calculated for each vehicle movement that must yield the right-of-way to an oncoming or crossing vehicle. In urbanized areas, LOS D is typically considered to be acceptable for peak hour traffic operations and is the standard set in the City of Aurora Traffic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

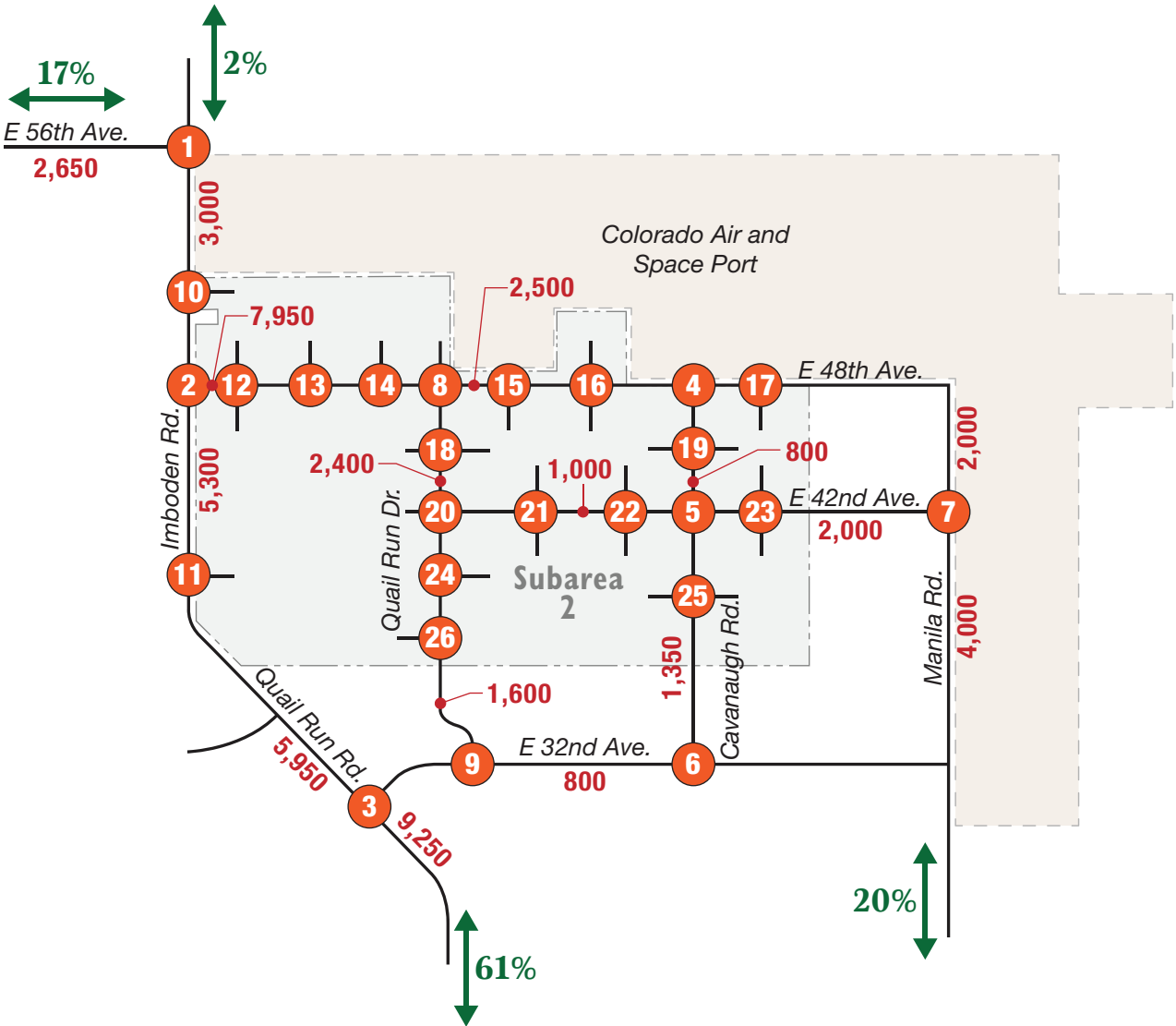
Of note, the current proposal for Subarea 2 represents a significant decrease in projected traffic when compared to the *TransPort Colorado Traffic Impact Study Analysis*, July 2022. Previous estimates of daily traffic were 18,242 trips. The current proposal represents a 17 percent daily reduction in 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**

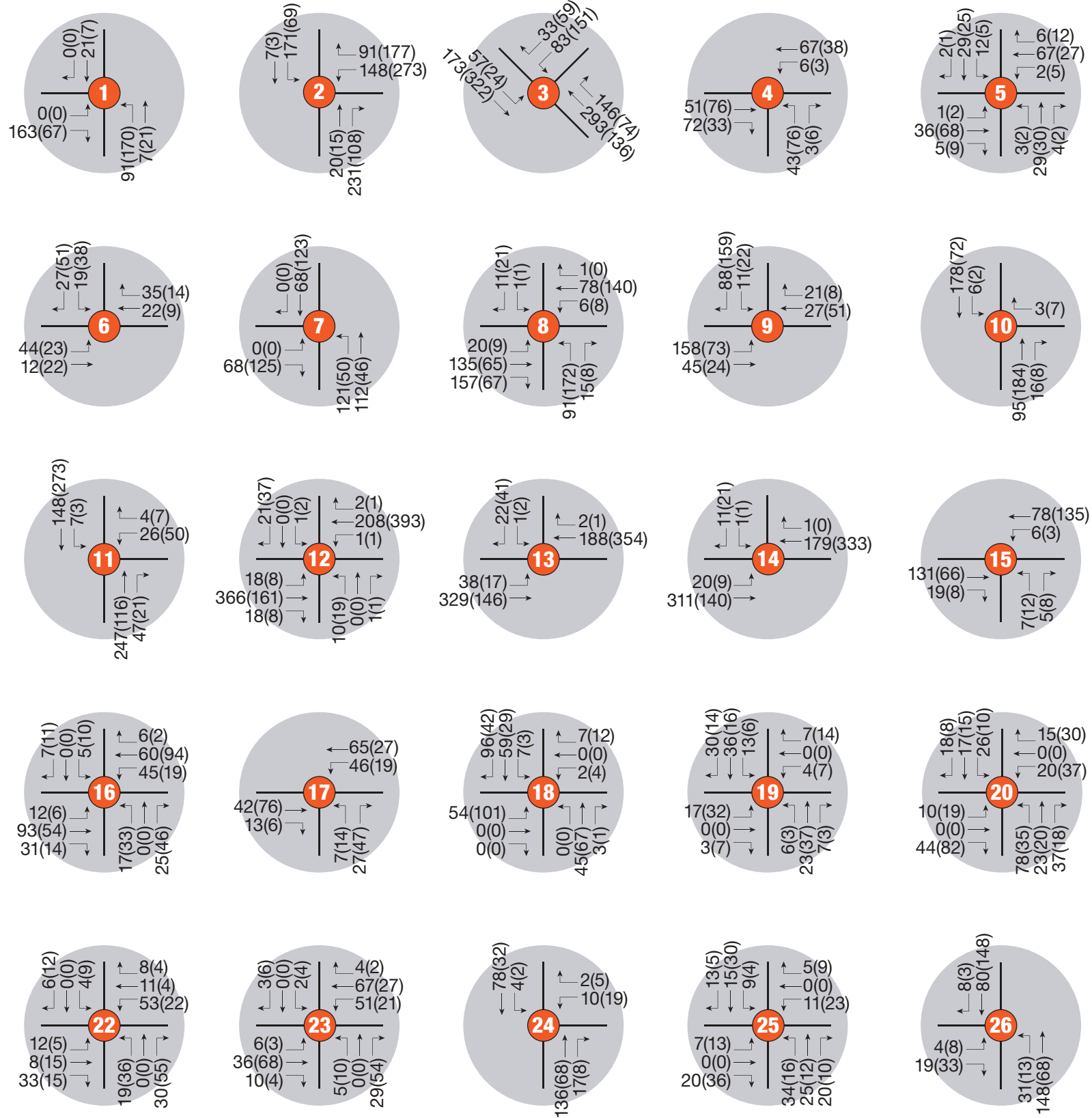
Trip distribution estimates for this site were based on those used in the master traffic study. The greatest component of site traffic will be toward Imboden Road/Quail Run Road, which will afford regional connectivity via the new interchange with I-70.

**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 9,250 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 7,950 daily trips and 32<sup>nd</sup> Avenue at 800 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 - SEPT\_24 122-260-01 9/30/24

## 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.

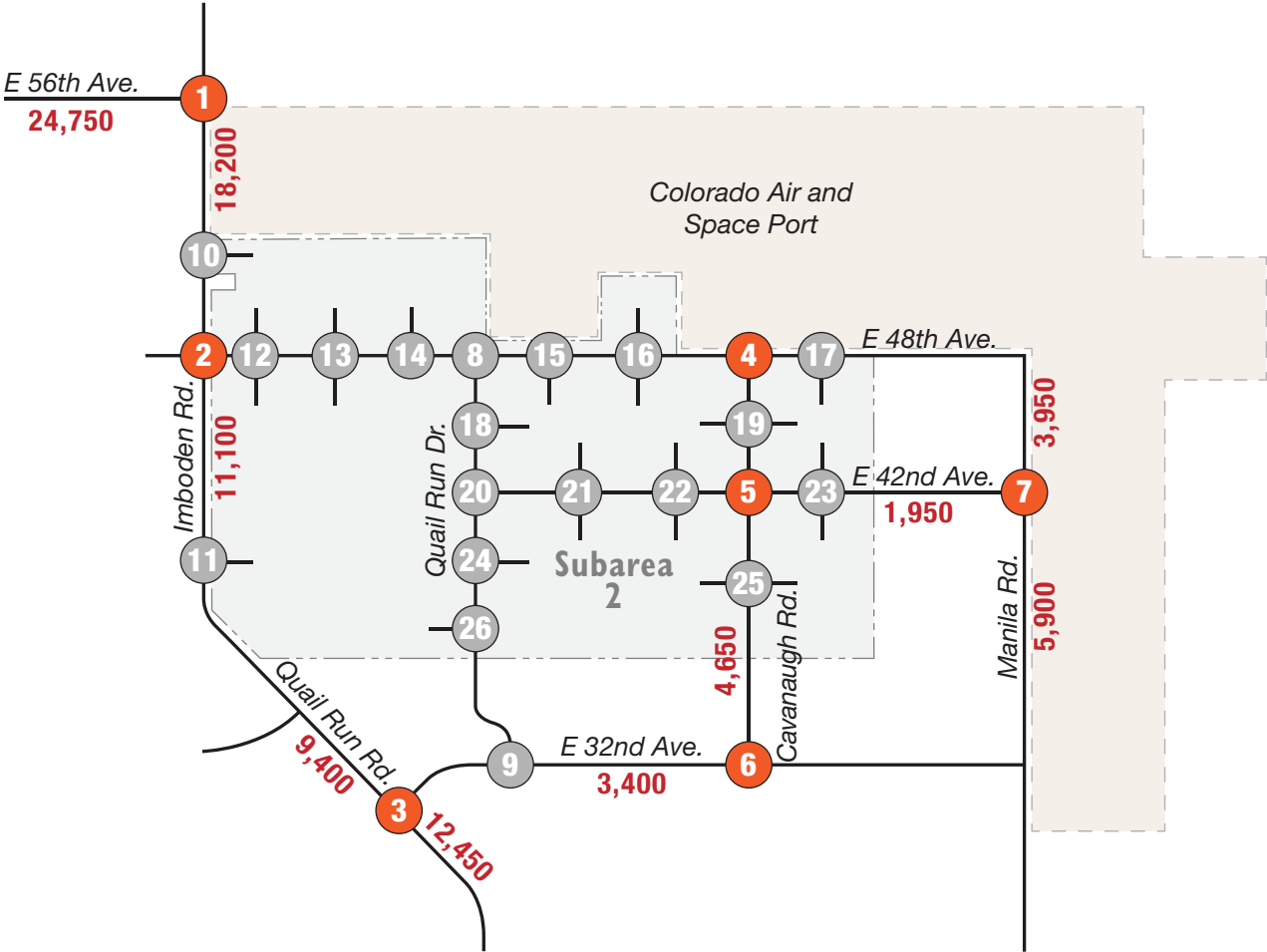
The *NEATS Refresh* traffic volumes have also been supplemented with projections contained within both the *TransPort Colorado Traffic Impact Study Analysis*, July 2022, prepared by Felsburg Holt & Ullevig, and the *Rocky Mountain Rail Park TIS*, July 2018, prepared by Kimley-Horn and Associates.



#### **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

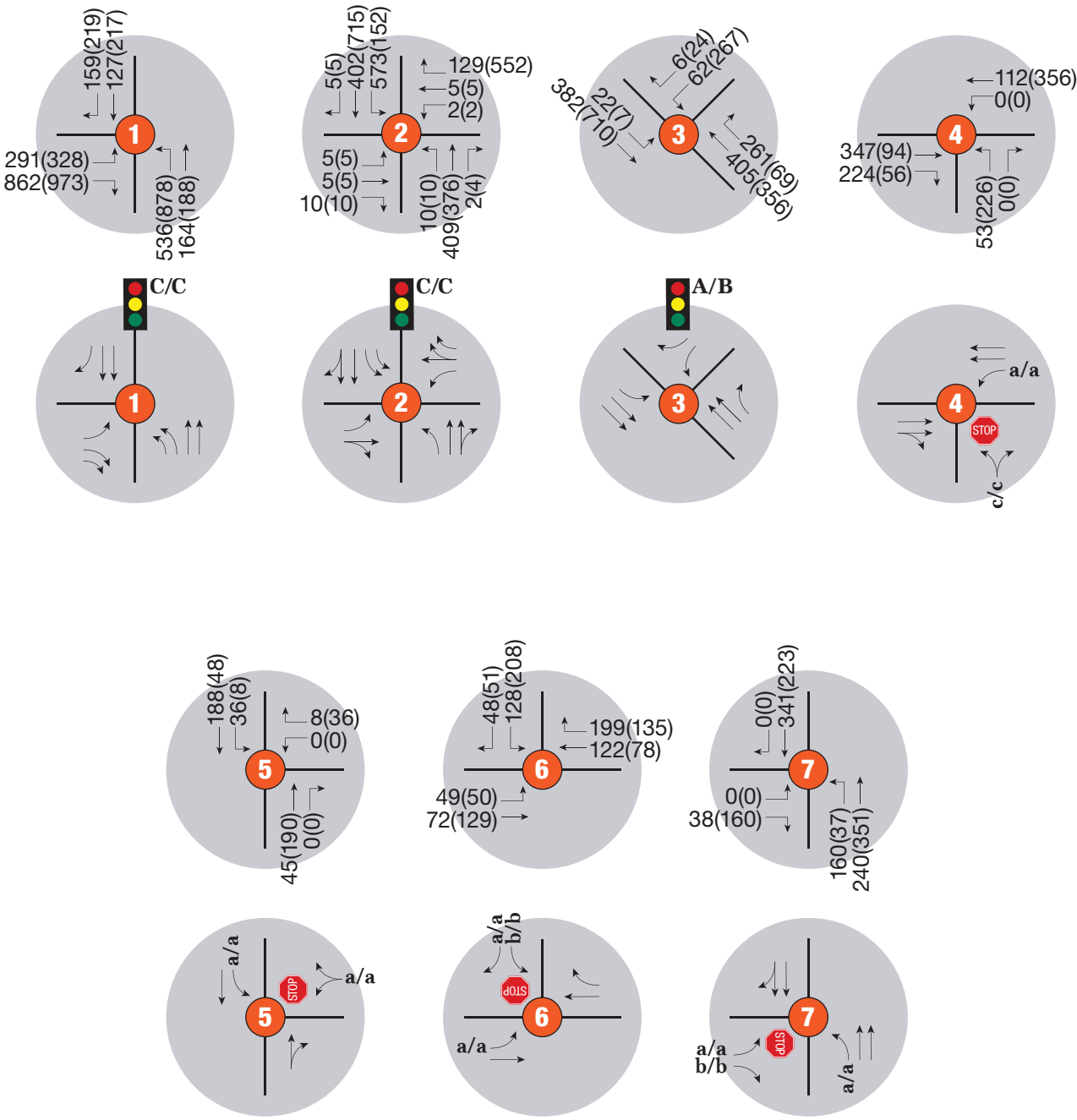
x/x = AM/PM Peak Hour Unsignalized Intersection Level of Service

STOP = Stop Sign

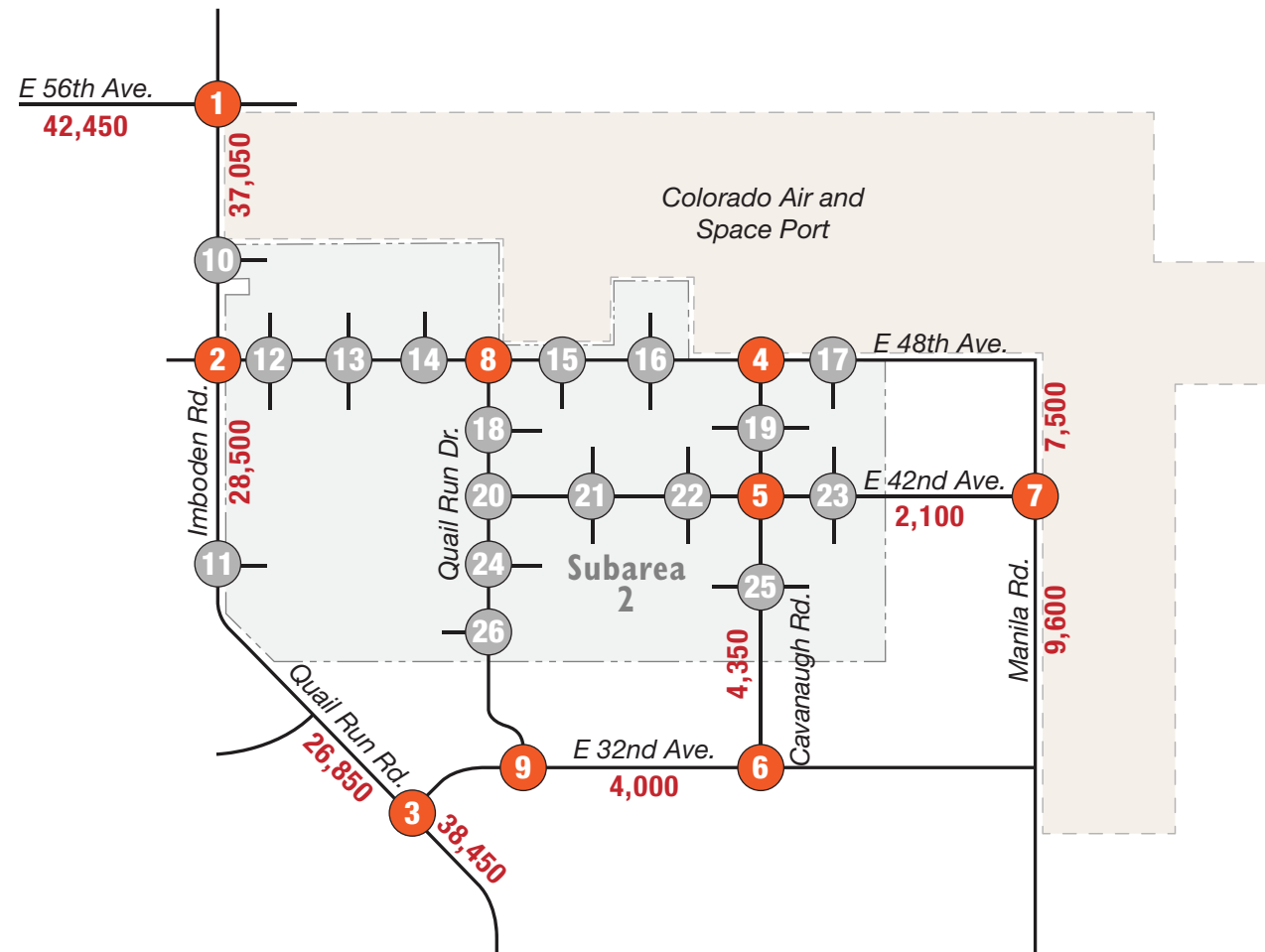
Traffic Signal = Traffic Signal

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

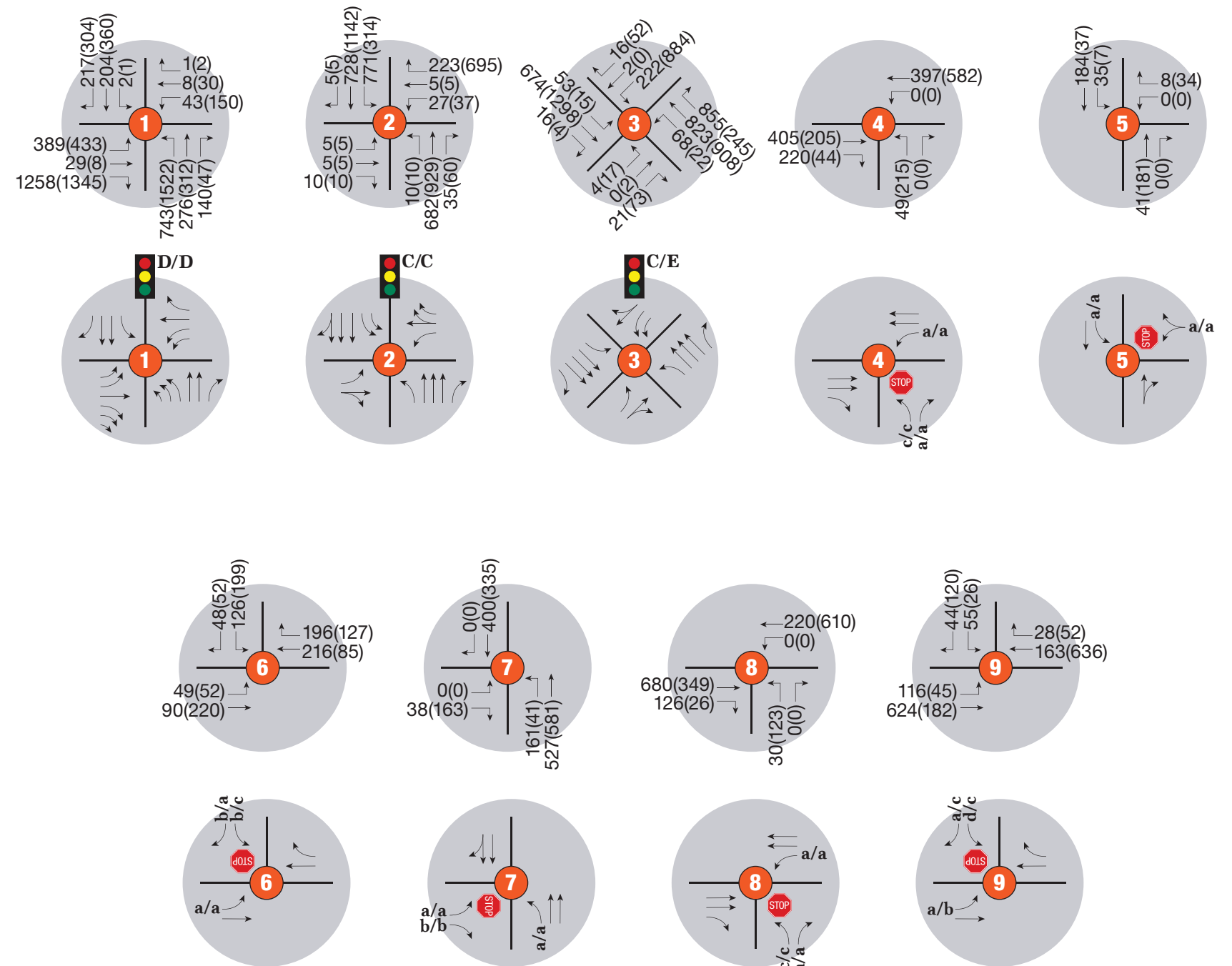
x/x = AM/PM Peak Hour Unsignalized Intersection Level of Service

 = Stop Sign

 = Traffic Signal

 = Intersection Numbers

 = Future Intersection



#### **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 (50.4)	e (58.7)
		EBR	a (3.9)	a (7.4)
		NBL	d (38.7)	d (44.2)
		NBT	a (6.9)	b (10.4)
		SBT	d (35.7)	d (47.8)
		SBR	a (5.3)	b (15.3)
		Overall	C (29.8)	C (31.4)
2 – Signalized	48th Avenue & Imboden Road/Quail Run Road	EBL	d (53.2)	d (49.4)
		EBTR	c (34.4)	c (28.6)
		WBL	d (51.5)	d (44.5)
		WBTR	c (27.3)	c (22.2)
		WBR	a (4.8)	c (26.4)
		NBL	a (8.1)	a (4.4)
		NBTR	b (17.5)	a (9.3)
		SBL	d (52.0)	e (55.3)
		SBTR	a (2.3)	a (4.8)
		Overall	C (26.1)	C (25.2)
3 – Signalized	32nd Avenue & Imboden Road/Quail Run Road	WBL	e (64.1)	e (57.5)
		WBR	c (27.0)	b (10.7)
		NBT	a (5.4)	b (11.5)
		NBR	a (0.6)	a (0.3)
		SBL	a (2.7)	a (9.9)
		SBT	a (2.8)	b (11.5)
		Overall	A (6.6)	B (17.6)
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 (10.0)	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 (38.5)	e (56.1)
		EBT	c (29.2)	d (41.3)
		EBR	b (10.2)	b (17.0)
		WBL	e (60.7)	f (100.6)
		WBT	d (44.3)	e (59.1)
		WBR	a (0)	a (0)
		NBL	c (32.3)	e (71.2)
		NBT	b (10.3)	b (11.8)
		NBR	a (2.3)	a (0.8)
		SBL	d (42.0)	d (52.0)
		SBT	d (45.4)	f (87.5)
		SBR	a (3.7)	b (15.0)
		Overall	D (36.5)	D (54.5)
1 – CFI <sup>1</sup>	56th Avenue & Imboden Road/Quail Run Road	EBL	b (17.8)	c (28.0)
		EBT	c (30.0)	c (29.1)
		EBR	a (0.7)	a (0.8)
		WBL	b (13.9)	c (23.8)
		WBT	c (30.5)	c (24.7)
		WBR	a (0)	a (0)
		NBL	c (25.5)	c (25.6)
		NBT	d (35.5)	c (24.9)
		NBR	a (0.1)	a (0.1)
		SBL	d (40.0)	d (53.0)
		SBT	e (65.2)	e (78.6)
		SBR	a (0.2)	a (0.2)
		Overall	A (9.7)	B (12.2)
2 – Signalized	48th Avenue & Imboden Road/Quail Run Road	EBL	e (55.8)	e (66.2)
		EBTR	d (37.1)	d (41.9)
		WBL	d (49.5)	e (57.8)
		WBTR	b (16.5)	b (18.2)
		WBR	b (12.1)	d (45.7)
		NBL	b (13.4)	a (9.2)
		NBT	c (28.9)	c (22.6)
		NBR	a (0.2)	a (0.2)
		SBL	d (40.5)	d (52.4)
		SBTR	a (3.8)	a (5.2)
		Overall	C (28.0)	C (28.9)
3 – Signalized	32nd Avenue & Imboden Road/Quail Run Road	EBL	d (55.0)	e (72.1)
		EBTR	a (0.3)	c (31.5)
		WBL	d (45.2)	e (61.1)

Intersection #	Intersection	Movement	AM LOS (Delay [sec])	PM LOS (Delay [sec])
		WBTR	b (10.9)	a (0.3)
		NBL	b (12.9)	c (33.4)
		NBT	b (18.9)	c (32.1)
		NBR	a (5.1)	a (0.9)
		SBL	b (13.3)	c (22.7)
		SBT	b (18.4)	d (42.1)
		SBR	a (0.1)	a (0)
		Overall	C (21.7)	<b>E (60.3)</b>
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)
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 (24.0)
		NBR	a (0)	a (0)
9 – TWSC	32nd Avenue & Quail Run Drive	EBL	a (8.2)	b (10.0)
		SBL	d (32.6)	c (22.6)
		SBR	a (9.7)	c (17.9)

<sup>1</sup>HCM does not support clustered intersections. Delay and LOS uses synchro methodology and is additive from cross-over and main intersection delay values.

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 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 dual exclusive left shared through/right and an exclusive right turn lane 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 1 Condition A, Minimum Eight-Hour Vehicular Volume; Warrant 1 Condition B, Interruption of Continuous Traffic; Warrant 1 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 27,450 in 2040 and 45,150 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 13,150 in the Short-Term and 15,300 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 7

- Northbound left turn anticipated to operate at LOS F during the AM and PM peak hour

#### Intersection 9

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

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.

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

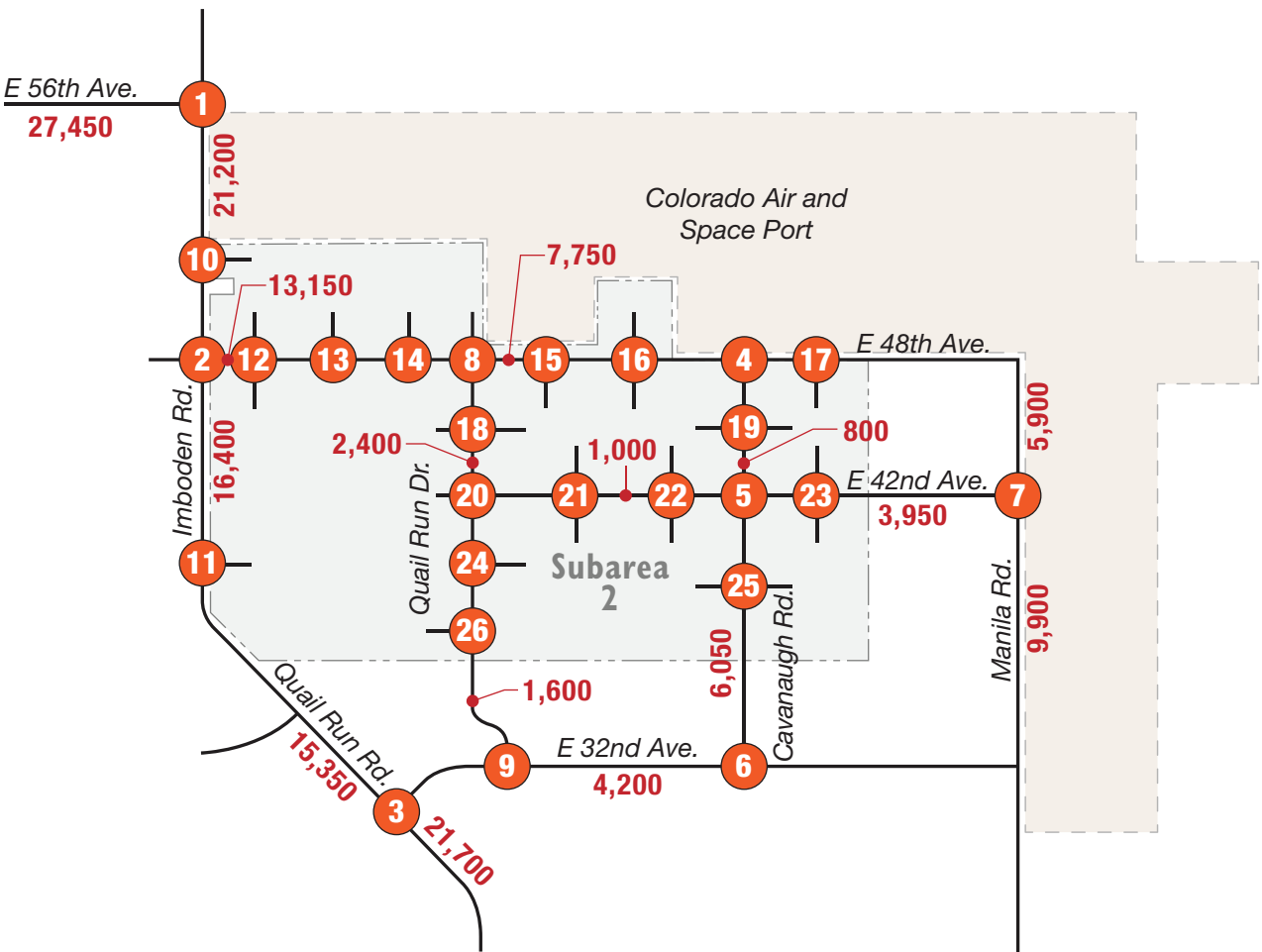
- 32<sup>nd</sup> Avenue
- Quail Run Drive
- Cavanaugh Road
- 42<sup>nd</sup> Avenue

4-Lane Minor Arterial

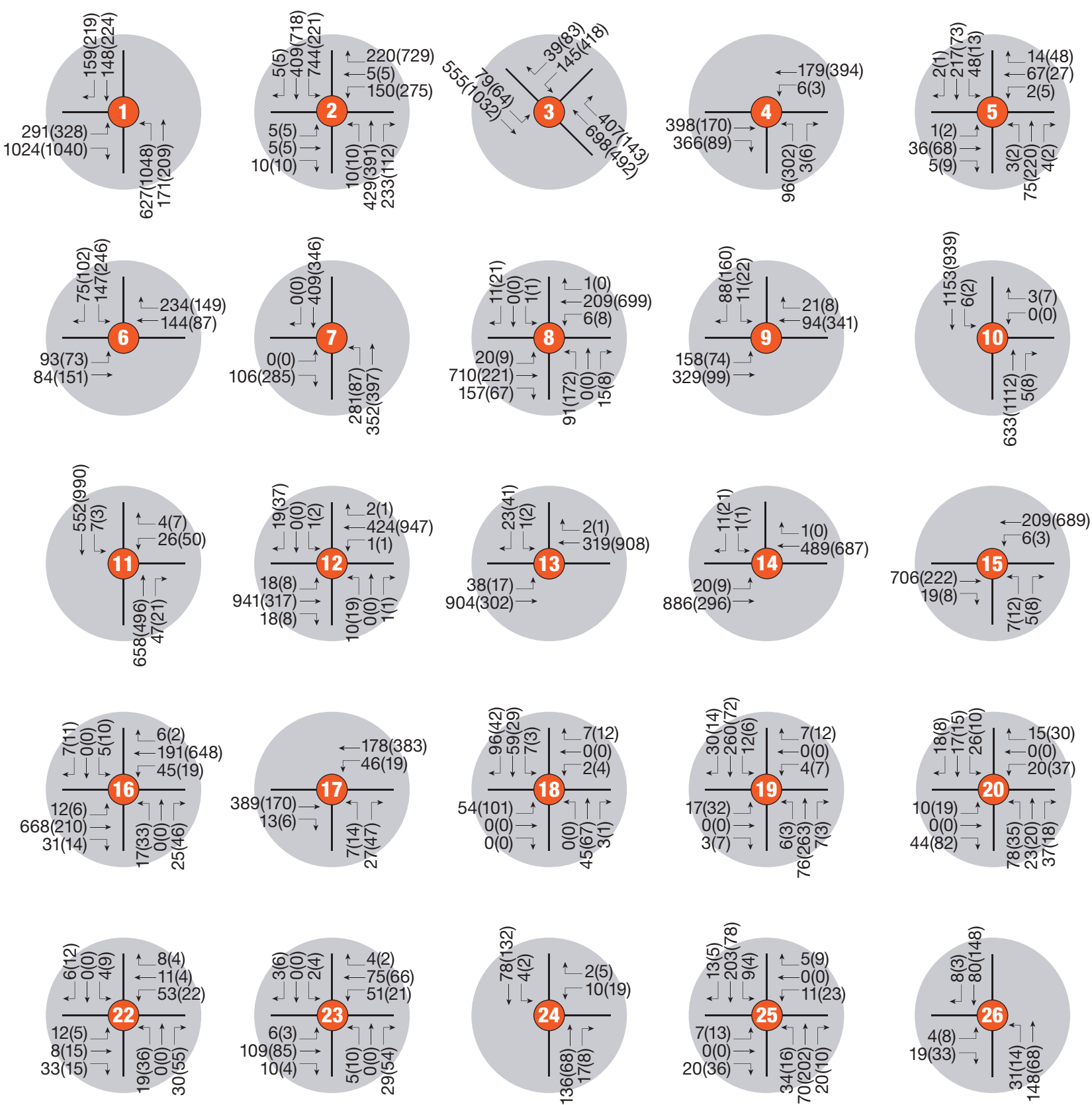
- 56<sup>th</sup> Avenue
- Imboden Road/Quail Run Road
- 48<sup>th</sup> Avenue
- Manila Road

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

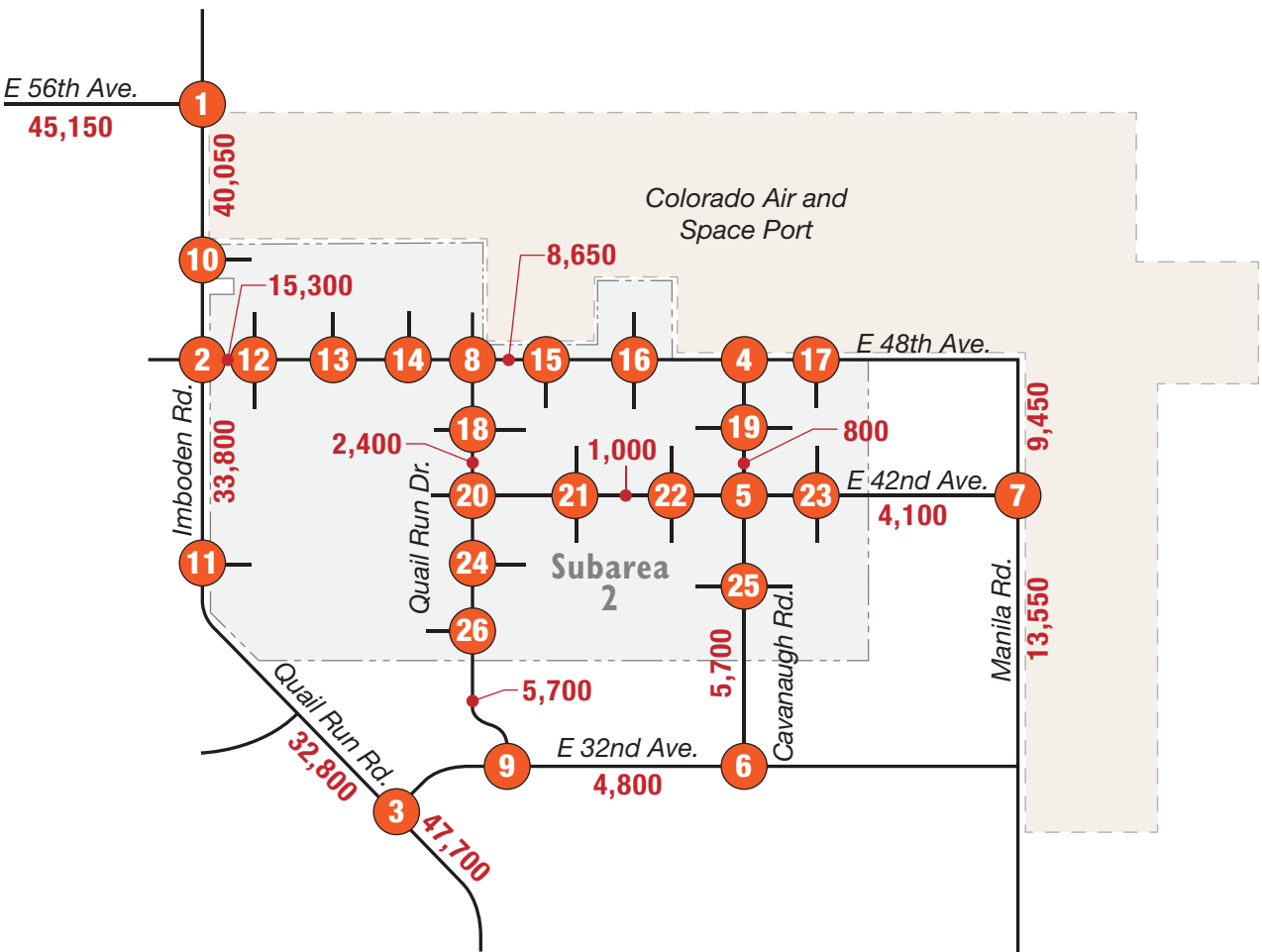


- LEGEND**
- xxx(xxx) = AM(PM) Peak Hour Traffic Volumes
  - XXXX = Daily Traffic Volumes
  - X = Intersection Numbers

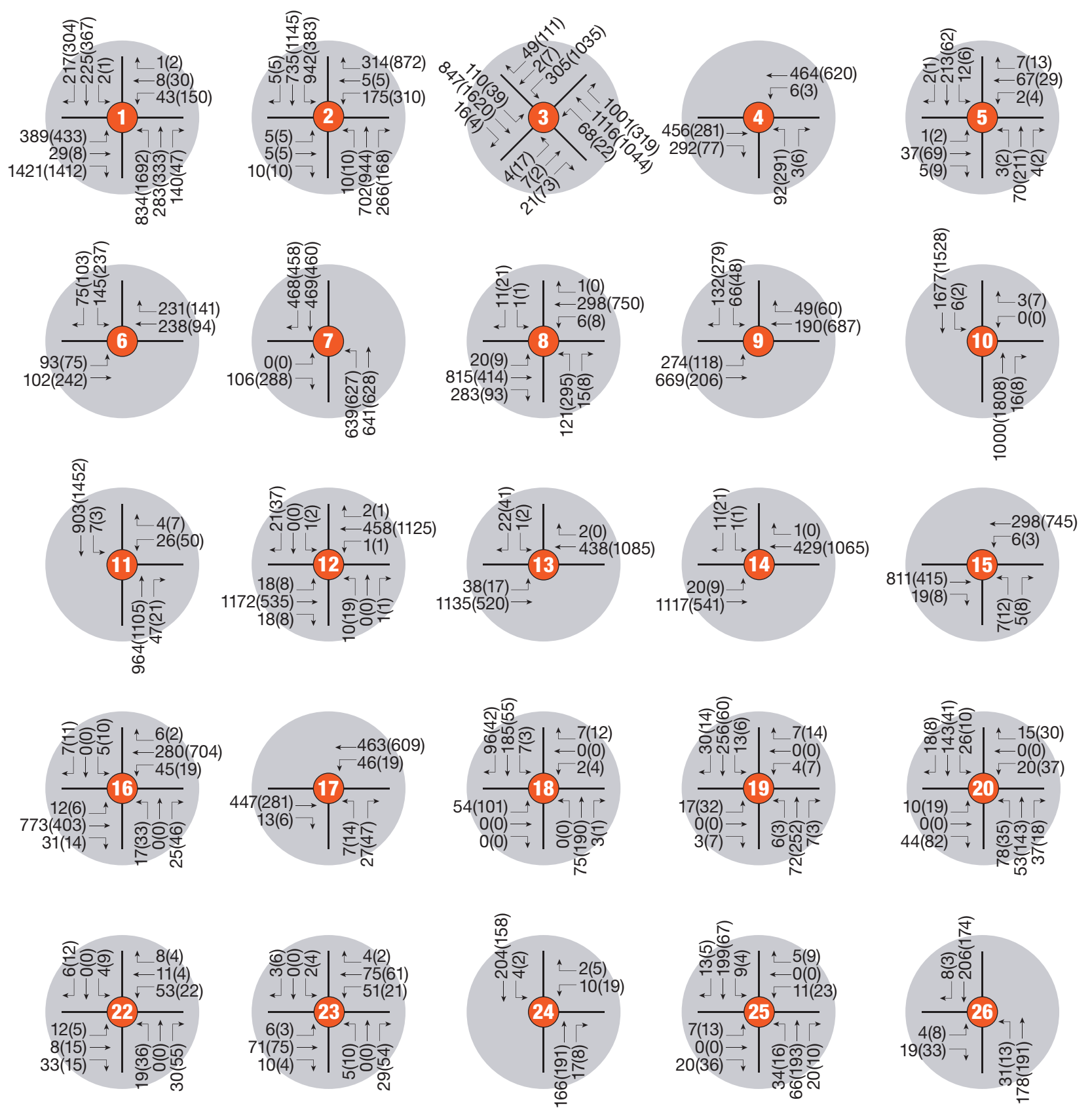


NOTE: Drawing Not to Scale

KEY MAP

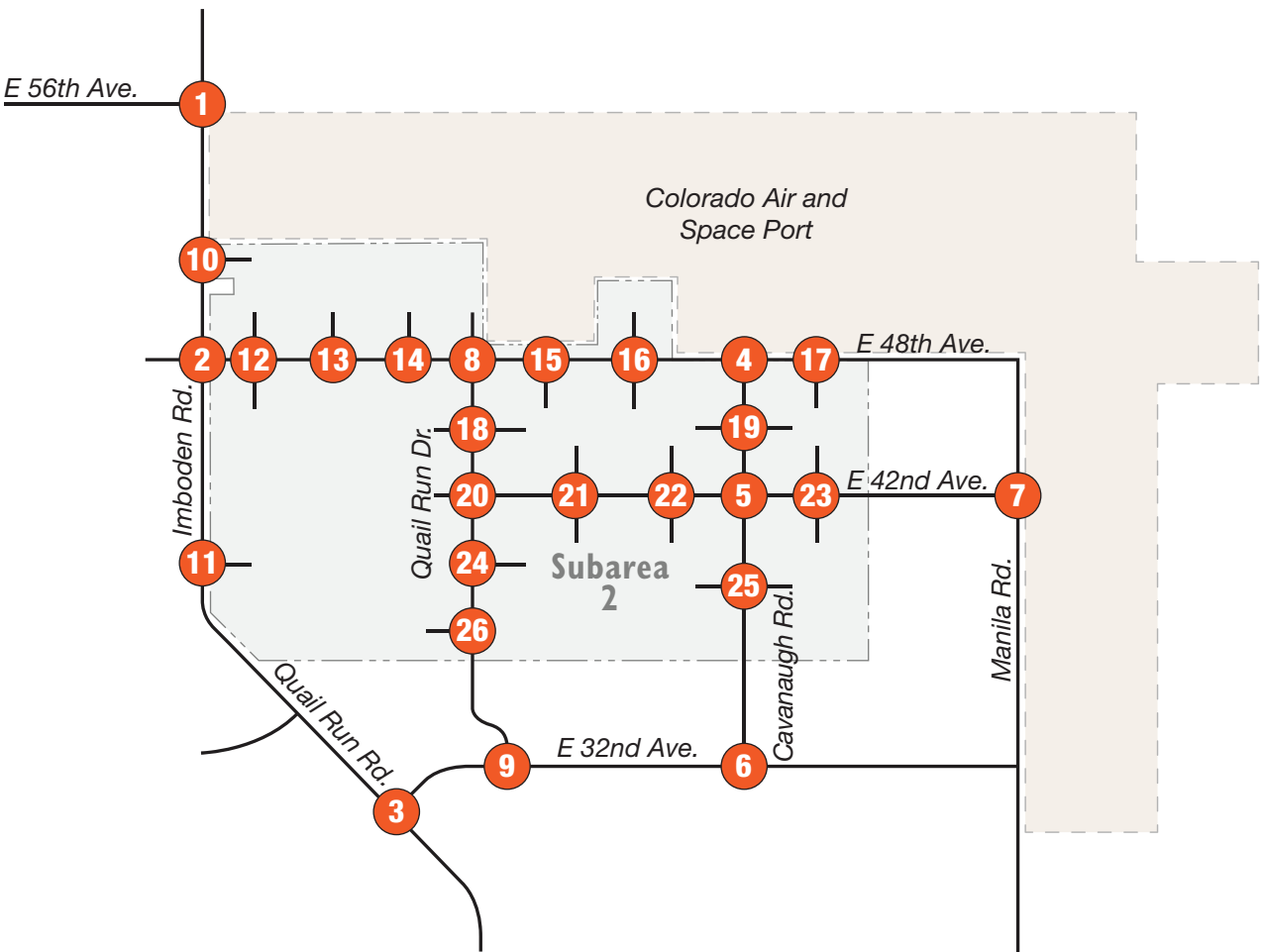


- LEGEND**
- xxx(xxx) = AM(PM) Peak Hour Traffic Volumes
  - XXXX = Daily Traffic Volumes
  - X = Intersection Numbers

