

TRAFFIC IMPACT ANALYSIS

Aurora Logistics Center (ALC)

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I. INTRODUCTION

The Aurora Logistics Center (ALC) development is an approximate 1,280-acre master plan development proposal located between Peña Boulevard and Interstate 70 (I-70) in Aurora, as shown on **Figure 1**. The uses will consist primarily of commercial and industrial uses with up to 16.4 million square feet of developed space. Buildout of this Framework Development Plan (FDP) will take many years to complete, possibly beyond the 2045 horizon of this analysis.

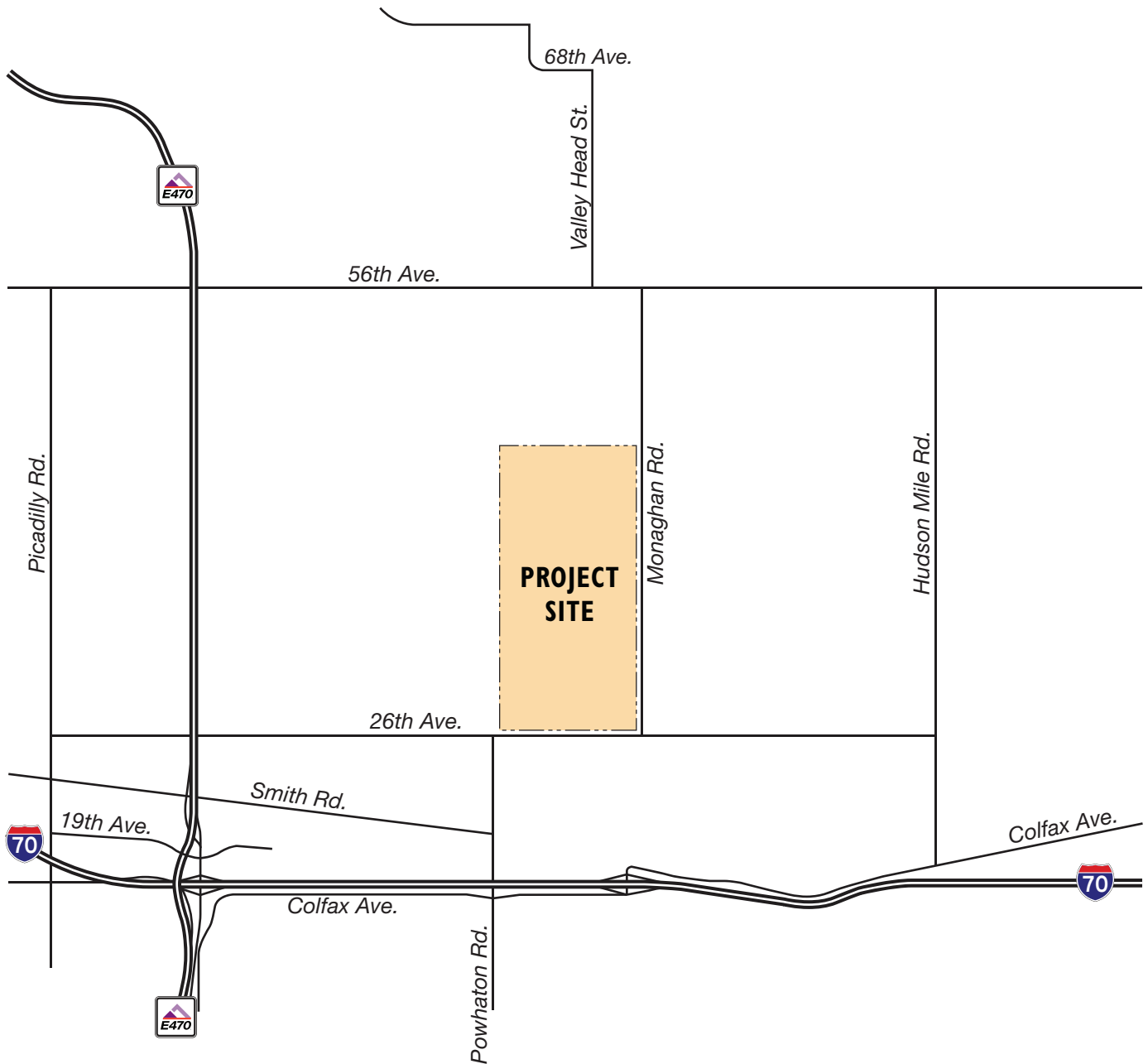
The site is rectangular in shape and bounded on the south by 26th Avenue and 48th Avenue on the north. A future extension of Powhaton Road to the north would serve as the western boundary of the development, and Monaghan Road will serve as the eastern boundary of the site. **Figure 2** illustrates the proposed FDP site plan. A total of 25 planning areas (including open spaces parcels) are identified in the master plan development, bisected by an interior roadway network. Exact roadway alignments will be determined at the time of Contextual Site Plan (CSP), but roadway connection intentions are presented for the FDP's planning areas, consistent with the City's Roadway Design and Technical Criteria Manual per Section 4.04.1.

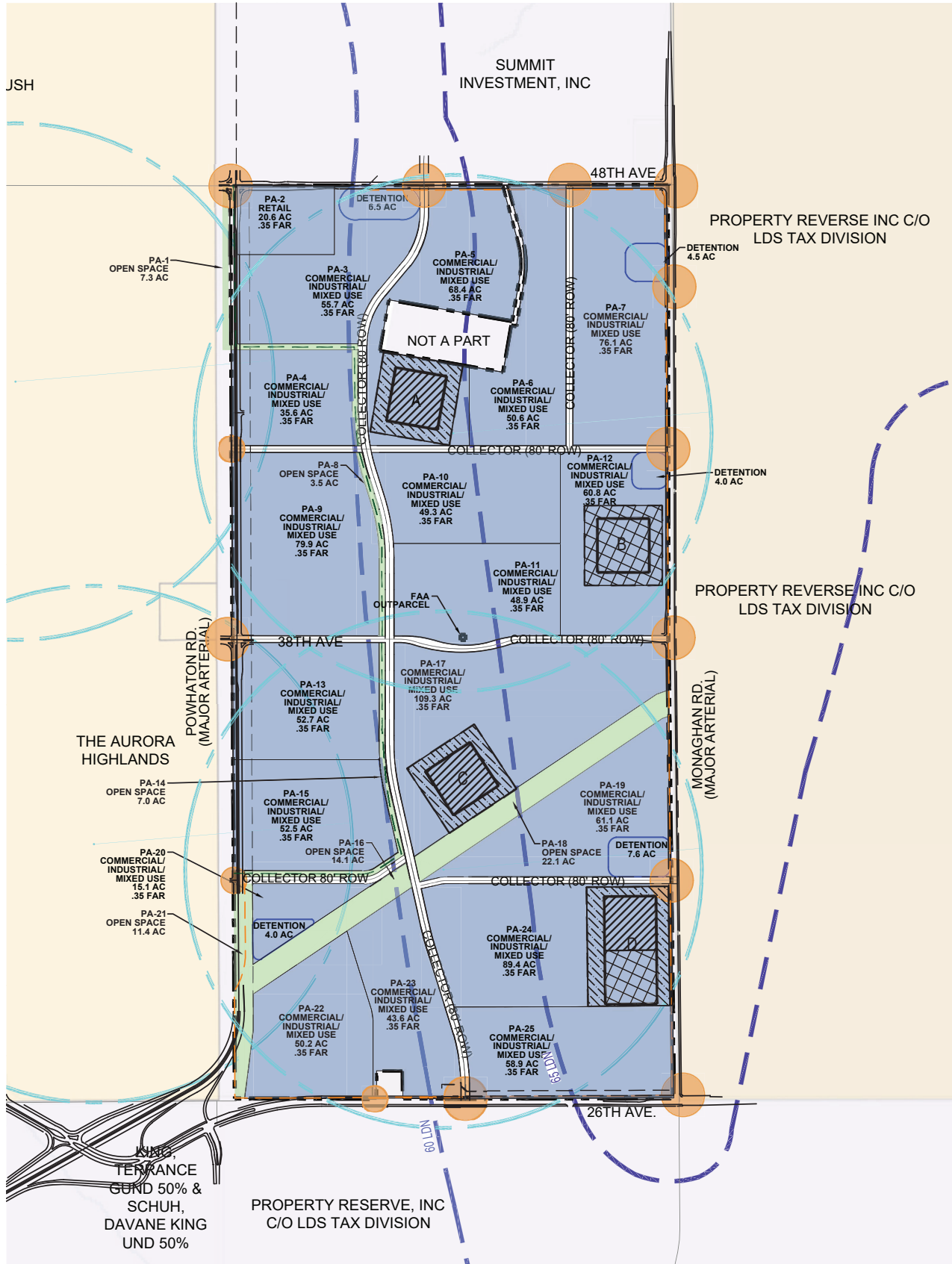
Currently, access into the area is limited. In this undeveloped area, 56th Avenue (one mile north of the site) and 26th Avenue are the primary means of access. 56th Avenue provides a direct connection to E-470 to the west. Powhaton Road provides a connection to E. Colfax Avenue to the south, which, in turn, provides a direct connection to I-70 approximately 0.9 mile to the east.

The purpose of this study is to assess the traffic impacts on the key roadways related to the proposed development to support projected traffic volumes. This report includes information on existing traffic conditions, vehicle-trips associated with the planned development, total traffic volume projections, and recommendations on future roadway needs, including supporting analysis for roadway classifications. A maximum development scenario was analyzed with respect to traffic impacts. More detailed traffic impact studies may be appropriate for individual parcels as they are developed.

This analysis focuses on the long-term timeframe, year 2045, using the *Aurora Northeast Area Transportation Study (NEATS) Refresh Transportation Plan* as a means of informing background traffic along study area roadways. More recently, traffic analysis work associated with the 26th Avenue/Powhaton Road/Aerotropolis Parkway intersection was used as a basis for this study as well. That study, prepared by AECOM in June 2022, presents long-term traffic projections along the perimeter ALC arterial roadways, and these were used in developing traffic projections in this traffic impact study.

A short-term timeframe was not specifically analyzed in this study because of the numerous variables associated with the surrounding development and the timing of that development. This study focuses on the long-term (year 2045) timeframe realizing that a roadway improvement phasing plan (in conjunction with other development) will be needed to serve this and the adjoining FDPs.





II. EXISTING CONDITIONS

II.A. Land Use

Currently, the site is undeveloped and lies entirely within the Aurora city limits. The area that immediately surrounds these two sections is undeveloped, but the Aurora Highlands to the west is developing and numerous homes have been built. Green Valley Ranch is a nearby residential area to the west (west of Picadilly Road), and the Majestic Commerce Center is an industrial/warehouse area located immediately south of Green Valley Ranch. Various other small commercial developments exist along I-70 directly south of the master plan, but there is little development near the ALC master plan site.

II.B. Transportation Network

Roadways

Key roadways that currently serve the site include the following:

- **E-470** is a north-south four-lane tollway that is located 2 miles to the west of the proposed development. A grade-separated interchange is provided at 56th Avenue. An interchange is planned at 48th Avenue where the bridge over E-470 at 48th Avenue is in place. An interchange at 38th Avenue is also underway in conjunction with the development of The Aurora Highlands.
- **26th Avenue** is a minor two-lane roadway facility along the south side of the ALC development that crosses E-470 (no interchange) and extends for 7 miles, from Picadilly Road to the west and Watkins Road to the east.
- **Powhaton Road** is a two-lane road that extends south from 26th Avenue as a two-lane facility, crossing the Union Pacific Railroad (UPRR) at-grade, spanning I-70, and extending south approximately 5 miles to Jewell Avenue. The northern extension of Powhaton Road north of 26th Avenue will ultimately define the west side of the development, but this road is not yet built.
- **Monaghan Road** is an existing two-lane road that serves as the eastern boundary for the proposed development. Monaghan Road extends 3 miles from 26th Street to 56th Street.

A key future roadway worth noting is Jackson Gap Way. Ultimately, Jackson Gap Way will serve as the primary entrance north into Denver International Airport (DEN), continuing south of the site, winding east to the Powhaton alignment, and connecting to I-70 via an interchange as a diagonal roadway toward the southwest from the Powhaton/26th Avenue intersection. The planned roadway network through the area contains many of the elements identified in the current NEATS study with respect to arterial roads.

Traffic Volumes and Operations

Since the area in the immediate vicinity of the ALC FDP is undeveloped, there is little existing traffic on the roadway network. A spot check of the most recent counts on the county roadways surrounding the development indicates that volumes are typically under 1,000 vehicles per day (VPD). Along I-70 near the Powhaton Road alignment, approximately 31,000 VPD occurred in 2022.

III. FUTURE ROADWAY NETWORK

In 2022, the city of Aurora completed the *NEATS Refresh* study and the Powhaton Road Alignment Study. The NEATS Refresh Study provides Year 2040 and regional buildout transportation recommendations for the roadways and a multimodal transportation system. The NEATS study area encompassed a regional area extending from approximately Tower Road east to Schumaker Road, and from Jewell Avenue on the south to 72nd Avenue on the north. Recommendations with respect to the ALC FDP include:

- **26th Avenue** would be designated as a four-lane minor arterial plus turn lanes. The existing grade separation over E-470 will be maintained to the west, and 26th Avenue would continue to end at Watkins Road to the east. Signalized and roundabout intersections would be allowed at a minimum of one-eighth-mile spacing with other public or private access usually restricted to right-in/right-out intersections spaced at a minimum of 300 feet from other intersections.
- **38th Avenue** would be a collector street with turn lanes as required serving the ALC development, from Monaghan Road through ALC to Powhaton Road and into the adjacent Aurora Highlands development. Signalized, roundabout and stop-controlled intersections would be allowed at a minimum one-eighth-mile spacing, with some restrictions on other public or private access intersections.
- **48th Avenue** would be designated as a major arterial with turn lanes between Monaghan Road and Powhaton Road. West of Powhaton Road, 48th Avenue would also be a six-lane major arterial with turn lanes through the interchange with E-470 and to the intersection with Picadilly Road. A four-lane facility is planned east of Powhaton Road. At-grade signalized intersections would be allowed at a minimum of one-eighth-mile spacing. Public or private access would be restricted to right-in/right-out intersections spaced at a minimum of 300 feet from each other from other intersections.
- **Powhaton Road** would be designated as a six-lane major arterial with turn lanes along the western boundary of the ALC FDP, from 26th Avenue to 48th Avenue. North of 48th Avenue, the designation would continue as a six-lane major arterial as it winds to the west into the Jackson gap way alignment as the major primary north entrance into DEN. To the south of 26th Avenue, the designation would remain as a six-lane major arterial with turn lanes. A new grade separation over the UPRR would be constructed, and the existing grade separation over I-70 would remain. At-grade signalized intersections would be allowed at one-half-mile spacing with other public or private access usually restricted to right-in/right-out intersections with auxiliary turn lanes.
- **Monaghan Road**, immediately adjacent to the ALC FDP, would be designated as a four-lane minor arterial with turn lanes from 26th Street north to 64th Avenue. To the south, Monaghan Road would be extended as a major arterial with turn lanes to include a grade separation over the UPRR and tie into an interchange with I-70. South of the interstate, Monaghan Road would continue as a major arterial to Jewell Avenue. Signalized and roundabout intersections would be allowed at a minimum one-eighth-mile spacing with other public or private access usually restricted to right-in/right-out intersections.

- **Aerotropolis Parkway/Harvest Road** is proposed to be a six-lane major arterial with turn lanes from its current northern terminus at East 6th Avenue, continuing north through a new interchange with I-70, a grade separation over the UPRR, and its transition to the northeast to tie into Powhatan Road near the intersection with 26th Avenue as indicated in the current *NEATS Refresh*. Given the diagonal roadway south of 26th Avenue that will lead to the I-70/Harvest Road interchange, AECOM conducted more analysis that identified a diverging diamond interchange layout, which is the basis of analysis of this report. North of 26th Avenue, at-grade signalized intersections would be allowed at one-half-mile spacing with other public or private access usually restricted to right-in/right-out intersections.

Access-wise, development within the ALC FDP will primarily be served by 32nd Avenue, 38th Avenue, 42nd Avenue, and the north-south collector road. Powhatan will be access-limited, and direct access onto the other perimeter arterials will be controlled, and some may include turn restrictions.

IV. FUTURE PROJECTED CONDITIONS

This traffic study assesses the traffic conditions and impacts associated with the full buildout of the master plan. The intent is to assess the lane configuration of the major roadway network adjacent to the FDP and the collector roads planned to be built within. The buildout scenario assesses year 2045 conditions consistent with the *NEATS Refresh* and the AECOM June 2, 2022 Traffic Forecasting memorandum previously referenced. The long-term analysis assesses the road system given daily traffic projections and peak hour traffic projections at the perimeter roadways. The same analyses incorporate the potential of ALC being built out to its maximum density. As individual parcels develop, a more refined traffic impact study may be appropriate to assess access specifics and/or to update information presented in this report.

Traffic projections shown in this study are based on the premise that ALC would be built out to its maximum densities per the FDP proposal (and FAR=0.35). Traffic demands associated with the remainder of the area and region are based on raw the projections shown in the AECOM memo.

IV.A. Site Trip Generation

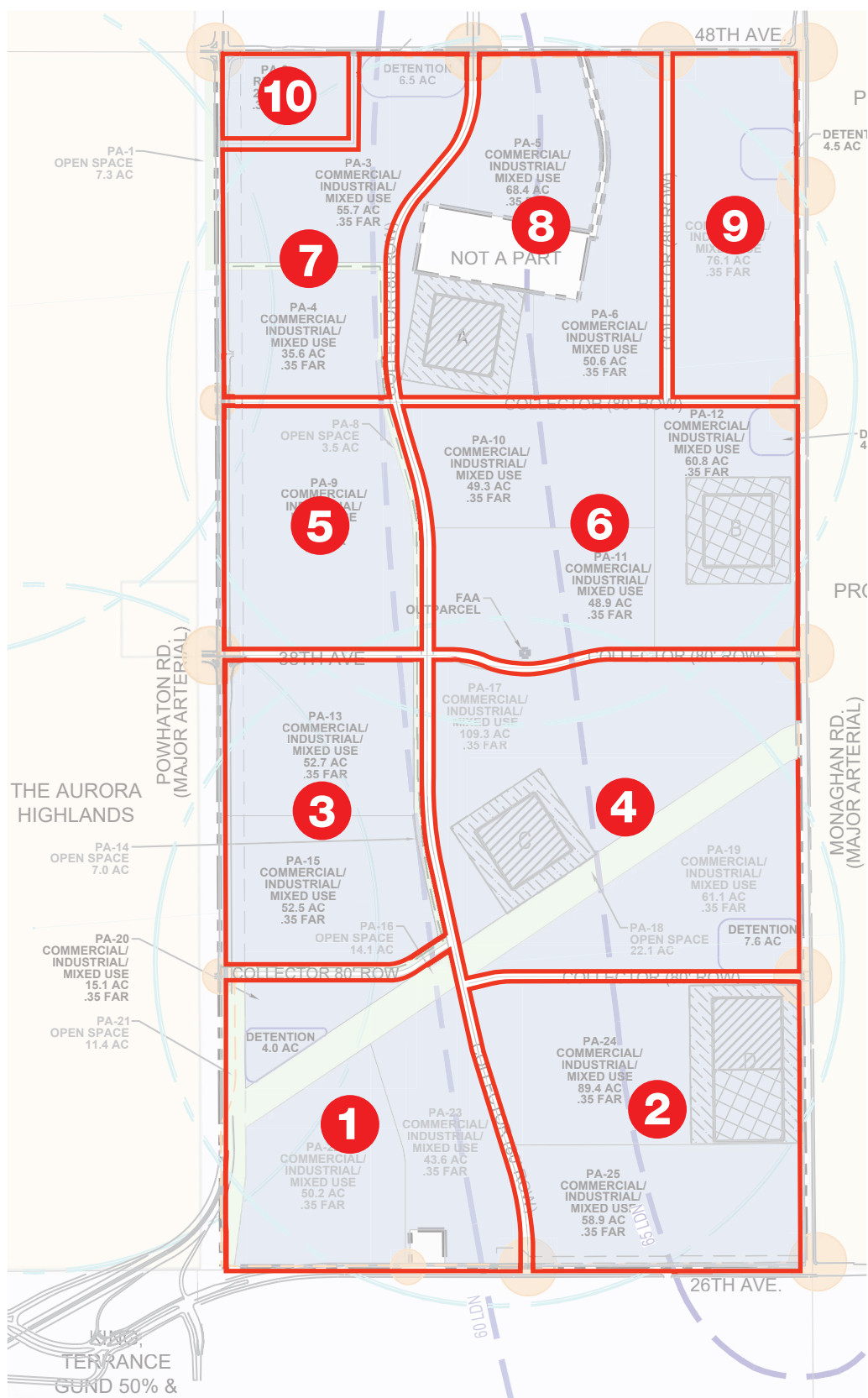
The number of vehicle-trips that will be generated by the proposed development was estimated based on trip rates and procedures documented in *Trip Generation* (Institute of Transportation Engineers, 11th Edition, 2021). The category used in this analysis includes industrial uses, ITE Code 130, Industrial Park and ITE code 820, shopping center. **Table I** summarizes the trip generation estimates by planning area. In total, the entire ALC FDP is estimated to generate 51,600 external vehicle trips per day if built out to its absolute maximum. The planning areas shown in **Table I** correspond to the Transportation Analysis Zones (TAZs) shown on **Figure 3**.

