

TRANSPORTATION IMPACT STUDY

Port Colorado PA 13 in Aurora, Colorado

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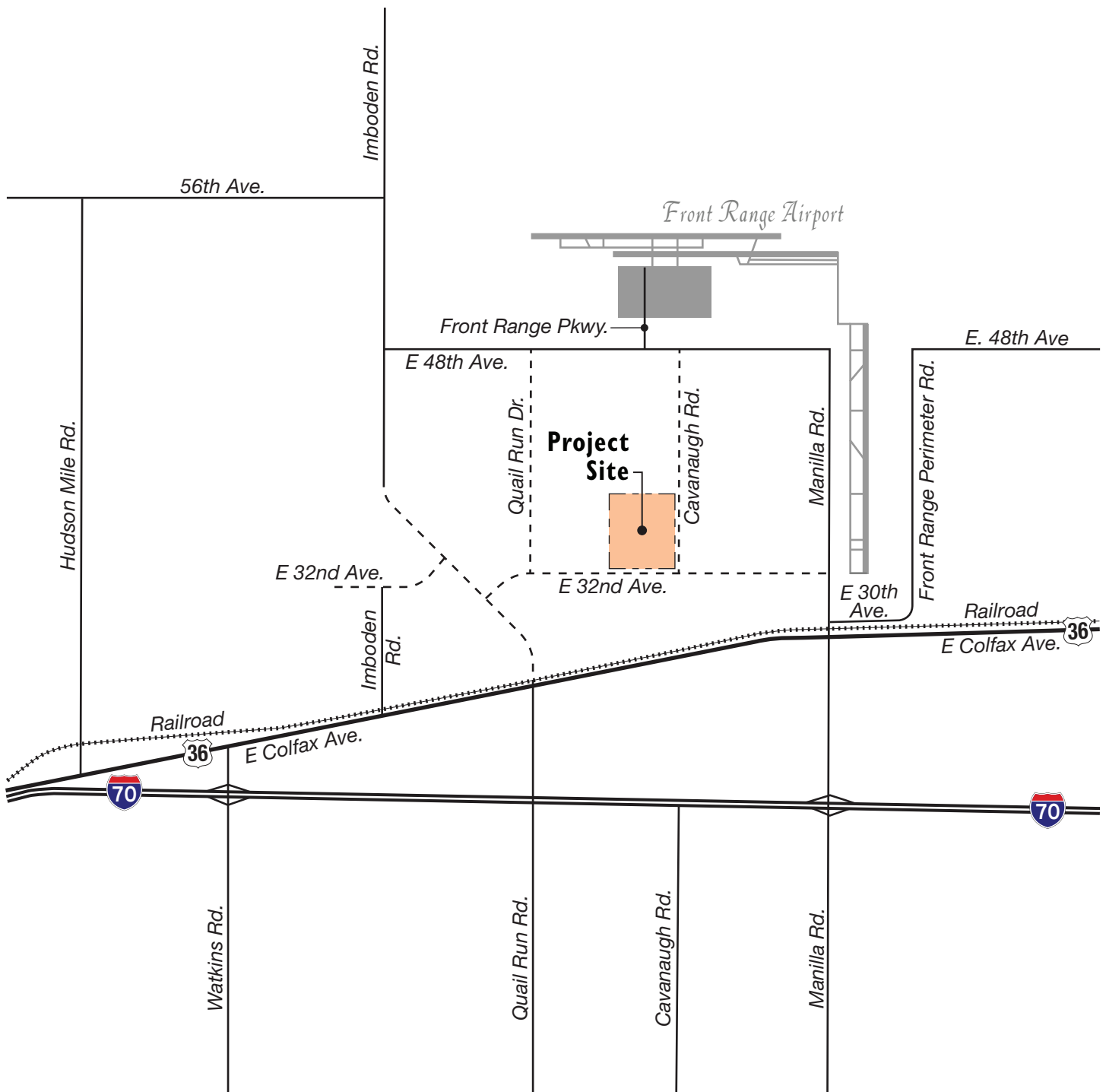
I. INTRODUCTION

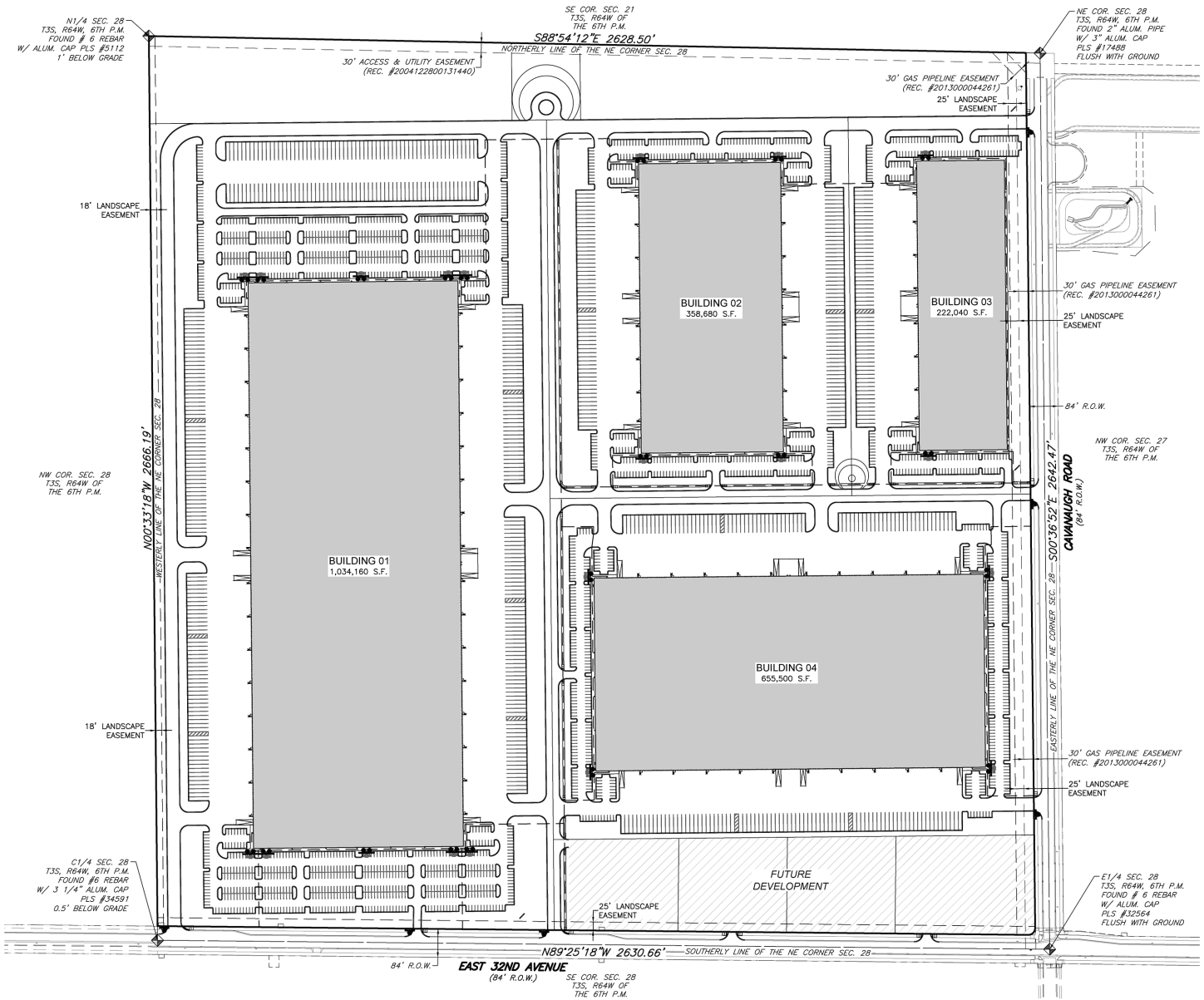
Velocity Development is proposing to develop an approximately 155-acre site within the Port Colorado Master Plan area, previously the Transport development area. The PA 13 site is located in the northwest quadrant of the future intersection of 32nd Avenue and Cavanaugh Road in Aurora, Colorado. **Figure 1** illustrates the location of the site and the adjacent primary roadway network (existing and future planned roadways).

The proposed industrial development would consist of approximately 2.2 million square feet of distribution center buildings and approximately 32,000 square feet of amenity space. Primary access to the site will be provided onto 32nd Avenue along the south side of the site and Cavanaugh Street east of the site. **Figure 2** depicts the current site plan depicting building locations and site access points.

The purpose of this Transportation Impact Study (TIS) is to estimate the potential impacts specific to the proposed development and to identify any resultant required roadway and/or intersection improvements and traffic control needs. A short-term scenario representing completion of the site in year 2026 was analyzed. Similarly, a long-term future scenario was explored to examine traffic impacts within the context of the buildout of the site, sometime beyond year 2040. An existing conditions analysis has been omitted as Manilla Road is the only study area roadway that currently exists, and no study area intersections currently exist. An existing conditions analysis for the surrounding area was conducted in the FDP Study in 2020.

This study builds on the *Transport Colorado Master Plan Traffic Impact Study Analysis*, April 2020, prepared by Felsburg Holt & Ullevig, with updates to anticipated land uses and quantities. This study addresses transportation needs of the 5,378-acre Port Colorado Framework Development Plan (FDP).





II. EXISTING CONDITIONS

II.A. Surrounding Land Use

The area around the Port Colorado FDP is mostly vacant. The Front Range Airport is located to the north and east of the site. Denver International Airport (DEN) is located northwest of the FDP.

II.B. Roadway System

Very few roadways exist in proximity to the site. One notable roadway, Manilla Road, runs north-south and defines part of the overall FDP's eastern boundary. Manilla Road has a posted speed of 45 miles per hour (mph) near the site. Additional widening is planned to establish a four-lane roadway between 48th Avenue and the interchange at I-70. Timing of the improvement is highly dependent on development within Port Colorado. The master TIS identified the need for this improvement once approximately 700 acres of the site are developed which is estimated to occur in a 10 to 15 year timeline.

I-70 exists south of the site, but site access to I-70 is approximately two and a half miles away to the southeast at the Manilla Road interchange. I-70 has a posted speed of 75 mph adjacent to the study area.

Colfax Avenue (US-36) also exists approximately one and a half miles away to the south. Colfax Avenue has a posted speed of 55 mph near the site.

II.C. Traffic Volumes

Past data collected for the master study along Manilla Road in September 2018 indicates that approximately 350 vehicles per day (VPD) travel Manilla Road near the site today. Due to the lack of additional development in the area, new data was not collected as it was believed that traffic in the vicinity of the site would not have experienced significant changes over the course of the last three years.

III. PROPOSED CONDITIONS

III.A. Future Road Network

In 2018, the City of Aurora completed the NEATS Refresh study, which provides Year 2040 and regional buildout transportation recommendations for the roadways and a multimodal transportation system. The NEATS Refresh study area encompassed a regional area extending from approximately between Tower Road east to Schumaker Road, and from Jewell Avenue on the south to 72nd Avenue on the north. Recommendations with respect to Port Colorado included:

- Constructing a new interchange with I-70 at Quail Run Road. The I 601 process to permit the new interchange has recently been initiated by the Port Colorado Team. It is anticipated that the construction of an interchange will occur in a 5 to 10-year timeline.
- Constructing a diagonal connection between Imboden Road and Quail Run as a four-lane arterial as defined by NEATS. The Port Colorado FDP TIS identified the need for this segment to have an ultimate 6-lane cross-section. Construction of this diagonal connection will likely coincide with the Quail Run Road interchange project.

In the short term, 32nd will only have emergency access connectivity to the west. In the long term, 32nd Avenue will provide the main points of access for the site and will ultimately continue as a three-lane collector between Quail Run Drive and Manilla Road. 32nd Avenue is currently being constructed east to west beginning at Manilla Road with the initial phase terminating at Quail Run Drive, approximately a half mile beyond the site's western boundary. Cavanaugh Road will also be constructed as a three-lane collector between 32nd and 48th Avenues with the initial phase being built immediately adjacent to the site.

III.B. Site Trip Generation

The current proposed industrial development will consist of approximately 2.2 million square feet of distribution center buildings and approximately 32,000 square feet of amenity space. The FDP master plan traffic study had contemplated approximately 1 million square feet of light industrial space for PA-13. Trip generation estimates were developed using weekday data contained in *Trip Generation*, 10th Edition, Institute of Transportation Engineers (ITE), 2017. The Port Colorado FDP Traffic Impact Study has estimated a generation of approximately 3,900 trips per day. **Table 1** shows the trip generation for the proposed development, which is estimated to generate 3,444 trips per day when built out, equating to roughly 12 percent less trip generation as compared to estimates made in the Port Colorado FDP Traffic Impact Study.

Table 1. Trip Generation Summary

Land Use	Intensity	ITE Code	Daily Trips	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
High-Cube Transload and Short-Term Storage Warehouse	2,237 KSF	154	3,132	138	41	179	63	161	224
General Office	32 KSF	710	312	32	5	37	6	31	37
Grand Total			3,444	170	46	216	69	192	261

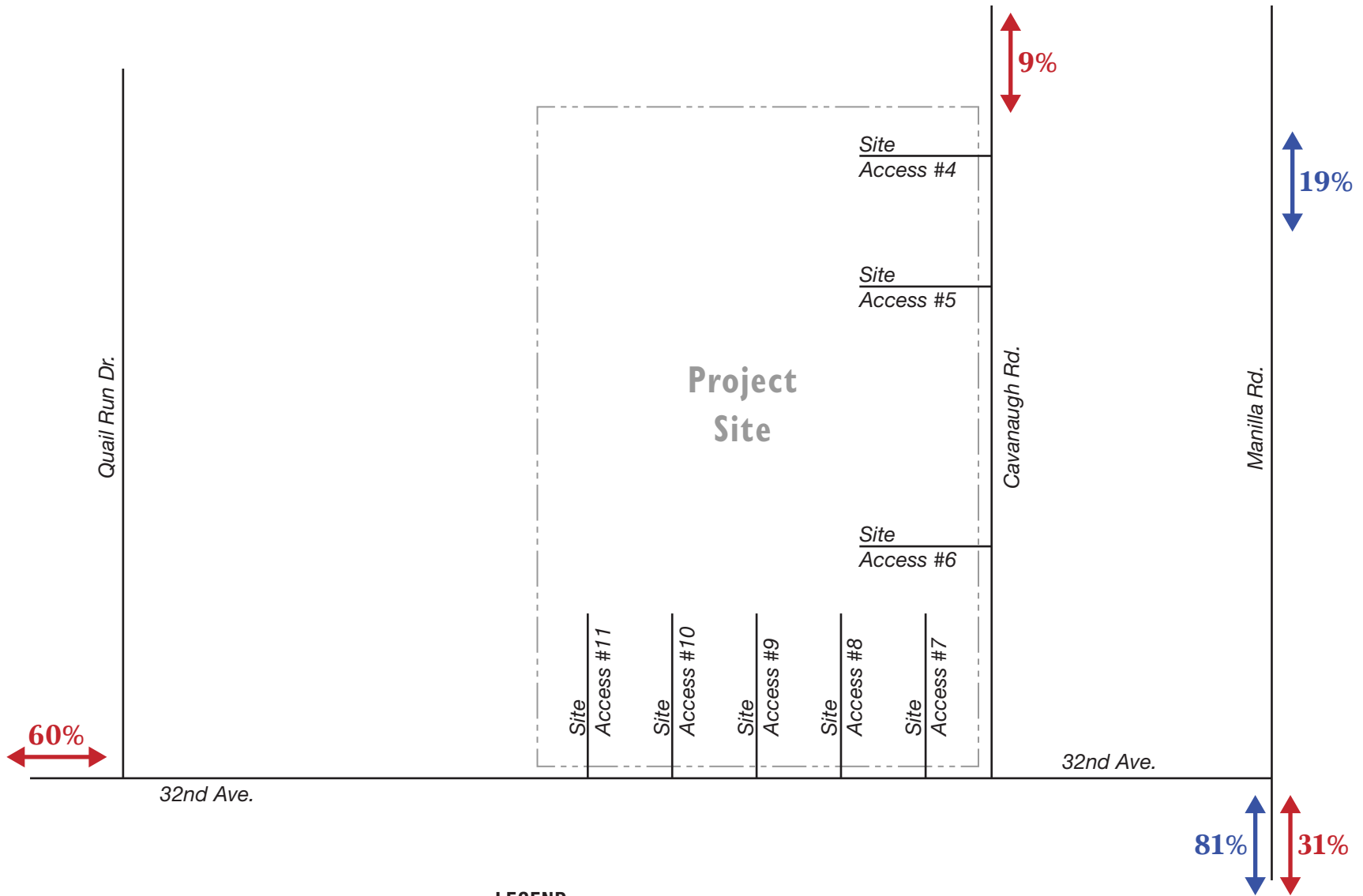
III.C. Trip Distribution and Traffic Assignment

Trip distribution estimates for this site were based on those used in the FDP master plan traffic study. The greatest component of site traffic will be toward Quail Run Drive, which will afford regional connectivity as the area's roadway network builds out including to the proposed interchange with I-70.

Figure 3 shows the site-trip distribution percentages for the short and long term scenarios. **Figure 4** shows the trip assignment for the short-term scenario in which all traffic will access the site via Manilla Road. From the traffic assignment shown on **Figure 4**, 32nd Avenue would be impacted the greatest; PA 13's buildout would add all 3,450 VPD onto 32nd Avenue in the short-term planning horizon east of the site.