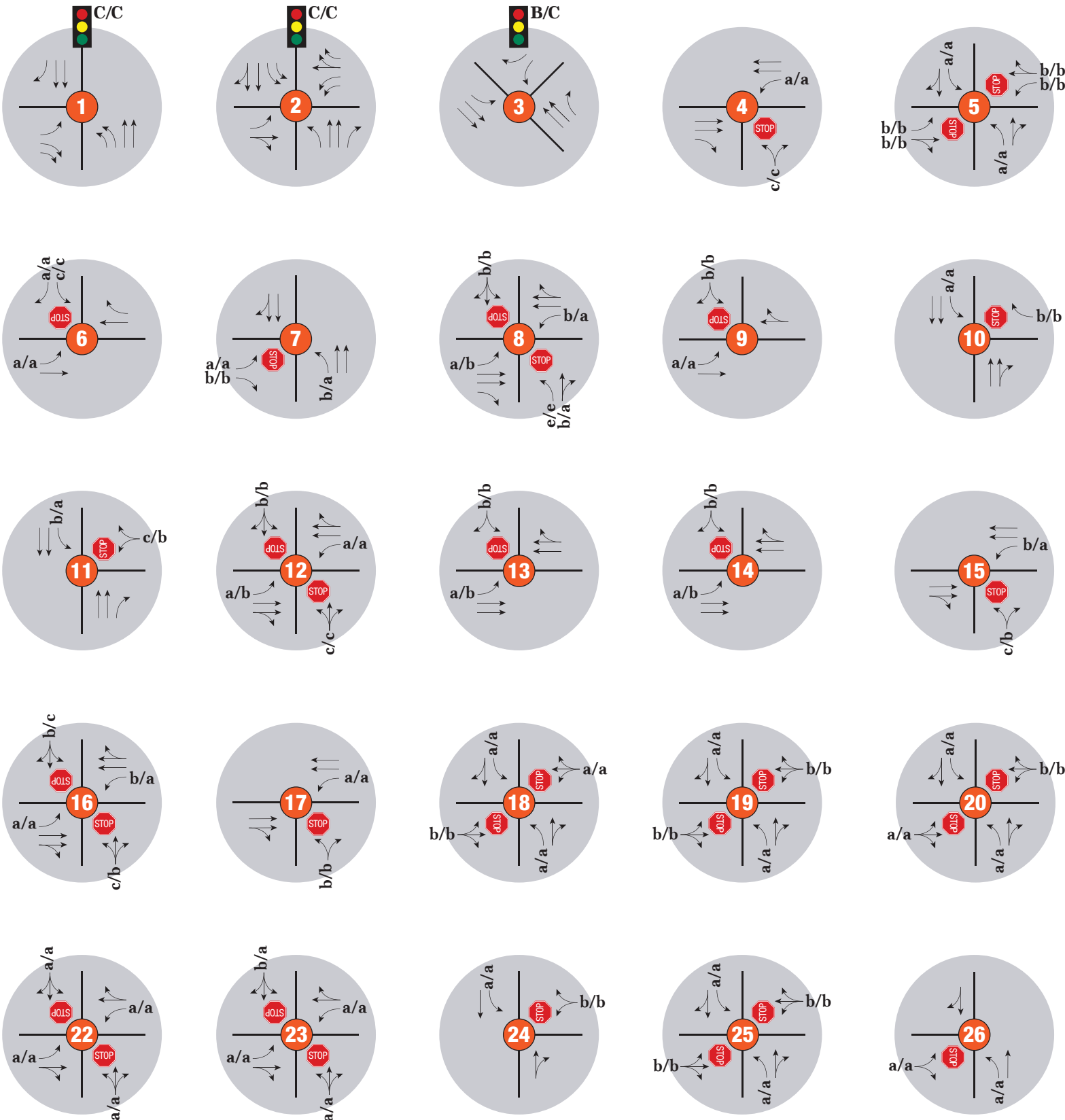


NOTE: Drawing Not to Scale

KEY MAP

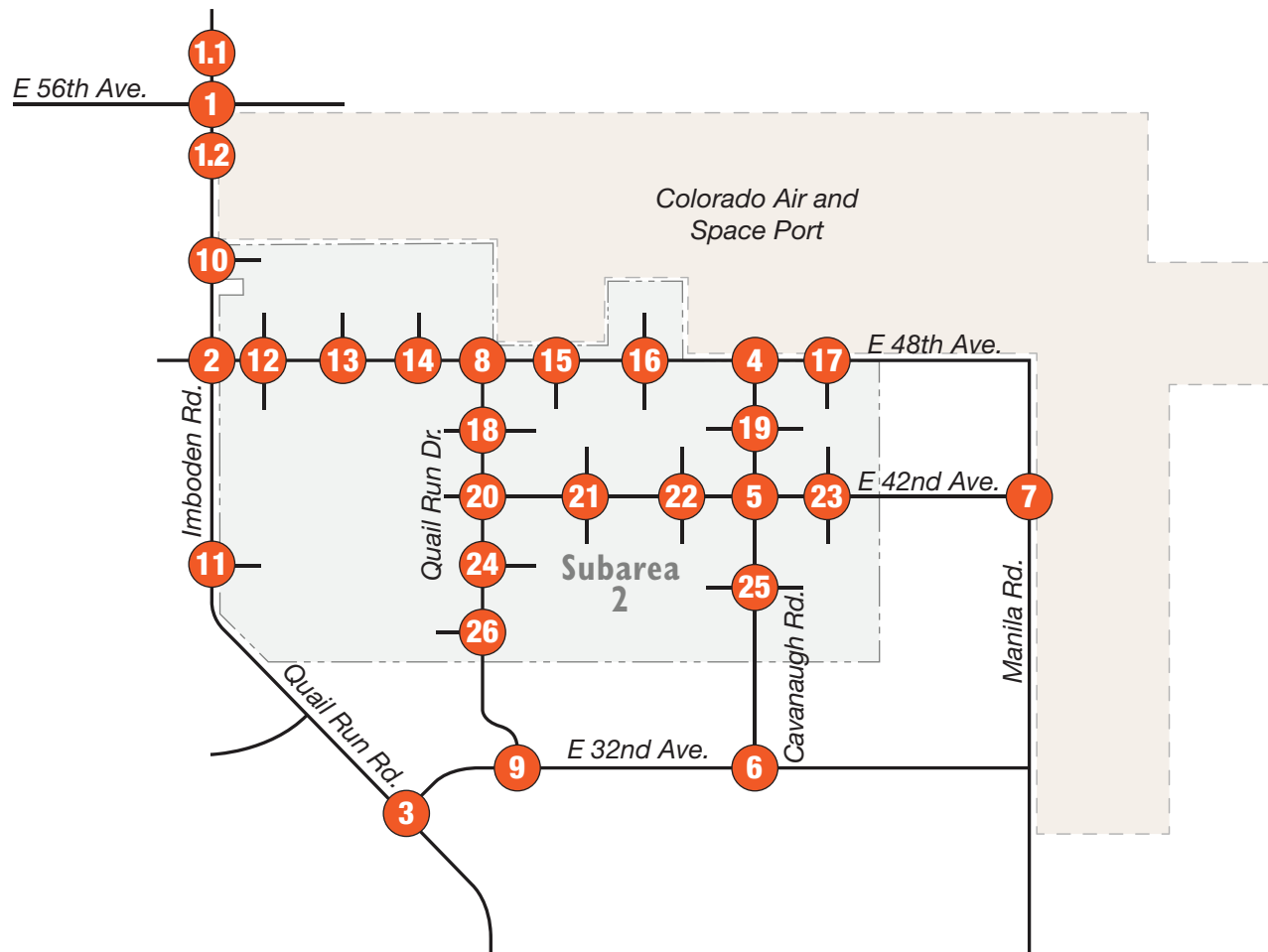


- LEGEND**
- X/X = AM/PM Peak Hour Signalized Intersection Level of Service
  - x/x = AM/PM Peak Hour Unsignalized Intersection Level of Service
  - STOP = Stop Sign
  - Traffic Signal Icon = Traffic Signal
  - X = Intersection Numbers





## KEY MAP

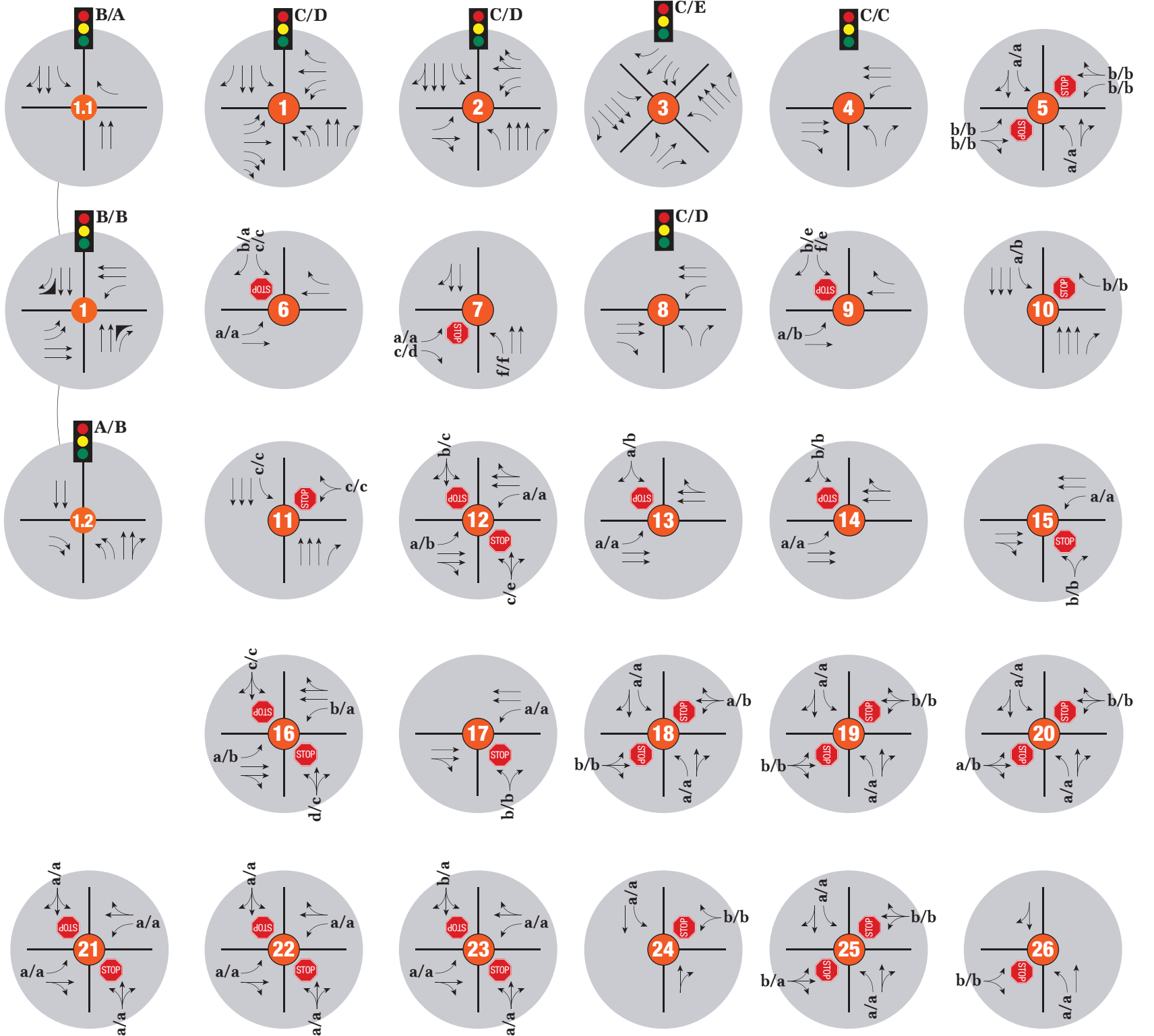


### LEGEND

- 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

NOTE: Drawing Not to Scale

### CFI (Continuous Flow Intersection)



**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	d (50.1)	e (74.5)
		EBR	a (7.5)	a (7.4)
		NBL	c (32.6)	d (48.6)
		NBT	a (5.3)	a (6.9)
		SBT	d (39.6)	d (49.7)
		SBR	a (7.5)	b (19.2)
		Overall	C (29.8)	C (34.8)
2 - Signalized	48th Avenue & Imboden Road	EBL	d (54.6)	d (54.4)
		EBTR	d (37.1)	d (36.8)
		WBL	d (50.0)	d (49.2)
		WBTR	b (13.0)	b (11.9)
		WBR	a (7.1)	c (32.8)
		NBL	b (14.1)	a (9.4)
		NBT	c (31.9)	b (18.6)
		NBR	a (4.2)	a (1.8)
		SBL	d (43.6)	e (56.0)
		SBTR	a (5.9)	a (8.1)
		Overall	C (33.1)	C (28.3)
3 - Signalized	32nd Avenue & Quail Run Road	WBL	e (63.4)	e (56.7)
		WBR	b (13.3)	a (5.4)
		NBT	b (11.7)	c (23.7)
		NBR	a (1.1)	a (0.5)
		SBL	a (6.0)	b (15.7)
		SBT	a (5.6)	c (23.6)
		Overall	B (10.8)	C (26.3)
4 - TWSC	48th Avenue & Cavanaugh Road	WBL	b (10.5)	a (8.2)
		NBLR	c (16.5)	c (23.6)
5 - TWSC	42nd Avenue & Cavanaugh Road	EBL	b (14.6)	b (12.8)
		EBTR	b (13.2)	b (12.6)
		WBL	b (13.6)	b (12.9)
		WBTR	b (13.6)	b (11.3)
		NBL	a (8.0)	a (7.6)
		SBL	a (7.7)	a (8.0)
6 - TWSC	32nd Avenue & Cavanaugh Road	EBL	a (8.9)	a (8.3)
		SBL	c (16.4)	c (19.3)
		SBR	a (9.8)	a (9.6)
7 - TWSC	Manila Road & 42nd Avenue	EBL	a (0)	a (0)
		EBR	b (11.0)	b (13.0)
		NBL	b (10.4)	a (8.8)
8 - TWSC		EBL	a (8.1)	b (10.1)

Short Term Total LOS Summary				
Intersection #	Intersection	Movement	AM LOS (Delay [sec])	PM LOS (Delay [sec])
	48th Avenue & Quail Run Drive	WBL	b (11.1)	a (8.3)
		NBL	e (48.0)	e (37.4)
		NBTR	b (11.7)	a (9.3)
		SBLTR	b (10.0)	b (12.4)
9 - TWSC	32nd Avenue & Quail Run Drive	EBL	a (8.1)	a (8.7)
		SBLR	a (10.9)	b (14.5)
10 - TWSC	PA-2 Access & Imboden	WBR	b (11.2)	b (11.4)
		SBL	a (9.8)	a (9.4)
11 - TWSC	PA-5 Access & Imboden	WBLR	c (16.3)	b (11.8)
		SBL	b (10.1)	a (9.2)
12 - TWSC	PA-2 Access & 48th Avenue	EBL	a (8.9)	b (11.7)
		WBL	a (8.9)	a (7.9)
		NBLTR	c (15.7)	c (19.9)
		SBLTR	b (10.3)	b (14.9)
13 - TWSC	PA-3 Western Access & 48th Avenue	EBL	a (8.5)	b (11.5)
		SBLTR	b (10.4)	b (14.6)
14 - TWSC	PA-3 Eastern Access & 48th Avenue	EBL	a (9.2)	b (10.1)
		SBLTR	b (11.8)	b (12.2)
15 - TWSC	PA-8A Access & 48th Avenue	WBL	b (10.2)	a (8.1)
		NBLR	c (17.2)	b (13.0)
16 - TWSC	PA-4 Access & 48th Avenue	EBL	a (8.0)	a (9.8)
		WBL	b (10.4)	a (8.1)
		NBLTR	c (20.4)	b (14.1)
		SBLTR	b (13.7)	c (18.2)
17 - TWSC	PA-8B Access & 48th Avenue	WBL	a (8.9)	a (8.0)
		NBLR	b (11.5)	b (10.4)
18 - TWSC	PA-8A Access & Quail Run Drive	EBLTR	b (10.4)	b (10.5)
		WBLTR	a (9.0)	a (9.1)
		NBL	a (0)	a (0)
		SBL	a (7.6)	a (7.6)
19 - TWSC	PA-8B Access & Cavanaugh Road	EBLTR	b (12.3)	b (12.1)
		WBLTR	b (10.2)	b (11.0)
		NBL	a (8.2)	a (7.6)
		SBL	a (7.6)	a (8.1)
20 - TWSC		EBLTR	a (9.4)	a (9.4)
		WBLTR	b (10.7)	a (10.0)



Short Term Total LOS Summary				
Intersection #	Intersection	Movement	AM LOS (Delay [sec])	PM LOS (Delay [sec])
	42nd Avenue & Quail Run Drive	NBL	a (7.7)	a (7.5)
		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 (9.2)	a (9.1)
		SBLTR	a (8.8)	a (8.9)
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 (7.8)	a (7.7)
		NBLTR	a (9.7)	a (9.6)
		SBLTR	b (10.1)	a (9.8)
24 - TWSC	PA-9 Access & Quail Run Drive	WBLR	b (10.2)	b (10.0)
		SBL	a (7.8)	a (7.6)
25 - TWSC	PA-9 Access & Cavanaugh Road	EBLTR	b (10.6)	b (10.0)
		WBLTR	b (11.5)	b (11.8)
		NBL	a (8.1)	a (7.7)
		SBL	a (7.7)	a (8.0)
26 - TWSC	PA-7 Access & Quail Run Drive	EBLR	a (9.4)	a (9.8)
		NBL	a (7.7)	a (7.8)

**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	c (30.8)	e (79.2)
		EBT	c (29.1)	d (48.4)
		EBR	b (10.4)	b (15.5)
		WBL	e (60.7)	f (86.5)
		WBT	e (56.6)	e (62.5)
		WBR	a (0)	a (0)
		NBL	c (28.3)	f (95.2)
		NBT	a (7.6)	b (16.4)
		NBR	a (0.5)	a (3.8)
		SBL	d (43.5)	d (55.0)
		SBT	d (50.6)	f (83.3)
		SBR	a (2.3)	b (15.8)
		Overall	C (29.0)	D (45.1)
1 – CFI <sup>1</sup>	56th Avenue & Imboden Road/Quail Run Road	EBL	b (17.8)	c (27.9)
		EBT	c (30.0)	c (29.1)
		EBR	a (1.0)	a (0.9)
		WBL	b (13.9)	c (23.7)
		WBT	c (30.5)	c (24.7)
		WBR	a (0)	a (0)
		NBL	c (26.4)	c (31.5)
		NBT	d (35.4)	c (24.9)
		NBR	a (0.1)	a (0.1)
		SBL	d (50.0)	d (53.0)
		SBT	e (66.5)	e (79.8)
		SBR	a (0.1)	a (0.2)
		Overall	A (9.6)	B (13.1)
2 - Signalized	48th Avenue & Imboden Road	EBL	d (54.6)	e (69.8)
		EBTR	d (37.1)	d (44.1)
		WBL	d (49.7)	e (60.5)
		WBTR	b (13.8)	c (20.6)
		WBR	a (7.8)	d (46.9)
		NBL	c (28.7)	b (12.9)
		NBT	c (31.8)	a (30.9)
		NBR	a (6.5)	a (4.2)
		SBL	d (53.0)	e (60.3)
		SBTR	a (3.8)	b (10.5)
		Overall	C (30.5)	D (35.9)
3 - Signalized	32nd Avenue & Quail Run Road	EBL	d (54.8)	e (79.5)
		EBT	e (56.4)	e (66.0)
		EBR	a (1.4)	a (5.8)
		WBL	d (43.5)	e (77.2)
		WBT	c (25.0)	c (20.3)
		WBR	a (3.7)	a (3.9)
		NBL	b (13.9)	d (36.9)
		NBT	b (16.6)	d (43.6)
		NBR	b (10.3)	a (1.1)

Long Term Total LOS Summary				
Intersection #	Intersection	Movement	AM LOS (Delay [sec])	PM LOS (Delay [sec])
		SBL	b (12.6)	d (43.2)
		SBT	b (19.3)	f (87.6)
		SBR	a (0.1)	a (0)
		Overall	C (31.8)	E (74.9)
4 - Signalized	48th Avenue & Cavanaugh Road	EBT	c (29.3)	b (10.2)
		EBR	a (0.3)	a (0.1)
		WBL	c (33.7)	c (24.3)
		WBT	d (49.2)	d (42)
		NBL	a (8.4)	b (15.5)
		NBR	a (5.7)	a (7.5)
		Overall	C (33.0)	C (31.0)
5 - TWSC	42nd Avenue & Cavanaugh Road	EBL	b (12.7)	b (11.7)
		EBTR	b (12.1)	b (12.2)
		WBL	b (12.1)	b (12.4)
		WBTR	b (12.5)	b (11.4)
		NBL	a (8.0)	a (7.6)
		SBL	a (7.6)	a (8.0)
6 - TWSC	32nd Avenue & Cavanaugh Road	EBL	a (9.3)	a (8.3)
		SBL	c (19.9)	c (24.2)
		SBR	b (10.6)	a (9.6)
7 - TWSC	Manila Road & 42nd Avenue	EBL	a (0)	a (0)
		EBR	c (15.7)	d (27.9)
		NBL	f (151.8)	f (131.8)
8 - Signalized	48th Avenue & Quail Run Drive	EBT	b (14.7)	c (33.4)
		EBR	a (1.2)	a (2.0)
		EBL	a (6.1)	c (22.6)
		WBL	b (11)	b (16.6)
		WBT	b (14.4)	c (31.3)
		NBL	b (19.1)	b (19.7)
		SBT	a (0.1)	a (0.2)
		Overall	C (33.9)	D (36.8)
9 - TWSC	32nd Avenue & Quail Run Drive	EBL	a (9.1)	b (11.1)
		SBL	f (143.8)	e (42.8)
		SBR	b (0.7)	e (43.6)
10 - TWSC	PA-2 Access & Imboden	WVBR	a (10.5)	b (12.9)
		SBL	a (9.5)	b (11.3)
11 - TWSC	PA-5 Access & Imboden	WBLR	c (16.7)	c (15.8)
		SBL	c (17.7)	c (19.5)
12 - TWSC	PA-2 Access & 48th Avenue	EBL	a (9.0)	b (13.1)
		WBL	a (9.6)	a (8.1)
		NBLTR	c (18.2)	e (48.0)
		SBLTR	b (10.5)	c (18.8)
13 - TWSC	PA-3 Western Access & 48th Avenue	EBL	a (8.1)	a (9.3)
		SBLR	a (9.9)	b (13.5)

Long Term Total LOS Summary				
Intersection #	Intersection	Movement	AM LOS (Delay [sec])	PM LOS (Delay [sec])
14 - TWSC	PA-3 Eastern Access & 48th Avenue	EBL	a (8.0)	a (9.2)
		SBLTR	b (10.2)	b (12.9)
15 - TWSC	PA-8A Access & 48th Avenue	WBL	a (8.6)	a (7.9)
		NBLR	b (11.5)	b (12.6)
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)
17 - TWSC	PA-8B Access & 48th Avenue	WBL	a (9.2)	a (8.4)
		NBLR	b (12.8)	b (11.7)
18 - TWSC	PA-8A Access & Quail Run Drive	EBLTR	b (11.4)	b (12.2)
		WBLTR	a (9.4)	b (10.0)
		NBL	a (0)	a (0)
		SBL	a (7.6)	a (7.9)
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 (10.1)	a (9.9)
		WBLTR	b (11.9)	b (11.8)
		NBL	a (7.9)	a (7.6)
		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 (8.9)	a (8.9)
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 (10.0)	a (9.7)
24 - TWSC	PA-9 Access & Quail Run Drive	WBLR	b (11.4)	b (11.2)
		SBL	a (7.9)	a (7.9)
25 - TWSC	PA-9 Access & Cavanaugh Road	EBLTR	b (10.6)	a (9.9)
		WBLTR	b (11.5)	b (11.6)
		NBL	a (8.1)	a (7.6)
		SBL	a (7.7)	a (8.0)
26 - TWSC		EBLR	b (10.4)	b (10.3)

Long Term Total LOS Summary				
Intersection #	Intersection	Movement	AM LOS (Delay [sec])	PM LOS (Delay [sec])
	PA-7 Access & Quail Run Drive	NBL	a (8.1)	a (7.9)

<sup>1</sup>HCM does not support clustered intersections. Delay and LOS uses synchro methodology and is additive from cross-over and main intersection delay values.

## 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 as well as the existing interchanges at Watkins Road and Manila Road. Watkins Road has been identified for future improvements by Arapahoe County in recent planning studies in support of significant development plans south of I-70 most notably the master planned Prosper development. Improvements at the interchange of Manila Road and I-70 have also been identified as part of the Port Colorado Master TIS but are not anticipated to be necessary with the development of Subarea 2 under the assumption of Quail Run interchange serving that area of development. All interchange work along I-70 will need to follow the CDOT I601 process to gain approval from CDOT and FHWA.

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 dual left, shared through/right, and exclusive right 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
- An alternative for 56<sup>th</sup> Avenue/Imboden Road/Quail Run Road would be to create a CFI, instead of providing triple rights and triple lefts which could potentially be a very large intersection to sustain a high volume of traffic
- 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 I3

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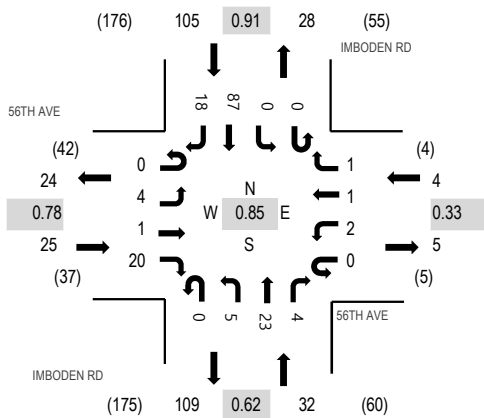
**Location:** 1 IMBODEN RD & 56TH AVE AM

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

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

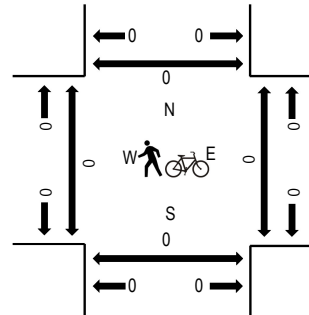
**Peak 15-Minutes:** 06:45 AM - 07:00 AM

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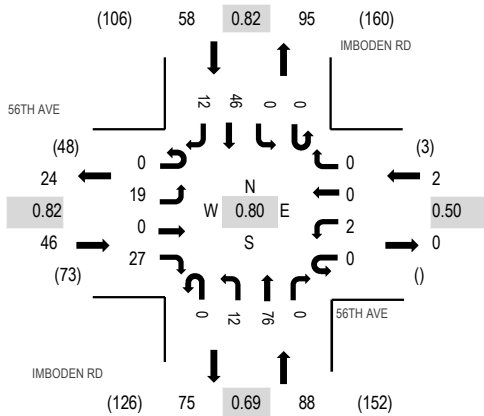
**Location:** 1 IMBODEN RD & 56TH AVE PM

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

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

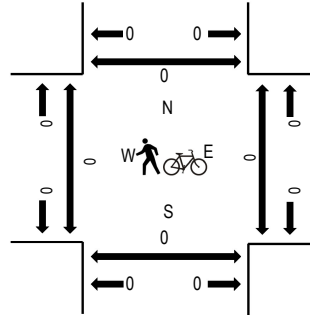
**Peak 15-Minutes:** 05:00 PM - 05:15 PM

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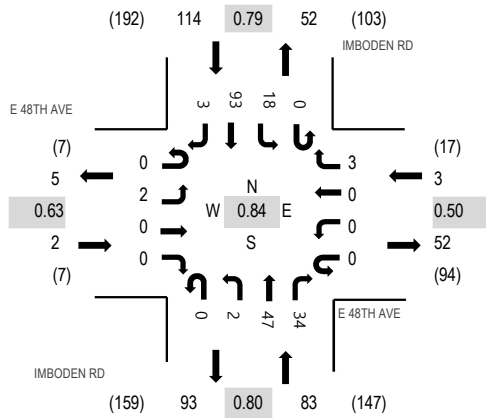
**Location:** 2 IMBODEN RD & E 48TH AVE AM

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

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

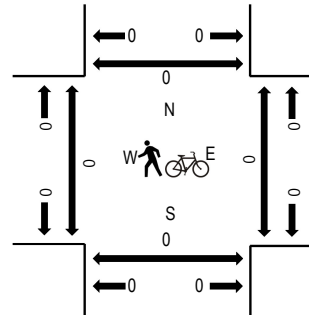
**Peak 15-Minutes:** 06:45 AM - 07:00 AM

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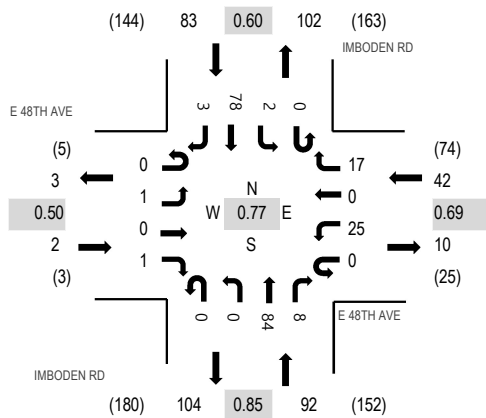
**Location:** 2 IMBODEN RD & E 48TH AVE PM

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

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

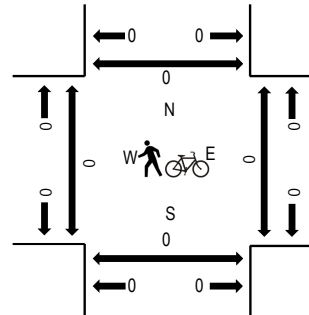
**Peak 15-Minutes:** 04:45 PM - 05:00 PM

### 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  
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/v	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/veh)	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  
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/v	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/veh)	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  
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/v	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/veh)	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  
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/v	9.6		10		0		0.2	
HCM LOS	A		B					

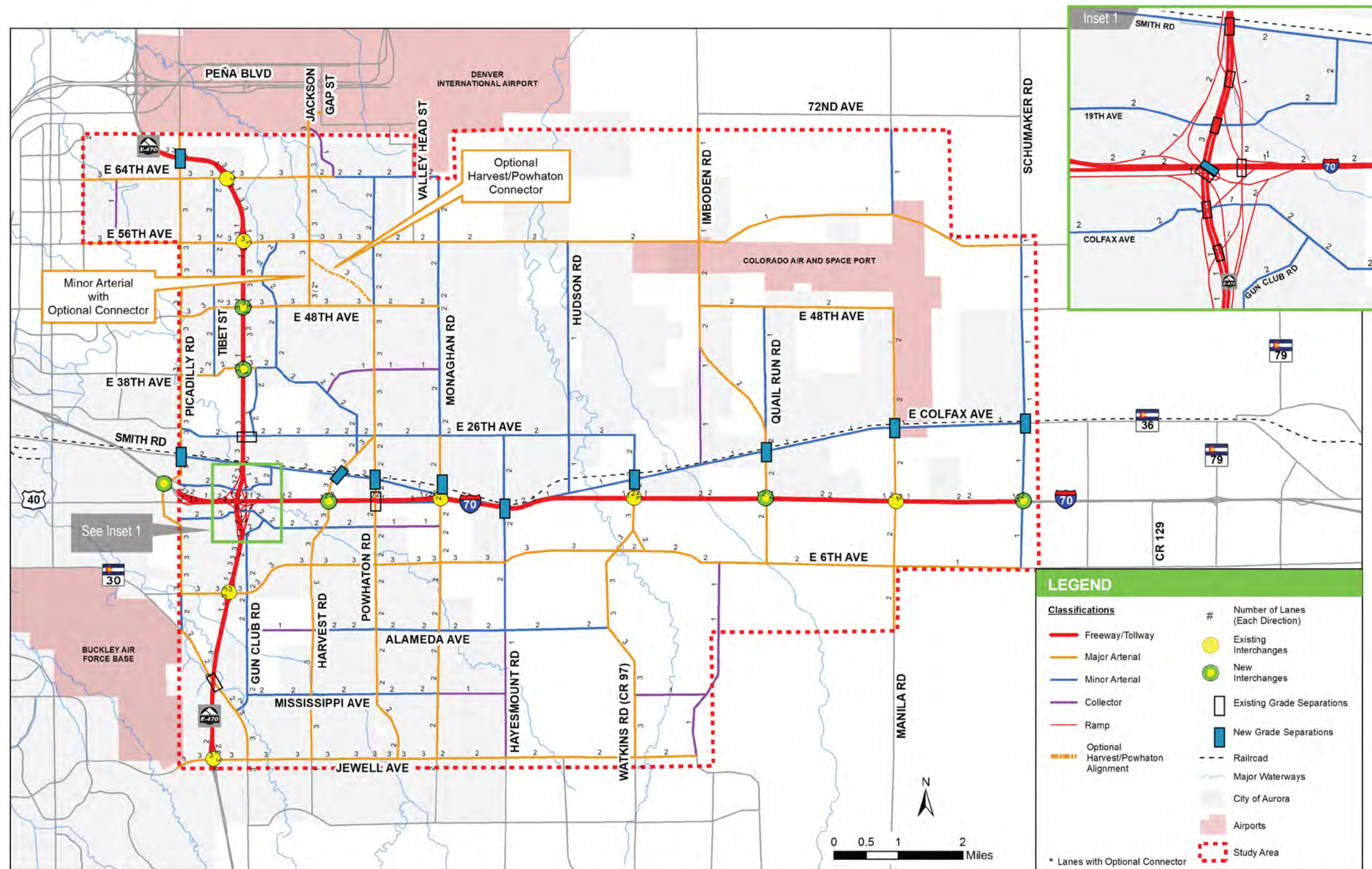
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1431	-	-	786	780	1411	-
HCM Lane V/C Ratio	-	-	-	0.003	0.072	0.002	-
HCM Control Delay (s/veh)	0	-	-	9.6	10	7.6	-
HCM Lane LOS	A	-	-	A	B	A	-
HCM 95th %tile Q (veh)	0	-	-	0	0.2	0	-

## 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

Short Term 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 Effect Green (s)	34.5	72.6	32.6	74.5	36.4	76.4
Actuated g/C Ratio	0.29	0.61	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 (s/veh)	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 (s/veh)	50.4	3.9	38.7	6.9	35.7	5.3
LOS	D	A	D	A	D	A
Approach Delay (s/veh)	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 (s/veh): 21.2

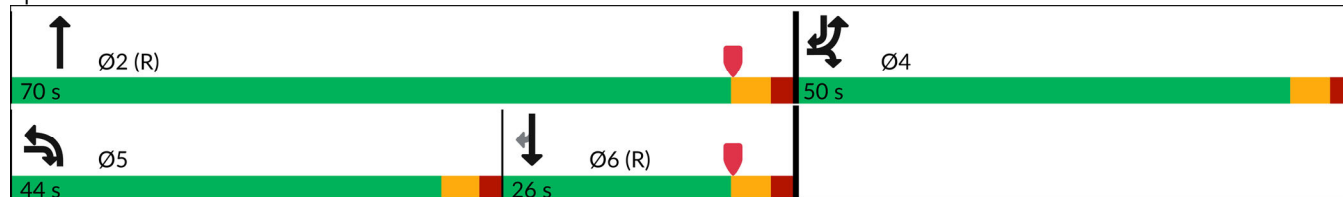
Intersection LOS: C

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

Short Term 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, s/veh			29.8			
HCM 6th LOS			C			

# Timings 2: Imboden Rd & 48th Avenue

Short Term 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	pm+pt	NA	Prot	NA
Protected Phases		4		8	1	5	2	1	6
Permitted Phases	4		8		8	2			
Detector Phase	4	4	8	8	1	5	2	1	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.5	23.5	23.5	23.5	10.5	10.5	23.5	10.5	23.5
Total Split (s)	25.0	25.0	25.0	25.0	52.0	12.0	43.0	52.0	83.0
Total Split (%)	20.8%	20.8%	20.8%	20.8%	43.3%	10.0%	35.8%	43.3%	69.2%
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	Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Max	None	C-Max
Act Effct Green (s)	7.5	7.5	7.5	7.5	43.6	71.0	65.4	32.9	102.5
Actuated g/C Ratio	0.06	0.06	0.06	0.06	0.36	0.59	0.55	0.27	0.85
v/c Ratio	0.08	0.17	0.03	0.52	0.15	0.02	0.28	0.81	0.18
Control Delay (s/veh)	53.2	34.4	51.5	27.3	4.8	8.1	17.5	52.0	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	53.2	34.4	51.5	27.3	4.8	8.1	17.5	52.0	2.3
LOS	D	C	D	C	A	A	B	D	A
Approach Delay (s/veh)		38.9		16.5			17.2		31.4
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 (s/veh): 26.3

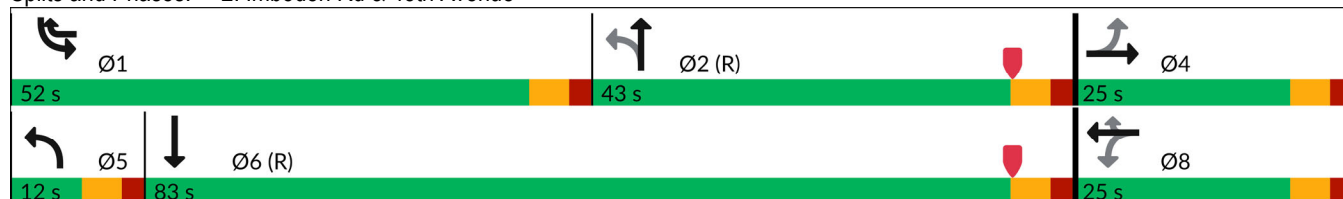
Intersection LOS: C

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

Short 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	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	508	1643	7	703	2324	27
Arrive On Green	0.06	0.06	0.06	0.06	0.00	0.06	0.01	0.55	0.55	0.25	0.79	0.79
Sat Flow, veh/h	1018	425	936	1143	0	2592	1457	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	1457	1453	1527	1413	1453	1523
Q Serve(g_s), s	0.6	0.0	1.3	0.2	0.0	4.8	0.4	9.4	9.5	25.5	4.4	4.4
Cycle Q Clear(g_c), s	0.6	0.0	1.3	1.5	0.0	4.8	0.4	9.4	9.5	25.5	4.4	4.4
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	508	804	845	703	1147	1203
V/C Ratio(X)	0.04	0.00	0.20	0.02	0.00	0.18	0.02	0.27	0.27	0.89	0.19	0.19
Avail Cap(c_a), veh/h	225	0	221	233	0	1066	568	804	845	1095	1147	1203
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	11.4	14.1	14.1	43.4	3.1	3.1
Incr Delay (d2), s/veh	0.1	0.0	1.2	0.1	0.0	0.1	0.0	0.8	0.8	4.9	0.3	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	0.1	0.0	2.8	0.2	5.9	6.2	13.9	2.1	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	53.4	0.0	54.8	54.4	0.0	30.4	11.4	14.9	14.9	48.4	3.4	3.4
LnGrp LOS	D		D	D		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			29.7		
Approach LOS	D			C			B			C		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	35.4	71.9		12.7	7.0	100.3		12.7				
Change Period (Y+Rc), s	5.5	5.5		5.5	5.5	5.5		5.5				
Max Green Setting (Gmax), s	46.5	37.5		19.5	6.5	77.5		19.5				
Max Q Clear Time (g_c+I1), s	27.5	11.5		3.3	2.4	6.4		6.8				
Green Ext Time (p_c), s	2.4	2.8		0.0	0.0	3.0		0.4				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh	26.1											
HCM 6th LOS	C											
Notes												

# Timings 3: Quail Run Rd & 32nd Avenue

Short Term 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	pm+pt	NA
Protected Phases	3	3	2	3	1	6
Permitted Phases				2	6	
Detector Phase	3	3	2	3	1	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	10.5	23.5
Total Split (s)	53.0	53.0	55.0	53.0	12.0	67.0
Total Split (%)	44.2%	44.2%	45.8%	44.2%	10.0%	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			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	C-Max	None	None	C-Max
Act Effect Green (s)	11.0	11.0	91.0	109.7	98.0	98.0
Actuated g/C Ratio	0.09	0.09	0.76	0.91	0.82	0.82
v/c Ratio	0.51	0.06	0.20	0.24	0.04	0.18
Control Delay (s/veh)	64.1	27.0	5.4	0.6	2.7	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	64.1	27.0	5.4	0.6	2.7	2.8
LOS	E	C	A	A	A	A
Approach Delay (s/veh)	60.6		3.5			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: 45

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.51

Intersection Signal Delay (s/veh): 6.7

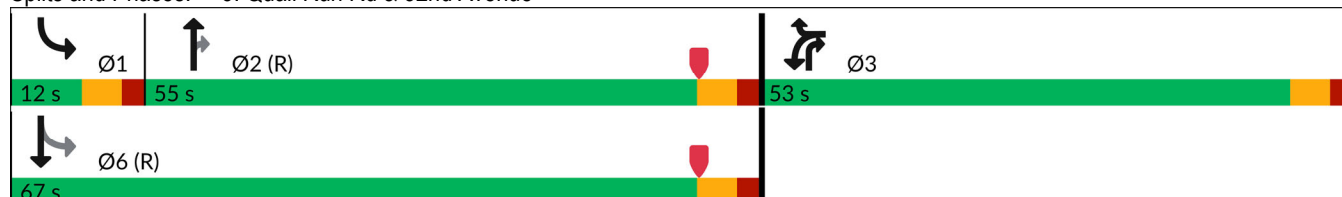
Intersection LOS: A

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

Short Term 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	2270	1088	536	2470
Arrive On Green	0.06	0.06	0.78	0.78	0.02	0.85
Sat Flow, veh/h	1457	1296	2983	1296	1457	2983
Grp Volume(v), veh/h	67	7	440	284	24	415
Grp Sat Flow(s),veh/h/ln	1457	1296	1453	1296	1457	1453
Q Serve(g_s), s	5.4	0.6	4.7	5.4	0.4	3.0
Cycle Q Clear(g_c), s	5.4	0.6	4.7	5.4	0.4	3.0
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	85	76	2270	1088	536	2470
V/C Ratio(X)	0.79	0.09	0.19	0.26	0.04	0.17
Avail Cap(c_a), veh/h	577	513	2270	1088	582	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	3.4	2.0	2.2	1.6
Incr Delay (d2), s/veh	14.7	0.5	0.2	0.6	0.0	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	2.2	1.9	0.1	1.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	70.5	54.0	3.6	2.6	2.2	1.7
LnGrp LOS	E	D	A	A	A	A
Approach Vol, veh/h	74		724			439
Approach Delay, s/veh	68.9		3.2			1.7
Approach LOS	E		A			A
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	8.3	99.2			107.5	12.5
Change Period (Y+Rc), s	5.5	5.5			5.5	5.5
Max Green Setting (Gmax), s	6.5	49.5			61.5	47.5
Max Q Clear Time (g_c+l1), s	2.4	7.4			5.0	7.4
Green Ext Time (p_c), s	0.0	4.6			3.2	0.2
<b>Intersection Summary</b>						
HCM 6th Ctrl Delay, s/veh			6.6			
HCM 6th LOS			A			





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







Short Term 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/v	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/veh)	15.3	-	-	0	-	
HCM Lane LOS	C	-	-	A	-	
HCM 95th %tile Q (veh)	0.5	-	-	0	-	

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

Short 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	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/v	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/veh)	-	-	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
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.35	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.425	-	-
Pot Cap-1 Maneuver	1093	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1093	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s/v	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/veh)	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/v	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/veh)	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

Short Term 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 Effect 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	0.53
v/c Ratio	0.85	0.62	0.89	0.11	0.44	0.34
Control Delay (s/veh)	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 (s/veh)	58.7	7.4	44.2	10.4	47.8	15.3
LOS	E	A	D	B	D	B
Approach Delay (s/veh)	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 (s/veh): 28.9

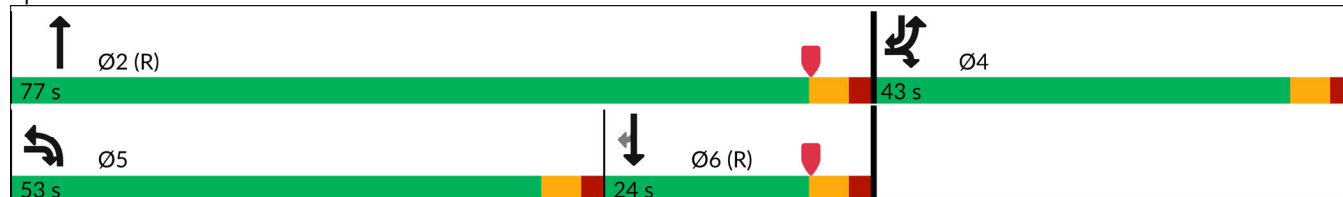
Intersection LOS: C

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

Short Term 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, s/veh			31.4			
HCM 6th LOS			C			



















### Notes

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

# Timings 2: Imboden Rd & 48th Avenue

Short Term 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	pm+pt	NA	Prot	NA
Protected Phases		4		8	1	5	2	1	6
Permitted Phases	4		8		8	2			
Detector Phase	4	4	8	8	1	5	2	1	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.5	23.5	23.5	23.5	10.5	10.5	23.5	10.5	23.5
Total Split (s)	47.0	47.0	47.0	47.0	33.0	12.0	40.0	33.0	61.0
Total Split (%)	39.2%	39.2%	39.2%	39.2%	27.5%	10.0%	33.3%	27.5%	50.8%
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	Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Max	None	C-Max
Act Effct Green (s)	10.4	10.4	10.4	10.4	28.6	86.1	80.4	12.7	96.3
Actuated g/C Ratio	0.09	0.09	0.09	0.09	0.24	0.72	0.67	0.11	0.80
v/c Ratio	0.10	0.13	0.02	0.80	0.71	0.03	0.21	0.56	0.34
Control Delay (s/veh)	49.4	28.6	44.5	22.2	26.4	4.4	9.3	55.3	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	49.4	28.6	44.5	22.2	26.4	4.4	9.3	55.3	4.8
LOS	D	C	D	C	C	A	A	E	A
Approach Delay (s/veh)		33.6		24.4			9.1		13.6
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 (s/veh): 16.1

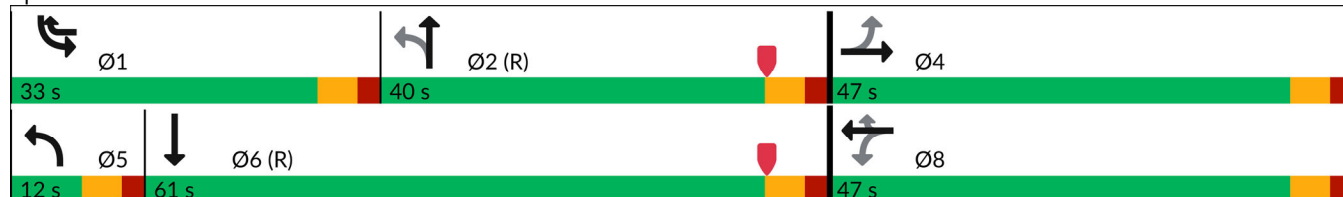
Intersection LOS: B

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

Short 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	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	343	1599	16	220	1797	12
Arrive On Green	0.24	0.24	0.24	0.24	0.00	0.24	0.01	0.54	0.54	0.08	0.61	0.61
Sat Flow, veh/h	1159	425	936	1143	0	2592	1457	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	1457	1453	1524	1413	1453	1526
Q Serve(g_s), s	0.4	0.0	1.1	0.2	0.0	24.7	0.4	8.8	8.9	6.9	16.8	16.8
Cycle Q Clear(g_c), s	0.4	0.0	1.1	1.2	0.0	24.7	0.4	8.8	8.9	6.9	16.8	16.8
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	343	788	827	220	882	927
V/C Ratio(X)	0.01	0.00	0.05	0.01	0.00	0.73	0.03	0.26	0.26	0.75	0.43	0.43
Avail Cap(c_a), veh/h	461	0	471	445	0	1098	403	788	827	648	882	927
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	12.3	14.6	14.6	54.2	12.6	12.6
Incr Delay (d2), s/veh	0.0	0.0	0.1	0.0	0.0	1.7	0.0	0.8	0.7	4.0	1.2	1.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.2	0.0	0.7	0.1	0.0	12.6	0.2	5.5	5.8	4.6	9.0	9.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	34.6	0.0	34.9	35.3	0.0	37.8	12.3	15.4	15.3	58.2	13.8	13.7
LnGrp LOS	C		C	D		D	B	B	B	E	B	B
Approach Vol, veh/h	21		605				424				947	
Approach Delay, s/veh	34.8		37.8				15.3				21.5	
Approach LOS	C		D				B				C	
Timer - Assigned Phs	1	2	4		5	6	8					
Phs Duration (G+Y+Rc), s	14.8	70.6	34.6		7.0	78.4	34.6					
Change Period (Y+Rc), s	5.5	5.5	5.5		5.5	5.5	5.5					
Max Green Setting (Gmax), s	27.5	34.5	41.5		6.5	55.5	41.5					
Max Q Clear Time (g_c+I1), s	8.9	10.9	3.1		2.4	18.8	26.7					
Green Ext Time (p_c), s	0.5	2.5	0.1		0.0	5.9	2.4					
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			25.2									
HCM 6th LOS			C									
Notes												