It should be noted that the rectangular white parcel shown on **Figure 3** in the northern portion of the FDP site is not included in this trip generation estimate since it is no part of the FDP and not planned for development at this time.

Table 1. Trip Generation Summary¹

Fig. 3 TAZ Zone #	Acres	Land Use	Developed SF Area (KSF)	Daily Trips	AM Peak Hour			PM Peak Hour		
					In	Out	Total	In	Out	Total
1	108.9	Commercial/ Industrial Park	1660	4047	457	108	565	124	441	565
2	148.3	Commercial/ Industrial Park	2261	4752	623	146	769	169	600	769
3	105.2	Commercial/ Industrial Park	1604	3975	442	103	545	120	425	545
4	170.4	Commercial/ Industrial Park	2598	5108	715	168	883	194	689	883
5	79.9	Commercial/ Industrial Park	1218	3445	335	79	414	91	323	414
6	159	Commercial/ Industrial Park	2424	4927	668	156	824	181	643	824
7	91.3	Commercial/ Industrial Park	1392	3692	383	90	473	104	369	473
8	119	Commercial/ Industrial Park	1814	4238	500	117	617	136	481	617
9	76.1	Industrial Park	1160	3359	320	74	394	87	307	394
10	20.6	Shopping Center	314	14064	198	121	319	618	669	1287
			16446	51607	4641	1162	5803	1824	4947	6771

¹Square footage amounts based on applying a Floor-Area ratio (FAR) of 0.35.



IV.B. Trip Distribution and Traffic Assignment

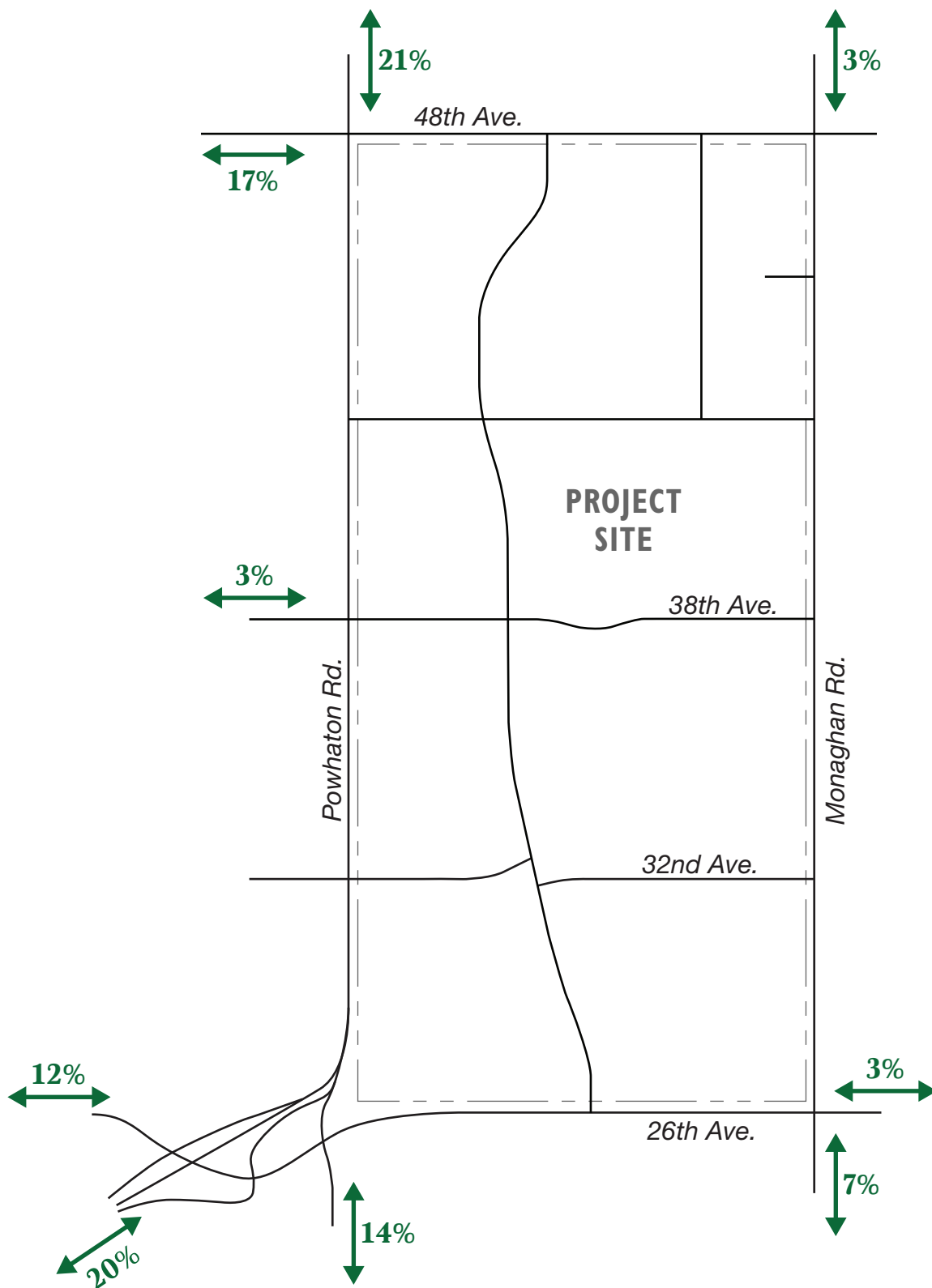
The site trip distribution assumptions for the ALC development have been estimated from the NEATS model TAZ centroid traffic loadings and professional judgment of the directionality of these trips apparent in the 2040 NEATS assignment results. The distribution percentages are based on patterns observed from the NEATS travel demand modeling. That is, FHU staff reviewed the raw results of the model to help develop the percentages. Results were modified based on feedback from city staff on the first submittal of this report in September 2020.

Figure 4 shows the trip distribution percentages used in the study. The NEATS model indicates that the trip distribution for the site will be primarily focused to the south, west, and north. Numerous roads will serve the site traffic in these overall cardinal directions. However, westerly-oriented traffic is anticipated to primarily make use of 48th Avenue, and to a lesser degree 26th Avenue. The model does not suggest that 38th Avenue would necessarily play a significant role in serving westerly-oriented site traffic. This is primarily due to the planned residential area to the west (The Aurora Highlands), which will not provide a direct east-west arterial connectivity through that area.

The direct diagonal connection heading away from the site toward the southwest via a new major road will directly connect to a future interchange to I-70, and this directional orientation will be a significant attraction of site traffic. The NEATS travel demand model suggests a significant amount of the site's traffic will use this direct regional access, and 20 percent of the site traffic is anticipated to do so. There will also be an attraction to DEN and other planned development, all of which would be served by Powhatan Road to Jackson Gap Street Road to the north, and to a lesser extent Monaghan Road to the north.

Applying the trip distribution percentages of **Figure 4** to the trip generation estimate of **Table I** yields the site-generated traffic shown on **Figure 5**. These estimates have been developed assuming that the zones (shown on **Figure 3**) will have access to each adjacent roadway, with the exception of Powhatan Road, in which no direct access will be allowed other than the intersections with 32nd Avenue, 38th Avenue, and 42nd Avenue. Resulting projections will be greater than those in NEATS since this study considers the maximum buildout potential of ALC, whereas the *NEATS Refresh* considered a less-intense development level. Within ALC, very little development was assumed to occur in the ALC property with respect to the NEATS travel demand model.

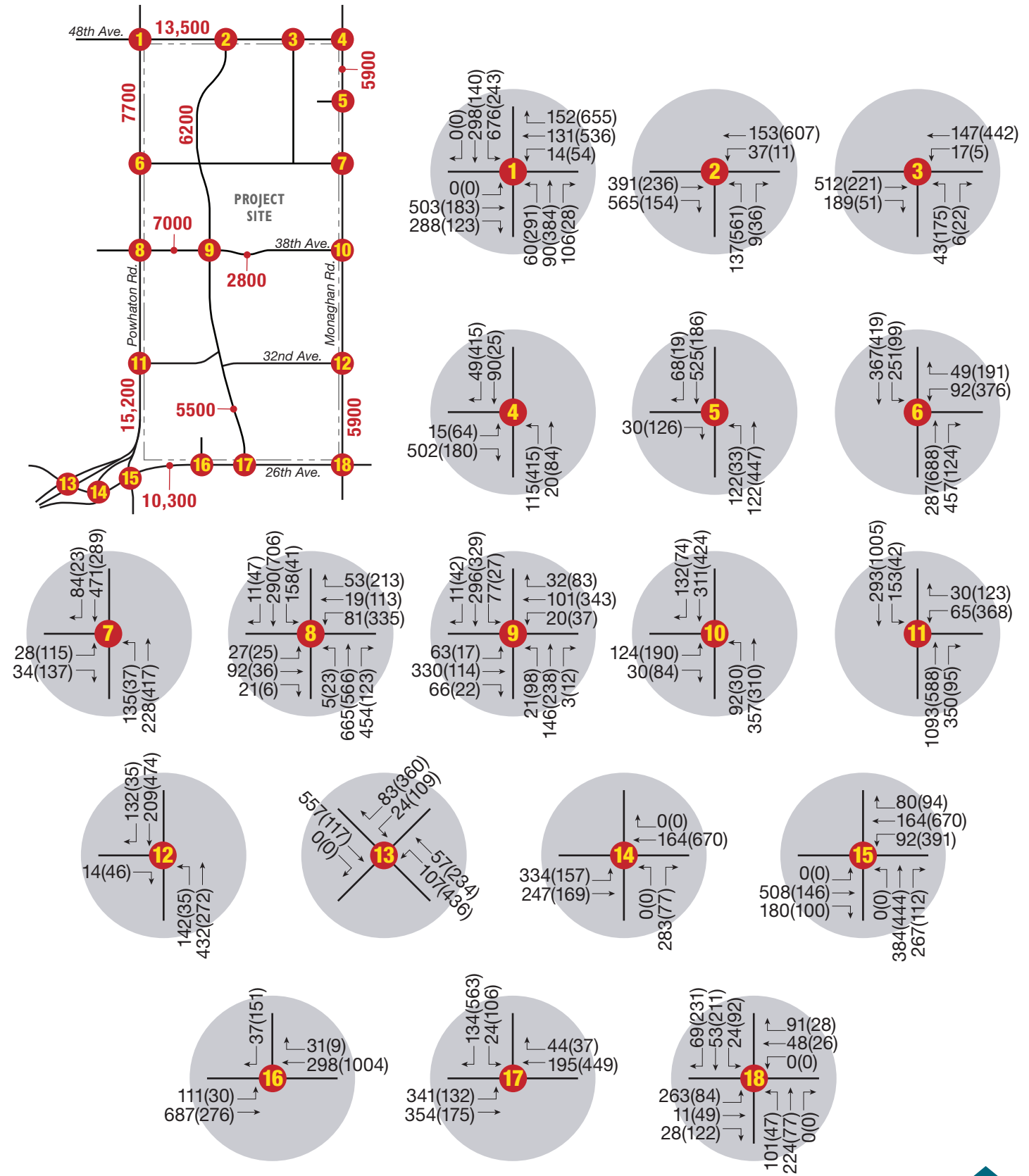
The roadway that will be impacted the most by site traffic is Powhatan Road, which is projected to serve 15,200 VPD of ALC traffic adjacent to the site. The internal collector roads are anticipated to serve less than 8,000 VPD of site traffic.



LEGEND

XX% = Site Trip Distribution

KEY MAP



LEGEND

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

XXXX = Daily Traffic Volumes

NOTE: Drawing Not to Scale



FIGURE 5

ALC Site Generated Traffic Volumes

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IV.C. Background Traffic Volumes

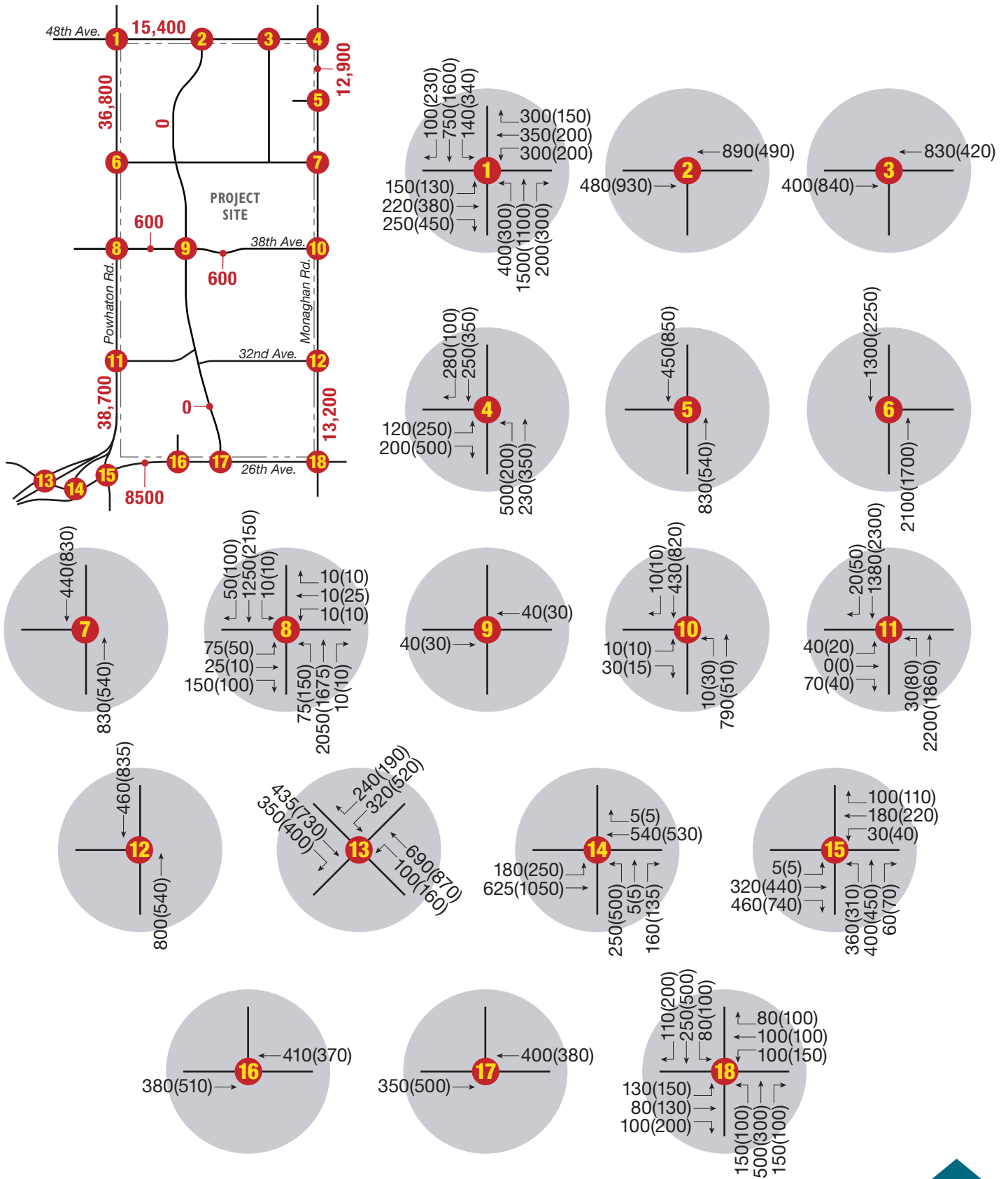
The AECOM Traffic Forecasting memo, previously referenced, was used as the primary means of developing background traffic for this ALC FDP traffic study. This memo provides daily traffic projections along all ALC perimeter roadways, which included trips generated by ACL property. Estimated trips from the ALC FDP area programmed into the AECOM memo were removed in developing 2045 background traffic for this study.

Resulting daily traffic was then converted to AM and PM peak hour traffic by applying an approximate 9 percent and 10 percent, respectively, peak hour percentage. Directional split of the peak hour traffic was estimated from the AM and PM peak period assignment results per the NEATS travel demand modeling.

The peak hour intersection turning movement projections were then developed by applying techniques developed by the National Cooperative Highway Research Program. Adjustments were made to produce reasonable AM and PM peak hour directional reflection patterns and to reasonably balance traffic flows between successive intersections.

Background traffic volume estimates are shown on **Figure 6**. Powhatan Road will be the busiest roadways in the study area serving an estimated background traffic demand of approximately 39,000 VPD north of 26th Avenue, which is the highest volume roadway along the ALC perimeter with respect to background traffic.

KEY MAP



V. YEAR 2045 TOTAL TRAFFIC CONDITIONS

The daily and peak hour traffic volume estimates for the ALC site shown on **Figure 5** were combined with the Year 2045 background traffic volume projections of **Figure 6** to create the Year 2045 total traffic forecasts along the study area roads and intersections. These estimated forecasts are shown on **Figure 7**.

Powhatan Road is projected to carry the greatest traffic in the immediate study area. There is a strong background pattern projected involving vehicles traveling the diagonal segment of Aerotropolis Parkway south of 26th Avenue to/from Jackson Gap Street to the north into DEN. This roadway will ultimately provide a new interchange with I-70. Other notable volume forecasts include 48th Avenue, which could serve 28,900 VDP adjacent to the site. Monaghan Road and 26th Avenue are both projected to serve less than 20,000 VPD.