Figure 5 shows the trip assignment resulting from applying the percentages for site traffic in the long-term scenario. This scenario includes the continuation of 32nd Avenue to the west and Cavanaugh Road to the north. 32nd Avenue will continue to be impacted the most by the development, which is projected to add approximately 2,100 VPD west of the site.

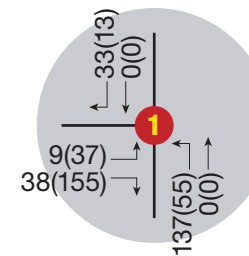
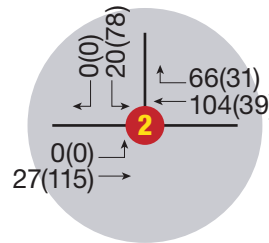
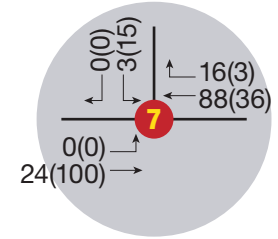
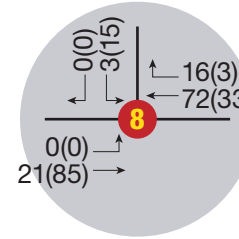
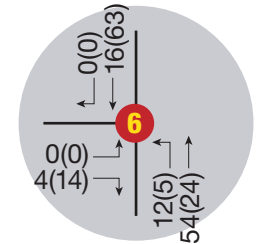
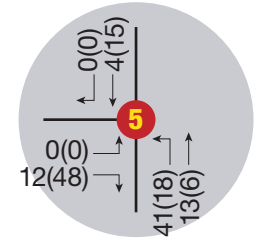
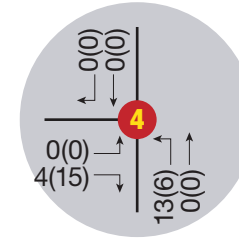
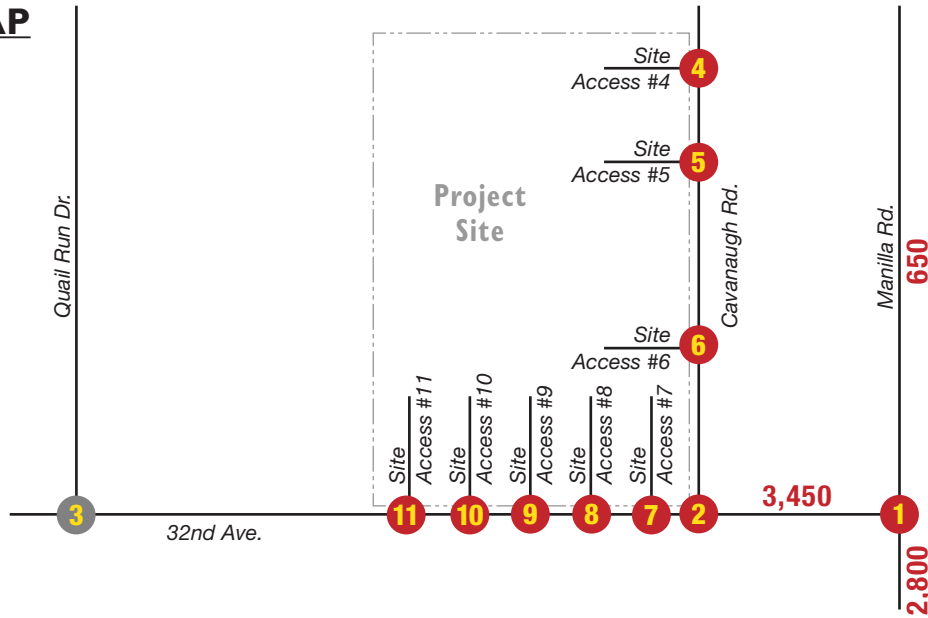
Relatively minor traffic amounts will be oriented to the north reflecting completion of the area's roadway system by buildout of the NEATS study area. Similar to the short-term planning horizon, 32nd Avenue would be most impacted by PA 13 trips. However, the impact is reduced compared to the short-term since additional options will be available to serve site traffic, namely the completion of Cavanaugh Road to the north to 48th Avenue and the interchange of Quail Run Road with I-70 to the southwest.



LEGEND

- ↔ **XX%** = Short Term Site Trip Distribution
- ↔ **XX%** = Long Term Site Trip Distribution

KEY MAP



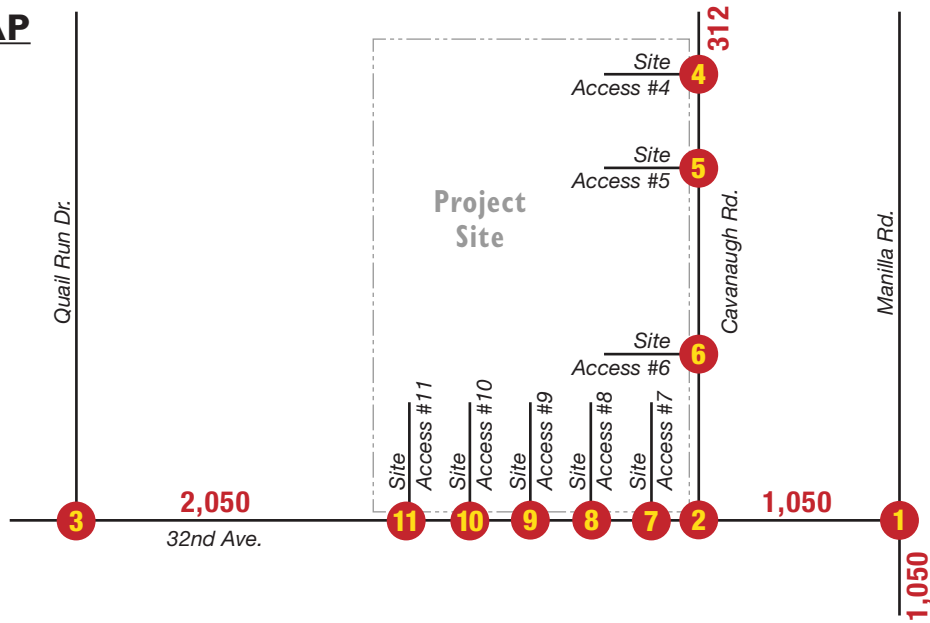
LEGEND

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

XXXX = Daily Traffic Volumes

X = Future Intersection

KEY MAP



LEGEND

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

XXXX = Daily Traffic Volumes

NOTE: Drawing Not to Scale

IV. FUTURE CONDITIONS

IV.A. Short-Term Future Background

Roadway System

There will be relatively little other development in the area, so the roadway network will be limited. The expected roadways will include 32nd Avenue (between Quail Run Drive and Manilla Road), Cavanaugh Road (adjacent to the site only), and Manilla Road.

Traffic Volumes

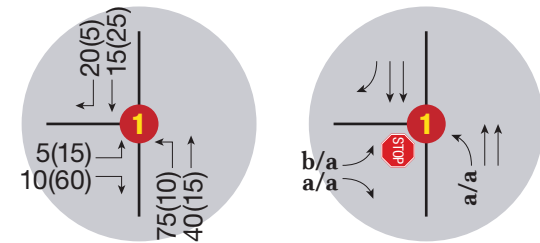
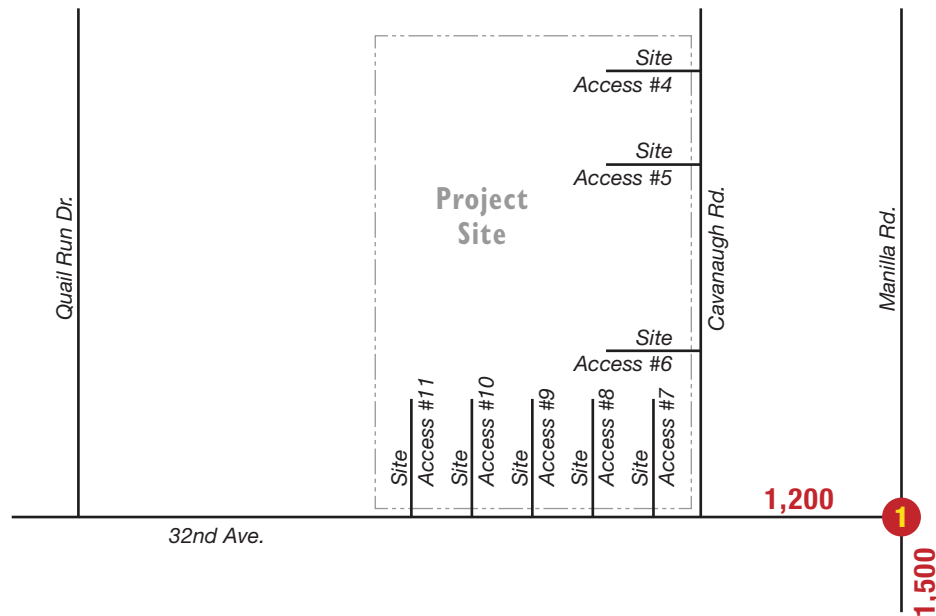
Background traffic is the component of roadway volumes that would use the adjacent roadway system regardless of site development. Components of the short-term background traffic include the development of the transload facility serving the Port Colorado and Precision Building Systems which were explored as part of the Port Colorado ISP traffic study. **Figure 6** shows the projected short-term background traffic demands.

Traffic Control and Operations

The level of service (LOS) results and intersection laneage are included on **Figure 9**. Calculations used techniques documented in the *Highway Capacity Manual* (Transportation Research Board, 2016) using anticipated traffic volumes and intersection geometry. LOS is a qualitative measure of traffic operational conditions, based on roadway capacity and vehicle delay. Levels of service are described by a letter designation ranging from A to F, with LOS A representing almost free-flow travel, while LOS F represents congested conditions. For signalized intersections, LOS is calculated for the entire intersection while LOS for unsignalized intersections is calculated for movements that must yield ROW to other traffic movements.

The intersection of Manilla Road with 32nd Avenue has been assessed as a stop-controlled intersection for the short term background scenario. Results show that the intersection would function at a LOS B or better for all movements. **Appendix B** contains the LOS Worksheets.

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

IV.B. Long-Term Future Background

Roadway System

Long-Term analysis for this report assumes full regional buildout. The full roadway network surrounding the site is planned to be built out, including Quail Run Drive to the west and Cavanaugh Road will extend to 48th Avenue to the north.

Traffic Volumes

The long-term background traffic has been estimated using traffic volume projections from the *Transport Colorado Master Plan Traffic Impact Study* (assuming Port Colorado is built out) and the NEATS buildout scenario. Volumes from the two studies were combined and then trips associated with the PA 13 area, as represented in the *Transport Colorado Master Plan Traffic Study*, were removed.

Figure 7 shows the projected long-term background traffic demands along the study area roadways and intersections. Manilla Road will serve the greatest amount of long-term traffic at 22,000 VPD south of 32nd Avenue. Traffic loadings along 32nd Avenue are projected to reach 7,600 VPD west of Cavanaugh Road immediately adjacent to the site.

Traffic Control and Operations

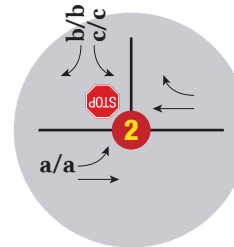
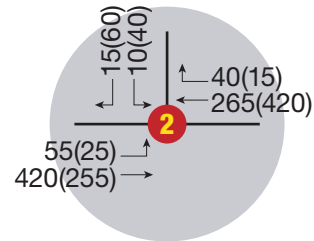
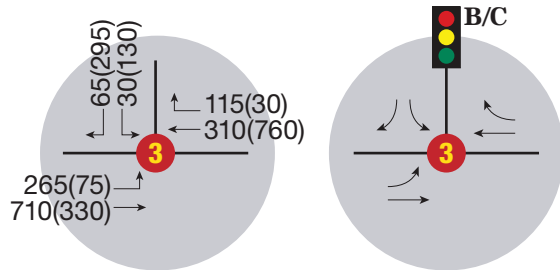
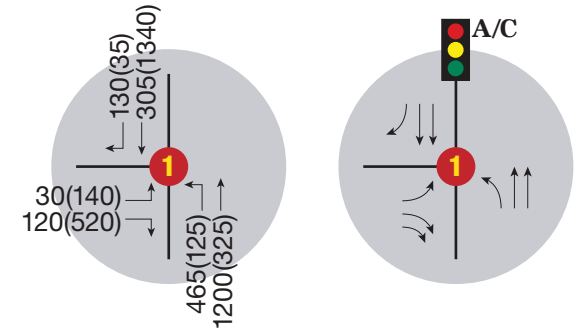
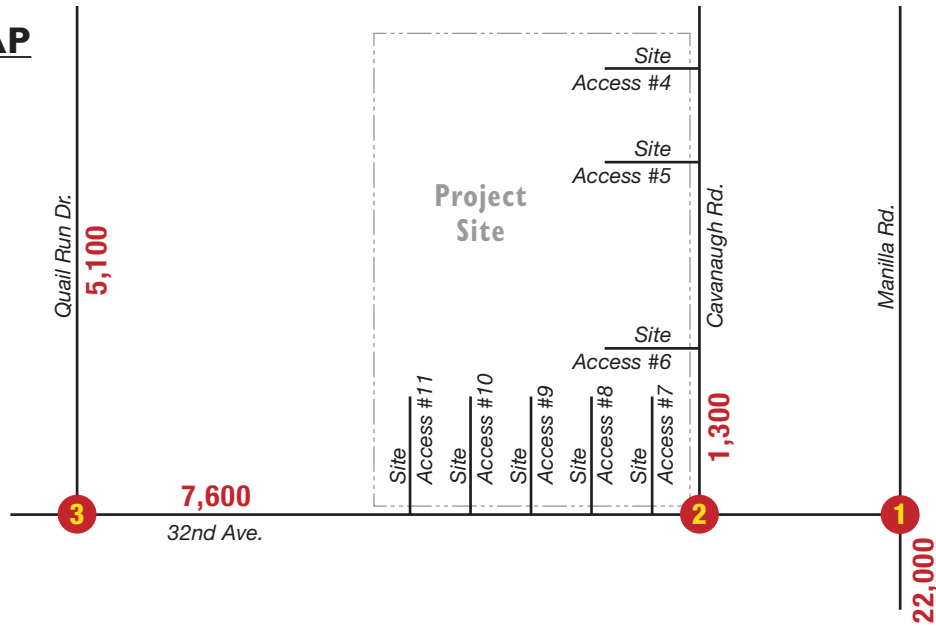
Intersection capacity analyses were conducted using the long-term background peak hour volumes as illustrated on **Figure 7**. Warrant 1 (Eight Hour Vehicular Volume), Warrant 2 (Four Hour Vehicular Volume), and Warrant 3 (Peak Hour Volume) from the MUTCD have been applied here in assessing the appropriateness for signalization at study area intersections. A factor of 57 percent has been used and applied to the peak hour traffic as a means of estimating the 8th highest hour. The 2nd through 7th highest hours were determined through linear interpolation of the peak hour and 8th highest hour traffic, which were then assessed with respect to traffic signal warrants 1 and 2. The procedure outlined above provides a reasonable set of data in which to assess future signalization potential. Signalization is forecasted to be warranted at 32nd Avenue with Manilla Road and Quail Run Drive by NEATS buildout. Signal Warrant Analyses are shown in **Appendix A**.

Primary recommendations for the long-term time frame include:

- Installing traffic signals, once warranted, at 32nd Avenue/Manilla Road and 32nd Avenue/Quail Run Drive.
- Constructing dual right turn lanes on the eastbound approach at the intersection of 32nd Avenue with Manilla Road.

Figure 7 shows that the two signalized intersections will all operate at LOS C or better. The 32nd Avenue/Manilla Road intersection will require dual right turn lanes on the eastbound approach. The stop-sign controlled intersection is anticipated to operate acceptably at LOS C or better. Worksheets are presented in **Appendix B**.

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

IV.C. Short-Term Future Total Traffic Conditions

Roadway System

Very few roadways exist within Port Colorado at this time. In the short term, 32nd Avenue will be built out to Manilla Road to the east and Cavanaugh will extend north of 32nd Avenue. Additional roadways providing access to the site are also planned for the short term.