# Timings 3: Quail Run Rd & 32nd Avenue

Short Term 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	pm+pt	NA
Protected Phases	3	3	2	3	1	6
Permitted Phases				2	6	
Detector Phase	3	3	2	3	1	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	10.5	23.5
Total Split (s)	56.0	56.0	52.0	56.0	12.0	64.0
Total Split (%)	46.7%	46.7%	43.3%	46.7%	10.0%	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			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	C-Max	None	None	C-Max
Act Effect Green (s)	30.2	30.2	76.4	116.5	78.8	78.8
Actuated g/C Ratio	0.25	0.25	0.64	0.97	0.66	0.66
v/c Ratio	0.80	0.08	0.21	0.06	0.02	0.41
Control Delay (s/veh)	57.5	10.7	11.5	0.3	9.9	11.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	57.5	10.7	11.5	0.3	9.9	11.5
LOS	E	B	B	A	A	B
Approach Delay (s/veh)	53.7		9.7			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: 55

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay (s/veh): 19.5

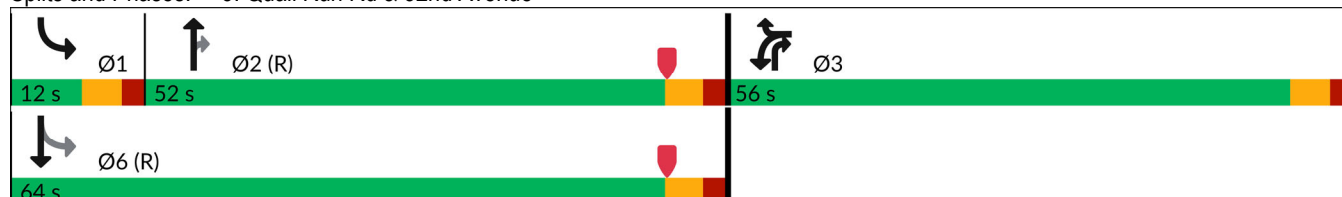
Intersection LOS: B

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

Short Term 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	1841	1105	545	2003
Arrive On Green	0.22	0.22	0.63	0.63	0.01	0.69
Sat Flow, veh/h	1457	1296	2983	1296	1457	2983
Grp Volume(v), veh/h	290	26	387	75	8	772
Grp Sat Flow(s),veh/h/ln	1457	1296	1453	1296	1457	1453
Q Serve(g_s), s	23.3	1.9	6.8	1.1	0.2	13.5
Cycle Q Clear(g_c), s	23.3	1.9	6.8	1.1	0.2	13.5
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	319	284	1841	1105	545	2003
V/C Ratio(X)	0.91	0.09	0.21	0.07	0.01	0.39
Avail Cap(c_a), veh/h	613	545	1841	1105	609	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	9.3	1.4	7.3	7.9
Incr Delay (d2), s/veh	9.8	0.1	0.3	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	3.9	0.4	0.1	7.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	55.5	37.5	9.5	1.5	7.3	8.5
LnGrp LOS	E	D	A	A	A	A
Approach Vol, veh/h	316		462			780
Approach Delay, s/veh	54.0		8.2			8.4
Approach LOS	D		A			A
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	6.7	81.5			88.2	31.8
Change Period (Y+Rc), s	5.5	5.5			5.5	5.5
Max Green Setting (Gmax), s	6.5	46.5			58.5	50.5
Max Q Clear Time (g_c+l1), s	2.2	8.8			15.5	25.3
Green Ext Time (p_c), s	0.0	3.2			6.7	1.0
<b>Intersection Summary</b>						
HCM 6th Ctrl Delay, s/veh			17.6			
HCM 6th LOS			B			

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





Short Term 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/v	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/veh)	15.6	-	-	0	-	
HCM Lane LOS	C	-	-	A	-	
HCM 95th %tile Q (veh)	2.1	-	-	0	-	



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







Short 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	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/v	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/veh)	-	-	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/v	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/veh)	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/v	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/veh)	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

PM 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)	31.0	44.0		12.0	25.0	25.0	38.0	64.0	12.0	26.0	26.0	31.0
Total Split (%)	25.8%	36.7%		10.0%	20.8%	20.8%	31.7%	53.3%	10.0%	21.7%	21.7%	25.8%
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
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 Effct Green (s)	37.2	36.2	73.3	6.3	12.0	12.0	31.6	61.0	72.8	23.9	23.9	66.6
Actuated g/C Ratio	0.31	0.30	0.61	0.05	0.10	0.10	0.26	0.51	0.61	0.20	0.20	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	0.39	0.29
Control Delay (s/veh)	38.5	29.2	10.2	60.7	44.3	0.0	32.3	10.3	2.3	42.0	45.4	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	38.5	29.2	10.2	60.7	44.3	0.0	32.3	10.3	2.3	42.0	45.4	3.7
LOS	D	C	B	E	D	A	C	B	A	D	D	A
Approach Delay (s/veh)		17.1			57.1			23.4			24.0	
Approach LOS		B			E			C			C	

### Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 35 (29%), 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 (s/veh): 20.8

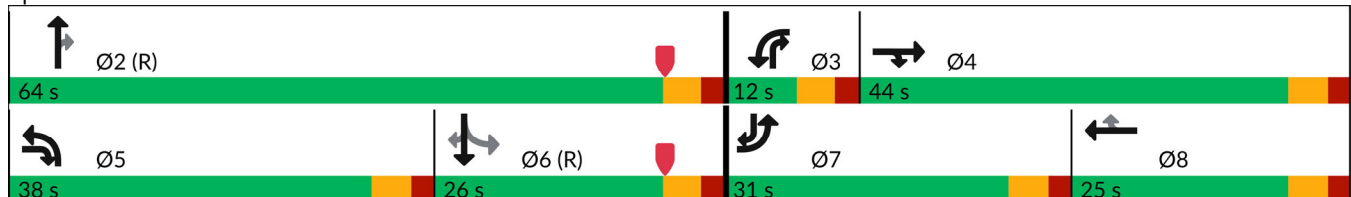
Intersection LOS: C

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  
PM 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	480	491	1613	93	281	238	924	1478	702	243	692	529		
Arrive On Green	0.17	0.32	0.32	0.03	0.18	0.18	0.22	0.51	0.51	0.24	0.24	0.24		
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	1.7	38.5	2.0	0.6	0.1	22.8	6.8	7.3	0.2	7.6	15.8		
Cycle Q Clear(g_c), s	17.5	1.7	38.5	2.0	0.6	0.1	22.8	6.8	7.3	0.2	7.6	15.8		
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00		
Lane Grp Cap(c), veh/h	480	491	1613	93	281	238	924	1478	702	243	692	529		
V/C Ratio(X)	0.88	0.07	0.85	0.50	0.03	0.00	0.87	0.20	0.22	0.01	0.32	0.45		
Avail Cap(c_a), veh/h	601	491	1613	153	281	238	1113	1478	702	243	692	529		
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	48.6	28.3	23.0	57.1	40.2	40.0	44.9	16.1	14.3	34.9	37.7	25.7		
Incr Delay (d2), s/veh	12.1	0.1	4.4	4.2	0.0	0.0	6.4	0.3	0.7	0.1	1.2	2.7		
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	11.3	1.2	16.5	1.4	0.4	0.0	12.8	4.2	4.1	0.1	5.1	9.0		
Unsig. Movement Delay, s/veh														
LnGrp Delay(d), s/veh	60.7	28.3	27.5	61.2	40.3	40.0	51.3	16.4	14.9	35.0	38.9	28.4		
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	35.2			57.5				38.6				33.5		
Approach LOS	D			E				D				C		
Timer - Assigned Phs	2			3			4			5			6	
Phs Duration (G+Y+Rc), s	66.5			9.5			44.0			32.5			34.1	
Change Period (Y+Rc), s	5.5			5.5			5.5			5.5			5.5	
Max Green Setting (Gmax), s	58.5			6.5			38.5			32.5			20.5	
Max Q Clear Time (g_c+I1), s	9.3			4.0			40.5			24.8			17.8	
Green Ext Time (p_c), s	2.8			0.0			0.0			2.2			0.6	
Intersection Summary														
HCM 6th Ctrl Delay, s/veh	36.5													
HCM 6th LOS	D													
Notes														

# Timings

## 1: Imboden & 56th Avenue

Long Term Background  
AM Peak

						
Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Configurations	 	 		 	 	 
Traffic Volume (vph)	389	29	43	8	276	204
Future Volume (vph)	389	29	43	8	276	204
Turn Type	Prot	NA	Prot	NA	NA	NA
Protected Phases	1	4	1	4	2	2
Permitted Phases						
Detector Phase	7	4	3	4	2	2
Switch Phase	4		8			
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.0	16.0	16.0	16.0	16.0	16.0
Total Split (s)	37.0	18.0	37.0	18.0	65.0	65.0
Total Split (%)	30.8%	15.0%	30.8%	15.0%	54.2%	54.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
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)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead		Lead		Lag	Lag
Lead-Lag Optimize?						
Recall Mode	Max	Min	Max	Min	C-Max	C-Max
Act Effct Green (s)	31.0	12.0	31.0	12.0	59.0	59.0
Actuated g/C Ratio	0.26	0.10	0.26	0.10	0.49	0.49
v/c Ratio	0.52	0.10	0.13	0.03	0.18	0.13
Control Delay (s/veh)	17.8	30.0	13.9	30.5	17.4	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	17.8	30.0	13.9	30.5	17.4	16.8
LOS	B	C	B	C	B	B
Approach Delay (s/veh)		18.6		16.5	17.4	16.8
Approach LOS		B		B	B	B

### Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.54  
 Intersection Signal Delay (s/veh): 17.8  
 Intersection LOS: B  
 Intersection Capacity Utilization 36.1%  
 ICU Level of Service A  
 Analysis Period (min) 15

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



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HCM 6th Edition methodology does not support clustered intersections.

# Timings 11: Imboden NBL & 56th Avenue

Long Term Background  
AM Peak

	→	↘	←	↙	↗		
Lane Group	EBT	EBR	WBT	NBL	SBR	Ø1	Ø4
Lane Configurations	↑↑↑	↗↗	↑↑	↙↙	↗		
Traffic Volume (vph)	418	1258	8	743	217		
Future Volume (vph)	418	1258	8	743	217		
Turn Type	NA	Free	NA	Prot	Free		
Protected Phases	1 4		1 4	2		1	4
Permitted Phases		Free			Free		
Detector Phase	1 4		8	2			
Switch Phase							
Minimum Initial (s)				10.0		10.0	10.0
Minimum Split (s)				16.0		16.0	16.0
Total Split (s)				65.0		37.0	18.0
Total Split (%)				54.2%		31%	15%
Yellow Time (s)				4.0		4.0	4.0
All-Red Time (s)				2.0		2.0	2.0
Lost Time Adjust (s)				0.0			
Total Lost Time (s)				6.0			
Lead/Lag				Lag		Lead	
Lead-Lag Optimize?							
Recall Mode				C-Max		Max	Min
Act Effect Green (s)	49.0	120.0	49.0	59.0	120.0		
Actuated g/C Ratio	0.41	1.00	0.41	0.49	1.00		
v/c Ratio	0.19	0.54	0.01	0.50	0.15		
Control Delay (s/veh)	23.0	0.7	0.4	14.8	0.2		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay (s/veh)	23.0	0.7	0.4	14.8	0.2		
LOS	C	A	A	B	A		
Approach Delay (s/veh)	6.3		0.4				
Approach LOS	A		A				

## Intersection Summary

Cycle Length: 120  
Actuated Cycle Length: 120  
Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow  
Natural Cycle: 60  
Control Type: Actuated-Coordinated  
Maximum v/c Ratio: 0.54  
Intersection Signal Delay (s/veh): 8.1  
Intersection LOS: A  
Intersection Capacity Utilization 37.9%  
ICU Level of Service A  
Analysis Period (min) 15

## Splits and Phases: 11: Imboden NBL & 56th Avenue





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HCM 6th Edition methodology does not support clustered intersections.

Timings  
12: 56th Avenue & Imboden SBL

Long Term Background  
AM Peak

	→	←	↖	↗	↘		
Lane Group	EBT	WBT	WBR	NBR	SBL	Ø1	Ø4
Lane Configurations	↑↑	↑↑↑	↖	↗	↘		
Traffic Volume (vph)	29	51	1	140	2		
Future Volume (vph)	29	51	1	140	2		
Turn Type	NA	NA	Free	Free	Prot		
Protected Phases	1 4	1 4			2	1	4
Permitted Phases			Free	Free			
Detector Phase	1 4	1 4			2		
Switch Phase							
Minimum Initial (s)					10.0	10.0	10.0
Minimum Split (s)					16.0	16.0	16.0
Total Split (s)					65.0	37.0	18.0
Total Split (%)					54.2%	31%	15%
Yellow Time (s)					4.0	4.0	4.0
All-Red Time (s)					2.0	2.0	2.0
Lost Time Adjust (s)					0.0		
Total Lost Time (s)					6.0		
Lead/Lag					Lag	Lead	
Lead-Lag Optimize?							
Recall Mode					C-Max	Max	Min
Act Effect Green (s)	49.0	49.0	120.0	120.0	59.0		
Actuated g/C Ratio	0.41	0.41	1.00	1.00	0.49		
v/c Ratio	0.02	0.04	0.00	0.09	0.00		
Control Delay (s/veh)	0.0	21.4	0.0	0.1	29.0		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay (s/veh)	0.0	21.4	0.0	0.1	29.0		
LOS	A	C	A	A	C		
Approach Delay (s/veh)		21.1					
Approach LOS		C					

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.54
Intersection Signal Delay (s/veh): 6.1
Intersection Capacity Utilization 20.0%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service A

Splits and Phases: 12: 56th Avenue & Imboden SBL











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HCM 6th Edition methodology does not support clustered intersections.

# Timings 13: Imboden & 56th Avenue EBR

Long Term Background  
AM Peak

						
Lane Group	EBR	NBL	NBT	SBT	Ø2	Ø4
Lane Configurations						
Traffic Volume (vph)	1258	743	276	247		
Future Volume (vph)	1258	743	276	247		
Turn Type	Free	Prot	NA	NA		
Protected Phases		2 4	Free	1	2	4
Permitted Phases	Free					
Detector Phase		2 4		1		
Switch Phase						
Minimum Initial (s)				10.0	10.0	10.0
Minimum Split (s)				16.0	16.0	16.0
Total Split (s)				37.0	65.0	18.0
Total Split (%)				30.8%	54%	15%
Yellow Time (s)				4.0	4.0	4.0
All-Red Time (s)				2.0	2.0	2.0
Lost Time Adjust (s)				0.0		
Total Lost Time (s)				6.0		
Lead/Lag				Lead	Lag	
Lead-Lag Optimize?						
Recall Mode				Max	C-Max	Min
Act Effect Green (s)	120.0	77.0	120.0	31.0		
Actuated g/C Ratio	1.00	0.64	1.00	0.26		
v/c Ratio	0.51	0.37	0.13	0.29		
Control Delay (s/veh)	0.6	10.7	0.1	48.4		
Queue Delay	0.0	0.0	0.0	0.0		
Total Delay (s/veh)	0.6	10.7	0.1	48.4		
LOS	A	B	A	D		
Approach Delay (s/veh)			6.9	48.4		
Approach LOS			A	D		

## Intersection Summary

Cycle Length: 120  
Actuated Cycle Length: 120  
Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow  
Natural Cycle: 60  
Control Type: Actuated-Coordinated  
Maximum v/c Ratio: 0.54  
Intersection Signal Delay (s/veh): 7.6  
Intersection Capacity Utilization 37.9%  
Analysis Period (min) 15

## Splits and Phases: 13: Imboden & 56th Avenue EBR



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HCM 6th Edition methodology does not support clustered intersections.

# Timings

## 14: Imboden & 56th Avenue WBR

Long Term Background

AM Peak

						
Lane Group	WBR	NBT	SBL	SBT	Ø1	Ø4
Lane Configurations						
Traffic Volume (vph)	1	665	2	204		
Future Volume (vph)	1	665	2	204		
Turn Type	pt+ov	NA	Prot	NA		
Protected Phases	1 4	2	1 4	Free	1	4
Permitted Phases	2					
Detector Phase		2	1 4			
Switch Phase						
Minimum Initial (s)		10.0			10.0	10.0
Minimum Split (s)		16.0			16.0	16.0
Total Split (s)		65.0			37.0	18.0
Total Split (%)		54.2%			31%	15%
Yellow Time (s)		4.0			4.0	4.0
All-Red Time (s)		2.0			2.0	2.0
Lost Time Adjust (s)		0.0				
Total Lost Time (s)		6.0				
Lead/Lag		Lag			Lead	
Lead-Lag Optimize?						
Recall Mode		C-Max			Max	Min
Act Effect Green (s)	120.0	59.0	49.0	120.0		
Actuated g/C Ratio	1.00	0.49	0.41	1.00		
v/c Ratio	0.00	0.43	0.00	0.14		
Control Delay (s/veh)	0.0	18.1	21.0	0.1		
Queue Delay	0.0	0.0	0.0	0.0		
Total Delay (s/veh)	0.0	18.1	21.0	0.1		
LOS	A	B	C	A		
Approach Delay (s/veh)		18.1		0.2		
Approach LOS		B		A		

### Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.54

Intersection Signal Delay (s/veh): 11.3

Intersection LOS: B

Intersection Capacity Utilization 36.7%

ICU Level of Service A

Analysis Period (min) 15

### Splits and Phases: 14: Imboden & 56th Avenue WBR























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HCM 6th Edition methodology does not support clustered intersections.

# Timings 2: Imboden Rd & 48th Avenue

Long Term Background  
PM Peak

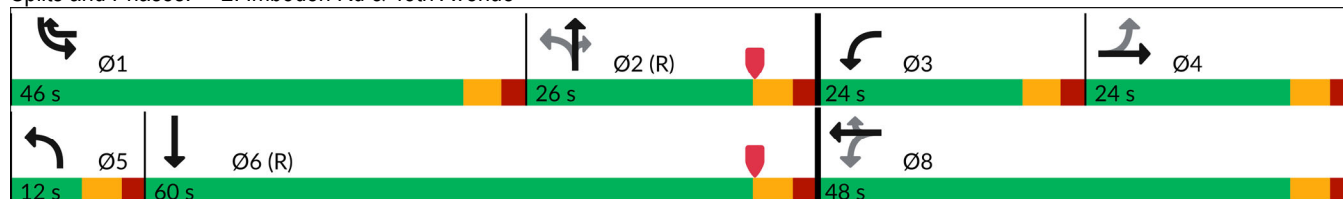
										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	5	5	27	5	223	10	682	35	771	728
Future Volume (vph)	5	5	27	5	223	10	682	35	771	728
Turn Type	Perm	NA	pm+pt	NA	pm+ov	pm+pt	NA	Perm	Prot	NA
Protected Phases		4	3	8	1	5	2		1	6
Permitted Phases	4		8		8	2		2		
Detector Phase	4	4	3	8	1	5	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)	24.0	24.0	24.0	23.5	10.5	10.5	23.5	23.5	10.5	23.5
Total Split (s)	24.0	24.0	24.0	48.0	46.0	12.0	26.0	26.0	46.0	60.0
Total Split (%)	20.0%	20.0%	20.0%	40.0%	38.3%	10.0%	21.7%	21.7%	38.3%	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	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	6.4	6.4	13.0	12.8	59.6	55.2	49.4	49.4	41.3	93.9
Actuated g/C Ratio	0.05	0.05	0.11	0.11	0.50	0.46	0.41	0.41	0.34	0.78
v/c Ratio	0.08	0.19	0.25	0.52	0.20	0.04	0.43	0.06	0.87	0.25
Control Delay (s/veh)	55.8	37.1	49.5	16.5	12.1	13.4	28.9	0.2	40.5	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 (s/veh)	55.8	37.1	49.5	16.5	12.1	13.4	28.9	0.2	40.5	3.8
LOS	E	D	D	B	B	B	C	A	D	A
Approach Delay (s/veh)		41.6		18.0			27.3			22.6
Approach LOS		D		B			C			C

## Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 20 (17%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow  
 Natural Cycle: 115  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.87  
 Intersection Signal Delay (s/veh): 23.7  
 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  
PM 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	108	18	39	155	0	1155	311	1740	540	895	3085	19	
Arrive On Green	0.04	0.04	0.04	0.04	0.00	0.13	0.01	0.42	0.42	0.32	0.72	0.72	
Sat Flow, veh/h	1159	425	936	1457	0	2592	1457	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	1457	1392	1296	1413	1392	1525	
Q Serve(g_s), s	0.5	0.0	1.4	2.2	0.0	6.9	0.5	15.1	2.1	34.6	7.6	7.6	
Cycle Q Clear(g_c), s	0.5	0.0	1.4	2.2	0.0	6.9	0.5	15.1	2.1	34.6	7.6	7.6	
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	155	0	1155	311	1740	540	895	2006	1099	
V/C Ratio(X)	0.05	0.00	0.28	0.19	0.00	0.21	0.04	0.43	0.07	0.94	0.26	0.26	
Avail Cap(c_a), veh/h	239	0	210	319	0	1739	371	1740	540	954	2006	1099	
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	55.3	0.0	55.8	49.6	0.0	20.4	19.7	24.8	21.0	39.8	5.7	5.7	
Incr Delay (d2), s/veh	0.2	0.0	2.7	0.6	0.0	0.1	0.0	0.8	0.3	12.4	0.2	0.4	
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(95%),veh/ln	0.3	0.0	0.9	1.5	0.0	3.8	0.3	8.8	1.2	18.6	3.8	4.2	
Unsig. Movement Delay, s/veh													
LnGrp Delay(d), s/veh	55.5	0.0	58.4	50.2	0.0	20.4	19.7	25.6	21.3	52.3	6.0	6.2	
LnGrp LOS	E		E	D		C	B	C	C	D	A	A	
Approach Vol, veh/h	21			274				790				1634	
Approach Delay, s/veh	57.7			23.6				25.3				29.7	
Approach LOS	E			C				C				C	
Timer - Assigned Phs	1	2	3	4	5	6	8						
Phs Duration (G+Y+Rc), s	43.5	55.5	10.5	10.5	7.0	92.0	21.0						
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5	5.5	5.5						
Max Green Setting (Gmax), s	40.5	20.5	18.5	18.5	6.5	54.5	42.5						
Max Q Clear Time (g_c+I1), s	36.6	17.1	4.2	3.4	2.5	9.6	8.9						
Green Ext Time (p_c), s	1.4	1.7	0.0	0.0	0.0	6.4	1.0						
Intersection Summary													
HCM 6th Ctrl Delay, s/veh	28.0												
HCM 6th LOS	C												
Notes													

# 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)	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	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases		4	3	8	5	2	3	1	6	
Permitted Phases	4				2		2	6		6
Detector Phase	4	4	3	8	5	2	3	1	6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.5	23.5	10.5	23.5	10.5	23.5	10.5	10.5	23.5	23.5
Total Split (s)	24.0	24.0	49.0	73.0	12.0	35.0	49.0	12.0	35.0	35.0
Total Split (%)	20.0%	20.0%	40.8%	60.8%	10.0%	29.2%	40.8%	10.0%	29.2%	29.2%
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	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	None	None	C-Max	C-Max
Act Effct Green (s)	6.1	6.1	21.8	29.1	76.0	69.1	97.5	75.0	68.5	68.5
Actuated g/C Ratio	0.05	0.05	0.18	0.24	0.63	0.58	0.81	0.63	0.57	0.57
v/c Ratio	0.05	0.06	0.47	0.06	0.19	0.37	0.76	0.18	0.31	0.02
Control Delay (s/veh)	55.0	0.3	45.2	10.9	12.9	18.9	5.1	13.3	18.4	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 (s/veh)	55.0	0.3	45.2	10.9	12.9	18.9	5.1	13.3	18.4	0.1
LOS	D	A	D	B	B	B	A	B	B	A
Approach Delay (s/veh)		8.4		42.7		11.9			17.7	
Approach LOS		A		D		B			B	

## Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay (s/veh): 16.1








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

	Ø1		Ø2 (R)		Ø3		Ø4
12 s		35 s		49 s		24 s	
	Ø5		Ø6 (R)		Ø8		
12 s		35 s		73 s			

# 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)	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	97	0	42	303	26	219	443	2677	970	225	2667	828
Arrive On Green	0.03	0.00	0.03	0.11	0.19	0.19	0.04	0.64	0.64	0.04	0.64	0.64
Sat Flow, veh/h	1139	0	1296	2826	139	1179	1457	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	1457	1392	1296	1457	1392	1296
Q Serve(g_s), s	0.4	0.0	2.1	10.0	0.0	1.4	2.1	11.7	76.4	1.6	9.2	0.6
Cycle Q Clear(g_c), s	0.4	0.0	2.1	10.0	0.0	1.4	2.1	11.7	76.4	1.6	9.2	0.6
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	97	0	42	303	0	245	443	2677	970	225	2667	828
V/C Ratio(X)	0.04	0.00	0.54	0.80	0.00	0.08	0.17	0.33	0.96	0.26	0.27	0.02
Avail Cap(c_a), veh/h	236	0	200	1024	0	741	466	2677	970	252	2667	828
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	56.3	0.0	57.2	52.3	0.0	40.4	7.0	9.8	13.4	7.4	9.5	7.9
Incr Delay (d2), s/veh	0.2	0.0	10.4	4.7	0.0	0.1	0.2	0.3	20.3	0.6	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	0.0	1.5	6.7	0.0	0.9	1.1	6.4	31.4	0.9	5.0	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	56.5	0.0	67.5	57.0	0.0	40.5	7.2	10.2	33.7	8.0	9.8	8.0
LnGrp LOS	E		E	E		D	A	B	C	A	A	A
Approach Vol, veh/h	27			260			1898			808		
Approach Delay, s/veh	65.9			55.8			21.6			9.6		
Approach LOS	E			E			C			A		
Timer - Assigned Phs	1	2	3	4	5	6	8					
Phs Duration (G+Y+Rc), s	9.8	82.4	18.4	9.4	10.1	82.1	27.8					
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5	5.5	5.5					
Max Green Setting (Gmax), s	6.5	29.5	43.5	18.5	6.5	29.5	67.5					
Max Q Clear Time (g_c+I1), s	3.6	78.4	12.0	4.1	4.1	11.2	3.4					
Green Ext Time (p_c), s	0.0	0.0	0.9	0.1	0.0	5.1	0.1					
Intersection Summary												
HCM 6th Ctrl Delay, s/veh				21.7								
HCM 6th LOS				C								
Notes												

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

Long Term Background  
PM 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/v	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/veh)	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  
PM 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
Stage 1	45	-	-
Stage 2	276	-	-
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	628	963	-
Stage 1	922	-	-
Stage 2	720	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	611	963	-
Mov Cap-2 Maneuver	611	-	-
Stage 1	922	-	-
Stage 2	701	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	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/veh)	-	-	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
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.35	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.425	-	-
Pot Cap-1 Maneuver	1001	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1001	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-







Approach	EB	WB	SB
HCM Control Delay, s/v	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/veh)	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/v	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/veh)	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	0	859	370
Stage 1	-	-	-	-	739	-
Stage 2	-	-	-	-	120	-
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	-	-	637	-	255	566
Stage 1	-	-	-	-	378	-
Stage 2	-	-	-	-	828	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	637	-	255	566
Mov Cap-2 Maneuver	-	-	-	-	255	-
Stage 1	-	-	-	-	378	-
Stage 2	-	-	-	-	828	-
Approach	EB	WB	NB			
HCM Control Delay, s/v	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/veh)	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
Stage 1	-	-	-	-	177
Stage 2	-	-	-	-	930
Critical Hdwy	4.35	-	-	-	6.65
Critical Hdwy Stg 1	-	-	-	-	5.65
Critical Hdwy Stg 2	-	-	-	-	5.65
Follow-up Hdwy	2.425	-	-	-	3.725
Pot Cap-1 Maneuver	1238	-	-	-	210
Stage 1	-	-	-	-	801
Stage 2	-	-	-	-	350
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1238	-	-	-	189
Mov Cap-2 Maneuver	-	-	-	-	189
Stage 1	-	-	-	-	719
Stage 2	-	-	-	-	350

Approach	EB	WB	SB
HCM Control Delay, s/v	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/veh)	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)	30.0	39.0		15.0	24.0	24.0	60.0	86.0	15.0	26.0	26.0	30.0
Total Split (%)	21.4%	27.9%		10.7%	17.1%	17.1%	42.9%	61.4%	10.7%	18.6%	18.6%	21.4%
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 Effct Green (s)	34.1	33.5	93.5	9.5	13.6	13.6	54.5	80.5	95.5	20.5	20.5	60.1
Actuated g/C Ratio	0.24	0.24	0.67	0.07	0.10	0.10	0.39	0.58	0.68	0.15	0.15	0.43
v/c Ratio	0.69	0.02	0.73	0.86	0.22	0.01	1.04	0.20	0.06	0.01	0.93	0.49
Control Delay (s/veh)	56.1	41.3	17.0	100.6	59.1	0.0	71.2	11.8	0.8	52.0	87.5	15.0
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 (s/veh)	56.1	41.3	17.0	100.6	59.1	0.0	71.2	11.8	0.8	52.0	87.5	15.0
LOS	E	D	B	F	E	A	E	B	A	D	F	B
Approach Delay (s/veh)		26.6			92.7			59.6			54.3	
Approach LOS		C			F			E			D	

### Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 88 (63%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 140

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay (s/veh): 47.1

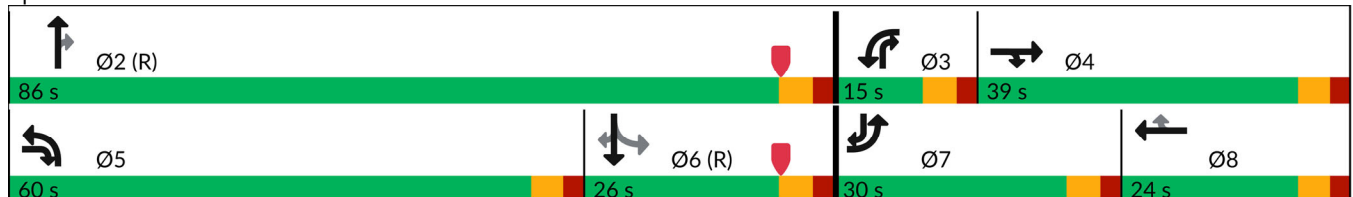
Intersection LOS: D

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	495	366	1858	192	202	171	1599	1671	833	176	426	417
Arrive On Green	0.17	0.24	0.24	0.07	0.13	0.13	0.39	0.57	0.57	0.15	0.15	0.15
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	23.1	0.6	33.5	8.0	2.7	0.2	54.5	7.9	2.0	0.1	18.6	20.5
Cycle Q Clear(g_c), s	23.1	0.6	33.5	8.0	2.7	0.2	54.5	7.9	2.0	0.1	18.6	20.5
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	495	366	1858	192	202	171	1599	1671	833	176	426	417
V/C Ratio(X)	0.95	0.02	0.79	0.85	0.16	0.01	1.03	0.20	0.06	0.01	0.92	0.79
Avail Cap(c_a), veh/h	495	366	1858	192	202	171	1599	1671	833	176	426	417
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	57.2	40.7	19.1	64.5	53.9	52.8	42.8	14.3	9.3	51.1	58.9	43.2
Incr Delay (d2), s/veh	28.8	0.0	2.3	28.6	0.4	0.0	29.8	0.2	0.1	0.1	27.4	14.3
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	15.5	0.4	17.1	6.6	1.9	0.1	30.4	4.8	1.1	0.1	13.2	17.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	85.9	40.8	21.4	93.1	54.3	52.8	72.6	14.5	9.4	51.1	86.3	57.5
LnGrp LOS	F	D	C	F	D	D	F	B	A	D	F	E
Approach Vol, veh/h	1942			198			2044			722		
Approach Delay, s/veh	37.2			86.2			61.4			73.1		
Approach LOS	D			F			E			E		
Timer - Assigned Phs	2			3			4			5		
Phs Duration (G+Y+Rc), s	86.0			15.0			39.0			60.0		
Change Period (Y+Rc), s	5.5			5.5			5.5			5.5		
Max Green Setting (Gmax), s	80.5			9.5			33.5			54.5		
Max Q Clear Time (g_c+I1), s	9.9			10.0			35.5			56.5		
Green Ext Time (p_c), s	2.8			0.0			0.0			0.0		
Intersection Summary												
HCM 6th Ctrl Delay, s/veh	54.5											
HCM 6th LOS	D											
Notes												

# Timings

## 1: Imboden & 56th Avenue

Long Term Background  
PM Peak

						
Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Configurations						
Traffic Volume (vph)	433	8	150	30	312	360
Future Volume (vph)	433	8	150	30	312	360
Turn Type	Prot	NA	Prot	NA	NA	NA
Protected Phases	1	4	1	4	2	2
Permitted Phases						
Detector Phase	7	4	3	4	2	2
Switch Phase	4		8			
Minimum Initial (s)	5.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	9.5	16.0	9.5	16.0	16.0	16.0
Total Split (s)	26.0	16.0	26.0	16.0	78.0	78.0
Total Split (%)	21.7%	13.3%	21.7%	13.3%	65.0%	65.0%
Yellow Time (s)	3.5	4.0	3.5	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	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)	4.5	6.0	4.5	6.0	6.0	6.0
Lead/Lag	Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	None	Min	None	Min	C-Max	C-Max
Act Effct Green (s)	21.3	10.0	21.3	10.0	72.2	72.2
Actuated g/C Ratio	0.18	0.08	0.18	0.08	0.60	0.60
v/c Ratio	0.81	0.03	0.58	0.12	0.17	0.19
Control Delay (s/veh)	28.0	29.1	23.8	24.7	10.9	11.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	28.0	29.1	23.8	24.7	10.9	11.0
LOS	C	C	C	C	B	B
Approach Delay (s/veh)		28.1		23.9	10.9	11.0
Approach LOS		C		C	B	B

### Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay (s/veh): 18.7

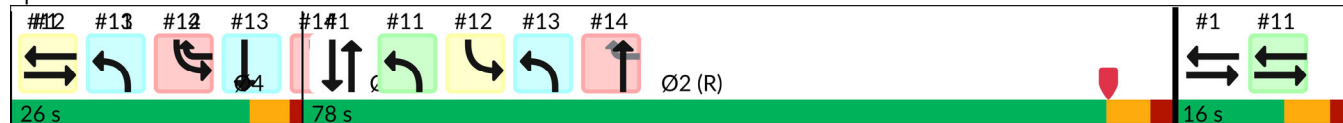
Intersection LOS: B

Intersection Capacity Utilization 39.0%

ICU Level of Service A

Analysis Period (min) 15

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



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HCM 6th Edition methodology does not support clustered intersections.

Timings  
11: Imboden NBL & 56th Avenue

Long Term Background  
PM Peak

	→	↘	←	↙	↗		
Lane Group	EBT	EBR	WBT	NBL	SBR	Ø1	Ø4
Lane Configurations	↑↑↑	↗↗	↑↑	↙↙	↗		
Traffic Volume (vph)	441	1345	30	1522	304		
Future Volume (vph)	441	1345	30	1522	304		
Turn Type	NA	Free	NA	Prot	Free		
Protected Phases	1 4		1 4	2		1	4
Permitted Phases		Free			Free		
Detector Phase	1 4		1 4	2			
Switch Phase							
Minimum Initial (s)				10.0		5.0	10.0
Minimum Split (s)				16.0		9.5	16.0
Total Split (s)				78.0		26.0	16.0
Total Split (%)				65.0%		22%	13%
Yellow Time (s)				4.0		3.5	4.0
All-Red Time (s)				2.0		1.0	2.0
Lost Time Adjust (s)				0.0			
Total Lost Time (s)				6.0			
Lead/Lag				Lag		Lead	
Lead-Lag Optimize?						Yes	
Recall Mode				C-Max		None	Min
Act Effct Green (s)	37.3	120.0	37.3	72.2	120.0		
Actuated g/C Ratio	0.31	1.00	0.31	0.60	1.00		
v/c Ratio	0.25	0.55	0.03	0.84	0.20		
Control Delay (s/veh)	31.3	0.8	0.1	14.7	0.3		
Queue Delay	0.1	0.0	0.0	0.0	0.0		
Total Delay (s/veh)	31.4	0.8	0.1	14.7	0.3		
LOS	C	A	A	B	A		
Approach Delay (s/veh)	8.3		0.1				
Approach LOS	A		A				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay (s/veh): 10.3

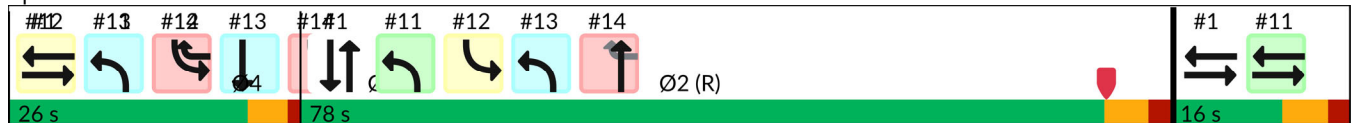
Intersection LOS: B

Intersection Capacity Utilization 56.9%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 11: Imboden NBL & 56th Avenue



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HCM 6th Edition methodology does not support clustered intersections.

Timings  
12: 56th Avenue & Imboden SBL

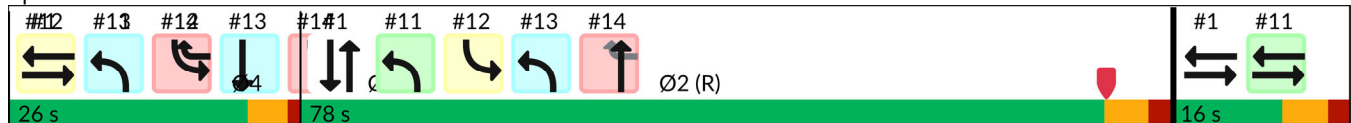
Long Term Background  
PM Peak

	→	←	↖	↗	↘		
Lane Group	EBT	WBT	WBR	NBR	SBL	Ø1	Ø4
Lane Configurations	↑↑	↑↑↑	↖	↗	↘		
Traffic Volume (vph)	8	180	2	47	1		
Future Volume (vph)	8	180	2	47	1		
Turn Type	NA	NA	Free	Free	Prot		
Protected Phases	1 4	1 4			2	1	4
Permitted Phases			Free	Free			
Detector Phase	1 4	1 4			2		
Switch Phase							
Minimum Initial (s)					10.0	5.0	10.0
Minimum Split (s)					16.0	9.5	16.0
Total Split (s)					78.0	26.0	16.0
Total Split (%)					65.0%	22%	13%
Yellow Time (s)					4.0	3.5	4.0
All-Red Time (s)					2.0	1.0	2.0
Lost Time Adjust (s)					0.0		
Total Lost Time (s)					6.0		
Lead/Lag					Lag	Lead	
Lead-Lag Optimize?						Yes	
Recall Mode					C-Max	None	Min
Act Effect Green (s)	37.3	37.3	120.0	120.0	72.2		
Actuated g/C Ratio	0.31	0.31	1.00	1.00	0.60		
v/c Ratio	0.01	0.14	0.00	0.03	0.00		
Control Delay (s/veh)	0.0	30.0	0.0	0.0	25.0		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay (s/veh)	0.0	30.0	0.0	0.0	25.0		
LOS	A	C	A	A	C		
Approach Delay (s/veh)		29.8					
Approach LOS		C					

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay (s/veh): 23.3
Intersection Capacity Utilization 14.6%
Analysis Period (min) 15
Intersection LOS: C
ICU Level of Service A

Splits and Phases: 12: 56th Avenue & Imboden SBL













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HCM 6th Edition methodology does not support clustered intersections.

# Timings 13: Imboden & 56th Avenue EBR

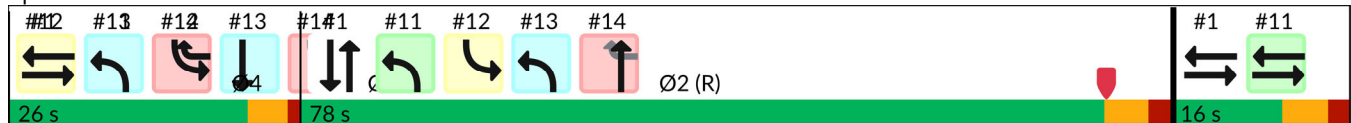
Long Term Background  
PM Peak

						
Lane Group	EBR	NBL	NBT	SBT	Ø2	Ø4
Lane Configurations						
Traffic Volume (vph)	1345	1522	312	510		
Future Volume (vph)	1345	1522	312	510		
Turn Type	Free	Prot	NA	NA		
Protected Phases		2 4	Free	1	2	4
Permitted Phases	Free					
Detector Phase		2 4		1		
Switch Phase						
Minimum Initial (s)				5.0	10.0	10.0
Minimum Split (s)				9.5	16.0	16.0
Total Split (s)				26.0	78.0	16.0
Total Split (%)				21.7%	65%	13%
Yellow Time (s)				3.5	4.0	4.0
All-Red Time (s)				1.0	2.0	2.0
Lost Time Adjust (s)				0.0		
Total Lost Time (s)				4.5		
Lead/Lag				Lead	Lag	
Lead-Lag Optimize?				Yes		
Recall Mode				None	C-Max	Min
Act Effect Green (s)	120.0	88.2	120.0	21.3		
Actuated g/C Ratio	1.00	0.74	1.00	0.18		
v/c Ratio	0.55	0.66	0.11	0.87		
Control Delay (s/veh)	0.7	9.8	0.1	67.6		
Queue Delay	0.0	0.0	0.0	0.0		
Total Delay (s/veh)	0.7	9.9	0.1	67.6		
LOS	A	A	A	E		
Approach Delay (s/veh)			8.0	67.6		
Approach LOS			A	E		

## Intersection Summary

Cycle Length: 120  
Actuated Cycle Length: 120  
Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow  
Natural Cycle: 90  
Control Type: Actuated-Coordinated  
Maximum v/c Ratio: 0.87  
Intersection Signal Delay (s/veh): 13.2      Intersection LOS: B  
Intersection Capacity Utilization 64.6%      ICU Level of Service C  
Analysis Period (min) 15

## Splits and Phases: 13: Imboden & 56th Avenue EBR











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HCM 6th Edition methodology does not support clustered intersections.

# Timings 14: Imboden & 56th Avenue WBR

Long Term Background  
PM Peak

						
Lane Group	WBR	NBT	SBL	SBT	Ø1	Ø4
Lane Configurations						
Traffic Volume (vph)	2	745	1	360		
Future Volume (vph)	2	745	1	360		
Turn Type	pt+ov	NA	Prot	NA		
Protected Phases	1 4	2	1 4	Free	1	4
Permitted Phases	2					
Detector Phase	1 4	2	1 4			
Switch Phase						
Minimum Initial (s)	10.0				5.0	10.0
Minimum Split (s)	16.0				9.5	16.0
Total Split (s)	78.0				26.0	16.0
Total Split (%)	65.0%				22%	13%
Yellow Time (s)	4.0				3.5	4.0
All-Red Time (s)	2.0				1.0	2.0
Lost Time Adjust (s)	0.0					
Total Lost Time (s)	6.0					
Lead/Lag	Lag				Lead	
Lead-Lag Optimize?					Yes	
Recall Mode	C-Max				None	Min
Act Effct Green (s)	120.0	72.2	37.3	120.0		
Actuated g/C Ratio	1.00	0.60	0.31	1.00		
v/c Ratio	0.00	0.40	0.00	0.22		
Control Delay (s/veh)	0.0	14.0	28.0	0.2		
Queue Delay	0.0	0.0	0.0	0.0		
Total Delay (s/veh)	0.0	14.0	28.0	0.2		
LOS	A	B	C	A		
Approach Delay (s/veh)	14.0				0.2	
Approach LOS	B				A	

## Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay (s/veh): 7.5

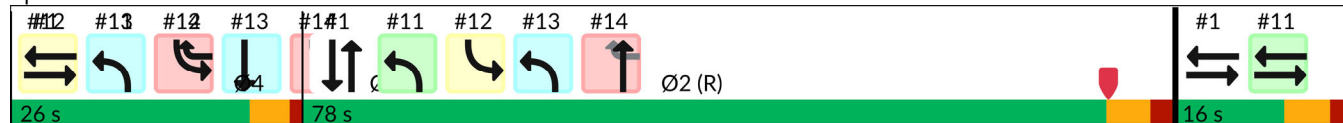
Intersection LOS: A

Intersection Capacity Utilization 33.5%

ICU Level of Service A

Analysis Period (min) 15

## Splits and Phases: 14: Imboden & 56th Avenue WBR























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HCM 6th Edition methodology does not support clustered intersections.