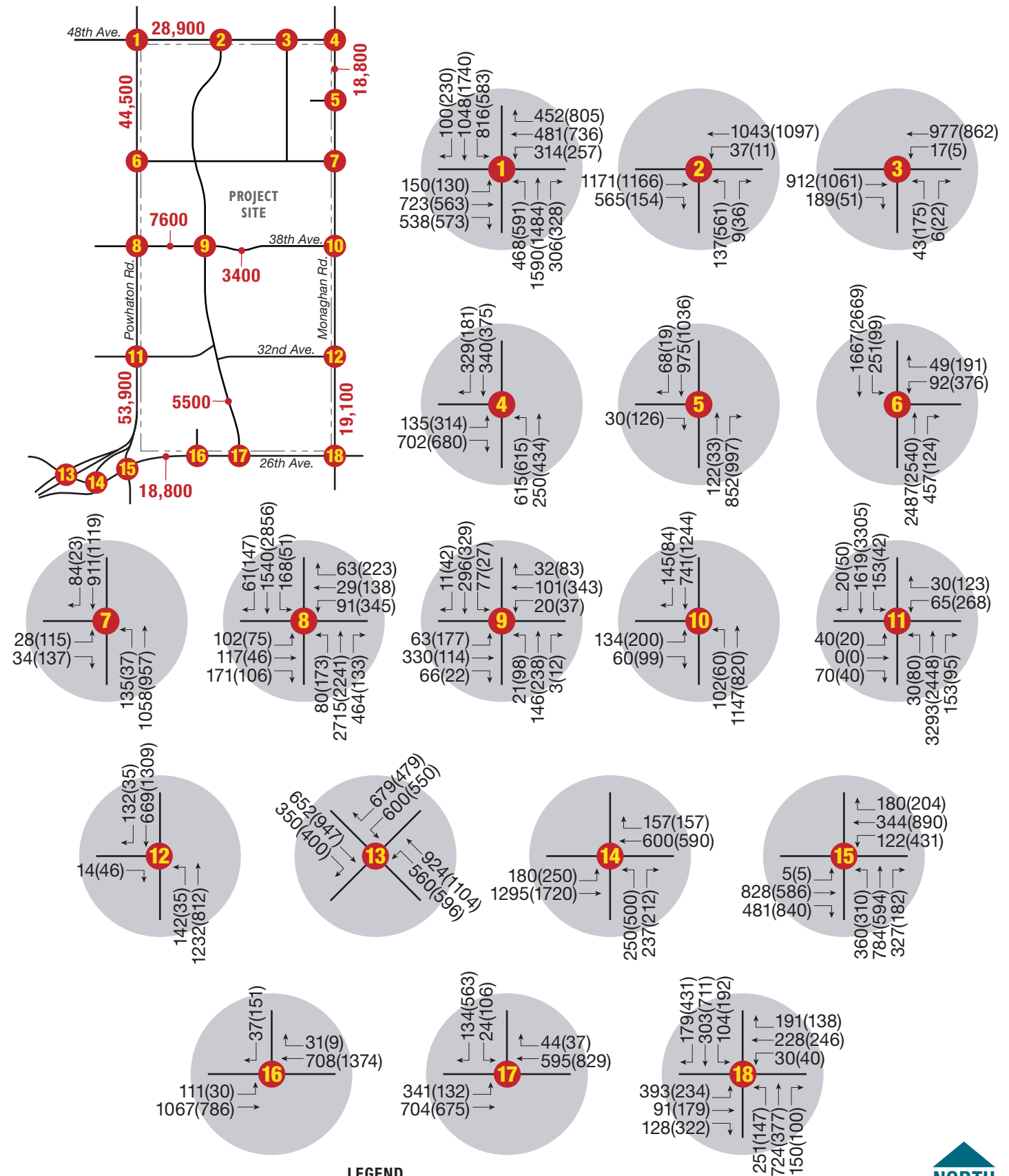
V.A. Traffic Signalization Warrant Analyses

The *Manual on Uniform Traffic Control Devices* (MUTCD) identifies eight warrants that provide guidance to determine whether installation of a traffic signal is justified. Some of these warrants are based on traffic volume levels, while others are based on the accident history of an intersection or whether the intersection is a designated school crossing. The four-hour warrant has been applied to assess the need. Forecasts for the four highest hours of a typical weekday were developed by applying factors to the AM and PM peak hours. Other than the planned interchange at Powhatan Road/Aerotropolis Parkway/26th Avenue (which will clearly involve signalization), other intersections were evaluated as shown in **Appendix A**. The following were found to meet warrants based on the 2045 traffic projections:

- Powhatan Road/38th Avenue
- Powhatan Road/48th Avenue
- Powhatan Road/42nd Avenue
- Powhatan Road /32nd Avenue
- Monaghan Road/26th Avenue
- Monaghan Road/38th Avenue
- Monaghan Road /42nd Avenue
- Monaghan Road/48th Avenue
- 26th Avenue/ North-south internal collector road
- 26th Avenue/Powhatan Road
- 26th Avenue/Diverging Diamond intersections
- 48th Avenue/North-south internal collector roads (both intersections)

Other intersections onto the adjacent arterials are recommended for restricted movements, which is discussed later in this report.

KEY MAP



LEGEND

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

XXXX = Daily Traffic Volumes



NOTE: Drawing Not to Scale



FIGURE 7

ALC 2045 Total Traffic Volumes

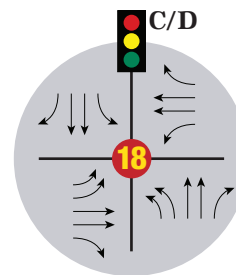
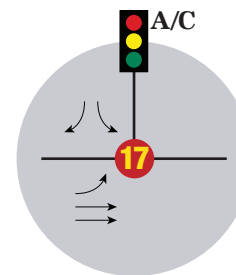
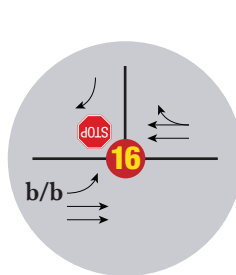
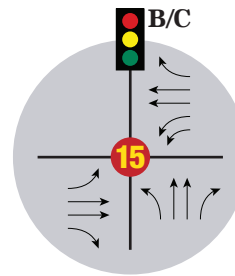
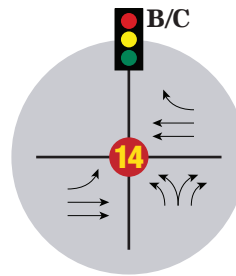
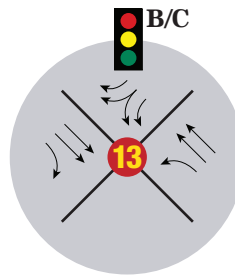
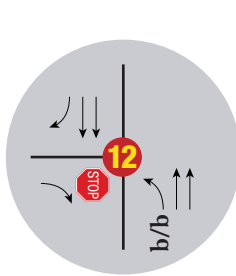
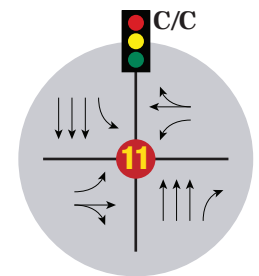
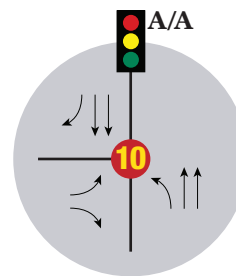
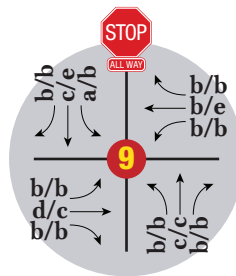
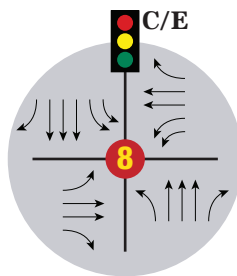
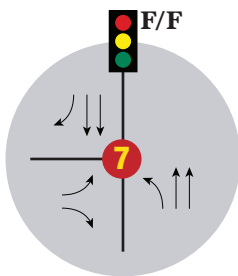
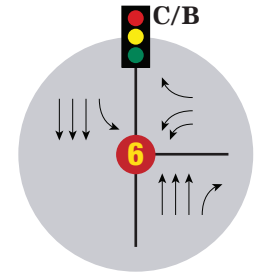
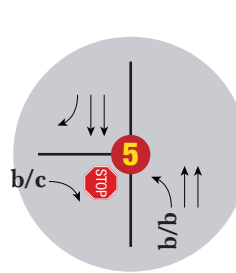
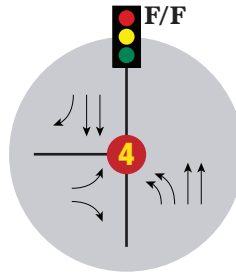
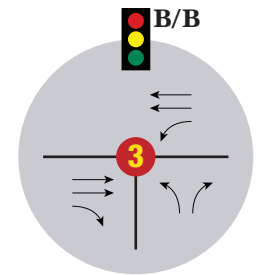
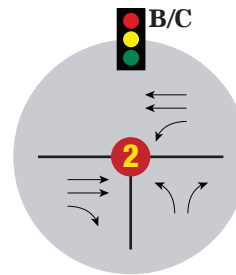
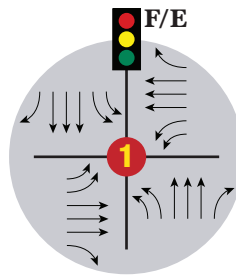
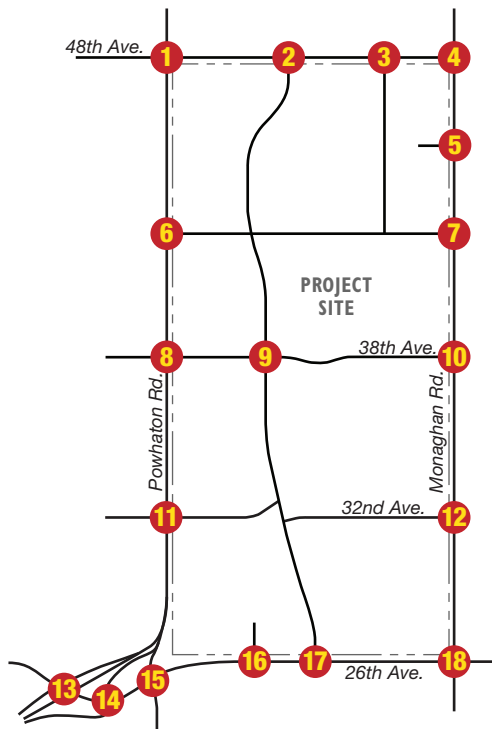
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V.B. Roadway and Intersection Capacity Analyses

Capacity analyses were conducted for the surrounding roadway network using the traffic volume estimates of **Figure 7**. The level of service (LOS) analysis results and intersection lane requirements can be found on **Figure 8** (worksheets are shown in **Appendix B**). With respect to the roadways, **Figure 9** shows the roadway needs in map form with the following cross-sections descriptions below:

- **Aerotropolis Parkway** (diagonally to the southwest) should ultimately be built to a major arterial classification to include six through lanes of traffic. Turn lanes are needed at the major intersections as described in the following section.
- **Powhatan Road**, from 26th Avenue to 48th Avenue, should ultimately be built to a major arterial classification to include six through lanes of traffic. North of 48th Avenue, the cross section would continue as a six-lane arterial, connecting with Jackson Gap Parkway near 56th Avenue (on further into DEN). South of 26th Avenue, the cross section would reduce to a four-lane section. Turn lanes are needed at the intersections as described in the following section.
- **Monaghan Road**, from 26th Avenue to 48th Avenue, should be built to a four-lane minor arterial cross-section with widened sections for turn lanes at major intersections as described in the following section.
- **26th Avenue** should be built to a four-lane minor arterial standard. Left turn lanes will be needed at all cross-streets, and right turn lanes will be needed at the heavier-used cross-streets.
- **38th Avenue** should be built to a three-lane collector standard through the site, which includes a center left turn lane and one through lane in each direction. Additional turn lanes will be needed at the Powhatan Road intersection.
- **48th Avenue** will be a four-lane arterial adjacent to the ATEC site, widening to a six-lane arterial west of Powhatan Road. Turn lanes will be required at all intersections.
- The **North-South collector road** through the site should be built to a three-lane collector standard through the site, which includes a center left turn lane and one through lane in each direction. Additional turn lanes will be needed at the 26th Avenue, 38th Avenue, and 48th Avenue intersections.
- **32nd and 42nd Avenues** should be built to include two through lanes, with a two-lane collector roadway classification being most appropriate.

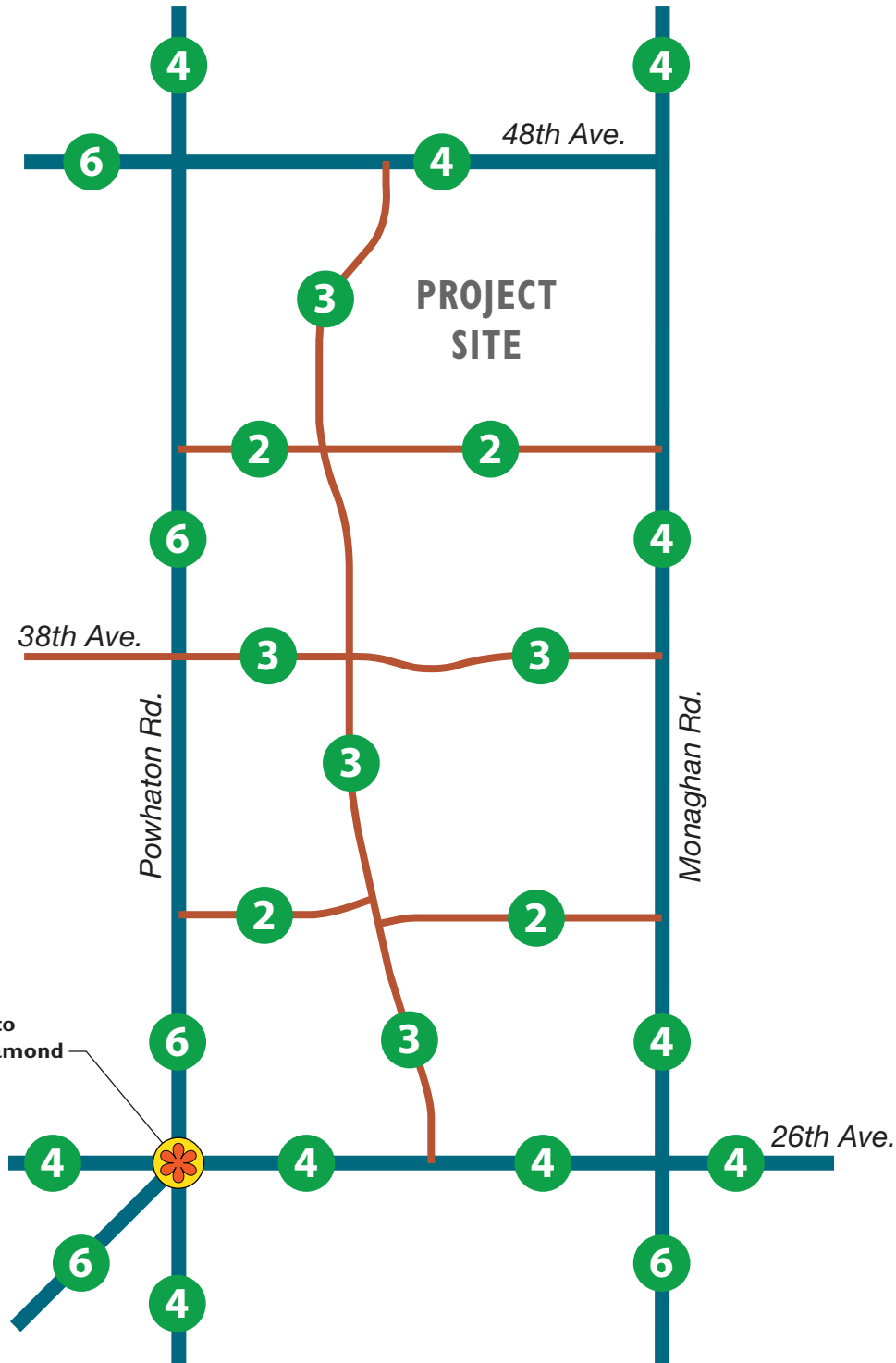
KEY MAP



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



NOTE:
This intersection to
be a Diverging Diamond
Interchange

LEGEND

- = Arterial
- = Collector
- X = Number of Through Lanes

With respect to the intersections, the following illustrate the turn lane geometry needs at specific intersections analyzed in this study:

- **Powhaton/48th.** Lane needs include dual left turn lanes on all four approaches. Each approach should also provide separate right turn lanes. Even with this “maxed-out” intersection geometry, this intersection could still experience operational challenges during peak hours given the high level of background traffic projected along Powhaton Road. A 150-second cycle length may be needed for this intersection to function properly (which was applied to this analysis).
- **48th/North-South Collector Road.** As a tee intersection, this intersection should function no worse than LOS C. While not needed from a LOS perspective, dual left turn lanes should be considered along the northbound approach. Dual left turns were not specifically analyzed in this report, but a more detailed future traffic impact study should consider this possibility.
- **48th/Monaghan.** With 48th Avenue terminating at Monaghan, this will be a tee-intersection. Background traffic will be the primary culprit to warranting signalization. Dual left turn lanes should be provided along the northbound approach.
- **26th/Monaghan.** Each approach should ultimately provide dual through lanes, a separate right turn lane, and a separate left turn lane. The northbound and eastbound approaches should also include a second left turn lane.
- **Powhaton/38th.** Lane needs include dual left turn lanes along the southbound and westbound approaches. Separate right turn lanes should also be provided along all four approaches. Two east-west through lanes should be provided in each direction.
- **38th/North-South Collector Road.** This internal intersection will not warrant signalization. Acceptable operations can be achieved with an all-way-stop intersection. A separate lane should be provided for each movement along all four approaches.
- **38th/Monaghan.** With 38th Avenue terminating at Monaghan, this will be a tee-intersection that is anticipated to warrant signalization. Single turn lanes for all turning movements should be provided as should dual through lanes north-south.
- **26th/North-South Collector.** Signalization will be warranted based on the 2045 traffic, and this intersection will experience a heavy pattern of traffic between the north and west legs of this intersection. Given the heavy southbound right turn movement, a free-flow southbound right turn lane could potentially be built provided that a westbound acceleration lane is added to 26th Avenue to receive free-flowing traffic.
- **32nd/Powhaton.** This intersection will be signalized to serve the east side of the road. Because this roadway lines up with a residential roadway within The Aurora Highlands, a special design will be required to physically prohibit east-west through traffic while allowing the signal to serve left turns, right turns, and the north-south through traffic. A northbound right turn deceleration lane is needed.
- **32nd/ Monaghan.** This intersection is recommended to be three-quarter movement in which the eastbound left-out movement would be prohibited. A planned signal at 38th Avenue can instead serve this left turn demand.
- **26th/Monaghan.** This intersection will need dual left turn lanes along the northbound and eastbound approaches. All four approaches should also be built with a separate right turn lane and dual through lanes. Signalization should be planned.
- **Powhaton/Aerotropolis/26th.** This is a planned diverging diamond interchange. The analyses presented in this report indicate that this configuration will function well.

Several perimeter intersections have been identified to be limited turns to avoid installing too many signals and also realizing that another nearby signal would be accessible. These intersections include:

- Monaghan/42nd Avenue
- Monaghan/32nd Avenue
- 26th/Access (first one east of Powhaton). Development served by this access should ideally be able to access the north-south collector road. That is, Planning Area 22 on the master plan should be provided access to the north-south collector road through Planning Area 23.

In addition to the turn lane needs described above, a queuing analysis at the study area intersections was also completed, the results of which are shown in **Table 2**

The City of Aurora's *Traffic Impact Study Guidelines* indicate that the CDOT State Highway Access Code (SHAC) be used to determine storage and taper lengths. These values often yield overly conservative results and provide storage well in excess of 95th percentile queues (which already incorporate a heavy vehicle percentage of 10 percent), often by a factor of two to three. The SHAC procedures do not account for other conditions in the intersection such as low opposing through movements if a left turn movement is in question. As such, there are instances above where the final recommendation would more appropriately align with the 95th percentile lengths relative to informing design. Lead-in taper lengths of 144 feet (188 feet where dual left turn lanes are to be provided) should be used, indicative of a 40 MPH speed per CDOT SHAC. **Table 2** indicates which movements are more appropriately sized from the 95th percentile result. The second to last column reflects our recommended lane length based on the results and engineering judgement.

