Platinum Commercial Park

Traffic Impact Study

Prepared on behalf of:

Performance Engineering

December 2024

TRAFFIC & TRANSPORTATION CONSULTING

Traffic Impact Study

Prepared for submittal to:

for the project:

Platinum Commercial Park

on behalf of:

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1 INTRODUCTION

This report documents the Traffic Impact Study conducted for the Platinum Commercial Park project to the northeast of the City of Laurel. It is situated at Lot 4, SE 1/4 SW 1/4 Section 30, Township 1 South, Range 25 East, Yellowstone County, Montana. The study documented here was conducted as required by Yellowstone County Subdivision Regulations Section 4.6.C.4.B, in concert with Performance Engineering, LLC.

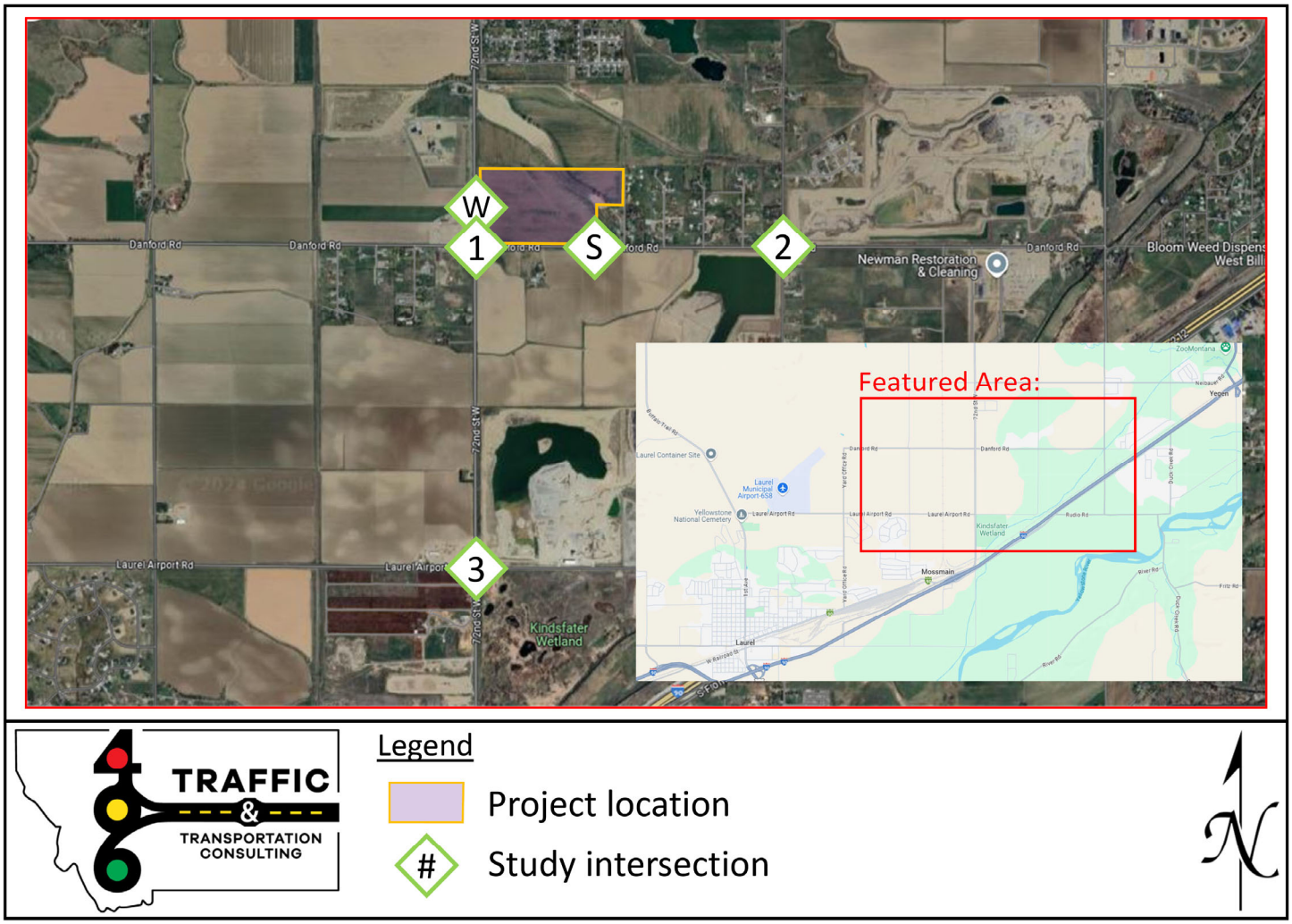
1.1 PROJECT SITE AND STUDY AREA

The site location is shown in **Exhibit 1** along with the intersections studied. The study intersections were identified in coordination with County staff. The three existing study intersections for this project are:

1. S 72nd St W at Danford Road
2. S 64th St W at Danford Road
3. S 72nd St W at Laurel Airport Road

The two access points for the project have also been studied with respect to intersection operations. From here forward in this report, study intersections are generally referred to only by their distinguishing street names (e.g., "72nd at Danford") for the sake of brevity.

Exhibit 1. Overall Site Location and Study Intersections



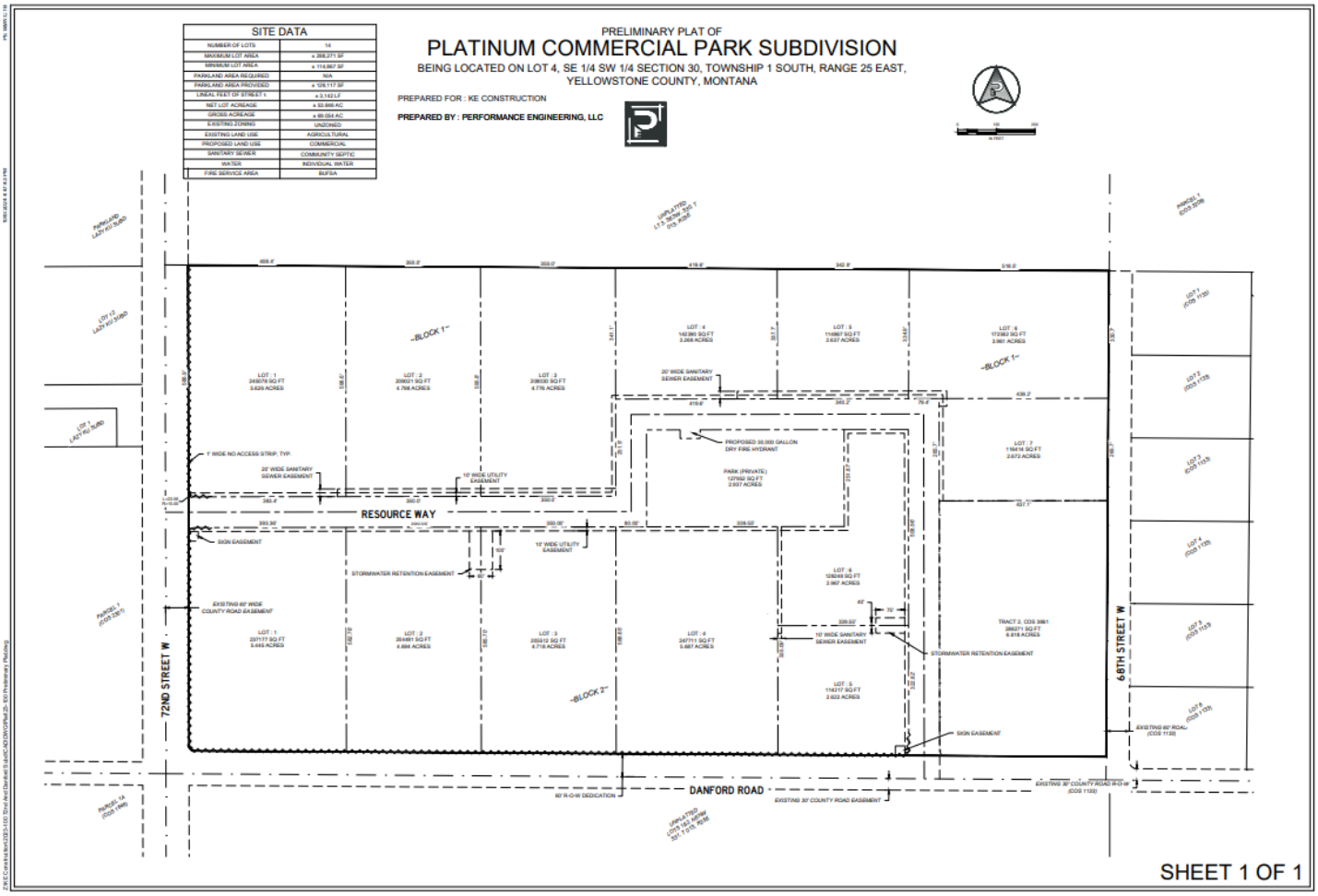
1.2 ZONING AND LAND-USE CONTEXT

The project site is outside of the existing city limits of Laurel and Billings, but the segments of S 72nd St W and Danford Road adjacent to the project site form the boundary of the City of Laurel's planning jurisdiction. The intersection of S 72nd St W and Laurel Airport Road is entirely within Laurel's planning jurisdiction. The proposed development is to be located on what is currently rural, non-qualified agricultural land. Being outside of any city limits, no zoning restrictions are in place for this area. All of the adjacent land uses are either agricultural or rural residential, such as the Lazy Ku subdivision on the west side of S 72nd St W. Most of the project trips will come from the railyard to the south, Laurel's airport to the southwest, Interstate 90 to the south, and the greater Billings area to the northeast.

1.3 PROJECT DESCRIPTION

The proposed project is a new industrial park development to the northeast of Laurel. A new through street named Resource Way will be built completely within the project site, and it will connect to two new site accesses onto Danford Road and S 72nd St W. This new road will bisect the site into two "blocks". The northern block will be divided into seven lots, while the southern block will be divided into six lots, creating a total of thirteen lots on the project site. Each lot will employ an estimated 25 industrial workers, adding to a total of 325 employees. **Exhibit 2** shows the site plan and proposed access point locations for the proposed development.

Exhibit 2. Platinum Commercial Park Site Plan



Source: Performance Engineering, 3/12/2024

1.4 Analysis Methods and References

Operational performance was analyzed at the study intersections using the industry-standard methods presented in the USDOT's Highway Capacity Manual (HCM), published in its modern form as Transportation Research Board Special Report 209. The Synchro software package, version 12, was employed as both a data repository and a capacity analysis tool, with reports for each intersection generated using Synchro's application of the assumptions of the HCM's 7th edition, which is the most recent at the time of this study. The HCM methodology for intersection capacity analysis produces delay estimates for each turning movement (or "lane group", when multiple turning movements operate from the same lane).

As indicated in **Exhibit 3**, these delay estimates are assigned Level of Service (LOS) grades that range from A (best) to F (worst). It's also important to note that for unsignalized intersections with only side-street stop sign control, LOS for the intersection is represented by the LOS for the worst lane group, which are most often on the stop-controlled side street approach. "T" intersections with side-street stop control also fall under this category.

Exhibit 3. LOS Definitions

LOS	Delay, seconds per vehicle
A	0 - 10.0
B	10.1 - 15.0
C	15.1 - 25.0
D	25.1 - 35.0
E	35.1 - 50.0
F	50.1 or more

Source: HCM 7th Edition

Operations impacts are determined by whether LOS relates to acceptability standards. According to the Yellowstone County subdivision regulations, the County employs a peak hour intersection LOS standard of C or better. If the future LOS at any intersection or approach is predicted to be lower than C, traffic mitigation measures such as turning lanes, roundabouts, all-way stops, or traffic signals may be required.

2 EXISTING AND BASE CONDITIONS

2.1 Streets and Intersections

S 72nd St W is a north-south rural major collector in MDT Financial District 5, giving it MDT functional class designation RMA_RMC_345, with one travel lane in each direction and a speed limit of 60 mph in the study area. For those not using Interstate 90 to the south, it serves as part of the primary "backroad" route between Laurel and Billings, connecting to Neibauer Road and King Ave W to the north of the study area. At its southern terminus after crossing over railroad tracks, it turns into Old US 10, which connects to Interstate 90 and Laurel's Main Street. It has no exclusive turn lanes at any of the study intersections and it has no multimodal facilities.

Danford Road is an east-west local road with one travel lane in each direction and a speed limit of 50 mph in the study area. It generally exists to connect local farms and residences to north-south routes such as S 72nd St W, S 64th St W, and S 56th St W, which crosses under Interstate 90 and intersects with S Frontage Road. Danford Road has no exclusive turn lanes at any of its intersections and it has no multimodal facilities.