# 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	pm+pt	NA	Perm	Prot	NA
Protected Phases		4	3	8	1	5	2		1	6
Permitted Phases	4		8		8	2		2		
Detector Phase	4	4	3	8	1	5	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	10.5	23.5	23.5	10.5	23.5
Total Split (s)	25.0	25.0	25.0	50.0	37.0	12.0	53.0	53.0	37.0	78.0
Total Split (%)	17.9%	17.9%	17.9%	35.7%	26.4%	8.6%	37.9%	37.9%	26.4%	55.7%
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	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	7.0	7.0	17.0	17.0	54.2	80.6	74.8	74.8	31.8	107.4
Actuated g/C Ratio	0.05	0.05	0.12	0.12	0.39	0.58	0.53	0.53	0.23	0.77
v/c Ratio	0.10	0.21	0.32	0.80	0.78	0.05	0.46	0.09	0.54	0.39
Control Delay (s/veh)	66.2	41.9	57.8	18.2	45.7	9.2	22.6	0.2	52.4	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	66.2	41.9	57.8	18.2	45.7	9.2	22.6	0.2	52.4	5.2
LOS	E	D	E	B	D	A	C	A	D	A
Approach Delay (s/veh)		47.7		33.2			21.1			15.3
Approach LOS		D		C			C			B

## Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

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

Natural Cycle: 85

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay (s/veh): 21.4

Intersection LOS: C

Intersection Capacity Utilization 64.6%

ICU Level of Service C

Analysis Period (min) 15
























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	166	84	186	320	0	1072	227	1957	608	395	2559	10
Arrive On Green	0.20	0.20	0.20	0.04	0.00	0.27	0.01	0.47	0.47	0.14	0.60	0.60
Sat Flow, veh/h	578	425	936	1457	0	2592	1457	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	1457	1392	1296	1413	1392	1526
Q Serve(g_s), s	1.0	0.0	1.3	3.0	0.0	33.9	0.6	23.7	3.9	16.5	23.0	23.0
Cycle Q Clear(g_c), s	1.0	0.0	1.3	3.0	0.0	33.9	0.6	23.7	3.9	16.5	23.0	23.0
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	166	0	270	320	0	1072	227	1957	608	395	1659	910
V/C Ratio(X)	0.03	0.00	0.06	0.13	0.00	0.71	0.05	0.52	0.11	0.86	0.48	0.49
Avail Cap(c_a), veh/h	166	0	270	470	0	1186	277	1957	608	636	1659	910
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	0.53	0.53	0.53
Uniform Delay (d), s/veh	45.4	0.0	45.5	40.7	0.0	34.0	19.1	26.1	20.8	58.9	16.1	16.1
Incr Delay (d2), s/veh	0.1	0.0	0.1	0.2	0.0	1.7	0.1	1.0	0.4	3.9	0.5	1.0
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	0.3	0.0	0.8	2.0	0.0	16.3	0.4	12.7	2.3	9.1	10.6	11.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	45.4	0.0	45.6	40.8	0.0	35.8	19.2	27.0	21.2	62.8	16.6	17.0
LnGrp LOS	D		D	D		D	B	C	C	E	B	B
Approach Vol, veh/h	21			798			1086			1587		
Approach Delay, s/veh	45.6			36.0			26.6			26.7		
Approach LOS	D			D			C			C		
Timer - Assigned Phs	1	2	3	4	5	6	8					
Phs Duration (G+Y+Rc), s	25.1	71.1	10.5	33.3	7.2	88.9	43.8					
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5	5.5	5.5					
Max Green Setting (Gmax), s	31.5	47.5	19.5	19.5	6.5	72.5	44.5					
Max Q Clear Time (g_c+I1), s	18.5	25.7	5.0	3.3	2.6	25.0	35.9					
Green Ext Time (p_c), s	1.0	8.0	0.1	0.0	0.0	12.0	2.4					
Intersection Summary												
HCM 6th Ctrl Delay, s/veh				28.9								
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	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases		4	3	8	5	2	3	1	6	
Permitted Phases	4				2		2	6		6
Detector Phase	4	4	3	8	5	2	3	1	6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.5	23.5	10.5	23.5	10.5	23.5	10.5	10.5	23.5	23.5
Total Split (s)	24.0	24.0	52.0	76.0	11.0	53.0	52.0	11.0	53.0	53.0
Total Split (%)	17.1%	17.1%	37.1%	54.3%	7.9%	37.9%	37.1%	7.9%	37.9%	37.9%
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	Lead	Lead	Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	None	None	C-Max	C-Max
Act Effct Green (s)	8.3	8.3	50.9	64.7	64.3	59.9	114.1	63.2	57.7	57.7
Actuated g/C Ratio	0.06	0.06	0.36	0.46	0.46	0.43	0.82	0.45	0.41	0.41
v/c Ratio	0.28	0.56	0.94	0.09	0.21	0.56	0.24	0.09	0.83	0.01
Control Delay (s/veh)	72.1	31.5	61.1	0.3	33.4	32.1	0.9	22.7	42.1	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 (s/veh)	72.1	31.5	61.1	0.3	33.4	32.1	0.9	22.7	42.1	0.0
LOS	E	C	E	A	C	C	A	C	D	A
Approach Delay (s/veh)		38.9		57.7		25.6			41.8	
Approach LOS		D		E		C			D	

## Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

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

Natural Cycle: 140

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay (s/veh): 40.5

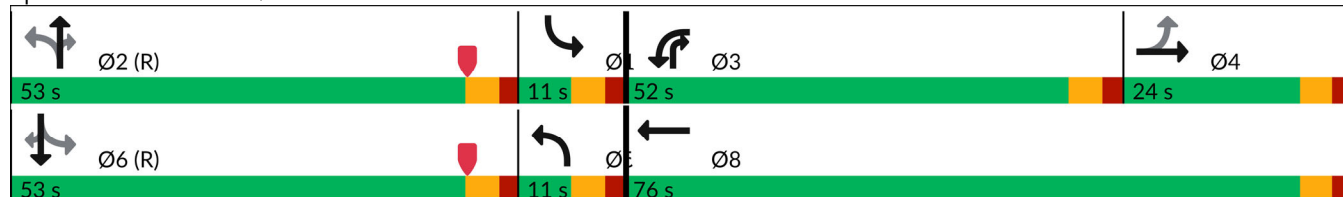
Intersection LOS: D

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	136	2	98	939	0	581	189	1417	870	252	1417	440	
Arrive On Green	0.08	0.08	0.08	0.33	0.00	0.45	0.09	0.34	0.34	0.09	0.34	0.34	
Sat Flow, veh/h	1101	32	1269	2826	0	1296	1457	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	1457	1392	1296	1457	1392	1296	
Q Serve(g_s), s	2.1	0.0	8.6	46.5	0.0	3.6	0.0	28.6	4.2	0.0	47.2	0.3	
Cycle Q Clear(g_c), s	2.1	0.0	8.6	46.5	0.0	3.6	0.0	28.6	4.2	0.0	47.2	0.3	
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	136	0	100	939	0	581	189	1417	870	252	1417	440	
V/C Ratio(X)	0.13	0.00	0.81	1.02	0.00	0.10	0.13	0.70	0.31	0.06	1.00	0.01	
Avail Cap(c_a), veh/h	197	0	172	939	0	653	189	1417	870	252	1417	440	
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	60.6	0.0	63.6	46.8	0.0	22.3	57.4	40.0	2.8	43.1	46.2	30.7	
Incr Delay (d2), s/veh	0.4	0.0	14.0	35.6	0.0	0.1	0.3	2.9	0.9	0.1	23.0	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	1.1	0.0	5.8	28.8	0.0	2.0	1.4	15.4	2.8	0.8	26.4	0.2	
Unsig. Movement Delay, s/veh													
LnGrp Delay(d), s/veh	61.0	0.0	77.6	82.3	0.0	22.3	57.7	42.9	3.7	43.2	69.1	30.7	
LnGrp LOS	E		E	F		C	E	D	A	D	E	C	
Approach Vol, veh/h	99			1018				1277				1431	
Approach Delay, s/veh	74.6			79.0				35.0				68.7	
Approach LOS	E			E				C				E	
Timer - Assigned Phs	1	2	3	4	5	6	8						
Phs Duration (G+Y+Rc), s	18.7	53.0	52.0	16.3	18.7	53.0	68.3						
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5	5.5	5.5						
Max Green Setting (Gmax), s	5.5	47.5	46.5	18.5	5.5	47.5	70.5						
Max Q Clear Time (g_c+I1), s	2.0	30.6	48.5	10.6	2.0	49.2	5.6						
Green Ext Time (p_c), s	0.0	7.6	0.0	0.2	0.0	0.0	0.4						
Intersection Summary													
HCM 6th Ctrl Delay, s/veh	60.3												
HCM 6th LOS	E												

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/v	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/veh)	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
Stage 1	197	-	-
Stage 2	56	-	-
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	688	789	-
Stage 1	784	-	-
Stage 2	911	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	684	789	-
Mov Cap-2 Maneuver	684	-	-
Stage 1	784	-	-
Stage 2	906	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	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/veh)	-	-	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/v	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/veh)	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/v	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/veh)	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/v	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/veh)	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	987
Stage 1	-	-	691
Stage 2	-	-	296
Critical Hdwy	4.35	-	6.65
Critical Hdwy Stg 1	-	-	5.65
Critical Hdwy Stg 2	-	-	5.65
Follow-up Hdwy	2.425	-	3.725
Pot Cap-1 Maneuver	765	-	249
Stage 1	-	-	457
Stage 2	-	-	705
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	765	-	233
Mov Cap-2 Maneuver	-	-	233
Stage 1	-	-	428
Stage 2	-	-	705

Approach	EB	WB	SB
HCM Control Delay, s/v	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/veh)	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

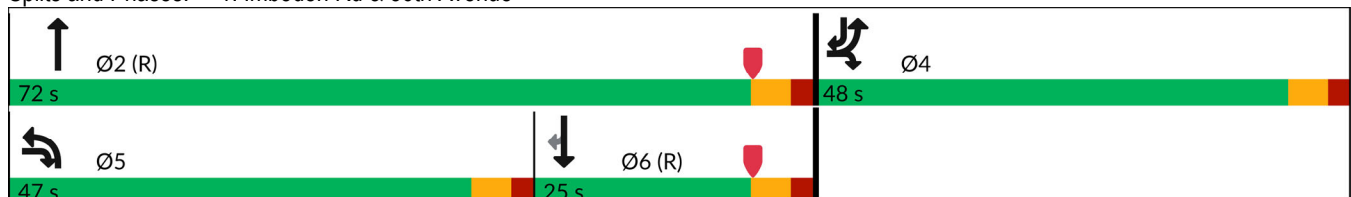
Short Term Total  
AM Peak

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	291	1024	631	171	148	159
Future Volume (vph)	291	1024	631	171	148	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)	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
Act Effect Green (s)	34.7	77.9	37.6	74.3	31.1	71.4
Actuated g/C Ratio	0.29	0.65	0.31	0.62	0.26	0.60
v/c Ratio	0.76	0.67	0.78	0.10	0.21	0.22
Control Delay (s/veh)	50.1	7.5	32.6	5.3	39.6	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	50.1	7.5	32.6	5.3	39.6	7.5
LOS	D	A	C	A	D	A
Approach Delay (s/veh)	16.9			26.8	23.0	
Approach LOS	B			C	C	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 20 (17%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay (s/veh): 21.0
Intersection Capacity Utilization 52.0%
Analysis Period (min) 15
Intersection LOS: C
ICU Level of Service A

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















# HCM 7th Signalized Intersection Summary

1: Imboden Rd & 56th Avenue





















Short Term Total

AM Peak

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	291	1024	631	171	148	159
Future Volume (veh/h)	291	1024	631	171	148	159
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
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	186	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	186	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(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.0	16.6	42.3	12.7	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			872	334	
Approach Delay, s/veh	22.7			43.5	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+I1), 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 7th Control Delay, s/veh			29.8			
HCM 7th LOS			C			
Notes						
User approved pedestrian interval to be less than phase max green.						

# Timings 2: Imboden Rd & 48th Avenue

Short Term Total  
AM Peak

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	5	5	150	5	220	10	429	233	744	409
Future Volume (vph)	5	5	150	5	220	10	429	233	744	409
Turn Type	Perm	NA	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA
Protected Phases		4	3	8	1	5	2	3	1	6
Permitted Phases	4		8		8	2		2		
Detector Phase	4	4	3	8	1	5	2	3	1	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.5	23.5	10.5	23.5	10.5	10.5	23.5	10.5	10.5	23.5
Total Split (s)	24.0	24.0	20.0	44.0	46.0	12.0	30.0	20.0	46.0	64.0
Total Split (%)	20.0%	20.0%	16.7%	36.7%	38.3%	10.0%	25.0%	16.7%	38.3%	53.3%
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		Lead	Lead	Lag	Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Max	None	None	C-Max
Act Effct Green (s)	6.4	6.4	17.0	17.0	62.8	52.0	46.2	63.4	40.3	89.6
Actuated g/C Ratio	0.05	0.05	0.14	0.14	0.52	0.43	0.39	0.53	0.34	0.75
v/c Ratio	0.06	0.19	0.49	0.44	0.18	0.03	0.42	0.32	0.86	0.21
Control Delay (s/veh)	54.6	37.1	50.0	13.0	7.1	14.1	31.9	4.2	43.6	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	54.6	37.1	50.0	13.0	7.1	14.1	31.9	4.2	43.6	5.9
LOS	D	D	D	B	A	B	C	A	D	A
Approach Delay (s/veh)		41.3		26.0			22.0			30.1
Approach LOS		D		C			C			C

## 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

Maximum v/c Ratio: 0.86

Intersection Signal Delay (s/veh): 27.1

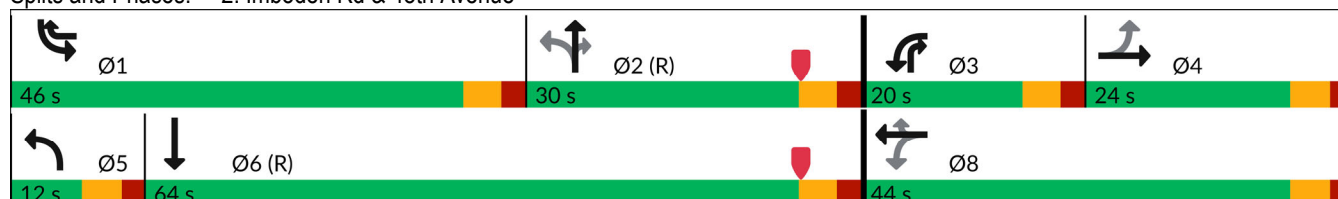
Intersection LOS: C

Intersection Capacity Utilization 57.8%

ICU Level of Service B

Analysis Period (min) 15
























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



# HCM 7th Signalized Intersection Summary

## 2: Imboden Rd & 48th Avenue

Short 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	150	5	220	10	429	233	744	409	5
Future Volume (veh/h)	5	5	10	150	5	220	10	429	233	744	409	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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	163	0	242	11	466	253	809	445	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	393	0	1208	384	1153	605	871	2037	23
Arrive On Green	0.04	0.04	0.04	0.07	0.00	0.16	0.01	0.40	0.40	0.31	0.69	0.69
Sat Flow, veh/h	1159	425	936	2913	0	2592	1457	2906	1296	2826	2944	33
Grp Volume(v), veh/h	5	0	16	163	0	242	11	466	253	809	220	230
Grp Sat Flow(s),veh/h/ln	1159	0	1361	1457	0	1296	1457	1453	1296	1413	1453	1524
Q Serve(g_s), s	0.5	0.0	1.4	6.2	0.0	6.6	0.5	13.8	15.5	33.3	6.6	6.6
Cycle Q Clear(g_c), s	0.5	0.0	1.4	6.2	0.0	6.6	0.5	13.8	15.5	33.3	6.6	6.6
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	393	0	1208	384	1153	605	871	1006	1054
V/C Ratio(X)	0.05	0.00	0.28	0.41	0.00	0.20	0.03	0.40	0.42	0.93	0.22	0.22
Avail Cap(c_a), veh/h	239	0	210	541	0	1631	444	1153	605	954	1006	1054
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	48.3	0.0	18.9	21.1	26.0	21.2	40.2	6.7	6.7
Incr Delay (d2), s/veh	0.2	0.0	2.7	0.7	0.0	0.1	0.0	1.1	2.1	14.2	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	4.1	0.0	3.6	0.3	8.6	8.7	19.1	3.7	3.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	55.5	0.0	58.4	49.0	0.0	19.0	21.1	27.1	23.3	54.5	7.2	7.2
LnGrp LOS	E		E	D		B	C	C	C	D	A	A
Approach Vol, veh/h	21			405			730			1259		
Approach Delay, s/veh	57.7			31.1			25.7			37.6		
Approach LOS	E			C			C			D		
Timer - Assigned Phs	1	2	3	4	5	6	8					
Phs Duration (G+Y+Rc), s	42.5	53.1	13.9	10.5	7.0	88.5	24.4					
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5	5.5	5.5					
Max Green Setting (Gmax), s	40.5	24.5	14.5	18.5	6.5	58.5	38.5					
Max Q Clear Time (g_c+I1), s	35.3	17.5	8.2	3.4	2.5	8.6	8.6					
Green Ext Time (p_c), s	1.7	2.4	0.3	0.0	0.0	3.1	1.0					

### Intersection Summary

HCM 7th Control Delay, s/veh	33.1
HCM 7th 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

Short Term Total  
AM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	145	39	698	407	79	555
Future Volume (vph)	145	39	698	407	79	555
Turn Type	Prot	Prot	NA	pm+ov	pm+pt	NA
Protected Phases	3	3	2	3	1	6
Permitted Phases				2	6	
Detector Phase	3	3	2	3	1	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	10.5	23.5
Total Split (s)	38.0	38.0	70.0	38.0	12.0	82.0
Total Split (%)	31.7%	31.7%	58.3%	31.7%	10.0%	68.3%
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			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	C-Max	None	None	C-Max
Act Effect Green (s)	18.8	18.8	79.4	104.8	90.2	90.2
Actuated g/C Ratio	0.16	0.16	0.66	0.87	0.75	0.75
v/c Ratio	0.70	0.18	0.40	0.37	0.21	0.28
Control Delay (s/veh)	63.4	13.3	11.7	1.1	6.0	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	63.4	13.3	11.7	1.1	6.0	5.6
LOS	E	B	B	A	A	A
Approach Delay (s/veh)	52.9		7.8			5.7
Approach LOS	D		A			A

### 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: 50

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.70

Intersection Signal Delay (s/veh): 11.4

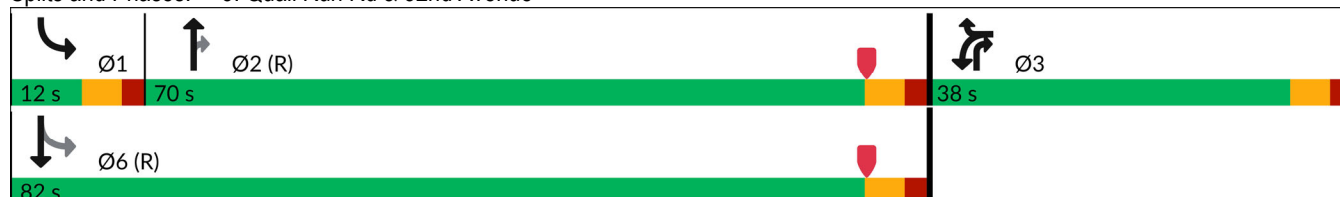
Intersection LOS: B

Intersection Capacity Utilization 45.5%

ICU Level of Service A

Analysis Period (min) 15













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



# HCM 7th Signalized Intersection Summary

## 3: Quail Run Rd & 32nd Avenue

Short Term Total  
AM Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	145	39	698	407	79	555
Future Volume (veh/h)	145	39	698	407	79	555
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
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	158	42	759	442	86	603
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	185	165	2023	1067	341	2270
Arrive On Green	0.13	0.13	0.70	0.70	0.04	0.78
Sat Flow, veh/h	1457	1296	2983	1296	1457	2983
Grp Volume(v), veh/h	158	42	759	442	86	603
Grp Sat Flow(s), veh/h/ln	1457	1296	1453	1296	1457	1453
Q Serve(g_s), s	12.7	3.5	12.9	11.0	1.9	6.9
Cycle Q Clear(g_c), s	12.7	3.5	12.9	11.0	1.9	6.9
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	185	165	2023	1067	341	2270
V/C Ratio(X)	0.85	0.25	0.38	0.41	0.25	0.27
Avail Cap(c_a), veh/h	395	351	2023	1067	363	2270
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	51.3	47.2	7.5	2.8	5.1	3.6
Incr Delay (d2), s/veh	10.5	0.8	0.5	1.2	0.4	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	8.9	2.1	7.0	4.2	0.9	3.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	61.8	48.0	8.0	4.0	5.5	3.9
LnGrp LOS	E	D	A	A	A	A
Approach Vol, veh/h	200		1201			689
Approach Delay, s/veh	58.9		6.6			4.1
Approach LOS	E		A			A
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	10.2	89.0			99.2	20.8
Change Period (Y+Rc), s	5.5	5.5			5.5	5.5
Max Green Setting (Gmax), s	6.5	64.5			76.5	32.5
Max Q Clear Time (g_c+I1), s	3.9	14.9			8.9	14.7
Green Ext Time (p_c), s	0.0	9.2			5.0	0.5
<b>Intersection Summary</b>						
HCM 7th Control Delay, s/veh			10.8			
HCM 7th LOS			B			

HCM 7th TWSC  
4: Cavanaugh Road & 48t Avenue/48th Avenue

Short Term Total  
AM Peak

Intersection						
Int Delay, s/veh	1.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	
Traffic Vol, veh/h	398	366	6	179	96	3
Future Vol, veh/h	398	366	6	179	96	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	433	398	7	195	104	3









Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	830	0	543
Stage 1	-	-	-	-	433
Stage 2	-	-	-	-	110
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	-	-	666	-	418
Stage 1	-	-	-	-	559
Stage 2	-	-	-	-	838
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	666	-	414
Mov Cap-2 Maneuver	-	-	-	-	414
Stage 1	-	-	-	-	559
Stage 2	-	-	-	-	830

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0.34	16.52
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	419	-	-	666	-
HCM Lane V/C Ratio	0.257	-	-	0.01	-
HCM Control Delay (s/veh)	16.5	-	-	10.5	-
HCM Lane LOS	C	-	-	B	-
HCM 95th %tile Q(veh)	1	-	-	0	-

HCM 7th TWSC  
5: Cavanaugh Road & 42nd Avenue

Short 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	1	36	5	2	67	14	3	75	4	48	217	2
Future Vol, veh/h	1	36	5	2	67	14	3	75	4	48	217	2
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	1	39	5	2	73	15	3	82	4	52	236	2

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	466	434	237	450	433	84	238	0	0	86	0	0
Stage 1	341	341	-	90	90	-	-	-	-	-	-	-
Stage 2	124	92	-	360	342	-	-	-	-	-	-	-
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	471	482	748	482	483	916	1205	-	-	1377	-	-
Stage 1	628	600	-	863	777	-	-	-	-	-	-	-
Stage 2	827	776	-	614	599	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	377	463	748	422	463	916	1205	-	-	1377	-	-
Mov Cap-2 Maneuver	377	463	-	422	463	-	-	-	-	-	-	-
Stage 1	627	577	-	861	775	-	-	-	-	-	-	-
Stage 2	735	774	-	546	576	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	13.2		13.6		0.29		1.39	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1205	-	-	377	485	422	507	1377	-	-
HCM Lane V/C Ratio	0.003	-	-	0.003	0.092	0.005	0.174	0.038	-	-
HCM Control Delay (s/veh)	8	-	-	14.6	13.2	13.6	13.6	7.7	-	-
HCM Lane LOS	A	-	-	B	B	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0.3	0	0.6	0.1	-	-



Intersection						
Int Delay, s/veh	5.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	93	84	144	234	147	75
Future Vol, veh/h	93	84	144	234	147	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	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	101	91	157	254	160	82







Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	411	0	0 450 157
Stage 1	-	-	- 157 -
Stage 2	-	-	- 293 -
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	1034	-	- 526 832
Stage 1	-	-	- 819 -
Stage 2	-	-	- 707 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1034	-	- 475 832
Mov Cap-2 Maneuver	-	-	- 475 -
Stage 1	-	-	- 739 -
Stage 2	-	-	- 707 -

Approach	EB	WB	SB
HCM Control Delay, s/v	4.65	0	14.15
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1034	-	-	-	475	832
HCM Lane V/C Ratio	0.098	-	-	-	0.336	0.098
HCM Control Delay (s/veh)	8.9	-	-	-	16.4	9.8
HCM Lane LOS	A	-	-	-	C	A
HCM 95th %tile Q(veh)	0.3	-	-	-	1.5	0.3













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

Short Term Total  
AM Peak

Intersection						
Int Delay, s/veh	3.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	106	281	352	409	0
Future Vol, veh/h	0	106	281	352	409	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	305	383	445	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1247	222	445	0	-	0
Stage 1	445	-	-	-	-	-
Stage 2	802	-	-	-	-	-
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	137	715	965	-	-	-
Stage 1	551	-	-	-	-	-
Stage 2	348	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	94	715	965	-	-	-
Mov Cap-2 Maneuver	94	-	-	-	-	-
Stage 1	377	-	-	-	-	-
Stage 2	348	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/v	11	4.64		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	965	-	-	715	-	-
HCM Lane V/C Ratio	0.317	-	-	0.161	-	-
HCM Control Delay (s/veh)	10.4	-	0	11	-	-
HCM Lane LOS	B	-	A	B	-	-
HCM 95th %tile Q(veh)	1.4	-	-	0.6	-	-

HCM 7th TWSC  
8: Quail Run Drive & 48th Avenue






Short Term Total  
AM Peak

Intersection												
Int Delay, s/veh	4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	710	157	6	209	1	91	0	15	1	0	11
Future Vol, veh/h	20	710	157	6	209	1	91	0	15	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	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	22	772	171	7	227	1	99	0	16	1	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	228	0	0	942	0	0	942	1057	386	670	1227	114
Stage 1	-	-	-	-	-	-	815	815	-	241	241	-
Stage 2	-	-	-	-	-	-	127	241	-	429	986	-
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	1185	-	-	597	-	-	186	190	552	301	148	848
Stage 1	-	-	-	-	-	-	292	339	-	680	651	-
Stage 2	-	-	-	-	-	-	801	651	-	517	277	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1185	-	-	597	-	-	178	184	552	283	143	848
Mov Cap-2 Maneuver	-	-	-	-	-	-	178	184	-	283	143	-
Stage 1	-	-	-	-	-	-	287	333	-	667	644	-
Stage 2	-	-	-	-	-	-	781	644	-	492	272	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.18	0.31	42.87	10.04
HCM LOS			E	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	178	552	1185	-	-	597	-	-	727
HCM Lane V/C Ratio	0.556	0.03	0.018	-	-	0.011	-	-	0.018
HCM Control Delay (s/veh)	48	11.7	8.1	-	-	11.1	-	-	10
HCM Lane LOS	E	B	A	-	-	B	-	-	B
HCM 95th %tile Q(veh)	2.9	0.1	0.1	-	-	0	-	-	0.1

Intersection						
Int Delay, s/veh	3.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	158	329	94	21	11	88
Future Vol, veh/h	158	329	94	21	11	88
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	172	358	102	23	12	96

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	125	0	-	0	815 114
Stage 1	-	-	-	-	114 -
Stage 2	-	-	-	-	701 -
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	1331	-	-	-	318 880
Stage 1	-	-	-	-	857 -
Stage 2	-	-	-	-	452 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1331	-	-	-	277 880
Mov Cap-2 Maneuver	-	-	-	-	277 -
Stage 1	-	-	-	-	746 -
Stage 2	-	-	-	-	452 -

Approach	EB	WB	SB
HCM Control Delay, s/v	2.63	0	10.99
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1331	-	-	-	709
HCM Lane V/C Ratio	0.129	-	-	-	0.152
HCM Control Delay (s/veh)	8.1	-	-	-	11
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.4	-	-	-	0.5

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↗↗		↘	↗↗
Traffic Vol, veh/h	0	3	633	5	6	1153
Future Vol, veh/h	0	3	633	5	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	0	3	688	5	7	1253
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	-	347	0	0	693	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.4	-	-	4.6	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.55	-	-	2.45	-
Pot Cap-1 Maneuver	0	587	-	-	760	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	587	-	-	760	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s/v11.17		0		0.05		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	587	760	-	
HCM Lane V/C Ratio	-	-	0.006	0.009	-	
HCM Control Delay (s/veh)	-	-	11.2	9.8	-	
HCM Lane LOS	-	-	B	A	-	
HCM 95th %tile Q(veh)	-	-	0	0	-	

HCM 7th TWSC  
11: Imboden Rd & PA-5 Access

Short Term Total  
AM Peak

Intersection						
Int Delay, s/veh	0.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑↑	↑	↑	↑↑
Traffic Vol, veh/h	26	4	658	47	7	552
Future Vol, veh/h	26	4	658	47	7	552
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	715	51	8	600

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1030	358	0	0	766
Stage 1	715	-	-	-	-
Stage 2	315	-	-	-	-
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	*336	577	-	-	708
Stage 1	*389	-	-	-	-
Stage 2	*769	-	-	-	-
Platoon blocked, %	0	-	-	-	-
Mov Cap-1 Maneuver	*333	577	-	-	708
Mov Cap-2 Maneuver	*333	-	-	-	-
Stage 1	*389	-	-	-	-
Stage 2	*760	-	-	-	-







Approach	WB	NB	SB
HCM Control Delay, s/v16.25		0	0.13
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	353	708
HCM Lane V/C Ratio	-	-	0.093	0.011
HCM Control Delay (s/veh)	-	-	16.3	10.1
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 7th TWSC  
12: PA-5 Access/PA-2 Access & 48th Avenue

Short Term Total  
AM Peak

Intersection												
Int Delay, s/veh	0.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	18	941	18	1	424	2	10	0	1	1	0	19
Future Vol, veh/h	18	941	18	1	424	2	10	0	1	1	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	20	1023	20	1	461	2	11	0	1	1	0	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	463	0	0	1042	0	0	1304	1537	521	1015	1546	232
Stage 1	-	-	-	-	-	-	1072	1072	-	464	464	-
Stage 2	-	-	-	-	-	-	233	465	-	551	1082	-
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	948	-	-	*929	-	-	*352	*206	*641	*607	*202	705
Stage 1	-	-	-	-	-	-	*607	*536	-	*491	*508	-
Stage 2	-	-	-	-	-	-	*688	*507	-	*607	*536	-
Platoon blocked, %		-	-	0	-	-	0	0	0	0	0	
Mov Cap-1 Maneuver	948	-	-	*929	-	-	*334	*201	*641	*593	*197	705
Mov Cap-2 Maneuver	-	-	-	-	-	-	*334	*201	-	*593	*197	-
Stage 1	-	-	-	-	-	-	*594	*524	-	*481	*507	-
Stage 2	-	-	-	-	-	-	*667	*506	-	*593	*524	-





Approach	EB			WB			NB			SB		
HCM Control Delay, s/v	0.16			0.02			15.67			10.32		
HCM LOS							C			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	349	948	-	-	* 929	-	-	698
HCM Lane V/C Ratio	0.034	0.021	-	-	0.001	-	-	0.031
HCM Control Delay (s/veh)	15.7	8.9	-	-	8.9	-	-	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 7th TWSC  
13: 48th Avenue & PA-3 Western Access

Short Term Total  
AM Peak

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	38	904	319	2	1	23
Future Vol, veh/h	38	904	319	2	1	23
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	41	983	347	2	1	25

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	349	0	0	922	174
Stage 1	-	-	-	348	-
Stage 2	-	-	-	574	-
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	1057	-	-	230	771
Stage 1	-	-	-	623	-
Stage 2	-	-	-	467	-
Platoon blocked, %		-	-		
Mov Cap-1 Maneuver	1057	-	-	221	771
Mov Cap-2 Maneuver	-	-	-	221	-
Stage 1	-	-	-	598	-
Stage 2	-	-	-	467	-





Approach	EB	WB	SB
HCM Control Delay, s/v	0.34	0	10.35
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1057	-	-	-	699
HCM Lane V/C Ratio	0.039	-	-	-	0.037
HCM Control Delay (s/veh)	8.5	-	-	-	10.4
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1



HCM 7th TWSC  
14: 48th Avenue & PA-3 Eastern Access

Short Term Total  
AM Peak

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	886	489	1	1	11
Future Vol, veh/h	20	886	489	1	1	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	22	963	532	1	1	12

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	533	0	0	1057	266
Stage 1	-	-	-	532	-
Stage 2	-	-	-	525	-
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	887	-	-	186	667
Stage 1	-	-	-	493	-
Stage 2	-	-	-	497	-
Platoon blocked, %	-	-	-		
Mov Cap-1 Maneuver	887	-	-	181	667
Mov Cap-2 Maneuver	-	-	-	181	-
Stage 1	-	-	-	481	-
Stage 2	-	-	-	497	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0.2	0	11.77
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	887	-	-	-	545
HCM Lane V/C Ratio	0.025	-	-	-	0.024
HCM Control Delay (s/veh)	9.2	-	-	-	11.8
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

HCM 7th TWSC  
15: PA-8A Access & 48th Avenue

Short Term Total  
AM Peak

Intersection						
Int Delay, s/veh	0.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	
Traffic Vol, veh/h	706	19	6	209	7	5
Future Vol, veh/h	706	19	6	209	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	767	21	7	227	8	5







Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	788	0	904
Stage 1	-	-	-	-	778
Stage 2	-	-	-	-	127
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	-	-	694	-	237
Stage 1	-	-	-	-	359
Stage 2	-	-	-	-	821
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	694	-	235
Mov Cap-2 Maneuver	-	-	-	-	235
Stage 1	-	-	-	-	359
Stage 2	-	-	-	-	813

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0.29	17.22
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	308	-	-	694	-
HCM Lane V/C Ratio	0.042	-	-	0.009	-
HCM Control Delay (s/veh)	17.2	-	-	10.2	-
HCM Lane LOS	C	-	-	B	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

HCM 7th TWSC  
16: PA-8A Access/PA-4 Access & 48th Avenue

Short Term 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	31	45	191	6	17	0	25	5	0	7
Future Vol, veh/h	12	668	31	45	191	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	726	34	49	208	7	18	0	27	5	0	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	214	0	0	760	0	0	971	1081	380	698	1095	107
Stage 1	-	-	-	-	-	-	769	769	-	309	309	-
Stage 2	-	-	-	-	-	-	202	312	-	389	786	-
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	1201	-	-	713	-	-	176	183	557	287	180	857
Stage 1	-	-	-	-	-	-	313	358	-	616	604	-
Stage 2	-	-	-	-	-	-	719	602	-	548	351	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1201	-	-	713	-	-	161	169	557	251	165	857
Mov Cap-2 Maneuver	-	-	-	-	-	-	161	169	-	251	165	-
Stage 1	-	-	-	-	-	-	309	354	-	609	563	-
Stage 2	-	-	-	-	-	-	664	561	-	516	347	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s/v	0.14			1.94			20.39			13.69		
HCM LOS							C			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	279	1201	-	-	713	-	-	427
HCM Lane V/C Ratio	0.163	0.011	-	-	0.069	-	-	0.031
HCM Control Delay (s/veh)	20.4	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 7th TWSC  
17: PA-8B Access & 48th Avenue

Short Term Total  
AM Peak

Intersection						
Int Delay, s/veh	1.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	
Traffic Vol, veh/h	389	13	46	178	7	27
Future Vol, veh/h	389	13	46	178	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	423	14	50	193	8	29

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	437	0	627
Stage 1	-	-	-	-	430
Stage 2	-	-	-	-	197
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	-	-	972	-	367
Stage 1	-	-	-	-	561
Stage 2	-	-	-	-	752
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	972	-	348
Mov Cap-2 Maneuver	-	-	-	-	348
Stage 1	-	-	-	-	561
Stage 2	-	-	-	-	714

Approach	EB	WB	NB
HCM Control Delay, s/v	0	1.83	11.51
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	590	-	-	972	-
HCM Lane V/C Ratio	0.063	-	-	0.051	-
HCM Control Delay (s/veh)	11.5	-	-	8.9	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.2	-

HCM 7th TWSC  
18: Quail Run Drive & PA-8A Access

Short Term Total  
AM 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	54	0	0	2	0	7	0	45	3	7	59	96
Future Vol, veh/h	54	0	0	2	0	7	0	45	3	7	59	96
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	59	0	0	2	0	8	0	49	3	8	64	104

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	180	184	116	130	234	51	168	0	0	52	0	0
Stage 1	132	132	-	51	51	-	-	-	-	-	-	-
Stage 2	49	52	-	79	184	-	-	-	-	-	-	-
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	733	671	877	792	628	956	1281	-	-	1418	-	-
Stage 1	820	745	-	907	810	-	-	-	-	-	-	-
Stage 2	909	808	-	875	706	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	723	668	877	788	625	956	1281	-	-	1418	-	-
Mov Cap-2 Maneuver	723	668	-	788	625	-	-	-	-	-	-	-
Stage 1	820	741	-	907	810	-	-	-	-	-	-	-
Stage 2	902	808	-	870	703	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v10.42		8.99	0	0.33
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1281	-	-	723 913	1418	-	-
HCM Lane V/C Ratio	-	-	-	0.081 0.011	0.005	-	-
HCM Control Delay (s/veh)	0	-	-	10.4 9	7.6	-	-
HCM Lane LOS	A	-	-	B A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.3 0	0	-	-

HCM 7th TWSC  
19: Cavanaugh Road & PA-8A Access/PA-8B Access

Short 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	76	7	12	260	30
Future Vol, veh/h	17	0	3	4	0	7	6	76	7	12	260	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	83	8	13	283	33

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	421	428	299	408	441	86	315	0	0	90	0	0
Stage 1	325	325	-	99	99	-	-	-	-	-	-	-
Stage 2	96	103	-	309	341	-	-	-	-	-	-	-
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	505	486	690	515	478	912	1126	-	-	1372	-	-
Stage 1	641	610	-	853	770	-	-	-	-	-	-	-
Stage 2	857	767	-	655	600	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	493	478	690	505	470	912	1126	-	-	1372	-	-
Mov Cap-2 Maneuver	493	478	-	505	470	-	-	-	-	-	-	-
Stage 1	638	604	-	848	766	-	-	-	-	-	-	-
Stage 2	845	763	-	646	594	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	12.3		10.19		0.55		0.3	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1126	-	-	515 705	1372	-	-
HCM Lane V/C Ratio	0.006	-	-	0.042 0.017	0.01	-	-
HCM Control Delay (s/veh)	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 7th TWSC  
20: Quail Run Drive & 42nd Avenue

Short 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	10	0	44	20	0	15	78	23	37	26	17	18
Future Vol, veh/h	10	0	44	20	0	15	78	23	37	26	17	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	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	11	0	48	22	0	16	85	25	40	28	18	20







Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	279	320	28	290	309	45	38	0	0	65	0	0
Stage 1	85	85	-	215	215	-	-	-	-	-	-	-
Stage 2	195	235	-	75	95	-	-	-	-	-	-	-
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	629	561	984	619	569	963	1436	-	-	1402	-	-
Stage 1	869	782	-	738	684	-	-	-	-	-	-	-
Stage 2	757	670	-	880	774	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	570	517	984	543	525	963	1436	-	-	1402	-	-
Mov Cap-2 Maneuver	570	517	-	543	525	-	-	-	-	-	-	-
Stage 1	818	766	-	694	644	-	-	-	-	-	-	-
Stage 2	700	630	-	820	758	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	9.45		10.72		4.33		3.25	
HCM LOS	A		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1436	-	-	868	668	1402	-
HCM Lane V/C Ratio	0.059	-	-	0.068	0.057	0.02	-
HCM Control Delay (s/veh)	7.7	-	-	9.4	10.7	7.6	-
HCM Lane LOS	A	-	-	A	B	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.2	0.2	0.1	-

HCM 7th TWSC  
21: PA-9 Access/PA-8A Access & 42nd Avenue

Short 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	5	45	13	9	26	2	5	0	7	1	0	4
Future Vol, veh/h	5	45	13	9	26	2	5	0	7	1	0	4
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	49	14	10	28	2	5	0	8	1	0	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	30	0	0	63	0	0	115	117	56	109	123	29
Stage 1	-	-	-	-	-	-	67	67	-	49	49	-
Stage 2	-	-	-	-	-	-	48	50	-	60	74	-
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	1446	-	-	1405	-	-	811	732	949	818	727	983
Stage 1	-	-	-	-	-	-	889	796	-	909	811	-
Stage 2	-	-	-	-	-	-	910	810	-	897	791	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1446	-	-	1405	-	-	799	725	949	803	719	983
Mov Cap-2 Maneuver	-	-	-	-	-	-	799	725	-	803	719	-
Stage 1	-	-	-	-	-	-	886	793	-	906	805	-
Stage 2	-	-	-	-	-	-	900	804	-	886	788	-







Approach	EB			WB			NB			SB		
HCM Control Delay, s/v	0.6			1.84			9.15			8.85		
HCM LOS							A			A		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	880	1446	-	-	1405	-	-	941
HCM Lane V/C Ratio	0.015	0.004	-	-	0.007	-	-	0.006
HCM Control Delay (s/veh)	9.2	7.5	-	-	7.6	-	-	8.8
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0



HCM 7th TWSC  
22: PA-9 Access/PA-8A Access & 42nd Avenue

Short Term Total  
AM Peak

Intersection												
Int Delay, s/veh	5.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	8	33	53	11	8	19	0	30	4	0	6
Future Vol, veh/h	12	8	33	53	11	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	9	36	58	12	9	21	0	33	4	0	7







Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	21	0	0	45	0	0	180	189	27	166	202	16
Stage 1	-	-	-	-	-	-	53	53	-	132	132	-
Stage 2	-	-	-	-	-	-	127	136	-	35	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	1458	-	-	1428	-	-	734	667	986	749	655	1000
Stage 1	-	-	-	-	-	-	905	808	-	820	745	-
Stage 2	-	-	-	-	-	-	824	742	-	925	793	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1458	-	-	1428	-	-	693	634	986	689	623	1000
Mov Cap-2 Maneuver	-	-	-	-	-	-	693	634	-	689	623	-
Stage 1	-	-	-	-	-	-	897	801	-	812	715	-
Stage 2	-	-	-	-	-	-	786	712	-	887	786	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	1.7	5.61	9.53	9.31
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	847	1458	-	-	1428	-	-	847
HCM Lane V/C Ratio	0.063	0.009	-	-	0.04	-	-	0.013
HCM Control Delay (s/veh)	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 7th TWSC  
23: PA-8C Access/PA-8B Access & 42nd Avenue

Short Term Total  
AM 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	6	109	10	51	75	4	5	0	29	2	0	3
Future Vol, veh/h	6	109	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	118	11	55	82	4	5	0	32	2	0	3





Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	86	0	0	129	0	0	329	334	124	326	337	84
Stage 1	-	-	-	-	-	-	137	137	-	195	195	-
Stage 2	-	-	-	-	-	-	192	197	-	132	142	-
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	-	-	1326	-	-	582	551	869	585	548	916
Stage 1	-	-	-	-	-	-	814	741	-	757	698	-
Stage 2	-	-	-	-	-	-	759	697	-	820	737	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1377	-	-	1326	-	-	553	525	869	538	523	916
Mov Cap-2 Maneuver	-	-	-	-	-	-	553	525	-	538	523	-
Stage 1	-	-	-	-	-	-	810	738	-	753	669	-
Stage 2	-	-	-	-	-	-	725	668	-	786	734	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s/v	0.37			3.07			9.71			10.08		
HCM LOS							A			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	801	1377	-	-	1326	-	-	715
HCM Lane V/C Ratio	0.046	0.005	-	-	0.042	-	-	0.008
HCM Control Delay (s/veh)	9.7	7.6	-	-	7.8	-	-	10.1
HCM Lane LOS	A	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0.1	-	-	0

HCM 7th TWSC  
24: Quail Run Drive & PA-9 Access

Short 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	136	17	4	78
Future Vol, veh/h	10	2	136	17	4	78
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	148	18	4	85

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	251	157	0
Stage 1	157	-	-
Stage 2	93	-	-
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	691	832	-
Stage 1	818	-	-
Stage 2	876	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	688	832	-
Mov Cap-2 Maneuver	688	-	-
Stage 1	818	-	-
Stage 2	873	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v10.18		0	0.38
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	709	1284
HCM Lane V/C Ratio	-	-	0.018	0.003
HCM Control Delay (s/veh)	-	-	10.2	7.8
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0

HCM 7th TWSC  
25: Cavanaugh Road & PA-9 Access/PA-8C Access

Short 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	7	0	20	11	0	5	34	70	20	9	203	13
Future Vol, veh/h	7	0	20	11	0	5	34	70	20	9	203	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	76	22	10	221	14





Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	397	419	228	401	415	87	235	0	0	98	0	0
Stage 1	247	247	-	161	161	-	-	-	-	-	-	-
Stage 2	150	172	-	240	254	-	-	-	-	-	-	-
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	524	492	758	521	494	912	1209	-	-	1363	-	-
Stage 1	708	661	-	790	723	-	-	-	-	-	-	-
Stage 2	801	715	-	715	657	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	501	473	758	487	476	912	1209	-	-	1363	-	-
Mov Cap-2 Maneuver	501	473	-	487	476	-	-	-	-	-	-	-
Stage 1	686	657	-	766	701	-	-	-	-	-	-	-
Stage 2	772	693	-	689	652	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v10.63		11.52	2.21	0.31
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1209	-	-	669	570	1363	-
HCM Lane V/C Ratio	0.031	-	-	0.044	0.031	0.007	-
HCM Control Delay (s/veh)	8.1	-	-	10.6	11.5	7.7	-
HCM Lane LOS	A	-	-	B	B	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0.1	0	-

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

Short Term Total  
AM Peak

Intersection						
Int Delay, s/veh	1.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	19	31	148	80	8
Future Vol, veh/h	4	19	31	148	80	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	161	87	9

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	320	91	96
Stage 1	91	-	-
Stage 2	228	-	-
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	629	906	1366
Stage 1	878	-	-
Stage 2	758	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	613	906	1366
Mov Cap-2 Maneuver	613	-	-
Stage 1	856	-	-
Stage 2	758	-	-













Approach	EB	NB	SB
HCM Control Delay, s/v	9.43	1.33	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1366	-	837	-	-
HCM Lane V/C Ratio	0.025	-	0.03	-	-
HCM Control Delay (s/veh)	7.7	-	9.4	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

# Timings

## 1: Imboden Rd & 56th Avenue

Short Term Total  
PM Peak

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	328	1040	1048	209	224	219
Future Volume (vph)	328	1040	1048	209	224	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)	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
Act Effct Green (s)	32.0	88.8	51.3	77.0	20.2	57.7
Actuated g/C Ratio	0.27	0.74	0.43	0.64	0.17	0.48
v/c Ratio	0.93	0.64	0.95	0.12	0.50	0.37
Control Delay (s/veh)	74.5	7.4	48.6	6.9	49.7	19.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	74.5	7.4	48.6	6.9	49.7	19.2
LOS	E	A	D	A	D	B
Approach Delay (s/veh)	23.5			41.7	34.6	
Approach LOS	C			D	C	

### Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 86 (72%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.95

Intersection Signal Delay (s/veh): 32.6

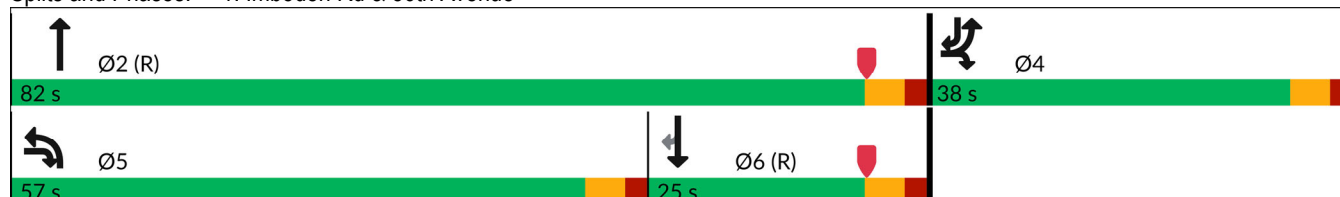
Intersection LOS: C

Intersection Capacity Utilization 68.0%

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

Short Term Total  
PM Peak

























						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	328	1040	1048	209	224	219
Future Volume (veh/h)	328	1040	1048	209	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	1130	1139	227	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	1575	1186	1853	500	574
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	1130	1139	227	243	238
Grp Sat Flow(s),veh/h/ln	1457	1141	1413	1453	1453	1296
Q Serve(g_s), s	28.4	32.5	47.0	3.7	9.1	15.0
Cycle Q Clear(g_c), s	28.4	32.5	47.0	3.7	9.1	15.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	395	1575	1186	1853	500	574
V/C Ratio(X)	0.90	0.72	0.96	0.12	0.49	0.41
Avail Cap(c_a), veh/h	395	1575	1213	1853	500	574
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	33.9	8.6	44.9	22.8
Incr Delay (d2), s/veh	23.8	1.6	17.1	0.1	3.3	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	33.2	25.6	2.1	6.3	12.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	66.0	13.0	51.0	8.7	48.2	25.0
LnGrp LOS	E	B	D	A	D	C
Approach Vol, veh/h	1487			1366	481	
Approach Delay, s/veh	25.7			43.9	36.7	
Approach LOS	C			D	D	
Timer - Assigned Phs	2		4		5	6
Phs Duration (G+Y+Rc), s	82.0		38.0		55.8	26.2
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		49.0	17.0
Green Ext Time (p_c), s	1.7		0.0		1.3	0.6
Intersection Summary						
HCM 6th Ctrl Delay, s/veh			34.8			
HCM 6th LOS			C			

Approach	EB	NB	SB
Crosswalk Length (ft)	61.5	72.0	83.9
Crosswalk Width (ft)	12.0	12.0	12.0
Total Number of Lanes Crossed	5	6	5
Number of Right-Turn Islands	0	0	0
Type of Control	None	None	None
Corresponding Signal Phase	6	4	2
Effective Walk Time (s)	0.0	0.0	0.0
Right Corner Size A (ft)	9.0	9.0	9.0
Right Corner Size B (ft)	9.0	9.0	9.0
Right Corner Curb Radius (ft)	0.0	0.0	0.0
Right Corner Total Area (sq.ft)	81.00	81.00	81.00
Ped. Left-Right Flow Rate (p/h)	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0
85th percentile speed (mph)	30	30	30
Right Corner Area per Ped (sq.ft)	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-
Ped. Circulation Area (sq.ft)	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-
Pedestrian Delay (s/p)	60.0	60.0	60.0
Pedestrian Compliance Code	Poor	Poor	Poor
Pedestrian Crosswalk Score	2.88	2.92	2.53
Pedestrian Crosswalk LOS	C	C	C



# Timings 2: Imboden Rd & 48th Avenue

Short Term Total  
PM Peak

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations			 				 		 	 
Traffic Volume (vph)	5	5	275	5	729	10	391	112	221	718
Future Volume (vph)	5	5	275	5	729	10	391	112	221	718
Turn Type	Perm	NA	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA
Protected Phases		4	3	8	1	5	2	3	1	6
Permitted Phases	4		8		8	2		2		
Detector Phase	4	4	3	8	1	5	2	3	1	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.5	23.5	10.5	23.5	10.5	10.5	23.5	10.5	10.5	23.5
Total Split (s)	24.0	24.0	36.0	60.0	27.0	12.0	33.0	36.0	27.0	48.0
Total Split (%)	20.0%	20.0%	30.0%	50.0%	22.5%	10.0%	27.5%	30.0%	22.5%	40.0%
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	Lead	Lag	Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Max	None	None	C-Max
Act Effct Green (s)	6.6	6.6	22.7	22.7	45.3	69.6	63.7	86.6	17.1	83.8
Actuated g/C Ratio	0.06	0.06	0.19	0.19	0.38	0.58	0.53	0.72	0.14	0.70
v/c Ratio	0.06	0.19	0.64	0.72	0.76	0.03	0.28	0.13	0.60	0.39
Control Delay (s/veh)	54.4	36.8	49.2	11.9	32.8	9.4	18.6	1.8	56.0	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	54.4	36.8	49.2	11.9	32.8	9.4	18.6	1.8	56.0	8.1
LOS	D	D	D	B	C	A	B	A	E	A
Approach Delay (s/veh)		41.0		29.6			14.7			19.3
Approach LOS		D		C			B			B

## Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay (s/veh): 22.7

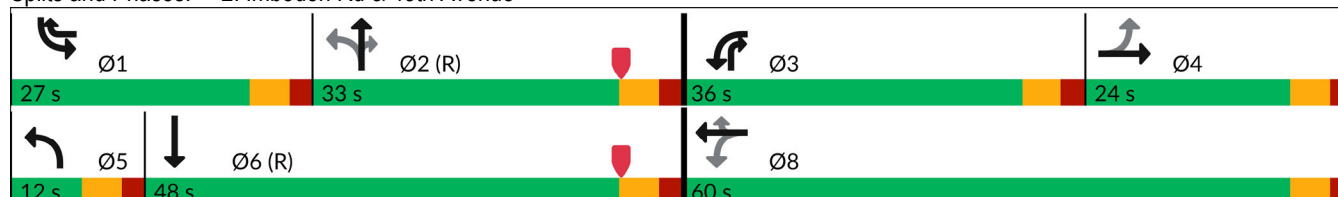
Intersection LOS: C

Intersection Capacity Utilization 58.8%

ICU Level of Service B

Analysis Period (min) 15
























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



# HCM 6th Signalized Intersection Summary

## 2: Imboden Rd & 48th Avenue












Short 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	275	5	729	10	391	112	221	718	5	
Future Volume (veh/h)	5	5	10	275	5	729	10	391	112	221	718	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	299	0	795	11	425	122	240	780	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	146	65	144	762	0	1068	292	1310	724	295	1605	10	
Arrive On Green	0.15	0.15	0.15	0.11	0.00	0.31	0.01	0.45	0.45	0.10	0.54	0.54	
Sat Flow, veh/h	558	425	936	2913	0	2592	1457	2906	1296	2826	2960	19	
Grp Volume(v), veh/h	5	0	16	299	0	795	11	425	122	240	383	402	
Grp Sat Flow(s),veh/h/ln	558	0	1361	1457	0	1296	1457	1453	1296	1413	1453	1526	
Q Serve(g_s), s	0.9	0.0	1.2	9.9	0.0	31.2	0.5	11.3	5.5	10.0	19.6	19.6	
Cycle Q Clear(g_c), s	0.9	0.0	1.2	9.9	0.0	31.2	0.5	11.3	5.5	10.0	19.6	19.6	
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	146	0	209	762	0	1068	292	1310	724	295	788	828	
V/C Ratio(X)	0.03	0.00	0.08	0.39	0.00	0.74	0.04	0.32	0.17	0.81	0.49	0.49	
Avail Cap(c_a), veh/h	146	0	210	1189	0	1448	352	1310	724	506	788	828	
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	43.3	0.0	43.5	34.9	0.0	29.9	17.7	21.2	12.9	52.6	17.1	17.1	
Incr Delay (d2), s/veh	0.1	0.0	0.2	0.3	0.0	1.4	0.1	0.7	0.5	5.4	2.1	2.0	
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(95%),veh/ln	0.2	0.0	0.8	6.4	0.0	14.9	0.3	7.1	3.0	6.8	11.2	11.6	
Unsig. Movement Delay, s/veh													
LnGrp Delay(d), s/veh	43.4	0.0	43.6	35.2	0.0	31.4	17.8	21.9	13.4	58.0	19.2	19.1	
LnGrp LOS	D		D	D		C	B	C	B	E	B	B	
Approach Vol, veh/h	21			1094				558				1025	
Approach Delay, s/veh	43.6			32.4				19.9				28.2	
Approach LOS	D			C				B				C	
Timer - Assigned Phs	1	2	3	4	5	6	8						
Phs Duration (G+Y+Rc), s	18.0	59.6	18.4	24.0	7.0	70.6	42.4						
Change Period (Y+Rc), s	5.5	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	6.5	42.5	54.5						
Max Q Clear Time (g_c+I1), s	12.0	13.3	11.9	3.2	2.5	21.6	33.2						
Green Ext Time (p_c), s	0.6	2.8	1.0	0.0	0.0	5.2	3.7						
Intersection Summary													
HCM 6th Ctrl Delay, s/veh	28.3												
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.													