Table 2. Year 2045 Intersection Queuing Results*

Location	Critical Movements	95% Queue Length (ft)	Recommended Storage Length	SHAC Recommended Auxiliary Lane Length
		2045 Build (AM/PM Peak)		
48 th Avenue & Powhaton Road (Intersection 1)	EB Left-turn	142 / 140	150	175
	EB Through	379 / 301	Continuous	Continuous
	EB Right-turn	Free Movement	Continuous	Continuous
	WB Left-turn	283 / 226	300	625
	WB Through	202 / 364	Continuous	Continuous
	WB Right-turn	163 / 1083	1100	875
	NB Left-turn	270 / 411	425	650
	NB Through	694 / 627	Continuous	Continuous
	NB Right-turn	Free Movement	Continuous	Continuous
	SB Left-turn	589 / 327	600	900
	SB Through	377 / 648	Continuous	Continuous
	SB Right-turn	12 / 122	125	250
48 th Avenue & N-S Collector (Intersection 2)	EB Through	261 / 383	Continuous	Continuous
	EB Right-turn	37 / 31	50	625
	WB Left-turn	29 / 14	50	50
	WB Through	219 / 312	325	Continuous
	NB Left-turn	121 / 405	425	450
	NB Right-turn	12 / 20	25	50

Location	Critical Movements	95% Queue Length (ft)	Recommended Storage Length	SHAC Recommended Auxiliary Lane Length
		2045 Build (AM/PM Peak)		
48 th Avenue & N Access (Intersection 3)	EB Through	162 / 200	Continuous	Continuous
	EB Right-turn	28 / 14	50	225
	WB Left-turn	13 / 5	25	25
	WB Through	181 / 150	Continuous	Continuous
	NB Left-turn	21 / 77	25	200
	NB Right-turn	5 / 11	25	25
48 th Avenue & Monaghan Road (Intersection 4)	EB Left-turn	147 / 341	350	350
	EB Right-turn	375 / 367	375	775
	NB Left-turn	82 / 107	125	675
	NB Through	32 / 48	Continuous	Continuous
	SB Through	86 / 95	Continuous	Continuous
	SB Right-turn	51 / 39	75	375
E Access & Monaghan Road (Intersection 5)	EB Right-turn	5 / 30	50	150
	NB Left-turn	N/A	25	125
	NB Through	25 / 5	Continuous	Continuous
	SB Through	N/A	Continuous	Continuous
	SB Right-turn	N/A	25	75
42 nd Avenue & Powhatan Road (Intersection 6)	WB Left-turn	47 / 164	175	425
	WB Right-turn	31 / 118	125	225
	NB Through	677 / 553	Continuous	Continuous
	NB Right-turn	42 / 21	50	500
	SB Left-turn	265 / 65	275	275
	SB Through	157 / 387	Continuous	Continuous
42 nd Avenue & Monaghan Road (Intersection 7)	EB Left-turn	30 / 79	100	125
	EB Right-turn	16 / 64	75	150
	NB Left-turn	11 / 4	25	150
	NB Through	107 / 136	Continuous	Continuous
	SB Through	151 / 271	Continuous	Continuous
	SB Right-turn	4 / 3	25	100
38 th Avenue & Powhatan Road (Intersection 8)	EB Left-turn	290 / 134	300	125
	EB Through	97 / 46	Continuous	Continuous
	EB Right-turn	132 / 39	150	200
	WB Left-turn	90 / 377	400	375
	WB Through	33 / 107	Continuous	Continuous
	WB Right-turn	0 / 196	200	250
	NB Left-turn	180 / 319	325	200
	NB Through	953 / 657	Continuous	Continuous
	NB Right-turn	173 / 17	175	525
	SB Left-turn	186 / 53	200	200
	SB Through	354 / 1275	Continuous	Continuous
	SB Right-turn	8 / 36	50	175

Location	Critical Movements	95% Queue Length (ft)	Recommended Storage Length	SHAC Recommended Auxiliary Lane Length
		2045 Build (AM/PM Peak)		
38 th Avenue & N-S Collector (Intersection 9)	EB Left-turn	14 / 6	25	75
	EB Through	150 / 31	Continuous	Continuous
	EB Right-turn	14 / 6	25	75
	WB Left-turn	8	25	50
	WB Through	210	Continuous	Continuous
	WB Right-turn	18	25	100
	NB Left-turn	6 / 27	50	100
	NB Through	40 / 95	Continuous	Continuous
	NB Right-turn	0 / 3	25	25
	SB Left-turn	18 / 6	25	100
	SB Through	123 / 195	Continuous	Continuous
	SB Right-turn	3 / 8	25	50
38 th Avenue & Monaghan Road (Intersection 10)	EB Left-turn	126 / 164	175	225
	EB Right-turn	32 / 56	75	125
	NB Left-turn	45 / 44	50	125
	NB Through	194 / 132	Continuous	Continuous
	SB Through	107 / 241	Continuous	Continuous
	SB Right-turn	16 / 14	25	175
32 nd Avenue & Powhatan Road (Intersection 11)	EB Left-turn	61 / 39	75	50
	EB Through-Right	60 / 52	Continuous	Continuous
	WB Left-turn	91 / 456	475	300
	WB Through-Right	39 / 148	Continuous	Continuous
	NB Left-turn	19 / 152	175	100
	NB Through	814 / 152	Continuous	Continuous
	NB Right-turn	20 / 13	25	400
	SB Left-turn	294 / 64	300	175
	SB Through	171 / 1120	Continuous	Continuous
	SB Right-turn	6 / 10	25	75
32 nd Avenue & Monaghan Road (Intersection 12)	EB Left-turn	6 / 8	25	0
	EB Right-turn	N/A	25	50
	NB Left-turn	20 / 13	25	150
	NB Through	N/A	Continuous	Continuous
	SB Through	N/A	Continuous	Continuous
	SB Right-turn	N/A	25	150

Location	Critical Movements	95% Queue Length (ft)	Recommended Storage Length	SHAC Recommended Auxiliary Lane Length
		2045 Build (AM/PM Peak)		
26 th Avenue & Powhatan Road (Intersection 15)	EB Left-turn	7 / 8	25	25
	EB Through	212 / 149	Continuous	Continuous
	EB Right-turn	28 / 491	500	925
	WB Left-turn	23 / 162	175	475
	WB Through	57 / 150	Continuous	Continuous
	WB Right-turn	61 / 57	75	225
	NB Left-turn	203 / 181	225	400
	NB Through	198 / 152	Continuous	Continuous
	NB Right-turn	84 / 38	100	375
26 th Avenue & S Access (Intersection 16)	EB Left-turn	15 / 8	25	125
	EB Through	N/A	Continuous	Continuous
	WB Through	N/A	Continuous	Continuous
	WB Right-turn	N/A	25	50
	SB Right-turn	6 / 65	75	175
26 th Avenue & N-S Collector (Intersection 17)	EB Left-turn	297 / 157	300	375
	EB Through	70 / 166	Continuous	Continuous
	WB Through	61 / 327	Continuous	Continuous
	SB Left-turn	35 / 81	100	125
	SB Right-turn	51 / 373	400	625
26 th Avenue & Monaghan Road (Intersection 18)	EB Left-turn	200 / 109	200	450
	EB Through	32 / 76	Continuous	Continuous
	EB Right-turn	0 / 144	150	350
	WB Left-turn	37 / 58	75	50
	WB Through	70 / 110	Continuous	Continuous
	WB Right-turn	3 / 9	25	225
	NB Left-turn	142 / 76	150	300
	NB Through	253 / 144	Continuous	Continuous
	NB Right-turn	0 / 0	25	175
	SB Left-turn	71 / 144	150	225
	SB Through	88 / 256	Continuous	Continuous
	SB Right-turn	0 / 0	25	475

Notes:

*Where dual lanes are provided the presented value is on a per lane basis.

**The State Highway Access Code recommended auxiliary storage lengths above represent the storage length without the inclusion of taper length.

*** Recommended length based primarily on 95th percentile queue than SHAC.

VI. SUMMARY AND RECOMMENDATIONS

Stream Realty is planning to develop an approximate 1,280-acre site in Aurora, Colorado, referred to as Aurora Logistics Center (ALC). The FDP site is located along the east side of the future Powhaton Road between 26th Avenue and the future 48th Avenue. If built to its maximum allowed density, up to 16.4 million square feet of industrial and commercial building space could occur, estimated to generate up to 51,607 external vehicle-trips per day.

The recently updated *NEATS Refresh* identifies the appropriate roadway classification and laneage of the surrounding street system. The NEATS study and the traffic forecasting memo produced by AECOM were key resources in preparing this traffic impact study with respect to the major roadways and the traffic demand for the rest of the area outside the ALC FDP.

The overarching roadway recommendations include:

- **Powhaton Road.** This roadway will ultimately serve as a busy north-south major arterial facility through the region. As such, ultimate traffic demands will be significant requiring a six-lane facility and dual left turn lanes along select approaches at all study area intersections. Its intersection with 26th Avenue and Aerotropolis Parkway will be a diverging diamond interchange, which is projected to function well.
- **48th Avenue.** West of Powhaton, 48th Avenue is planned to provide six through lanes. East of Powhaton Road, 48th Avenue need only be a four-lane arterial with turn lanes at intersections. This roadway will not continue east beyond Monaghan Road.
- **38th Avenue.** This road will not extend east of Monaghan Road. Passing through the FDP, this road should be planned as a three-lane collector road, with additional turn lanes needed at intersections, especially the Powhaton Road intersection.
- **Monaghan Road.** Projected traffic along this roadway suggests the need for a four-lane arterial road, which is consistent with NEATS. Center left turn lanes should be provided at all cross-streets; dual northbound left turn lanes should be provided at 48th Avenue.
- **26th Avenue.** The NEATS plan identifies this roadway to be a four-lane minor arterial that will suffice given the 2045 traffic projections. Turn lanes are needed at the intersections. Its intersection with Aerotropolis Parkway and Powhaton Road will include a diverging diamond interchange.
- **North-south Internal Road.** Passing through the FDP, this road should be planned as a three-lane collector road, with additional turn lanes needed at intersections.

Relative to the study area intersections, traffic signals are anticipated to be installed at the major intersections, including:

- | | |
|--|--|
| ▪ Powhaton Road/48 th Avenue | ▪ Monaghan Road/42 nd Avenue |
| ▪ Powhaton Road/42 nd Avenue | ▪ Monaghan Road/48 th Avenue |
| ▪ Powhaton Road/38 th Avenue | ▪ 26 th Avenue/North-south internal collector road |
| ▪ Powhaton Road/32 nd Avenue
(intersection to be modified to prevent
east-west through movements) | ▪ 48 th Avenue/North-south internal collector
road |
| ▪ Monaghan Road/26 th Avenue | ▪ 48 th Avenue/Internal road east of Monaghan |
| ▪ Monaghan Road/38 th Avenue | |

As individual parcels develop, specific traffic analyses may be appropriate to update and refine the findings presented in this study. This analysis considers a potential maximum land use for each parcel, and the likely development will be less intense, thereby possibly leading to lesser improvement needs.

APPENDIX A. YEAR 2045 SIGNAL WARRANT ANALYSIS

MUTCD Volume-based Warrant Evaluation

48th & Powhatan

Intersection # 1

2040 Total Traffic



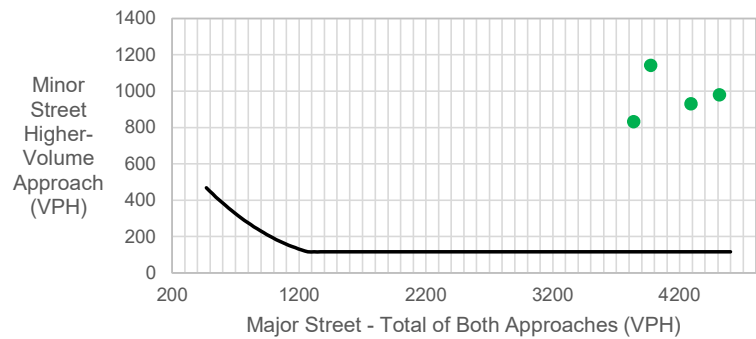
Major Street: 48th Ave
Approach Speed: 40 MPH
Lanes Moving Traffic: 2 or more
Option: Low Speed, Urban

Minor Street: Powhatan Rd
Right Turn Volume Included: 50% EB, 50% NB, 50% SB
Lanes Moving Traffic: 2 or more

WARRANT 2, Four Hour Vehicular Volume

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
PM Peak Hour	4513	979
95% PM Peak Hour	4287	930
85% PM Peak Hour	3836	832
AM Peak Hour	3972	1142

Satisfied Yes
(100% Factor)



MUTCD Volume-based Warrant Evaluation
48th & N-S Collector
Intersection # 2
2040 Total Traffic



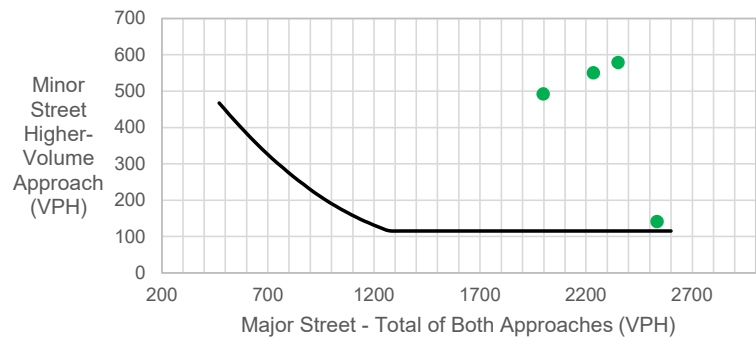
Major Street: 48th Ave
 Approach Speed: 40 MPH
 Lanes Moving Traffic: 2 or more
 Option: Low Speed, Urban

Minor Street: N-S Collector
 Right Turn Volume Included: 50% EB, 50% NB
 Lanes Moving Traffic: 2 or more

WARRANT 2, Four Hour Vehicular Volume

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
PM Peak Hour	2351	579
95% PM Peak Hour	2233	550
85% PM Peak Hour	1998	492
AM Peak Hour	2533	141

Satisfied **Yes**
 (100% Factor)



MUTCD Volume-based Warrant Evaluation

48th & NE Access

Intersection # 3

2040 Total Traffic



Major Street: 48th Ave
Approach Speed: 40 MPH
Lanes Moving Traffic: 2 or more
Option: Low Speed, Urban

Minor Street: North East Access
Right Turn Volume Included: 50% EB, 50% NB
Lanes Moving Traffic: 2 or more

WARRANT 2, Four Hour Vehicular Volume

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
PM Peak Hour	1953	186
95% PM Peak Hour	1855	177
85% PM Peak Hour	1660	158
AM Peak Hour	2000	46

Satisfied No
(100% Factor)



MUTCD Volume-based Warrant Evaluation
Monaghan Rd & 48th Street

Intersection # 4

2040 Total Traffic



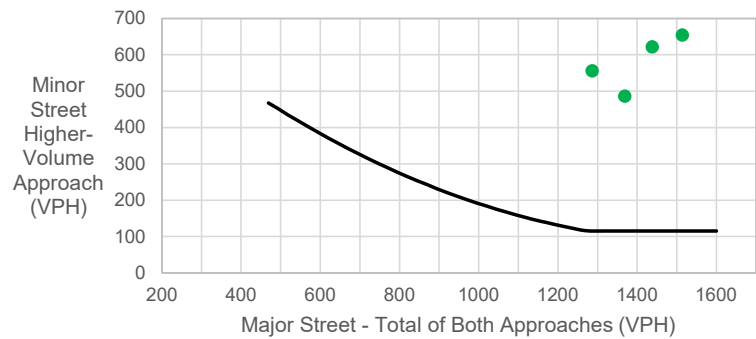
Major Street: Monaghan Rd
 Approach Speed: 40 MPH
 Lanes Moving Traffic: 2 or more
 Option: Low Speed, Urban

Minor Street: 48th Ave
 Right Turn Volume Included: 50% EB, 50% SB
 Lanes Moving Traffic: 2 or more

WARRANT 2, Four Hour Vehicular Volume

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
PM Peak Hour	1514	654
95% PM Peak Hour	1438	621
85% PM Peak Hour	1287	556
AM Peak Hour	1369	486

Satisfied **Yes**
 (100% Factor)



MUTCD Volume-based Warrant Evaluation
Northern E-W Collector & Powhatan
Intersection # 6
2040 Total Traffic



Major Street: Powhatan Rd
 Approach Speed: 40 MPH
 Lanes Moving Traffic: 2 or more
 Option: Low Speed, Urban

Minor Street: Northern E-W Collector
 Right Turn Volume Included: 75% WB, 50% NB, 50% SB
 Lanes Moving Traffic: 2 or more

WARRANT 2, Four Hour Vehicular Volume

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
PM Peak Hour	5370	471
95% PM Peak Hour	5102	447
85% PM Peak Hour	4565	400
AM Peak Hour	4633	116

Satisfied **Yes**
 (100% Factor)



MUTCD Volume-based Warrant Evaluation
Northern E-W Collector & Monaghan
Intersection # 7
2040 Total Traffic



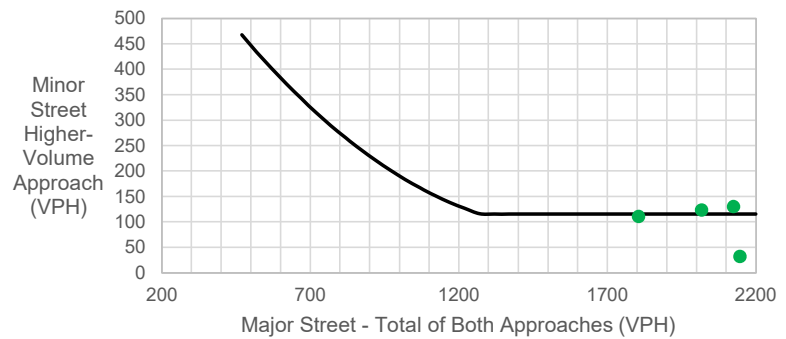
Major Street: Monaghan Rd
 Approach Speed: 40 MPH
 Lanes Moving Traffic: 2 or more
 Option: Low Speed, Urban

Minor Street: Northern E-W Collector
 Right Turn Volume Included: 50% EB, 50% NB, 50% SB
 Lanes Moving Traffic: 2 or more

WARRANT 2, Four Hour Vehicular Volume

	Both Approchs. Major Street	Higher Vol. Approch. Minor Street
PM Peak Hour	2124	130
95% PM Peak Hour	2018	124
85% PM Peak Hour	1805	111
AM Peak Hour	2146	32

Satisfied No
 (100% Factor)



MUTCD Volume-based Warrant Evaluation
38th & Powhatan
Intersection # 8
2040 Total Traffic



Major Street: Powhatan Rd
 Approach Speed: 40 MPH
 Lanes Moving Traffic: 2 or more
 Option: Low Speed, Urban

Minor Street: 38th Ave
 Right Turn Volume Included: 50% EB, 50% NB, 50% SB
 Lanes Moving Traffic: 2 or more

WARRANT 2, Four Hour Vehicular Volume

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
PM Peak Hour	5394	174
95% PM Peak Hour	5124	165
85% PM Peak Hour	4585	148
AM Peak Hour	4533	304

Satisfied **Yes**
 (100% Factor)



MUTCD Volume-based Warrant Evaluation
38th & Monaghan
Intersection # 10
2040 Total Traffic



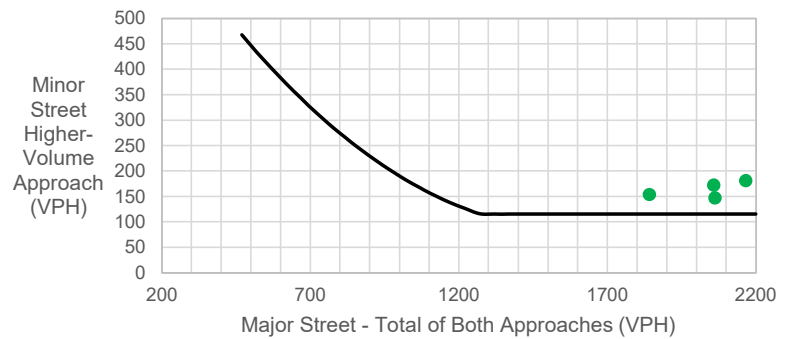
Major Street: Monaghan Rd
 Approach Speed: 40 MPH
 Lanes Moving Traffic: 2 or more
 Option: Low Speed, Urban

Minor Street: 38th Ave
 Right Turn Volume Included: 50% EB, 50% NB, 50% SB
 Lanes Moving Traffic: 2 or more

WARRANT 2, Four Hour Vehicular Volume

	Both Apprchs. Major Street	Higher Vol. Apprch. Minor Street
PM Peak Hour	2166	181
95% PM Peak Hour	2058	172
85% PM Peak Hour	1841	154
AM Peak Hour	2062	147

Satisfied **Yes**
 (100% Factor)



MUTCD Volume-based Warrant Evaluation

32nd & Powhatan

Intersection # 11

2040 Total Traffic



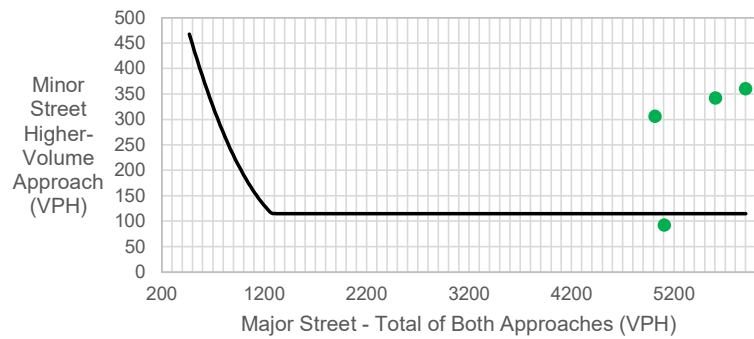
Major Street: Powhatan Rd
Approach Speed: 40 MPH
Lanes Moving Traffic: 2 or more
Option: Low Speed, Urban