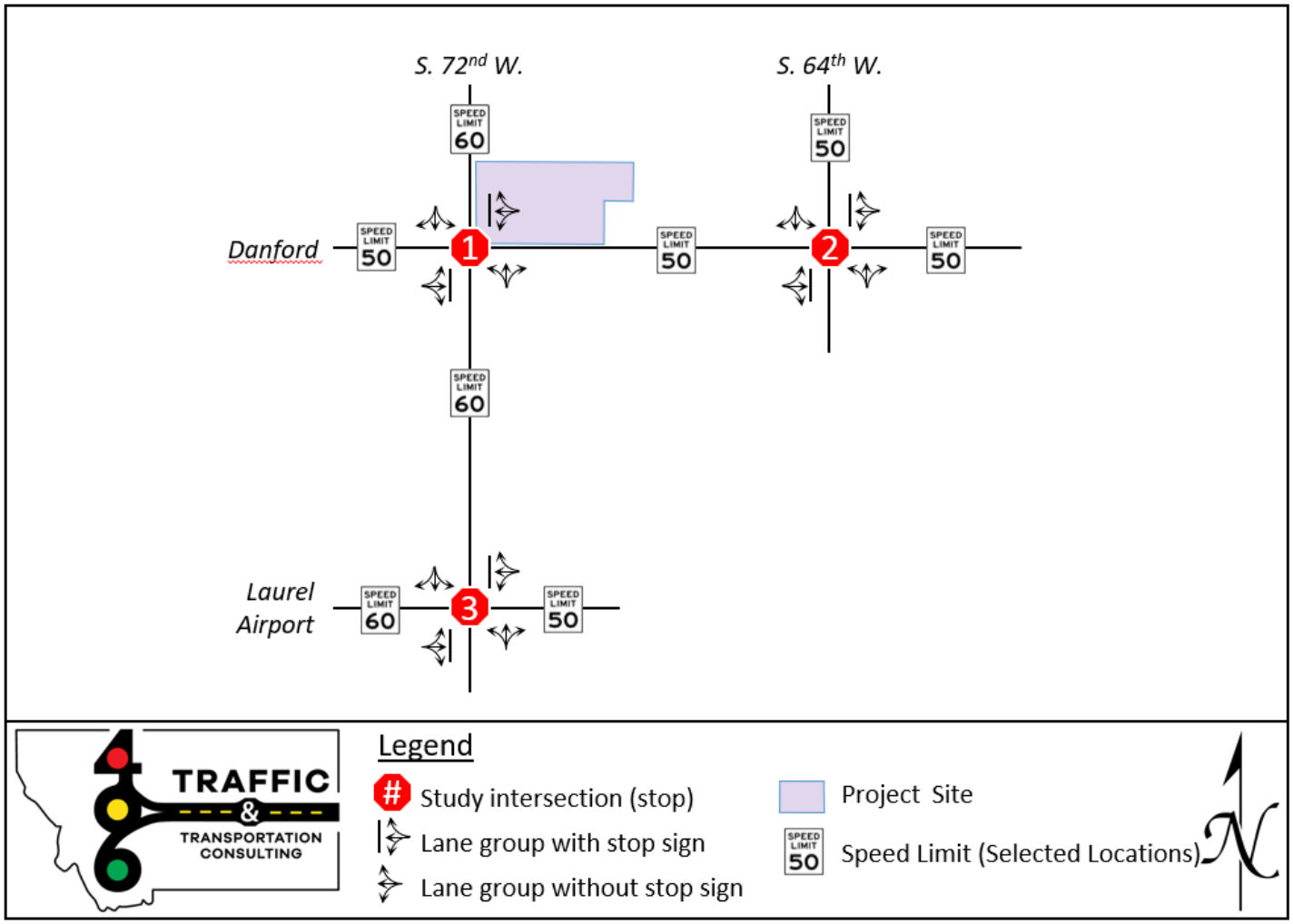
Laurel Airport Road is an east-west rural major collector with a speed limit of 60 mph to the west of S 72nd St W, and it is a local street with a speed limit of 50 mph to the east of S 72nd St W. Laurel Airport Road has one travel lane in each direction. It provides access to the eponymous Laurel Municipal Airport, as well as to a few rural neighborhoods and an MDT maintenance facility. Its western terminus is at Buffalo Trail Road near the Yellowstone National Cemetery, and it simply turns into S 64th St W at its eastern terminus. It has no exclusive turn lanes at any of its intersections and it has no multimodal facilities. There is a flashing red signal head at its intersection with S 72nd St W however.

S 64th St W is a north-south local road with one travel lane in each direction and a speed limit of 50 mph in the study area. It generally exists to connect local farms and neighborhoods to east-west routes such as Danford Road, King Ave W, and Neibauer Rd, which turns into Shiloh Road to the east. S 64th St W turns into Laurel Airport Road at its southern terminus. It is probably not part of the aforementioned preferred non-interstate

route between Billings and Laurel because of its lower speed limits and because of the Elder Grove school zone near its intersection with Hesper Road to the north of the study area. S 64th St W has no exclusive turn lanes at any of its intersections and it has no multimodal facilities in the study area.

No signal-controlled intersections currently exist within the study area. All three study intersections are currently two-way stop controlled. There is a flashing amber signal head at the 72nd intersection with Laurel Airport Road, but no other traffic control exists for north-south traffic in the study area. Note that T-intersections with a stop sign at only one leg of the intersection are also considered two-way stop-controlled. **Exhibit 4** shows traffic control and lane arrangements schematically at each existing intersection, as well as posted speed limits on selected road segments.

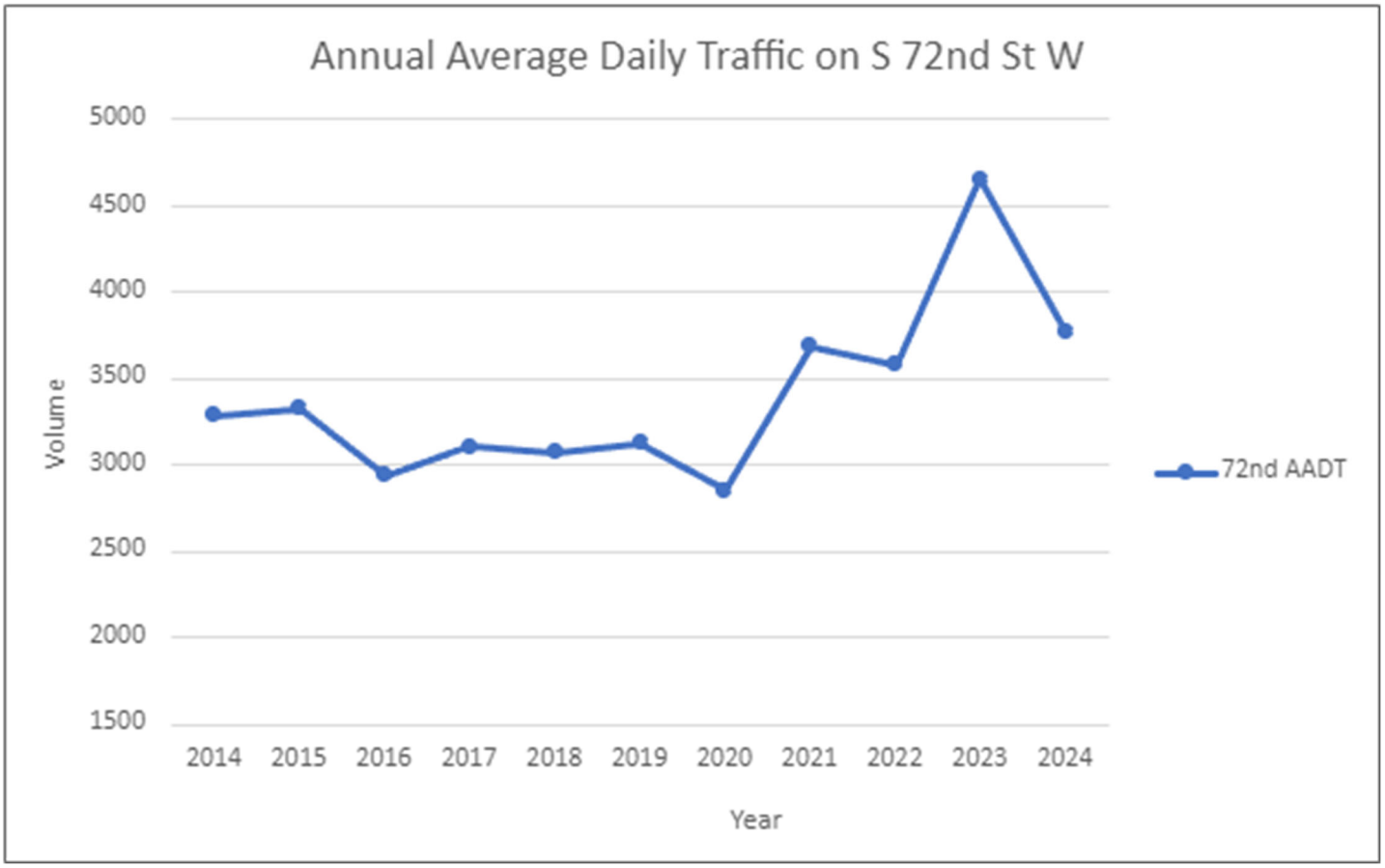
Exhibit 4. Road and Intersection Basics



2.2 Historical Traffic Volumes

Daily traffic information was gathered from the Montana Department of Transportation's (MDT's) public-facing data resource, the Transportation Data Management System. The MDT maintains a permanent traffic counting station on S 72nd St W between Laurel Airport Road and Danford Road from which the annualized average daily traffic (AADT) data was used in this study. These volumes were examined over ten years for a historical perspective. The historical AADT volumes are shown in **Exhibit 5**.

Exhibit 5. Historical AADT



Source: MDT Transportation Data Management System: retrieved 11/25/2024

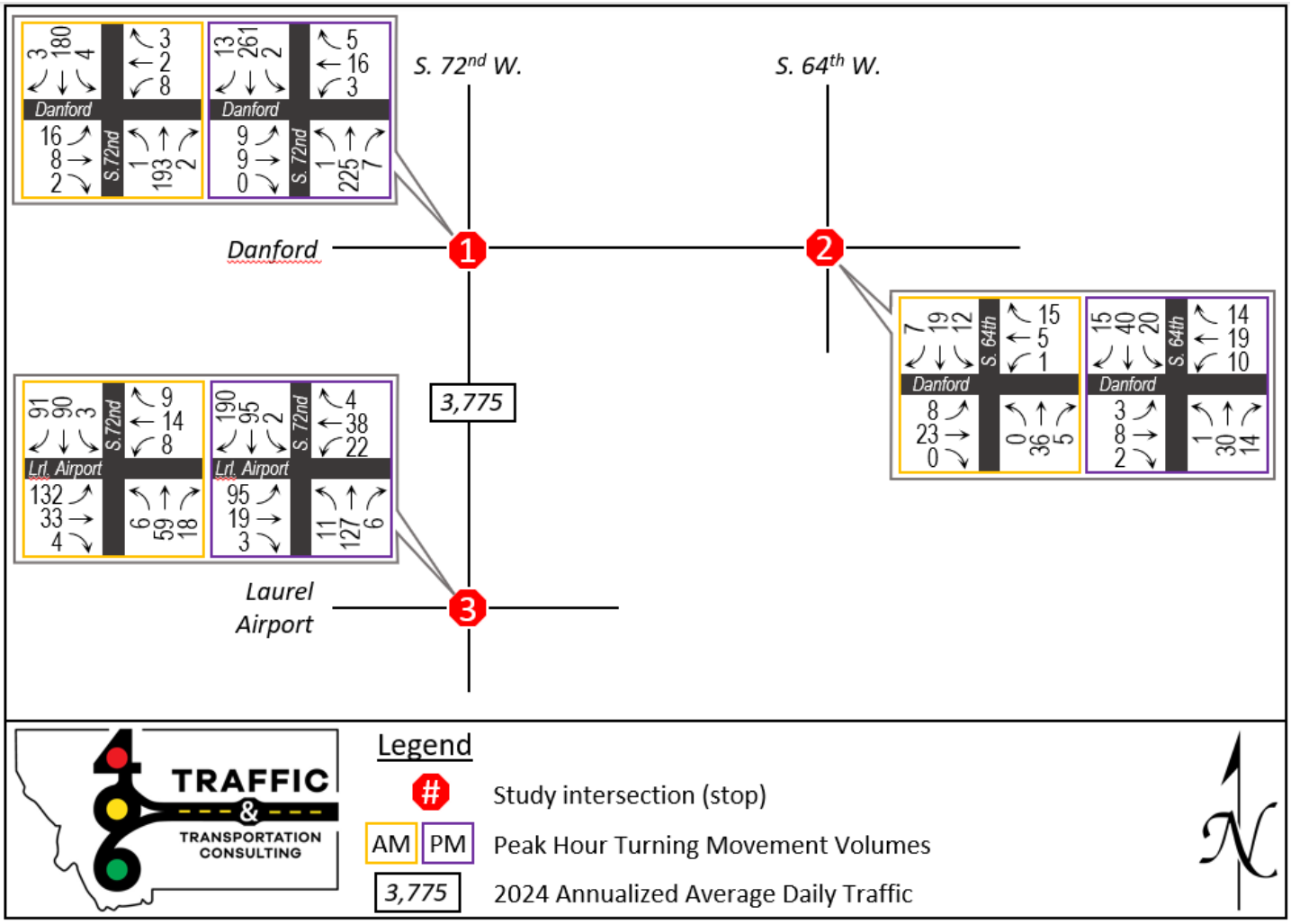
A few trends can be discerned from these data. The COVID-19 pandemic caused a slight decrease in traffic in 2020, but traffic levels quickly rebounded to exceed pre-pandemic levels in 2021. The sharp increase in traffic in 2023 was likely caused by the major MDT project on Interstate 90, which temporarily narrowed the freeway to one travel lane in each direction and closed the S 56th St W underpass. For the duration of construction, this made S 72nd St W a much more attractive route between Laurel and the northern parts of Billings than before. Traffic on S 72nd St W drastically dropped after construction was complete, the S 56th St W underpass was reopened, and all lanes of the interstate returned to normal operations. Aside from these events, a very slow average growth rate has been observed over the past decade. The 10-year average growth rate of 1.4% per year is used for this project's traffic.