Approach	EB	WB	NB	SB
Crosswalk Length (ft)	47.5	73.1	84.6	72.6
Crosswalk Width (ft)	12.0	12.0	12.0	12.0
Total Number of Lanes Crossed	3	6	6	6
Number of Right-Turn Islands	0	0	0	0
Type of Control	None	None	None	None
Corresponding Signal Phase	6	2	4	8
Effective Walk Time (s)	0.0	0.0	0.0	0.0
Right Corner Size A (ft)	9.0	9.0	9.0	9.0
Right Corner Size B (ft)	9.0	9.0	9.0	9.0
Right Corner Curb Radius (ft)	0.0	0.0	0.0	0.0
Right Corner Total Area (sq.ft)	81.00	81.00	81.00	81.00
Ped. Left-Right Flow Rate (p/h)	0	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0	0
85th percentile speed (mph)	30	30	30	30
Right Corner Area per Ped (sq.ft)	0.0	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-	-
Ped. Circulation Area (sq.ft)	0.0	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-	-
Pedestrian Delay (s/p)	60.0	60.0	60.0	60.0
Pedestrian Compliance Code	Poor	Poor	Poor	Poor
Pedestrian Crosswalk Score	1.98	2.71	2.74	2.84
Pedestrian Crosswalk LOS	B	C	C	C

# Timings 3: Quail Run Rd & 32nd Avenue

Short Term Total  
PM Peak

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	418	83	492	143	64	1032
Future Volume (vph)	418	83	492	143	64	1032
Turn Type	Prot	Prot	NA	pm+ov	pm+pt	NA
Protected Phases	3	3	2	3	1	6
Permitted Phases				2	6	
Detector Phase	3	3	2	3	1	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	10.5	23.5
Total Split (s)	54.0	54.0	54.0	54.0	12.0	66.0
Total Split (%)	45.0%	45.0%	45.0%	45.0%	10.0%	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			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	C-Max	None	None	C-Max
Act Effect Green (s)	42.4	42.4	56.5	105.5	66.6	66.6
Actuated g/C Ratio	0.35	0.35	0.47	0.88	0.56	0.56
v/c Ratio	0.89	0.18	0.39	0.13	0.20	0.70
Control Delay (s/veh)	56.7	5.4	23.7	0.5	15.7	23.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	56.7	5.4	23.7	0.5	15.7	23.6
LOS	E	A	C	A	B	C
Approach Delay (s/veh)	48.2		18.5			23.2
Approach LOS	D		B			C

## 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

Maximum v/c Ratio: 0.89

Intersection Signal Delay (s/veh): 27.5

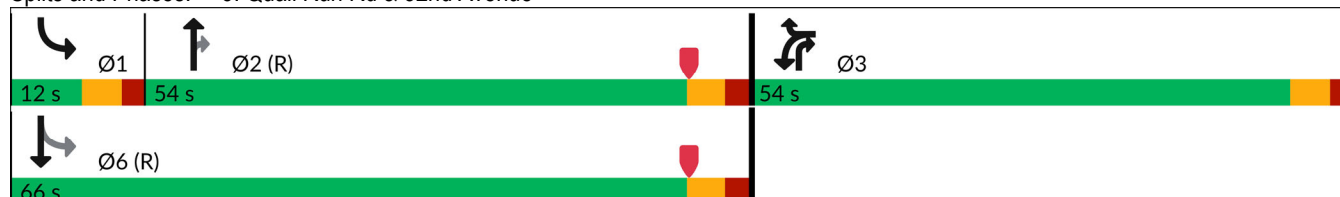
Intersection LOS: C

Intersection Capacity Utilization 60.9%

ICU Level of Service B

Analysis Period (min) 15













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



# HCM 6th Signalized Intersection Summary

## 3: Quail Run Rd & 32nd Avenue

Short Term Total  
PM Peak

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	418	83	492	143	64	1032
Future Volume (veh/h)	418	83	492	143	64	1032
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	454	90	535	155	70	1122
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	483	430	1434	1069	384	1677
Arrive On Green	0.33	0.33	0.49	0.49	0.04	0.58
Sat Flow, veh/h	1457	1296	2983	1296	1457	2983
Grp Volume(v), veh/h	454	90	535	155	70	1122
Grp Sat Flow(s),veh/h/ln	1457	1296	1453	1296	1457	1453
Q Serve(g_s), s	36.3	6.0	13.7	2.9	2.7	31.9
Cycle Q Clear(g_c), s	36.3	6.0	13.7	2.9	2.7	31.9
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	483	430	1434	1069	384	1677
V/C Ratio(X)	0.94	0.21	0.37	0.14	0.18	0.67
Avail Cap(c_a), veh/h	589	524	1434	1069	409	1677
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	39.0	28.8	18.9	2.1	14.0	17.5
Incr Delay (d2), s/veh	21.1	0.2	0.7	0.3	0.2	2.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	22.1	0.1	8.3	1.1	1.6	16.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	60.1	29.1	19.6	2.4	14.3	19.6
LnGrp LOS	E	C	B	A	B	B
Approach Vol, veh/h	544		690			1192
Approach Delay, s/veh	54.9		15.7			19.3
Approach LOS	D		B			B
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	10.0	64.7			74.7	45.3
Change Period (Y+Rc), s	5.5	5.5			5.5	5.5
Max Green Setting (Gmax), s	6.5	48.5			60.5	48.5
Max Q Clear Time (g_c+l1), s	4.7	15.7			33.9	38.3
Green Ext Time (p_c), s	0.0	4.7			9.8	1.4
<b>Intersection Summary</b>						
HCM 6th Ctrl Delay, s/veh			26.3			
HCM 6th LOS			C			

Approach	WB	NB	SB
Crosswalk Length (ft)	40.2	71.2	60.0
Crosswalk Width (ft)	12.0	12.0	12.0
Total Number of Lanes Crossed	3	5	5
Number of Right-Turn Islands	0	0	0
Type of Control	None	None	None
Corresponding Signal Phase	2	6	3
Effective Walk Time (s)	0.0	0.0	0.0
Right Corner Size A (ft)	9.0	9.0	9.0
Right Corner Size B (ft)	9.0	9.0	9.0
Right Corner Curb Radius (ft)	0.0	0.0	0.0
Right Corner Total Area (sq.ft)	81.00	81.00	81.00
Ped. Left-Right Flow Rate (p/h)	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0
85th percentile speed (mph)	30	30	30
Right Corner Area per Ped (sq.ft)	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-
Ped. Circulation Area (sq.ft)	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-
Pedestrian Delay (s/p)	60.0	60.0	60.0
Pedestrian Compliance Code	Poor	Poor	Poor
Pedestrian Crosswalk Score	2.21	2.76	2.68
Pedestrian Crosswalk LOS	B	C	C









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

Short Term Total  
PM Peak

Intersection						
Int Delay, s/veh	7.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↑	↑	↑↑	↑↑	
Traffic Vol, veh/h	170	89	3	394	302	6
Future Vol, veh/h	170	89	3	394	302	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	185	97	3	428	328	7
Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	0	0	282	0	405	93
Stage 1	-	-	-	-	185	-
Stage 2	-	-	-	-	220	-
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	-	-	1126	-	518	877
Stage 1	-	-	-	-	764	-
Stage 2	-	-	-	-	731	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1126	-	516	877
Mov Cap-2 Maneuver	-	-	-	-	516	-
Stage 1	-	-	-	-	764	-
Stage 2	-	-	-	-	729	-
Approach	EB	WB		NB		
HCM Control Delay, s/v	0	0.1		23.6		
HCM LOS	C					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	520	-	-	1126	-	
HCM Lane V/C Ratio	0.644	-	-	0.003	-	
HCM Control Delay (s/veh)	23.6	-	-	8.2	-	
HCM Lane LOS	C	-	-	A	-	
HCM 95th %tile Q (veh)	4.5	-	-	0	-	

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

Short Term Total  
PM Peak

Intersection												
Int Delay, s/veh	4.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	68	9	5	27	48	2	220	2	13	73	1
Future Vol, veh/h	2	68	9	5	27	48	2	220	2	13	73	1
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	2	74	10	5	29	52	2	239	2	14	79	1

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	393	353	80	394	352	240	80	0	0	241	0	0
Stage 1	108	108	-	244	244	-	-	-	-	-	-	-
Stage 2	285	245	-	150	108	-	-	-	-	-	-	-
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	537	920	526	538	745	1384	-	-	1202	-	-
Stage 1	844	763	-	711	664	-	-	-	-	-	-	-
Stage 2	675	663	-	801	763	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	465	530	920	460	531	745	1384	-	-	1202	-	-
Mov Cap-2 Maneuver	465	530	-	460	531	-	-	-	-	-	-	-
Stage 1	843	754	-	710	663	-	-	-	-	-	-	-
Stage 2	599	662	-	706	754	-	-	-	-	-	-	-







Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	12.6		11.4		0.1		1.2	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1384	-	-	465	558	460	651	1202	-	-
HCM Lane V/C Ratio	0.002	-	-	0.005	0.15	0.012	0.125	0.012	-	-
HCM Control Delay (s/veh)	7.6	-	-	12.8	12.6	12.9	11.3	8	-	-
HCM Lane LOS	A	-	-	B	B	B	B	A	-	-
HCM 95th %tile Q (veh)	0	-	-	0	0.5	0	0.4	0	-	-



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

Short Term Total  
PM Peak

Intersection						
Int Delay, s/veh	7.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	73	151	87	149	246	102
Future Vol, veh/h	73	151	87	149	246	102
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	79	164	95	162	267	111







Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	257	0	-	0	417 95
Stage 1	-	-	-	-	95 -
Stage 2	-	-	-	-	322 -
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	1185	-	-	-	551 902
Stage 1	-	-	-	-	874 -
Stage 2	-	-	-	-	686 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1185	-	-	-	514 902
Mov Cap-2 Maneuver	-	-	-	-	514 -
Stage 1	-	-	-	-	815 -
Stage 2	-	-	-	-	686 -

Approach	EB	WB	SB
HCM Control Delay, s/v	2.7	0	16.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1185	-	-	-	514	902
HCM Lane V/C Ratio	0.067	-	-	-	0.52	0.123
HCM Control Delay (s/veh)	8.3	-	-	-	19.3	9.6
HCM Lane LOS	A	-	-	-	C	A
HCM 95th %tile Q (veh)	0.2	-	-	-	3	0.4









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

Short Term Total  
PM Peak

Intersection						
Int Delay, s/veh	4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	285	87	397	346	0
Future Vol, veh/h	0	285	87	397	346	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	310	95	432	376	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	782	188	376	0	-	0
Stage 1	376	-	-	-	-	-
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	287	755	1030	-	-	-
Stage 1	601	-	-	-	-	-
Stage 2	579	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	261	755	1030	-	-	-
Mov Cap-2 Maneuver	261	-	-	-	-	-
Stage 1	546	-	-	-	-	-
Stage 2	579	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/v	13	1.6		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1030	-	-	755	-	-
HCM Lane V/C Ratio	0.092	-	-	0.41	-	-
HCM Control Delay (s/veh)	8.8	-	0	13	-	-
HCM Lane LOS	A	-	A	B	-	-
HCM 95th %tile Q (veh)	0.3	-	-	2	-	-

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





Short Term Total  
PM 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	9	221	67	8	699	0	172	0	8	1	0	21
Future Vol, veh/h	9	221	67	8	699	0	172	0	8	1	0	21
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	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	10	240	73	9	760	0	187	0	9	1	0	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	760	0	0	313	0	0	658	1038	120	918	1111	380
Stage 1	-	-	-	-	-	-	260	260	-	778	778	-
Stage 2	-	-	-	-	-	-	398	778	-	140	333	-
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	713	-	-	1094	-	-	307	195	840	194	175	557
Stage 1	-	-	-	-	-	-	661	638	-	309	354	-
Stage 2	-	-	-	-	-	-	541	354	-	786	588	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	713	-	-	1094	-	-	290	191	840	189	171	557
Mov Cap-2 Maneuver	-	-	-	-	-	-	290	191	-	189	171	-
Stage 1	-	-	-	-	-	-	652	629	-	305	351	-
Stage 2	-	-	-	-	-	-	515	351	-	767	580	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s/v	0.3			0.1			36.2			12.4		
HCM LOS							E			B		

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	290	840	713	-	-	1094	-	-	512
HCM Lane V/C Ratio	0.645	0.01	0.014	-	-	0.008	-	-	0.047
HCM Control Delay (s/veh)	37.4	9.3	10.1	-	-	8.3	-	-	12.4
HCM Lane LOS	E	A	B	-	-	A	-	-	B
HCM 95th %tile Q (veh)	4.1	0	0	-	-	0	-	-	0.1

Intersection						
Int Delay, s/veh	4.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	74	99	341	8	22	160
Future Vol, veh/h	74	99	341	8	22	160
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	80	108	371	9	24	174

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	380	0	0 644 376
Stage 1	-	-	- - 376 -
Stage 2	-	-	- - 268 -
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	1063	-	- - 403 622
Stage 1	-	-	- - 647 -
Stage 2	-	-	- - 727 -
Platoon blocked, %		-	- -
Mov Cap-1 Maneuver	1063	-	- - 373 622
Mov Cap-2 Maneuver	-	-	- - 373 -
Stage 1	-	-	- - 598 -
Stage 2	-	-	- - 727 -

Approach	EB	WB	SB
HCM Control Delay, s/v	3.7	0	14.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1063	-	-	-	576
HCM Lane V/C Ratio	0.076	-	-	-	0.343
HCM Control Delay (s/veh)	8.7	-	-	-	14.5
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q (veh)	0.2	-	-	-	1.5

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

Short Term Total  
PM Peak

Intersection						
Int Delay, s/veh	0					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↗↗		↘	↗↗
Traffic Vol, veh/h	0	7	1112	8	2	939
Future Vol, veh/h	0	7	1112	8	2	939
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	0	8	1209	9	2	1021

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	-	609	0 0 1218 0
Stage 1	-	-	- - -
Stage 2	-	-	- - -
Critical Hdwy	-	7.4	- - 4.6 -
Critical Hdwy Stg 1	-	-	- - -
Critical Hdwy Stg 2	-	-	- - -
Follow-up Hdwy	-	3.55	- - 2.45 -
Pot Cap-1 Maneuver	0	*567	- - *822 -
Stage 1	0	-	- - -
Stage 2	0	-	- - -
Platoon blocked, %		1	- - 1 -
Mov Cap-1 Maneuver	-	*567	- - *822 -
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	WB	NB	SB
HCM Control Delay, s/v	11.4	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 567	* 822	-
HCM Lane V/C Ratio	-	- 0.013	0.003	-
HCM Control Delay (s/veh)	-	- 11.4	9.4	-
HCM Lane LOS	-	- B	A	-
HCM 95th %tile Q (veh)	-	- 0	0	-

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

Intersection						
Int Delay, s/veh	0.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	YY		↑↑	↑	↑	↑↑
Traffic Vol, veh/h	50	7	496	21	3	990
Future Vol, veh/h	50	7	496	21	3	990
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	539	23	3	1076

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1083	270	0	0	562
Stage 1	539	-	-	-	-
Stage 2	544	-	-	-	-
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	*583	663	-	-	862
Stage 1	*488	-	-	-	-
Stage 2	*583	-	-	-	-
Platoon blocked, %	1	-	-	-	-
Mov Cap-1 Maneuver	*581	663	-	-	862
Mov Cap-2 Maneuver	*581	-	-	-	-
Stage 1	*488	-	-	-	-
Stage 2	*581	-	-	-	-







Approach	WB	NB	SB
HCM Control Delay, s/v	11.8	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	590	862
HCM Lane V/C Ratio	-	-	0.105	0.004
HCM Control Delay (s/veh)	-	-	11.8	9.2
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

Short Term Total  
PM Peak

Intersection												
Int Delay, s/veh	0.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	317	8	1	947	1	19	0	1	2	0	37
Future Vol, veh/h	8	317	8	1	947	1	19	0	1	2	0	37
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	345	9	1	1029	1	21	0	1	2	0	40

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1030	0	0	354	0	0	885	1400	177	1223	1404	515
Stage 1	-	-	-	-	-	-	368	368	-	1032	1032	-
Stage 2	-	-	-	-	-	-	517	1032	-	191	372	-
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	548	-	-	1258	-	-	283	135	*908	*145	134	449
Stage 1	-	-	-	-	-	-	785	708	-	*211	262	-
Stage 2	-	-	-	-	-	-	454	262	-	*860	705	-
Platoon blocked, %		-	-	1	-	-	1	1	1	1	1	
Mov Cap-1 Maneuver	548	-	-	1258	-	-	254	132	*908	*143	131	449
Mov Cap-2 Maneuver	-	-	-	-	-	-	254	132	-	*143	131	-
Stage 1	-	-	-	-	-	-	772	696	-	*208	262	-
Stage 2	-	-	-	-	-	-	413	262	-	*845	694	-





Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.3	0	19.9	14.9
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	263	548	-	-	1258	-	-	405
HCM Lane V/C Ratio	0.083	0.016	-	-	0.001	-	-	0.105
HCM Control Delay (s/veh)	19.9	11.7	-	-	7.9	-	-	14.9
HCM Lane LOS	C	B	-	-	A	-	-	B
HCM 95th %tile Q (veh)	0.3	0	-	-	0	-	-	0.3

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

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

Short Term Total  
PM Peak

Intersection						
Int Delay, s/veh	0.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	17	302	908	1	2	41
Future Vol, veh/h	17	302	908	1	2	41
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	18	328	987	1	2	45

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	988	0	0	1188	494
Stage 1	-	-	-	988	-
Stage 2	-	-	-	200	-
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	571	-	-	150	464
Stage 1	-	-	-	273	-
Stage 2	-	-	-	749	-
Platoon blocked, %	-	-	-		
Mov Cap-1 Maneuver	571	-	-	145	464
Mov Cap-2 Maneuver	-	-	-	145	-
Stage 1	-	-	-	264	-
Stage 2	-	-	-	749	-





Approach	EB	WB	SB
HCM Control Delay, s/v	0.6	0	14.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	571	-	-	-	421
HCM Lane V/C Ratio	0.032	-	-	-	0.111
HCM Control Delay (s/veh)	11.5	-	-	-	14.6
HCM Lane LOS	B	-	-	-	B
HCM 95th %tile Q (veh)	0.1	-	-	-	0.4



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

Short Term Total  
PM Peak

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	296	687	0	1	21
Future Vol, veh/h	9	296	687	0	1	21
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	10	322	747	0	1	23

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	747	0	0	928	374
Stage 1	-	-	-	747	-
Stage 2	-	-	-	181	-
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	722	-	-	228	562
Stage 1	-	-	-	374	-
Stage 2	-	-	-	767	-
Platoon blocked, %	-	-	-		
Mov Cap-1 Maneuver	722	-	-	225	562
Mov Cap-2 Maneuver	-	-	-	225	-
Stage 1	-	-	-	369	-
Stage 2	-	-	-	767	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0.3	0	12.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	722	-	-	-	526
HCM Lane V/C Ratio	0.014	-	-	-	0.045
HCM Control Delay (s/veh)	10.1	-	-	-	12.2
HCM Lane LOS	B	-	-	-	B
HCM 95th %tile Q (veh)	0	-	-	-	0.1







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

Short Term Total  
PM Peak

Intersection						
Int Delay, s/veh	0.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↱		↱	↑↑	↱	
Traffic Vol, veh/h	222	8	3	689	12	8
Future Vol, veh/h	222	8	3	689	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	241	9	3	749	13	9
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	250	0	627	125
Stage 1	-	-	-	-	246	-
Stage 2	-	-	-	-	381	-
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	-	-	1161	-	367	834
Stage 1	-	-	-	-	708	-
Stage 2	-	-	-	-	597	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1161	-	366	834
Mov Cap-2 Maneuver	-	-	-	-	366	-
Stage 1	-	-	-	-	708	-
Stage 2	-	-	-	-	595	-
Approach	EB		WB		NB	
HCM Control Delay, s/v	0		0		13	
HCM LOS	B					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	472	-	-	1161	-	
HCM Lane V/C Ratio	0.046	-	-	0.003	-	
HCM Control Delay (s/veh)	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

Short 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	210	14	19	648	2	33	0	46	10	0	11
Future Vol, veh/h	6	210	14	19	648	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	228	15	21	704	2	36	0	50	11	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	706	0	0	243	0	0	644	998	122	875	1004	353
Stage 1	-	-	-	-	-	-	250	250	-	747	747	-
Stage 2	-	-	-	-	-	-	394	748	-	128	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	751	-	-	1169	-	-	315	207	838	209	205	581
Stage 1	-	-	-	-	-	-	671	645	-	323	367	-
Stage 2	-	-	-	-	-	-	544	367	-	799	640	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	751	-	-	1169	-	-	302	201	838	192	199	581
Mov Cap-2 Maneuver	-	-	-	-	-	-	302	201	-	192	199	-
Stage 1	-	-	-	-	-	-	665	639	-	320	360	-
Stage 2	-	-	-	-	-	-	523	360	-	744	634	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s/v	0.3			0.2			14.1			18.2		
HCM LOS							B			C		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	481	751	-	-	1169	-	-	296
HCM Lane V/C Ratio	0.179	0.009	-	-	0.018	-	-	0.077
HCM Control Delay (s/veh)	14.1	9.8	-	-	8.1	-	-	18.2
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

Short Term Total  
PM Peak

Intersection						
Int Delay, s/veh	1.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↱		↱	↑↑	↱	
Traffic Vol, veh/h	170	6	19	383	14	47
Future Vol, veh/h	170	6	19	383	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	185	7	21	416	15	51
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	192	0	439	96
Stage 1	-	-	-	-	189	-
Stage 2	-	-	-	-	250	-
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	-	-	1226	-	491	873
Stage 1	-	-	-	-	760	-
Stage 2	-	-	-	-	704	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1226	-	483	873
Mov Cap-2 Maneuver	-	-	-	-	483	-
Stage 1	-	-	-	-	760	-
Stage 2	-	-	-	-	692	-
Approach	EB		WB		NB	
HCM Control Delay, s/v	0		0.4		10.4	
HCM LOS	B					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	737	-	-	1226	-	
HCM Lane V/C Ratio	0.09	-	-	0.017	-	
HCM Control Delay (s/veh)	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

Short Term Total  
PM Peak

Intersection												
Int Delay, s/veh	4.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	101	0	0	4	0	12	0	67	1	3	29	42
Future Vol, veh/h	101	0	0	4	0	12	0	67	1	3	29	42
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	110	0	0	4	0	13	0	73	1	3	32	46

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	141	135	55	135	158	74	78	0	0	74	0	0
Stage 1	61	61	-	74	74	-	-	-	-	-	-	-
Stage 2	80	74	-	61	84	-	-	-	-	-	-	-
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	779	715	951	786	694	927	1387	-	-	1392	-	-
Stage 1	896	801	-	881	790	-	-	-	-	-	-	-
Stage 2	874	790	-	896	782	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	767	714	951	784	693	927	1387	-	-	1392	-	-
Mov Cap-2 Maneuver	767	714	-	784	693	-	-	-	-	-	-	-
Stage 1	896	799	-	881	790	-	-	-	-	-	-	-
Stage 2	862	790	-	894	780	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	10.5		9.1		0		0.3	
HCM LOS	B		A					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1387	-	-	767	887	1392	-
HCM Lane V/C Ratio	-	-	-	0.143	0.02	0.002	-
HCM Control Delay (s/veh)	0	-	-	10.5	9.1	7.6	-
HCM Lane LOS	A	-	-	B	A	A	-
HCM 95th %tile Q (veh)	0	-	-	0.5	0.1	0	-

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

Short Term 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	32	0	7	7	0	12	3	263	3	6	72	14
Future Vol, veh/h	32	0	7	7	0	12	3	263	3	6	72	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	13	3	286	3	7	78	15

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	400	395	86	398	401	288	93	0	0	289	0	0
Stage 1	100	100	-	294	294	-	-	-	-	-	-	-
Stage 2	300	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	522	508	913	523	504	700	1369	-	-	1152	-	-
Stage 1	853	770	-	667	630	-	-	-	-	-	-	-
Stage 2	662	629	-	849	764	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	509	504	913	515	500	700	1369	-	-	1152	-	-
Mov Cap-2 Maneuver	509	504	-	515	500	-	-	-	-	-	-	-
Stage 1	851	765	-	666	629	-	-	-	-	-	-	-
Stage 2	648	628	-	837	759	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	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	-	-	553 618	1152	-	-
HCM Lane V/C Ratio	0.002	-	-	0.077 0.033	0.006	-	-
HCM Control Delay (s/veh)	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

Short Term Total  
PM Peak

Intersection												
Int Delay, s/veh	6.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	19	0	44	37	0	30	35	20	18	10	15	8
Future Vol, veh/h	19	0	44	37	0	30	35	20	18	10	15	8
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	21	0	48	40	0	33	38	22	20	11	16	9







Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	168	161	21	175	155	32	25	0	0	42	0	0
Stage 1	43	43	-	108	108	-	-	-	-	-	-	-
Stage 2	125	118	-	67	47	-	-	-	-	-	-	-
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	747	691	994	739	697	980	1453	-	-	1431	-	-
Stage 1	916	816	-	844	763	-	-	-	-	-	-	-
Stage 2	826	756	-	889	812	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	704	668	994	685	673	980	1453	-	-	1431	-	-
Mov Cap-2 Maneuver	704	668	-	685	673	-	-	-	-	-	-	-
Stage 1	892	809	-	822	743	-	-	-	-	-	-	-
Stage 2	778	736	-	840	806	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	9.4		10		3.6		2.3	
HCM LOS	A		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1453	-	-	884	792	1431	-
HCM Lane V/C Ratio	0.026	-	-	0.077	0.092	0.008	-
HCM Control Delay (s/veh)	7.5	-	-	9.4	10	7.5	-
HCM Lane LOS	A	-	-	A	B	A	-
HCM 95th %tile Q (veh)	0.1	-	-	0.3	0.3	0	-

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

Short 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	2	20	6	4	48	1	11	0	13	2	0	8
Future Vol, veh/h	2	20	6	4	48	1	11	0	13	2	0	8
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	2	22	7	4	52	1	12	0	14	2	0	9

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	53	0	0	29	0	0	95	91	26	98	94	53
Stage 1	-	-	-	-	-	-	30	30	-	61	61	-
Stage 2	-	-	-	-	-	-	65	61	-	37	33	-
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	1417	-	-	1447	-	-	836	757	987	832	755	953
Stage 1	-	-	-	-	-	-	931	827	-	896	801	-
Stage 2	-	-	-	-	-	-	891	801	-	923	824	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1417	-	-	1447	-	-	826	754	987	818	752	953
Mov Cap-2 Maneuver	-	-	-	-	-	-	826	754	-	818	752	-
Stage 1	-	-	-	-	-	-	930	826	-	895	799	-
Stage 2	-	-	-	-	-	-	880	799	-	909	823	-







Approach	EB			WB			NB			SB		
HCM Control Delay, s/v	0.5			0.6			9.1			8.9		
HCM LOS							A			A		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	906	1417	-	-	1447	-	-	923
HCM Lane V/C Ratio	0.029	0.002	-	-	0.003	-	-	0.012
HCM Control Delay (s/veh)	9.1	7.5	-	-	7.5	-	-	8.9
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

Short 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	15	15	22	4	4	36	0	55	9	0	12
Future Vol, veh/h	5	15	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	16	16	24	4	4	39	0	60	10	0	13







Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	8	0	0	32	0	0	95	90	24	118	96	6
Stage 1	-	-	-	-	-	-	34	34	-	54	54	-
Stage 2	-	-	-	-	-	-	61	56	-	64	42	-
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	-	-	1444	-	-	836	758	990	807	753	1013
Stage 1	-	-	-	-	-	-	926	823	-	903	807	-
Stage 2	-	-	-	-	-	-	896	805	-	892	817	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1474	-	-	1444	-	-	813	743	990	746	738	1013
Mov Cap-2 Maneuver	-	-	-	-	-	-	813	743	-	746	738	-
Stage 1	-	-	-	-	-	-	923	821	-	900	793	-
Stage 2	-	-	-	-	-	-	870	791	-	835	815	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s/v	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)	911	1474	-	-	1444	-	-	878
HCM Lane V/C Ratio	0.109	0.004	-	-	0.017	-	-	0.026
HCM Control Delay (s/veh)	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

Short Term Total  
PM Peak

Intersection												
Int Delay, s/veh	3.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	85	4	21	66	2	10	0	54	4	0	6
Future Vol, veh/h	3	85	4	21	66	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	92	4	23	72	2	11	0	59	4	0	7





Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	74	0	0	96	0	0	223	220	94	249	221	73
Stage 1	-	-	-	-	-	-	100	100	-	119	119	-
Stage 2	-	-	-	-	-	-	123	120	-	130	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	1392	-	-	1365	-	-	686	640	903	659	639	928
Stage 1	-	-	-	-	-	-	853	770	-	833	755	-
Stage 2	-	-	-	-	-	-	829	754	-	821	768	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1392	-	-	1365	-	-	672	628	903	607	627	928
Mov Cap-2 Maneuver	-	-	-	-	-	-	672	628	-	607	627	-
Stage 1	-	-	-	-	-	-	851	768	-	831	742	-
Stage 2	-	-	-	-	-	-	809	741	-	766	766	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s/v	0.2			1.8			9.6			9.8		
HCM LOS							A			A		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	857	1392	-	-	1365	-	-	766
HCM Lane V/C Ratio	0.081	0.002	-	-	0.017	-	-	0.014
HCM Control Delay (s/veh)	9.6	7.6	-	-	7.7	-	-	9.8
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

Short Term Total  
PM Peak

Intersection						
Int Delay, s/veh	1.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	19	5	68	8	2	132
Future Vol, veh/h	19	5	68	8	2	132
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	74	9	2	143

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	226	79	0
Stage 1	79	-	-
Stage 2	147	-	-
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	714	921	-
Stage 1	889	-	-
Stage 2	827	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	713	921	-
Mov Cap-2 Maneuver	713	-	-
Stage 1	889	-	-
Stage 2	826	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	10	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	748	1381
HCM Lane V/C Ratio	-	-	0.035	0.002
HCM Control Delay (s/veh)	-	-	10	7.6
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

Short Term 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	13	0	36	23	0	9	16	202	10	4	78	5
Future Vol, veh/h	13	0	36	23	0	9	16	202	10	4	78	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	220	11	4	85	5





Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	361	361	88	375	358	226	90	0	0	231	0	0
Stage 1	96	96	-	260	260	-	-	-	-	-	-	-
Stage 2	265	265	-	115	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	554	531	910	542	533	759	1372	-	-	1213	-	-
Stage 1	857	773	-	697	653	-	-	-	-	-	-	-
Stage 2	692	649	-	837	771	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	540	523	910	513	525	759	1372	-	-	1213	-	-
Mov Cap-2 Maneuver	540	523	-	513	525	-	-	-	-	-	-	-
Stage 1	847	771	-	689	645	-	-	-	-	-	-	-
Stage 2	675	641	-	798	769	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	10		11.8		0.5		0.4	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1372	-	-	770	564	1213	-
HCM Lane V/C Ratio	0.013	-	-	0.069	0.062	0.004	-
HCM Control Delay (s/veh)	7.7	-	-	10	11.8	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

Short Term Total  
PM Peak

Intersection						
Int Delay, s/veh	1.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	33	14	68	148	3
Future Vol, veh/h	8	33	14	68	148	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	15	74	161	3

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	267	163	164	0	-	0
Stage 1	163	-	-	-	-	-
Stage 2	104	-	-	-	-	-
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	675	825	1286	-	-	-
Stage 1	813	-	-	-	-	-
Stage 2	866	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	667	825	1286	-	-	-
Mov Cap-2 Maneuver	667	-	-	-	-	-
Stage 1	803	-	-	-	-	-
Stage 2	866	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	9.8	1.3	0
HCM LOS	A		

























Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1286	-	789	-	-
HCM Lane V/C Ratio	0.012	-	0.056	-	-
HCM Control Delay (s/veh)	7.8	-	9.8	-	-
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
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	Lag	Lead		Lag	Lead	Lead	Lead		Lag	Lag	Lag	Lag
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 Effct Green (s)	44.0	37.3	71.9	6.3	6.3	6.3	34.5	59.9	71.7	19.8	19.8	67.1
Actuated g/C Ratio	0.37	0.31	0.60	0.05	0.05	0.05	0.29	0.50	0.60	0.17	0.17	0.56
v/c Ratio	0.41	0.07	0.80	0.32	0.11	0.00	0.77	0.21	0.18	0.01	0.51	0.29
Control Delay (s/veh)	30.8	29.1	10.4	60.7	56.6	0.0	28.3	7.6	0.5	43.5	50.6	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	30.8	29.1	10.4	60.7	56.6	0.0	28.3	7.6	0.5	43.5	50.6	2.3
LOS	C	C	B	E	E	A	C	A	A	D	D	A
Approach Delay (s/veh)		15.0			59.0			20.5			27.0	
Approach LOS		B			E			C			C	

### Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 5 (4%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay (s/veh): 19.0

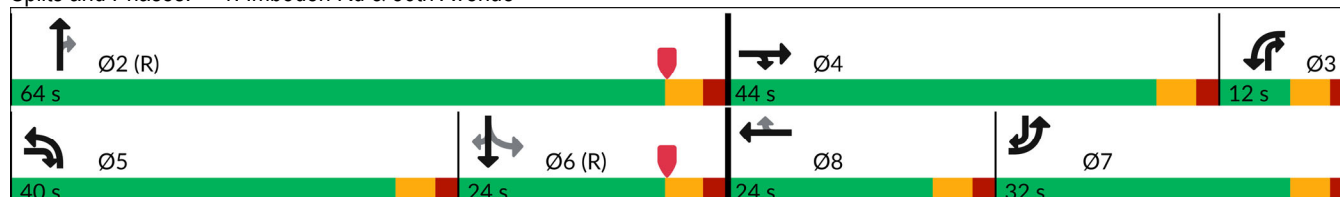
Intersection LOS: B

Intersection Capacity Utilization 57.3%

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

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	871	485	1672	93	64	54	1023	1490	707	251	633	682
Arrive On Green	0.31	0.32	0.32	0.03	0.04	0.04	0.25	0.51	0.51	0.22	0.22	0.22
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	14.6	1.8	34.7	2.0	0.7	0.1	25.5	6.9	3.3	0.2	8.6	7.9
Cycle Q Clear(g_c), s	14.6	1.8	34.7	2.0	0.7	0.1	25.5	6.9	3.3	0.2	8.6	7.9
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	871	485	1672	93	64	54	1023	1490	707	251	633	682
V/C Ratio(X)	0.49	0.07	0.92	0.50	0.14	0.02	0.89	0.21	0.21	0.01	0.39	0.35
Avail Cap(c_a), veh/h	871	491	1684	153	236	200	1181	1490	707	251	633	682
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	33.8	28.6	9.5	57.1	55.4	55.1	43.4	15.9	14.0	36.8	40.1	6.9
Incr Delay (d2), s/veh	0.4	0.1	9.0	4.2	1.0	0.1	7.6	0.3	0.7	0.1	1.8	1.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	8.8	1.2	12.3	1.4	0.5	0.1	14.3	4.3	4.0	0.1	5.9	4.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	34.2	28.7	18.6	61.2	56.4	55.3	51.1	16.2	14.7	36.8	41.9	8.3
LnGrp LOS	C	C	B	E	E	E	D	B	B	D	D	A
Approach Vol, veh/h	2000			57			1367			483		
Approach Delay, s/veh	22.0			60.4			39.2			25.5		
Approach LOS	C			E			D			C		
Timer - Assigned Phs	2			3			4			5		
Phs Duration (G+Y+Rc), s	67.0			9.5			43.5			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	8.9			4.0			36.7			27.5		
Green Ext Time (p_c), s	2.8			0.0			1.3			2.3		
Intersection Summary												
HCM 6th Ctrl Delay, s/veh				29.0								
HCM 6th LOS	C											

# Timings

## 1: Imboden & 56th Avenue

Long Term Total

AM Peak

						
Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Configurations	 	 		 	 	 
Traffic Volume (vph)	389	29	43	8	283	225
Future Volume (vph)	389	29	43	8	283	225
Turn Type	Prot	NA	Prot	NA	NA	NA
Protected Phases	1	4	1	4	2	2
Permitted Phases						
Detector Phase	7	4	3	4	2	2
Switch Phase	4		8			
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.0	16.0	16.0	16.0	16.0	16.0
Total Split (s)	37.0	18.0	37.0	18.0	65.0	65.0
Total Split (%)	30.8%	15.0%	30.8%	15.0%	54.2%	54.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
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)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead		Lead		Lag	Lag
Lead-Lag Optimize?						
Recall Mode	Max	Min	Max	Min	C-Max	C-Max
Act Effect Green (s)	31.0	12.0	31.0	12.0	59.0	59.0
Actuated g/C Ratio	0.26	0.10	0.26	0.10	0.49	0.49
v/c Ratio	0.52	0.10	0.13	0.03	0.18	0.14
Control Delay (s/veh)	17.8	30.0	13.9	30.5	17.4	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	17.8	30.0	13.9	30.5	17.4	17.0
LOS	B	C	B	C	B	B
Approach Delay (s/veh)		18.6		16.5	17.4	17.0
Approach LOS		B		B	B	B

### Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.61

Intersection Signal Delay (s/veh): 17.8

Intersection LOS: B

Intersection Capacity Utilization 36.1%

ICU Level of Service A

Analysis Period (min) 15

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





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HCM 6th Edition methodology does not support clustered intersections.

Timings  
11: Imboden NBL & 56th Avenue

Long Term Total  
AM Peak

	→	↘	←	↙	↗		
Lane Group	EBT	EBR	WBT	NBL	SBR	Ø1	Ø4
Lane Configurations	↑↑↑	↗↗	↑↑	↙↙	↗		
Traffic Volume (vph)	418	1421	8	834	217		
Future Volume (vph)	418	1421	8	834	217		
Turn Type	NA	Free	NA	Prot	Free		
Protected Phases	1 4		1 4	2		1	4
Permitted Phases		Free			Free		
Detector Phase	1 4		8	2			
Switch Phase							
Minimum Initial (s)				10.0		10.0	10.0
Minimum Split (s)				16.0		16.0	16.0
Total Split (s)				65.0		37.0	18.0
Total Split (%)				54.2%		31%	15%
Yellow Time (s)				4.0		4.0	4.0
All-Red Time (s)				2.0		2.0	2.0
Lost Time Adjust (s)				0.0			
Total Lost Time (s)				6.0			
Lead/Lag				Lag		Lead	
Lead-Lag Optimize?							
Recall Mode				C-Max		Max	Min
Act Effect Green (s)	49.0	120.0	49.0	59.0	120.0		
Actuated g/C Ratio	0.41	1.00	0.41	0.49	1.00		
v/c Ratio	0.19	0.61	0.01	0.56	0.15		
Control Delay (s/veh)	23.0	1.0	0.4	15.2	0.2		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay (s/veh)	23.0	1.0	0.4	15.2	0.2		
LOS	C	A	A	B	A		
Approach Delay (s/veh)	6.0		0.4				
Approach LOS	A		A				

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.61  
 Intersection Signal Delay (s/veh): 8.1  
 Intersection LOS: A  
 Intersection Capacity Utilization 40.5%  
 ICU Level of Service A  
 Analysis Period (min) 15

Splits and Phases: 11: Imboden NBL & 56th Avenue



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HCM 6th Edition methodology does not support clustered intersections.

Timings  
12: 56th Avenue & Imboden SBL

Long Term Total  
AM Peak

	→	←	↶	↷	↘		
Lane Group	EBT	WBT	WBR	NBR	SBL	Ø1	Ø4
Lane Configurations	↑↑	↑↑↑	↶	↷	↘		
Traffic Volume (vph)	29	51	1	140	2		
Future Volume (vph)	29	51	1	140	2		
Turn Type	NA	NA	Free	Free	Prot		
Protected Phases	1 4	1 4			2	1	4
Permitted Phases			Free	Free			
Detector Phase	1 4	1 4			2		
Switch Phase							
Minimum Initial (s)					10.0	10.0	10.0
Minimum Split (s)					16.0	16.0	16.0
Total Split (s)					65.0	37.0	18.0
Total Split (%)					54.2%	31%	15%
Yellow Time (s)					4.0	4.0	4.0
All-Red Time (s)					2.0	2.0	2.0
Lost Time Adjust (s)					0.0		
Total Lost Time (s)					6.0		
Lead/Lag					Lag	Lead	
Lead-Lag Optimize?							
Recall Mode					C-Max	Max	Min
Act Effect Green (s)	49.0	49.0	120.0	120.0	59.0		
Actuated g/C Ratio	0.41	0.41	1.00	1.00	0.49		
v/c Ratio	0.02	0.04	0.00	0.09	0.00		
Control Delay (s/veh)	0.0	21.4	0.0	0.1	29.0		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay (s/veh)	0.0	21.4	0.0	0.1	29.0		
LOS	A	C	A	A	C		
Approach Delay (s/veh)		21.1					
Approach LOS		C					

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.61
Intersection Signal Delay (s/veh): 6.1
Intersection Capacity Utilization 20.0%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service A

Splits and Phases: 12: 56th Avenue & Imboden SBL

#13	#14	#12	#13	#14		#1	#11	#12	#13	#14		#1	#11	#12
↶	↷	↔	↓	↷	Ø1	↑	↶	↷	↶	↑	Ø2 (R)	↔	↔	↔
37 s						65 s						18 s		

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HCM 6th Edition methodology does not support clustered intersections.