Minor Street: 32nd Ave
Right Turn Volume Included: 75% WB, 50% NB, 50% SB
Lanes Moving Traffic: 2 or more

WARRANT 2, Four Hour Vehicular Volume

	Both Approchs. Major Street	Higher Vol. Approch. Minor Street
PM Peak Hour	5900	360
95% PM Peak Hour	5605	342
85% PM Peak Hour	5015	306
AM Peak Hour	5105	92

Satisfied No
(100% Factor)



MUTCD Volume-based Warrant Evaluation

26th & Powhatan

Intersection # 15

2040 Total Traffic



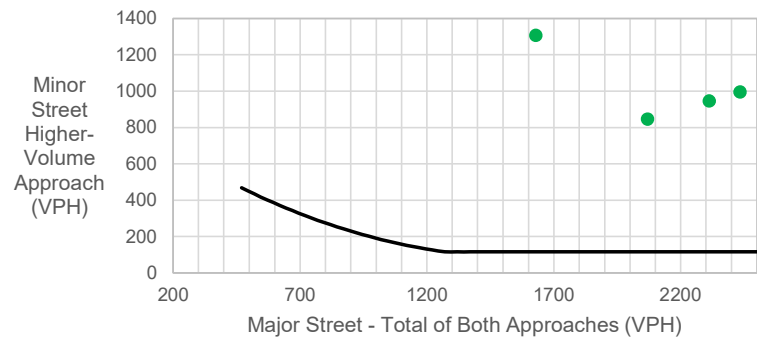
Major Street: 26th Ave
Approach Speed: 40 MPH
Lanes Moving Traffic: 2 or more
Option: Low Speed, Urban

Minor Street: Powhatan
Right Turn Volume Included: 50% EB, 50% WB, & 50% NB
Lanes Moving Traffic: 2 or more

WARRANT 2, Four Hour Vehicular Volume

	Both Approchs. Major Street	Higher Vol. Approch. Minor Street
PM Peak Hour	2434	995
95% PM Peak Hour	2312	945
85% PM Peak Hour	2069	846
AM Peak Hour	1629	1307

Satisfied Yes
(100% Factor)



MUTCD Volume-based Warrant Evaluation
26th & N-S Collector
Intersection # 17
2040 Total Traffic



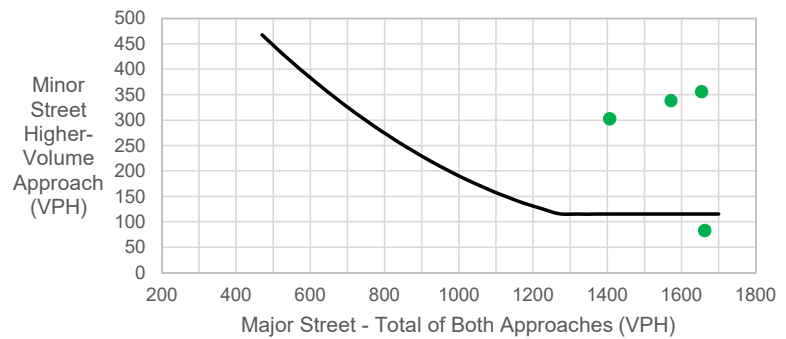
Major Street: 26th Ave
 Approach Speed: 40 MPH
 Lanes Moving Traffic: 2 or more
 Option: Low Speed, Urban

Minor Street: N-S Collector
 Right Turn Volume Included: 50% SB, 50% WB
 Lanes Moving Traffic: 2 or more

WARRANT 2, Four Hour Vehicular Volume

	Both Approchs. Major Street	Higher Vol. Approch. Minor Street
PM Peak Hour	1654	356
95% PM Peak Hour	1571	338
85% PM Peak Hour	1406	303
AM Peak Hour	1662	83

Satisfied No
 (100% Factor)



MUTCD Volume-based Warrant Evaluation

26th & Monaghan

Intersection # 18

2040 Total Traffic



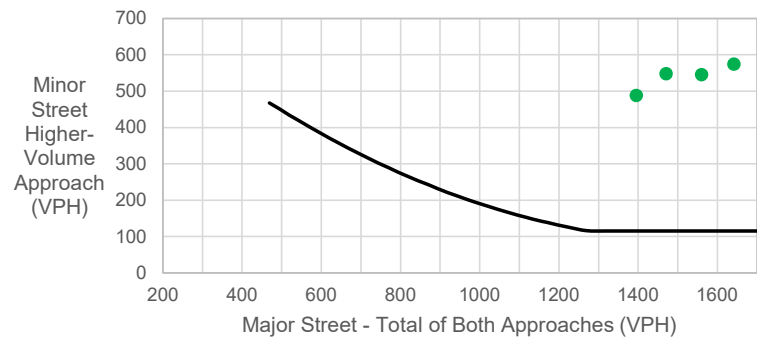
Major Street: 26th Ave
Approach Speed: 40 MPH
Lanes Moving Traffic: 2 or more
Option: Low Speed, Urban

Minor Street: Monaghan Rd
Right Turn Volume Included: 50% EB, 50% NB, 50% SB
Lanes Moving Traffic: 2 or more

WARRANT 2, Four Hour Vehicular Volume

	Both Aprchs. Major Street	Higher Vol. Aprch. Minor Street
PM Peak Hour	1642	574
95% PM Peak Hour	1560	545
85% PM Peak Hour	1396	488
AM Peak Hour	1471	548

Satisfied Yes
(100% Factor)



























APPENDIX B. YEAR 2045 TOTAL TRAFFIC LEVEL OF SERVICE WORKSHEETS

HCM 6th Signalized Intersection Summary

1: Powhaton Rd & 48th Ave

2045 Total
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	150	723	538	314	481	452	468	1590	306	816	1048	100
Future Volume (veh/h)	150	723	538	314	481	452	468	1590	306	816	1048	100
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	163	786	0	341	523	491	509	1728	0	887	1139	109
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	313	748		313	713	221	843	1745		843	1709	531
Arrive On Green	0.09	0.15	0.00	0.09	0.14	0.14	0.25	0.35	0.00	0.25	0.34	0.34
Sat Flow, veh/h	3374	4985	1547	3374	4985	1547	3374	4985	1547	3374	4985	1547
Grp Volume(v), veh/h	163	786	0	341	523	491	509	1728	0	887	1139	109
Grp Sat Flow(s),veh/h/ln	1687	1662	1547	1687	1662	1547	1687	1662	1547	1687	1662	1547
Q Serve(g_s), s	6.4	21.0	0.0	13.0	14.1	12.3	18.7	48.3	0.0	35.0	27.2	7.0
Cycle Q Clear(g_c), s	6.4	21.0	0.0	13.0	14.1	12.3	18.7	48.3	0.0	35.0	27.2	7.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	313	748		313	713	221	843	1745		843	1709	531
V/C Ratio(X)	0.52	1.05		1.09	0.73	2.22	0.60	0.99		1.05	0.67	0.21
Avail Cap(c_a), veh/h	313	748		313	926	287	867	1745		843	1709	531
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	0.16	0.16	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	60.5	59.5	0.0	63.5	57.4	22.8	46.4	45.3	0.0	52.5	39.2	32.5
Incr Delay (d2), s/veh	1.5	47.2	0.0	76.6	2.2	563.3	0.2	6.7	0.0	45.5	2.1	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	12.1	0.0	8.9	6.1	39.2	7.9	20.8	0.0	20.1	11.5	2.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	62.1	106.7	0.0	140.1	59.6	586.1	46.6	52.0	0.0	98.0	41.3	33.4
LnGrp LOS	E	F		F	E	F	D	D		F	D	C
Approach Vol, veh/h	949			1355			2237			2135		
Approach Delay, s/veh	99.0			270.6			50.7			64.4		
Approach LOS	F			F			D			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	40.0	55.0	18.0	27.0	41.0	54.0	19.0	26.0				
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	6.0	* 6	6.0	* 6				
Max Green Setting (Gmax), s	35.0	49.0	13.0	21.0	36.0	* 48	8.0	* 26				
Max Q Clear Time (g_c+I1), s	37.0	50.3	15.0	23.0	20.7	29.2	8.4	16.1				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	1.7	8.4	0.0	3.9				

Intersection Summary

HCM 6th Ctrl Delay 106.6

HCM 6th LOS F

Notes

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

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

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

HCM 6th Signalized Intersection Summary

2: N-S Collector & 48th Ave

2045 Total
AM Peak Hour

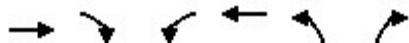


Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↓	↑↑	↓	↑
Traffic Volume (veh/h)	1171	565	37	1043	137	9
Future Volume (veh/h)	1171	565	37	1043	137	9
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1752	1752	1826	1752	1752
Adj Flow Rate, veh/h	1273	614	40	1134	149	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	10	10	5	10	10
Cap, veh/h	1960	839	164	1960	531	472
Arrive On Green	0.56	0.56	0.56	0.56	0.32	0.32
Sat Flow, veh/h	3561	1485	225	3561	1668	1485
Grp Volume(v), veh/h	1273	614	40	1134	149	10
Grp Sat Flow(s),veh/h/ln	1735	1485	225	1735	1668	1485
Q Serve(g_s), s	19.4	23.6	11.4	16.3	5.1	0.4
Cycle Q Clear(g_c), s	19.4	23.6	30.8	16.3	5.1	0.4
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1960	839	164	1960	531	472
V/C Ratio(X)	0.65	0.73	0.24	0.58	0.28	0.02
Avail Cap(c_a), veh/h	2546	1090	202	2546	531	472
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	11.5	12.4	22.1	10.8	19.6	18.0
Incr Delay (d2), s/veh	0.4	1.8	0.8	0.3	1.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.5	7.1	0.6	5.5	2.1	0.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	11.9	14.3	22.9	11.1	21.0	18.1
LnGrp LOS	B	B	C	B	C	B
Approach Vol, veh/h	1887			1174	159	
Approach Delay, s/veh	12.7			11.5	20.8	
Approach LOS	B			B	C	
Timer - Assigned Phs	2		4		8	
Phs Duration (G+Y+Rc), s	29.0		48.0		48.0	
Change Period (Y+Rc), s	4.5		4.5		4.5	
Max Green Setting (Gmax), s	24.5		56.5		56.5	
Max Q Clear Time (g_c+l1), s	7.1		25.6		32.8	
Green Ext Time (p_c), s	0.4		15.9		10.6	
Intersection Summary						
HCM 6th Ctrl Delay			12.6			
HCM 6th LOS			B			

HCM 6th Signalized Intersection Summary

3: 48th Ave

2045 Total
AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Volume (veh/h)	912	189	17	977	43	6
Future Volume (veh/h)	912	189	17	977	43	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1752	1752	1826	1752	1752
Adj Flow Rate, veh/h	991	205	18	1062	47	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	10	10	5	10	10
Cap, veh/h	1306	559	216	1306	707	629
Arrive On Green	0.38	0.38	0.38	0.38	0.42	0.42
Sat Flow, veh/h	3561	1485	438	3561	1668	1485
Grp Volume(v), veh/h	991	205	18	1062	47	7
Grp Sat Flow(s), veh/h/ln	1735	1485	438	1735	1668	1485
Q Serve(g_s), s	11.2	4.5	1.7	12.4	0.8	0.1
Cycle Q Clear(g_c), s	11.2	4.5	12.9	12.4	0.8	0.1
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1306	559	216	1306	707	629
V/C Ratio(X)	0.76	0.37	0.08	0.81	0.07	0.01
Avail Cap(c_a), veh/h	1388	594	226	1388	707	629
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.73	0.73	0.71	0.71	1.00	1.00
Uniform Delay (d), s/veh	12.3	10.2	17.9	12.6	7.7	7.5
Incr Delay (d2), s/veh	1.7	0.3	0.1	2.6	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	1.2	0.2	4.2	0.2	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.0	10.4	18.0	15.2	7.9	7.5
LnGrp LOS	B	B	B	B	A	A
Approach Vol, veh/h	1196			1080	54	
Approach Delay, s/veh	13.4			15.3	7.8	
Approach LOS	B			B	A	
Timer - Assigned Phs	2			4		8
Phs Duration (G+Y+Rc), s	23.6			21.4		21.4
Change Period (Y+Rc), s	4.5			4.5		4.5
Max Green Setting (Gmax), s	18.0			18.0		18.0
Max Q Clear Time (g_c+I1), s	2.8			13.2		14.9
Green Ext Time (p_c), s	0.1			3.0		2.0
Intersection Summary						
HCM 6th Ctrl Delay			14.1			
HCM 6th LOS			B			

HCM 6th Signalized Intersection Summary 4: Monaghan Rd & 48th Ave

2045 Total
AM Peak Hour




Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	135	702	615	250	340	329
Future Volume (veh/h)	135	702	615	250	340	329
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	1826	1826	501	501	501	501
Adj Flow Rate, veh/h	147	763	668	272	370	358
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5
Cap, veh/h	583	717	359	490	296	132
Arrive On Green	0.34	0.34	0.13	0.52	0.31	0.31
Sat Flow, veh/h	1739	1547	925	976	976	424
Grp Volume(v), veh/h	147	763	668	272	370	358
Grp Sat Flow(s), veh/h/ln	1739	1547	463	476	476	424
Q Serve(g_s), s	3.7	20.1	7.7	11.7	18.7	18.7
Cycle Q Clear(g_c), s	3.7	20.1	7.7	11.7	18.7	18.7
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	583	717	359	490	296	132
V/C Ratio(X)	0.25	1.06	1.86	0.56	1.25	2.71
Avail Cap(c_a), veh/h	583	717	359	490	296	132
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	14.5	16.1	21.9	9.9	20.6	20.6
Incr Delay (d2), s/veh	1.0	52.0	398.6	4.5	136.6	789.3
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%), veh/ln	1.5	28.7	21.3	1.3	7.5	30.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	15.5	68.1	420.4	14.4	157.2	810.0
LnGrp LOS	B	F	F	B	F	F
Approach Vol, veh/h	910			940	728	
Approach Delay, s/veh	59.6			302.9	478.2	
Approach LOS	E			F	F	
Timer - Assigned Phs	2			4	5	6
Phs Duration (G+Y+Rc), s	35.4			24.6	12.2	23.2
Change Period (Y+Rc), s	4.5			4.5	4.5	4.5
Max Green Setting (Gmax), s	30.9			20.1	7.7	18.7
Max Q Clear Time (g_c+I1), s	13.7			22.1	9.7	20.7
Green Ext Time (p_c), s	1.5			0.0	0.0	0.0
Intersection Summary						
HCM 6th Ctrl Delay			266.5			
HCM 6th LOS			F			

Intersection						
Int Delay, s/veh	1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗	↘	↗↗	↗↗	↘
Traffic Vol, veh/h	0	30	122	852	975	68
Future Vol, veh/h	0	30	122	852	975	68
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	15	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	5	5	10
Mvmt Flow	0	33	133	926	1060	74
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	-	530	1134	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.1	4.3	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.4	2.3	-	-	-
Pot Cap-1 Maneuver	0	473	568	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	473	568	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	13.2	1.7		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	568	-	473	-	-	
HCM Lane V/C Ratio	0.233	-	0.069	-	-	
HCM Control Delay (s)	13.3	-	13.2	-	-	
HCM Lane LOS	B	-	B	-	-	
HCM 95th %tile Q(veh)	0.9	-	0.2	-	-	

HCM 6th Signalized Intersection Summary 6: Powhatan Rd & E-W Road

2045 Total
AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰↱	↰	↑↑↑	↰	↰	↑↑↑
Traffic Volume (veh/h)	92	49	2487	457	251	1667
Future Volume (veh/h)	92	49	2487	457	251	1667
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	1752	1752	1826	1752	1752	1826
Adj Flow Rate, veh/h	100	53	2703	497	273	1812
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	10	5	10	10	5
Cap, veh/h	575	264	2769	825	295	3655
Arrive On Green	0.18	0.18	0.56	0.56	0.13	0.73
Sat Flow, veh/h	3237	1485	5149	1485	1668	5149
Grp Volume(v), veh/h	100	53	2703	497	273	1812
Grp Sat Flow(s),veh/h/ln	1618	1485	1662	1485	1668	1662
Q Serve(g_s), s	2.4	2.7	47.4	20.1	10.1	13.7
Cycle Q Clear(g_c), s	2.4	2.7	47.4	20.1	10.1	13.7
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	575	264	2769	825	295	3655
V/C Ratio(X)	0.17	0.20	0.98	0.60	0.93	0.50
Avail Cap(c_a), veh/h	575	264	2769	825	295	3655
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.4	31.5	19.4	13.4	29.2	5.0
Incr Delay (d2), s/veh	0.7	1.7	12.3	3.3	36.4	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	1.1	19.3	6.9	6.1	3.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	32.0	33.3	31.8	16.6	65.6	5.5
LnGrp LOS	C	C	C	B	E	A
Approach Vol, veh/h	153		3200			2085
Approach Delay, s/veh	32.5		29.4			13.4
Approach LOS	C		C			B
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	16.0	54.0			70.0	20.0
Change Period (Y+Rc), s	4.5	4.0			4.0	4.0
Max Green Setting (Gmax), s	11.5	50.0			66.0	16.0
Max Q Clear Time (g_c+I1), s	12.1	49.4			15.7	4.7
Green Ext Time (p_c), s	0.0	0.6			23.2	0.3
Intersection Summary						
HCM 6th Ctrl Delay			23.3			
HCM 6th LOS			C			

HCM 6th Signalized Intersection Summary

7: Monaghan Rd & E-W Road

2045 Total
AM Peak Hour















Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	28	34	135	1058	911	84
Future Volume (veh/h)	28	34	135	1058	911	84
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	1752	1752	427	501	1826	1752
Adj Flow Rate, veh/h	30	37	147	1150	990	91
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	10	10	5	5	10
Cap, veh/h	94	224	215	755	2165	926
Arrive On Green	0.06	0.06	0.09	0.79	0.62	0.62
Sat Flow, veh/h	1668	1485	406	976	3561	1485
Grp Volume(v), veh/h	30	37	147	1150	990	91
Grp Sat Flow(s), veh/h/ln	1668	1485	406	476	1735	1485
Q Serve(g_s), s	1.0	1.3	5.7	47.6	9.0	1.5
Cycle Q Clear(g_c), s	1.0	1.3	5.7	47.6	9.0	1.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	94	224	215	755	2165	926
V/C Ratio(X)	0.32	0.16	0.68	1.52	0.46	0.10
Avail Cap(c_a), veh/h	501	586	215	755	2165	926
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.86	0.86	1.00	1.00
Uniform Delay (d), s/veh	27.2	22.2	13.4	6.2	5.9	4.5
Incr Delay (d2), s/veh	2.0	0.3	7.5	241.0	0.7	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%), veh/ln	0.4	1.2	1.8	26.3	2.5	0.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	29.2	22.5	20.9	247.2	6.6	4.7
LnGrp LOS	C	C	C	F	A	A
Approach Vol, veh/h	67			1297	1081	
Approach Delay, s/veh	25.5			221.6	6.5	
Approach LOS	C			F	A	
Timer - Assigned Phs	2			4	5	6
Phs Duration (G+Y+Rc), s	52.1			7.9	10.2	41.9
Change Period (Y+Rc), s	4.5			4.5	4.5	4.5
Max Green Setting (Gmax), s	33.0			18.0	5.7	22.8
Max Q Clear Time (g_c+I1), s	49.6			3.3	7.7	11.0
Green Ext Time (p_c), s	0.0			0.1	0.0	5.7
Intersection Summary						
HCM 6th Ctrl Delay			121.1			
HCM 6th LOS			F			