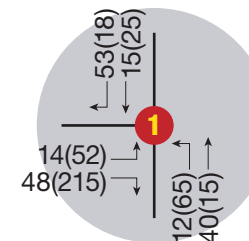
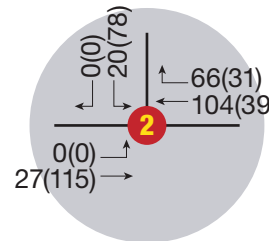
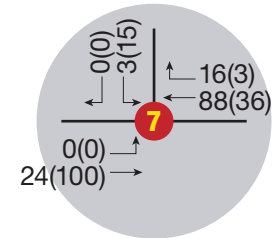
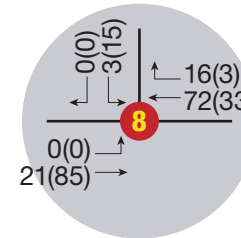
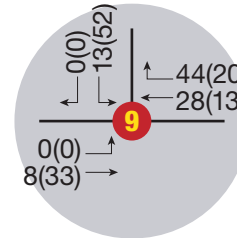
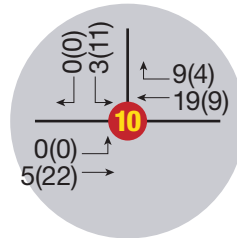
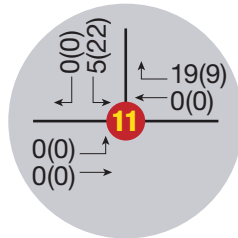
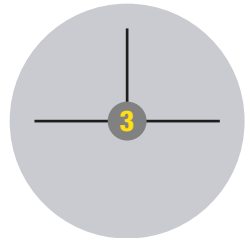
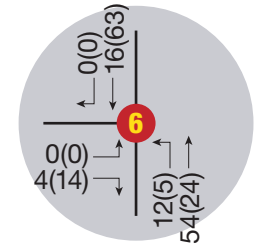
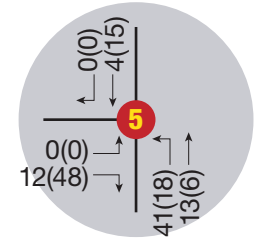
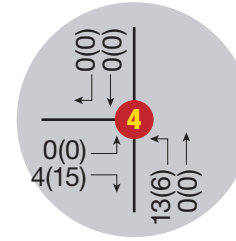
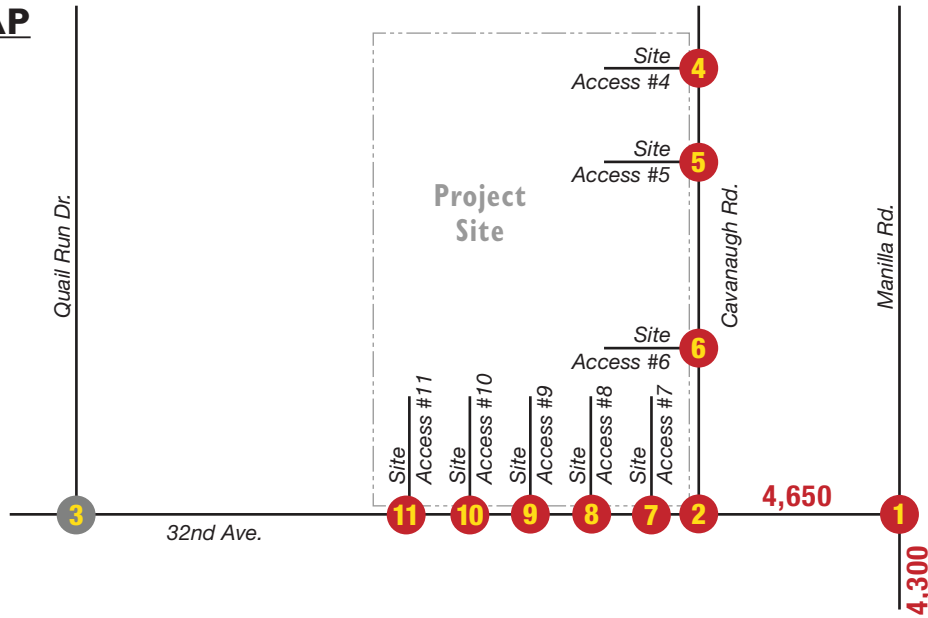
Traffic Volumes

The short-term total traffic has been estimated using the site generated traffic in combination with background traffic extracted from other nearby traffic impact studies. **Figure 8** shows the forecasted volumes of the projected short-term total traffic demands along the study area roadways and intersections. By 2026, Manilla south of 32nd Avenue is anticipated to carry 4,300 VPD, and 32nd Avenue is projected to serve a total of 4,650 VPD.

Traffic Control and Operations

The level of service (LOS) results and intersection laneage are included on **Figure 9**. As illustrated all intersections are anticipated to operate acceptably at LOS B or better assuming the addition of left and right turn lane at all site accesses on 32nd Avenue and left turn lanes at site accesses on Cavanaugh Road. It should be noted that right turn lanes along 32nd Avenue are not anticipated to be warranted due to lack of following volume, however they are being provided in anticipation of possible development to the west prior to completion of the Quail Run/I-70 interchange and to provide an added level of safety for heavy vehicles entering the site. **Appendix C** includes the LOS analysis worksheets.

KEY MAP



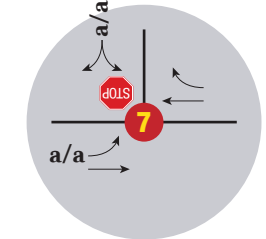
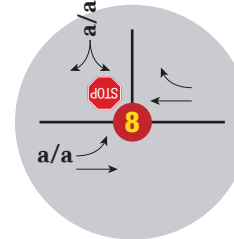
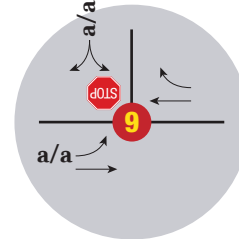
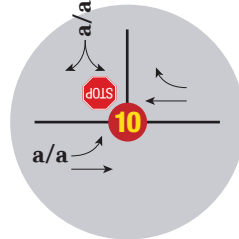
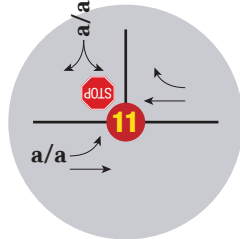
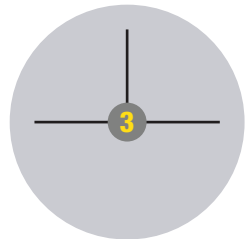
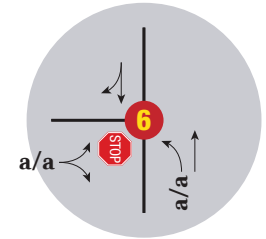
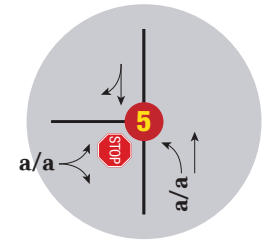
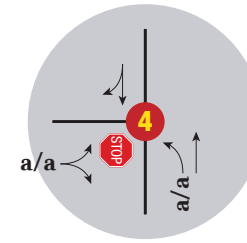
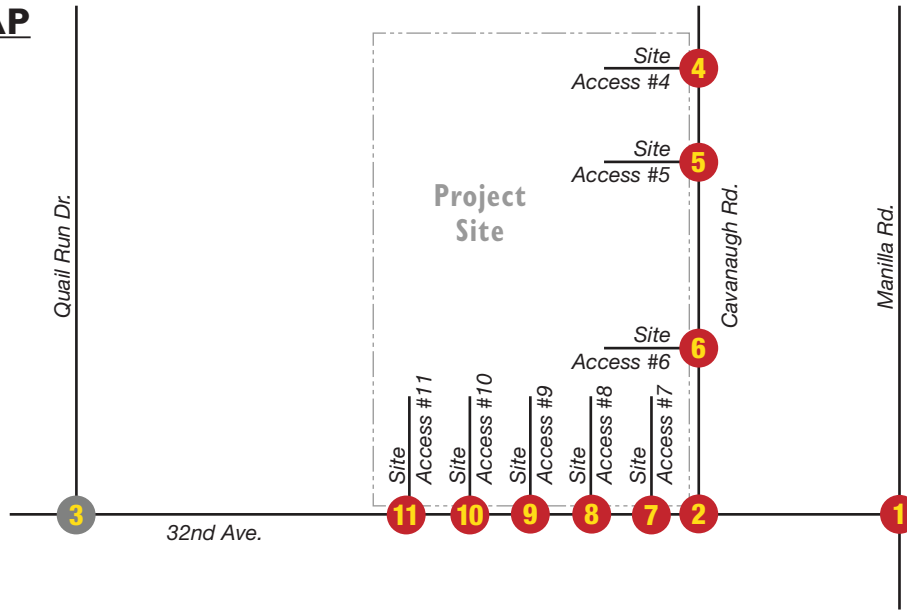
LEGEND

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

XXXXX = Daily Traffic Volumes

X = Future Intersection

KEY MAP

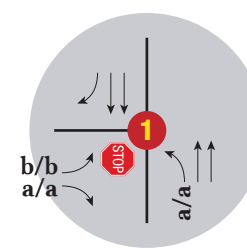
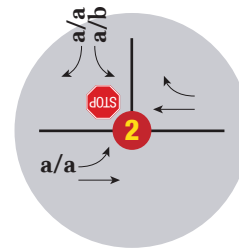


LEGEND

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

= Stop Sign

= Future Intersection



IV.D. Long-Term Future Total Traffic Conditions

Roadway System

The roadway network for the Port Colorado development is assumed to be built out by the full buildout of the NEATS study area sometime beyond the year 2040 for the long-term future scenario. No additional roadways are needed beyond those listed in the long-term background scenario.

Traffic Volumes

The long-term site generated traffic volumes illustrated on **Figure 5** were added to the long-term future background traffic volumes found on **Figure 7** to produce the NEATS buildout total traffic volumes shown on **Figure 10**. Manilla Road is anticipated to carry the greatest amount of total traffic estimated to be 23,000 VPD. 32nd Avenue is anticipated to carry 9,670 VPD east of Quail Run Drive.

Traffic Control and Operations

Intersection capacity analyses were conducted using the long-term total peak hour volumes as illustrated on **Figure 10**. Signalization is forecasted to be warranted at 32nd Avenue with Manilla Road and Quail Run Drive by NEATS buildout. Signal Warrant Analyses are shown in **Appendix A**.

Figure 11 shows that the two signalized intersections will all operate at LOS D or better. The 32nd Avenue/Manilla Road intersection will require dual right turn lanes on the eastbound approach. The stop-sign controlled intersections are all anticipated to operate acceptably at LOS C or better. Worksheets are presented in **Appendix C**.

Primary recommendations for the long-term time frame include:

- Installing traffic signals, once warranted, at 32nd Avenue/Manilla Road and 32nd Avenue/Quail Run Drive.
- Constructing dual right turn lanes on the eastbound approach at the intersection of 32nd Avenue with Manilla Road.
- Adding left and right turn lanes at all site accesses on 32nd Avenue and adding left-turn lanes at all site accesses on Cavanaugh Road.

Output from the traffic analysis effort was utilized to recommend the storage lengths shown in **Table 2**, using the following methodology:

Left-Turn Lane Storage Lengths – At signalized intersections, the greater of the HCM 6th Edition or Synchro methodology queue calculations were reported. For unsignalized intersections, the HCM 6th Edition calculation was reported.

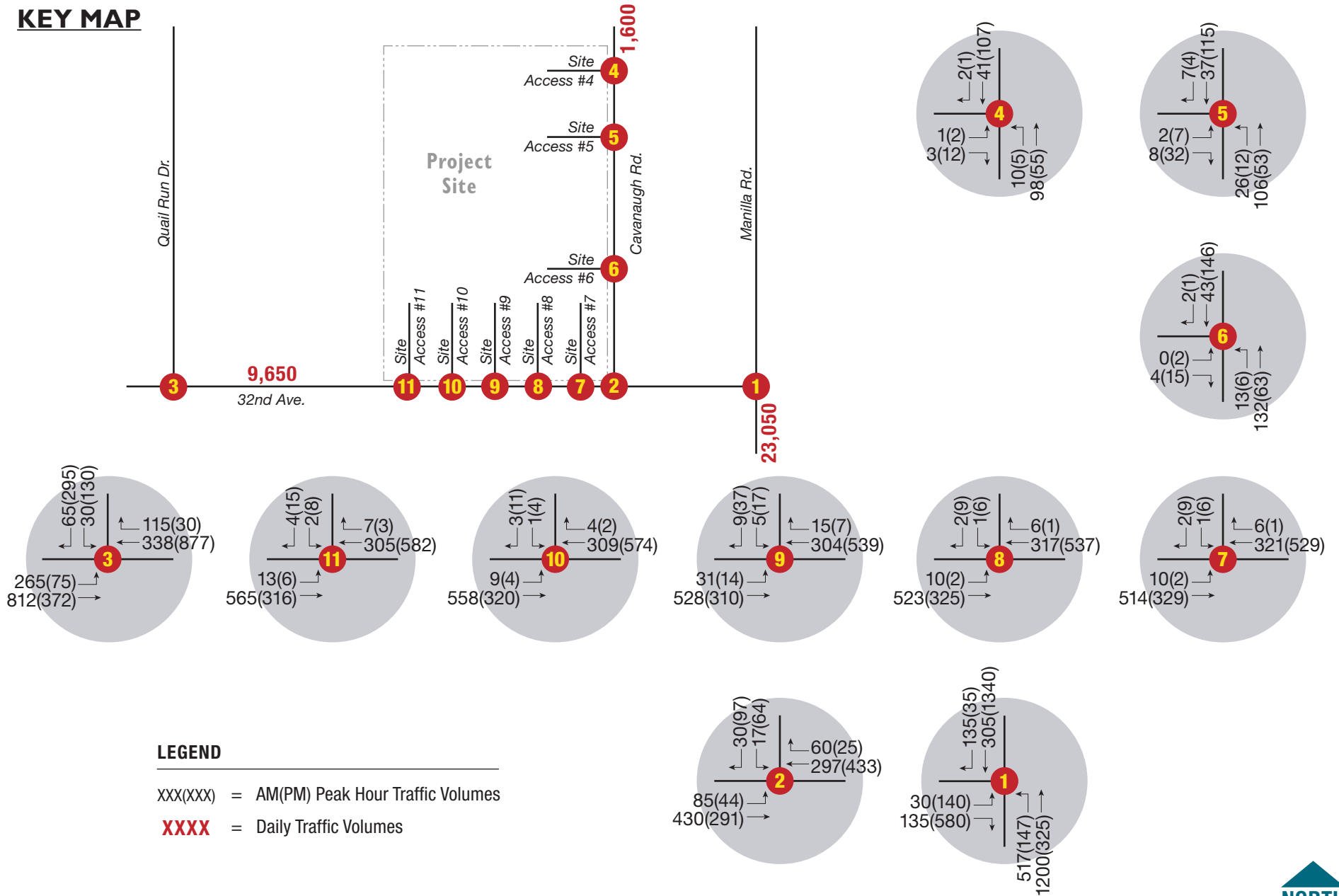
Through Movements – For signalized intersections, synchro calculation results were reported. No through movement queues are reported for unsignalized intersections as through movements are free.

Right-Turn Movements – For signalized intersections, the synchro queue length was used. HCM 6th Edition information was not used because HCM's signalized intersection methodology does not account for right turns on red. For unsignalized intersections, HCM 6th Edition calculation was reported.

Internal Intersection Traffic Control

Most of the internal intersections are in a tee-configuration, and the recommended orientation for all of these entails placing a stop sign along the “stem” of the tee. There is one centrally located intersection of the east-west and north-south central site driveways that includes a driveway to the eastern truck court for Building I, it is recommended that side-street stop-control be utilized at this intersection in the east-west direction.