# Timings

## 13: Imboden & 56th Avenue EBR

Long Term Total

AM Peak

						
Lane Group	EBR	NBL	NBT	SBT	Ø2	Ø4
Lane Configurations						
Traffic Volume (vph)	1421	834	283	268		
Future Volume (vph)	1421	834	283	268		
Turn Type	Free	Prot	NA	NA		
Protected Phases		2 4	Free	1	2	4
Permitted Phases	Free					
Detector Phase		2 4		1		
Switch Phase						
Minimum Initial (s)				10.0	10.0	10.0
Minimum Split (s)				16.0	16.0	16.0
Total Split (s)				37.0	65.0	18.0
Total Split (%)				30.8%	54%	15%
Yellow Time (s)				4.0	4.0	4.0
All-Red Time (s)				2.0	2.0	2.0
Lost Time Adjust (s)				0.0		
Total Lost Time (s)				6.0		
Lead/Lag				Lead	Lag	
Lead-Lag Optimize?						
Recall Mode				Max	C-Max	Min
Act Effect Green (s)	120.0	77.0	120.0	31.0		
Actuated g/C Ratio	1.00	0.64	1.00	0.26		
v/c Ratio	0.58	0.41	0.14	0.31		
Control Delay (s/veh)	0.7	11.2	0.1	49.5		
Queue Delay	0.0	0.0	0.0	0.0		
Total Delay (s/veh)	0.7	11.2	0.1	49.5		
LOS	A	B	A	D		
Approach Delay (s/veh)			7.4	49.5		
Approach LOS			A	D		

### Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.61

Intersection Signal Delay (s/veh): 7.8

Intersection LOS: A

Intersection Capacity Utilization 40.5%

ICU Level of Service A

Analysis Period (min) 15

### Splits and Phases: 13: Imboden & 56th Avenue EBR



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HCM 6th Edition methodology does not support clustered intersections.

# Timings

## 14: Imboden & 56th Avenue WBR

Long Term Total

AM Peak

						
Lane Group	WBR	NBT	SBL	SBT	Ø1	Ø4
Lane Configurations		 		 		
Traffic Volume (vph)	1	672	2	225		
Future Volume (vph)	1	672	2	225		
Turn Type	pt+ov	NA	Prot	NA		
Protected Phases	1 4	2	1 4	Free	1	4
Permitted Phases	2					
Detector Phase		2	1 4			
Switch Phase						
Minimum Initial (s)		10.0			10.0	10.0
Minimum Split (s)		16.0			16.0	16.0
Total Split (s)		65.0			37.0	18.0
Total Split (%)		54.2%			31%	15%
Yellow Time (s)		4.0			4.0	4.0
All-Red Time (s)		2.0			2.0	2.0
Lost Time Adjust (s)		0.0				
Total Lost Time (s)		6.0				
Lead/Lag		Lag			Lead	
Lead-Lag Optimize?						
Recall Mode		C-Max			Max	Min
Act Effect Green (s)	120.0	59.0	49.0	120.0		
Actuated g/C Ratio	1.00	0.49	0.41	1.00		
v/c Ratio	0.00	0.44	0.00	0.15		
Control Delay (s/veh)	0.0	18.0	21.0	0.1		
Queue Delay	0.0	0.0	0.0	0.0		
Total Delay (s/veh)	0.0	18.0	21.0	0.1		
LOS	A	B	C	A		
Approach Delay (s/veh)		18.0		0.2		
Approach LOS		B		A		

### Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.61

Intersection Signal Delay (s/veh): 11.1

Intersection LOS: B

Intersection Capacity Utilization 36.9%

ICU Level of Service A

Analysis Period (min) 15

### Splits and Phases: 14: Imboden & 56th Avenue WBR































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HCM 6th Edition methodology does not support clustered intersections.

# 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	175	5	314	10	702	266	942	735
Future Volume (vph)	5	5	175	5	314	10	702	266	942	735
Turn Type	Perm	NA	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA
Protected Phases		4	3	8	1	5	2	3	1	6
Permitted Phases	4		8		8	2		2		
Detector Phase	4	4	3	8	1	5	2	3	1	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.5	23.5	10.5	23.5	10.5	10.5	23.5	10.5	10.5	23.5
Total Split (s)	25.0	25.0	15.0	40.0	50.0	12.0	30.0	15.0	50.0	68.0
Total Split (%)	20.8%	20.8%	12.5%	33.3%	41.7%	10.0%	25.0%	12.5%	41.7%	56.7%
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		Lag	Lead	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Max	None	None	C-Max
Act Effect Green (s)	6.4	6.4	14.7	14.7	64.7	44.3	44.3	57.1	44.5	91.7
Actuated g/C Ratio	0.05	0.05	0.12	0.12	0.54	0.37	0.37	0.48	0.37	0.76
v/c Ratio	0.06	0.19	0.68	0.58	0.25	0.05	0.50	0.40	0.99	0.25
Control Delay (s/veh)	54.6	37.1	49.7	13.8	7.8	28.7	31.8	6.5	53.0	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 (s/veh)	54.6	37.1	49.7	13.8	7.8	28.7	31.8	6.5	53.0	3.8
LOS	D	D	D	B	A	C	C	A	D	A
Approach Delay (s/veh)		41.3		24.6			24.9			31.4
Approach LOS		D		C			C			C

## Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 116 (97%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.99

Intersection Signal Delay (s/veh): 28.4

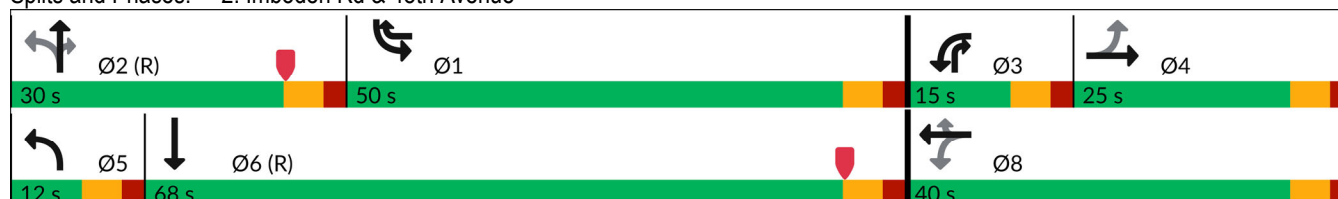
Intersection LOS: C

Intersection Capacity Utilization 65.8%

ICU Level of Service C

Analysis Period (min) 15
























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



# 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	175	5	314	10	702	266	942	735	5
Future Volume (veh/h)	5	5	10	175	5	314	10	702	266	942	735	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	190	0	344	11	763	289	1024	799	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	413	0	1707	119	853	364	1396	2934	18
Arrive On Green	0.04	0.04	0.04	0.08	0.00	0.16	0.01	0.20	0.20	0.49	0.69	0.69
Sat Flow, veh/h	848	425	936	2913	0	2592	1457	4176	1296	2826	4282	27
Grp Volume(v), veh/h	5	0	16	190	0	344	11	763	289	1024	519	285
Grp Sat Flow(s),veh/h/ln	848	0	1361	1457	0	1296	1457	1392	1296	1413	1392	1525
Q Serve(g_s), s	0.7	0.0	1.4	7.2	0.0	0.0	0.8	21.4	12.4	34.5	8.7	8.7
Cycle Q Clear(g_c), s	0.7	0.0	1.4	7.2	0.0	0.0	0.8	21.4	12.4	34.5	8.7	8.7
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	413	0	1707	119	853	364	1396	1907	1045
V/C Ratio(X)	0.05	0.00	0.28	0.46	0.00	0.20	0.09	0.90	0.79	0.73	0.27	0.27
Avail Cap(c_a), veh/h	198	0	221	420	0	2026	179	853	364	1396	1907	1045
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	48.0	0.0	8.1	41.6	46.5	26.7	24.1	7.3	7.3
Incr Delay (d2), s/veh	0.2	0.0	2.7	0.8	0.0	0.1	0.3	13.9	16.1	2.0	0.4	0.6
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	0.3	0.0	0.9	4.8	0.0	3.1	0.5	13.2	8.7	17.2	4.5	5.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	55.7	0.0	58.4	48.8	0.0	8.1	42.0	60.4	42.9	26.1	7.7	8.0
LnGrp LOS	E		E	D		A	D	E	D	C	A	A
Approach Vol, veh/h	21				534				1063			
Approach Delay, s/veh	57.8				22.6				55.4			
Approach LOS	E				C				E			
Timer - Assigned Phs	1	2	3	4	5	6	8					
Phs Duration (G+Y+Rc), s	64.8	30.0	14.7	10.5	7.0	87.7	25.2					
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5	5.5	5.5					
Max Green Setting (Gmax), s	44.5	24.5	9.5	19.5	6.5	62.5	34.5					
Max Q Clear Time (g_c+I1), s	36.5	23.4	9.2	3.4	2.8	10.7	2.0					
Green Ext Time (p_c), s	2.9	0.7	0.0	0.0	0.0	6.5	1.5					
Intersection Summary												
HCM 6th Ctrl Delay, s/veh	30.5											
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.												
User approved changes to right turn type.												

# Timings 3: Quail Run Rd & 32nd Avenue

Long Term Total  
AM Peak

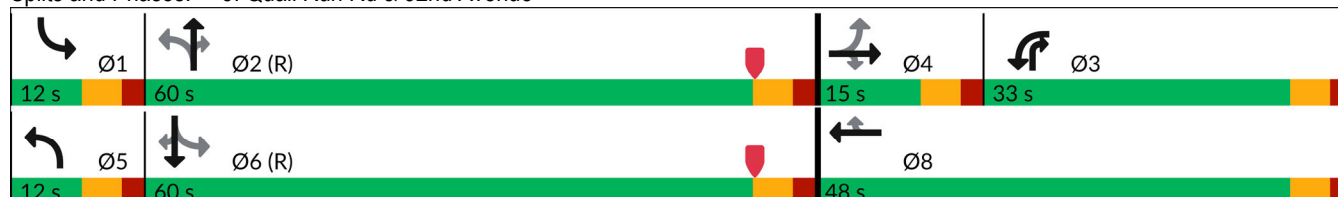
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	7	21	305	2	49	68	1116	1001	10	847	16
Future Volume (vph)	4	7	21	305	2	49	68	1116	1001	10	847	16
Turn Type	Perm	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases		4		3	8		5	2	3	1	6	
Permitted Phases	4		4			8	2		2	6		6
Detector Phase	4	4	4	3	8	8	5	2	3	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.5	23.5	23.5	10.5	23.5	23.5	10.5	23.5	10.5	10.5	23.5	23.5
Total Split (s)	15.0	15.0	15.0	33.0	48.0	48.0	12.0	60.0	33.0	12.0	60.0	60.0
Total Split (%)	12.5%	12.5%	12.5%	27.5%	40.0%	40.0%	10.0%	50.0%	27.5%	10.0%	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	Lead	Lead	Lead	Lag			Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	None	None	C-Max	C-Max
Act Effct Green (s)	6.3	6.3	6.3	27.0	34.4	34.4	73.5	72.2	105.8	69.8	64.9	64.9
Actuated g/C Ratio	0.05	0.05	0.05	0.23	0.29	0.29	0.61	0.60	0.88	0.58	0.54	0.54
v/c Ratio	0.05	0.10	0.13	0.53	0.00	0.13	0.26	0.49	0.87	0.05	0.41	0.02
Control Delay (s/veh)	54.8	56.4	1.4	43.5	25.0	3.7	13.9	16.6	10.3	12.6	19.3	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 (s/veh)	54.8	56.4	1.4	43.5	25.0	3.7	13.9	16.6	10.3	12.6	19.3	0.1
LOS	D	E	A	D	C	A	B	B	B	B	B	A
Approach Delay (s/veh)		20.1			38.0			13.6			18.9	
Approach LOS		C			D			B			B	

## Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 115 (96%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow  
 Natural Cycle: 100  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.87  
 Intersection Signal Delay (s/veh): 17.6  
 Intersection Capacity Utilization 84.1%  
 Analysis Period (min) 15

Intersection LOS: B  
 ICU Level of Service E

























## 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	305	2	49	68	1116	1001	10	847	16
Future Volume (veh/h)	4	7	21	305	2	49	68	1116	1001	10	847	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	332	2	53	74	1213	1088	11	921	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	103	61	51	393	344	291	353	2610	991	140	2504	777
Arrive On Green	0.04	0.04	0.04	0.14	0.22	0.22	0.04	0.63	0.63	0.01	0.60	0.60
Sat Flow, veh/h	1103	1530	1296	2826	1530	1296	1457	4176	1296	1457	4176	1296
Grp Volume(v), veh/h	4	8	23	332	2	53	74	1213	1088	11	921	17
Grp Sat Flow(s),veh/h/ln	1103	1530	1296	1413	1530	1296	1457	1392	1296	1457	1392	1296
Q Serve(g_s), s	0.4	0.6	1.8	13.8	0.1	4.0	2.3	18.4	39.3	0.4	13.6	0.6
Cycle Q Clear(g_c), s	0.5	0.6	1.8	13.8	0.1	4.0	2.3	18.4	39.3	0.4	13.6	0.6
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	103	61	51	393	344	291	353	2610	991	140	2504	777
V/C Ratio(X)	0.04	0.13	0.45	0.84	0.01	0.18	0.21	0.46	1.10	0.08	0.37	0.02
Avail Cap(c_a), veh/h	146	121	103	648	542	459	376	2610	991	201	2504	777
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	55.7	55.6	42.1	50.4	36.1	37.6	9.2	11.9	4.0	10.2	12.3	9.7
Incr Delay (d2), s/veh	0.2	1.0	6.0	5.4	0.0	0.3	0.3	0.6	59.3	0.2	0.4	0.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.2	0.5	1.4	8.9	0.1	2.3	1.3	9.5	27.3	0.2	7.6	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	55.8	56.6	48.2	55.8	36.1	37.9	9.5	12.5	63.3	10.4	12.8	9.8
LnGrp LOS	E	E	D	E	D	D	A	B	F	B	B	A
Approach Vol, veh/h	35			387			2375			949		
Approach Delay, s/veh	51.0			53.2			35.7			12.7		
Approach LOS	D			D			D			B		
Timer - Assigned Phs	1	2	3	4	5	6	8					
Phs Duration (G+Y+Rc), s	7.0	80.5	22.2	10.3	10.1	77.5	32.5					
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5	5.5	5.5					
Max Green Setting (Gmax), s	6.5	54.5	27.5	9.5	6.5	54.5	42.5					
Max Q Clear Time (g_c+l1), s	2.4	41.3	15.8	3.8	4.3	15.6	6.0					
Green Ext Time (p_c), s	0.0	10.5	1.0	0.0	0.0	8.3	0.2					
Intersection Summary												
HCM 6th Ctrl Delay, s/veh	31.8											
HCM 6th LOS	C											
Notes												

# Timings 4: Cavanaugh Road & 48th Avenue

Long Term Total  
AM Peak

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘	↗
Traffic Volume (vph)	456	292	6	464	92	3
Future Volume (vph)	456	292	6	464	92	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
Act Effect Green (s)	28.1	120.0	28.1	28.1	80.9	80.9
Actuated g/C Ratio	0.23	1.00	0.23	0.23	0.67	0.67
v/c Ratio	0.73	0.25	0.07	0.75	0.10	0.00
Control Delay (s/veh)	29.3	0.3	33.7	49.2	8.4	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	29.3	0.3	33.7	49.2	8.4	5.7
LOS	C	A	C	D	A	A
Approach Delay (s/veh)	18.0			49.0	8.3	
Approach LOS	B			D	A	

## Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 50 (42%), Referenced to phase 2: and 6:, Start of Yellow

Natural Cycle: 40

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay (s/veh): 28.4

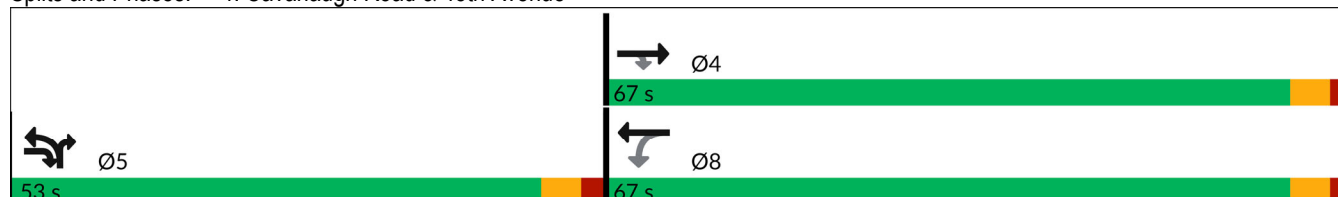
Intersection LOS: C

Intersection Capacity Utilization 31.4%

ICU Level of Service A

Analysis Period (min) 15

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)	456	292	6	464	92	3
Future Volume (veh/h)	456	292	6	464	92	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	496	317	7	504	100	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	646	1177	94	646	999	889
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	496	317	7	504	100	3
Grp Sat Flow(s),veh/h/ln	1453	1296	549	1453	1457	1296
Q Serve(g_s), s	19.2	3.6	1.5	19.6	2.8	0.1
Cycle Q Clear(g_c), s	19.2	3.6	20.7	19.6	2.8	0.1
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	646	1177	94	646	999	889
V/C Ratio(X)	0.77	0.27	0.07	0.78	0.10	0.00
Avail Cap(c_a), veh/h	1489	1553	254	1489	999	889
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	5.9
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	11.6	1.5	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	45.7	0.8	53.8	46.0	6.4	5.9
LnGrp LOS	D	A	D	D	A	A
Approach Vol, veh/h	813			511	103	
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	87.8		32.2		32.2	
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+l1), s	4.8		21.2		22.7	
Green Ext Time (p_c), s	0.3		5.3		4.0	
Intersection Summary						
HCM 6th Ctrl Delay, s/veh			33.0			
HCM 6th LOS			C			

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

Long Term Total  
AM 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	1	37	5	2	67	7	3	70	4	12	213	2
Future Vol, veh/h	1	37	5	2	67	7	3	70	4	12	213	2
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	1	40	5	2	73	8	3	76	4	13	232	2

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	384	345	233	366	344	78	234	0	0	80	0	0
Stage 1	259	259	-	84	84	-	-	-	-	-	-	-
Stage 2	125	86	-	282	260	-	-	-	-	-	-	-
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	535	543	752	550	543	922	1209	-	-	1384	-	-
Stage 1	698	653	-	870	782	-	-	-	-	-	-	-
Stage 2	826	781	-	678	653	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	471	537	752	510	537	922	1209	-	-	1384	-	-
Mov Cap-2 Maneuver	471	537	-	510	537	-	-	-	-	-	-	-
Stage 1	697	647	-	868	780	-	-	-	-	-	-	-
Stage 2	741	779	-	625	647	-	-	-	-	-	-	-







Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	12.1		12.5		0.3		0.4	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1209	-	-	471	556	510	559	1384	-	-
HCM Lane V/C Ratio	0.003	-	-	0.002	0.082	0.004	0.144	0.009	-	-
HCM Control Delay (s/veh)	8	-	-	12.7	12.1	12.1	12.5	7.6	-	-
HCM Lane LOS	A	-	-	B	B	B	B	A	-	-
HCM 95th %tile Q (veh)	0	-	-	0	0.3	0	0.5	0	-	-



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	102	238	231	145	75
Future Vol, veh/h	93	102	238	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	111	259	251	158	82







Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	510	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.35	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.425	-	-
Pot Cap-1 Maneuver	947	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	947	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s/v	4.4	0	16.7
HCM LOS	C		

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	947	-	-	-	397	727
HCM Lane V/C Ratio	0.107	-	-	-	0.397	0.112
HCM Control Delay (s/veh)	9.3	-	-	-	19.9	10.6
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q (veh)	0.4	-	-	-	1.9	0.4

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

Long Term Total  
AM Peak

Intersection						
Int Delay, s/veh	42.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	106	639	641	469	468
Future Vol, veh/h	0	106	639	641	469	468
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	695	697	510	509

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	2504	510	1019
Stage 1	765	-	-
Stage 2	1739	-	-
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	17	452 ~ 554	-
Stage 1	365	-	-
Stage 2	99	-	-
Platoon blocked, %			-
Mov Cap-1 Maneuver	0	452 ~ 554	-
Mov Cap-2 Maneuver	0	-	-
Stage 1	0	-	-
Stage 2	99	-	-



















Approach	EB	NB	SB
HCM Control Delay, s/v	15.7	75.8	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	~ 554	-	-	452	-	-
HCM Lane V/C Ratio	1.254	-	-	0.255	-	-
HCM Control Delay (s/veh)	151.8	-	0	15.7	-	-
HCM Lane LOS	F	-	A	C	-	-
HCM 95th %tile Q (veh)	27.2	-	-	1	-	-

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

# Timings 8: Quail Run Drive & 48th Avenue

Long Term Total  
AM Peak

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	20	815	283	6	298	121	0	1	0
Future Volume (vph)	20	815	283	6	298	121	0	1	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	7	4	5	3	8	5	2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	7	4	5	3	8	5	2	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
Minimum Split (s)	10.5	23.5	10.5	10.5	23.5	10.5	23.5	23.5	23.5
Total Split (s)	12.0	57.0	25.0	12.0	57.0	25.0	51.0	26.0	26.0
Total Split (%)	10.0%	47.5%	20.8%	10.0%	47.5%	20.8%	42.5%	21.7%	21.7%
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
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5		5.5
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Max	C-Max	C-Max
Act Effect Green (s)	45.8	44.5	61.8	43.4	39.7	62.1	62.1		44.8
Actuated g/C Ratio	0.38	0.37	0.52	0.36	0.33	0.52	0.52		0.37
v/c Ratio	0.07	0.83	0.39	0.04	0.34	0.22	0.02		0.02
Control Delay (s/veh)	6.1	14.7	1.2	11.0	14.4	19.1	0.1		0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay (s/veh)	6.1	14.7	1.2	11.0	14.4	19.1	0.1		0.1
LOS	A	B	A	B	B	B	A		A
Approach Delay (s/veh)		11.1			14.3		17.0		0.1
Approach LOS		B			B		B		A

## Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 4 (3%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay (s/veh): 12.1

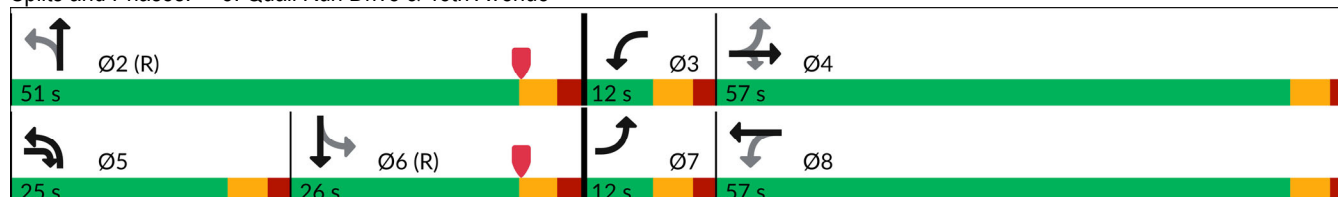
Intersection LOS: B

Intersection Capacity Utilization 45.1%

ICU Level of Service A

Analysis Period (min) 15





















## 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	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	815	283	6	298	1	121	0	15	1	0	11
Future Volume (veh/h)	20	815	283	6	298	1	121	0	15	1	0	11
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	22	886	308	7	324	1	132	0	16	1	0	12
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	318	1035	554	101	1020	3	626	0	645	53	17	456
Arrive On Green	0.02	0.36	0.36	0.01	0.34	0.34	0.07	0.00	0.50	0.38	0.00	0.38
Sat Flow, veh/h	1457	2906	1296	1457	2972	9	1457	0	1296	55	44	1196
Grp Volume(v), veh/h	22	886	308	7	158	167	132	0	16	13	0	0
Grp Sat Flow(s), veh/h/ln	1457	1453	1296	1457	1453	1528	1457	0	1296	1296	0	0
Q Serve(g_s), s	1.2	33.9	21.4	0.4	9.6	9.6	6.4	0.0	0.8	0.0	0.0	0.0
Cycle Q Clear(g_c), s	1.2	33.9	21.4	0.4	9.6	9.6	6.4	0.0	0.8	0.7	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	0.08		0.92
Lane Grp Cap(c), veh/h	318	1035	554	101	499	524	626	0	645	526	0	0
V/C Ratio(X)	0.07	0.86	0.56	0.07	0.32	0.32	0.21	0.00	0.02	0.02	0.00	0.00
Avail Cap(c_a), veh/h	366	1247	648	167	624	656	760	0	645	526	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	25.0	35.8	25.8	29.8	29.0	29.0	18.6	0.0	15.3	23.2	0.0	0.0
Incr Delay (d2), s/veh	0.1	5.2	0.9	0.3	0.4	0.3	0.2	0.0	0.1	0.1	0.0	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.7	18.4	10.9	0.3	6.2	6.5	3.9	0.0	0.4	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	25.1	41.0	26.7	30.0	29.4	29.4	18.8	0.0	15.4	23.3	0.0	0.0
LnGrp LOS	C	D	C	C	C	C	B		B	C		
Approach Vol, veh/h		1216			332			148				13
Approach Delay, s/veh		37.1			29.4			18.4				23.3
Approach LOS		D			C			B				C
Timer - Assigned Phs		2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s		65.2	6.5	48.3	14.0	51.2	8.1	46.7				
Change Period (Y+Rc), s		5.5	5.5	5.5	5.5	5.5	5.5	5.5				
Max Green Setting (Gmax), s		45.5	6.5	51.5	19.5	20.5	6.5	51.5				
Max Q Clear Time (g_c+I1), s		2.8	2.4	35.9	8.4	2.7	3.2	11.6				
Green Ext Time (p_c), s		0.1	0.0	6.9	0.2	0.0	0.0	2.1				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay, s/veh			33.9									
HCM 6th LOS			C									

Intersection						
Int Delay, s/veh	9.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	274	669	190	49	66	132
Future Vol, veh/h	274	669	190	49	66	132
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	298	727	207	53	72	143

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	260	0	-	0	1530
Stage 1	-	-	-	-	207
Stage 2	-	-	-	-	1323
Critical Hdwy	4.35	-	-	-	6.65
Critical Hdwy Stg 1	-	-	-	-	5.65
Critical Hdwy Stg 2	-	-	-	-	5.65
Follow-up Hdwy	2.425	-	-	-	3.725
Pot Cap-1 Maneuver	1182	-	-	-	114
Stage 1	-	-	-	-	776
Stage 2	-	-	-	-	222
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1182	-	-	-	85
Mov Cap-2 Maneuver	-	-	-	-	85
Stage 1	-	-	-	-	580
Stage 2	-	-	-	-	222

Approach	EB	WB	SB
HCM Control Delay, s/v	2.6	0	55.1
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1182	-	-	-	85	779
HCM Lane V/C Ratio	0.252	-	-	-	0.844	0.184
HCM Control Delay (s/veh)	9.1	-	-	-	143.8	10.7
HCM Lane LOS	A	-	-	-	F	B
HCM 95th %tile Q (veh)	1	-	-	-	4.4	0.7

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

Long Term Total  
AM Peak

Intersection						
Int Delay, s/veh	0					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↗↗↗	↗	↗	↗↗↗
Traffic Vol, veh/h	0	3	1000	16	6	1677
Future Vol, veh/h	0	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	0	3	1087	17	7	1823

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	-	544	0 0 1104 0
Stage 1	-	-	- - -
Stage 2	-	-	- - -
Critical Hdwy	-	7.6	- - 5.8 -
Critical Hdwy Stg 1	-	-	- - -
Critical Hdwy Stg 2	-	-	- - -
Follow-up Hdwy	-	4.15	- - 3.35 -
Pot Cap-1 Maneuver	0	*652	- - *807 -
Stage 1	0	-	- - -
Stage 2	0	-	- - -
Platoon blocked, %		1	- - 1 -
Mov Cap-1 Maneuver	-	*652	- - *807 -
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	WB	NB	SB
HCM Control Delay, s/v	10.5	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 652	* 807	-
HCM Lane V/C Ratio	-	- 0.005	0.008	-
HCM Control Delay (s/veh)	-	- 10.5	9.5	-
HCM Lane LOS	-	- B	A	-
HCM 95th %tile Q (veh)	-	- 0	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	Y Y		↑↑↑↑	↑	Y Y	↑↑↑↑
Traffic Vol, veh/h	26	4	964	47	7	903
Future Vol, veh/h	26	4	964	47	7	903
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	1048	51	8	982

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1457	524	0	0	1099
Stage 1	1048	-	-	-	-
Stage 2	409	-	-	-	-
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	*346	382	-	-	292
Stage 1	*192	-	-	-	-
Stage 2	*690	-	-	-	-
Platoon blocked, %	1	-	-	-	-
Mov Cap-1 Maneuver	*336	382	-	-	292
Mov Cap-2 Maneuver	*336	-	-	-	-
Stage 1	*192	-	-	-	-
Stage 2	*671	-	-	-	-







Approach	WB	NB	SB
HCM Control Delay, s/v	16.7	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	341	292
HCM Lane V/C Ratio	-	-	0.096	0.026
HCM Control Delay (s/veh)	-	-	16.7	17.7
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	1172	18	1	458	2	10	0	1	1	0	21
Future Vol, veh/h	18	1172	18	1	458	2	10	0	1	1	0	21
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	1274	20	1	498	2	11	0	1	1	0	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	500	0	0	1294	0	0	1575	1826	647	1178	1835	250
Stage 1	-	-	-	-	-	-	1324	1324	-	501	501	-
Stage 2	-	-	-	-	-	-	251	502	-	677	1334	-
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	915	-	-	*787	-	-	*286	*146	*543	*513	*143	684
Stage 1	-	-	-	-	-	-	*514	*453	-	*465	*487	-
Stage 2	-	-	-	-	-	-	*670	*486	-	*514	*453	-
Platoon blocked, %		-	-	1	-	-	1	1	1	1	1	
Mov Cap-1 Maneuver	915	-	-	*787	-	-	*272	*142	*543	*503	*139	684
Mov Cap-2 Maneuver	-	-	-	-	-	-	*272	*142	-	*503	*139	-
Stage 1	-	-	-	-	-	-	*503	*443	-	*455	*487	-
Stage 2	-	-	-	-	-	-	*647	*486	-	*502	*443	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.1	0	18.2	10.5
HCM LOS			C	B





Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	285	915	-	-	*787	-	-	673
HCM Lane V/C Ratio	0.042	0.021	-	-	0.001	-	-	0.036
HCM Control Delay (s/veh)	18.2	9	-	-	9.6	-	-	10.5
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: 48th Avenue & PA-3 Western Access

Long Term Total  
AM Peak

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	38	1135	438	2	1	22
Future Vol, veh/h	38	1135	438	2	1	22
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	41	1234	476	2	1	24

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	478	0	0	1176	239
Stage 1	-	-	-	477	-
Stage 2	-	-	-	699	-
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	1215	-	-	219	*860
Stage 1	-	-	-	788	-
Stage 2	-	-	-	398	-
Platoon blocked, %	1	-	-	1	1
Mov Cap-1 Maneuver	1215	-	-	212	*860
Mov Cap-2 Maneuver	-	-	-	212	-
Stage 1	-	-	-	761	-
Stage 2	-	-	-	398	-





Approach	EB	WB	SB
HCM Control Delay, s/v	0.3	0	9.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1215	-	-	-	759
HCM Lane V/C Ratio	0.034	-	-	-	0.033
HCM Control Delay (s/veh)	8.1	-	-	-	9.9
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q (veh)	0.1	-	-	-	0.1

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

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

Long Term Total  
AM Peak

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	1117	429	1	1	11
Future Vol, veh/h	20	1117	429	1	1	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	25	25	25	25
Mvmt Flow	22	1214	466	1	1	12

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	467	0	-	0	1118 234
Stage 1	-	-	-	-	467 -
Stage 2	-	-	-	-	651 -
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	1229	-	-	-	244 *860
Stage 1	-	-	-	-	799 -
Stage 2	-	-	-	-	423 -
Platoon blocked, %	1	-	-	-	1 1
Mov Cap-1 Maneuver	1229	-	-	-	239 *860
Mov Cap-2 Maneuver	-	-	-	-	239 -
Stage 1	-	-	-	-	785 -
Stage 2	-	-	-	-	423 -

Approach	EB	WB	SB
HCM Control Delay, s/v	0.1	0	10.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1229	-	-	-	707
HCM Lane V/C Ratio	0.018	-	-	-	0.018
HCM Control Delay (s/veh)	8	-	-	-	10.2
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q (veh)	0.1	-	-	-	0.1

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

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

Long Term Total  
AM Peak

Intersection						
Int Delay, s/veh	0.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	
Traffic Vol, veh/h	811	19	6	298	7	5
Future Vol, veh/h	811	19	6	298	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	324	8	5

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	903	0	1069
Stage 1	-	-	-	-	893
Stage 2	-	-	-	-	176
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	-	-	*999	-	*512
Stage 1	-	-	-	-	*652
Stage 2	-	-	-	-	*772
Platoon blocked, %	-	-	1	-	1
Mov Cap-1 Maneuver	-	-	*999	-	*508
Mov Cap-2 Maneuver	-	-	-	-	*508
Stage 1	-	-	-	-	*652
Stage 2	-	-	-	-	*767







Approach	EB	WB	NB
HCM Control Delay, s/v	0	0.2	11.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	570	-	-	* 999	-
HCM Lane V/C Ratio	0.023	-	-	0.007	-
HCM Control Delay (s/veh)	11.5	-	-	8.6	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q (veh)	0.1	-	-	0	-

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

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	280	6	17	0	25	5	0	7
Future Vol, veh/h	12	773	31	45	280	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	304	7	18	0	27	5	0	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	311	0	0	874	0	0	1133	1292	437	852	1306	156
Stage 1	-	-	-	-	-	-	883	883	-	406	406	-
Stage 2	-	-	-	-	-	-	250	409	-	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	1096	-	-	638	-	-	132	134	508	218	131	794
Stage 1	-	-	-	-	-	-	264	313	-	535	542	-
Stage 2	-	-	-	-	-	-	671	540	-	504	307	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1096	-	-	638	-	-	122	122	508	192	119	794
Mov Cap-2 Maneuver	-	-	-	-	-	-	122	122	-	192	119	-
Stage 1	-	-	-	-	-	-	261	309	-	529	500	-
Stage 2	-	-	-	-	-	-	614	498	-	471	303	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s/v	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	1096	-	-	638	-	-	344
HCM Lane V/C Ratio	0.205	0.012	-	-	0.077	-	-	0.038
HCM Control Delay (s/veh)	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	447	13	46	463	7	27
Future Vol, veh/h	447	13	46	463	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	486	14	50	503	8	29

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	500	0	845
Stage 1	-	-	-	-	493
Stage 2	-	-	-	-	352
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	-	-	915	-	260
Stage 1	-	-	-	-	518
Stage 2	-	-	-	-	619
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	915	-	246
Mov Cap-2 Maneuver	-	-	-	-	246
Stage 1	-	-	-	-	518
Stage 2	-	-	-	-	585

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	501	-	-	915	-
HCM Lane V/C Ratio	0.074	-	-	0.055	-
HCM Control Delay (s/veh)	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	1.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	54	0	0	2	0	7	0	75	3	7	185	96
Future Vol, veh/h	54	0	0	2	0	7	0	75	3	7	185	96
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	59	0	0	2	0	8	0	82	3	8	201	104

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	357	354	253	353	405	84	305	0	0	85	0	0
Stage 1	269	269	-	84	84	-	-	-	-	-	-	-
Stage 2	88	85	-	269	321	-	-	-	-	-	-	-
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	630	583	813	635	540	915	1156	-	-	1378	-	-
Stage 1	754	679	-	870	782	-	-	-	-	-	-	-
Stage 2	866	782	-	754	639	-	-	-	-	-	-	-
Platoon blocked, %	1	1	1	1	1	1	-	-	-	-	-	-
Mov Cap-1 Maneuver	622	580	813	632	537	915	1156	-	-	1378	-	-
Mov Cap-2 Maneuver	622	580	-	632	537	-	-	-	-	-	-	-
Stage 1	754	675	-	870	782	-	-	-	-	-	-	-
Stage 2	859	782	-	750	635	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	11.4		9.4		0		0.2	
HCM LOS	B		A					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1156	-	-	622 832	1378	-	-
HCM Lane V/C Ratio	-	-	-	0.094 0.012	0.006	-	-
HCM Control Delay (s/veh)	0	-	-	11.4 9.4	7.6	-	-
HCM Lane LOS	A	-	-	B A	A	-	-
HCM 95th %tile Q (veh)	0	-	-	0.3 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	72	7	13	256	30
Future Vol, veh/h	17	0	3	4	0	7	6	72	7	13	256	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	78	8	14	278	33

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	423	423	295	420	435	82	311	0	0	86	0	0
Stage 1	323	323	-	96	96	-	-	-	-	-	-	-
Stage 2	100	100	-	324	339	-	-	-	-	-	-	-
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	503	489	693	506	481	918	1130	-	-	1377	-	-
Stage 1	643	611	-	857	773	-	-	-	-	-	-	-
Stage 2	853	770	-	642	601	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	492	481	693	497	473	918	1130	-	-	1377	-	-
Mov Cap-2 Maneuver	492	481	-	497	473	-	-	-	-	-	-	-
Stage 1	639	605	-	852	768	-	-	-	-	-	-	-
Stage 2	841	765	-	632	595	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	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)	1130	-	-	514 702	1377	-	-
HCM Lane V/C Ratio	0.006	-	-	0.042 0.017	0.01	-	-
HCM Control Delay (s/veh)	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	4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	10	0	44	20	0	15	78	53	37	26	143	18
Future Vol, veh/h	10	0	44	20	0	15	78	53	37	26	143	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	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	11	0	48	22	0	16	85	58	40	28	155	20

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	477	489	165	493	479	78	175	0	0	98	0	0
Stage 1	221	221	-	248	248	-	-	-	-	-	-	-
Stage 2	256	268	-	245	231	-	-	-	-	-	-	-
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	469	902	484	476	922	1306	-	-	1363	-	-
Stage 1	790	709	-	708	661	-	-	-	-	-	-	-
Stage 2	700	647	-	764	701	-	-	-	-	-	-	-
Platoon blocked, %	1	1	1	1	1		1	-	-		-	-
Mov Cap-1 Maneuver	458	429	902	429	436	922	1306	-	-	1363	-	-
Mov Cap-2 Maneuver	458	429	-	429	436	-	-	-	-	-	-	-
Stage 1	739	694	-	662	618	-	-	-	-	-	-	-
Stage 2	643	605	-	709	687	-	-	-	-	-	-	-







Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	10.1		11.9		3.7		1.1	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1306	-	-	765 557	1363	-	-
HCM Lane V/C Ratio	0.065	-	-	0.077 0.068	0.021	-	-
HCM Control Delay (s/veh)	7.9	-	-	10.1 11.9	7.7	-	-
HCM Lane LOS	A	-	-	B B	A	-	-
HCM 95th %tile Q (veh)	0.2	-	-	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	2.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	45	13	9	26	2	5	0	7	1	0	4
Future Vol, veh/h	5	45	13	9	26	2	5	0	7	1	0	4
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	49	14	10	28	2	5	0	8	1	0	4
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	30	0	0	63	0	0	117	116	56	119	122	29
Stage 1	-	-	-	-	-	-	66	66	-	49	49	-
Stage 2	-	-	-	-	-	-	51	50	-	70	73	-
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	1446	-	-	1405	-	-	808	733	949	806	728	983
Stage 1	-	-	-	-	-	-	890	797	-	909	811	-
Stage 2	-	-	-	-	-	-	907	810	-	885	791	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1446	-	-	1405	-	-	798	726	949	793	721	983
Mov Cap-2 Maneuver	-	-	-	-	-	-	798	726	-	793	721	-
Stage 1	-	-	-	-	-	-	887	795	-	906	805	-
Stage 2	-	-	-	-	-	-	897	804	-	875	789	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s/v	0.6			1.8			9.2			8.9		
HCM LOS							A			A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	880	1446	-	-	1405	-	-	938				
HCM Lane V/C Ratio	0.015	0.004	-	-	0.007	-	-	0.006				
HCM Control Delay (s/veh)	9.2	7.5	-	-	7.6	-	-	8.9				
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	5.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	8	33	53	11	8	19	0	30	4	0	6
Future Vol, veh/h	12	8	33	53	11	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	9	36	58	12	9	21	0	33	4	0	7







Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	21	0	0	45	0	0	189	190	27	203	204	17
Stage 1	-	-	-	-	-	-	53	53	-	133	133	-
Stage 2	-	-	-	-	-	-	136	137	-	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	1458	-	-	1427	-	-	723	666	986	708	654	999
Stage 1	-	-	-	-	-	-	905	808	-	818	744	-
Stage 2	-	-	-	-	-	-	815	741	-	885	793	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1458	-	-	1427	-	-	691	633	986	659	621	999
Mov Cap-2 Maneuver	-	-	-	-	-	-	691	633	-	659	621	-
Stage 1	-	-	-	-	-	-	897	801	-	811	713	-
Stage 2	-	-	-	-	-	-	777	711	-	848	786	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s/v	1.7			5.6			9.5			9.4		
HCM LOS							A			A		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	846	1458	-	-	1427	-	-	828
HCM Lane V/C Ratio	0.063	0.009	-	-	0.04	-	-	0.013
HCM Control Delay (s/veh)	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/v	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/veh)	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	0.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	2	166	17	4	204
Future Vol, veh/h	10	2	166	17	4	204
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	180	18	4	222

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	419	189	0
Stage 1	189	-	-
Stage 2	230	-	-
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	549	797	-
Stage 1	791	-	-
Stage 2	757	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	547	797	-
Mov Cap-2 Maneuver	547	-	-
Stage 1	791	-	-
Stage 2	755	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	11.4	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	577	1248
HCM Lane V/C Ratio	-	-	0.023	0.003
HCM Control Delay (s/veh)	-	-	11.4	7.9
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	2.1											
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	20	9	199	13
Future Vol, veh/h	7	0	20	11	0	5	34	66	20	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	22	10	216	14





Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	403	411	223	411	407	83	230	0	0	94	0	0
Stage 1	243	243	-	157	157	-	-	-	-	-	-	-
Stage 2	160	168	-	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	519	497	762	513	500	916	1214	-	-	1368	-	-
Stage 1	712	664	-	794	726	-	-	-	-	-	-	-
Stage 2	791	718	-	702	659	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	501	479	762	484	482	916	1214	-	-	1368	-	-
Mov Cap-2 Maneuver	501	479	-	484	482	-	-	-	-	-	-	-
Stage 1	691	659	-	770	704	-	-	-	-	-	-	-
Stage 2	762	696	-	677	654	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	10.6		11.5		2.3		0.3	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1214	-	-	671 568	1368	-	-
HCM Lane V/C Ratio	0.03	-	-	0.044 0.031	0.007	-	-
HCM Control Delay (s/veh)	8.1	-	-	10.6 11.5	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

Long Term Total  
AM Peak

Intersection						
Int Delay, s/veh	1.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	19	31	178	206	8
Future Vol, veh/h	4	19	31	178	206	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	193	224	9

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	490	229	233	0	-	0
Stage 1	229	-	-	-	-	-
Stage 2	261	-	-	-	-	-
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	498	756	1210	-	-	-
Stage 1	758	-	-	-	-	-
Stage 2	732	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	484	756	1210	-	-	-
Mov Cap-2 Maneuver	484	-	-	-	-	-
Stage 1	737	-	-	-	-	-
Stage 2	732	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	10.4	1.2	0
HCM LOS	B		

























Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1210	-	689	-	-
HCM Lane V/C Ratio	0.028	-	0.036	-	-
HCM Control Delay (s/veh)	8.1	-	10.4	-	-
HCM Lane LOS	A	-	B	-	-
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
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)	30.0	36.0		18.0	24.0	24.0	68.0	96.0	18.0	28.0	28.0	30.0
Total Split (%)	20.0%	24.0%		12.0%	16.0%	16.0%	45.3%	64.0%	12.0%	18.7%	18.7%	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	Lag		Lead	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None	None	None	C-Max	None	C-Max	C-Max	None
Act Effct Green (s)	28.3	30.1	92.6	12.0	15.9	15.9	62.5	91.5	108.9	23.5	23.5	52.9
Actuated g/C Ratio	0.19	0.20	0.62	0.08	0.11	0.11	0.42	0.61	0.73	0.16	0.16	0.35
v/c Ratio	0.89	0.03	0.83	0.73	0.20	0.01	1.08	0.21	0.05	0.01	0.88	0.58
Control Delay (s/veh)	79.2	48.4	15.5	86.5	62.5	0.0	95.2	16.4	3.8	55.0	83.3	15.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	79.2	48.4	15.5	86.5	62.5	0.0	95.2	16.4	3.8	55.0	83.3	15.8
LOS	E	D	B	F	E	A	F	B	A	D	F	B
Approach Delay (s/veh)		30.6			81.6			80.5			52.8	
Approach LOS		C			F			F			D	

### Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 114 (76%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.08

Intersection Signal Delay (s/veh): 57.3

Intersection LOS: E

Intersection Capacity Utilization 75.1%

ICU Level of Service D

Analysis Period (min) 15

### 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	462	258	1869	200	116	98	1907	1891	935	128	436	406
Arrive On Green	0.16	0.17	0.17	0.07	0.08	0.08	0.46	0.65	0.65	0.15	0.15	0.15
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	24.5	0.7	17.4	8.5	3.1	0.2	65.2	7.5	1.7	0.2	20.3	6.9
Cycle Q Clear(g_c), s	24.5	0.7	17.4	8.5	3.1	0.2	65.2	7.5	1.7	7.6	20.3	6.9
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	462	258	1869	200	116	98	1907	1891	935	128	436	406
V/C Ratio(X)	1.02	0.03	0.82	0.82	0.28	0.02	0.96	0.19	0.05	0.01	0.92	0.81
Avail Cap(c_a), veh/h	462	311	1973	235	189	160	1907	1891	935	128	436	406
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	62.8	52.2	7.2	68.7	65.5	64.2	39.0	10.4	6.1	60.8	62.8	27.0
Incr Delay (d2), s/veh	47.2	0.1	2.8	17.0	1.3	0.1	13.3	0.2	0.1	0.1	26.4	16.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	17.7	0.5	9.6	6.4	2.2	0.1	31.9	4.4	0.9	0.1	14.1	14.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	109.9	52.2	10.0	85.8	66.8	64.2	52.2	10.7	6.2	60.9	89.2	43.1
LnGrp LOS	F	D	B	F	E	E	D	B	A	E	F	D
Approach Vol, veh/h	2015		198				2252		730			
Approach Delay, s/veh	33.6		82.4				44.5		68.3			
Approach LOS	C		F				D		E			
Timer - Assigned Phs	2		3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	103.1		16.1	30.8	75.1	28.0	30.0	16.9				
Change Period (Y+Rc), s	5.5		5.5	5.5	5.5	5.5	5.5	5.5				
Max Green Setting (Gmax), s	90.5		12.5	30.5	62.5	22.5	24.5	18.5				
Max Q Clear Time (g_c+I1), s	9.5		10.5	19.4	67.2	22.3	26.5	5.1				
Green Ext Time (p_c), s	3.0		0.1	5.8	0.0	0.1	0.0	0.1				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			45.1									
HCM 6th LOS			D									



# Timings

## 1: Imboden & 56th Avenue

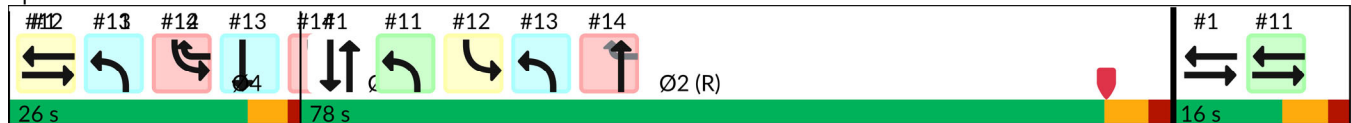
Long Term Total  
PM Peak

						
Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Configurations	 	 		 	 	 
Traffic Volume (vph)	433	8	150	30	333	367
Future Volume (vph)	433	8	150	30	333	367
Turn Type	Prot	NA	Prot	NA	NA	NA
Protected Phases	1	4	1	4	2	2
Permitted Phases						
Detector Phase	7	4	3	4	2	2
Switch Phase	4		8			
Minimum Initial (s)	5.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	9.5	16.0	9.5	16.0	16.0	16.0
Total Split (s)	26.0	16.0	26.0	16.0	78.0	78.0
Total Split (%)	21.7%	13.3%	21.7%	13.3%	65.0%	65.0%
Yellow Time (s)	3.5	4.0	3.5	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	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)	4.5	6.0	4.5	6.0	6.0	6.0
Lead/Lag	Lead		Lead		Lag	Lag
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	None	Min	None	Min	C-Max	C-Max
Act Effct Green (s)	21.3	10.0	21.3	10.0	72.2	72.2
Actuated g/C Ratio	0.18	0.08	0.18	0.08	0.60	0.60
v/c Ratio	0.81	0.03	0.58	0.12	0.18	0.19
Control Delay (s/veh)	27.9	29.1	23.7	24.7	11.0	11.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	27.9	29.1	23.7	24.7	11.0	11.1
LOS	C	C	C	C	B	B
Approach Delay (s/veh)		27.9		23.9	11.0	11.1
Approach LOS		C		C	B	B

### Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.93  
 Intersection Signal Delay (s/veh): 18.5  
 Intersection LOS: B  
 Intersection Capacity Utilization 39.2%  
 ICU Level of Service A  
 Analysis Period (min) 15

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



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HCM 6th Edition methodology does not support clustered intersections.