HCM 6th Signalized Intersection Summary

8: Powhatan Rd & 38th Ave

2045 Total
AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	102	117	171	91	29	63	80	2715	464	168	1540	61
Future Volume (veh/h)	102	117	171	91	29	63	80	2715	464	168	1540	61
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1752	1752	1752	1752	1752	1752	1826	1826	1752	1752	1826	1826
Adj Flow Rate, veh/h	111	127	186	99	32	0	87	2951	504	183	1674	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	10	10	10	10	10	5	5	10	10	5	5
Cap, veh/h	66	353	157	150	375		115	3202	1022	171	3169	
Arrive On Green	0.04	0.11	0.11	0.05	0.11	0.00	0.07	0.64	0.64	0.05	0.64	0.00
Sat Flow, veh/h	1668	3328	1485	3237	3328	1485	1739	4985	1485	3237	4985	1547
Grp Volume(v), veh/h	111	127	186	99	32	0	87	2951	504	183	1674	0
Grp Sat Flow(s),veh/h/ln	1668	1664	1485	1618	1664	1485	1739	1662	1485	1618	1662	1547
Q Serve(g_s), s	6.0	5.4	13.5	4.5	1.3	0.0	7.4	78.4	17.2	8.0	27.8	0.0
Cycle Q Clear(g_c), s	6.0	5.4	13.5	4.5	1.3	0.0	7.4	78.4	17.2	8.0	27.8	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	66	353	157	150	375		115	3202	1022	171	3169	
V/C Ratio(X)	1.67	0.36	1.18	0.66	0.09		0.76	0.92	0.49	1.07	0.53	
Avail Cap(c_a), veh/h	66	353	157	150	375		115	3202	1022	171	3169	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	72.5	62.7	48.1	70.8	60.0	0.0	69.3	23.7	11.1	71.5	15.1	0.0
Incr Delay (d2), s/veh	360.3	2.8	129.2	20.5	0.4	0.0	36.3	5.7	1.7	87.7	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.2	2.4	10.7	2.3	0.6	0.0	4.5	30.9	5.4	5.4	10.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	432.8	65.6	177.3	91.3	60.5	0.0	105.6	29.4	12.8	159.2	15.7	0.0
LnGrp LOS	F	E	F	F	E		F	C	B	F	B	
Approach Vol, veh/h	424			131			3542			1857		
Approach Delay, s/veh	210.7			83.8			28.9			29.9		
Approach LOS	F			F			C			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	4.0	103.0	12.0	22.0	15.0	102.0	11.0	23.0				
Change Period (Y+Rc), s	6.0	* 6	5.0	6.0	5.0	6.0	5.0	6.0				
Max Green Setting (Gmax), s	9.0	* 97	7.0	16.0	10.0	95.0	6.0	17.0				
Max Q Clear Time (g_c+T10), s	80.4	110.0	6.5	15.5	9.4	29.8	8.0	3.3				
Green Ext Time (p_c), s	0.0	16.1	0.0	0.1	0.0	21.9	0.0	0.1				

Intersection Summary

HCM 6th Ctrl Delay 43.3













HCM 6th LOS D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

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

Intersection												
Intersection Delay, s/veh20.1												
Intersection LOS C												

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	63	330	66	20	101	32	21	146	3	77	296	11
Future Vol, veh/h	63	330	66	20	101	32	21	146	3	77	296	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10	10	10	10
Mvmt Flow	68	359	72	22	110	35	23	159	3	84	322	12
Number of Lanes	1	1	1	1	1	1	1	1	1	1	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	3	3
Conflicting Approach Left SB		NB	EB	WB
Conflicting Lanes Left	3	3	3	3
Conflicting Approach RightNB		SB	WB	EB
Conflicting Lanes Right	3	3	3	3
HCM Control Delay	23.2	12.8	14.8	21.6
HCM LOS	C	B	B	C

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%	0%
Vol Thru, %	0%	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	21	146	3	63	330	66	20	101	32	77	296	11
LT Vol	21	0	0	63	0	0	20	0	0	77	0	0
Through Vol	0	146	0	0	330	0	0	101	0	0	296	0
RT Vol	0	0	3	0	0	66	0	0	32	0	0	11
Lane Flow Rate	23	159	3	68	359	72	22	110	35	84	322	12
Geometry Grp	8	8	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.054	0.357	0.007	0.15	0.734	0.133	0.052	0.249	0.072	0.186	0.672	0.023
Departure Headway (Hd)	8.593	8.093	7.393	7.863	7.363	6.663	8.656	8.156	7.456	8.017	7.517	6.817
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	417	444	483	457	491	538	413	440	480	448	479	525
Service Time	6.348	5.848	5.148	5.604	5.104	4.404	6.412	5.912	5.212	5.762	5.262	4.562
HCM Lane V/C Ratio	0.055	0.358	0.006	0.149	0.731	0.134	0.053	0.25	0.073	0.188	0.672	0.023
HCM Control Delay	11.8	15.3	10.2	12	27.9	10.4	11.9	13.6	10.8	12.6	24.4	9.7
HCM Lane LOS	B	C	B	B	D	B	B	B	B	B	C	A
HCM 95th-tile Q	0.2	1.6	0	0.5	6	0.5	0.2	1	0.2	0.7	4.9	0.1

HCM 6th Signalized Intersection Summary

10: Monaghan Rd & 38th Ave

2045 Total
AM Peak Hour













Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	134	60	102	1147	741	145
Future Volume (veh/h)	134	60	102	1147	741	145
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	1752	1752	1752	1826	1826	1752
Adj Flow Rate, veh/h	146	65	111	1247	805	158
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	10	10	5	5	10
Cap, veh/h	193	172	474	2665	2665	1140
Arrive On Green	0.12	0.12	0.77	0.77	0.77	0.77
Sat Flow, veh/h	1668	1485	546	3561	3561	1485
Grp Volume(v), veh/h	146	65	111	1247	805	158
Grp Sat Flow(s), veh/h/ln	1668	1485	546	1735	1735	1485
Q Serve(g_s), s	6.6	3.1	6.0	10.1	5.4	2.1
Cycle Q Clear(g_c), s	6.6	3.1	11.4	10.1	5.4	2.1
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	193	172	474	2665	2665	1140
V/C Ratio(X)	0.76	0.38	0.23	0.47	0.30	0.14
Avail Cap(c_a), veh/h	463	412	474	2665	2665	1140
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	33.2	31.7	4.4	3.2	2.7	2.3
Incr Delay (d2), s/veh	5.9	1.4	1.2	0.6	0.3	0.3
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%), veh/ln	2.9	1.2	0.7	2.3	1.2	0.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	39.1	33.0	5.6	3.8	3.0	2.6
LnGrp LOS	D	C	A	A	A	A
Approach Vol, veh/h	211			1358	963	
Approach Delay, s/veh	37.3			4.0	2.9	
Approach LOS	D			A	A	
Timer - Assigned Phs	2			4		6
Phs Duration (G+Y+Rc), s	64.0			13.5		64.0
Change Period (Y+Rc), s	4.5			4.5		4.5
Max Green Setting (Gmax), s	59.5			21.5		59.5
Max Q Clear Time (g_c+I1), s	13.4			8.6		7.4
Green Ext Time (p_c), s	15.5			0.5		7.7
Intersection Summary						
HCM 6th Ctrl Delay			6.4			
HCM 6th LOS			A			

HCM 6th Signalized Intersection Summary

11: Powhaton Rd

2045 Total
AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	0	70	65	0	30	30	3293	350	153	1619	20
Future Volume (veh/h)	40	0	70	65	0	30	30	3293	350	153	1619	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1752	1870	1752	1870	1826	1752	1752	1826	1870
Adj Flow Rate, veh/h	43	0	76	71	0	33	33	3579	380	166	1760	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	10	2	10	2	5	10	10	5	2
Cap, veh/h	266	0	259	216	0	259	231	3761	1120	69	3761	1196
Arrive On Green	0.16	0.00	0.16	0.16	0.00	0.16	0.75	0.75	0.75	0.75	0.75	0.75
Sat Flow, veh/h	1376	0	1585	1239	0	1585	266	4985	1485	28	4985	1585
Grp Volume(v), veh/h	43	0	76	71	0	33	33	3579	380	166	1760	22
Grp Sat Flow(s),veh/h/ln	1376	0	1585	1239	0	1585	266	1662	1485	28	1662	1585
Q Serve(g_s), s	3.0	0.0	4.6	5.9	0.0	2.0	5.9	68.7	9.3	14.3	14.7	0.4
Cycle Q Clear(g_c), s	5.0	0.0	4.6	10.5	0.0	2.0	20.6	68.7	9.3	83.0	14.7	0.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	266	0	259	216	0	259	231	3761	1120	69	3761	1196
V/C Ratio(X)	0.16	0.00	0.29	0.33	0.00	0.13	0.14	0.95	0.34	2.40	0.47	0.02
Avail Cap(c_a), veh/h	266	0	259	216	0	259	231	3761	1120	69	3761	1196
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.4	0.0	40.4	45.0	0.0	39.3	9.0	11.8	4.5	54.6	5.1	3.4
Incr Delay (d2), s/veh	1.3	0.0	2.9	4.0	0.0	1.0	1.3	7.1	0.8	673.9	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	2.0	2.0	0.0	0.8	0.4	22.0	2.6	14.8	4.3	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.7	0.0	43.3	49.0	0.0	40.3	10.3	18.8	5.3	728.5	5.5	3.4
LnGrp LOS	D	A	D	D	A	D	B	B	A	F	A	A
Approach Vol, veh/h	119		104			3992			1948			
Approach Delay, s/veh	43.1		46.3			17.5			67.1			
Approach LOS	D		D			B			E			
Timer - Assigned Phs	2		4			6			8			
Phs Duration (G+Y+Rc), s	87.5		22.5			87.5			22.5			
Change Period (Y+Rc), s	4.5		4.5			4.5			4.5			
Max Green Setting (Gmax), s	83.0		18.0			83.0			18.0			
Max Q Clear Time (g_c+I1), s	70.7		7.0			85.0			12.5			
Green Ext Time (p_c), s	12.2		0.3			0.0			0.1			
Intersection Summary												
HCM 6th Ctrl Delay	34.2											
HCM 6th LOS	C											

Intersection						
Int Delay, s/veh	0.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗	↘	↗↗	↗↗	↘
Traffic Vol, veh/h	0	14	142	1232	669	132
Future Vol, veh/h	0	14	142	1232	669	132
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	250	-	-	250
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	5	5	10
Mvmt Flow	0	15	154	1339	727	143

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	-	364	870
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	7.1	4.3
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.4	2.3
Pot Cap-1 Maneuver	0	610	722
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	610	722
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.1	1.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	722	-	610	-	-
HCM Lane V/C Ratio	0.214	-	0.025	-	-
HCM Control Delay (s)	11.3	-	11.1	-	-
HCM Lane LOS	B	-	B	-	-
HCM 95th %tile Q(veh)	0.8	-	0.1	-	-

Lanes, Volumes, Timings 13: West DDI Intersection

2045 Total
AM Peak Hour

	→	↘	↙	↖		
Lane Group	EBT	EBR2	NWL	NWT	Ø3	Ø4
Lane Configurations	↑↑	↑		↑↑		
Traffic Volume (vph)	652	350	560	924		
Future Volume (vph)	652	350	560	924		
Ideal Flow (vphpl)	1900	1900	1900	1900		
Satd. Flow (prot)	3539	1583	0	3472		
Flt Permitted				0.981		
Satd. Flow (perm)	3539	1583	0	3472		
Right Turn on Red		Yes				
Satd. Flow (RTOR)		380				
Link Speed (mph)	30			30		
Link Distance (ft)	322			317		
Travel Time (s)	7.3			7.2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Shared Lane Traffic (%)						
Lane Group Flow (vph)	709	380	0	1613		
Turn Type	NA	Perm	Perm	NA		
Protected Phases	2			4 3	3	4
Permitted Phases		2	4 3			
Total Split (s)	29.0	29.0			6.0	35.0
Total Lost Time (s)	4.0	4.0				
Act Effect Green (s)	24.1	24.1		37.9		
Actuated g/C Ratio	0.34	0.34		0.54		
v/c Ratio	0.58	0.48		0.86		
Control Delay	21.1	4.3		16.4		
Queue Delay	0.0	0.0		0.2		
Total Delay	21.1	4.3		16.6		
LOS	C	A		B		
Approach Delay	15.2			16.6		
Approach LOS	B			B		

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 40 (57%), Referenced to phase 2:EBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 16.0

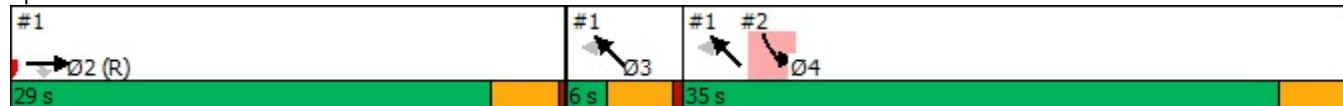
Intersection LOS: B

Intersection Capacity Utilization 66.5%

ICU Level of Service C













Analysis Period (min) 15

Splits and Phases: 1:



Lanes, Volumes, Timings
14: East DDI Intersection

2045 Total
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑									↑↑	
Traffic Volume (vph)	0	1295	0	0	0	0	0	0	0	0	600	0
Future Volume (vph)	0	1295	0	0	0	0	0	0	0	0	600	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	0	3539	0	0	0	0	0	0	0	0	3539	0
Flt Permitted												
Satd. Flow (perm)	0	3539	0	0	0	0	0	0	0	0	3539	0
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		187			321			181			334	
Travel Time (s)		4.3			7.3			4.1			7.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1408	0	0	0	0	0	0	0	0	652	0
Turn Type		NA									NA	
Protected Phases		4 3									2	
Permitted Phases												
Total Split (s)											43.0	
Total Lost Time (s)											4.0	
Act Effct Green (s)		37.4									24.6	
Actuated g/C Ratio		0.53									0.35	
v/c Ratio		0.75									0.52	
Control Delay		18.9									18.7	
Queue Delay		0.0									0.0	
Total Delay		18.9									18.7	
LOS		B									B	
Approach Delay		18.9									18.7	
Approach LOS		B									B	

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 0 (0%), Referenced to phase 2:SWT, Start of Green, Master Intersection

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 18.9

Intersection LOS: B

Intersection Capacity Utilization 59.0%

ICU Level of Service B

Analysis Period (min) 15






















Splits and Phases: 3:







HCM 6th Signalized Intersection Summary

15: 26th Ave

2045 Total
AM Peak Hour

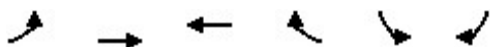
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	828	481	122	344	180	360	784	327	0	0	0
Future Volume (veh/h)	5	828	481	122	344	180	360	784	327	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach	No			No			No					
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826			
Adj Flow Rate, veh/h	5	900	523	133	374	196	391	852	355			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5			
Cap, veh/h	401	1185	1057	628	1764	787	594	1185	529			
Arrive On Green	0.34	0.34	0.34	0.09	0.51	0.51	0.34	0.34	0.34			
Sat Flow, veh/h	822	3469	1547	3374	3469	1547	1739	3469	1547			
Grp Volume(v), veh/h	5	900	523	133	374	196	391	852	355			
Grp Sat Flow(s),veh/h/ln	822	1735	1547	1687	1735	1547	1739	1735	1547			
Q Serve(g_s), s	0.2	13.8	9.7	1.3	3.6	4.3	11.5	12.9	11.8			
Cycle Q Clear(g_c), s	0.2	13.8	9.7	1.3	3.6	4.3	11.5	12.9	11.8			
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	401	1185	1057	628	1764	787	594	1185	529			
V/C Ratio(X)	0.01	0.76	0.49	0.21	0.21	0.25	0.66	0.72	0.67			
Avail Cap(c_a), veh/h	401	1185	1057	628	1764	787	594	1185	529			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Uniform Delay (d), s/veh	13.1	17.6	4.5	11.5	8.1	8.3	16.8	17.2	16.9			
Incr Delay (d2), s/veh	0.1	4.6	1.7	0.8	0.3	0.8	5.6	3.8	6.7			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.0	5.7	2.4	0.5	1.2	1.4	5.0	5.2	4.7			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.1	22.2	6.2	12.2	8.4	9.1	22.4	21.0	23.5			
LnGrp LOS	B	C	A	B	A	A	C	C	C			
Approach Vol, veh/h	1428			703			1598					
Approach Delay, s/veh	16.3			9.3			21.9					
Approach LOS	B			A			C					
Timer - Assigned Phs	2		3	4				8				
Phs Duration (G+Y+Rc), s	25.0		10.0	25.0				35.0				
Change Period (Y+Rc), s	4.5		4.5	4.5				4.5				
Max Green Setting (Gmax), s	20.5		5.5	20.5				30.5				
Max Q Clear Time (g_c+I1), s	14.9		3.3	15.8				6.3				
Green Ext Time (p_c), s	3.8		0.1	3.1				3.2				
Intersection Summary												
HCM 6th Ctrl Delay	17.4											
HCM 6th LOS	B											

Intersection						
Int Delay, s/veh	0.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	111	1067	708	31	0	37
Future Vol, veh/h	111	1067	708	31	0	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	250	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	5	5	10	10	10
Mvmt Flow	121	1160	770	34	0	40
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	804	0	-	0	-	402
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.3	-	-	-	-	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.3	-	-	-	-	3.4
Pot Cap-1 Maneuver	766	-	-	-	0	576
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	766	-	-	-	-	576
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	WB		SB		
HCM Control Delay, s	1	0		11.7		
HCM LOS	B					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	766	-	-	-	576	
HCM Lane V/C Ratio	0.158	-	-	-	0.07	
HCM Control Delay (s)	10.6	-	-	-	11.7	
HCM Lane LOS	B	-	-	-	B	
HCM 95th %tile Q(veh)	0.6	-	-	-	0.2	

HCM 6th Signalized Intersection Summary

17: 26th Ave & N-S Collector

2045 Total
AM Peak Hour















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	341	704	595	44	24	134
Future Volume (veh/h)	341	704	595	44	24	134
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	1752	1826	1826	1752	1752	1752
Adj Flow Rate, veh/h	371	765	647	48	26	146
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	5	5	10	10	10
Cap, veh/h	588	2667	2517	187	203	180
Arrive On Green	0.77	0.77	0.77	0.77	0.12	0.12
Sat Flow, veh/h	702	3561	3365	243	1668	1485
Grp Volume(v), veh/h	371	765	342	353	26	146
Grp Sat Flow(s),veh/h/ln	702	1735	1735	1782	1668	1485
Q Serve(g_s), s	26.5	5.4	4.7	4.7	1.1	7.9
Cycle Q Clear(g_c), s	31.2	5.4	4.7	4.7	1.1	7.9
Prop In Lane	1.00			0.14	1.00	1.00
Lane Grp Cap(c), veh/h	588	2667	1333	1370	203	180
V/C Ratio(X)	0.63	0.29	0.26	0.26	0.13	0.81
Avail Cap(c_a), veh/h	588	2667	1333	1370	366	326
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	7.2	2.8	2.7	2.7	32.1	35.1
Incr Delay (d2), s/veh	5.1	0.3	0.5	0.5	0.3	8.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	1.3	1.2	1.2	0.5	3.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	12.3	3.1	3.2	3.2	32.4	43.4
LnGrp LOS	B	A	A	A	C	D
Approach Vol, veh/h		1136	695		172	
Approach Delay, s/veh		6.1	3.2		41.8	
Approach LOS		A	A		D	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		67.5		14.5		67.5
Change Period (Y+Rc), s		4.5		4.5		4.5
Max Green Setting (Gmax), s		63.0		18.0		63.0
Max Q Clear Time (g_c+I1), s		33.2		9.9		6.7
Green Ext Time (p_c), s		10.5		0.3		5.1
Intersection Summary						
HCM 6th Ctrl Delay			8.2			
HCM 6th LOS			A			