KEY MAP

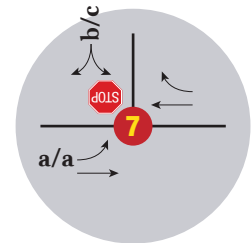
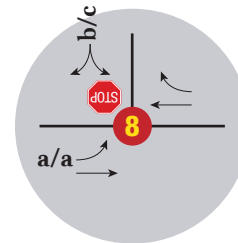
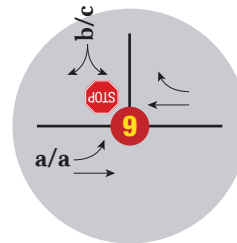
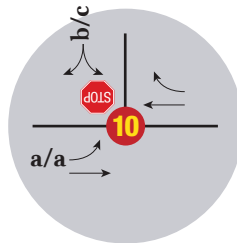
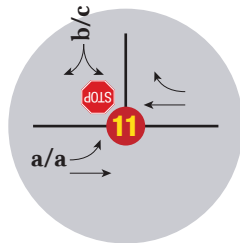
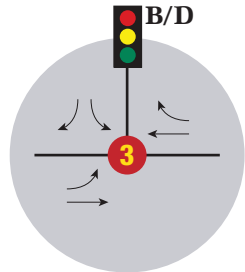
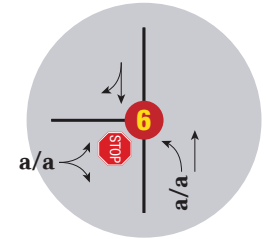
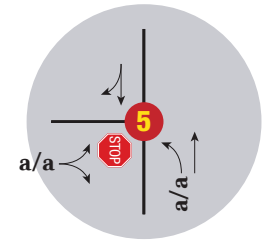
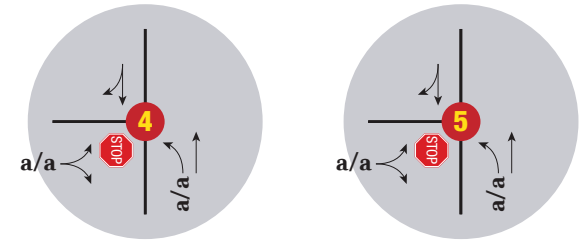
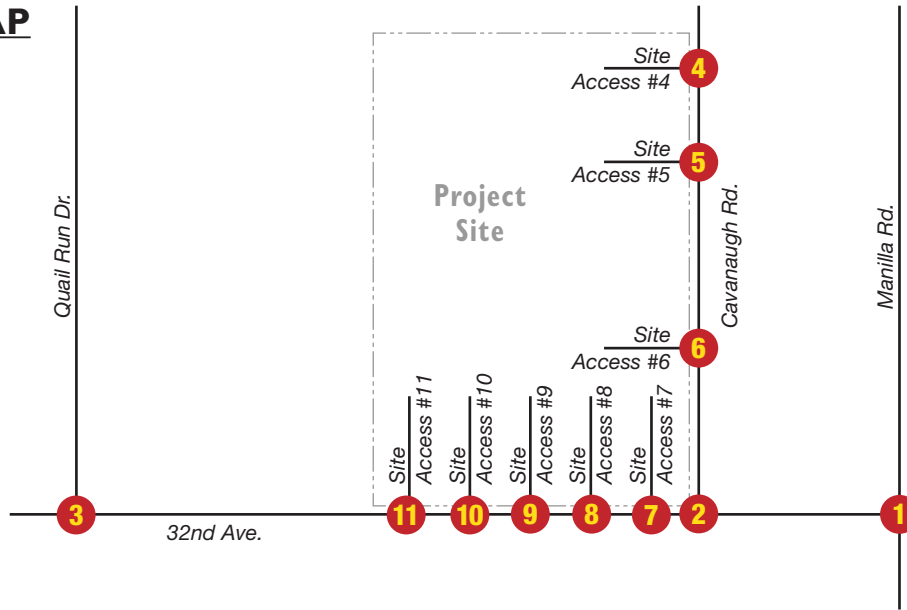


LEGEND

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

XXXX = Daily Traffic Volumes

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

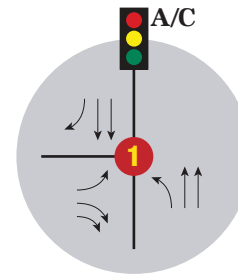
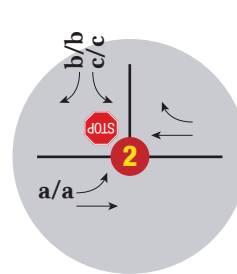


Table 2. Long-Term Future Port Colorado PA 13 Queueing

Intersection	Approach	Movement	95th Percentile Queue Length (ft) ¹		SHAC Recommended Storage Length ²	Recommended Storage Length
			AM	PM		
1. 32 nd Avenue/Manilla Road (Signalized)	Eastbound	Left-Turn	60	175	140	175
		Right-Turn*	30	290	Continuous	Continuous
	Northbound	Left-Turn	130	150	520	150
		Through	150	70	Continuous	Continuous
	Southbound	Through	110	640	Continuous	Continuous
		Right-Turn	30	10	130	50
2. 32 nd Avenue/Cavanaugh Road (Stop-Controlled)	Eastbound	Left-Turn	25	25	90	50
		Through	0	0	Continuous	Continuous
	Westbound	Through	0	0	Continuous	Continuous
		Right-Turn	0	0	60	50
	Southbound	Left-Turn	25	25	60	50
		Right-Turn	25	25	Continuous	Continuous
3. 32 nd Avenue/Quail Run Drive (Signalized)	Eastbound	Left-Turn	100	80	810	100
		Through	450	280	Continuous	Continuous
	Westbound	Through	210	1290	Continuous	Continuous
		Right-Turn	20	10	120	50
	Southbound	Left-Turn	60	175	130	175
		Right-Turn	40	230	Continuous	Continuous
4. Cavanaugh Road/Site Access #4 (Stop-Controlled)	Eastbound	Left-Turn/Right-Turn	0	25	Continuous	Continuous
	Northbound	Left-Turn	0	0	10	50
		Through	0	0	Continuous	Continuous
	Southbound	Through/ Right-Turn	0	0	Continuous	Continuous
5. Cavanaugh Road/Site Access #5 (Stop-Controlled)	Eastbound	Left-Turn/Right-Turn	0	25	Continuous	Continuous
	Northbound	Left	25	0	30	50
		Through	0	0	Continuous	Continuous
	Southbound	Through/Right-Turn	0	0	Continuous	Continuous
6. Cavanaugh Road/Site Access #6 (Stop-Controlled)	Eastbound	Left-Turn/Right-Turn	0	0	Continuous	Continuous
	Westbound	Left-Turn	0	0	10	50
		Through	0	0	Continuous	Continuous
	Southbound	Through/Right-Turn	0	0	Continuous	Continuous
7. 32 nd Avenue/Site Access #7 (Stop-Controlled)	Eastbound	Left-Turn	0	0	10	50
		Through	0	0	Continuous	Continuous
	Westbound	Through	0	0	Continuous	Continuous
		Right-Turn	0	0	10	50
	Southbound	Left-Turn/Right-Turn	0	25	Continuous	Continuous

Intersection	Approach	Movement	95th Percentile Queue Length (ft) ¹		SHAC Recommended Storage Length ²	Recommended Storage Length
			AM	PM		
8. 32 nd Avenue/Site Access #8	Eastbound	Left-Turn	0	0	10	50
		Through	0	0	Continuous	Continuous
	Westbound	Through	0	0	Continuous	Continuous
		Right-Turn	0	0	10	50
	Southbound	Left-Turn/Right-Turn	0	25	Continuous	Continuous
9. 32 nd Avenue/Site Access #9	Eastbound	Left-Turn	25	25	30	50
		Through	0	0	Continuous	Continuous
	Westbound	Through	0	0	Continuous	Continuous
		Right-Turn	0	0	20	50
	Southbound	Left-Turn/Right-Turn	25	25	Continuous	Continuous
10. 32 nd Avenue/Site Access #10	Eastbound	Left-Turn	0	0	10	50
		Through	0	0	Continuous	Continuous
	Westbound	Through	0	0	Continuous	Continuous
		Right-Turn	0	0	0	50
	Southbound	Left-Turn/Right-Turn	0	25	Continuous	Continuous
11. 32 nd Avenue/Site Access #11	Eastbound	Left-Turn	0	0	10	50
		Through	0	0	Continuous	Continuous
	Westbound	Through	0	0	Continuous	Continuous
		Right-Turn	0	0	10	50
	Southbound	Left-Turn/Right-Turn	0	25	Continuous	Continuous

*Dual turn lanes; queues and storage are per lane.

¹ Calculations based on HCM methodology using a heavy vehicle percentage of 20 percent network wide.

² Number shown is based on volume adjustments of 3 PCE per heavy vehicle.

V. SUMMARY AND RECOMMENDATIONS

Velocity Development Company is proposing to develop an approximate 155-acre site within the Port Colorado site. The PA 13 site is located north of the future 32nd Avenue extension and west of Cavanaugh Road. The proposed development would consist of approximately 2.2 million square feet of warehousing as well as two 16,000 square foot amenity buildings.

The proposed development is estimated to generate approximately 3,450 trips per day, with an estimated 216 occurring during the AM peak hour and 261 occurring during the PM peak hour. By comparison to the Port Colorado Master Plan Traffic Impact Study, PA 13 was assumed to generate approximately 3,900 trips per day. The current development proposal represents a 12 percent decrease in daily traffic generation as compared to that analyzed in the 2020 Master Plan Study.

The potential traffic impacts of the development were evaluated under short-term (2026) and long-term future (NEATS buildout) conditions. Given short-term conditions, all of the study area intersections are anticipated to function acceptably. These operations are based on the inclusion of left and right turn lanes at all site accesses on 32nd avenue and left turn lanes at all site accesses on Cavanaugh Road.

For the long-term timeframe, acceptable operations are anticipated given the following enhancements (in addition to the short-term planning horizon):

- Installing traffic signals at intersections along 32nd Avenue at Manilla Road and Quail Run Drive
- Constructing dual right turn lanes on the eastbound approach at the intersection of 32nd Avenue with Manilla Road to support other additional development within Port Colorado

APPENDIX A. SIGNAL WARRANT ANALYSES

MUTCD Volume-based Warrant Evaluation - 2026 Total Conditions w/ 50% RT Reductions
32nd Avenue & Manilla Road

Major Street: Manilla Road
 Minor Street: 32nd Avenue
 Major Street Approach Speed: 45 MPH
 Option: High speed, rural community



WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied No

	Number of lanes moving traffic	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	2 or more	420 (336)	294	276	258	240	222	204	186	168
Highest Apprch. Minor Street	2 or more	140 (112)	38	36	33	31	29	26	24	22

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied No

	Number of lanes moving traffic	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	2 or more	630 (504)	294	276	258	240	222	204	186	168
Highest Apprch. Minor Street	2 or more	70 (56)	38	36	33	31	29	26	24	22

WARRANT 1, Condition A and Condition B

56% Satisfied No

WARRANT 2, Four Hour Volume

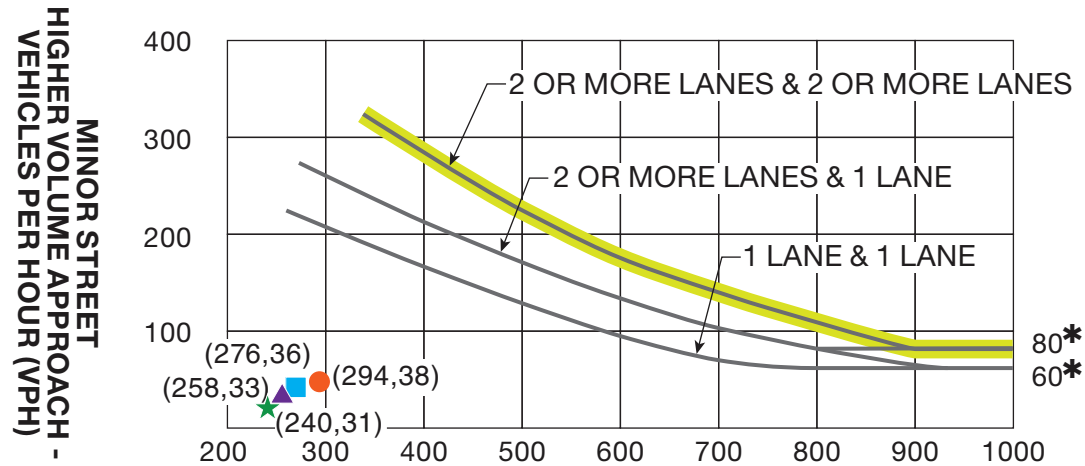
70% Satisfied No

	Number of lanes moving traffic	Peak Hour	2nd Highest	3rd Highest	4th Highest
Both Apprchs. Major Street	2 or more	294	276	258	240
Highest Apprch. Minor Street	2 or more	38	36	33	31

WARRANT 3, Peak Hour Volume

70% Satisfied No

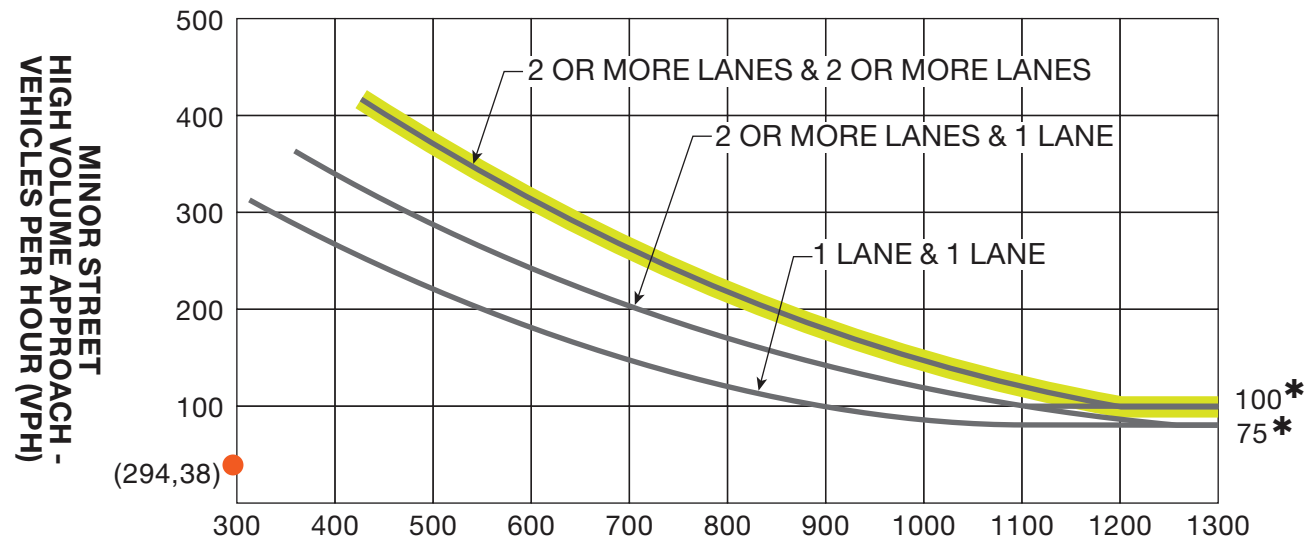
	Number of lanes moving traffic	Peak Hour
Both Apprchs. Major Street	2 or more	294
Highest Apprch. Minor Street	2 or more	38



* Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

LEGEND

- = AM Peak Hour
- = 2nd Highest Hour
- ▲ = 3rd Highest Hour
- ★ = 4th Highest Hour



* Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

LEGEND

● = AM Peak Hour

MUTCD Volume-based Warrant Evaluation - Regional Buildout Background Conditions w/ 50% RT Reductions
32nd Avenue & Manilla Road

Major Street: Manilla Road
 Minor Street: 32nd Avenue
 Major Street Approach Speed: 45 MPH
 Option: High speed, rural community



WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied Yes

	Number of lanes moving traffic	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	2 or more	420 (336)	1808	1697	1586	1476	1365	1254	1143	1032
Highest Apprch. Minor Street	2 or more	140 (112)	400	375	351	326	302	277	253	228

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied Yes

	Number of lanes moving traffic	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	2 or more	630 (504)	1808	1697	1586	1476	1365	1254	1143	1032
Highest Apprch. Minor Street	2 or more	70 (56)	400	375	351	326	302	277	253	228

WARRANT 1, Condition A and Condition B

56% Satisfied Yes

WARRANT 2, Four Hour Volume

70% Satisfied Yes

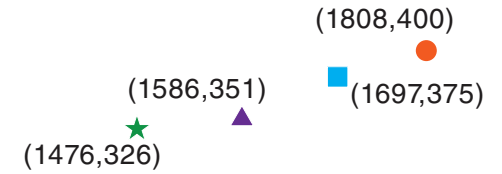
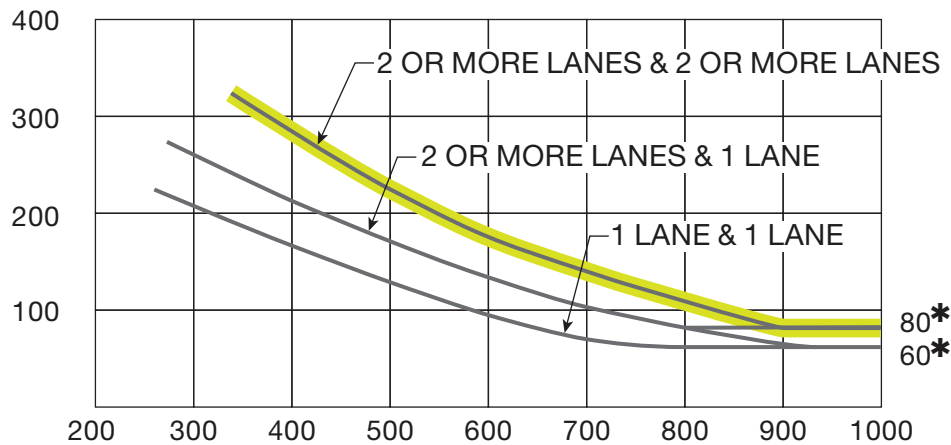
	Number of lanes moving traffic	Peak Hour	2nd Highest	3rd Highest	4th Highest
Both Apprchs. Major Street	2 or more	1808	1697	1586	1476
Highest Apprch. Minor Street	2 or more	400	375	351	326

WARRANT 3, Peak Hour Volume

70% Satisfied Yes

	Number of lanes moving traffic	Peak Hour
Both Apprchs. Major Street	2 or more	1808
Highest Apprch. Minor Street	2 or more	400

MINOR STREET -
HIGHER VOLUME APPROACH -
VEHICLES PER HOUR (VPH)



MAJOR STREET - TOTAL OF BOTH APPROACHES -
VEHICLES PER HOUR (VPH)