Timings  
11: Imboden NBL & 56th Avenue

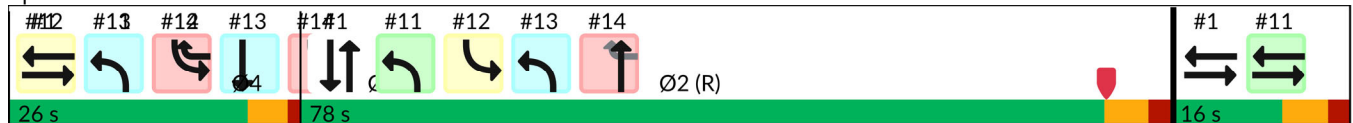
Long Term Total  
PM Peak

	→	↘	←	↙	↗		
Lane Group	EBT	EBR	WBT	NBL	SBR	Ø1	Ø4
Lane Configurations	↑↑↑	↗↗	↑↑	↙↙	↗		
Traffic Volume (vph)	441	1412	30	1692	304		
Future Volume (vph)	441	1412	30	1692	304		
Turn Type	NA	Free	NA	Prot	Free		
Protected Phases	1 4		1 4	2		1	4
Permitted Phases		Free			Free		
Detector Phase	1 4		1 4	2			
Switch Phase							
Minimum Initial (s)				10.0		5.0	10.0
Minimum Split (s)				16.0		9.5	16.0
Total Split (s)				78.0		26.0	16.0
Total Split (%)				65.0%		22%	13%
Yellow Time (s)				4.0		3.5	4.0
All-Red Time (s)				2.0		1.0	2.0
Lost Time Adjust (s)				0.0			
Total Lost Time (s)				6.0			
Lead/Lag				Lag		Lead	
Lead-Lag Optimize?						Yes	
Recall Mode				C-Max		None	Min
Act Effect Green (s)	37.3	120.0	37.3	72.2	120.0		
Actuated g/C Ratio	0.31	1.00	0.31	0.60	1.00		
v/c Ratio	0.25	0.58	0.03	0.93	0.20		
Control Delay (s/veh)	31.3	0.9	0.1	19.7	0.3		
Queue Delay	0.1	0.0	0.0	0.0	0.0		
Total Delay (s/veh)	31.3	0.9	0.1	19.7	0.3		
LOS	C	A	A	B	A		
Approach Delay (s/veh)	8.1		0.1				
Approach LOS	A		A				

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.93  
 Intersection Signal Delay (s/veh): 12.5  
 Intersection LOS: B  
 Intersection Capacity Utilization 61.7%  
 ICU Level of Service B  
 Analysis Period (min) 15

Splits and Phases: 11: Imboden NBL & 56th Avenue



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HCM 6th Edition methodology does not support clustered intersections.

Timings  
12: 56th Avenue & Imboden SBL

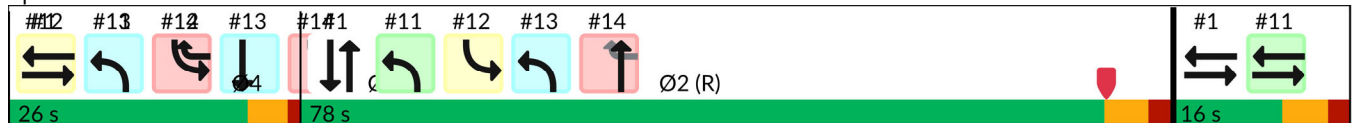
Long Term Total  
PM Peak

	→	←	↶	↷	↘		
Lane Group	EBT	WBT	WBR	NBR	SBL	Ø1	Ø4
Lane Configurations	↑↑	↑↑↑	↶	↶	↶		
Traffic Volume (vph)	8	180	2	47	1		
Future Volume (vph)	8	180	2	47	1		
Turn Type	NA	NA	Free	Free	Prot		
Protected Phases	1 4	1 4			2	1	4
Permitted Phases			Free	Free			
Detector Phase	1 4	1 4			2		
Switch Phase							
Minimum Initial (s)					10.0	5.0	10.0
Minimum Split (s)					16.0	9.5	16.0
Total Split (s)					78.0	26.0	16.0
Total Split (%)					65.0%	22%	13%
Yellow Time (s)					4.0	3.5	4.0
All-Red Time (s)					2.0	1.0	2.0
Lost Time Adjust (s)					0.0		
Total Lost Time (s)					6.0		
Lead/Lag					Lag	Lead	
Lead-Lag Optimize?						Yes	
Recall Mode					C-Max	None	Min
Act Effct Green (s)	37.3	37.3	120.0	120.0	72.2		
Actuated g/C Ratio	0.31	0.31	1.00	1.00	0.60		
v/c Ratio	0.01	0.14	0.00	0.03	0.00		
Control Delay (s/veh)	0.0	30.0	0.0	0.0	25.0		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay (s/veh)	0.0	30.0	0.0	0.0	25.0		
LOS	A	C	A	A	C		
Approach Delay (s/veh)		29.7					
Approach LOS		C					

Intersection Summary

Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.93  
 Intersection Signal Delay (s/veh): 23.3  
 Intersection LOS: C  
 Intersection Capacity Utilization 14.6%  
 ICU Level of Service A  
 Analysis Period (min) 15

Splits and Phases: 12: 56th Avenue & Imboden SBL



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HCM 6th Edition methodology does not support clustered intersections.

# Timings

## 13: Imboden & 56th Avenue EBR

Long Term Total

PM Peak

						
Lane Group	EBR	NBL	NBT	SBT	Ø2	Ø4
Lane Configurations						
Traffic Volume (vph)	1412	1692	333	517		
Future Volume (vph)	1412	1692	333	517		
Turn Type	Free	Prot	NA	NA		
Protected Phases		2 4	Free	1	2	4
Permitted Phases	Free					
Detector Phase		2 4		1		
Switch Phase						
Minimum Initial (s)				5.0	10.0	10.0
Minimum Split (s)				9.5	16.0	16.0
Total Split (s)				26.0	78.0	16.0
Total Split (%)				21.7%	65%	13%
Yellow Time (s)				3.5	4.0	4.0
All-Red Time (s)				1.0	2.0	2.0
Lost Time Adjust (s)				0.0		
Total Lost Time (s)				4.5		
Lead/Lag				Lead	Lag	
Lead-Lag Optimize?				Yes		
Recall Mode				None	C-Max	Min
Act Effect Green (s)	120.0	88.2	120.0	21.3		
Actuated g/C Ratio	1.00	0.74	1.00	0.18		
v/c Ratio	0.58	0.74	0.12	0.88		
Control Delay (s/veh)	0.7	11.5	0.1	68.7		
Queue Delay	0.0	0.3	0.0	0.0		
Total Delay (s/veh)	0.7	11.8	0.1	68.7		
LOS	A	B	A	E		
Approach Delay (s/veh)			9.6	68.7		
Approach LOS			A	E		

### Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay (s/veh): 13.8

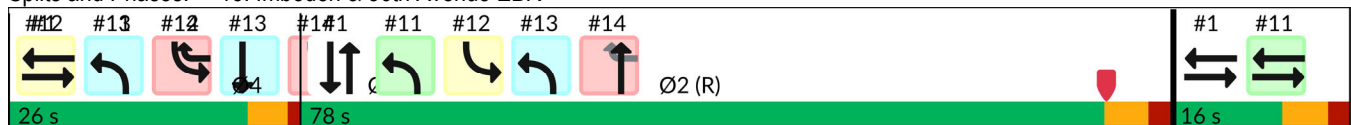
Intersection LOS: B

Intersection Capacity Utilization 69.6%

ICU Level of Service C

Analysis Period (min) 15

### Splits and Phases: 13: Imboden & 56th Avenue EBR



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HCM 6th Edition methodology does not support clustered intersections.











# Timings

## 14: Imboden & 56th Avenue WBR

Long Term Total

PM Peak

						
Lane Group	WBR	NBT	SBL	SBT	Ø1	Ø4
Lane Configurations						
Traffic Volume (vph)	2	766	1	367		
Future Volume (vph)	2	766	1	367		
Turn Type	pt+ov	NA	Prot	NA		
Protected Phases	1 4	2	1 4	Free	1	4
Permitted Phases	2					
Detector Phase	1 4	2	1 4			
Switch Phase						
Minimum Initial (s)		10.0			5.0	10.0
Minimum Split (s)		16.0			9.5	16.0
Total Split (s)		78.0			26.0	16.0
Total Split (%)		65.0%			22%	13%
Yellow Time (s)		4.0			3.5	4.0
All-Red Time (s)		2.0			1.0	2.0
Lost Time Adjust (s)		0.0				
Total Lost Time (s)		6.0				
Lead/Lag		Lag			Lead	
Lead-Lag Optimize?					Yes	
Recall Mode		C-Max			None	Min
Act Effect Green (s)	120.0	72.2	37.3	120.0		
Actuated g/C Ratio	1.00	0.60	0.31	1.00		
v/c Ratio	0.00	0.41	0.00	0.22		
Control Delay (s/veh)	0.0	13.9	28.0	0.2		
Queue Delay	0.0	0.0	0.0	0.0		
Total Delay (s/veh)	0.0	13.9	28.0	0.2		
LOS	A	B	C	A		
Approach Delay (s/veh)		13.9		0.2		
Approach LOS		B		A		

### Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBSB, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay (s/veh): 7.6

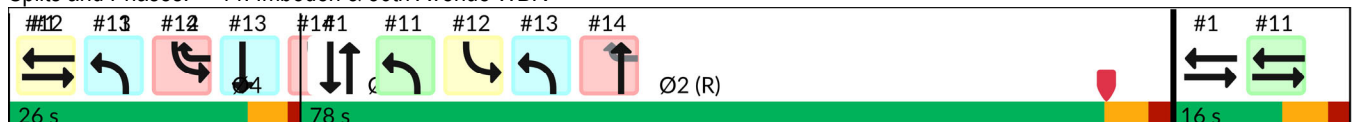
Intersection LOS: A

Intersection Capacity Utilization 34.1%

ICU Level of Service A

Analysis Period (min) 15

### Splits and Phases: 14: Imboden & 56th Avenue WBR





























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HCM 6th Edition methodology does not support clustered intersections.

# 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	310	5	872	10	944	168	383	1145
Future Volume (vph)	5	5	310	5	872	10	944	168	383	1145
Turn Type	Perm	NA	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA
Protected Phases		4	3	8	1	5	2	3	1	6
Permitted Phases	4		8		8	2		2		
Detector Phase	4	4	3	8	1	5	2	3	1	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.5	23.5	10.5	23.5	10.5	10.5	23.5	10.5	10.5	23.5
Total Split (s)	25.0	25.0	45.0	70.0	35.0	12.0	45.0	45.0	35.0	68.0
Total Split (%)	16.7%	16.7%	30.0%	46.7%	23.3%	8.0%	30.0%	30.0%	23.3%	45.3%
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		Lead	Lead	Lag	Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Max	None	None	C-Max
Act Effct Green (s)	7.1	7.1	30.8	30.8	68.3	76.6	70.7	98.7	32.0	103.5
Actuated g/C Ratio	0.05	0.05	0.21	0.21	0.46	0.51	0.47	0.66	0.21	0.69
v/c Ratio	0.09	0.21	0.70	0.82	0.83	0.05	0.52	0.20	0.70	0.44
Control Delay (s/veh)	69.8	44.1	60.5	20.6	46.9	12.9	30.9	4.2	60.3	10.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	69.8	44.1	60.5	20.6	46.9	12.9	30.9	4.2	60.3	10.5
LOS	E	D	E	C	D	B	C	A	E	B
Approach Delay (s/veh)		50.2		40.7			26.7			22.9
Approach LOS		D		D			C			C

## Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

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

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay (s/veh): 29.6

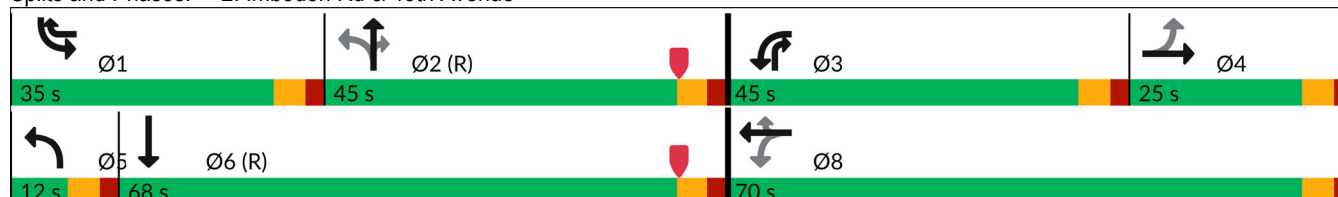
Intersection LOS: C

Intersection Capacity Utilization 72.2%

ICU Level of Service C

Analysis Period (min) 15






















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



# 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	310	5	872	10	944	168	383	1145	5	
Future Volume (veh/h)	5	5	10	310	5	872	10	944	168	383	1145	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	337	0	951	11	1026	183	416	1245	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	263	79	174	823	0	1289	196	1640	654	462	2334	9	
Arrive On Green	0.19	0.19	0.19	0.11	0.00	0.33	0.01	0.39	0.39	0.16	0.54	0.54	
Sat Flow, veh/h	1159	425	936	2913	0	2592	1457	4176	1296	2826	4293	17	
Grp Volume(v), veh/h	5	0	16	337	0	951	11	1026	183	416	807	443	
Grp Sat Flow(s),veh/h/ln	1159	0	1361	1457	0	1296	1457	1392	1296	1413	1392	1526	
Q Serve(g_s), s	0.5	0.0	1.5	13.5	0.0	43.7	0.7	29.7	12.2	21.7	28.0	28.0	
Cycle Q Clear(g_c), s	0.5	0.0	1.5	13.5	0.0	43.7	0.7	29.7	12.2	21.7	28.0	28.0	
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	263	0	253	823	0	1289	196	1640	654	462	1514	830	
V/C Ratio(X)	0.02	0.00	0.06	0.41	0.00	0.74	0.06	0.63	0.28	0.90	0.53	0.53	
Avail Cap(c_a), veh/h	263	0	253	1265	0	1538	241	1640	654	556	1514	830	
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	50.0	0.0	50.3	40.3	0.0	29.9	26.9	36.7	21.5	61.6	22.0	22.0	
Incr Delay (d2), s/veh	0.0	0.0	0.1	0.3	0.0	1.6	0.1	1.8	1.1	15.9	1.4	2.5	
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	8.6	0.0	19.9	0.4	15.7	7.2	13.7	14.5	16.0	
Unsig. Movement Delay, s/veh													
LnGrp Delay(d), s/veh	50.0	0.0	50.4	40.7	0.0	31.5	27.0	38.5	22.5	77.5	23.3	24.4	
LnGrp LOS	D		D	D		C	C	D	C	E	C	C	
Approach Vol, veh/h	21			1288				1220				1666	
Approach Delay, s/veh	50.3			33.9				36.0				37.1	
Approach LOS	D			C				D				D	
Timer - Assigned Phs	1	2	3	4	5	6	8						
Phs Duration (G+Y+Rc), s	30.0	64.4	22.3	33.3	7.3	87.1	55.6						
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5	5.5	5.5						
Max Green Setting (Gmax), s	29.5	39.5	39.5	19.5	6.5	62.5	64.5						
Max Q Clear Time (g_c+I1), s	23.7	31.7	15.5	3.5	2.7	30.0	45.7						
Green Ext Time (p_c), s	0.8	4.6	1.2	0.0	0.0	11.0	4.4						
Intersection Summary													
HCM 6th Ctrl Delay, s/veh	35.9												
HCM 6th LOS	D												
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	1035	7	111	22	1044	319	39	1620	4
Future Volume (vph)	17	2	73	1035	7	111	22	1044	319	39	1620	4
Turn Type	Perm	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases		4		3	8		5	2	3	1	6	
Permitted Phases	4		4			8	2		2	6		6
Detector Phase	4	4	4	3	8	8	5	2	3	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.5	23.5	23.5	10.5	23.5	23.5	10.5	23.5	10.5	10.5	23.5	23.5
Total Split (s)	24.0	24.0	24.0	54.0	78.0	78.0	12.0	60.0	54.0	12.0	60.0	60.0
Total Split (%)	16.0%	16.0%	16.0%	36.0%	52.0%	52.0%	8.0%	40.0%	36.0%	8.0%	40.0%	40.0%
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	Lead	Lead	Lead	Lag			Lead	Lead	Lag	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	None	None	C-Max	C-Max
Act Effct Green (s)	8.0	8.0	8.0	59.0	72.5	72.5	56.9	56.9	121.4	59.3	59.3	59.3
Actuated g/C Ratio	0.05	0.05	0.05	0.39	0.48	0.48	0.38	0.38	0.81	0.40	0.40	0.40
v/c Ratio	0.30	0.02	0.40	1.02	0.01	0.18	0.24	0.72	0.31	0.27	1.07	0.01
Control Delay (s/veh)	79.5	66.0	5.8	77.2	20.3	3.9	36.9	43.6	1.1	43.2	87.6	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 (s/veh)	79.5	66.0	5.8	77.2	20.3	3.9	36.9	43.6	1.1	43.2	87.6	0.0
LOS	E	E	A	E	C	A	D	D	A	D	F	A
Approach Delay (s/veh)		20.4			69.8			33.7			86.3	
Approach LOS		C			E			C			F	

## 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

Maximum v/c Ratio: 1.07

Intersection Signal Delay (s/veh): 63.5

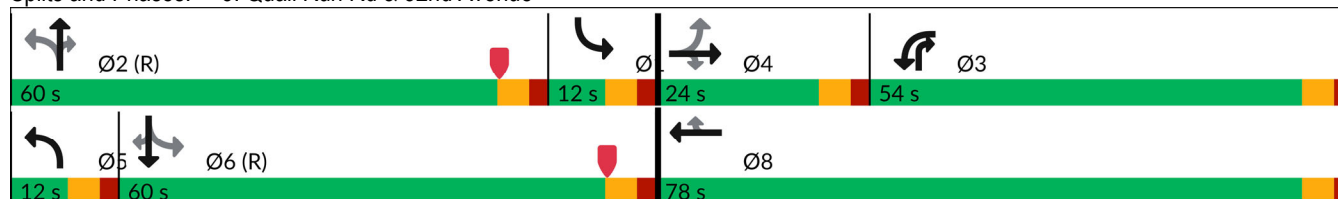
Intersection LOS: E

Intersection Capacity Utilization 79.1%

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 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	1035	7	111	22	1044	319	39	1620	4
Future Volume (veh/h)	17	2	73	1035	7	111	22	1044	319	39	1620	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	1125	8	121	24	1135	347	42	1761	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	124	105	89	914	656	556	79	1517	890	236	1838	571
Arrive On Green	0.07	0.07	0.07	0.32	0.43	0.43	0.02	0.36	0.36	0.10	0.44	0.44
Sat Flow, veh/h	1151	1530	1296	2826	1530	1296	1457	4176	1296	1457	4176	1296
Grp Volume(v), veh/h	18	2	79	1125	8	121	24	1135	347	42	1761	4
Grp Sat Flow(s),veh/h/ln	1151	1530	1296	1413	1530	1296	1457	1392	1296	1457	1392	1296
Q Serve(g_s), s	2.2	0.2	8.1	48.5	0.5	8.8	1.7	35.6	0.0	0.0	61.2	0.3
Cycle Q Clear(g_c), s	2.7	0.2	8.1	48.5	0.5	8.8	1.7	35.6	0.0	0.0	61.2	0.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	124	105	89	914	656	556	79	1517	890	236	1838	571
V/C Ratio(X)	0.15	0.02	0.89	1.23	0.01	0.22	0.30	0.75	0.39	0.18	0.96	0.01
Avail Cap(c_a), veh/h	186	189	160	914	739	626	111	1517	890	236	1838	571
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	66.5	65.1	55.9	50.7	24.6	27.0	40.8	41.7	10.1	52.2	40.6	23.6
Incr Delay (d2), s/veh	0.5	0.1	23.5	113.7	0.0	0.2	2.2	3.4	1.3	0.4	13.2	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	1.2	0.1	5.9	46.1	0.3	5.1	1.2	18.6	8.8	2.6	30.8	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	67.1	65.2	79.5	164.4	24.6	27.2	43.0	45.2	11.3	52.5	53.8	23.6
LnGrp LOS	E	E	E	F	C	C	D	D	B	D	D	C
Approach Vol, veh/h	99			1254			1506			1807		
Approach Delay, s/veh	76.9			150.3			37.3			53.7		
Approach LOS	E			F			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	8					
Phs Duration (G+Y+Rc), s	20.2	60.0	54.0	15.8	8.7	71.5	69.8					
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5	5.5	5.5					
Max Green Setting (Gmax), s	6.5	54.5	48.5	18.5	6.5	54.5	72.5					
Max Q Clear Time (g_c+I1), s	2.0	37.6	50.5	10.1	3.7	63.2	10.8					
Green Ext Time (p_c), s	0.0	9.0	0.0	0.2	0.0	0.0	0.5					

### Intersection Summary

HCM 6th Ctrl Delay, s/veh	74.9
HCM 6th LOS	E

### Notes

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

# Timings

## 4: Cavanaugh Road & 48th Avenue

Long Term Total

PM Peak

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘	↑
Traffic Volume (vph)	281	77	3	620	291	6
Future Volume (vph)	281	77	3	620	291	6
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
Act Effect Green (s)	37.4	120.0	37.4	37.4	71.6	71.6
Actuated g/C Ratio	0.31	1.00	0.31	0.31	0.60	0.60
v/c Ratio	0.34	0.07	0.01	0.75	0.37	0.01
Control Delay (s/veh)	10.2	0.1	24.3	42.0	15.5	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	10.2	0.1	24.3	42.0	15.5	7.5
LOS	B	A	C	D	B	A
Approach Delay (s/veh)	8.0			41.9	15.3	
Approach LOS	A			D	B	

### Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 28 (23%), Referenced to phase 2: and 6:, Start of Yellow

Natural Cycle: 45

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay (s/veh): 26.2

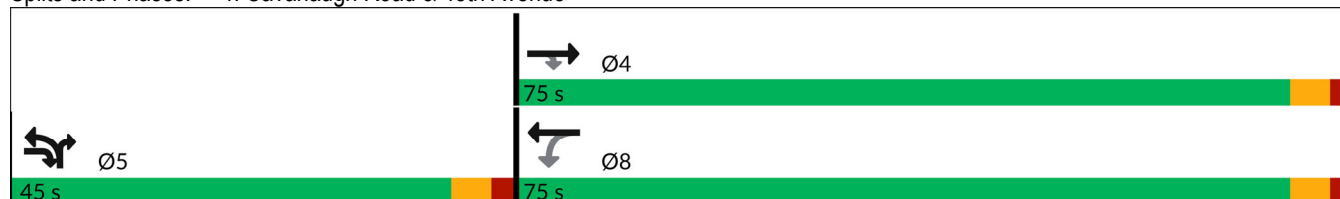
Intersection LOS: C

Intersection Capacity Utilization 42.4%

ICU Level of Service A

Analysis Period (min) 15

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)	281	77	3	620	291	6
Future Volume (veh/h)	281	77	3	620	291	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	305	84	3	674	316	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	816	1177	233	816	914	813
Arrive On Green	0.28	0.28	0.28	0.28	0.63	0.63
Sat Flow, veh/h	2983	1296	879	2983	1457	1296
Grp Volume(v), veh/h	305	84	3	674	316	7
Grp Sat Flow(s),veh/h/ln	1453	1296	879	1453	1457	1296
Q Serve(g_s), s	10.1	0.8	0.3	26.1	12.4	0.2
Cycle Q Clear(g_c), s	10.1	0.8	10.4	26.1	12.4	0.2
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	816	1177	233	816	914	813
V/C Ratio(X)	0.37	0.07	0.01	0.83	0.35	0.01
Avail Cap(c_a), veh/h	1683	1564	495	1683	914	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	6.5	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	389			677	323	
Approach Delay, s/veh	27.5			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+l1), s	14.4		12.1		28.1	
Green Ext Time (p_c), s	1.0		2.6		5.6	
Intersection Summary						
HCM 6th Ctrl Delay, s/veh			31.0			
HCM 6th LOS			C			



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

Long Term Total  
PM 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	2	69	9	4	29	13	2	211	2	6	62	1
Future Vol, veh/h	2	69	9	4	29	13	2	211	2	6	62	1
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	2	75	10	4	32	14	2	229	2	7	67	1







Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	339	317	68	358	316	230	68	0	0	231	0	0
Stage 1	82	82	-	234	234	-	-	-	-	-	-	-
Stage 2	257	235	-	124	82	-	-	-	-	-	-	-
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	563	935	557	564	755	1399	-	-	1213	-	-
Stage 1	872	784	-	720	671	-	-	-	-	-	-	-
Stage 2	699	670	-	827	784	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	536	559	935	492	560	755	1399	-	-	1213	-	-
Mov Cap-2 Maneuver	536	559	-	492	560	-	-	-	-	-	-	-
Stage 1	871	779	-	719	670	-	-	-	-	-	-	-
Stage 2	653	669	-	735	779	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	12.2		11.5		0.1		0.7	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1399	-	-	536	586	492	609	1213	-	-
HCM Lane V/C Ratio	0.002	-	-	0.004	0.145	0.009	0.075	0.005	-	-
HCM Control Delay (s/veh)	7.6	-	-	11.7	12.2	12.4	11.4	8	-	-
HCM Lane LOS	A	-	-	B	B	B	B	A	-	-
HCM 95th %tile Q (veh)	0	-	-	0	0.5	0	0.2	0	-	-

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

Long Term Total  
PM Peak

Intersection						
Int Delay, s/veh	8.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	75	242	94	141	237	103
Future Vol, veh/h	75	242	94	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	263	102	153	258	112

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	255	0	-	0	529
Stage 1	-	-	-	-	102
Stage 2	-	-	-	-	427
Critical Hdwy	4.35	-	-	-	6.65
Critical Hdwy Stg 1	-	-	-	-	5.65
Critical Hdwy Stg 2	-	-	-	-	5.65
Follow-up Hdwy	2.425	-	-	-	3.725
Pot Cap-1 Maneuver	1187	-	-	-	472
Stage 1	-	-	-	-	868
Stage 2	-	-	-	-	612
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1187	-	-	-	439
Mov Cap-2 Maneuver	-	-	-	-	439
Stage 1	-	-	-	-	808
Stage 2	-	-	-	-	612

Approach	EB	WB	SB
HCM Control Delay, s/v	2	0	19.8
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1187	-	-	-	439	894
HCM Lane V/C Ratio	0.069	-	-	-	0.587	0.125
HCM Control Delay (s/veh)	8.3	-	-	-	24.2	9.6
HCM Lane LOS	A	-	-	-	C	A
HCM 95th %tile Q (veh)	0.2	-	-	-	3.7	0.4

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

Long Term Total  
PM Peak

Intersection						
Int Delay, s/veh	36.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↱↱	↱↱	
Traffic Vol, veh/h	0	288	627	628	460	458
Future Vol, veh/h	0	288	627	628	460	458
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	682	683	500	498

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	2455	499	998	0	-	0
Stage 1	749	-	-	-	-	-
Stage 2	1706	-	-	-	-	-
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	18	460	~ 566	-	-	-
Stage 1	373	-	-	-	-	-
Stage 2	104	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	0	460	~ 566	-	-	-
Mov Cap-2 Maneuver	0	-	-	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	104	-	-	-	-	-



















Approach	EB	NB	SB
HCM Control Delay, s/v	27.9	65.9	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	~ 566	-	-	460	-	-
HCM Lane V/C Ratio	1.204	-	-	0.681	-	-
HCM Control Delay (s/veh)	131.8	-	0	27.9	-	-
HCM Lane LOS	F	-	A	D	-	-
HCM 95th %tile Q (veh)	24.8	-	-	5	-	-

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

# Timings 8: Quail Run Drive & 48th Avenue

Long Term Total  
PM Peak

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	9	414	93	9	750	295	0	1	0
Future Volume (vph)	9	414	93	9	750	295	0	1	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	7	4	5	3	8	5	2		6
Permitted Phases	4		4	8		2		6	
Detector Phase	7	4	5	3	8	5	2	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
Minimum Split (s)	10.5	23.5	10.5	10.5	23.5	10.5	23.5	23.5	23.5
Total Split (s)	12.0	48.0	35.0	12.0	48.0	35.0	60.0	25.0	25.0
Total Split (%)	10.0%	40.0%	29.2%	10.0%	40.0%	29.2%	50.0%	20.8%	20.8%
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
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5		5.5
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Max	C-Max	C-Max
Act Effct Green (s)	40.7	39.4	65.5	40.7	39.4	67.2	67.2		41.1
Actuated g/C Ratio	0.34	0.33	0.55	0.34	0.33	0.56	0.56		0.34
v/c Ratio	0.07	0.48	0.13	0.04	0.86	0.49	0.01		0.05
Control Delay (s/veh)	22.6	33.4	2.0	16.6	31.3	19.7	0.0		0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay (s/veh)	22.6	33.4	2.0	16.6	31.3	19.7	0.0		0.2
LOS	C	C	A	B	C	B	A		A
Approach Delay (s/veh)		27.6			31.2		19.2		0.2
Approach LOS		C			C		B		A

## Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay (s/veh): 27.3

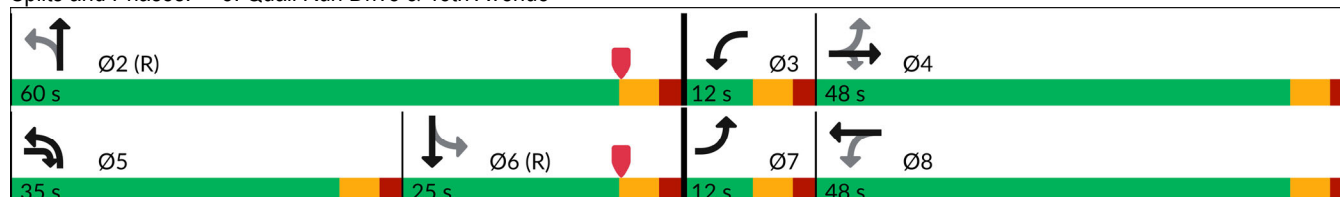
Intersection LOS: C

Intersection Capacity Utilization 52.9%

ICU Level of Service A
























Analysis Period (min) 15

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	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 						 	
Traffic Volume (veh/h)	9	414	93	9	750	0	295	0	8	1	0	21
Future Volume (veh/h)	9	414	93	9	750	0	295	0	8	1	0	21
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	10	450	101	10	815	0	321	0	9	1	0	23
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	103	913	618	222	913	0	698	0	695	37	12	409
Arrive On Green	0.01	0.31	0.31	0.01	0.31	0.00	0.16	0.00	0.54	0.33	0.00	0.33
Sat Flow, veh/h	1457	2906	1296	1457	2983	0	1457	0	1296	18	36	1245
Grp Volume(v), veh/h	10	450	101	10	815	0	321	0	9	24	0	0
Grp Sat Flow(s),veh/h/ln	1457	1453	1296	1457	1453	0	1457	0	1296	1299	0	0
Q Serve(g_s), s	0.6	15.1	5.3	0.6	32.1	0.0	16.7	0.0	0.4	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.6	15.1	5.3	0.6	32.1	0.0	16.7	0.0	0.4	1.5	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	0.04		0.96
Lane Grp Cap(c), veh/h	103	913	618	222	913	0	698	0	695	458	0	0
V/C Ratio(X)	0.10	0.49	0.16	0.05	0.89	0.00	0.46	0.00	0.01	0.05	0.00	0.00
Avail Cap(c_a), veh/h	165	1029	670	284	1029	0	819	0	695	458	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	31.8	33.4	17.8	28.4	39.2	0.0	18.7	0.0	13.0	27.6	0.0	0.0
Incr Delay (d2), s/veh	0.4	0.4	0.1	0.1	9.3	0.0	0.5	0.0	0.0	0.2	0.0	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.4	9.2	2.9	0.4	18.3	0.0	9.5	0.0	0.2	0.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	32.2	33.8	18.0	28.5	48.5	0.0	19.2	0.0	13.0	27.8	0.0	0.0
LnGrp LOS	C	C	B	C	D		B		B	C		
Approach Vol, veh/h		561			825			330			24	
Approach Delay, s/veh		30.9			48.2			19.0			27.8	
Approach LOS		C			D			B			C	
Timer - Assigned Phs		2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s		69.9	6.9	43.2	25.0	44.9	6.9	43.2				
Change Period (Y+Rc), s		5.5	5.5	5.5	5.5	5.5	5.5	5.5				
Max Green Setting (Gmax), s		54.5	6.5	42.5	29.5	19.5	6.5	42.5				
Max Q Clear Time (g_c+I1), s		2.4	2.6	17.1	18.7	3.5	2.6	34.1				
Green Ext Time (p_c), s		0.0	0.0	3.6	0.8	0.1	0.0	3.6				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay, s/veh			36.8									
HCM 6th LOS			D									

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

Long Term Total  
PM Peak

Intersection						
Int Delay, s/veh	11.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	118	206	687	60	48	279
Future Vol, veh/h	118	206	687	60	48	279
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	128	224	747	65	52	303

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	812	0	0 1227 747
Stage 1	-	-	- 747 -
Stage 2	-	-	- 480 -
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	723	-	- 177 378
Stage 1	-	-	- 430 -
Stage 2	-	-	- 577 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	723	-	- 146 378
Mov Cap-2 Maneuver	-	-	- 146 -
Stage 1	-	-	- 354 -
Stage 2	-	-	- 577 -

Approach	EB	WB	SB
HCM Control Delay, s/v	4	0	43.5
HCM LOS	E		

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	723	-	-	-	146	378
HCM Lane V/C Ratio	0.177	-	-	-	0.357	0.802
HCM Control Delay (s/veh)	11.1	-	-	-	42.8	43.6
HCM Lane LOS	B	-	-	-	E	E
HCM 95th %tile Q (veh)	0.6	-	-	-	1.5	7

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

Long Term Total  
PM Peak

Intersection						
Int Delay, s/veh	0					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗ ↘ ↘ ↘	↗ ↘ ↘ ↘	↗	↗ ↘ ↘ ↘	
Traffic Vol, veh/h	0	7	1808	8	2	1528
Future Vol, veh/h	0	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	0	8	1965	9	2	1661

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	-	983	0 0 1974 0
Stage 1	-	-	- - - -
Stage 2	-	-	- - - -
Critical Hdwy	-	7.6	- - 5.8 -
Critical Hdwy Stg 1	-	-	- - - -
Critical Hdwy Stg 2	-	-	- - - -
Follow-up Hdwy	-	4.15	- - 3.35 -
Pot Cap-1 Maneuver	0	*461	- - *571 -
Stage 1	0	-	- - - -
Stage 2	0	-	- - - -
Platoon blocked, %		1	- - 1 -
Mov Cap-1 Maneuver	-	*461	- - *571 -
Mov Cap-2 Maneuver	-	-	- - - -
Stage 1	-	-	- - - -
Stage 2	-	-	- - - -

Approach	WB	NB	SB
HCM Control Delay, s/v	12.9	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 461	* 571	-
HCM Lane V/C Ratio	-	- 0.017	0.004	-
HCM Control Delay (s/veh)	-	- 12.9	11.3	-
HCM Lane LOS	-	- B	B	-
HCM 95th %tile Q (veh)	-	- 0.1	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	Y Y		↑↑↑↑	↑	Y Y	↑↑↑↑
Traffic Vol, veh/h	50	7	1105	21	3	1452
Future Vol, veh/h	50	7	1105	21	3	1452
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	1201	23	3	1578

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1838	601	0	0	1224
Stage 1	1201	-	-	-	-
Stage 2	637	-	-	-	-
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	*409	338	-	-	251
Stage 1	*152	-	-	-	-
Stage 2	*558	-	-	-	-
Platoon blocked, %	1	-	-	-	-
Mov Cap-1 Maneuver	*404	338	-	-	251
Mov Cap-2 Maneuver	*404	-	-	-	-
Stage 1	*152	-	-	-	-
Stage 2	*552	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	15.8	0	0
HCM LOS	C		







Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	395	251
HCM Lane V/C Ratio	-	-	0.157	0.013
HCM Control Delay (s/veh)	-	-	15.8	19.5
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	1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	535	8	1	1125	1	19	0	1	2	0	37
Future Vol, veh/h	8	535	8	1	1125	1	19	0	1	2	0	37
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	582	9	1	1223	1	21	0	1	2	0	40

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1224	0	0	591	0	0	1219	1831	296	1535	1835	612
Stage 1	-	-	-	-	-	-	605	605	-	1226	1226	-
Stage 2	-	-	-	-	-	-	614	1226	-	309	609	-
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	453	-	-	*1177	-	-	113	59	*812	*63	58	384
Stage 1	-	-	-	-	-	-	755	670	-	*157	208	-
Stage 2	-	-	-	-	-	-	394	208	-	*769	666	-
Platoon blocked, %		-	-	1	-	-			1			
Mov Cap-1 Maneuver	453	-	-	*1177	-	-	100	58	*812	*62	57	384
Mov Cap-2 Maneuver	-	-	-	-	-	-	100	58	-	*62	57	-
Stage 1	-	-	-	-	-	-	740	656	-	*154	208	-
Stage 2	-	-	-	-	-	-	352	208	-	*753	652	-





Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.2	0	48	18.8
HCM LOS			E	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	105	453	-	-	*1177	-	-	303
HCM Lane V/C Ratio	0.207	0.019	-	-	0.001	-	-	0.14
HCM Control Delay (s/veh)	48	13.1	-	-	8.1	-	-	18.8
HCM Lane LOS	E	B	-	-	A	-	-	C
HCM 95th %tile Q (veh)	0.7	0.1	-	-	0	-	-	0.5

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

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

Long Term Total  
PM Peak

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	17	520	1085	0	2	41
Future Vol, veh/h	17	520	1085	0	2	41
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	18	565	1179	0	2	45

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	1179	0	0 1498 590
Stage 1	-	-	- 1179 -
Stage 2	-	-	- 319 -
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	*857	-	- *91 *592
Stage 1	-	-	- *560 -
Stage 2	-	-	- *646 -
Platoon blocked, %	1	-	- 1
Mov Cap-1 Maneuver	*857	-	- *89 *592
Mov Cap-2 Maneuver	-	-	- *89 -
Stage 1	-	-	- *548 -
Stage 2	-	-	- *646 -





Approach	EB	WB	SB
HCM Control Delay, s/v	0.3	0	13.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	* 857	-	-	-	469
HCM Lane V/C Ratio	0.022	-	-	-	0.1
HCM Control Delay (s/veh)	9.3	-	-	-	13.5
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q (veh)	0.1	-	-	-	0.3

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

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

Long Term Total  
PM Peak

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	541	1065	0	1	21
Future Vol, veh/h	9	541	1065	0	1	21
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	10	588	1158	0	1	23

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	1158	0	-	0	1472 579
Stage 1	-	-	-	-	1158 -
Stage 2	-	-	-	-	314 -
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	*857	-	-	-	*95 *592
Stage 1	-	-	-	-	*560 -
Stage 2	-	-	-	-	*650 -
Platoon blocked, %	1	-	-	-	1
Mov Cap-1 Maneuver	*857	-	-	-	*94 *592
Mov Cap-2 Maneuver	-	-	-	-	*94 -
Stage 1	-	-	-	-	*553 -
Stage 2	-	-	-	-	*650 -

Approach	EB	WB	SB
HCM Control Delay, s/v	0.2	0	12.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	* 857	-	-	-	477
HCM Lane V/C Ratio	0.011	-	-	-	0.05
HCM Control Delay (s/veh)	9.2	-	-	-	12.9
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q (veh)	0	-	-	-	0.2

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

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

Long Term Total  
PM Peak

Intersection						
Int Delay, s/veh	0.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑↑	
Traffic Vol, veh/h	415	8	3	745	12	8
Future Vol, veh/h	415	8	3	745	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	451	9	3	810	13	9

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	460	0	867
Stage 1	-	-	-	-	456
Stage 2	-	-	-	-	411
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	-	-	1238	-	387
Stage 1	-	-	-	-	812
Stage 2	-	-	-	-	575
Platoon blocked, %	-	-	1	-	1
Mov Cap-1 Maneuver	-	-	1238	-	386
Mov Cap-2 Maneuver	-	-	-	-	386
Stage 1	-	-	-	-	812
Stage 2	-	-	-	-	574







Approach	EB	WB	NB
HCM Control Delay, s/v	0	0	12.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	495	-	-	1238	-
HCM Lane V/C Ratio	0.044	-	-	0.003	-
HCM Control Delay (s/veh)	12.6	-	-	7.9	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q (veh)	0.1	-	-	0	-

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

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	403	14	19	704	2	33	0	46	10	0	11
Future Vol, veh/h	6	403	14	19	704	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	438	15	21	765	2	36	0	50	11	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	767	0	0	453	0	0	885	1269	227	1041	1275	384
Stage 1	-	-	-	-	-	-	460	460	-	808	808	-
Stage 2	-	-	-	-	-	-	425	809	-	233	467	-
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	708	-	-	957	-	-	206	139	710	156	137	553
Stage 1	-	-	-	-	-	-	494	510	-	295	342	-
Stage 2	-	-	-	-	-	-	520	341	-	687	506	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	708	-	-	957	-	-	197	135	710	141	133	553
Mov Cap-2 Maneuver	-	-	-	-	-	-	197	135	-	141	133	-
Stage 1	-	-	-	-	-	-	489	505	-	292	334	-
Stage 2	-	-	-	-	-	-	498	333	-	632	501	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s/v	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	708	-	-	957	-	-	231
HCM Lane V/C Ratio	0.253	0.009	-	-	0.022	-	-	0.099
HCM Control Delay (s/veh)	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	281	6	19	609	14	47
Future Vol, veh/h	281	6	19	609	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	305	7	21	662	15	51

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	312	0	682
Stage 1	-	-	-	-	309
Stage 2	-	-	-	-	373
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	-	-	1095	-	336
Stage 1	-	-	-	-	654
Stage 2	-	-	-	-	603
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1095	-	330
Mov Cap-2 Maneuver	-	-	-	-	330
Stage 1	-	-	-	-	654
Stage 2	-	-	-	-	592

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0.3	11.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	600	-	-	1095	-
HCM Lane V/C Ratio	0.111	-	-	0.019	-
HCM Control Delay (s/veh)	11.7	-	-	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	3.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	101	0	0	4	0	12	0	190	1	3	55	42
Future Vol, veh/h	101	0	0	4	0	12	0	190	1	3	55	42
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	110	0	0	4	0	13	0	207	1	3	60	46

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	303	297	83	297	320	208	106	0	0	208	0	0
Stage 1	89	89	-	208	208	-	-	-	-	-	-	-
Stage 2	214	208	-	89	112	-	-	-	-	-	-	-
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	624	589	942	630	572	778	1363	-	-	1237	-	-
Stage 1	887	790	-	744	689	-	-	-	-	-	-	-
Stage 2	739	689	-	887	771	-	-	-	-	-	-	-
Platoon blocked, %	1	1	1	1	1	1	-	-	-	-	-	-
Mov Cap-1 Maneuver	612	588	942	629	571	778	1363	-	-	1237	-	-
Mov Cap-2 Maneuver	612	588	-	629	571	-	-	-	-	-	-	-
Stage 1	887	788	-	744	689	-	-	-	-	-	-	-
Stage 2	727	689	-	884	770	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	12.2	10	0	0.2
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1363	-	-	612 735	1237	-	-
HCM Lane V/C Ratio	-	-	-	0.179 0.024	0.003	-	-
HCM Control Delay (s/veh)	0	-	-	12.2 10	7.9	-	-
HCM Lane LOS	A	-	-	B B	A	-	-
HCM 95th %tile Q (veh)	0	-	-	0.6 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	252	3	6	60	14
Future Vol, veh/h	32	0	7	7	0	14	3	252	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	274	3	7	65	15

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	376	370	73	373	376	276	80	0	0	277	0	0
Stage 1	87	87	-	282	282	-	-	-	-	-	-	-
Stage 2	289	283	-	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	541	525	928	544	521	711	1384	-	-	1164	-	-
Stage 1	867	780	-	678	638	-	-	-	-	-	-	-
Stage 2	672	637	-	862	774	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	526	521	928	536	517	711	1384	-	-	1164	-	-
Mov Cap-2 Maneuver	526	521	-	536	517	-	-	-	-	-	-	-
Stage 1	865	775	-	677	637	-	-	-	-	-	-	-
Stage 2	656	636	-	850	769	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	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	-	-	570 641	1164	-	-
HCM Lane V/C Ratio	0.002	-	-	0.074 0.036	0.006	-	-
HCM Control Delay (s/veh)	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	5.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	19	0	82	37	0	30	35	143	18	10	41	8
Future Vol, veh/h	19	0	82	37	0	30	35	143	18	10	41	8
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	21	0	89	40	0	33	38	155	20	11	45	9







Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	330	323	50	357	317	165	54	0	0	175	0	0
Stage 1	72	72	-	241	241	-	-	-	-	-	-	-
Stage 2	258	251	-	116	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	585	561	963	561	565	823	1419	-	-	1274	-	-
Stage 1	888	794	-	714	666	-	-	-	-	-	-	-
Stage 2	699	659	-	840	791	-	-	-	-	-	-	-
Platoon blocked, %	1	1	1	1	1	1	-	-	-	-	-	-
Mov Cap-1 Maneuver	547	541	963	495	545	823	1419	-	-	1274	-	-
Mov Cap-2 Maneuver	547	541	-	495	545	-	-	-	-	-	-	-
Stage 1	864	787	-	695	648	-	-	-	-	-	-	-
Stage 2	653	641	-	756	784	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	9.9		11.8		1.4		1.3	
HCM LOS	A		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1419	-	-	842 603	1274	-	-
HCM Lane V/C Ratio	0.027	-	-	0.13 0.121	0.009	-	-
HCM Control Delay (s/veh)	7.6	-	-	9.9 11.8	7.9	-	-
HCM Lane LOS	A	-	-	A B	A	-	-
HCM 95th %tile Q (veh)	0.1	-	-	0.4 0.4	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	2	20	6	4	48	1	11	0	13	2	0	8
Future Vol, veh/h	2	20	6	4	48	1	11	0	13	2	0	8
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	2	22	7	4	52	1	12	0	14	2	0	9







Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	53	0	0	29	0	0	95	91	26	98	94	53
Stage 1	-	-	-	-	-	-	30	30	-	61	61	-
Stage 2	-	-	-	-	-	-	65	61	-	37	33	-
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	1417	-	-	1447	-	-	836	757	987	832	755	953
Stage 1	-	-	-	-	-	-	931	827	-	896	801	-
Stage 2	-	-	-	-	-	-	891	801	-	923	824	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1417	-	-	1447	-	-	826	754	987	818	752	953
Mov Cap-2 Maneuver	-	-	-	-	-	-	826	754	-	818	752	-
Stage 1	-	-	-	-	-	-	930	826	-	895	799	-
Stage 2	-	-	-	-	-	-	880	799	-	909	823	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s/v	0.5			0.6			9.1			8.9		
HCM LOS							A			A		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	906	1417	-	-	1447	-	-	923
HCM Lane V/C Ratio	0.029	0.002	-	-	0.003	-	-	0.012
HCM Control Delay (s/veh)	9.1	7.5	-	-	7.5	-	-	8.9
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	15	15	22	4	4	36	0	55	9	0	12
Future Vol, veh/h	5	15	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	16	16	24	4	4	39	0	60	10	0	13







Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	8	0	0	32	0	0	95	90	24	118	96	6
Stage 1	-	-	-	-	-	-	34	34	-	54	54	-
Stage 2	-	-	-	-	-	-	61	56	-	64	42	-
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	-	-	1444	-	-	836	758	990	807	753	1013
Stage 1	-	-	-	-	-	-	926	823	-	903	807	-
Stage 2	-	-	-	-	-	-	896	805	-	892	817	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1474	-	-	1444	-	-	813	743	990	746	738	1013
Mov Cap-2 Maneuver	-	-	-	-	-	-	813	743	-	746	738	-
Stage 1	-	-	-	-	-	-	923	821	-	900	793	-
Stage 2	-	-	-	-	-	-	870	791	-	835	815	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s/v	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)	911	1474	-	-	1444	-	-	878
HCM Lane V/C Ratio	0.109	0.004	-	-	0.017	-	-	0.026
HCM Control Delay (s/veh)	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/v	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/veh)	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	0.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	19	5	191	8	2	158
Future Vol, veh/h	19	5	191	8	2	158
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	208	9	2	172

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	389	213	0
Stage 1	213	-	-
Stage 2	176	-	-
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	572	773	-
Stage 1	771	-	-
Stage 2	802	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	571	773	-
Mov Cap-2 Maneuver	571	-	-
Stage 1	771	-	-
Stage 2	800	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	11.2	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	604	1228
HCM Lane V/C Ratio	-	-	0.043	0.002
HCM Control Delay (s/veh)	-	-	11.2	7.9
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/v	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/veh)	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	1.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	33	13	191	174	3
Future Vol, veh/h	8	33	13	191	174	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	208	189	3

Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	427	191	192	0	-	0
Stage 1	191	-	-	-	-	-
Stage 2	236	-	-	-	-	-
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	543	795	1255	-	-	-
Stage 1	789	-	-	-	-	-
Stage 2	752	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	537	795	1255	-	-	-
Mov Cap-2 Maneuver	537	-	-	-	-	-
Stage 1	780	-	-	-	-	-
Stage 2	752	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	10.3	0.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1255	-	727	-	-
HCM Lane V/C Ratio	0.011	-	0.061	-	-
HCM Control Delay (s/veh)	7.9	-	10.3	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q (veh)	0	-	0.2	-	-

## APPENDIX G. SIGNAL WARRANT WORKSHEETS



**MUTCD Volume-based Warrant Evaluation**  
**Imboden Rd & 56th Avenue**  
**2040\_No Build**



Major Street: Imboden Rd  
 Lanes Moving Traffic: 2 or more  
 Approach Speed: 30 MPH  
 Option: Rural Community

Minor Street: 56th Avenue  
 Lanes Moving Traffic: 1  
 Right Turn Volume Included: 50% EB

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

70% Satisfied Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	1502	1410	1318	1226	1134	1042	950	858
Highest Apprch. Minor Street	105 (84)	815	765	715	665	615	565	515	465

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

70% Satisfied Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	1502	1410	1318	1226	1134	1042	950	858
Highest Apprch. Minor Street	53 (42)	815	765	715	665	615	565	515	465

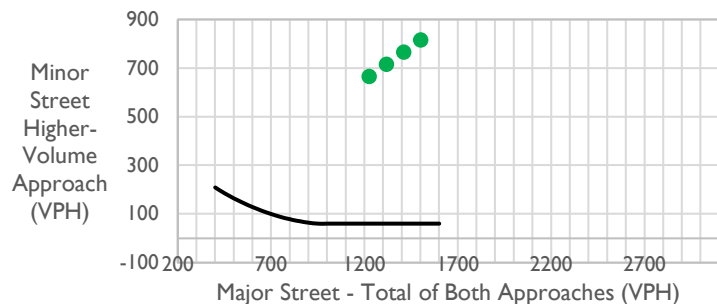
**WARRANT 1, Condition A and Condition B**

56% Satisfied Yes

**WARRANT 2, Four Hour Volume**

70% Satisfied Yes

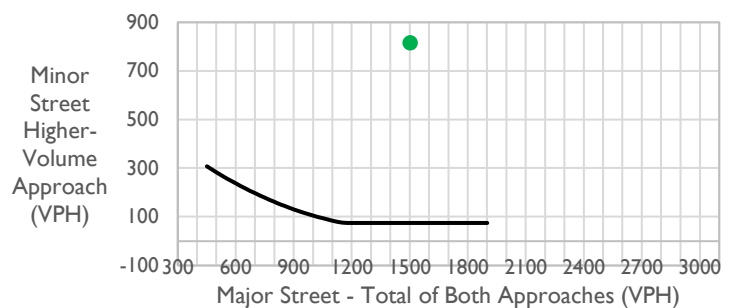
	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1502	815
2nd Highest	1410	765
3rd Highest	1318	715
4th Highest	1226	665



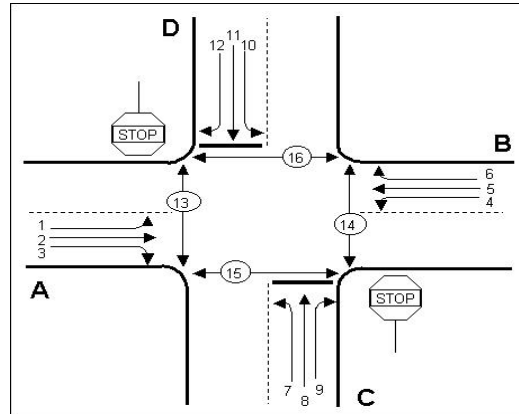
**WARRANT 3, Peak Hour Volume**

70% Satisfied Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1502	815



**Figure 2 - 11. Minor-road right-turn volume reduction for warrant check.**  
**Imboden Rd & 56th Avenue**  
**2040\_No Build**



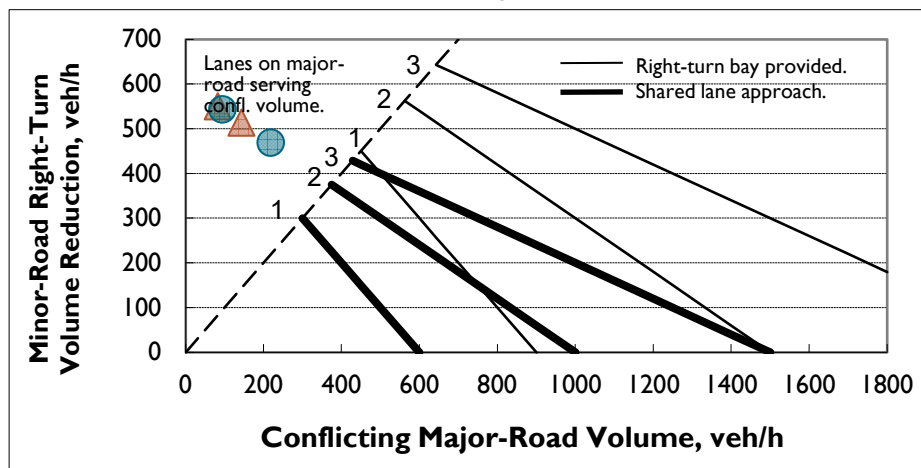
**INPUT**

Number of lanes on major-road approach:			2	
Right-turn geometry on minor-road:			Shared-lane approach	
Approach	Number	Movement	Volume (veh/hr)	
			AM	PM
Major A	2	Through	164	188
	3	Right	0	0
Major B	5	Through	127	217
	6	Right	159	219
Minor C	7	Left	0	0
	8	Through	0	0
	9	Right	0	0
Minor D	10	Left	291	328
	11	Through	0	0
	12	Right	862	973

**OUTPUT**

Variable	Volume (veh/hr)	
	AM	PM
Conflicting major-road volume (Vc9):	82	94
Conflicting major-road volume (Vc12):	143	218
Right-turn volume reduction (Vr9):	551	544
Right-turn volume reduction (Vr12):	514	469
Adjusted right-turn volume reduction (Vr9):	0	0
Adjusted right-turn volume reduction (Vr12):	514	469
Adjusted minor-road volume:	639	832

Chart Legend:



Source: NCHRP Report 457

**MUTCD Volume-based Warrant Evaluation**  
**Imboden Rd & 48th Avenue**  
**2040\_No Build**



Major Street: Imboden Rd  
 Lanes Moving Traffic: 2 or more  
 Approach Speed: 30 MPH  
 Option: Rural Community

Minor Street: 48th Avenue  
 Lanes Moving Traffic: 1  
 Right Turn Volume Included: 25% EB, 50% WB

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

70% Satisfied Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	1401	1315	1229	1143	1058	972	886	800
Highest Apprch. Minor Street	105 (84)	283	266	248	231	214	196	179	162

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

70% Satisfied Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	1401	1315	1229	1143	1058	972	886	800
Highest Apprch. Minor Street	53 (42)	283	266	248	231	214	196	179	162

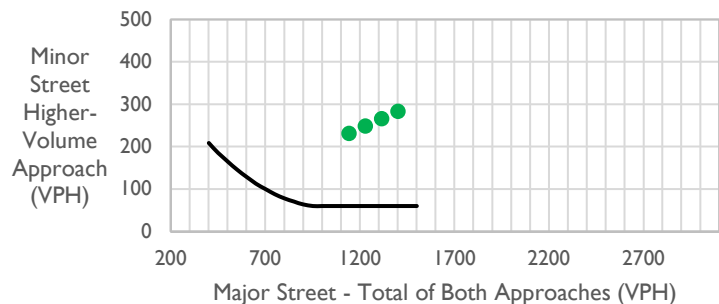
**WARRANT 1, Condition A and Condition B**

56% Satisfied Yes

**WARRANT 2, Four Hour Volume**

70% Satisfied Yes

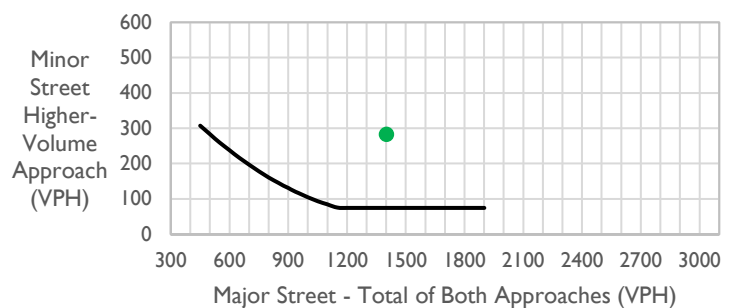
	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1401	283
2nd Highest	1315	266
3rd Highest	1229	248
4th Highest	1143	231



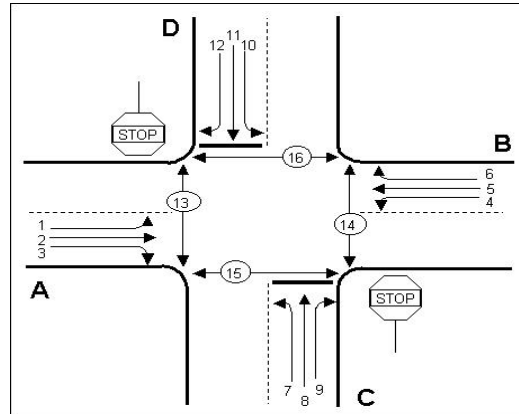
**WARRANT 3, Peak Hour Volume**

70% Satisfied Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1401	283



**Figure 2 - 11. Minor-road right-turn volume reduction for warrant check.**  
**Imboden Rd & 48th Avenue**  
**2040\_No Build**



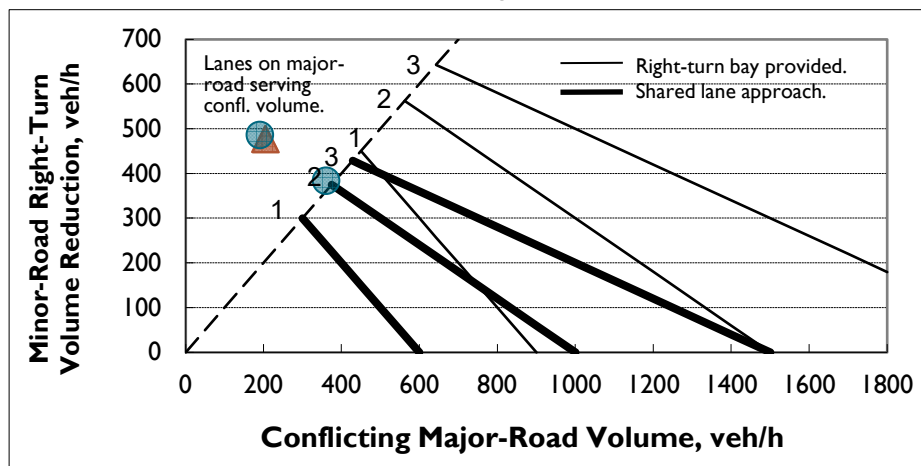
**INPUT**

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	409	376
	3	Right	2	4
Major B	5	Through	402	715
	6	Right	5	5
Minor C	7	Left	2	2
	8	Through	5	5
	9	Right	129	552
Minor D	10	Left	5	5
	11	Through	5	5
	12	Right	10	10

**OUTPUT**

Variable	Volume (veh/hr)	
	AM	PM
Conflicting major-road volume (Vc9):	206	190
Conflicting major-road volume (Vc12):	204	360
Right-turn volume reduction (Vr9):	477	486
Right-turn volume reduction (Vr12):	478	384
Adjusted right-turn volume reduction (Vr9):	129	486
Adjusted right-turn volume reduction (Vr12):	10	10
Adjusted minor-road volume:	10	73

Chart Legend:



Source: NCHRP Report 457

**MUTCD Volume-based Warrant Evaluation**  
**Quail Run Rd & 32nd Avenue**  
**2040\_No Build**



Major Street: Quail Run Rd  
 Lanes Moving Traffic: 2 or more  
 Approach Speed: 30 MPH  
 Option: Rural Community

Minor Street: 32nd Avenue  
 Lanes Moving Traffic: 1  
 Right Turn Volume Included: 0% WB

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

70% Satisfied Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	420 (336)	1142	1072	1002	932	862	792	722	652
Highest Apprch. Minor Street	105 (84)	291	273	255	237	220	202	184	166

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

70% Satisfied Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	630 (504)	1142	1072	1002	932	862	792	722	652
Highest Apprch. Minor Street	53 (42)	291	273	255	237	220	202	184	166

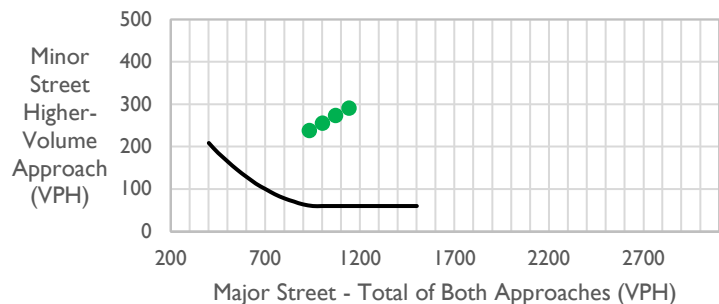
**WARRANT 1, Condition A and Condition B**

56% Satisfied Yes

**WARRANT 2, Four Hour Volume**

70% Satisfied Yes

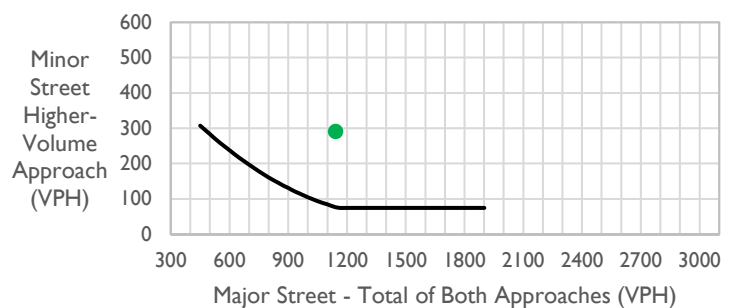
	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1142	291
2nd Highest	1072	273
3rd Highest	1002	255
4th Highest	932	237



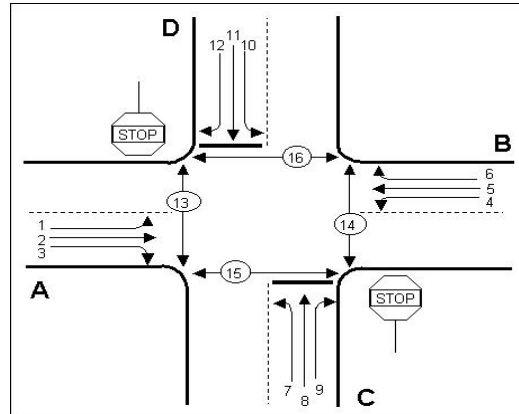
**WARRANT 3, Peak Hour Volume**

70% Satisfied Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1142	291



**Figure 2 - 11. Minor-road right-turn volume reduction for warrant check.**  
**Quail Run Rd & 32nd Avenue**  
**2040\_No Build**



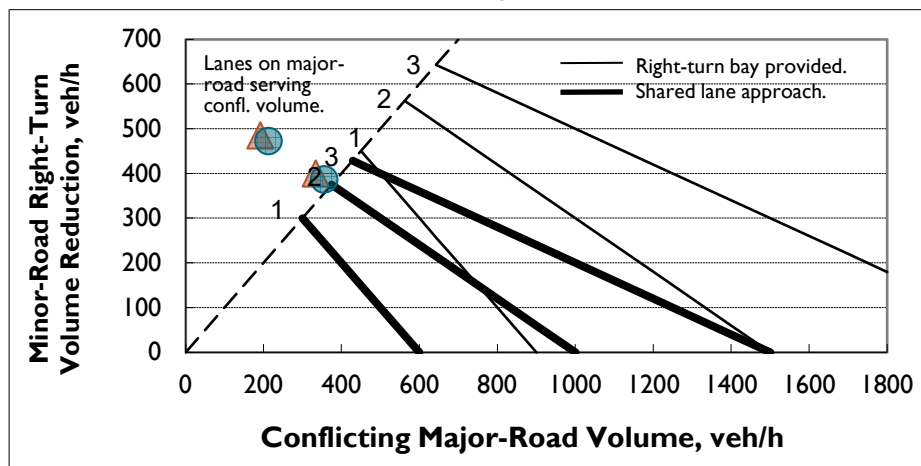
**INPUT**

Number of lanes on major-road approach:			2	
Right-turn geometry on minor-road:			Shared-lane approach	
Approach	Number	Movement	Volume (veh/hr)	
			AM	PM
Major A	2	Through	405	356
	3	Right	261	69
Major B	5	Through	382	710
	6	Right	0	0
Minor C	7	Left	62	267
	8	Through	0	0
	9	Right	6	24
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):	333	213
Conflicting major-road volume (Vc12):	191	355
Right-turn volume reduction (Vr9):	400	473
Right-turn volume reduction (Vr12):	485	387
Adjusted right-turn volume reduction (Vr9):	6	24
Adjusted right-turn volume reduction (Vr12):	0	0
Adjusted minor-road volume:	62	267

Chart Legend:



Source: NCHRP Report 457

**MUTCD Volume-based Warrant Evaluation**  
**Cavanaugh Road & 48th Avenue**  
**LT\_Build**



Major Street: 48th Avenue  
 Lanes Moving Traffic: 1  
 Approach Speed: 30 MPH  
 Option: Rural Community

Minor Street: Cavanaugh Road  
 Lanes Moving Traffic: 2 or more  
 Right Turn Volume Included: 50% NB

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

70% Satisfied Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	350 (280)	1220	1145	1070	996	921	846	771	697
Highest Apprch. Minor Street	140 (112)	293	275	257	239	221	203	185	167

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

70% Satisfied Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	525 (420)	1220	1145	1070	996	921	846	771	697
Highest Apprch. Minor Street	70 (56)	293	275	257	239	221	203	185	167

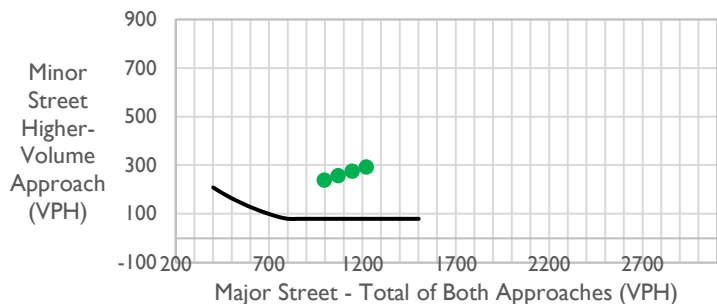
**WARRANT 1, Condition A and Condition B**

56% Satisfied Yes

**WARRANT 2, Four Hour Volume**

70% Satisfied Yes

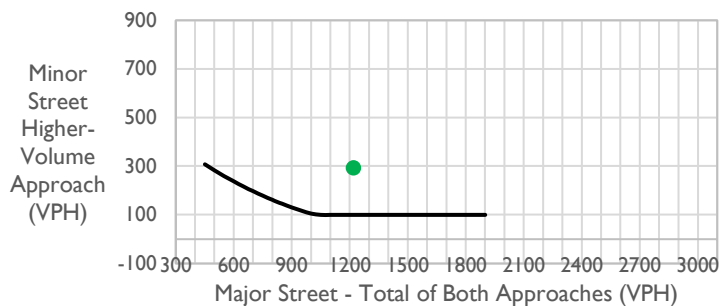
	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1220	293
2nd Highest	1145	275
3rd Highest	1070	257
4th Highest	996	239



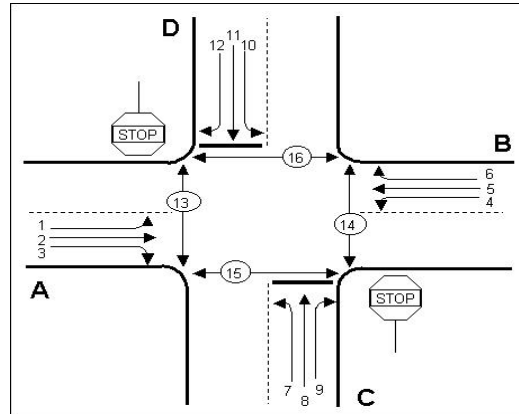
**WARRANT 3, Peak Hour Volume**

70% Satisfied Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1220	293



**Figure 2 - 11. Minor-road right-turn volume reduction for warrant check.**  
**Cavanaugh Road & 48th Avenue**  
**LT\_Build**



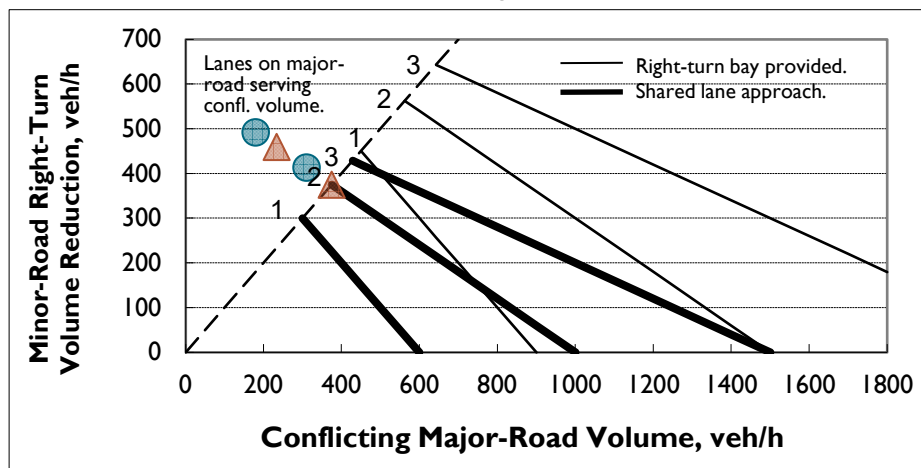
**INPUT**

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**  
**Cavanaugh Road & 32nd Avenue**  
**LT\_Build**



Major Street: 32nd Avenue  
 Lanes Moving Traffic: 1  
 Approach Speed: 30 MPH  
 Option: Rural Community

Minor Street: Cavanaugh Road  
 Lanes Moving Traffic: 2 or more  
 Right Turn Volume Included: 50% SB

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

70% Satisfied Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	350 (280)	634	595	556	517	479	440	401	362
Highest Apprch. Minor Street	140 (112)	289	271	254	236	218	200	183	165

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

70% Satisfied No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	525 (420)	634	595	556	517	479	440	401	362
Highest Apprch. Minor Street	70 (56)	289	271	254	236	218	200	183	165

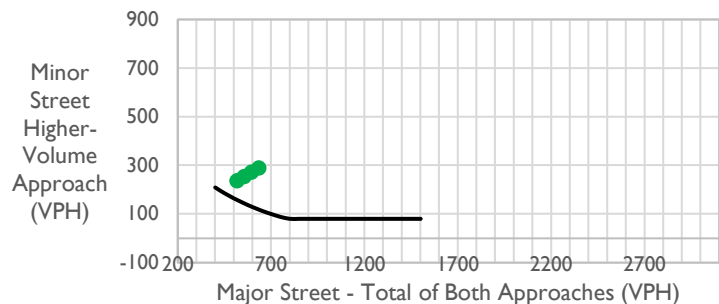
**WARRANT 1, Condition A and Condition B**

56% Satisfied No

**WARRANT 2, Four Hour Volume**

70% Satisfied Yes

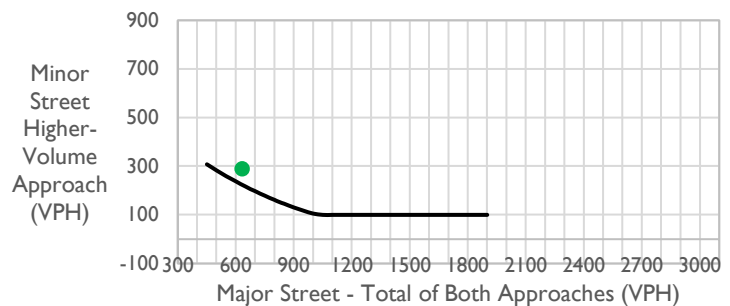
	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	634	289
2nd Highest	595	271
3rd Highest	556	254
4th Highest	517	236



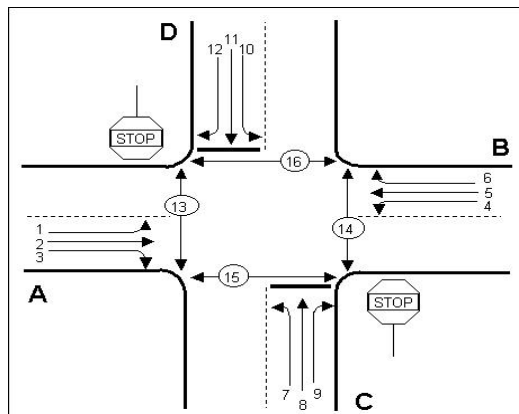
**WARRANT 3, Peak Hour Volume**

70% Satisfied Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	634	289



**Figure 2 - 11. Minor-road right-turn volume reduction for warrant check.**  
**Cavanaugh Road & 32nd Avenue**  
**LT\_Build**



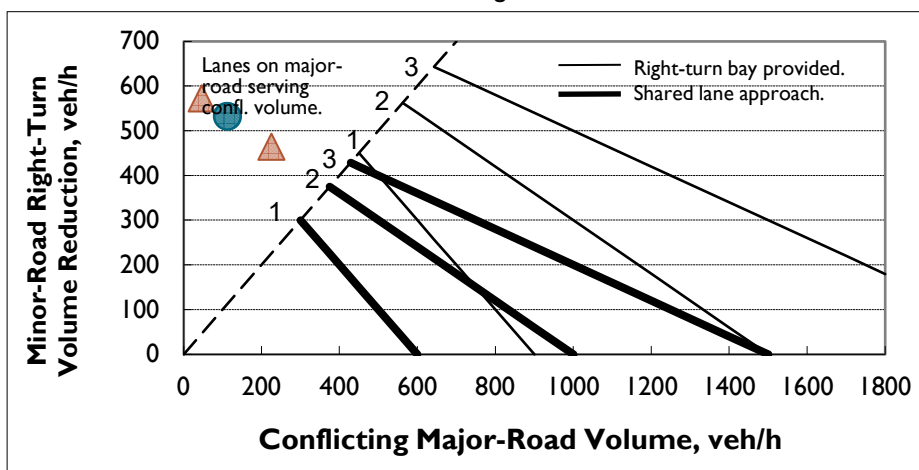
**INPUT**

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	91	223
	3	Right	0	0
Major B	5	Through	219	86
	6	Right	231	141
Minor C	7	Left	0	0
	8	Through	0	0
	9	Right	0	0
Minor D	10	Left	145	237
	11	Through	0	0
	12	Right	75	103

**OUTPUT**

Variable	Volume (veh/hr)	
	AM	PM
Conflicting major-road volume (Vc9):	46	112
Conflicting major-road volume (Vc12):	225	114
Right-turn volume reduction (Vr9):	573	533
Right-turn volume reduction (Vr12):	465	532
Adjusted right-turn volume reduction (Vr9):	0	0
Adjusted right-turn volume reduction (Vr12):	75	103
Adjusted minor-road volume:	145	237

Chart Legend:



Source: NCHRP Report 457

**MUTCD Volume-based Warrant Evaluation**  
**Quail Run Drive & 48th Avenue**  
**LT\_Build**



Major Street: 48th Avenue  
 Lanes Moving Traffic: 1  
 Approach Speed: 30 MPH  
 Option: Rural Community

Minor Street: Quail Run Drive  
 Lanes Moving Traffic: 2 or more  
 Right Turn Volume Included: 50% SB, 50% NB

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

70% Satisfied Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	350 (280)	1500	1408	1316	1224	1132	1040	948	857
Highest Apprch. Minor Street	140 (112)	382	359	335	312	288	265	242	218

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

70% Satisfied Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	525 (420)	1500	1408	1316	1224	1132	1040	948	857
Highest Apprch. Minor Street	70 (56)	382	359	335	312	288	265	242	218

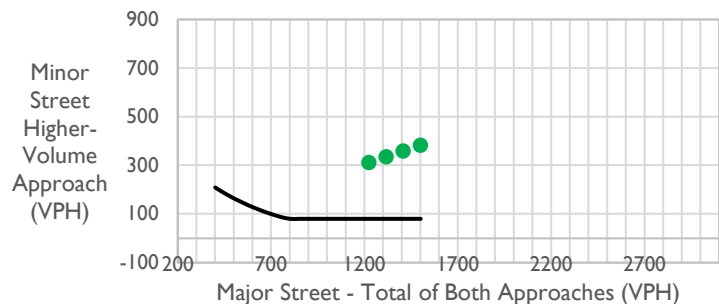
**WARRANT 1, Condition A and Condition B**

56% Satisfied Yes

**WARRANT 2, Four Hour Volume**

70% Satisfied Yes

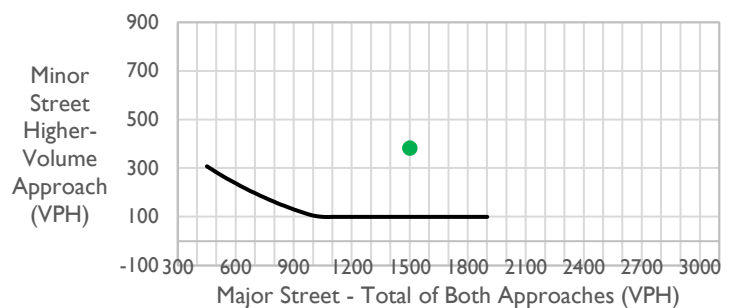
	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1500	382
2nd Highest	1408	359
3rd Highest	1316	335
4th Highest	1224	312



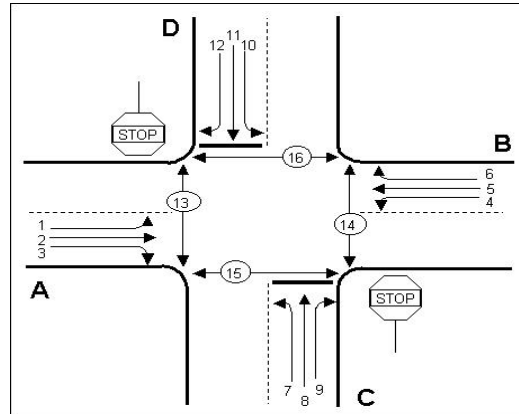
**WARRANT 3, Peak Hour Volume**

70% Satisfied Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1500	382



**Figure 2 - 11. Minor-road right-turn volume reduction for warrant check.**  
**Quail Run Drive & 48th Avenue**  
**LT\_Build**



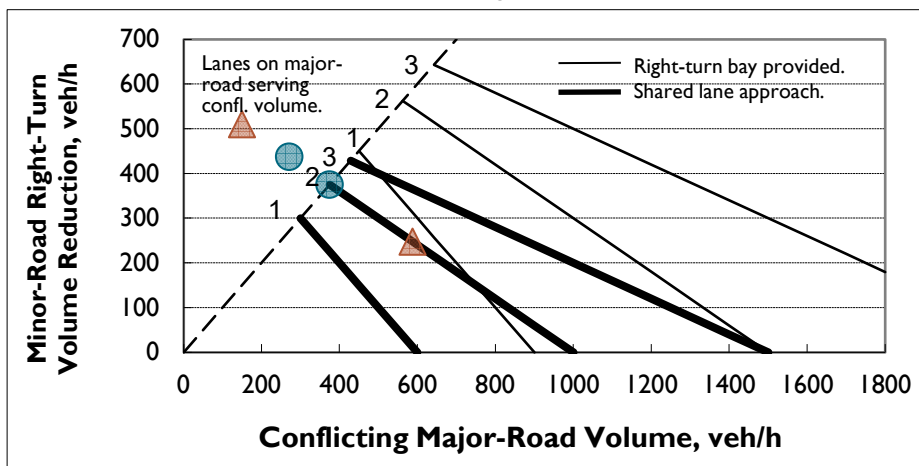
**INPUT**

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	814	414
	3	Right	360	127
Major B	5	Through	297	748
	6	Right	1	0
Minor C	7	Left	165	377
	8	Through	0	0
	9	Right	16	10
Minor D	10	Left	1	1
	11	Through	0	0
	12	Right	11	21

**OUTPUT**

Variable	Volume (veh/hr)	
	AM	PM
Conflicting major-road volume (Vc9):	587	271
Conflicting major-road volume (Vc12):	149	374
Right-turn volume reduction (Vr9):	248	438
Right-turn volume reduction (Vr12):	511	376
Adjusted right-turn volume reduction (Vr9):	16	10
Adjusted right-turn volume reduction (Vr12):	11	21
Adjusted minor-road volume:	165	377

Chart Legend:



Source: NCHRP Report 457

**MUTCD Volume-based Warrant Evaluation**  
**Quail Run Drive & 32nd Avenue**  
**LT\_Build**



Major Street: 32nd Avenue  
 Lanes Moving Traffic: 1  
 Approach Speed: 30 MPH  
 Option: Rural Community

Minor Street: Quail Run Drive  
 Lanes Moving Traffic: 2 or more  
 Right Turn Volume Included: 50% SB

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

70% Satisfied No

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	350 (280)	1104	1036	969	901	833	766	698	630
Highest Apprch. Minor Street	140 (112)	136	128	119	111	103	94	86	78

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

70% Satisfied Yes

	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	525 (420)	1104	1036	969	901	833	766	698	630
Highest Apprch. Minor Street	70 (56)	136	128	119	111	103	94	86	78

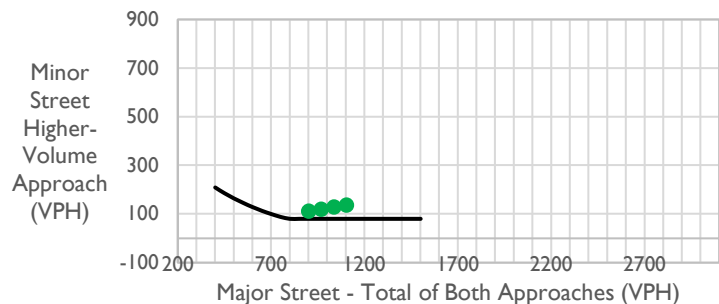
**WARRANT 1, Condition A and Condition B**

56% Satisfied No

**WARRANT 2, Four Hour Volume**

70% Satisfied Yes

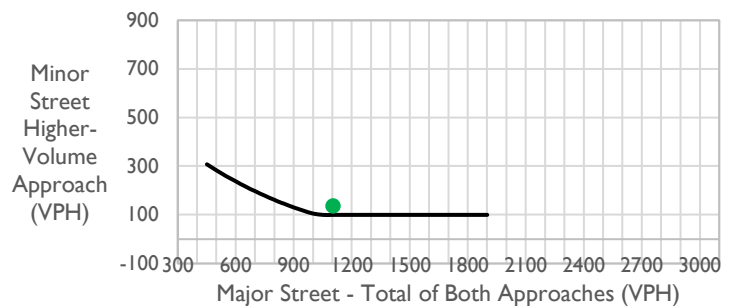
	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1104	136
2nd Highest	1036	128
3rd Highest	969	119
4th Highest	901	111



**WARRANT 3, Peak Hour Volume**

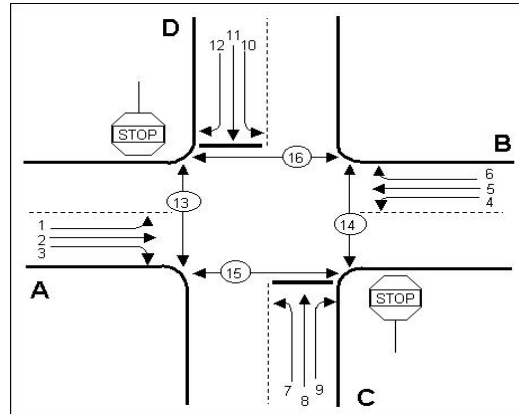
70% Satisfied Yes

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
Peak Hour	1104	136



**Figure 2 - 11. Minor-road right-turn volume reduction for warrant check.**  
**Quail Run Drive & 32nd Avenue**

LT\_Build



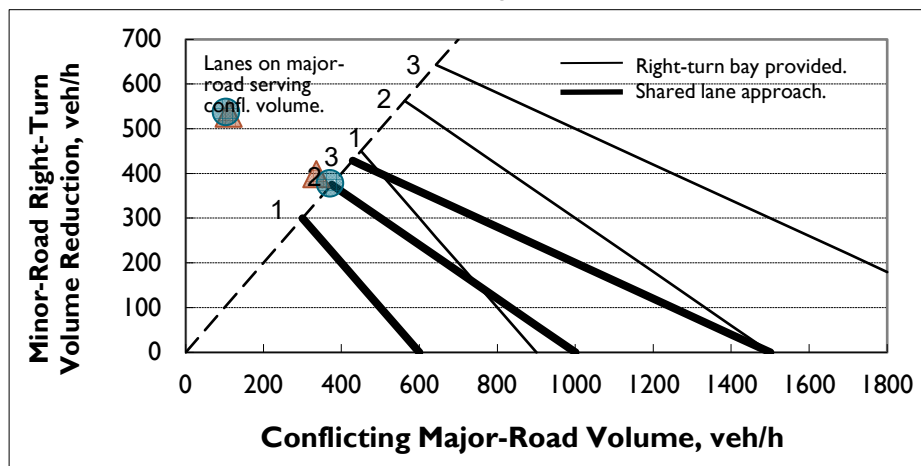
**INPUT**

Number of lanes on major-road approach:			2	
Right-turn geometry on minor-road:			Shared-lane approach	
Approach	Number	Movement	Volume (veh/hr)	
			AM	PM
Major A	2	Through	669	206
	3	Right	0	0
Major B	5	Through	190	687
	6	Right	30	53
Minor C	7	Left	0	0
	8	Through	0	0
	9	Right	0	0
Minor D	10	Left	56	28
	11	Through	0	0
	12	Right	99	216

**OUTPUT**

Variable	Volume (veh/hr)	
	AM	PM
Conflicting major-road volume (Vc9):	335	103
Conflicting major-road volume (Vc12):	110	370
Right-turn volume reduction (Vr9):	399	538
Right-turn volume reduction (Vr12):	534	378
Adjusted right-turn volume reduction (Vr9):	0	0
Adjusted right-turn volume reduction (Vr12):	99	216
Adjusted minor-road volume:	56	28

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 (400)	225 (450)
		EBT	N/A	N/A	N/A	41 (22)	41 (24)
		EBR	N/A	51 (178)	134 (213)	215 (410)	198 (296)
		WBL	0 (0)	N/A	N/A	50 (175)	50 (175)
		WBT	N/A	N/A	N/A	21 (62)	24 (65)
		WBR	N/A	N/A	N/A	0 (0)	0 (0)
		NBL	0 (0)	350 (550)	425 (650)	325 (775)	375 (#813)
		NBT	N/A	30 (78)	21 (42)	33 (80)	44 (128)
		NBR	N/A	N/A	N/A	0 (5)	1 (16)
		SBL	0 (0)	N/A	N/A	25 (25)	25 (25)
2	48th Avenue & Imboden Road	EBL	0 (0)	25 (25)	25 (25)	25 (25)	25 (25)
		EBTR	N/A	26 (24)	27 (27)	27 (29)	27 (30)
		WBL	0 (25)	25 (25)	84 (135)	50 (66)	77 (185)
		WBTR	N/A	51 (97)	55 (96)	58 (118)	30 (211)
		WBR	N/A	26 (175)	41 (273)	56 (336)	64 (473)
		NBL	0 (0)	25 (25)	25 (25)	25 (25)	25 (25)
		NBT	N/A	164 (117)	235 (165)	234 (298)	232 (362)
		NBTR	N/A	N/A	56 (23)	0 (0)	77 (55)
		SBL	25 (0)	350 (125)	500 (175)	475 (250)	546 (350)
		SBT	N/A	75 (225)	124 (300)	172 (275)	125 (375)
3	32nd Avenue & Quail Run Road	EBL	N/A	N/A	N/A	25 (50)	25 (50)
		EBT	N/A	N/A	N/A	0 (61)	23 (11)
		EBR	N/A	N/A	N/A	N/A	0 (0)
		WBL	N/A	125 (375)	225 (575)	175 (725)	225 (1175)
		WBT	N/A	15 (21)	30 (33)	14 (0)	7 (14)
		WBR	N/A	N/A	N/A	N/A	17 (36)
		NBL	N/A	N/A	N/A	65 (30)	50 (37)
		NBT	N/A	84 (129)	225 (208)	278 (317)	311 (414)
		NBR	N/A	10 (5)	14 (7)	35 (13)	922 (21)
		SBL	N/A	25 (25)	38 (54)	200 (25)	25 (75)
4	48th Avenue & Cavanaugh Road	EBL	N/A	N/A	N/A	0 (0)	0 (0)
		EBT	N/A	N/A	N/A	N/A	64 (22)
		EBR	N/A	N/A	N/A	N/A	0 (0)
		WBL	N/A	0 (0)	0 (0)	0 (0)	25 (25)
		WBT	N/A	N/A	N/A	N/A	231 (278)
		NBL	N/A	25 (75)	25 (125)	25 (100)	52 (220)
		EBL	N/A	N/A	0 (0)	N/A	0 (0)
		EBTR	N/A	N/A	25 (25)	N/A	25 (25)
		WBL	N/A	0 (25)	0 (0)	0 (25)	0 (0)
		WBTR	N/A	N/A	25 (25)	N/A	25 (25)
5	42nd Avenue & Cavanaugh Road	EBL	N/A	N/A	0 (0)	N/A	0 (0)
		EBTR	N/A	N/A	25 (25)	N/A	25 (25)
		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)
		SBR	N/A	25 (25)	25 (25)	25 (25)	25 (25)
		EBL	N/A	0 (0)	0 (0)	0 (0)	0 (0)
6	32nd Avenue & Cavanaugh Road	EBL	N/A	0 (0)	0 (0)	0 (0)	0 (0)
		EBR	N/A	25 (25)	25 (50)	25 (25)	25 (50)
		NBL	N/A	25 (25)	50 (25)	25 (25)	50 (25)
		EBL	N/A	0 (0)	0 (0)	0 (0)	0 (0)
		EBR	N/A	25 (25)	25 (50)	25 (25)	25 (50)
		NBL	N/A	25 (25)	50 (25)	25 (25)	50 (25)
		EBL	N/A	0 (0)	0 (0)	0 (0)	0 (0)
		EBR	N/A	25 (25)	25 (50)	25 (25)	25 (50)
		NBL	N/A	25 (25)	50 (25)	25 (25)	50 (25)
		EBL	N/A	0 (0)	0 (0)	0 (0)	0 (0)
7	Manila Road & 42nd Avenue	EBL	N/A	0 (0)	0 (0)	0 (0)	0 (0)
		EBR	N/A	25 (25)	25 (50)	25 (25)	25 (50)
		NBL	N/A	25 (25)	50 (25)	25 (25)	50 (25)
		EBL	N/A	N/A	25 (0)	N/A	2 (14)
		EBT	N/A	N/A	N/A	N/A	251 (188)
		EBR	N/A	N/A	N/A	N/A	16 (m19)
		WBL	N/A	N/A	0 (0)	0 (0)	25 (25)
		WBT	N/A	N/A	N/A	N/A	44 (185)
		NBL	N/A	N/A	75 (125)	25 (50)	m105 (256)
		NBTR	N/A	N/A	25 (0)	0 (0)	m0 (0)
8	48th Avenue & Quail Run Drive	SBLTR	N/A	N/A	25 (25)	N/A	m0 (0)
		EBL	N/A	N/A	25 (25)	25 (25)	m25 (25)
		SBL	N/A	N/A	25 (50)	50 (25)	125 (50)
		SBR	N/A	N/A	N/A	25 (50)	25 (175)
		EBL	N/A	N/A	0 (0)	N/A	0 (25)
		SBL	N/A	N/A	0 (0)	N/A	0 (0)
		WBL	N/A	N/A	25 (25)	N/A	25 (25)
		SBL	N/A	N/A	0 (0)	N/A	25 (0)
		WBL	N/A	N/A	25 (25)	N/A	25 (25)
		NBLTR	N/A	N/A	25 (25)	N/A	25 (25)
9	PA-2 Access & Imboden	SBLTR	N/A	N/A	25 (25)	N/A	25 (25)
		EBL	N/A	N/A	25 (0)	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)
		EBL	N/A	N/A	25 (0)	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)
		SBLTR	N/A	N/A	25 (25)	N/A	25 (25)
		EBL	N/A	N/A	25 (25)	N/A	25 (25)
		SBLR	N/A	N/A	25 (25)	N/A	25 (25)
10	PA-5 Access & Imboden	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)
		SBLTR	N/A	N/A	25 (25)	N/A	25 (25)
		EBL	N/A	N/A	25 (0)	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)
		SBLTR	N/A	N/A	25 (25)	N/A	25 (25)
		EBL	N/A	N/A	25 (25)	N/A	25 (25)
		SBLR	N/A	N/A	25 (25)	N/A	25 (25)
11	PA-3 Western 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	25 (25)
		SBLTR	N/A	N/A	25 (25)	N/A	25 (25)
		EBL	N/A	N/A	25 (0)	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)
		SBLTR	N/A	N/A	25 (25)	N/A	25 (25)
		EBL	N/A	N/A	25 (25)	N/A	25 (25)
		SBLR	N/A	N/A	25 (25)	N/A	25 (25)
12		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)
		SBLTR	N/A	N/A	25 (25)	N/A	25 (25)
		EBL	N/A	N/A	25 (0)	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)
		SBLTR	N/A	N/A	25 (25)	N/A	25 (25)
		EBL	N/A	N/A	25 (25)	N/A	25 (25)
		SBLR	N/A	N/A	25 (25)	N/A	25 (25)
13		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)
		SBLTR	N/A	N/A	25 (25)	N/A	25 (25)
		EBL	N/A	N/A	25 (0)	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)
		SBLTR	N/A	N/A	25 (25)	N/A	25 (25)
		EBL	N/A	N/A	25 (25)	N/A	25 (25)
		SBLR	N/A	N/A	25 (25)	N/A	25 (25)



14	PA-3 Eastern Access & 48th Avenue	EBL	N/A	N/A	25 (0)	N/A	25 (0)
		SBLR	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	25 (25)	N/A	25 (25)
		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)