HCM 6th Signalized Intersection Summary

18: Monaghan Rd & 26th Ave

2045 Total
AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	393	91	128	30	228	191	251	724	150	104	303	179
Future Volume (veh/h)	393	91	128	30	228	191	251	724	150	104	303	179
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	427	99	139	33	248	208	273	787	163	113	329	195
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	302	932	416	130	828	370	201	932	416	211	880	393
Arrive On Green	0.09	0.27	0.27	0.07	0.24	0.24	0.06	0.27	0.27	0.06	0.25	0.25
Sat Flow, veh/h	3374	3469	1547	1739	3469	1547	3374	3469	1547	1739	3469	1547
Grp Volume(v), veh/h	427	99	139	33	248	208	273	787	163	113	329	195
Grp Sat Flow(s),veh/h/ln	1687	1735	1547	1739	1735	1547	1687	1735	1547	1739	1735	1547
Q Serve(g_s), s	6.0	1.4	3.3	1.2	3.9	5.6	4.0	14.4	5.8	3.7	5.2	7.2
Cycle Q Clear(g_c), s	6.0	1.4	3.3	1.2	3.9	5.6	4.0	14.4	5.8	3.7	5.2	7.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	302	932	416	130	828	370	201	932	416	211	880	393
V/C Ratio(X)	1.41	0.11	0.33	0.25	0.30	0.56	1.36	0.84	0.39	0.53	0.37	0.50
Avail Cap(c_a), veh/h	302	932	416	130	828	370	201	932	416	211	880	393
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.5	18.4	8.9	29.2	20.9	11.2	31.5	23.2	20.0	23.2	20.6	21.3
Incr Delay (d2), s/veh	204.6	0.2	2.2	4.7	0.9	6.1	188.8	9.3	2.8	9.4	1.2	4.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ft	0.9	0.6	1.8	0.6	1.6	3.2	6.8	6.7	2.3	2.0	2.1	2.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	235.1	18.7	11.1	33.9	21.8	17.3	220.3	32.4	22.8	32.5	21.8	25.8
LnGrp LOS	F	B	B	C	C	B	F	C	C	C	C	C
Approach Vol, veh/h	665			489			1223			637		
Approach Delay, s/veh	156.0			20.7			73.1			24.9		
Approach LOS	F			C			E			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.0	24.0	10.0	24.0	10.0	23.0	12.0	22.0				
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	6.0	* 6	6.0	* 6				
Max Green Setting (Gmax), s	17.0	17.0	5.0	17.0	4.0	* 17	6.0	* 16				
Max Q Clear Time (g_c+1/3), s	16.4	16.4	3.2	5.3	6.0	9.2	8.0	7.6				
Green Ext Time (p_c), s	0.0	0.4	0.0	0.8	0.0	1.7	0.0	1.5				

Intersection Summary

HCM 6th Ctrl Delay 72.7

HCM 6th LOS E

























Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary

1: Powhaton Rd & 48th Ave

2045 Total
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	563	573	257	736	805	591	1484	328	583	1740	230
Future Volume (veh/h)	130	563	573	257	736	805	591	1484	328	583	1740	230
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	141	612	0	279	800	875	642	1613	0	634	1891	250
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	144	601		287	813	702	694	1732		981	2121	658
Arrive On Green	0.04	0.12	0.00	0.09	0.16	0.16	0.21	0.35	0.00	0.29	0.43	0.43
Sat Flow, veh/h	3374	4985	1547	3374	4985	1547	3374	4985	1547	3374	4985	1547
Grp Volume(v), veh/h	141	612	0	279	800	875	642	1613	0	634	1891	250
Grp Sat Flow(s),veh/h/ln	1687	1662	1547	1687	1662	1547	1687	1662	1547	1687	1662	1547
Q Serve(g_s), s	5.9	17.0	0.0	11.6	22.6	23.0	26.3	44.0	0.0	23.1	49.5	12.3
Cycle Q Clear(g_c), s	5.9	17.0	0.0	11.6	22.6	23.0	26.3	44.0	0.0	23.1	49.5	12.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	144	601		287	813	702	694	1732		981	2121	658
V/C Ratio(X)	0.98	1.02		0.97	0.98	1.25	0.93	0.93		0.65	0.89	0.38
Avail Cap(c_a), veh/h	144	601		287	813	702	694	1732		981	2121	658
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	67.4	62.0	0.0	64.3	58.8	38.5	54.9	44.4	0.0	43.7	37.5	17.3
Incr Delay (d2), s/veh	70.5	41.4	0.0	46.4	27.9	122.4	20.1	10.5	0.0	3.3	6.2	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	9.5	0.0	6.9	11.6	47.7	13.1	19.7	0.0	10.2	21.1	4.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	138.0	103.4	0.0	110.7	86.7	160.9	75.0	54.9	0.0	47.0	43.7	19.0
LnGrp LOS	F	F		F	F	F	E	D		D	D	B
Approach Vol, veh/h	753			1954			2255			2775		
Approach Delay, s/veh	109.9			123.3			60.6			42.2		
Approach LOS	F			F			E			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	46.0	55.0	17.0	23.0	35.0	66.0	11.0	29.0				
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	6.0	* 6	5.0	6.0				
Max Green Setting (Gmax), s	41.0	48.0	12.0	17.0	29.0	* 60	6.0	23.0				
Max Q Clear Time (g_c+I1), s	25.1	46.0	13.6	19.0	28.3	51.5	7.9	25.0				
Green Ext Time (p_c), s	2.2	1.7	0.0	0.0	0.2	7.2	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay 74.6

HCM 6th LOS E

Notes

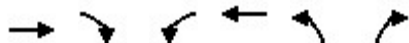
User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

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

HCM 6th Signalized Intersection Summary 2: N-S Collector & 48th Ave

2045 Total
PM Peak Hour

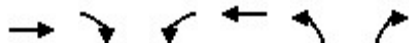


Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Volume (veh/h)	1166	154	11	1097	561	36
Future Volume (veh/h)	1166	154	11	1097	561	36
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1752	1752	1826	1752	1752
Adj Flow Rate, veh/h	1267	167	12	1192	610	39
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	10	10	5	10	10
Cap, veh/h	1447	619	132	1447	756	673
Arrive On Green	0.42	0.42	0.42	0.42	0.45	0.45
Sat Flow, veh/h	3561	1485	349	3561	1668	1485
Grp Volume(v), veh/h	1267	167	12	1192	610	39
Grp Sat Flow(s),veh/h/ln	1735	1485	349	1735	1668	1485
Q Serve(g_s), s	23.3	5.1	2.3	21.2	21.9	1.0
Cycle Q Clear(g_c), s	23.3	5.1	25.6	21.2	21.9	1.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1447	619	132	1447	756	673
V/C Ratio(X)	0.88	0.27	0.09	0.82	0.81	0.06
Avail Cap(c_a), veh/h	1473	630	135	1473	756	673
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	18.6	13.3	30.3	18.0	16.4	10.7
Incr Delay (d2), s/veh	6.2	0.2	0.3	3.9	9.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.6	1.6	0.2	8.4	9.3	0.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	24.7	13.5	30.6	21.9	25.4	10.8
LnGrp LOS	C	B	C	C	C	B
Approach Vol, veh/h	1434			1204	649	
Approach Delay, s/veh	23.4			22.0	24.5	
Approach LOS	C			C	C	
Timer - Assigned Phs	2		4		8	
Phs Duration (G+Y+Rc), s	36.0		33.5		33.5	
Change Period (Y+Rc), s	4.5		4.5		4.5	
Max Green Setting (Gmax), s	31.5		29.5		29.5	
Max Q Clear Time (g_c+l1), s	23.9		25.3		27.6	
Green Ext Time (p_c), s	1.5		3.1		1.4	
Intersection Summary						
HCM 6th Ctrl Delay			23.1			
HCM 6th LOS			C			

HCM 6th Signalized Intersection Summary

3: 48th Ave

2045 Total
PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Volume (veh/h)	1061	51	5	862	175	22
Future Volume (veh/h)	1061	51	5	862	175	22
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	1826	1752	1752	1826	1752	1752
Adj Flow Rate, veh/h	1153	55	5	937	190	24
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	10	10	5	10	10
Cap, veh/h	1418	607	194	1418	686	610
Arrive On Green	0.41	0.41	0.41	0.41	0.41	0.41
Sat Flow, veh/h	3561	1485	433	3561	1668	1485
Grp Volume(v), veh/h	1153	55	5	937	190	24
Grp Sat Flow(s), veh/h/ln	1735	1485	433	1735	1668	1485
Q Serve(g_s), s	14.7	1.1	0.5	10.9	3.8	0.5
Cycle Q Clear(g_c), s	14.7	1.1	15.2	10.9	3.8	0.5
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1418	607	194	1418	686	610
V/C Ratio(X)	0.81	0.09	0.03	0.66	0.28	0.04
Avail Cap(c_a), veh/h	1561	668	211	1561	686	610
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.39	0.39	0.72	0.72	1.00	1.00
Uniform Delay (d), s/veh	13.1	9.1	19.8	12.0	9.8	8.8
Incr Delay (d2), s/veh	1.3	0.0	0.0	0.7	1.0	0.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%), veh/ln	4.8	0.3	0.0	3.6	1.3	0.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	14.3	9.1	19.9	12.6	10.8	8.9
LnGrp LOS	B	A	B	B	B	A
Approach Vol, veh/h	1208			942	214	
Approach Delay, s/veh	14.1			12.7	10.6	
Approach LOS	B			B	B	
Timer - Assigned Phs	2			4		8
Phs Duration (G+Y+Rc), s	25.1			24.9		24.9
Change Period (Y+Rc), s	4.5			4.5		4.5
Max Green Setting (Gmax), s	18.5			22.5		22.5
Max Q Clear Time (g_c+I1), s	5.8			16.7		17.2
Green Ext Time (p_c), s	0.5			3.7		2.9
Intersection Summary						
HCM 6th Ctrl Delay			13.2			
HCM 6th LOS			B			

HCM 6th Signalized Intersection Summary 4: Monaghan Rd & 48th Ave

2045 Total
PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	314	680	615	434	375	181
Future Volume (veh/h)	314	680	615	434	375	181
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	1826	1826	501	501	501	501
Adj Flow Rate, veh/h	341	739	668	472	408	197
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5
Cap, veh/h	565	722	371	499	293	131
Arrive On Green	0.32	0.32	0.14	0.52	0.31	0.31
Sat Flow, veh/h	1739	1547	925	976	976	424
Grp Volume(v), veh/h	341	739	668	472	408	197
Grp Sat Flow(s), veh/h/ln	1739	1547	463	476	476	424
Q Serve(g_s), s	9.9	19.5	8.5	28.1	18.5	18.5
Cycle Q Clear(g_c), s	9.9	19.5	8.5	28.1	18.5	18.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	565	722	371	499	293	131
V/C Ratio(X)	0.60	1.02	1.80	0.95	1.39	1.51
Avail Cap(c_a), veh/h	565	722	371	499	293	131
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	17.0	16.0	21.3	13.4	20.8	20.8
Incr Delay (d2), s/veh	4.7	39.6	370.7	28.7	195.6	263.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%), veh/ln	4.3	26.4	20.6	4.3	9.8	11.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	21.7	55.6	392.0	42.1	216.4	283.8
LnGrp LOS	C	F	F	D	F	F
Approach Vol, veh/h	1080			1140	605	
Approach Delay, s/veh	44.9			247.2	238.3	
Approach LOS	D			F	F	
Timer - Assigned Phs	2			4	5	6
Phs Duration (G+Y+Rc), s	36.0			24.0	13.0	23.0
Change Period (Y+Rc), s	4.5			4.5	4.5	4.5
Max Green Setting (Gmax), s	31.5			19.5	8.5	18.5
Max Q Clear Time (g_c+I1), s	30.1			21.5	10.5	20.5
Green Ext Time (p_c), s	0.5			0.0	0.0	0.0
Intersection Summary						
HCM 6th Ctrl Delay			167.9			
HCM 6th LOS			F			

Notes


















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

Intersection						
Int Delay, s/veh	1.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗	↘	↗↗	↗↗	↗
Traffic Vol, veh/h	0	126	33	997	1036	19
Future Vol, veh/h	0	126	33	997	1036	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	15	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	5	5	10
Mvmt Flow	0	137	36	1084	1126	21
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	-	563	1147	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.1	4.3	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.4	2.3	-	-	-
Pot Cap-1 Maneuver	0	450	561	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	450	561	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	16.5	0.4		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	561	-	450	-	-	
HCM Lane V/C Ratio	0.064	-	0.304	-	-	
HCM Control Delay (s)	11.9	-	16.5	-	-	
HCM Lane LOS	B	-	C	-	-	
HCM 95th %tile Q(veh)	0.2	-	1.3	-	-	

HCM 6th Signalized Intersection Summary

6: Powhatan Rd & E-W Road

2045 Total
PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	 		  			  
Traffic Volume (veh/h)	376	191	2540	124	99	2669
Future Volume (veh/h)	376	191	2540	124	99	2669
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	1752	1752	1826	1752	1752	1826
Adj Flow Rate, veh/h	409	208	2761	135	108	2901
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	10	5	10	10	5
Cap, veh/h	575	264	3046	907	211	3655
Arrive On Green	0.18	0.18	0.61	0.61	0.07	0.73
Sat Flow, veh/h	3237	1485	5149	1485	1668	5149
Grp Volume(v), veh/h	409	208	2761	135	108	2901
Grp Sat Flow(s),veh/h/ln	1618	1485	1662	1485	1668	1662
Q Serve(g_s), s	10.7	12.1	43.5	3.5	1.8	33.4
Cycle Q Clear(g_c), s	10.7	12.1	43.5	3.5	1.8	33.4
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	575	264	3046	907	211	3655
V/C Ratio(X)	0.71	0.79	0.91	0.15	0.51	0.79
Avail Cap(c_a), veh/h	575	264	3046	907	211	3655
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.8	35.4	15.3	7.5	21.7	7.7
Incr Delay (d2), s/veh	7.3	20.8	5.1	0.3	8.6	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.7	5.8	15.5	1.1	1.9	9.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	42.1	56.2	20.4	7.8	30.3	9.5
LnGrp LOS	D	E	C	A	C	A
Approach Vol, veh/h	617		2896			3009
Approach Delay, s/veh	46.9		19.8			10.3
Approach LOS	D		B			B
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	11.0	59.0			70.0	20.0
Change Period (Y+Rc), s	4.5	4.0			4.0	4.0
Max Green Setting (Gmax), s	6.5	55.0			66.0	16.0
Max Q Clear Time (g_c+I1), s	3.8	45.5			35.4	14.1
Green Ext Time (p_c), s	0.1	9.1			27.8	0.5
Intersection Summary						
HCM 6th Ctrl Delay			17.9			
HCM 6th LOS			B			

HCM 6th Signalized Intersection Summary

7: Monaghan Rd & E-W Road

2045 Total
PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	115	137	37	957	1119	23
Future Volume (veh/h)	115	137	37	957	1119	23
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	1752	1752	427	501	1826	1752
Adj Flow Rate, veh/h	125	149	40	1040	1216	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	10	10	5	5	10
Cap, veh/h	225	260	176	681	2081	891
Arrive On Green	0.13	0.13	0.04	0.72	0.60	0.60
Sat Flow, veh/h	1668	1485	406	976	3561	1485
Grp Volume(v), veh/h	125	149	40	1040	1216	25
Grp Sat Flow(s), veh/h/ln	1668	1485	406	476	1735	1485
Q Serve(g_s), s	4.2	5.5	2.1	42.9	13.0	0.4
Cycle Q Clear(g_c), s	4.2	5.5	2.1	42.9	13.0	0.4
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	225	260	176	681	2081	891
V/C Ratio(X)	0.56	0.57	0.23	1.53	0.58	0.03
Avail Cap(c_a), veh/h	514	518	203	681	2081	891
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.90	0.90	1.00	1.00
Uniform Delay (d), s/veh	24.3	22.7	6.6	8.5	7.4	4.9
Incr Delay (d2), s/veh	2.2	2.0	0.6	244.4	1.2	0.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%), veh/ln	1.7	4.7	0.1	25.3	3.9	0.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	26.4	24.7	7.2	252.9	8.6	4.9
LnGrp LOS	C	C	A	F	A	A
Approach Vol, veh/h	274			1080	1241	
Approach Delay, s/veh	25.5			243.8	8.5	
Approach LOS	C			F	A	
Timer - Assigned Phs	2			4	5	6
Phs Duration (G+Y+Rc), s	47.4			12.6	6.9	40.5
Change Period (Y+Rc), s	4.5			4.5	4.5	4.5
Max Green Setting (Gmax), s	32.5			18.5	6.5	21.5
Max Q Clear Time (g_c+l1), s	44.9			7.5	4.1	15.0
Green Ext Time (p_c), s	0.0			0.6	0.0	4.3
Intersection Summary						
HCM 6th Ctrl Delay			108.3			
HCM 6th LOS			F			

Notes













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

HCM 6th Signalized Intersection Summary

8: Powhatan Rd & 38th Ave

2045 Total
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	46	106	345	138	223	173	2241	133	51	2856	147
Future Volume (veh/h)	75	46	106	345	138	223	173	2241	133	51	2856	147
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No				No			No		
Adj Sat Flow, veh/h/ln	1826	1752	1826	1752	1752	1752	1826	1826	1752	1752	1826	1826
Adj Flow Rate, veh/h	82	50	115	375	150	0	188	2436	145	55	3104	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	10	5	10	10	10	5	5	10	10	5	5
Cap, veh/h	140	372	173	234	460		173	3148	1045	128	2951	
Arrive On Green	0.04	0.11	0.11	0.07	0.14	0.00	0.07	0.63	0.63	0.04	0.59	0.00
Sat Flow, veh/h	1739	3328	1547	3237	3328	1485	1739	4985	1485	3237	4985	1547
Grp Volume(v), veh/h	82	50	115	375	150	0	188	2436	145	55	3104	0
Grp Sat Flow(s),veh/h/ln	1739	1664	1547	1618	1664	1485	1739	1662	1485	1618	1662	1547
Q Serve(g_s), s	0.7	2.1	9.0	11.0	6.2	0.0	11.0	53.5	4.9	2.5	90.0	0.0
Cycle Q Clear(g_c), s	0.7	2.1	9.0	11.0	6.2	0.0	11.0	53.5	4.9	2.5	90.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	140	372	173	234	460		173	3148	1045	128	2951	
V/C Ratio(X)	0.59	0.13	0.66	1.60	0.33		1.09	0.77	0.14	0.43	1.05	
Avail Cap(c_a), veh/h	140	372	173	234	460		173	3148	1045	128	2951	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	69.7	60.9	44.6	70.5	59.1	0.0	69.0	20.2	7.4	71.3	31.0	0.0
Incr Delay (d2), s/veh	16.7	0.7	18.4	289.6	1.9	0.0	93.0	1.9	0.3	10.2	32.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	0.9	4.4	14.0	2.7	0.0	11.2	20.7	1.6	1.2	43.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	86.5	61.6	62.9	360.1	61.0	0.0	162.0	22.1	7.7	81.6	63.2	0.0
LnGrp LOS	F	E	E	F	E		F	C	A	F	F	
Approach Vol, veh/h	247		525			2769			3159			
Approach Delay, s/veh	70.5		274.6			30.8			63.5			
Approach LOS	E		F			C			E			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	1.0	102.0	16.0	23.0	17.0	96.0	12.0	27.0				
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	6.0	* 6	6.0	* 6				
Max Green Setting (Gmax), s	6.0	95.0	11.0	16.0	11.0	* 90	6.0	* 21				
Max Q Clear Time (g_c+I), s	14.5	55.5	13.0	11.0	13.0	92.0	2.7	8.2				
Green Ext Time (p_c), s	0.0	30.8	0.0	0.2	0.0	0.0	0.0	0.6				

Intersection Summary

HCM 6th Ctrl Delay 66.8
HCM 6th LOS E

Notes













* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

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

Intersection

Intersection Delay, s/veh 29.3

Intersection LOS D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	114	22	37	343	83	98	238	12	27	329	42
Future Vol, veh/h	17	114	22	37	343	83	98	238	12	27	329	42
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10	10	10	10
Mvmt Flow	18	124	24	40	373	90	107	259	13	29	358	46
Number of Lanes	1	1	1	1	1	1	1	1	1	1	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	3	3
Conflicting Approach Left SB		NB	EB	WB
Conflicting Lanes Left	3	3	3	3
Conflicting Approach Right NB		SB	WB	EB
Conflicting Lanes Right	3	3	3	3
HCM Control Delay	15.2	34.9	20.9	35.4
HCM LOS	C	D	C	E

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%	0%
Vol Thru, %	0%	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	98	238	12	17	114	22	37	343	83	27	329	42
LT Vol	98	0	0	17	0	0	37	0	0	27	0	0
Through Vol	0	238	0	0	114	0	0	343	0	0	329	0
RT Vol	0	0	12	0	0	22	0	0	83	0	0	42
Lane Flow Rate	107	259	13	18	124	24	40	373	90	29	358	46
Geometry Grp	8	8	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.266	0.609	0.028	0.05	0.318	0.057	0.097	0.85	0.188	0.072	0.827	0.097
Departure Headway (Hd)	8.977	8.477	7.777	9.748	9.248	8.548	8.706	8.206	7.506	8.821	8.321	7.621
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	398	424	457	370	392	422	410	440	475	404	433	467
Service Time	6.777	6.277	5.577	7.448	6.948	6.248	6.498	5.998	5.298	6.614	6.114	5.414
HCM Lane V/C Ratio	0.269	0.611	0.028	0.049	0.316	0.057	0.098	0.848	0.189	0.072	0.827	0.099
HCM Control Delay	15	23.8	10.8	13	16.2	11.8	12.4	42.9	12	12.3	40.4	11.2
HCM Lane LOS	B	C	B	B	C	B	B	E	B	B	E	B
HCM 95th-tile Q	1.1	3.9	0.1	0.2	1.3	0.2	0.3	8.4	0.7	0.2	7.8	0.3