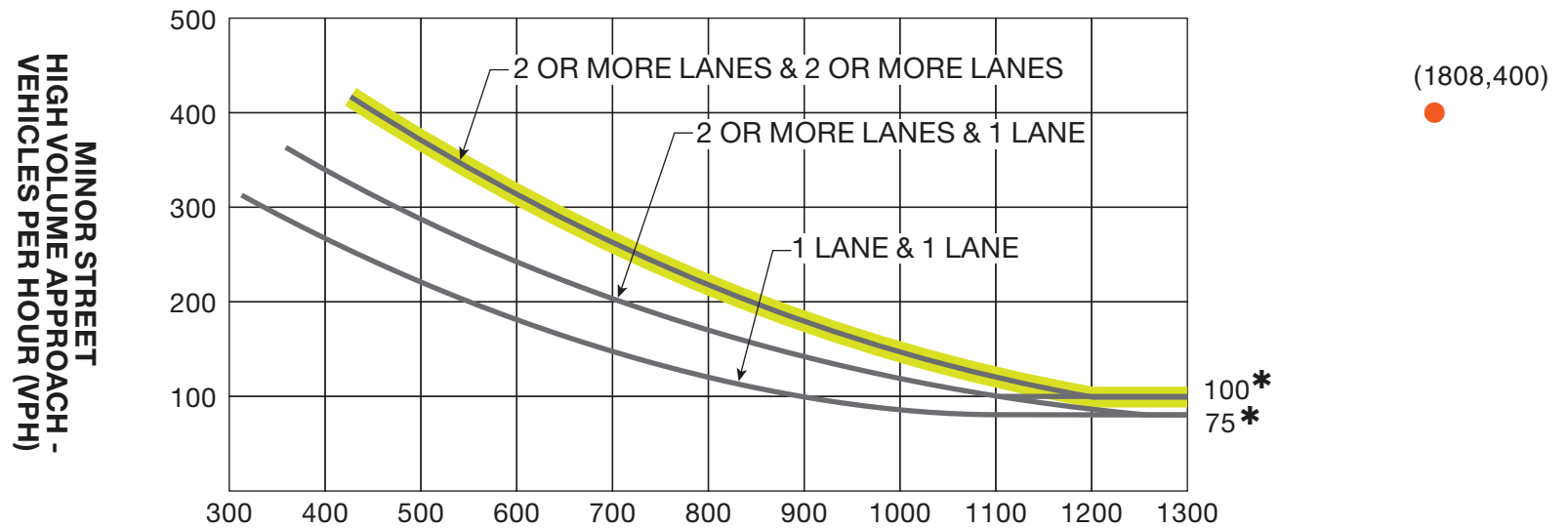
* Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

LEGEND

- = PM Peak Hour
- = 2nd Highest Hour
- ▲ = 3rd Highest Hour
- ★ = 4th Highest Hour

WARRANT 2

32nd Avenue and Manilla Road Regional Buildout Background Conditions
Four-Hour Vehicular Volume Warrant (70% Factor)
(Community Less than 10,000 Population or Above 40 mph On Major Street)



* Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

LEGEND

● = PM Peak Hour

MUTCD Volume-based Warrant Evaluation - Regional Buildout Background Conditions w/ 50% RT Reductions
32nd Avenue & Quail Run Drive

Major Street: 32nd Avenue
 Minor Street: Quail Run Drive
 Major Street Approach Speed: 45 MPH
 Option: High speed, rural community



WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied Yes

	Number of lanes moving traffic	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	2 or more	420 (336)	1180	1108	1035	963	891	818	746	674
Highest Apprch. Minor Street	2 or more	140 (112)	278	260	243	226	209	192	175	158

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied Yes

	Number of lanes moving traffic	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	2 or more	630 (504)	1180	1108	1035	963	891	818	746	674
Highest Apprch. Minor Street	2 or more	70 (56)	278	260	243	226	209	192	175	158

WARRANT 1, Condition A and Condition B

56% Satisfied Yes

WARRANT 2, Four Hour Volume

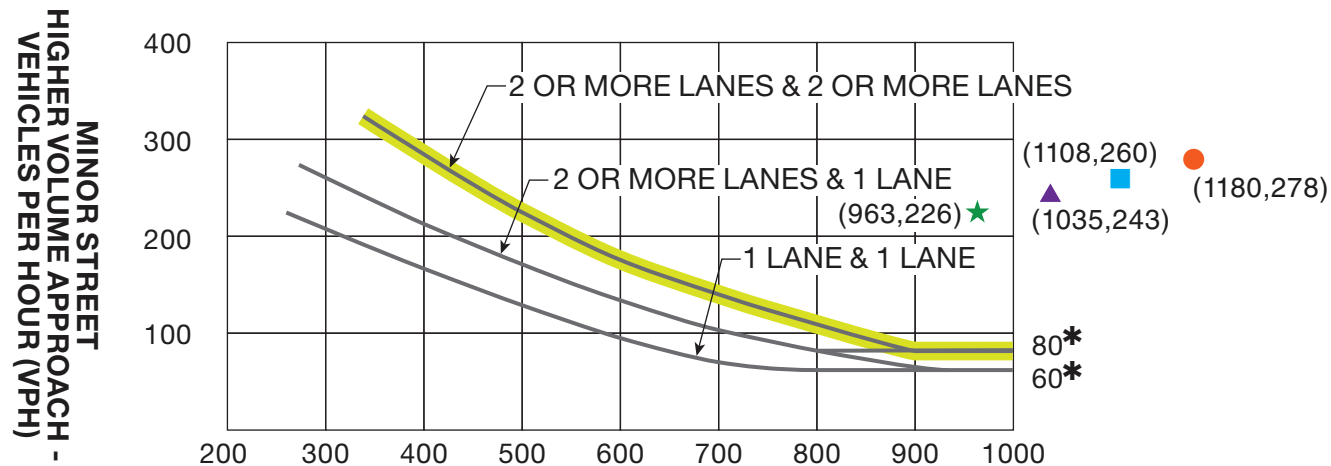
70% Satisfied Yes

	Number of lanes moving traffic	Peak Hour	2nd Highest	3rd Highest	4th Highest
Both Apprchs. Major Street	2 or more	1180	1108	1035	963
Highest Apprch. Minor Street	2 or more	278	260	243	226

WARRANT 3, Peak Hour Volume

70% Satisfied Yes

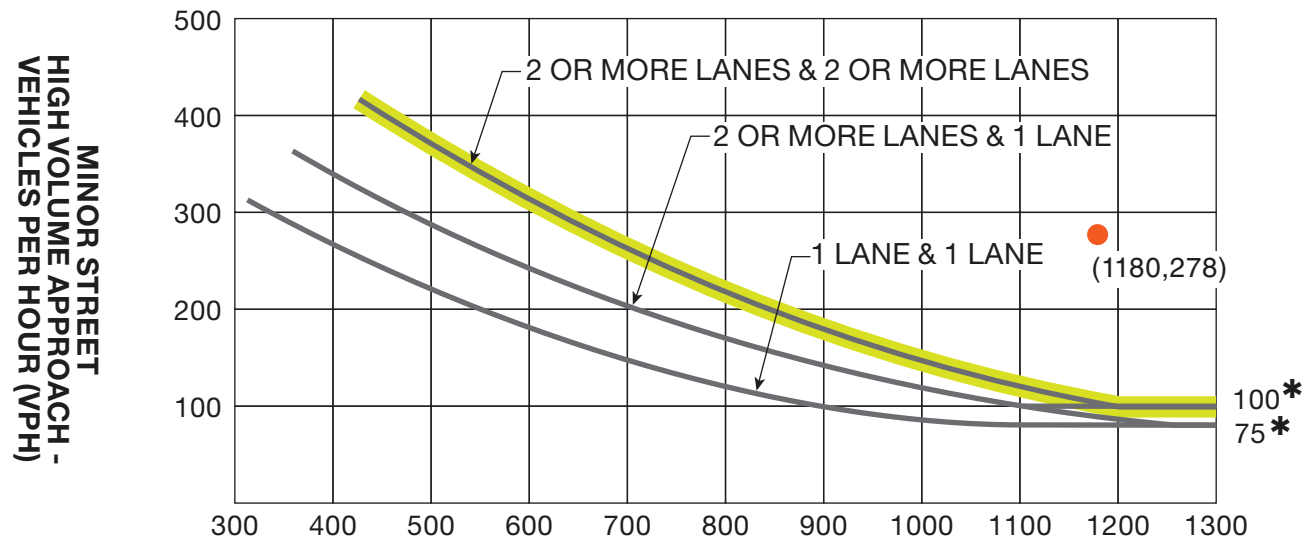
	Number of lanes moving traffic	Peak Hour
Both Apprchs. Major Street	2 or more	1180
Highest Apprch. Minor Street	2 or more	278



* Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

LEGEND

- = AM Peak Hour
- = 2nd Highest Hour
- ▲ = 3rd Highest Hour
- ★ = 4th Highest Hour









MAJOR STREET - TOTAL OF BOTH APPROACHES - VEHICLES PER HOUR (VPH)







* Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

LEGEND

● = AM Peak Hour

APPENDIX B. BACKGROUND TRAFFIC LOS WORKSHEETS













Intersection						
Int Delay, s/veh	4.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	10	75	40	15	20
Future Vol, veh/h	5	10	75	40	15	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	150	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	5	11	82	43	16	22
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	202	8	38	0	-	0
Stage 1	16	-	-	-	-	-
Stage 2	186	-	-	-	-	-
Critical Hdwy	7.2	7.3	4.5	-	-	-
Critical Hdwy Stg 1	6.2	-	-	-	-	-
Critical Hdwy Stg 2	6.2	-	-	-	-	-
Follow-up Hdwy	3.7	3.5	2.4	-	-	-
Pot Cap-1 Maneuver	719	1016	1449	-	-	-
Stage 1	954	-	-	-	-	-
Stage 2	776	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	678	1016	1449	-	-	-
Mov Cap-2 Maneuver	678	-	-	-	-	-
Stage 1	900	-	-	-	-	-
Stage 2	776	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9.2	5		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1449	-	678	1016	-	-
HCM Lane V/C Ratio	0.056	-	0.008	0.011	-	-
HCM Control Delay (s)	7.6	-	10.4	8.6	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	0	0	-	-







Intersection						
Int Delay, s/veh	5.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	15	60	10	15	25	5
Future Vol, veh/h	15	60	10	15	25	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	150	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	16	65	11	16	27	5
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	57	14	32	0	-	0
Stage 1	27	-	-	-	-	-
Stage 2	30	-	-	-	-	-
Critical Hdwy	7.2	7.3	4.5	-	-	-
Critical Hdwy Stg 1	6.2	-	-	-	-	-
Critical Hdwy Stg 2	6.2	-	-	-	-	-
Follow-up Hdwy	3.7	3.5	2.4	-	-	-
Pot Cap-1 Maneuver	894	1007	1457	-	-	-
Stage 1	942	-	-	-	-	-
Stage 2	938	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	887	1007	1457	-	-	-
Mov Cap-2 Maneuver	887	-	-	-	-	-
Stage 1	934	-	-	-	-	-
Stage 2	938	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	8.9	3		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1457	-	887	1007	-	-
HCM Lane V/C Ratio	0.007	-	0.018	0.065	-	-
HCM Control Delay (s)	7.5	-	9.1	8.8	-	-
HCM Lane LOS	A	-	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	0.2	-	-

HCM 6th Signalized Intersection Summary

1: Manila Rd & 32nd Ave

Long Term Background
AM Peak

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	30	120	465	1200	305	130
Future Volume (veh/h)	30	120	465	1200	305	130
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1604	1604	1604	1604	1604	1604
Adj Flow Rate, veh/h	33	130	505	1304	332	141
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	20	20	20	20	20	20
Cap, veh/h	102	427	762	2614	2160	1054
Arrive On Green	0.07	0.07	0.11	0.86	0.71	0.71
Sat Flow, veh/h	1527	2392	1527	3127	3127	1359
Grp Volume(v), veh/h	33	130	505	1304	332	141
Grp Sat Flow(s),veh/h/ln	1527	1196	1527	1523	1523	1359
Q Serve(g_s), s	2.5	5.7	9.6	12.7	4.3	3.1
Cycle Q Clear(g_c), s	2.5	5.7	9.6	12.7	4.3	3.1
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	102	427	762	2614	2160	1054
V/C Ratio(X)	0.32	0.30	0.66	0.50	0.15	0.13
Avail Cap(c_a), veh/h	248	656	1349	2614	2160	1054
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	53.4	42.8	2.8	2.1	5.7	3.4
Incr Delay (d2), s/veh	1.8	0.4	1.0	0.7	0.2	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	1.8	7.1	3.5	3.8	2.3	2.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	55.2	43.2	3.8	2.8	5.9	3.6
LnGrp LOS	E	D	A	A	A	A
Approach Vol, veh/h	163			1809	473	
Approach Delay, s/veh	45.6			3.1	5.2	
Approach LOS	D			A	A	
Timer - Assigned Phs	2			4	5	6
Phs Duration (G+Y+Rc), s	107.5			12.5	17.9	89.6
Change Period (Y+Rc), s	4.5			4.5	4.5	4.5
Max Green Setting (Gmax), s	91.5			19.5	59.5	27.5
Max Q Clear Time (g_c+l1), s	14.7			7.7	11.6	6.3
Green Ext Time (p_c), s	14.6			0.4	1.8	2.5
Intersection Summary						
HCM 6th Ctrl Delay			6.3			
HCM 6th LOS			A			







Intersection						
Int Delay, s/veh	1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	55	420	265	40	10	15
Future Vol, veh/h	55	420	265	40	10	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	150	150	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	60	457	288	43	11	16
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	331	0	-	0	865	288
Stage 1	-	-	-	-	288	-
Stage 2	-	-	-	-	577	-
Critical Hdwy	4.3	-	-	-	6.6	6.4
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	2.38	-	-	-	3.68	3.48
Pot Cap-1 Maneuver	1134	-	-	-	302	710
Stage 1	-	-	-	-	722	-
Stage 2	-	-	-	-	528	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1134	-	-	-	286	710
Mov Cap-2 Maneuver	-	-	-	-	286	-
Stage 1	-	-	-	-	684	-
Stage 2	-	-	-	-	528	-
Approach	EB	WB		SB		
HCM Control Delay, s	1	0		13.4		
HCM LOS	B					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1134	-	-	-	286	710
HCM Lane V/C Ratio	0.053	-	-	-	0.038	0.023
HCM Control Delay (s)	8.4	-	-	-	18.1	10.2
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.1	0.1

HCM 6th Signalized Intersection Summary

3: 32nd Ave & Quail Run Dr

Long Term Background
AM Peak















Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations							
Traffic Volume (veh/h)	265	710	310	115	30	65	
Future Volume (veh/h)	265	710	310	115	30	65	
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	1604	1604	1604	1604	1604	1604	
Adj Flow Rate, veh/h	288	772	337	125	33	71	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Percent Heavy Veh, %	20	20	20	20	20	20	
Cap, veh/h	622	1223	1033	1096	248	331	
Arrive On Green	0.08	0.76	0.64	0.64	0.16	0.16	
Sat Flow, veh/h	1527	1604	1604	1359	1527	1359	
Grp Volume(v), veh/h	288	772	337	125	33	71	
Grp Sat Flow(s),veh/h/ln	1527	1604	1604	1359	1527	1359	
Q Serve(g_s), s	7.2	26.5	11.4	2.4	2.2	5.0	
Cycle Q Clear(g_c), s	7.2	26.5	11.4	2.4	2.2	5.0	
Prop In Lane	1.00			1.00	1.00	1.00	
Lane Grp Cap(c), veh/h	622	1223	1033	1096	248	331	
V/C Ratio(X)	0.46	0.63	0.33	0.11	0.13	0.21	
Avail Cap(c_a), veh/h	708	1223	1033	1096	248	331	
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	6.1	6.5	9.6	2.5	43.0	36.2	
Incr Delay (d2), s/veh	0.5	2.5	0.8	0.2	1.1	1.5	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(95%),veh/ln	3.7	12.6	7.2	2.3	1.6	7.7	
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	6.6	9.0	10.5	2.7	44.1	37.7	
LnGrp LOS	A	A	B	A	D	D	
Approach Vol, veh/h		1060	462	104			
Approach Delay, s/veh		8.4	8.4	39.7			
Approach LOS		A	A	D			
Timer - Assigned Phs				4	6	7	8
Phs Duration (G+Y+Rc), s				96.0	24.0	14.2	81.8
Change Period (Y+Rc), s				4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s				91.5	19.5	16.5	70.5
Max Q Clear Time (g_c+I1), s				28.5	7.0	9.2	13.4
Green Ext Time (p_c), s				6.9	0.2	0.5	2.6
Intersection Summary							
HCM 6th Ctrl Delay			10.4				
HCM 6th LOS			B				

HCM 6th Signalized Intersection Summary







1: Manila Rd & 32nd Ave

Long Term Background
PM Peak

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	140	520	125	325	1340	35
Future Volume (veh/h)	140	520	125	325	1340	35
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1604	1604	1604	1604	1604	1604
Adj Flow Rate, veh/h	152	565	136	353	1457	38
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	20	20	20	20	20	20
Cap, veh/h	389	732	198	2043	1772	1136
Arrive On Green	0.25	0.25	0.05	0.67	0.58	0.58
Sat Flow, veh/h	1527	2392	1527	3127	3127	1359
Grp Volume(v), veh/h	152	565	136	353	1457	38
Grp Sat Flow(s),veh/h/ln	1527	1196	1527	1523	1523	1359
Q Serve(g_s), s	9.9	25.8	4.1	5.2	46.0	0.6
Cycle Q Clear(g_c), s	9.9	25.8	4.1	5.2	46.0	0.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	389	732	198	2043	1772	1136
V/C Ratio(X)	0.39	0.77	0.69	0.17	0.82	0.03
Avail Cap(c_a), veh/h	592	1050	266	2043	1772	1136
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	37.0	37.8	24.3	7.4	20.1	1.7
Incr Delay (d2), s/veh	0.6	2.2	4.5	0.2	4.5	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	6.7	22.8	4.6	2.9	22.9	0.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	37.7	40.1	28.8	7.6	24.6	1.7
LnGrp LOS	D	D	C	A	C	A
Approach Vol, veh/h	717			489	1495	
Approach Delay, s/veh	39.6			13.5	24.0	
Approach LOS	D			B	C	
Timer - Assigned Phs	2			4	5	6
Phs Duration (G+Y+Rc), s	85.0			35.0	10.7	74.3
Change Period (Y+Rc), s	4.5			4.5	4.5	4.5
Max Green Setting (Gmax), s	64.5			46.5	11.5	48.5
Max Q Clear Time (g_c+l1), s	7.2			27.8	6.1	48.0
Green Ext Time (p_c), s	2.5			2.8	0.1	0.4
Intersection Summary						
HCM 6th Ctrl Delay			26.2			
HCM 6th LOS			C			