2.3 Recent Traffic Counts

The three study intersections were counted for this project from 7-9 a.m. and from 4-6 p.m. on Wednesday, October 30, 2024 using Miovision cameras. Counts were summarized for analysis in 15-minute increments. Based on total entering volume (TEV), the AM peak hour was identified from these counts as starting at 7:15 am at the intersections of 64th and Danford and of 72nd and Laurel Airport Road. The AM peak hour started at 7:30 at the intersection of 72nd and Danford. The PM peak hour started at 4:30 pm at 64th and Danford, 4:45 at 72nd and Laurel Airport Road, and 5:00 pm at 72nd and Danford. The raw count data information is provided in **Appendix A**.

Counts at all three study intersections were adjusted for seasonal variation using the MDT's 2023 seasonal adjustment factor for an October Wednesday on a rural minor arterial/major collector in MDT financial district 5, which is 0.995. Existing annualized traffic volumes based on these counts are shown in **Exhibit 6**.

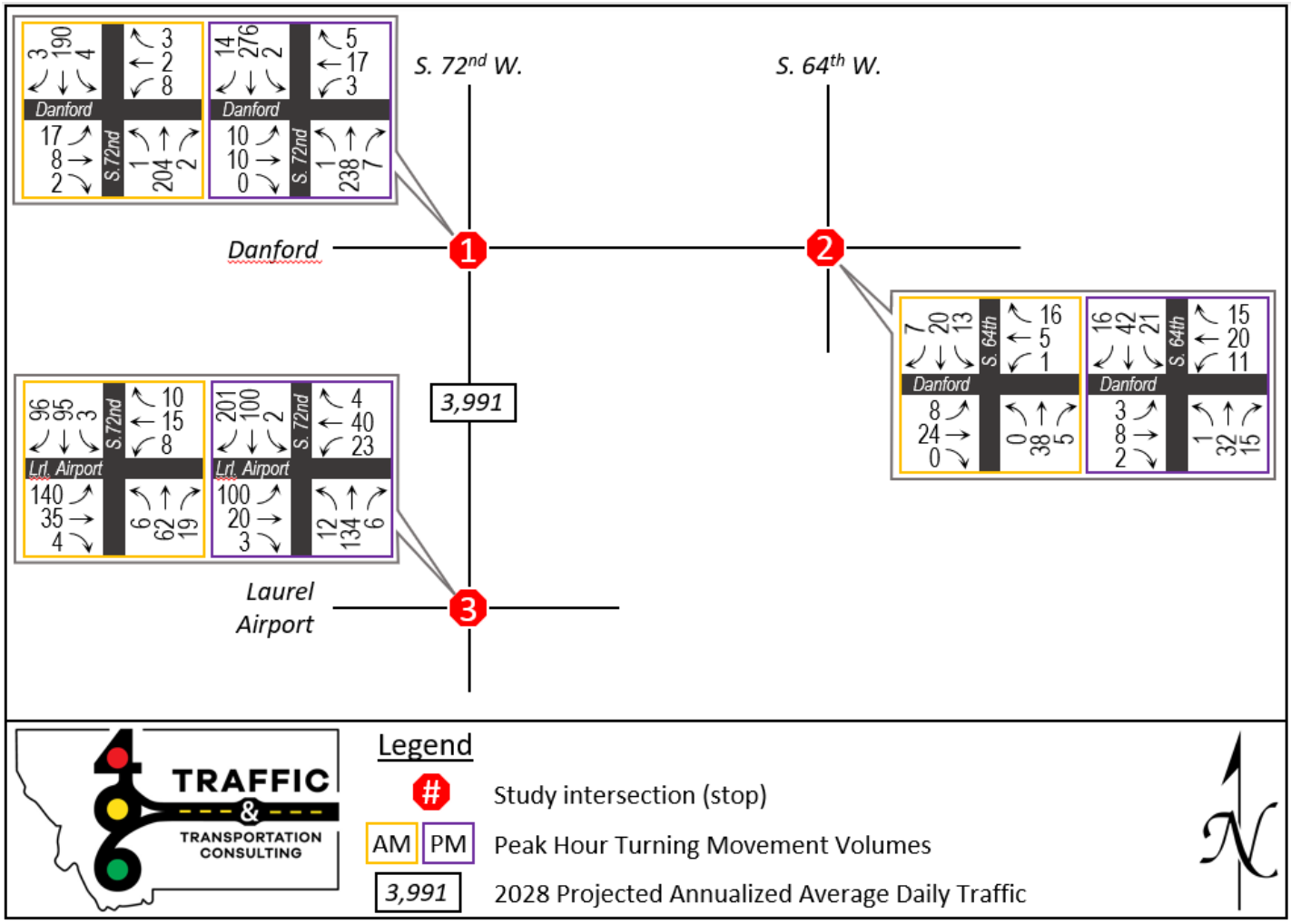
Exhibit 6. Existing Annualized Traffic Volumes



2.4 PROJECTED TRAFFIC WITHOUT THE PROPOSED DEVELOPMENT

Using the aforementioned 1.4% background growth rate, existing traffic was projected four years into the future (2028). This future study year was chosen to reflect the time needed for permitting activities, site preparation, utility work, and the leasing and furnishing of individual industrial lots, along with an additional year to account for traffic associated with the project to stabilize. **Exhibit 7** shows 2028 Background traffic.

Exhibit 7. Projected 2028 Background Traffic Volumes



3 TRIP GENERATION AND DISTRIBUTION

3.1 TRIP GENERATION

Trip generation rates, or equations as applicable, are from the Institute of Transportation Engineers (ITE) Trip Generation package's 11th edition. ITE trip generation data, when aggregated across enough varied sites, produce both simple average rates and best-fit equations, either linear or logarithmic, to help the analyst derive proper estimates for their situation. Equations are generally preferred over rates, especially for larger sites where trip generation per unit of land use can diminish with increasing project size.

Three types of adjustments to trip generation were evaluated for this project. First, a discount is sometimes taken to reflect internal capture where multiple uses are present in a single project site. All of the project site's lots are expected to be used for industrial buildings, so no such discount is taken for this single-use project. Second, modal reductions are sometimes taken where facilities and services for walking, cycling, and transit are more robust than in a "general urban/suburban" environment in which most ITE uses are studied. No such facilities exist near the project site, so no modal reductions are applied. Finally, some land uses attract trips that were already using the adjacent or nearby road network by virtue of improved convenience over a similar site that would have been used before. These are called "pass-by" and "diverted-linked" trips. Pass-by trips are those on streets bordering the site, while diverted-linked trips are those that might go slightly out of their way to stop at the establishment on their way to their destination. These reductions do not apply to this project

because it is located far from any major roadways where travelers might see it on their way to another destination. In addition, few (if any) travelers would be inclined to stop at industrial land uses on their way to another destination.

The summary of projected trip generation for the project is provided in **Exhibit 8**. Note that in/out splits are only meaningful for peak hour traffic.

Exhibit 8. Trip Generation

ITE 130: Industrial Park, X = 325 employees	Daily	AM Peak Hour			PM Peak Hour		
	Equation/rate	**Equation**/rate	In	Out	**Equation**/rate	In	Out
	ln(T)=.68 ln(X)+3.34	ln(T)=.82 ln(X)+0.39	86%	14%	ln(T)=.74 ln(X)+0.93	20%	80%
Trips (T):	1441	168	144	23	183	37	146

Source: Equations from ITE Trip Generation, 11th Edition.

The AM peak hour inbound and outbound traffic appears not to add to the total of 168 trips due to rounding; 168 is a lower calculation result (167.79) rounded up, while 144 and 23 are both slightly higher calculated numbers (144.30 and 23.49, respectively) that are rounded down. Actual numbers, not rounded ones, were used in the next step, trip distribution and assignment.

3.2 Trip Distribution and Assignment

Trip distribution has been estimated for the roads surrounding the project site in percentages that add to 100%. Trip distribution and assignment estimates were developed by considering the site's location relative to regional roadways and other major trip generators. Farther from the site, traffic eventually disperses in smaller percentages to other routes. No project trips were assigned to Laurel Airport Road east of 72nd or to 64th south of Danford Road because there are no major trip generators in those directions. Those roads also do not have any connections to the existing road network outside of the study area. Trip distribution percentages are shown in **Exhibit 9**.

The project trips presented as peak hour intersection turning movement volumes are shown in **Exhibit 10**, and the estimated total intersection volumes with the project are shown in **Exhibit 11**. These total intersection volumes were calculated by adding the new project trips to the 2028 background trips.