HCM 6th Signalized Intersection Summary 10: Monaghan Rd & 38th Ave

2045 Total
PM Peak Hour

















Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	200	99	60	820	1244	84
Future Volume (veh/h)	200	99	60	820	1244	84
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	1752	1752	1752	1826	1826	1752
Adj Flow Rate, veh/h	217	108	65	891	1352	91
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	10	10	5	5	10
Cap, veh/h	270	241	283	2475	2475	1059
Arrive On Green	0.16	0.16	0.71	0.71	0.71	0.71
Sat Flow, veh/h	1668	1485	346	3561	3561	1485
Grp Volume(v), veh/h	217	108	65	891	1352	91
Grp Sat Flow(s), veh/h/ln	1668	1485	346	1735	1735	1485
Q Serve(g_s), s	9.0	4.7	7.8	7.2	13.2	1.4
Cycle Q Clear(g_c), s	9.0	4.7	21.1	7.2	13.2	1.4
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	270	241	283	2475	2475	1059
V/C Ratio(X)	0.80	0.45	0.23	0.36	0.55	0.09
Avail Cap(c_a), veh/h	451	401	283	2475	2475	1059
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	29.1	27.3	9.8	4.0	4.9	3.2
Incr Delay (d2), s/veh	5.5	1.3	1.9	0.4	0.9	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%), veh/ln	3.9	1.7	0.7	1.8	3.5	0.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	34.6	28.6	11.7	4.4	5.7	3.3
LnGrp LOS	C	C	B	A	A	A
Approach Vol, veh/h	325			956	1443	
Approach Delay, s/veh	32.7			4.9	5.6	
Approach LOS	C			A	A	
Timer - Assigned Phs	2			4		6
Phs Duration (G+Y+Rc), s	56.0			16.2		56.0
Change Period (Y+Rc), s	4.5			4.5		4.5
Max Green Setting (Gmax), s	51.5			19.5		51.5
Max Q Clear Time (g_c+I1), s	23.1			11.0		15.2
Green Ext Time (p_c), s	8.9			0.7		14.4
Intersection Summary						
HCM 6th Ctrl Delay			8.6			
HCM 6th LOS			A			

HCM 6th Signalized Intersection Summary

11: Powhaton Rd

2045 Total
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								  			  	
Traffic Volume (veh/h)	20	0	40	268	0	123	80	2448	95	42	3305	50
Future Volume (veh/h)	20	0	40	268	0	123	80	2448	95	42	3305	50
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1752	1870	1752	1870	1826	1752	1752	1826	1870
Adj Flow Rate, veh/h	22	0	43	291	0	134	87	2661	103	46	3592	54
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	10	2	10	2	5	10	10	5	2
Cap, veh/h	201	0	297	271	0	297	63	3676	1095	101	3676	1169
Arrive On Green	0.19	0.00	0.19	0.19	0.00	0.19	0.74	0.74	0.74	0.74	0.74	0.74
Sat Flow, veh/h	1256	0	1585	1277	0	1585	43	4985	1485	94	4985	1585
Grp Volume(v), veh/h	22	0	43	291	0	134	87	2661	103	46	3592	54
Grp Sat Flow(s),veh/h/ln	1256	0	1585	1277	0	1585	43	1662	1485	94	1662	1585
Q Serve(g_s), s	1.9	0.0	2.7	19.8	0.0	9.0	7.3	36.1	2.3	52.4	81.2	1.1
Cycle Q Clear(g_c), s	10.9	0.0	2.7	22.5	0.0	9.0	88.5	36.1	2.3	88.5	81.2	1.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	201	0	297	271	0	297	63	3676	1095	101	3676	1169
V/C Ratio(X)	0.11	0.00	0.14	1.08	0.00	0.45	1.39	0.72	0.09	0.45	0.98	0.05
Avail Cap(c_a), veh/h	201	0	297	271	0	297	63	3676	1095	101	3676	1169
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.1	0.0	40.7	52.3	0.0	43.3	59.8	8.9	4.4	36.5	14.8	4.3
Incr Delay (d2), s/veh	1.1	0.0	1.0	76.3	0.0	4.9	247.8	1.3	0.2	14.0	10.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.0	1.2	14.0	0.0	3.9	6.2	11.6	0.7	1.8	28.6	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	49.2	0.0	41.7	128.6	0.0	48.1	307.6	10.1	4.6	50.5	25.2	4.4
LnGrp LOS	D	A	D	F	A	D	F	B	A	D	C	A
Approach Vol, veh/h	65		425			2851			3692			
Approach Delay, s/veh	44.3		103.2			19.0			25.2			
Approach LOS	D		F			B			C			
Timer - Assigned Phs	2		4			6			8			
Phs Duration (G+Y+Rc), s	93.0		27.0			93.0			27.0			
Change Period (Y+Rc), s	4.5		4.5			4.5			4.5			
Max Green Setting (Gmax), s	88.5		22.5			88.5			22.5			
Max Q Clear Time (g_c+I1), s	90.5		12.9			90.5			24.5			
Green Ext Time (p_c), s	0.0		0.1			0.0			0.0			
Intersection Summary												
HCM 6th Ctrl Delay			27.6									
HCM 6th LOS			C									

Intersection						
Int Delay, s/veh	0.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗	↘	↗↘	↗↘	↗
Traffic Vol, veh/h	0	46	35	812	1309	35
Future Vol, veh/h	0	46	35	812	1309	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	250	-	-	250
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	5	5	10
Mvmt Flow	0	50	38	883	1423	38


Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	-	712	1461
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	7.1	4.3
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.4	2.3
Pot Cap-1 Maneuver	0	357	420
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	357	420
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.7	0.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	420	-	357	-	-
HCM Lane V/C Ratio	0.091	-	0.14	-	-
HCM Control Delay (s)	14.4	-	16.7	-	-
HCM Lane LOS	B	-	C	-	-
HCM 95th %tile Q(veh)	0.3	-	0.5	-	-

Lanes, Volumes, Timings
13: West DDI Intersection

2045 Total
PM Peak Hour

						
Lane Group	EBT	EBR2	NWL	NWT	Ø3	Ø4
Lane Configurations	↑↑	↑		↑↑		
Traffic Volume (vph)	947	400	596	1104		
Future Volume (vph)	947	400	596	1104		
Ideal Flow (vphpl)	1900	1900	1900	1900		
Lane Util. Factor	0.95	1.00	0.95	0.95		
Fr t		0.850				
Flt Protected				0.983		
Satd. Flow (prot)	3539	1583	0	3479		
Flt Permitted				0.983		
Satd. Flow (perm)	3539	1583	0	3479		
Right Turn on Red		Yes				
Satd. Flow (RTOR)		435				
Link Speed (mph)	30			30		
Link Distance (ft)	322			317		
Travel Time (s)	7.3			7.2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Adj. Flow (vph)	1029	435	648	1200		
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1029	435	0	1848		
Enter Blocked Intersection	No	No	No	No		
Lane Alignment	Left	Right	Left	Left		
Median Width(ft)	0			0		
Link Offset(ft)	-12			-12		
Crosswalk Width(ft)	16			16		
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00		
Turning Speed (mph)		20	15			
Number of Detectors	2	1	1	1		
Detector Template	Thru	Right	Left			
Leading Detector (ft)	100	20	20	50		
Trailing Detector (ft)	0	0	0	0		
Detector 1 Position(ft)	0	0	0	0		
Detector 1 Size(ft)	6	20	20	50		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0	0.0		
Detector 2 Position(ft)	94					
Detector 2 Size(ft)	6					
Detector 2 Type	Cl+Ex					
Detector 2 Channel						
Detector 2 Extend (s)	0.0					
Turn Type	NA	Perm	Perm	NA		
Protected Phases	2			4 3	3	4
Permitted Phases		2	4 3			
Minimum Initial (s)	4.0	4.0			2.0	4.0
Minimum Split (s)	25.5	25.5			6.0	20.0
Total Split (s)	29.0	29.0			6.0	35.0

Lanes, Volumes, Timings 13: West DDI Intersection

2045 Total
PM Peak Hour



Lane Group	EBT	EBR2	NWL	NWT	Ø3	Ø4
Total Split (%)	41.4%	41.4%			9%	50%
Maximum Green (s)	25.0	25.0			2.0	31.0
Yellow Time (s)	3.5	3.5			3.5	3.5
All-Red Time (s)	0.5	0.5			0.5	0.5
Total Lost Time (s)	4.0	4.0				
Lead/Lag					Lead	Lag
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0			3.0	3.0
Recall Mode	C-Min	C-Min			None	None
Act Effect Green (s)	24.6	24.6		37.4		
Actuated g/C Ratio	0.35	0.35		0.53		
v/c Ratio	0.83	0.52		0.99		
Control Delay	27.8	4.4		36.9		
Queue Delay	0.0	0.0		3.4		
Total Delay	27.8	4.4		40.4		
LOS	C	A		D		
Approach Delay	20.8			40.4		
Approach LOS	C			D		

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 40 (57%), Referenced to phase 2:EBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.99

Intersection Signal Delay: 31.7

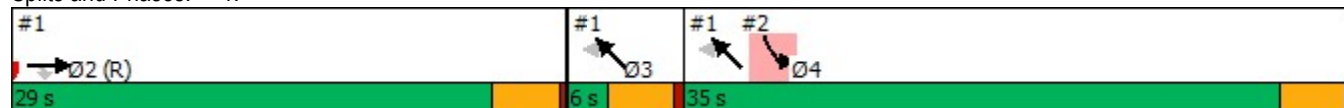
Intersection LOS: C

Intersection Capacity Utilization 80.7%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1:



Lanes, Volumes, Timings
14: East DDI Intersection

2045 Total
PM Peak Hour

	→	↘	↙	↗		
Lane Group	EBT	EBR2	NWL	NWT	Ø3	Ø4
Lane Configurations	↑↑	↑		↑↑		
Traffic Volume (vph)	947	400	596	1104		
Future Volume (vph)	947	400	596	1104		
Ideal Flow (vphpl)	1900	1900	1900	1900		
Satd. Flow (prot)	3539	1583	0	3479		
Flt Permitted				0.983		
Satd. Flow (perm)	3539	1583	0	3479		
Right Turn on Red		Yes				
Satd. Flow (RTOR)		435				
Link Speed (mph)	30			30		
Link Distance (ft)	322			317		
Travel Time (s)	7.3			7.2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1029	435	0	1848		
Turn Type	NA	Perm	Perm	NA		
Protected Phases	2			4 3	3	4
Permitted Phases		2	4 3			
Total Split (s)	29.0	29.0			6.0	35.0
Total Lost Time (s)	4.0	4.0				
Act Effct Green (s)	24.6	24.6		37.4		
Actuated g/C Ratio	0.35	0.35		0.53		
v/c Ratio	0.83	0.52		0.99		
Control Delay	27.8	4.4		36.9		
Queue Delay	0.0	0.0		3.4		
Total Delay	27.8	4.4		40.4		
LOS	C	A		D		
Approach Delay	20.8			40.4		
Approach LOS	C			D		

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 40 (57%), Referenced to phase 2:EBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.99

Intersection Signal Delay: 31.7

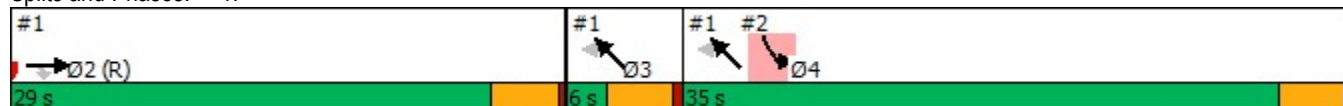
Intersection LOS: C

Intersection Capacity Utilization 80.7%

ICU Level of Service D

Analysis Period (min) 15






















Splits and Phases: 1:







HCM 6th Signalized Intersection Summary

15: 26th Ave

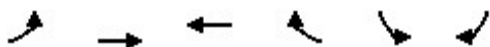
2045 Total
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	586	840	431	890	204	310	594	182	0	0	0
Future Volume (veh/h)	5	586	840	431	890	204	310	594	182	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach	No			No			No					
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826			
Adj Flow Rate, veh/h	5	637	913	468	967	222	337	646	198			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5			
Cap, veh/h	262	1070	954	534	1879	838	536	1070	477			
Arrive On Green	0.31	0.31	0.31	0.16	0.54	0.54	0.31	0.31	0.31			
Sat Flow, veh/h	460	3469	1547	3374	3469	1547	1739	3469	1547			
Grp Volume(v), veh/h	5	637	913	468	967	222	337	646	198			
Grp Sat Flow(s),veh/h/ln	460	1735	1547	1687	1735	1547	1739	1735	1547			
Q Serve(g_s), s	0.5	9.3	18.5	8.1	10.6	4.6	10.0	9.5	6.1			
Cycle Q Clear(g_c), s	0.5	9.3	18.5	8.1	10.6	4.6	10.0	9.5	6.1			
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	262	1070	954	534	1879	838	536	1070	477			
V/C Ratio(X)	0.02	0.60	0.96	0.88	0.51	0.26	0.63	0.60	0.42			
Avail Cap(c_a), veh/h	262	1070	954	534	1879	838	536	1070	477			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Uniform Delay (d), s/veh	14.5	17.6	10.8	24.7	8.7	7.4	17.8	17.6	16.5			
Incr Delay (d2), s/veh	0.1	2.4	20.4	18.0	1.0	0.8	5.5	2.5	2.6			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.1	3.7	13.2	4.4	3.4	1.4	4.4	3.8	2.3			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.6	20.0	31.1	42.7	9.7	8.1	23.3	20.2	19.1			
LnGrp LOS	B	C	C	D	A	A	C	C	B			
Approach Vol, veh/h	1555			1657			1181					
Approach Delay, s/veh	26.5			18.8			20.9					
Approach LOS	C			B			C					
Timer - Assigned Phs	2		3	4				8				
Phs Duration (G+Y+Rc), s	23.0		14.0	23.0				37.0				
Change Period (Y+Rc), s	4.5		4.5	4.5				4.5				
Max Green Setting (Gmax), s	18.5		9.5	18.5				32.5				
Max Q Clear Time (g_c+I1), s	12.0		10.1	20.5				12.6				
Green Ext Time (p_c), s	3.3		0.0	0.0				7.9				
Intersection Summary												
HCM 6th Ctrl Delay	22.1											
HCM 6th LOS	C											

Intersection						
Int Delay, s/veh	1.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	30	786	1374	9	0	151
Future Vol, veh/h	30	786	1374	9	0	151
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	250	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	5	5	10	10	10
Mvmt Flow	33	854	1493	10	0	164
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	1503	0	-	0	-	752
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.3	-	-	-	-	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.3	-	-	-	-	3.4
Pot Cap-1 Maneuver	404	-	-	-	0	336
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	404	-	-	-	-	336
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	WB		SB		
HCM Control Delay, s	0.5	0		25.5		
HCM LOS	D					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	404	-	-	-	336	
HCM Lane V/C Ratio	0.081	-	-	-	0.488	
HCM Control Delay (s)	14.7	-	-	-	25.5	
HCM Lane LOS	B	-	-	-	D	
HCM 95th %tile Q(veh)	0.3	-	-	-	2.6	

HCM 6th Signalized Intersection Summary 17: 26th Ave & N-S Collector

2045 Total
PM Peak Hour















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	132	675	829	37	106	563
Future Volume (veh/h)	132	675	829	37	106	563
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	1752	1826	1826	1752	1752	1752
Adj Flow Rate, veh/h	143	734	901	40	115	612
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	5	5	10	10	10
Cap, veh/h	174	1822	1254	56	624	710
Arrive On Green	0.10	0.53	0.37	0.37	0.37	0.37
Sat Flow, veh/h	1668	3561	3475	150	1668	1485
Grp Volume(v), veh/h	143	734	462	479	115	612
Grp Sat Flow(s),veh/h/ln	1668	1735	1735	1799	1668	1485
Q Serve(g_s), s	7.5	11.4	20.4	20.4	4.1	32.7
Cycle Q Clear(g_c), s	7.5	11.4	20.4	20.4	4.1	32.7
Prop In Lane	1.00			0.08	1.00	1.00
Lane Grp Cap(c), veh/h	174	1822	643	667	624	710
V/C Ratio(X)	0.82	0.40	0.72	0.72	0.18	0.86
Avail Cap(c_a), veh/h	222	1822	643	667	624	710
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.3	12.8	24.2	24.2	18.8	20.7
Incr Delay (d2), s/veh	17.5	0.7	6.8	6.5	0.1	10.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	4.3	9.2	9.5	1.6	25.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	56.8	13.5	30.9	30.7	19.0	31.3
LnGrp LOS	E	B	C	C	B	C
Approach Vol, veh/h		877	941		727	
Approach Delay, s/veh		20.5	30.8		29.3	
Approach LOS		C	C		C	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		51.5		38.0	13.8	37.7
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		47.0		33.5	11.9	30.6
Max Q Clear Time (g_c+I1), s		13.4		34.7	9.5	22.4
Green Ext Time (p_c), s		5.9		0.0	0.1	3.7
Intersection Summary						
HCM 6th Ctrl Delay			26.8			
HCM 6th LOS			C			

HCM 6th Signalized Intersection Summary 18: Monaghan Rd & 26th Ave

2045 Total
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	234	179	322	40	246	138	147	377	100	192	711	431
Future Volume (veh/h)	234	179	322	40	246	138	147	377	100	192	711	431
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	254	195	350	43	267	150	160	410	109	209	773	468
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	440	830	521	113	641	286	330	980	437	382	1169	521
Arrive On Green	0.13	0.24	0.24	0.07	0.18	0.18	0.10	0.28	0.28	0.16	0.34	0.34
Sat Flow, veh/h	3374	3469	1547	1739	3469	1547	3374	3469	1547	1739	3469	1547
Grp Volume(v), veh/h	254	195	350	43	267	150	160	410	109	209	773	468
Grp Sat Flow(s),veh/h/ln	1687	1735	1547	1739	1735	1547	1687	1735	1547	1739	1735	1547
Q Serve(g_s), s	6.5	4.2	8.8	2.2	6.3	8.1	4.1	8.8	3.6	8.7	17.5	16.5
Cycle Q Clear(g_c), s	6.5	4.2	8.8	2.2	6.3	8.1	4.1	8.8	3.6	8.7	17.5	16.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	440	830	521	113	641	286	330	980	437	382	1169	521
V/C Ratio(X)	0.58	0.24	0.67	0.38	0.42	0.52	0.48	0.42	0.25	0.55	0.66	0.90
Avail Cap(c_a), veh/h	440	830	521	113	641	286	330	980	437	382	1169	521
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.6	28.2	26.1	41.2	33.1	33.9	39.3	26.8	13.5	26.1	26.0	11.3
Incr Delay (d2), s/veh	5.4	0.7	6.7	9.4	2.0	6.7	5.0	1.3	1.4	5.5	2.9	20.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	1.8	3.5	1.2	2.8	3.5	1.9	3.8	1.9	4.1	7.5	8.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.0	28.9	32.9	50.6	35.1	40.6	44.3	28.2	14.8	31.7	29.0	32.1
LnGrp LOS	D	C	C	D	D	D	D	C	B	C	C	C
Approach Vol, veh/h	799			460			679			1450		
Approach Delay, s/veh	35.1			38.3			29.8			30.4		
Approach LOS	D			D			C			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	30.0	32.0	12.0	28.0	15.0	37.0	17.0	23.0				
Change Period (Y+Rc), s	5.0	6.0	6.0	* 6	6.0	* 6	5.0	6.0				
Max Green Setting (Gmax), s	15.0	25.0	6.0	* 22	9.0	* 31	12.0	16.0				
Max Q Clear Time (g_c+T1), s	11.0	10.8	4.2	10.8	6.1	19.5	8.5	10.1				
Green Ext Time (p_c), s	0.2	2.6	0.0	2.0	0.1	5.5	0.3	1.1				

Intersection Summary

HCM 6th Ctrl Delay 32.5
HCM 6th LOS C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.