Notes

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







Intersection						
Int Delay, s/veh	2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	25	255	420	15	40	60
Future Vol, veh/h	25	255	420	15	40	60
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	150	150	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	27	277	457	16	43	65
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	473	0	-	0	788	457
Stage 1	-	-	-	-	457	-
Stage 2	-	-	-	-	331	-
Critical Hdwy	4.3	-	-	-	6.6	6.4
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	2.38	-	-	-	3.68	3.48
Pot Cap-1 Maneuver	1001	-	-	-	336	568
Stage 1	-	-	-	-	601	-
Stage 2	-	-	-	-	689	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1001	-	-	-	327	568
Mov Cap-2 Maneuver	-	-	-	-	327	-
Stage 1	-	-	-	-	585	-
Stage 2	-	-	-	-	689	-
Approach	EB	WB		SB		
HCM Control Delay, s	0.8	0		14.4		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1001	-	-	-	327	568
HCM Lane V/C Ratio	0.027	-	-	-	0.133	0.115
HCM Control Delay (s)	8.7	-	-	-	17.7	12.2
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5	0.4

HCM 6th Signalized Intersection Summary

3: 32nd Ave & Quail Run Dr

Long Term Background
PM Peak















Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations							
Traffic Volume (veh/h)	75	330	760	30	130	295	
Future Volume (veh/h)	75	330	760	30	130	295	
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	1604	1604	1604	1604	1604	1604	
Adj Flow Rate, veh/h	82	359	826	33	141	321	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Percent Heavy Veh, %	20	20	20	20	20	20	
Cap, veh/h	200	1062	940	1153	401	410	
Arrive On Green	0.04	0.66	0.59	0.59	0.26	0.26	
Sat Flow, veh/h	1527	1604	1604	1359	1527	1359	
Grp Volume(v), veh/h	82	359	826	33	141	321	
Grp Sat Flow(s),veh/h/ln	1527	1604	1604	1359	1527	1359	
Q Serve(g_s), s	2.4	11.7	52.8	0.5	9.0	25.9	
Cycle Q Clear(g_c), s	2.4	11.7	52.8	0.5	9.0	25.9	
Prop In Lane	1.00			1.00	1.00	1.00	
Lane Grp Cap(c), veh/h	200	1062	940	1153	401	410	
V/C Ratio(X)	0.41	0.34	0.88	0.03	0.35	0.78	
Avail Cap(c_a), veh/h	236	1062	940	1153	401	410	
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	22.8	8.8	21.2	1.4	36.0	38.3	
Incr Delay (d2), s/veh	1.3	0.9	11.5	0.0	2.4	13.9	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(95%),veh/ln	2.2	7.2	28.7	0.7	6.5	27.0	
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	24.2	9.7	32.7	1.5	38.4	52.2	
LnGrp LOS	C	A	C	A	D	D	
Approach Vol, veh/h		441	859		462		
Approach Delay, s/veh		12.4	31.5		48.0		
Approach LOS		B	C		D		
Timer - Assigned Phs			4		6	7	8
Phs Duration (G+Y+Rc), s			84.0		36.0	9.2	74.8
Change Period (Y+Rc), s			4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s			79.5		31.5	7.5	67.5
Max Q Clear Time (g_c+I1), s			13.7		27.9	4.4	54.8
Green Ext Time (p_c), s			2.4		0.6	0.0	5.0
Intersection Summary							
HCM 6th Ctrl Delay			31.0				
HCM 6th LOS			C				

Notes

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






APPENDIX C. TOTAL TRAFFIC LOS WORKSHEETS

Intersection						
Int Delay, s/veh	6.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	14	48	212	40	15	53
Future Vol, veh/h	14	48	212	40	15	53
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	150	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	15	52	230	43	16	58
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	498	8	74	0	-	0
Stage 1	16	-	-	-	-	-
Stage 2	482	-	-	-	-	-
Critical Hdwy	7.2	7.3	4.5	-	-	-
Critical Hdwy Stg 1	6.2	-	-	-	-	-
Critical Hdwy Stg 2	6.2	-	-	-	-	-
Follow-up Hdwy	3.7	3.5	2.4	-	-	-
Pot Cap-1 Maneuver	459	1016	1401	-	-	-
Stage 1	954	-	-	-	-	-
Stage 2	538	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	384	1016	1401	-	-	-
Mov Cap-2 Maneuver	384	-	-	-	-	-
Stage 1	798	-	-	-	-	-
Stage 2	538	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	10.1	6.8		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1401	-	384	1016	-	-
HCM Lane V/C Ratio	0.164	-	0.04	0.051	-	-
HCM Control Delay (s)	8.1	-	14.8	8.7	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0.6	-	0.1	0.2	-	-

Intersection						
Int Delay, s/veh	0.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	27	104	66	20	0
Future Vol, veh/h	0	27	104	66	20	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	150	-	-	150	150	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	0	29	113	72	22	0
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	185	0	-	0	142	113
Stage 1	-	-	-	-	113	-
Stage 2	-	-	-	-	29	-
Critical Hdwy	4.3	-	-	-	6.6	6.4
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	2.38	-	-	-	3.68	3.48
Pot Cap-1 Maneuver	1288	-	-	-	810	893
Stage 1	-	-	-	-	869	-
Stage 2	-	-	-	-	949	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1288	-	-	-	810	893
Mov Cap-2 Maneuver	-	-	-	-	810	-
Stage 1	-	-	-	-	869	-
Stage 2	-	-	-	-	949	-
Approach	EB	WB		SB		
HCM Control Delay, s	0	0		9.6		
HCM LOS	A					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1288	-	-	-	810	-
HCM Lane V/C Ratio	-	-	-	-	0.027	-
HCM Control Delay (s)	0	-	-	-	9.6	0
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1	-






HCM 6th TWSC
4: Cavanaugh Rd & Site Access #4

Short Term Total
AM Peak

Intersection						
Int Delay, s/veh	7.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	4	13	0	0	0
Future Vol, veh/h	0	4	13	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	0	4	14	0	0	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	29	1	1	0	-	0
Stage 1	1	-	-	-	-	-
Stage 2	28	-	-	-	-	-
Critical Hdwy	6.6	6.4	4.3	-	-	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	2.38	-	-	-
Pot Cap-1 Maneuver	941	1033	1511	-	-	-
Stage 1	977	-	-	-	-	-
Stage 2	950	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	933	1033	1511	-	-	-
Mov Cap-2 Maneuver	933	-	-	-	-	-
Stage 1	968	-	-	-	-	-
Stage 2	950	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	8.5	7.4		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1511	-	1033	-	-	
HCM Lane V/C Ratio	0.009	-	0.004	-	-	
HCM Control Delay (s)	7.4	-	8.5	-	-	
HCM Lane LOS	A	-	A	-	-	
HCM 95th %tile Q(veh)	0	-	0	-	-	






HCM 6th TWSC
5: Cavanaugh Rd & Site Access #5







Short Term Total
AM Peak

Intersection						
Int Delay, s/veh	5.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	12	41	13	4	0
Future Vol, veh/h	0	12	41	13	4	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	0	13	45	14	4	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	108	4	4	0	-	0
Stage 1	4	-	-	-	-	-
Stage 2	104	-	-	-	-	-
Critical Hdwy	6.6	6.4	4.3	-	-	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	2.38	-	-	-
Pot Cap-1 Maneuver	848	1029	1507	-	-	-
Stage 1	974	-	-	-	-	-
Stage 2	877	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	823	1029	1507	-	-	-
Mov Cap-2 Maneuver	823	-	-	-	-	-
Stage 1	945	-	-	-	-	-
Stage 2	877	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	8.5	5.7		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1507	-	1029	-	-	
HCM Lane V/C Ratio	0.03	-	0.013	-	-	
HCM Control Delay (s)	7.5	-	8.5	-	-	
HCM Lane LOS	A	-	A	-	-	
HCM 95th %tile Q(veh)	0.1	-	0	-	-	

HCM 6th TWSC
6: Cavanaugh Rd & Site Access #6

Short Term Total
AM Peak

Intersection						
Int Delay, s/veh	1.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	4	12	54	16	0
Future Vol, veh/h	0	4	12	54	16	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	0	4	13	59	17	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	102	17	17	0	-	0
Stage 1	17	-	-	-	-	-
Stage 2	85	-	-	-	-	-
Critical Hdwy	6.6	6.4	4.3	-	-	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	2.38	-	-	-
Pot Cap-1 Maneuver	854	1012	1491	-	-	-
Stage 1	961	-	-	-	-	-
Stage 2	895	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	846	1012	1491	-	-	-
Mov Cap-2 Maneuver	846	-	-	-	-	-
Stage 1	952	-	-	-	-	-
Stage 2	895	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	8.6	1.4		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1491	-	1012	-	-	
HCM Lane V/C Ratio	0.009	-	0.004	-	-	
HCM Control Delay (s)	7.4	-	8.6	-	-	
HCM Lane LOS	A	-	A	-	-	
HCM 95th %tile Q(veh)	0	-	0	-	-	

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	24	88	16	3	0
Future Vol, veh/h	0	24	88	16	3	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	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	0	26	96	17	3	0







Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	113	0	-	0	122
Stage 1	-	-	-	-	96
Stage 2	-	-	-	-	26
Critical Hdwy	4.3	-	-	-	6.6
Critical Hdwy Stg 1	-	-	-	-	5.6
Critical Hdwy Stg 2	-	-	-	-	5.6
Follow-up Hdwy	2.38	-	-	-	3.68
Pot Cap-1 Maneuver	1372	-	-	-	832
Stage 1	-	-	-	-	885
Stage 2	-	-	-	-	952
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1372	-	-	-	832
Mov Cap-2 Maneuver	-	-	-	-	832
Stage 1	-	-	-	-	885
Stage 2	-	-	-	-	952

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1372	-	-	-	832
HCM Lane V/C Ratio	-	-	-	-	0.004
HCM Control Delay (s)	0	-	-	-	9.3
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection







Int Delay, s/veh 0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	21	72	16	3	0
Future Vol, veh/h	0	21	72	16	3	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	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	0	23	78	17	3	0

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	95	0	0 101 78
Stage 1	-	-	- 78 -
Stage 2	-	-	- 23 -
Critical Hdwy	4.3	-	- 6.6 6.4
Critical Hdwy Stg 1	-	-	- 5.6 -
Critical Hdwy Stg 2	-	-	- 5.6 -
Follow-up Hdwy	2.38	-	- 3.68 3.48
Pot Cap-1 Maneuver	1393	-	- 856 935
Stage 1	-	-	- 901 -
Stage 2	-	-	- 955 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1393	-	- 856 935
Mov Cap-2 Maneuver	-	-	- 856 -
Stage 1	-	-	- 901 -
Stage 2	-	-	- 955 -

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1393	-	-	-	856
HCM Lane V/C Ratio	-	-	-	-	0.004
HCM Control Delay (s)	0	-	-	-	9.2
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection						
Int Delay, s/veh	1.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	8	28	44	13	0
Future Vol, veh/h	0	8	28	44	13	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	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	0	9	30	48	14	0







Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	78	0	-	0	39
Stage 1	-	-	-	-	30
Stage 2	-	-	-	-	9
Critical Hdwy	4.3	-	-	-	6.6
Critical Hdwy Stg 1	-	-	-	-	5.6
Critical Hdwy Stg 2	-	-	-	-	5.6
Follow-up Hdwy	2.38	-	-	-	3.68
Pot Cap-1 Maneuver	1414	-	-	-	929
Stage 1	-	-	-	-	948
Stage 2	-	-	-	-	969
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1414	-	-	-	929
Mov Cap-2 Maneuver	-	-	-	-	929
Stage 1	-	-	-	-	948
Stage 2	-	-	-	-	969

Approach	EB	WB	SB
HCM Control Delay, s	0	0	8.9
HCM LOS	A		

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1414	-	-	-	929
HCM Lane V/C Ratio	-	-	-	-	0.015
HCM Control Delay (s)	0	-	-	-	8.9
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection







Int Delay, s/veh 0.7







Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	5	19	9	3	0
Future Vol, veh/h	0	5	19	9	3	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	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	0	5	21	10	3	0







Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	31	0	0 26 21
Stage 1	-	-	- - 21 -
Stage 2	-	-	- - 5 -
Critical Hdwy	4.3	-	- - 6.6 6.4
Critical Hdwy Stg 1	-	-	- - 5.6 -
Critical Hdwy Stg 2	-	-	- - 5.6 -
Follow-up Hdwy	2.38	-	- - 3.68 3.48
Pot Cap-1 Maneuver	1473	-	- - 945 1007
Stage 1	-	-	- - 957 -
Stage 2	-	-	- - 973 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1473	-	- - 945 1007
Mov Cap-2 Maneuver	-	-	- - 945 -
Stage 1	-	-	- - 957 -
Stage 2	-	-	- - 973 -

Approach	EB	WB	SB
HCM Control Delay, s	0	0	8.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1473	-	-	-	945
HCM Lane V/C Ratio	-	-	-	-	0.003
HCM Control Delay (s)	0	-	-	-	8.8
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	19	5	0
Future Vol, veh/h	0	0	0	19	5	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	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	0	0	0	21	5	0
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	21	0	-	0	0	0
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Critical Hdwy	4.3	-	-	-	6.6	6.4
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	2.38	-	-	-	3.68	3.48
Pot Cap-1 Maneuver	1485	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1485	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	WB		SB		
HCM Control Delay, s	0	0				
HCM LOS	-					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1485	-	-	-	-	
HCM Lane V/C Ratio	-	-	-	-	-	
HCM Control Delay (s)	0	-	-	-	-	
HCM Lane LOS	A	-	-	-	-	
HCM 95th %tile Q(veh)	0	-	-	-	-	

Intersection						
Int Delay, s/veh	8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	52	215	65	15	25	18
Future Vol, veh/h	52	215	65	15	25	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	150	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	57	234	71	16	27	20
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	177	14	47	0	-	0
Stage 1	27	-	-	-	-	-
Stage 2	150	-	-	-	-	-
Critical Hdwy	7.2	7.3	4.5	-	-	-
Critical Hdwy Stg 1	6.2	-	-	-	-	-
Critical Hdwy Stg 2	6.2	-	-	-	-	-
Follow-up Hdwy	3.7	3.5	2.4	-	-	-
Pot Cap-1 Maneuver	747	1007	1437	-	-	-
Stage 1	942	-	-	-	-	-
Stage 2	811	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	710	1007	1437	-	-	-
Mov Cap-2 Maneuver	710	-	-	-	-	-
Stage 1	896	-	-	-	-	-
Stage 2	811	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9.9	6.2		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1437	-	710	1007	-	-
HCM Lane V/C Ratio	0.049	-	0.08	0.232	-	-
HCM Control Delay (s)	7.6	-	10.5	9.7	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	0.3	0.9	-	-

Intersection						
Int Delay, s/veh	3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	115	39	29	77	0
Future Vol, veh/h	0	115	39	29	77	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	150	-	-	150	150	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	0	125	42	32	84	0






Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	74	0	0 167 42
Stage 1	-	-	- 42 -
Stage 2	-	-	- 125 -
Critical Hdwy	4.3	-	- 6.6 6.4
Critical Hdwy Stg 1	-	-	- 5.6 -
Critical Hdwy Stg 2	-	-	- 5.6 -
Follow-up Hdwy	2.38	-	- 3.68 3.48
Pot Cap-1 Maneuver	1419	-	- 783 980
Stage 1	-	-	- 936 -
Stage 2	-	-	- 858 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1419	-	- 783 980
Mov Cap-2 Maneuver	-	-	- 783 -
Stage 1	-	-	- 936 -
Stage 2	-	-	- 858 -

Approach	EB	WB	SB
HCM Control Delay, s	0	0	10.1
HCM LOS	B		

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1419	-	-	-	783	-
HCM Lane V/C Ratio	-	-	-	-	0.107	-
HCM Control Delay (s)	0	-	-	-	10.1	0
HCM Lane LOS	A	-	-	-	B	A
HCM 95th %tile Q(veh)	0	-	-	-	0.4	-

HCM 6th TWSC
4: Cavanaugh Rd & Site Access #4

Short Term Total
PM Peak

Intersection						
Int Delay, s/veh	7.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	15	6	0	0	0
Future Vol, veh/h	0	15	6	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	0	16	7	0	0	0






Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	15	1	1	0	-	0
Stage 1	1	-	-	-	-	-
Stage 2	14	-	-	-	-	-
Critical Hdwy	6.6	6.4	4.3	-	-	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	2.38	-	-	-
Pot Cap-1 Maneuver	959	1033	1511	-	-	-
Stage 1	977	-	-	-	-	-
Stage 2	964	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	954	1033	1511	-	-	-
Mov Cap-2 Maneuver	954	-	-	-	-	-
Stage 1	972	-	-	-	-	-
Stage 2	964	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.5	7.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1511	-	1033	-	-
HCM Lane V/C Ratio	0.004	-	0.016	-	-
HCM Control Delay (s)	7.4	-	8.5	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-






HCM 6th TWSC
5: Cavanaugh Rd & Site Access #5

Short Term Total
PM Peak

Intersection						
Int Delay, s/veh	6.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	48	18	6	15	0
Future Vol, veh/h	0	48	18	6	15	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	0	52	20	7	16	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	63	16	16	0	-	0
Stage 1	16	-	-	-	-	-
Stage 2	47	-	-	-	-	-
Critical Hdwy	6.6	6.4	4.3	-	-	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	2.38	-	-	-
Pot Cap-1 Maneuver	900	1013	1492	-	-	-
Stage 1	962	-	-	-	-	-
Stage 2	931	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	888	1013	1492	-	-	-
Mov Cap-2 Maneuver	888	-	-	-	-	-
Stage 1	949	-	-	-	-	-
Stage 2	931	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	8.7	5.6		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1492	-	1013	-	-	
HCM Lane V/C Ratio	0.013	-	0.052	-	-	
HCM Control Delay (s)	7.4	-	8.7	-	-	
HCM Lane LOS	A	-	A	-	-	
HCM 95th %tile Q(veh)	0	-	0.2	-	-	







HCM 6th TWSC
6: Cavanaugh Rd & Site Access #6

Short Term Total
PM Peak

Intersection						
Int Delay, s/veh	1.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	14	5	24	63	0
Future Vol, veh/h	0	14	5	24	63	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	0	15	5	26	68	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	104	68	68	0	-	0
Stage 1	68	-	-	-	-	-
Stage 2	36	-	-	-	-	-
Critical Hdwy	6.6	6.4	4.3	-	-	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	2.38	-	-	-
Pot Cap-1 Maneuver	852	947	1426	-	-	-
Stage 1	911	-	-	-	-	-
Stage 2	942	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	849	947	1426	-	-	-
Mov Cap-2 Maneuver	849	-	-	-	-	-
Stage 1	907	-	-	-	-	-
Stage 2	942	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	8.9	1.3		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1426	-	947	-	-	
HCM Lane V/C Ratio	0.004	-	0.016	-	-	
HCM Control Delay (s)	7.5	-	8.9	-	-	
HCM Lane LOS	A	-	A	-	-	
HCM 95th %tile Q(veh)	0	-	0	-	-	

Intersection







Int Delay, s/veh 0.9







Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	100	36	3	15	0
Future Vol, veh/h	0	100	36	3	15	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	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	0	109	39	3	16	0







Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	42	0	0 148 39
Stage 1	-	-	- 39 -
Stage 2	-	-	- 109 -
Critical Hdwy	4.3	-	- 6.6 6.4
Critical Hdwy Stg 1	-	-	- 5.6 -
Critical Hdwy Stg 2	-	-	- 5.6 -
Follow-up Hdwy	2.38	-	- 3.68 3.48
Pot Cap-1 Maneuver	1459	-	- 804 983
Stage 1	-	-	- 939 -
Stage 2	-	-	- 873 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1459	-	- 804 983
Mov Cap-2 Maneuver	-	-	- 804 -
Stage 1	-	-	- 939 -
Stage 2	-	-	- 873 -







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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1459	-	-	-	804
HCM Lane V/C Ratio	-	-	-	-	0.02
HCM Control Delay (s)	0	-	-	-	9.6
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection						
Int Delay, s/veh	1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	85	33	3	15	0
Future Vol, veh/h	0	85	33	3	15	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	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	0	92	36	3	16	0
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	39	0	-	0	128	36
Stage 1	-	-	-	-	36	-
Stage 2	-	-	-	-	92	-
Critical Hdwy	4.3	-	-	-	6.6	6.4
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	2.38	-	-	-	3.68	3.48
Pot Cap-1 Maneuver	1462	-	-	-	825	987
Stage 1	-	-	-	-	942	-
Stage 2	-	-	-	-	888	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1462	-	-	-	825	987
Mov Cap-2 Maneuver	-	-	-	-	825	-
Stage 1	-	-	-	-	942	-
Stage 2	-	-	-	-	888	-
Approach	EB	WB		SB		
HCM Control Delay, s	0	0		9.5		
HCM LOS	A					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1462	-	-	-	825	
HCM Lane V/C Ratio	-	-	-	-	0.02	
HCM Control Delay (s)	0	-	-	-	9.5	
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	0	33	13	20	52	0
Future Vol, veh/h	0	33	13	20	52	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	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	0	36	14	22	57	0
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	36	0	-	0	50	14
Stage 1	-	-	-	-	14	-
Stage 2	-	-	-	-	36	-
Critical Hdwy	4.3	-	-	-	6.6	6.4
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	2.38	-	-	-	3.68	3.48
Pot Cap-1 Maneuver	1466	-	-	-	916	1016
Stage 1	-	-	-	-	964	-
Stage 2	-	-	-	-	942	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1466	-	-	-	916	1016
Mov Cap-2 Maneuver	-	-	-	-	916	-
Stage 1	-	-	-	-	964	-
Stage 2	-	-	-	-	942	-
Approach	EB	WB		SB		
HCM Control Delay, s	0	0		9.2		
HCM LOS	A					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1466	-	-	-	916	
HCM Lane V/C Ratio	-	-	-	-	0.062	
HCM Control Delay (s)	0	-	-	-	9.2	
HCM Lane LOS	A	-	-	-	A	
HCM 95th %tile Q(veh)	0	-	-	-	0.2	

Intersection						
Int Delay, s/veh	2.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	22	9	4	11	0
Future Vol, veh/h	0	22	9	4	11	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	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	0	24	10	4	12	0
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	14	0	-	0	34	10
Stage 1	-	-	-	-	10	-
Stage 2	-	-	-	-	24	-
Critical Hdwy	4.3	-	-	-	6.6	6.4
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	2.38	-	-	-	3.68	3.48
Pot Cap-1 Maneuver	1494	-	-	-	935	1021
Stage 1	-	-	-	-	968	-
Stage 2	-	-	-	-	954	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1494	-	-	-	935	1021
Mov Cap-2 Maneuver	-	-	-	-	935	-
Stage 1	-	-	-	-	968	-
Stage 2	-	-	-	-	954	-
Approach	EB	WB		SB		
HCM Control Delay, s	0	0		8.9		
HCM LOS	A					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1494	-	-	-	935	
HCM Lane V/C Ratio	-	-	-	-	0.013	
HCM Control Delay (s)	0	-	-	-	8.9	
HCM Lane LOS	A	-	-	-	A	
HCM 95th %tile Q(veh)	0	-	-	-	0	

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	9	22	0
Future Vol, veh/h	0	0	0	9	22	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	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	0	0	0	10	24	0

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	10	0	0
Stage 1	-	-	0
Stage 2	-	-	0
Critical Hdwy	4.3	-	6.6
Critical Hdwy Stg 1	-	-	5.6
Critical Hdwy Stg 2	-	-	5.6
Follow-up Hdwy	2.38	-	3.68
Pot Cap-1 Maneuver	1500	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1500	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-













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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1500	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	-
HCM Lane LOS	A	-	-	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

HCM 6th Signalized Intersection Summary







1: Manila Rd & 32nd Ave

Long Term Total
AM Peak

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	30	135	517	1200	305	130
Future Volume (veh/h)	30	135	517	1200	305	130
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1604	1604	1604	1604	1604	1604
Adj Flow Rate, veh/h	33	147	562	1304	332	141
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	20	20	20	20	20	20
Cap, veh/h	110	487	770	2598	2083	1028
Arrive On Green	0.07	0.07	0.13	0.85	0.68	0.68
Sat Flow, veh/h	1527	2392	1527	3127	3127	1359
Grp Volume(v), veh/h	33	147	562	1304	332	141
Grp Sat Flow(s),veh/h/ln	1527	1196	1527	1523	1523	1359
Q Serve(g_s), s	2.5	6.3	11.7	13.2	4.6	3.4
Cycle Q Clear(g_c), s	2.5	6.3	11.7	13.2	4.6	3.4
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	110	487	770	2598	2083	1028
V/C Ratio(X)	0.30	0.30	0.73	0.50	0.16	0.14
Avail Cap(c_a), veh/h	248	703	1327	2598	2083	1028
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	52.8	40.5	3.3	2.3	6.7	4.0
Incr Delay (d2), s/veh	1.5	0.3	1.4	0.7	0.2	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	1.8	7.9	4.5	4.1	2.6	2.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	54.3	40.9	4.7	3.0	6.9	4.3
LnGrp LOS	D	D	A	A	A	A
Approach Vol, veh/h	180			1866	473	
Approach Delay, s/veh	43.3			3.5	6.1	
Approach LOS	D			A	A	
Timer - Assigned Phs	2			4	5	6
Phs Duration (G+Y+Rc), s	106.8			13.2	20.3	86.6
Change Period (Y+Rc), s	4.5			4.5	4.5	4.5
Max Green Setting (Gmax), s	91.5			19.5	59.5	27.5
Max Q Clear Time (g_c+I1), s	15.2			8.3	13.7	6.6
Green Ext Time (p_c), s	14.6			0.4	2.0	2.5
Intersection Summary						
HCM 6th Ctrl Delay			6.8			
HCM 6th LOS			A			

Notes

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







Intersection						
Int Delay, s/veh	1.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	85	430	297	60	17	30
Future Vol, veh/h	85	430	297	60	17	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	150	150	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	92	467	323	65	18	33
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	388	0	-	0	974	323
Stage 1	-	-	-	-	323	-
Stage 2	-	-	-	-	651	-
Critical Hdwy	4.3	-	-	-	6.6	6.4
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	2.38	-	-	-	3.68	3.48
Pot Cap-1 Maneuver	1079	-	-	-	259	678
Stage 1	-	-	-	-	695	-
Stage 2	-	-	-	-	487	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1079	-	-	-	237	678
Mov Cap-2 Maneuver	-	-	-	-	237	-
Stage 1	-	-	-	-	636	-
Stage 2	-	-	-	-	487	-
Approach	EB	WB		SB		
HCM Control Delay, s	1.4	0		14.5		
HCM LOS	B					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1079	-	-	-	237	678
HCM Lane V/C Ratio	0.086	-	-	-	0.078	0.048
HCM Control Delay (s)	8.6	-	-	-	21.5	10.6
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.3	0.2

HCM 6th Signalized Intersection Summary

3: 32nd Ave & Quail Run Dr






Long Term Total
AM Peak



Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations							
Traffic Volume (veh/h)	265	812	338	115	30	65	
Future Volume (veh/h)	265	812	338	115	30	65	
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	1604	1604	1604	1604	1604	1604	
Adj Flow Rate, veh/h	288	883	367	125	33	71	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Percent Heavy Veh, %	20	20	20	20	20	20	
Cap, veh/h	609	1236	1049	1099	235	317	
Arrive On Green	0.08	0.77	0.65	0.65	0.15	0.15	
Sat Flow, veh/h	1527	1604	1604	1359	1527	1359	
Grp Volume(v), veh/h	288	883	367	125	33	71	
Grp Sat Flow(s),veh/h/ln	1527	1604	1604	1359	1527	1359	
Q Serve(g_s), s	7.0	33.7	12.3	2.3	2.2	5.1	
Cycle Q Clear(g_c), s	7.0	33.7	12.3	2.3	2.2	5.1	
Prop In Lane	1.00			1.00	1.00	1.00	
Lane Grp Cap(c), veh/h	609	1236	1049	1099	235	317	
V/C Ratio(X)	0.47	0.71	0.35	0.11	0.14	0.22	
Avail Cap(c_a), veh/h	690	1236	1049	1099	235	317	
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	6.0	7.0	9.3	2.4	43.9	37.2	
Incr Delay (d2), s/veh	0.6	3.5	0.9	0.2	1.2	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	3.5	15.3	7.7	2.2	1.7	7.7	
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	6.6	10.6	10.2	2.6	45.1	38.9	
LnGrp LOS	A	B	B	A	D	D	
Approach Vol, veh/h		1171	492		104		
Approach Delay, s/veh		9.6	8.3		40.8		
Approach LOS		A	A		D		
Timer - Assigned Phs				4	6	7	8
Phs Duration (G+Y+Rc), s				97.0	23.0	14.0	83.0
Change Period (Y+Rc), s				4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s				92.5	18.5	15.9	72.1
Max Q Clear Time (g_c+I1), s				35.7	7.1	9.0	14.3
Green Ext Time (p_c), s				8.7	0.2	0.5	2.9
Intersection Summary							
HCM 6th Ctrl Delay			11.1				
HCM 6th LOS			B				
Notes							






HCM 6th TWSC
4: Cavanaugh Rd & Site Access #4

Long Term Total
AM Peak

Intersection						
Int Delay, s/veh	0.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	1	3	10	98	41	2
Future Vol, veh/h	1	3	10	98	41	2
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, %	20	20	20	20	20	20
Mvmt Flow	1	3	11	107	45	2
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	175	46	47	0	-	0
Stage 1	46	-	-	-	-	-
Stage 2	129	-	-	-	-	-
Critical Hdwy	6.6	6.4	4.3	-	-	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	2.38	-	-	-
Pot Cap-1 Maneuver	775	975	1452	-	-	-
Stage 1	932	-	-	-	-	-
Stage 2	854	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	769	975	1452	-	-	-
Mov Cap-2 Maneuver	769	-	-	-	-	-
Stage 1	925	-	-	-	-	-
Stage 2	854	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9	0.7		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1452	-	914	-	-	
HCM Lane V/C Ratio	0.007	-	0.005	-	-	
HCM Control Delay (s)	7.5	-	9	-	-	
HCM Lane LOS	A	-	A	-	-	
HCM 95th %tile Q(veh)	0	-	0	-	-	






HCM 6th TWSC
5: Cavanaugh Rd & Site Access #5







Long Term Total
AM Peak

Intersection						
Int Delay, s/veh	1.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	8	26	106	37	7
Future Vol, veh/h	2	8	26	106	37	7
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, %	20	20	20	20	20	20
Mvmt Flow	2	9	28	115	40	8
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	215	44	48	0	-	0
Stage 1	44	-	-	-	-	-
Stage 2	171	-	-	-	-	-
Critical Hdwy	6.6	6.4	4.3	-	-	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	2.38	-	-	-
Pot Cap-1 Maneuver	735	977	1451	-	-	-
Stage 1	934	-	-	-	-	-
Stage 2	817	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	721	977	1451	-	-	-
Mov Cap-2 Maneuver	721	-	-	-	-	-
Stage 1	916	-	-	-	-	-
Stage 2	817	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9	1.5		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1451	-	912	-	-	
HCM Lane V/C Ratio	0.019	-	0.012	-	-	
HCM Control Delay (s)	7.5	-	9	-	-	
HCM Lane LOS	A	-	A	-	-	
HCM 95th %tile Q(veh)	0.1	-	0	-	-	

HCM 6th TWSC
6: Cavanaugh Rd & Site Access #6

Long Term Total
AM Peak







Intersection						
Int Delay, s/veh	0.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	4	13	132	43	2
Future Vol, veh/h	0	4	13	132	43	2
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, %	20	20	20	20	20	20
Mvmt Flow	0	4	14	143	47	2
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	219	48	49	0	-	0
Stage 1	48	-	-	-	-	-
Stage 2	171	-	-	-	-	-
Critical Hdwy	6.6	6.4	4.3	-	-	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	2.38	-	-	-
Pot Cap-1 Maneuver	731	972	1450	-	-	-
Stage 1	930	-	-	-	-	-
Stage 2	817	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	724	972	1450	-	-	-
Mov Cap-2 Maneuver	724	-	-	-	-	-
Stage 1	921	-	-	-	-	-
Stage 2	817	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	8.7	0.7		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1450	-	972	-	-	
HCM Lane V/C Ratio	0.01	-	0.004	-	-	
HCM Control Delay (s)	7.5	-	8.7	-	-	
HCM Lane LOS	A	-	A	-	-	
HCM 95th %tile Q(veh)	0	-	0	-	-	







Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	514	321	6	1	2
Future Vol, veh/h	10	514	321	6	1	2
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, %	20	20	20	20	20	20
Mvmt Flow	11	559	349	7	1	2

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	356	0	0 930 349
Stage 1	-	-	- 349 -
Stage 2	-	-	- 581 -
Critical Hdwy	4.3	-	- 6.6 6.4
Critical Hdwy Stg 1	-	-	- 5.6 -
Critical Hdwy Stg 2	-	-	- 5.6 -
Follow-up Hdwy	2.38	-	- 3.68 3.48
Pot Cap-1 Maneuver	1110	-	- 276 655
Stage 1	-	-	- 676 -
Stage 2	-	-	- 525 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1110	-	- 273 655
Mov Cap-2 Maneuver	-	-	- 273 -
Stage 1	-	-	- 669 -
Stage 2	-	-	- 525 -

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	13.1
HCM LOS	B		

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1110	-	-	-	447
HCM Lane V/C Ratio	0.01	-	-	-	0.007
HCM Control Delay (s)	8.3	-	-	-	13.1
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0







Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	523	317	6	1	2
Future Vol, veh/h	10	523	317	6	1	2
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, %	20	20	20	20	20	20
Mvmt Flow	11	568	345	7	1	2
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	352	0	-	0	935	345
Stage 1	-	-	-	-	345	-
Stage 2	-	-	-	-	590	-
Critical Hdwy	4.3	-	-	-	6.6	6.4
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	2.38	-	-	-	3.68	3.48
Pot Cap-1 Maneuver	1113	-	-	-	274	659
Stage 1	-	-	-	-	679	-
Stage 2	-	-	-	-	520	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1113	-	-	-	271	659
Mov Cap-2 Maneuver	-	-	-	-	271	-
Stage 1	-	-	-	-	672	-
Stage 2	-	-	-	-	520	-
Approach	EB	WB		SB		
HCM Control Delay, s	0.2	0		13.1		
HCM LOS	B					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1113	-	-	-	446	
HCM Lane V/C Ratio	0.01	-	-	-	0.007	
HCM Control Delay (s)	8.3	-	-	-	13.1	
HCM Lane LOS	A	-	-	-	B	
HCM 95th %tile Q(veh)	0	-	-	-	0	







Intersection						
Int Delay, s/veh	0.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	31	528	304	15	5	9
Future Vol, veh/h	31	528	304	15	5	9
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, %	20	20	20	20	20	20
Mvmt Flow	34	574	330	16	5	10

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	346	0	-	0	972
Stage 1	-	-	-	-	330
Stage 2	-	-	-	-	642
Critical Hdwy	4.3	-	-	-	6.6
Critical Hdwy Stg 1	-	-	-	-	5.6
Critical Hdwy Stg 2	-	-	-	-	5.6
Follow-up Hdwy	2.38	-	-	-	3.68
Pot Cap-1 Maneuver	1119	-	-	-	260
Stage 1	-	-	-	-	690
Stage 2	-	-	-	-	491
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1119	-	-	-	252
Mov Cap-2 Maneuver	-	-	-	-	252
Stage 1	-	-	-	-	669
Stage 2	-	-	-	-	491

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	13.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1119	-	-	-	421
HCM Lane V/C Ratio	0.03	-	-	-	0.036
HCM Control Delay (s)	8.3	-	-	-	13.9
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	558	309	4	1	3
Future Vol, veh/h	9	558	309	4	1	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, %	20	20	20	20	20	20
Mvmt Flow	10	607	336	4	1	3
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	340	0	-	0	963	336
Stage 1	-	-	-	-	336	-
Stage 2	-	-	-	-	627	-
Critical Hdwy	4.3	-	-	-	6.6	6.4
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	2.38	-	-	-	3.68	3.48
Pot Cap-1 Maneuver	1125	-	-	-	263	667
Stage 1	-	-	-	-	685	-
Stage 2	-	-	-	-	500	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1125	-	-	-	261	667
Mov Cap-2 Maneuver	-	-	-	-	261	-
Stage 1	-	-	-	-	679	-
Stage 2	-	-	-	-	500	-
Approach	EB	WB		SB		
HCM Control Delay, s	0.1	0		12.6		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1125	-	-	-	480	
HCM Lane V/C Ratio	0.009	-	-	-	0.009	
HCM Control Delay (s)	8.2	-	-	-	12.6	
HCM Lane LOS	A	-	-	-	B	
HCM 95th %tile Q(veh)	0	-	-	-	0	

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	13	565	305	7	2	4
Future Vol, veh/h	13	565	305	7	2	4
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, %	20	20	20	20	20	20
Mvmt Flow	14	614	332	8	2	4

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	340	0	0 974 332
Stage 1	-	-	- 332 -
Stage 2	-	-	- 642 -
Critical Hdwy	4.3	-	- 6.6 6.4
Critical Hdwy Stg 1	-	-	- 5.6 -
Critical Hdwy Stg 2	-	-	- 5.6 -
Follow-up Hdwy	2.38	-	- 3.68 3.48
Pot Cap-1 Maneuver	1125	-	- *257 670
Stage 1	-	-	- *688 -
Stage 2	-	-	- *555 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	1125	-	- *254 670
Mov Cap-2 Maneuver	-	-	- *254 -
Stage 1	-	-	- *680 -
Stage 2	-	-	- *555 -

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	13.4
HCM LOS	B		













Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1125	-	-	-	433
HCM Lane V/C Ratio	0.013	-	-	-	0.015
HCM Control Delay (s)	8.2	-	-	-	13.4
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0







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

HCM 6th Signalized Intersection Summary

1: Manila Rd & 32nd Ave

Long Term Total
PM Peak

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	140	580	147	325	1340	35
Future Volume (veh/h)	140	580	147	325	1340	35
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1604	1604	1604	1604	1604	1604
Adj Flow Rate, veh/h	152	630	160	353	1457	38
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	20	20	20	20	20	20
Cap, veh/h	375	727	209	2069	1778	1127
Arrive On Green	0.25	0.25	0.06	0.68	0.58	0.58
Sat Flow, veh/h	1527	2392	1527	3127	3127	1359
Grp Volume(v), veh/h	152	630	160	353	1457	38
Grp Sat Flow(s),veh/h/ln	1527	1196	1527	1523	1523	1359
Q Serve(g_s), s	10.0	29.5	4.8	5.0	45.8	0.6
Cycle Q Clear(g_c), s	10.0	29.5	4.8	5.0	45.8	0.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	375	727	209	2069	1778	1127
V/C Ratio(X)	0.40	0.87	0.76	0.17	0.82	0.03
Avail Cap(c_a), veh/h	375	727	280	2069	1778	1127
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	37.9	39.5	24.8	7.0	19.9	1.8
Incr Delay (d2), s/veh	0.7	10.8	8.4	0.2	4.4	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	6.8	26.0	5.8	2.8	22.7	0.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	38.6	50.3	33.3	7.2	24.3	1.8
LnGrp LOS	D	D	C	A	C	A
Approach Vol, veh/h	782			513	1495	
Approach Delay, s/veh	48.0			15.3	23.7	
Approach LOS	D			B	C	
Timer - Assigned Phs	2			4	5	6
Phs Duration (G+Y+Rc), s	86.0			34.0	11.5	74.5
Change Period (Y+Rc), s	4.5			4.5	4.5	4.5
Max Green Setting (Gmax), s	81.5			29.5	12.5	64.5
Max Q Clear Time (g_c+I1), s	7.0			31.5	6.8	47.8
Green Ext Time (p_c), s	2.6			0.0	0.2	10.0
Intersection Summary						
HCM 6th Ctrl Delay			29.0			
HCM 6th LOS			C			







Intersection						
Int Delay, s/veh	3.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	44	291	433	25	64	97
Future Vol, veh/h	44	291	433	25	64	97
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	150	150	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	48	316	471	27	70	105
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	498	0	-	0	883	471
Stage 1	-	-	-	-	471	-
Stage 2	-	-	-	-	412	-
Critical Hdwy	4.3	-	-	-	6.6	6.4
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	2.38	-	-	-	3.68	3.48
Pot Cap-1 Maneuver	979	-	-	-	294	557
Stage 1	-	-	-	-	592	-
Stage 2	-	-	-	-	631	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	979	-	-	-	280	557
Mov Cap-2 Maneuver	-	-	-	-	280	-
Stage 1	-	-	-	-	563	-
Stage 2	-	-	-	-	631	-
Approach	EB	WB		SB		
HCM Control Delay, s	1.2	0		16.6		
HCM LOS				C		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	979	-	-	-	280	557
HCM Lane V/C Ratio	0.049	-	-	-	0.248	0.189
HCM Control Delay (s)	8.9	-	-	-	22.1	13
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.2	-	-	-	1	0.7

HCM 6th Signalized Intersection Summary

3: 32nd Ave & Quail Run Dr






Long Term Total
PM Peak



Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations							
Traffic Volume (veh/h)	75	372	877	30	130	295	
Future Volume (veh/h)	75	372	877	30	130	295	
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	1604	1604	1604	1604	1604	1604	
Adj Flow Rate, veh/h	82	404	953	33	141	321	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Percent Heavy Veh, %	20	20	20	20	20	20	
Cap, veh/h	125	1083	960	1153	381	392	
Arrive On Green	0.04	0.68	0.60	0.60	0.25	0.25	
Sat Flow, veh/h	1527	1604	1604	1359	1527	1359	
Grp Volume(v), veh/h	82	404	953	33	141	321	
Grp Sat Flow(s),veh/h/ln	1527	1604	1604	1359	1527	1359	
Q Serve(g_s), s	2.4	13.1	70.5	0.5	9.2	26.4	
Cycle Q Clear(g_c), s	2.4	13.1	70.5	0.5	9.2	26.4	
Prop In Lane	1.00			1.00	1.00	1.00	
Lane Grp Cap(c), veh/h	125	1083	960	1153	381	392	
V/C Ratio(X)	0.66	0.37	0.99	0.03	0.37	0.82	
Avail Cap(c_a), veh/h	492	1083	960	1153	668	647	
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	30.3	8.5	23.8	1.4	37.2	39.8	
Incr Delay (d2), s/veh	5.7	1.0	27.3	0.0	0.6	4.2	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(95%),veh/ln	2.9	7.9	40.6	0.7	6.2	25.9	
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	36.0	9.4	51.1	1.5	37.8	44.0	
LnGrp LOS	D	A	D	A	D	D	
Approach Vol, veh/h		486	986		462		
Approach Delay, s/veh		13.9	49.4		42.1		
Approach LOS		B	D		D		
Timer - Assigned Phs			4		6	7	8
Phs Duration (G+Y+Rc), s			85.5		34.5	9.2	76.4
Change Period (Y+Rc), s			4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s			58.5		52.5	33.5	20.5
Max Q Clear Time (g_c+I1), s			15.1		28.4	4.4	72.5
Green Ext Time (p_c), s			2.7		1.6	0.2	0.0
Intersection Summary							
HCM 6th Ctrl Delay			38.7				
HCM 6th LOS			D				
Notes							





HCM 6th TWSC
4: Cavanaugh Rd & Site Access #4

Long Term Total
PM Peak

Intersection						
Int Delay, s/veh	0.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	12	5	55	107	1
Future Vol, veh/h	2	12	5	55	107	1
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, %	20	20	20	20	20	20
Mvmt Flow	2	13	5	60	116	1
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	187	117	117	0	-	0
Stage 1	117	-	-	-	-	-
Stage 2	70	-	-	-	-	-
Critical Hdwy	6.6	6.4	4.3	-	-	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	2.38	-	-	-
Pot Cap-1 Maneuver	763	889	1367	-	-	-
Stage 1	865	-	-	-	-	-
Stage 2	909	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	760	889	1367	-	-	-
Mov Cap-2 Maneuver	760	-	-	-	-	-
Stage 1	862	-	-	-	-	-
Stage 2	909	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9.2	0.6		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1367	-	868	-	-	
HCM Lane V/C Ratio	0.004	-	0.018	-	-	
HCM Control Delay (s)	7.6	-	9.2	-	-	
HCM Lane LOS	A	-	A	-	-	
HCM 95th %tile Q(veh)	0	-	0.1	-	-	






HCM 6th TWSC
5: Cavanaugh Rd & Site Access #5

Long Term Total
PM Peak

Intersection						
Int Delay, s/veh	2.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	7	32	12	53	115	4
Future Vol, veh/h	7	32	12	53	115	4
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, %	20	20	20	20	20	20
Mvmt Flow	8	35	13	58	125	4
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	211	127	129	0	-	0
Stage 1	127	-	-	-	-	-
Stage 2	84	-	-	-	-	-
Critical Hdwy	6.6	6.4	4.3	-	-	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	2.38	-	-	-
Pot Cap-1 Maneuver	739	877	1353	-	-	-
Stage 1	856	-	-	-	-	-
Stage 2	896	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	732	877	1353	-	-	-
Mov Cap-2 Maneuver	732	-	-	-	-	-
Stage 1	847	-	-	-	-	-
Stage 2	896	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9.5	1.4		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1353	-	847	-	-	
HCM Lane V/C Ratio	0.01	-	0.05	-	-	
HCM Control Delay (s)	7.7	-	9.5	-	-	
HCM Lane LOS	A	-	A	-	-	
HCM 95th %tile Q(veh)	0	-	0.2	-	-	







HCM 6th TWSC
6: Cavanaugh Rd & Site Access #6

Long Term Total
PM Peak

Intersection						
Int Delay, s/veh	0.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	15	6	63	146	1
Future Vol, veh/h	2	15	6	63	146	1
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, %	20	20	20	20	20	20
Mvmt Flow	2	16	7	68	159	1
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	242	160	160	0	-	0
Stage 1	160	-	-	-	-	-
Stage 2	82	-	-	-	-	-
Critical Hdwy	6.6	6.4	4.3	-	-	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	2.38	-	-	-
Pot Cap-1 Maneuver	709	840	1317	-	-	-
Stage 1	827	-	-	-	-	-
Stage 2	898	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	705	840	1317	-	-	-
Mov Cap-2 Maneuver	705	-	-	-	-	-
Stage 1	823	-	-	-	-	-
Stage 2	898	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	9.5	0.7		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1317	-	821	-	-	
HCM Lane V/C Ratio	0.005	-	0.023	-	-	
HCM Control Delay (s)	7.7	-	9.5	-	-	
HCM Lane LOS	A	-	A	-	-	
HCM 95th %tile Q(veh)	0	-	0.1	-	-	

Intersection







Int Delay, s/veh 0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	329	529	1	6	9
Future Vol, veh/h	2	329	529	1	6	9
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, %	20	20	20	20	20	20
Mvmt Flow	2	358	575	1	7	10

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	576	0	0 937 575
Stage 1	-	-	- 575 -
Stage 2	-	-	- 362 -
Critical Hdwy	4.3	-	- 6.6 6.4
Critical Hdwy Stg 1	-	-	- 5.6 -
Critical Hdwy Stg 2	-	-	- 5.6 -
Follow-up Hdwy	2.38	-	- 3.68 3.48
Pot Cap-1 Maneuver	914	-	- 273 485
Stage 1	-	-	- 529 -
Stage 2	-	-	- 666 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	914	-	- 272 485
Mov Cap-2 Maneuver	-	-	- 272 -
Stage 1	-	-	- 528 -
Stage 2	-	-	- 666 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	15.2
HCM LOS			C







Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	914	-	-	-	369
HCM Lane V/C Ratio	0.002	-	-	-	0.044
HCM Control Delay (s)	8.9	-	-	-	15.2
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.1







Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	325	537	1	6	9
Future Vol, veh/h	2	325	537	1	6	9
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, %	20	20	20	20	20	20
Mvmt Flow	2	353	584	1	7	10

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	585	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.3	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.38	-	-
Pot Cap-1 Maneuver	907	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	907	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	15.3
HCM LOS	C		

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	907	-	-	-	366
HCM Lane V/C Ratio	0.002	-	-	-	0.045
HCM Control Delay (s)	9	-	-	-	15.3
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.1







Intersection						
Int Delay, s/veh	1.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	14	310	539	7	17	37
Future Vol, veh/h	14	310	539	7	17	37
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, %	20	20	20	20	20	20
Mvmt Flow	15	337	586	8	18	40
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	594	0	-	0	953	586
Stage 1	-	-	-	-	586	-
Stage 2	-	-	-	-	367	-
Critical Hdwy	4.3	-	-	-	6.6	6.4
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	2.38	-	-	-	3.68	3.48
Pot Cap-1 Maneuver	900	-	-	-	267	478
Stage 1	-	-	-	-	523	-
Stage 2	-	-	-	-	663	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	900	-	-	-	262	478
Mov Cap-2 Maneuver	-	-	-	-	262	-
Stage 1	-	-	-	-	514	-
Stage 2	-	-	-	-	663	-
Approach	EB	WB		SB		
HCM Control Delay, s	0.4	0		16.2		
HCM LOS	C					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	900	-	-	-	380	
HCM Lane V/C Ratio	0.017	-	-	-	0.154	
HCM Control Delay (s)	9.1	-	-	-	16.2	
HCM Lane LOS	A	-	-	-	C	
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5	

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	4	320	574	2	4	11
Future Vol, veh/h	4	320	574	2	4	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	-	-	100	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	4	348	624	2	4	12

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	626	0	980
Stage 1	-	-	624
Stage 2	-	-	356
Critical Hdwy	4.3	-	6.6
Critical Hdwy Stg 1	-	-	5.6
Critical Hdwy Stg 2	-	-	5.6
Follow-up Hdwy	2.38	-	3.68
Pot Cap-1 Maneuver	875	-	257
Stage 1	-	-	501
Stage 2	-	-	671
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	875	-	256
Mov Cap-2 Maneuver	-	-	256
Stage 1	-	-	498
Stage 2	-	-	671

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	15
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	875	-	-	-	376
HCM Lane V/C Ratio	0.005	-	-	-	0.043
HCM Control Delay (s)	9.1	-	-	-	15
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection						
Int Delay, s/veh	0.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	6	316	582	3	8	15
Future Vol, veh/h	6	316	582	3	8	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	100	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	7	343	633	3	9	16

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	636	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.3	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.38	-	-
Pot Cap-1 Maneuver	867	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	867	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	16.3
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	867	-	-	-	344
HCM Lane V/C Ratio	0.008	-	-	-	0.073
HCM Control Delay (s)	9.2	-	-	-	16.3
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

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