Exhibit 9. Distribution of Project Trips

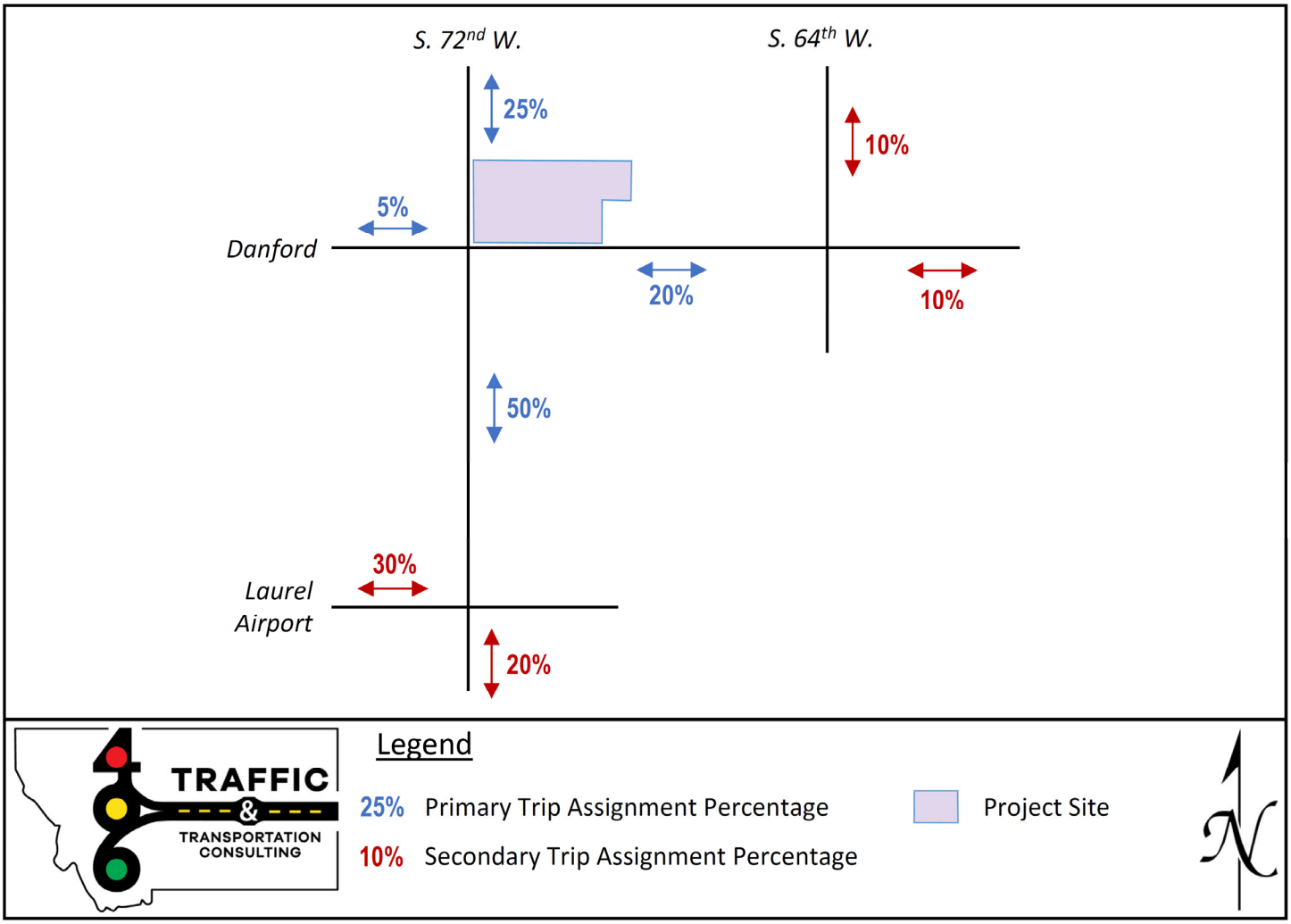


Exhibit 10. Project Trip Assignment

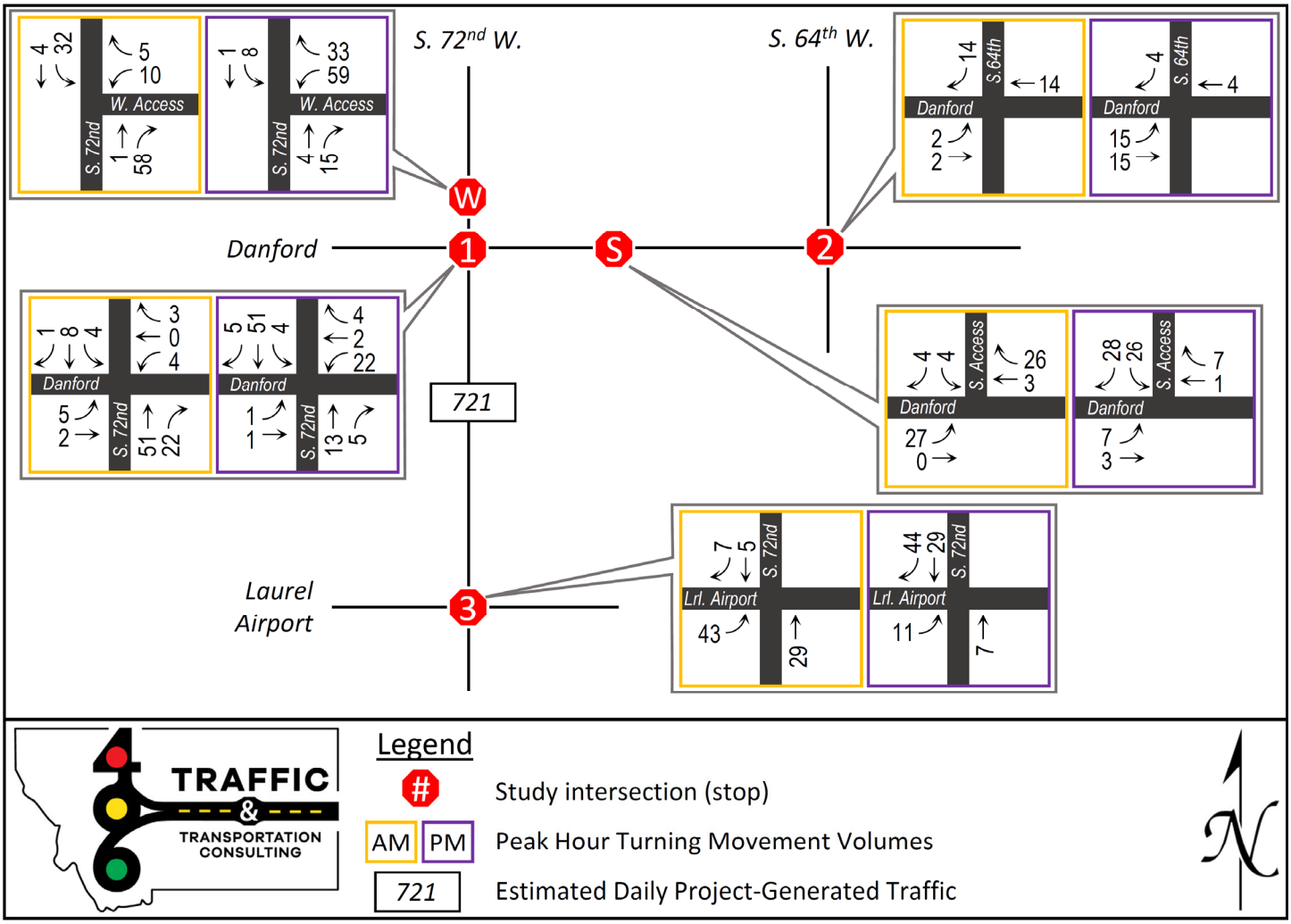
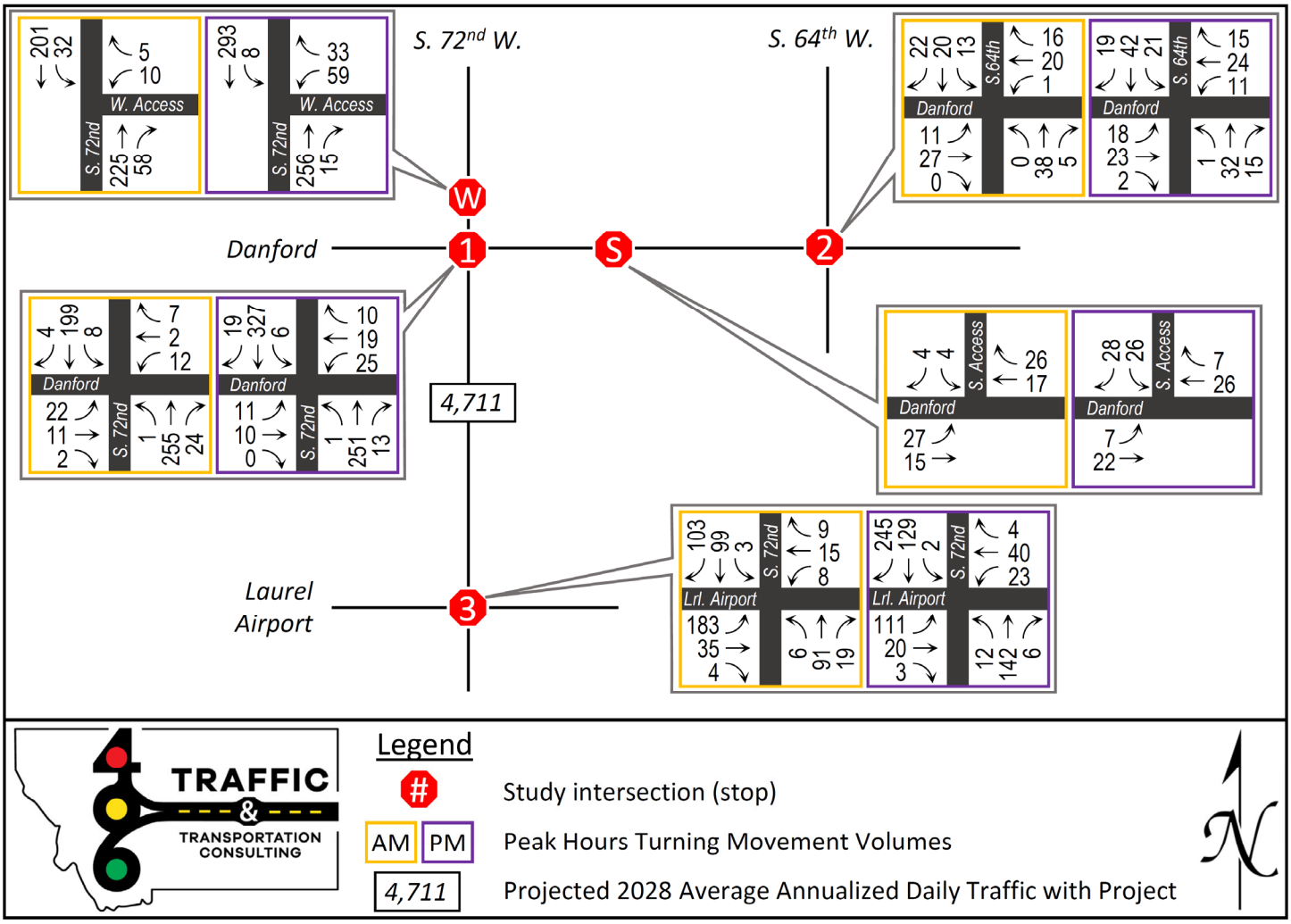


Exhibit 11. 2028 Total Traffic with Project



4 TRAFFIC ANALYSIS RESULTS

4.1 INTERSECTION OPERATIONS

All study intersections operate with two-way stop control (TWSC) in all scenarios. The peak hour intersection Level of Service (LOS) and delay results with and without the project are shown in **Exhibit 12**. Analysis software results are provided in Appendix B.

Exhibit 12. Intersection LOS and Delay Results

	Intersection	LOS (delay, seconds/vehicle) Existing	Future Background	Future With Project	*TWSC Worst Lane Group**
AM Peak	1. 72nd at Danford	B (12.4)	B (12.7)	B (14.2)	Eastbound
	2. 64th at Danford	A (9.9)	A (9.9)	B (10.1)	Eastbound
	3. 72nd at Laurel Airport Road	B (12.4)	B (12.8)	B (14.6)	Eastbound
	4. (A_w) Western Site Access at 72nd	-	-	B (13.1)	Westbound
	5. (A_s) Southern Site Access at Danford	-	-	A (9.2)	Southbound
PM Peak	1. 72nd at Danford	B (13.9)	B (14.4)	C (16.0)	Eastbound
	2. 64th at Danford	B (10.1)	B (10.2)	B (10.7)	Eastbound
	3. 72nd at Laurel Airport Road	B (14.0)	B (14.7)	C (16.7)	Eastbound
	4. (A_w) Western Site Access at 72nd	-	-	B (15.0)	Westbound
	5. (A_s) Southern Site Access at Danford	-	-	A (9.2)	Southbound

* *Worst lane group is the one that determines the intersection LOS at a Two-Way Stop Controlled intersection.*

The results in the table indicate that traffic generated by the project would result in small changes in peak hour delay. Two cases indicate a future LOS that would degrade from B to C under the assumptions used in this study. At the 72nd/Danford intersection, the PM peak hour delay would increase by 1.8 seconds per vehicle for the Eastbound approach, and at the 72nd/Laurel Airport Road intersection, the PM peak hour delay would increase by 2.0 seconds per vehicle, also for the Eastbound approach. The western site access is projected to operate at LOS B, with delay right at the LOS B limit of 15.0 seconds per vehicle, with site traffic in the PM peak hour. With all intersections projected to operate within the peak hour LOS standard documented previously in Section 1.4, no mitigations are necessary to reduce the delay impacts of project-generated traffic.

4.2 AUXILIARY TURN LANES

MDT turn lane analysis was conducted for all turning movements with 40 or more right turning vehicles or 20 or more left turning vehicles on the free-flowing legs of public roads at study intersections and site access points. This analysis was conducted in accordance with the MDT *Traffic Engineering Manual*, Section 28.4.1, using the peak hour total traffic volumes shown previously in Exhibit 10 of this report. For left turn analysis, the MDT chart for a 60 mph design speed was used despite some roadway segments in the study area having current 50 mph posted speed limits because posted speed can vary from design speed. The turning movement conditions that qualified and were subject to this analysis are indicated in **Exhibit 13**, as defined by their peak hour and approach direction.

Exhibit 13. Locations Qualified for Auxiliary Turn Lane Analysis

Intersection	**Right Turns** (40+ vph) AM Peak	PM Peak	**Left Turns** (20+ vph) AM Peak	PM Peak
1. 72nd at Danford	-	-	-	-
2. 64th at Danford	-	-	-	SB*
3. 72nd at Laurel Airport Road	SB	SB		
4. (A_w) Western Site Access at 72nd	NB	-	SB	-
5. (A_s) Southern Site Access at Danford	-	-	EB	-

* *Movement contains no project trips or opposing trips*

Three of the four AM inbound movements at the site access points qualified for turn lane analysis; only the westbound right at the Southern access did not. None of them met MDT's standard for consideration of new turn lanes. The PM southbound left turn at the 64th at Danford intersection was examined as a qualified location despite having no project trips in either the left turn or its opposing movement, but was not close to meeting MDT's standard. The southbound right turn at the 72nd at Laurel Airport Road intersection has very high volumes in both peak hours. A southbound right turn lane is recommended for further study there even without the project, based on the higher peak hour (PM). Completed charts for these auxiliary right- and left-turn lane analyses are provided in Appendix C.

5 CRASH HISTORY ANALYSIS

Information reported in this crash history analysis includes the total number of reported crashes, injuries, and fatalities, the crash frequencies, crash rates, and severity indices, and the types of collisions at each of the three study intersections. Crash data were acquired from MDT for the 5-year time frame between January 1, 2019 and December 31, 2023, the most recent such period for which crash data were available at the time of this study.

5.1 CRASH FREQUENCY

The following formula was used to calculate crash frequencies for each of the three study intersections, where CF = crash frequency measured in crashes per year:

$$CF = \frac{Total\ Crashes\ within\ time\ period}{Time\ Period}$$

5.2 CRASH RATE

Crash rates, measured in crashes per million entering vehicles, were computed using the following formula, where CF = crash frequency measured in crashes per year, and DEV = daily entering volume:

$$Crash\ Rate = \left(\frac{CF}{365} \div DEV\right) \times 1{,}000{,}000$$

The crash frequency is divided by 365 days per year to approximate the average number of crashes per day.

In order to calculate this rate, the project's field data for peak hour entering volume needed to be converted to a daily average. The average daily entering volumes for the study period were calculated using the following formula, where DEV = daily entering volume, Peak Hour TEV = the total entering volume during the study's current PM peak hour, GrowthFactor = the estimated average annual growth rate assumed for this study based on MDT historical data, and k = a K-Factor from MDT's public-facing traffic count database system for the same location on 72nd where AADT is reported:

$$DEV = \frac{Peak\ Hour\ TEV \times k}{GrowthFactor^3}$$

The Peak Hour TEV is divided by the annual growth rate cubed (to represent three years of growth) and multiplied by a 2021 K-Factor to estimate the average daily entering volumes across the five-year period from which crash data is available. For this calculation, the average DEV is assumed to have occurred in 2021, the middle year of that period.

5.3 CRASH SEVERITY INDEX

The formula below was used to calculate the crash severity index for each of the three study intersections, where K = the number of fatal crashes, ABC = the number of crashes involving an injury of any severity, and PDO = the number of property damage only crashes:

$$Severity\ Index = \frac{(8 \times K) + (3 \times ABC) + (1 \times PDO)}{Total\ Crashes}$$

This formula assigns a weight to each crash severity. For example, an injury crash is considered three times as severe as a PDO crash in this calculation. These weighting coefficients are used by MDT and were provided by a Yellowstone County designee for use in this study.

5.4 CRASH ANALYSIS SUMMARY

Exhibit 14 tabulates the results of the study area crash history analysis.

Exhibit 14. Crash History Analysis Results

Reported Crash Types, Injuries, and Fatalities:			
Study Intersection	72nd at Danford	64th at Danford	72nd at Laurel Airport Road
Right angle	2	2	5
Left turn, opposite direction	0	0	2
Rear end	0	0	1
Total Reported Crashes	2	2	8
Total Number of Fatalities	0	0	1
Total Number of Injuries	7	3	5
Crash Severities, Frequencies, and Rates:			
Study Intersection	72nd at Danford	64th at Danford	72nd at Laurel Airport Road
Property Damage Only Crashes	0	0	3
Possible Injury Crashes	0	0	1
Suspected Minor Injury Crashes	1	1	3
Suspected Serious Injury Crashes	1	1	0
Fatal Crashes	0	0	1
Crash Frequency (crashes/year)	0.4	0.4	1.6
Daily Entering Volume, crash study midpoint year	5,278	1,680	5,860
Crash Rate (crashes per million entering vehicles)	0.21	0.65	0.75
Severity Index	3.0	3.0	2.9

The highest crash frequency and crash rate occurred at the intersection of 72nd at Laurel Airport Road, but this intersection also had the highest daily entering volumes. It saw the highest number of PDO crashes, as well as a slightly lower severity index than the other two. While the number of injuries (7) was highest at the intersection of 72nd at Danford, the vehicles involved in the two crashes had more people in them injured than the vehicles involved in injury crashes at other intersections. Most crashes at the three study intersections were right-angle collisions. This was the only type of collision to occur at either Danford intersection, and is often related to the failure of a side-street driver to properly yield the right of way when facing a stop sign.

The only fatal crash to occur at any of the three study intersections during the study period was a rear-end collision at the intersection of 72nd at Laurel Airport Road. While rear-end collisions are usually not the deadliest collision type, this collision involved a stopped motorcycle with two occupants. The fatal crash happened at night and both drivers involved were considered by MDT to be impaired.

6 INTERSECTION COST PARTICIPATION

The net new trips identified in this report are subject to examination under the County's cost participation program to the extent that they would travel through studied intersections. Cost participation has been estimated for the three public-street intersections in this study under the assumptions that (a) the peak with the highest percentage of trips added to the intersection's critical volume governs contribution and (b) site traffic must result in an increase of 2% in total critical-movement volume, after project trips are considered, to be subject to cost participation. Once it's demonstrated that an intersection is eligible, the applicant pays the entire percentage, not just the marginal part above 2%, unless another arrangement is made with the County. **Exhibit 14** shows the intersection cost participation summary for project trips.

Exhibit 14. Intersection Cost Participation

Intersection	AM	PM	Higher Peak, if 2% or Greater
1. 72nd at Danford	5.0%	6.2%	6.2%
2. 64th at Danford	1.5%	1.3%	-%
3. 72nd at Laurel Airport Road	6.0%	1.5%	6.0%
		Total Participation %:	**12.2%**
		x $500,000	**$61,000**

Two of the three intersections studied would experience a high enough critical-movement volume increase due to the project to require participation in the cost of future improvements. The detailed cost participation calculations for project trips are provided in Appendix D.

7 CONCLUSIONS AND RECOMMENDATIONS

The Platinum Commercial Park project has been studied in accordance with Yellowstone County TIS guidelines and the latest traffic engineering industry standards and references for traffic impact analysis. Because no traffic impacts are indicated with respect to the County's LOS C standard for peak hour intersection operations, no mitigations for traffic operations are recommended as a result of this project. A southbound right turn lane on 72nd at Laurel Airport Road has been shown to be warranted even without this project based on design hour volume per MDT guidelines, and is therefore recommended for the County's independent consideration. The intersection cost participation total for the project is 12.2% of $500,000, or $61,000.

This concludes the Platinum Commercial Park Traffic Impact Study.

Appendix A: Raw Traffic Count Data

Study Name **S 72nd St W & Danford Rd**
Start Date **10/30/2024**
Start Time **7:00 AM**
Project **406 West Billings (Laurel)**
Type **Road**
Classification **Totals**

	S 72nd St W Southbound				Danford Road Westbound				S 72nd St W Northbound				Danford Road Eastbound			
Start Time	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U
7:00 AM	0	37	4	0	0	1	0	0	0	47	0	0	0	0	1	0
7:15 AM	1	36	1	0	1	0	1	0	1	38	0	0	1	0	2	0
7:30 AM	0	47	2	0	3	0	0	0	0	63	0	0	0	4	6	0
7:45 AM	1	46	0	0	0	1	3	0	0	59	1	0	1	3	5	0
8:00 AM	2	50	1	0	0	0	1	1	1	36	0	0	1	0	1	0
8:15 AM	0	38	1	0	0	1	3	0	1	36	0	0	0	1	4	0
8:30 AM	0	41	1	0	0	1	0	0	1	44	1	0	1	0	1	0
8:45 AM	2	31	0	0	0	0	2	0	2	39	0	0	0	2	7	0
4:00 PM	1	65	1	0	1	0	0	1	4	63	2	0	0	1	4	0
4:15 PM	3	64	0	0	1	0	2	0	1	59	1	0	2	1	4	0
4:30 PM	3	65	0	0	1	0	2	0	0	61	0	0	0	1	4	0
4:45 PM	1	61	0	0	1	3	3	0	1	34	0	0	0	0	7	0
5:00 PM	2	67	0	0	1	8	1	0	1	52	0	0	0	2	0	0
5:15 PM	3	66	0	0	3	2	0	0	3	63	0	0	0	3	0	0
5:30 PM	5	76	0	0	0	5	1	0	2	58	0	0	0	4	5	0
5:45 PM	3	53	2	0	1	1	1	0	1	53	1	0	0	0	4	0

Study Name **S 64th St W & Danford Rd**
Start Date **10/30/2024**
Start Time **7:00 AM**
Project **406 West Billings (Laurel)**
Type **Road**
Classification **Totals**

	S 64th St W Southbound				Danford Road Westbound				S 64th St W Northbound				Danford Road Eastbound			
Start Time	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U
7:00 AM	0	0	3	0	0	2	0	0	0	3	0	0	0	4	1	0
7:15 AM	2	4	3	0	1	0	0	0	1	10	0	0	0	4	1	0
7:30 AM	1	4	7	0	2	2	1	0	1	8	0	0	0	10	2	0
7:45 AM	3	6	2	0	8	2	0	0	2	9	0	0	0	5	5	0
8:00 AM	1	5	0	0	4	1	0	0	1	9	0	0	0	4	0	0
8:15 AM	0	1	2	0	2	2	0	0	0	4	0	0	1	4	1	0
8:30 AM	0	3	7	0	1	1	0	0	1	3	0	0	0	2	1	0
8:45 AM	2	4	2	1	0	1	1	0	2	7	0	0	0	4	0	0
4:00 PM	1	7	1	0	1	2	4	0	2	8	0	0	1	2	2	0
4:15 PM	3	7	2	0	2	4	0	0	1	9	0	0	0	3	3	0
4:30 PM	4	15	10	0	4	4	2	0	6	12	0	0	1	1	0	0
4:45 PM	3	8	4	0	1	5	2	0	3	5	1	0	1	2	0	0
5:00 PM	6	9	1	0	7	6	3	0	3	8	0	0	0	2	0	0
5:15 PM	2	8	5	0	2	4	3	0	2	5	0	0	0	3	3	0
5:30 PM	3	10	1	0	1	4	3	0	1	4	0	0	1	3	1	0
5:45 PM	0	6	2	0	2	3	0	0	1	7	1	0	0	2	0	0

Study Name **S 72nd St W & Laurel Airport Rd**
Start Date **10/30/2024**
Start Time **7:00 AM**
Project **406 West Billings (Laurel)**
Type **Road**
Classification **Totals**

	S 72nd St W Southbound				Laurel Airport Road Westbound				S 72nd St W Northbound				Laurel Airport Road Eastbound			
Start Time	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U	Right	Thru	Left	U
7:00 AM	9	25	1	0	1	0	3	0	4	16	0	0	0	4	25	0
7:15 AM	17	21	1	0	1	4	2	0	8	12	0	0	1	11	30	0
7:30 AM	23	20	0	0	6	1	3	0	3	19	0	0	0	7	40	0
7:45 AM	30	22	1	0	2	3	1	0	6	21	1	0	2	6	35	0
8:00 AM	21	27	1	0	0	6	2	0	1	7	5	0	1	9	28	0
8:15 AM	18	20	7	0	4	1	4	0	6	12	5	0	0	5	20	0
8:30 AM	15	23	2	0	6	1	5	0	1	9	5	0	1	5	33	0
8:45 AM	17	16	2	0	1	2	3	0	3	12	6	0	3	10	26	0
4:00 PM	39	25	4	0	7	5	8	0	1	39	1	0	0	3	25	0
4:15 PM	24	34	4	0	2	4	6	0	4	33	1	0	1	9	32	0
4:30 PM	41	22	3	0	4	8	1	0	1	29	1	0	0	10	21	0
4:45 PM	44	23	1	0	1	10	7	0	2	21	6	0	0	5	20	0
5:00 PM	54	27	0	0	0	10	5	0	2	31	1	0	1	9	25	0
5:15 PM	46	18	0	0	0	7	3	0	1	43	1	0	0	5	26	0
5:30 PM	47	27	1	0	3	11	7	0	1	33	3	0	2	0	24	0
5:45 PM	28	28	0	0	0	2	5	0	0	24	1	0	1	7	26	0

Appendix B: Analysis Software Output

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	16	8	2	8	2	3	1	193	2	4	180	3
Future Vol, veh/h	16	8	2	8	2	3	1	193	2	4	180	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	4	4	4	15	15	15	11	11	11	11	11	11
Mvmt Flow	19	9	2	9	2	4	1	227	2	5	212	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	454	455	214	456	455	228	215	0	0	229	0	0
Stage 1	223	223	-	231	231	-	-	-	-	-	-	-
Stage 2	231	232	-	226	225	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.25	6.65	6.35	4.21	-	-	4.21	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.25	5.65	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.25	5.65	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.635	4.135	3.435	2.299	-	-	2.299	-	-
Pot Cap-1 Maneuver	513	498	821	493	482	780	1303	-	-	1287	-	-
Stage 1	775	715	-	744	690	-	-	-	-	-	-	-
Stage 2	768	709	-	748	694	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	506	496	821	480	480	780	1303	-	-	1287	-	-
Mov Cap-2 Maneuver	506	496	-	480	480	-	-	-	-	-	-	-
Stage 1	772	712	-	743	689	-	-	-	-	-	-	-
Stage 2	761	708	-	733	691	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	12.39	12.04	0.04	0.17
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	9	-	-	518	526	38	-	-
HCM Lane V/C Ratio	0.001	-	-	0.059	0.029	0.004	-	-
HCM Ctrl Dly (s/v)	7.8	0	-	12.4	12	7.8	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	8	23	0	1	5	15	0	36	5	12	19	7
Future Vol, veh/h	8	23	0	1	5	15	0	36	5	12	19	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	6	6	6	5	5	5	2	2	2	11	11	11
Mvmt Flow	10	29	0	1	6	19	0	46	6	15	24	9

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	109	112	29	119	113	49	33	0	0	53	0	0
Stage 1	60	60	-	49	49	-	-	-	-	-	-	-
Stage 2	49	53	-	70	64	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.56	6.26	7.15	6.55	6.25	4.12	-	-	4.21	-	-
Critical Hdwy Stg 1	6.16	5.56	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.56	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4.054	3.354	3.545	4.045	3.345	2.218	-	-	2.299	-	-
Pot Cap-1 Maneuver	860	771	1035	849	771	1011	1578	-	-	1497	-	-
Stage 1	942	837	-	956	848	-	-	-	-	-	-	-
Stage 2	954	843	-	933	836	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	828	762	1035	808	763	1011	1578	-	-	1497	-	-
Mov Cap-2 Maneuver	828	762	-	808	763	-	-	-	-	-	-	-
Stage 1	932	829	-	956	848	-	-	-	-	-	-	-
Stage 2	929	843	-	890	827	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	9.87	9	0	2.35
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1578	-	-	778	928	539	-	-
HCM Lane V/C Ratio	-	-	-	0.051	0.029	0.01	-	-
HCM Ctrl Dly (s/v)	0	-	-	9.9	9	7.4	0	-
HCM Lane LOS	A	-	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-

Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	132	33	4	8	14	9	6	59	18	3	90	91
Future Vol, veh/h	132	33	4	8	14	9	6	59	18	3	90	91
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	48	48	48	20	20	20	8	8	8
Mvmt Flow	147	37	4	9	16	10	7	66	20	3	100	101

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	244	256	151	214	297	76	201	0	0	86	0	0
Stage 1	157	157	-	89	89	-	-	-	-	-	-	-
Stage 2	87	99	-	125	208	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.58	6.98	6.68	4.3	-	-	4.18	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.58	5.98	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.58	5.98	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.932	4.432	3.732	2.38	-	-	2.272	-	-
Pot Cap-1 Maneuver	710	648	896	654	545	872	1270	-	-	1474	-	-
Stage 1	845	768	-	817	740	-	-	-	-	-	-	-
Stage 2	921	813	-	779	652	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	676	643	896	609	541	872	1270	-	-	1474	-	-
Mov Cap-2 Maneuver	676	643	-	609	541	-	-	-	-	-	-	-
Stage 1	843	766	-	812	736	-	-	-	-	-	-	-
Stage 2	886	809	-	737	650	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	12.4	11.06	0.57	0.12
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	124	-	-	673	628	27	-	-
HCM Lane V/C Ratio	0.005	-	-	0.279	0.055	0.002	-	-
HCM Ctrl Dly (s/v)	7.8	0	-	12.4	11.1	7.4	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.1	0.2	0	-	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	9	9	0	3	16	5	1	225	7	2	261	13
Future Vol, veh/h	9	9	0	3	16	5	1	225	7	2	261	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	0	0	0	4	4	4	4	4	4	2	2	2
Mvmt Flow	10	10	0	3	18	6	1	253	8	2	293	15

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	569	568	301	562	571	257	308	0	0	261	0	0
Stage 1	305	305	-	259	259	-	-	-	-	-	-	-
Stage 2	264	263	-	303	312	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.14	6.54	6.24	4.14	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.536	4.036	3.336	2.236	-	-	2.218	-	-
Pot Cap-1 Maneuver	436	435	744	435	428	777	1241	-	-	1304	-	-
Stage 1	709	666	-	741	690	-	-	-	-	-	-	-
Stage 2	746	695	-	702	654	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	413	434	744	423	426	777	1241	-	-	1304	-	-
Mov Cap-2 Maneuver	413	434	-	423	426	-	-	-	-	-	-	-
Stage 1	707	664	-	741	689	-	-	-	-	-	-	-
Stage 2	720	694	-	690	652	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	13.93	13.12	0.03	0.06
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	8	-	-	423	470	13	-	-
HCM Lane V/C Ratio	0.001	-	-	0.048	0.057	0.002	-	-
HCM Ctrl Dly (s/v)	7.9	0	-	13.9	13.1	7.8	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.2	0	-	-

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	8	2	10	19	14	1	30	14	20	40	15
Future Vol, veh/h	3	8	2	10	19	14	1	30	14	20	40	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	75	75	75	75	75	75	75	75	75
Heavy Vehicles, %	15	15	15	9	9	9	4	4	4	5	5	5
Mvmt Flow	4	11	3	13	25	19	1	40	19	27	53	20

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	172	178	63	164	179	49	73	0	0	59	0	0
Stage 1	117	117	-	52	52	-	-	-	-	-	-	-
Stage 2	55	61	-	112	127	-	-	-	-	-	-	-
Critical Hdwy	7.25	6.65	6.35	7.19	6.59	6.29	4.14	-	-	4.15	-	-
Critical Hdwy Stg 1	6.25	5.65	-	6.19	5.59	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.25	5.65	-	6.19	5.59	-	-	-	-	-	-	-
Follow-up Hdwy	3.635	4.135	3.435	3.581	4.081	3.381	2.236	-	-	2.245	-	-
Pot Cap-1 Maneuver	763	693	966	785	703	1000	1514	-	-	1526	-	-
Stage 1	857	775	-	943	838	-	-	-	-	-	-	-
Stage 2	925	819	-	876	778	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	708	680	966	756	689	1000	1514	-	-	1526	-	-
Mov Cap-2 Maneuver	708	680	-	756	689	-	-	-	-	-	-	-
Stage 1	842	760	-	942	837	-	-	-	-	-	-	-
Stage 2	879	818	-	846	764	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	10.13	9.95	0.16	1.97
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	38	-	-	719	785	455	-	-
HCM Lane V/C Ratio	0.001	-	-	0.024	0.073	0.017	-	-
HCM Ctrl Dly (s/v)	7.4	0	-	10.1	9.9	7.4	0	-
HCM Lane LOS	A	A	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.2	0.1	-	-

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	95	19	3	22	38	4	11	127	6	2	95	190
Future Vol, veh/h	95	19	3	22	38	4	11	127	6	2	95	190
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	5	5	5	10	10	10	3	3	3
Mvmt Flow	102	20	3	24	41	4	12	137	6	2	102	204

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	389	375	204	280	474	140	306	0	0	143	0	0
Stage 1	209	209	-	163	163	-	-	-	-	-	-	-
Stage 2	181	167	-	117	311	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.15	6.55	6.25	4.2	-	-	4.13	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.545	4.045	3.345	2.29	-	-	2.227	-	-
Pot Cap-1 Maneuver	570	556	836	666	484	900	1210	-	-	1434	-	-
Stage 1	793	729	-	832	757	-	-	-	-	-	-	-
Stage 2	821	760	-	881	653	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	513	549	836	631	478	900	1210	-	-	1434	-	-
Mov Cap-2 Maneuver	513	549	-	631	478	-	-	-	-	-	-	-
Stage 1	792	728	-	823	749	-	-	-	-	-	-	-
Stage 2	764	752	-	851	652	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	14.04	12.65	0.61	0.05
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	136	-	-	523	539	11	-	-
HCM Lane V/C Ratio	0.01	-	-	0.24	0.128	0.002	-	-
HCM Ctrl Dly (s/v)	8	0	-	14	12.7	7.5	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.9	0.4	0	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	17	8	2	8	2	3	1	204	2	4	190	3
Future Vol, veh/h	17	8	2	8	2	3	1	204	2	4	190	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	4	4	4	15	15	15	11	11	11	11	11	11
Mvmt Flow	20	9	2	9	2	4	1	240	2	5	224	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	478	479	225	481	480	241	227	0	0	242	0	0
Stage 1	235	235	-	244	244	-	-	-	-	-	-	-
Stage 2	244	245	-	238	236	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.25	6.65	6.35	4.21	-	-	4.21	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.25	5.65	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.25	5.65	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.635	4.135	3.435	2.299	-	-	2.299	-	-
Pot Cap-1 Maneuver	494	483	809	474	467	767	1290	-	-	1273	-	-
Stage 1	764	707	-	732	681	-	-	-	-	-	-	-
Stage 2	756	700	-	737	686	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	487	480	809	461	464	767	1290	-	-	1273	-	-
Mov Cap-2 Maneuver	487	480	-	461	464	-	-	-	-	-	-	-
Stage 1	761	704	-	731	680	-	-	-	-	-	-	-
Stage 2	749	699	-	722	683	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	12.7	12.3	0.04	0.16
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	9	-	-	499	509	36	-	-
HCM Lane V/C Ratio	0.001	-	-	0.064	0.03	0.004	-	-
HCM Ctrl Dly (s/v)	7.8	0	-	12.7	12.3	7.8	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	8	24	0	1	5	16	0	38	5	13	20	7
Future Vol, veh/h	8	24	0	1	5	16	0	38	5	13	20	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	6	6	6	5	5	5	2	2	2	11	11	11
Mvmt Flow	10	31	0	1	6	21	0	49	6	17	26	9

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	115	119	30	126	120	52	35	0	0	55	0	0
Stage 1	63	63	-	52	52	-	-	-	-	-	-	-
Stage 2	52	55	-	74	68	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.56	6.26	7.15	6.55	6.25	4.12	-	-	4.21	-	-
Critical Hdwy Stg 1	6.16	5.56	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.56	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4.054	3.354	3.545	4.045	3.345	2.218	-	-	2.299	-	-
Pot Cap-1 Maneuver	852	764	1033	840	765	1007	1577	-	-	1494	-	-
Stage 1	937	834	-	953	846	-	-	-	-	-	-	-
Stage 2	951	841	-	928	832	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	818	756	1033	797	756	1007	1577	-	-	1494	-	-
Mov Cap-2 Maneuver	818	756	-	797	756	-	-	-	-	-	-	-
Stage 1	927	825	-	953	846	-	-	-	-	-	-	-
Stage 2	924	841	-	883	823	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	9.94	9.01	0	2.42
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1577	-	-	770	926	556	-	-
HCM Lane V/C Ratio	-	-	-	0.053	0.03	0.011	-	-
HCM Ctrl Dly (s/v)	0	-	-	9.9	9	7.4	0	-
HCM Lane LOS	A	-	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-

Intersection	
Int Delay, s/veh	5.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	140	35	4	8	15	9	6	62	19	3	95	96
Future Vol, veh/h	140	35	4	8	15	9	6	62	19	3	95	96
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	48	48	48	20	20	20	8	8	8
Mvmt Flow	156	39	4	9	17	10	7	69	21	3	106	107

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	256	269	159	224	312	79	212	0	0	90	0	0
Stage 1	166	166	-	93	93	-	-	-	-	-	-	-
Stage 2	91	103	-	132	219	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.58	6.98	6.68	4.3	-	-	4.18	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.58	5.98	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.58	5.98	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.932	4.432	3.732	2.38	-	-	2.272	-	-
Pot Cap-1 Maneuver	697	637	886	644	534	867	1258	-	-	1468	-	-
Stage 1	836	761	-	813	737	-	-	-	-	-	-	-
Stage 2	917	810	-	773	644	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	662	632	886	596	530	867	1258	-	-	1468	-	-
Mov Cap-2 Maneuver	662	632	-	596	530	-	-	-	-	-	-	-
Stage 1	834	759	-	808	733	-	-	-	-	-	-	-
Stage 2	881	805	-	728	642	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	12.8	11.22	0.54	0.12
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	119	-	-	660	614	25	-	-
HCM Lane V/C Ratio	0.005	-	-	0.302	0.058	0.002	-	-
HCM Ctrl Dly (s/v)	7.9	0	-	12.8	11.2	7.5	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.3	0.2	0	-	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	9	9	0	3	17	5	1	238	7	2	276	14
Future Vol, veh/h	9	9	0	3	17	5	1	238	7	2	276	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	0	0	0	4	4	4	4	4	4	2	2	2
Mvmt Flow	10	10	0	3	19	6	1	267	8	2	310	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	602	600	318	593	604	271	326	0	0	275	0	0
Stage 1	322	322	-	274	274	-	-	-	-	-	-	-
Stage 2	279	278	-	320	330	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.14	6.54	6.24	4.14	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.536	4.036	3.336	2.236	-	-	2.218	-	-
Pot Cap-1 Maneuver	415	417	727	414	410	763	1223	-	-	1288	-	-
Stage 1	694	654	-	728	680	-	-	-	-	-	-	-
Stage 2	732	684	-	688	642	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	391	416	727	403	409	763	1223	-	-	1288	-	-
Mov Cap-2 Maneuver	391	416	-	403	409	-	-	-	-	-	-	-
Stage 1	692	653	-	727	679	-	-	-	-	-	-	-
Stage 2	705	684	-	676	641	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	14.4	13.54	0.03	0.05
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	7	-	-	403	450	12	-	-
HCM Lane V/C Ratio	0.001	-	-	0.05	0.062	0.002	-	-
HCM Ctrl Dly (s/v)	7.9	0	-	14.4	13.5	7.8	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.2	0	-	-

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	8	2	11	20	15	1	32	15	21	42	16
Future Vol, veh/h	3	8	2	11	20	15	1	32	15	21	42	16
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	75	75	75	75	75	75	75	75	75
Heavy Vehicles, %	15	15	15	9	9	9	4	4	4	5	5	5
Mvmt Flow	4	11	3	15	27	20	1	43	20	28	56	21

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	181	188	67	173	189	53	77	0	0	63	0	0
Stage 1	123	123	-	55	55	-	-	-	-	-	-	-
Stage 2	59	65	-	117	133	-	-	-	-	-	-	-
Critical Hdwy	7.25	6.65	6.35	7.19	6.59	6.29	4.14	-	-	4.15	-	-
Critical Hdwy Stg 1	6.25	5.65	-	6.19	5.59	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.25	5.65	-	6.19	5.59	-	-	-	-	-	-	-
Follow-up Hdwy	3.635	4.135	3.435	3.581	4.081	3.381	2.236	-	-	2.245	-	-
Pot Cap-1 Maneuver	752	684	962	775	694	995	1509	-	-	1521	-	-
Stage 1	851	770	-	939	835	-	-	-	-	-	-	-
Stage 2	921	816	-	871	773	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	694	670	962	745	680	995	1509	-	-	1521	-	-
Mov Cap-2 Maneuver	694	670	-	745	680	-	-	-	-	-	-	-
Stage 1	835	755	-	939	834	-	-	-	-	-	-	-
Stage 2	873	815	-	839	758	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	10.21	10.03	0.15	1.97
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	35	-	-	709	776	453	-	-
HCM Lane V/C Ratio	0.001	-	-	0.024	0.079	0.018	-	-
HCM Ctrl Dly (s/v)	7.4	0	-	10.2	10	7.4	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.3	0.1	-	-

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	100	20	3	23	40	4	12	135	6	2	100	201
Future Vol, veh/h	100	20	3	23	40	4	12	135	6	2	100	201
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	5	5	5	10	10	10	3	3	3
Mvmt Flow	108	22	3	25	43	4	13	145	6	2	108	216

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	412	397	216	297	502	148	324	0	0	152	0	0
Stage 1	220	220	-	174	174	-	-	-	-	-	-	-
Stage 2	192	177	-	123	328	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.15	6.55	6.25	4.2	-	-	4.13	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.545	4.045	3.345	2.29	-	-	2.227	-	-
Pot Cap-1 Maneuver	550	540	824	650	467	890	1192	-	-	1423	-	-
Stage 1	783	721	-	821	749	-	-	-	-	-	-	-
Stage 2	809	752	-	874	642	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	490	533	824	613	461	890	1192	-	-	1423	-	-
Mov Cap-2 Maneuver	490	533	-	613	461	-	-	-	-	-	-	-
Stage 1	781	720	-	811	740	-	-	-	-	-	-	-
Stage 2	750	743	-	843	641	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	14.73	13.03	0.63	0.05
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	140	-	-	502	520	10	-	-
HCM Lane V/C Ratio	0.011	-	-	0.264	0.139	0.002	-	-
HCM Ctrl Dly (s/v)	8.1	0	-	14.7	13	7.5	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.1	0.5	0	-	-

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	22	11	2	12	2	7	1	255	24	8	199	4
Future Vol, veh/h	22	11	2	12	2	7	1	255	24	8	199	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	4	4	4	15	15	15	11	11	11	11	11	11
Mvmt Flow	26	13	2	14	2	8	1	300	28	9	234	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	559	586	236	576	574	314	239	0	0	328	0	0
Stage 1	255	255	-	316	316	-	-	-	-	-	-	-
Stage 2	304	331	-	259	258	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.25	6.65	6.35	4.21	-	-	4.21	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.25	5.65	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.25	5.65	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.635	4.135	3.435	2.299	-	-	2.299	-	-
Pot Cap-1 Maneuver	437	420	798	410	412	697	1277	-	-	1182	-	-
Stage 1	745	692	-	668	632	-	-	-	-	-	-	-
Stage 2	702	642	-	718	671	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	425	415	798	392	407	697	1277	-	-	1182	-	-
Mov Cap-2 Maneuver	425	415	-	392	407	-	-	-	-	-	-	-
Stage 1	738	686	-	667	631	-	-	-	-	-	-	-
Stage 2	690	641	-	695	665	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	14.18	13.26	0.03	0.31
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	6	-	-	433	461	68	-	-
HCM Lane V/C Ratio	0.001	-	-	0.095	0.054	0.008	-	-
HCM Ctrl Dly (s/v)	7.8	0	-	14.2	13.3	8.1	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.2	0	-	-

Intersection	
Int Delay, s/veh	4.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	11	27	0	1	20	16	0	38	5	13	20	22
Future Vol, veh/h	11	27	0	1	20	16	0	38	5	13	20	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	6	6	6	5	5	5	2	2	2	11	11	11
Mvmt Flow	14	35	0	1	26	21	0	49	6	17	26	28

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	135	128	40	128	139	52	54	0	0	55	0	0
Stage 1	73	73	-	52	52	-	-	-	-	-	-	-
Stage 2	62	55	-	76	87	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.56	6.26	7.15	6.55	6.25	4.12	-	-	4.21	-	-
Critical Hdwy Stg 1	6.16	5.56	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.56	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4.054	3.354	3.545	4.045	3.345	2.218	-	-	2.299	-	-
Pot Cap-1 Maneuver	828	755	1020	838	746	1007	1552	-	-	1494	-	-
Stage 1	927	826	-	953	846	-	-	-	-	-	-	-
Stage 2	940	841	-	925	817	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	774	746	1020	790	738	1007	1552	-	-	1494	-	-
Mov Cap-2 Maneuver	774	746	-	790	738	-	-	-	-	-	-	-
Stage 1	916	817	-	953	846	-	-	-	-	-	-	-
Stage 2	893	841	-	876	807	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	10.1	9.56	0	1.76
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1552	-	-	754	836	385	-	-
HCM Lane V/C Ratio	-	-	-	0.065	0.057	0.011	-	-
HCM Ctrl Dly (s/v)	0	-	-	10.1	9.6	7.4	0	-
HCM Lane LOS	A	-	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.2	0	-	-

Intersection	
Int Delay, s/veh	6.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	183	35	4	8	15	9	6	91	19	3	99	103
Future Vol, veh/h	183	35	4	8	15	9	6	91	19	3	99	103
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	48	48	48	20	20	20	8	8	8
Mvmt Flow	203	39	4	9	17	10	7	101	21	3	110	114

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	297	309	167	261	356	112	224	0	0	122	0	0
Stage 1	174	174	-	125	125	-	-	-	-	-	-	-
Stage 2	123	136	-	136	231	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.58	6.98	6.68	4.3	-	-	4.18	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.58	5.98	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.58	5.98	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.932	4.432	3.732	2.38	-	-	2.272	-	-
Pot Cap-1 Maneuver	656	605	877	607	503	830	1245	-	-	1429	-	-
Stage 1	828	755	-	779	712	-	-	-	-	-	-	-
Stage 2	881	784	-	768	636	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	621	600	877	561	499	830	1245	-	-	1429	-	-
Mov Cap-2 Maneuver	621	600	-	561	499	-	-	-	-	-	-	-
Stage 1	826	753	-	775	708	-	-	-	-	-	-	-
Stage 2	845	780	-	723	634	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	14.57	11.61	0.41	0.11
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	90	-	-	621	580	24	-	-
HCM Lane V/C Ratio	0.005	-	-	0.397	0.061	0.002	-	-
HCM Ctrl Dly (s/v)	7.9	0	-	14.6	11.6	7.5	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.9	0.2	0	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	5	225	58	32	201
Future Vol, veh/h	10	5	225	58	32	201
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	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	30	30	11	11	11	11
Mvmt Flow	12	6	265	68	38	236

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	611	299	0	0	333	0
Stage 1	299	-	-	-	-	-
Stage 2	312	-	-	-	-	-
Critical Hdwy	6.7	6.5	-	-	4.21	-
Critical Hdwy Stg 1	5.7	-	-	-	-	-
Critical Hdwy Stg 2	5.7	-	-	-	-	-
Follow-up Hdwy	3.77	3.57	-	-	2.299	-
Pot Cap-1 Maneuver	415	679	-	-	1178	-
Stage 1	693	-	-	-	-	-
Stage 2	683	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	400	679	-	-	1178	-
Mov Cap-2 Maneuver	400	-	-	-	-	-
Stage 1	693	-	-	-	-	-
Stage 2	658	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	13.08	0	1.12
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	463	247	-
HCM Lane V/C Ratio	-	-	0.038	0.032	-
HCM Ctrl Dly (s/v)	-	-	13.1	8.2	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	27	15	17	26	4	4
Future Vol, veh/h	27	15	17	26	4	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	4	4	15	15	30	30
Mvmt Flow	32	18	20	31	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	51	0	-	0	116	35
Stage 1	-	-	-	-	35	-
Stage 2	-	-	-	-	81	-
Critical Hdwy	4.14	-	-	-	6.7	6.5
Critical Hdwy Stg 1	-	-	-	-	5.7	-
Critical Hdwy Stg 2	-	-	-	-	5.7	-
Follow-up Hdwy	2.236	-	-	-	3.77	3.57
Pot Cap-1 Maneuver	1543	-	-	-	817	963
Stage 1	-	-	-	-	920	-
Stage 2	-	-	-	-	876	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1543	-	-	-	800	963
Mov Cap-2 Maneuver	-	-	-	-	800	-
Stage 1	-	-	-	-	901	-
Stage 2	-	-	-	-	876	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	4.75	0	9.17
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1157	-	-	-	874
HCM Lane V/C Ratio	0.021	-	-	-	0.011
HCM Ctrl Dly (s/v)	7.4	0	-	-	9.2
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	11	10	0	25	19	10	1	251	13	6	327	19
Future Vol, veh/h	11	10	0	25	19	10	1	251	13	6	327	19
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	0	0	0	4	4	4	4	4	4	2	2	2
Mvmt Flow	12	11	0	28	21	11	1	282	15	7	367	21

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	687	690	378	678	694	289	389	0	0	297	0	0
Stage 1	392	392	-	292	292	-	-	-	-	-	-	-
Stage 2	295	299	-	387	402	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.14	6.54	6.24	4.14	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.536	4.036	3.336	2.236	-	-	2.218	-	-
Pot Cap-1 Maneuver	364	371	673	363	364	745	1159	-	-	1265	-	-
Stage 1	637	610	-	712	668	-	-	-	-	-	-	-
Stage 2	718	670	-	633	597	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	335	368	673	350	361	745	1159	-	-	1265	-	-
Mov Cap-2 Maneuver	335	368	-	350	361	-	-	-	-	-	-	-
Stage 1	633	606	-	711	667	-	-	-	-	-	-	-
Stage 2	683	669	-	617	593	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	16.04	15.84	0.03	0.13
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	7	-	-	350	393	30	-	-
HCM Lane V/C Ratio	0.001	-	-	0.067	0.155	0.005	-	-
HCM Ctrl Dly (s/v)	8.1	0	-	16	15.8	7.9	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.5	0	-	-

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	18	23	2	11	24	15	1	32	15	21	42	19
Future Vol, veh/h	18	23	2	11	24	15	1	32	15	21	42	19
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	75	75	75	75	75	75	75	75	75
Heavy Vehicles, %	15	15	15	9	9	9	4	4	4	5	5	5
Mvmt Flow	24	31	3	15	32	20	1	43	20	28	56	25

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	186	190	69	183	193	53	81	0	0	63	0	0
Stage 1	125	125	-	55	55	-	-	-	-	-	-	-
Stage 2	61	65	-	127	137	-	-	-	-	-	-	-
Critical Hdwy	7.25	6.65	6.35	7.19	6.59	6.29	4.14	-	-	4.15	-	-
Critical Hdwy Stg 1	6.25	5.65	-	6.19	5.59	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.25	5.65	-	6.19	5.59	-	-	-	-	-	-	-
Follow-up Hdwy	3.635	4.135	3.435	3.581	4.081	3.381	2.236	-	-	2.245	-	-
Pot Cap-1 Maneuver	747	682	959	763	690	995	1504	-	-	1521	-	-
Stage 1	849	768	-	939	835	-	-	-	-	-	-	-
Stage 2	918	816	-	860	770	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	684	668	959	712	676	995	1504	-	-	1521	-	-
Mov Cap-2 Maneuver	684	668	-	712	676	-	-	-	-	-	-	-
Stage 1	832	754	-	939	834	-	-	-	-	-	-	-
Stage 2	864	815	-	807	755	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	10.74	10.21	0.15	1.9
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	35	-	-	685	757	434	-	-
HCM Lane V/C Ratio	0.001	-	-	0.084	0.088	0.018	-	-
HCM Ctrl Dly (s/v)	7.4	0	-	10.7	10.2	7.4	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.3	0.1	-	-

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	111	20	3	23	40	4	12	142	6	2	129	245
Future Vol, veh/h	111	20	3	23	40	4	12	142	6	2	129	245
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	5	5	5	10	10	10	3	3	3
Mvmt Flow	119	22	3	25	43	4	13	153	6	2	139	263

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	475	460	270	335	588	156	402	0	0	159	0	0
Stage 1	275	275	-	182	182	-	-	-	-	-	-	-
Stage 2	200	185	-	154	406	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.15	6.55	6.25	4.2	-	-	4.13	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.545	4.045	3.345	2.29	-	-	2.227	-	-
Pot Cap-1 Maneuver	500	498	768	612	417	882	1114	-	-	1414	-	-
Stage 1	731	683	-	813	744	-	-	-	-	-	-	-
Stage 2	802	747	-	842	592	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	440	491	768	575	411	882	1114	-	-	1414	-	-
Mov Cap-2 Maneuver	440	491	-	575	411	-	-	-	-	-	-	-
Stage 1	730	681	-	803	734	-	-	-	-	-	-	-
Stage 2	742	737	-	810	591	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	16.68	13.99	0.62	0.04
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	134	-	-	451	472	8	-	-
HCM Lane V/C Ratio	0.012	-	-	0.319	0.153	0.002	-	-
HCM Ctrl Dly (s/v)	8.3	0	-	16.7	14	7.5	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.4	0.5	0	-	-

Intersection	
Int Delay, s/veh	2.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	59	33	256	15	8	292
Future Vol, veh/h	59	33	256	15	8	292
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	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	30	30	4	4	2	2
Mvmt Flow	66	37	288	17	9	328

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	642	296	0	0	304	0
Stage 1	296	-	-	-	-	-
Stage 2	346	-	-	-	-	-
Critical Hdwy	6.7	6.5	-	-	4.12	-
Critical Hdwy Stg 1	5.7	-	-	-	-	-
Critical Hdwy Stg 2	5.7	-	-	-	-	-
Follow-up Hdwy	3.77	3.57	-	-	2.218	-
Pot Cap-1 Maneuver	397	682	-	-	1256	-
Stage 1	695	-	-	-	-	-
Stage 2	658	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	394	682	-	-	1256	-
Mov Cap-2 Maneuver	394	-	-	-	-	-
Stage 1	695	-	-	-	-	-
Stage 2	652	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	14.97	0	0.21
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	464	48	-
HCM Lane V/C Ratio	-	-	0.223	0.007	-
HCM Ctrl Dly (s/v)	-	-	15	7.9	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.8	0	-

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	7	22	26	7	26	28
Future Vol, veh/h	7	22	26	7	26	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	0	0	4	4	30	30
Mvmt Flow	8	25	29	8	29	31

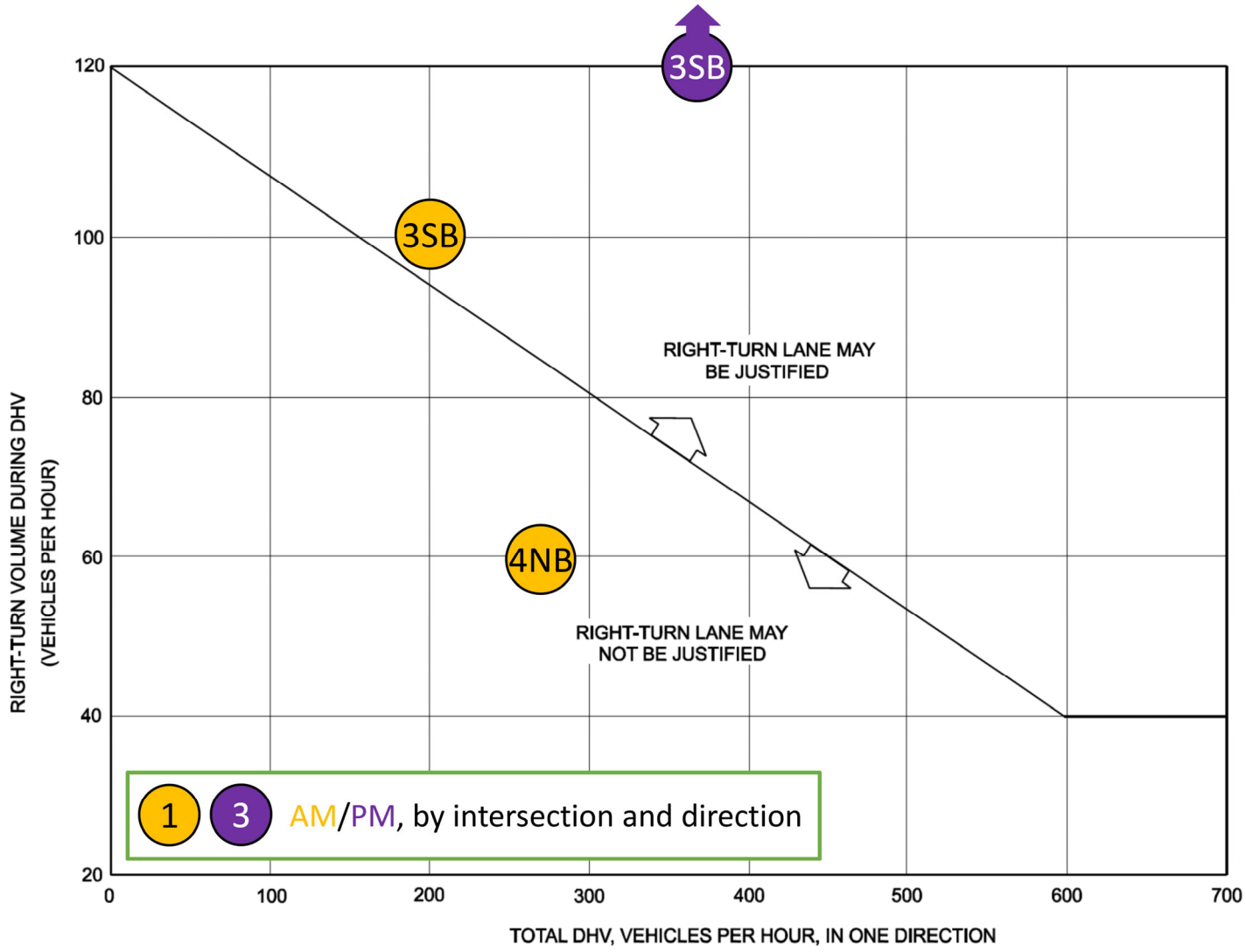
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	37	0	-	0	74	33
Stage 1	-	-	-	-	33	-
Stage 2	-	-	-	-	40	-
Critical Hdwy	4.1	-	-	-	6.7	6.5
Critical Hdwy Stg 1	-	-	-	-	5.7	-
Critical Hdwy Stg 2	-	-	-	-	5.7	-
Follow-up Hdwy	2.2	-	-	-	3.77	3.57
Pot Cap-1 Maneuver	1587	-	-	-	865	966
Stage 1	-	-	-	-	922	-
Stage 2	-	-	-	-	915	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1587	-	-	-	861	966
Mov Cap-2 Maneuver	-	-	-	-	861	-
Stage 1	-	-	-	-	917	-
Stage 2	-	-	-	-	915	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	1.76	0	9.23
HCM LOS			A

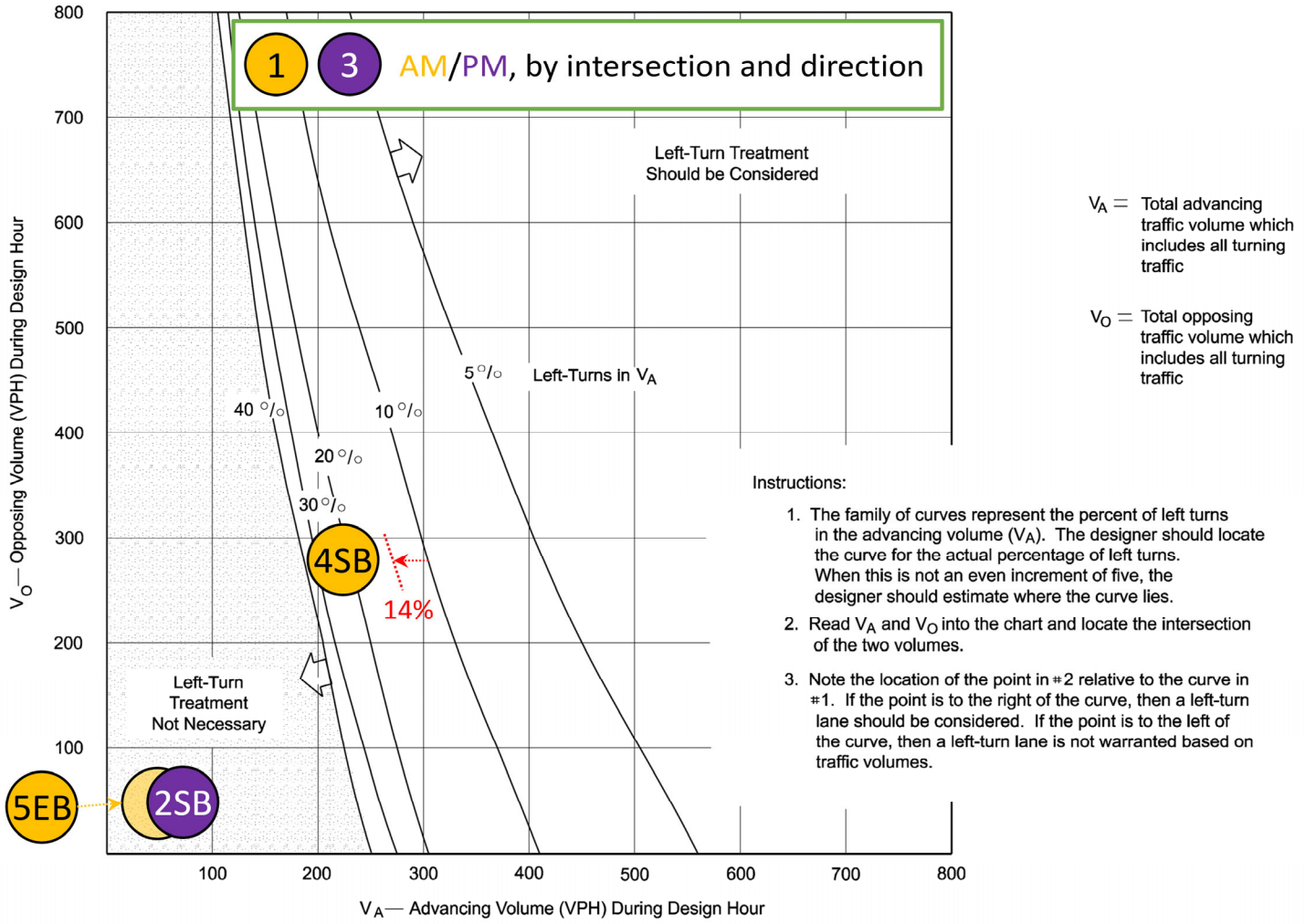
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	434	-	-	-	912
HCM Lane V/C Ratio	0.005	-	-	-	0.067
HCM Ctrl Dly (s/v)	7.3	0	-	-	9.2
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Appendix C: Auxiliary Turn Lane Analysis Charts

Right Turn Lane Analysis Chart (from MDT Design Manual, Figure 28.4A)



Left Turn Lane Analysis Chart (from MDT Design Manual, Figure 28.4C)



Appendix D: Intersection Cost Participation Calculations

Yellowstone County Cost Participation Worksheet: Platinum Commercial Park TIS

Whether a movement pair is critical is based on Total traffic (Background + Project)

1: 72nd at Danford

Lane Group		AM Peak Hour		PM Peak Hour	
(**critical**)	Lanes	Vproject	Per Lane	Vproject	Per Lane
EB T	1	2	2	1	**1**
WB L	1	4	4	22	**22**
WB T	1	0	**0**	2	2
EB L	1	5	**5**	1	1
NB T	1	51	**51**	13	13
SB L	1	4	**4**	4	4
SB T	1	8	8	51	**51**
NB L	1	0	0	0	**0**
Project **Critical** Lane Volume			60		74
Critical Lane Capacity			1200		1200
% Increase			5.0%		6.2%
Max % Increase			6.2%		

2: 64th at Danford

Lane Group		AM Peak Hour		PM Peak Hour	
(**critical**)	Lanes	Vproject	Per Lane	Vproject	Per Lane
EB T	1	2	2	15	15
WB L	1	0	0	0	0
WB T	1	14	**14**	4	**4**
EB L	1	2	**2**	15	**15**
NB T	1	No project traffic in these movements			
SB L	1				
SB T	1				
NB L	1				
Project **Critical** Lane Volume			16		19
Critical Lane Capacity			1200		1200
% Increase			1.3%		1.6%
Max % Increase			1.6%		

3: 72nd at Laurel Airport

Lane Group		AM Peak Hour		PM Peak Hour	
(**critical**)	Lanes	Vproject	Per Lane	Vproject	Per Lane
EB T	1	No project traffic in these movements			
WB L	1				
WB T	1				
EB L	1	43	**43**	11	**11**
NB T	1	29	**29**	7	**7**
SB L	1	0	0	0	0
SB T	1	5	5	29	29
NB L	1	0	0	0	0
Project **Critical** Lane Volume			72		18
Critical Lane Capacity			1200		1200
% Increase			6.0%		1.5%
Max % Increase			6.0%		