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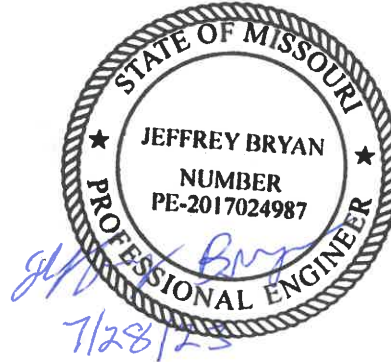
# MEMO

Date: July 27, 2023

To: Coby Crowl, PE  
 McClure Engineering

From: Jeff Bryan, PE, PTOE

Subject: 2023 West Pryor TIS Update



In October 2020 an updated analysis for the West Pryor Village Traffic Impact Study (TIS) was completed by McClure Engineering. The October 2022 update was required due to revisions to the site plan at that time. Additional revisions have occurred to the 2020 site plan, therefore, this memo outlines the steps completed to update the TIS.

The site plan for the 2020 TIS Update is included in this memo. Also included is the revised 2023 site plan, dated 12/6/22. The revised 2023 site plan was compared to the 2020 site plan to determine changes in land use and/or size of buildings, number of units, etc. After receiving the 2023 site plan, two parcels changed. Parcel 7a is no longer a pre-school but is now an 80-room hotel. Also, Parcel 7 is expected to contain 188 apartment units. In addition, Parcel 13 consists of one 7,000 square foot restaurant and is expected to contain two 2,500 square foot restaurants. These changes are reflected in the trip generations.

The revised 2023 site plan information was used to determine the revised typical weekday peak hour trip generation for the parcels with changes in land use and/or size. The revised trip generation used the 11<sup>th</sup> Edition of *Trip Generation*, the current version, from the Institute of Transportation Engineers. This was compared to the trip generation in the 2020 update, which used the 10<sup>th</sup> Edition of *Trip Generation*. The trip generation from the 2020 update is included in the memo. A spreadsheet showing the trip generation comparison for the parcels that changed is included in the memo. Table 1 contains a summary of the trip generation comparison.

**Table 1 – Trip Generation Comparison – Changed Parcels**

	Daily Trips	AM Entering	AM Exiting	AM Total	PM Entering	PM Exiting	PM Total
<b>2020 Study Update</b>	12655	407	365	772	593	443	1036
<b>2023 Study Update</b>	12197	441	476	917	628	533	1161
<b>Difference</b>	-458	34	111	145	35	90	125
<b>% Change</b>	-3.6%	8.4%	30.4%	18.8%	5.9%	20.3%	12.1%

As can be seen in the table above, the proposed site plan would be expected to generate 458 fewer daily trips, an additional 145 morning peak hour trips, and an additional 125 evening peak hour trips.

In order to complete the analysis, the change in peak hour trips (increase or decrease) for each parcel was determined. The distribution rates from the original 2018 study were applied to the trip generation differences (the distribution percentages vary by the phase of development) to assign the trips to the intersections and individual movements. The exhibits from the 2018 study showing the distribution percentages used are included in this memo. Summing up each of the four phases of development gives the total new trips for each peak hour. Exhibits showing the peak hour total new trips are included in the memo. These total new trips were then added or subtracted from the 2020 proposed volumes to determine the 2023 updated intersection volumes. An exhibit showing the total intersection volumes for each intersection is included in the memo.

The next step in the analysis was to review intersections for auxiliary lanes. This was completed using Section 16 of the Lee's Summit Access Management Code – Turn Lanes. As several intersection approaches already have left and/or right turn lanes, this review concentrated on approaches without those lanes.

The 2018 TIS refers to Black Twig Lane as a residential street. Section 16.1 of the Access Management Code lists criteria for the requirement of left turn lanes. Each of the requirements is for higher functional streets (non-residential). Therefore, a left turn lane is not recommended for the southbound approach of Black Twig Lane at Chipman Road, or for any of the approaches at the intersection of Lowenstein Drive and Black Twig Lane that don't currently have a left turn lane.

Section 16.2 of the Access Management Code lists criteria for the requirement of right turn lanes. Each of the requirements is for higher functional streets (non-residential). Therefore, a right turn lane is not recommended for the southbound approach of Black Twig Lane at Chipman Road, or for any of the approaches at the intersection of Lowenstein Drive and Black Twig Lane.

A signal warrant analysis was then completed for the non-signalized intersections [not including the right-in, right-out (RIRO)]. For this analysis the total intersection volumes and the intersection lane configurations were entered into the software Warrants 10 for review. As only peak hour information was available, it was assumed that the peak hour volumes were distributed equally among each 15-minute period in the peak hour. While Warrants 10 will review each of the 9 signal warrants, plus the all-way stop control warrant (AWSC), the use of peak hour data narrowed the signal warrant review to Warrant 3, Peak Hour. The analysis for Chipman Road and Black Twig Lane indicated signal warrants were not met and the AWSC warrant was not met. The same results were found for the intersection of Lowenstein Drive and Black Twig Lane. The signal warrant analysis results for each intersection can be found in this memo.

The synchro files from the 2020 TIS Update were modified for the revised volumes. In addition, each intersection was reviewed, and any revisions based on existing conditions were made. The following revisions were made to the 2023 update synchro files:

- At Summit Woods Crossing and Pryor Road, a southbound right turn lane with 150' of storage was added to give two southbound through lanes. As opposed to three lanes, with the third lane being a drop lane for right turns.
- At Summit Woods Crossing and Pryor Road, the northbound receiving lanes were set at two lanes.
- At Summit Woods Crossing and Pryor Road, the westbound lanes were changed to dual left turn lanes and a thru/right lane, instead of a single left turn lane.

- At the RIRO and Pryor Road, a southbound right turn lane with 150’ of storage was added to give two southbound through lanes, instead of three lanes, with the third lane being a drop lane for right turns.
- At Lowenstein Drive and Pryor Road, the southbound right turn lane storage was reduced from 450’ to 190’.
- West of Lowenstein Drive and Pryor Road, node 12 was moved west to provide more eastbound left turn storage.
- On Chipman Road west of Pryor Road, a two-way left turn lane (TWLTL) was added.
- Black Twig Road and Lowenstein Drive was changed from two-way stop control to all-way stop control.
- At Black Twig Road and Lowenstein Drive, a left turn lane was added to the northwest bound direction.
- On Lowenstein Drive between Black Twig Road and Pryor Road, a TWLTL was added.

With the above revisions, the synchro analysis was completed. The initial results showed a level of service (LOS) F for a movement at Lowenstein and Pryor in the PM peak hour. Optimization of the cycle length removed the LOS F. The synchro output for each study intersection is included in this memo. The following Table 2 shows the overall intersection LOS and delay at each study intersection. At intersections operating under two-way stop control, the LOS shown is for the minor movement instead of the overall intersection.

**Table 2 – 2023 TIS Update Levels Of Service**

Intersection	AM Peak Hour		PM Peak Hour	
	LOS	Delay	LOS	Delay
I-470 South Ramp & Pryor Rd	A	8.6	B	16.7
Summit Woods Xing& Pryor Rd	C	20.1	C	29.8
Eastbound RIRO at Pryor Rd	B	11.3	C	16.5
Lowenstein Dr & Pryor Rd	B	19.7	C	32.7
Chipman Rd & Pryor Rd	C	28.1	C	31.0
Black Twig Ln & Lowenstein Dr	A	8.6	A	8.3
Southbound Black Twig Ln at Chipman Rd	B	11.7	C	24.7

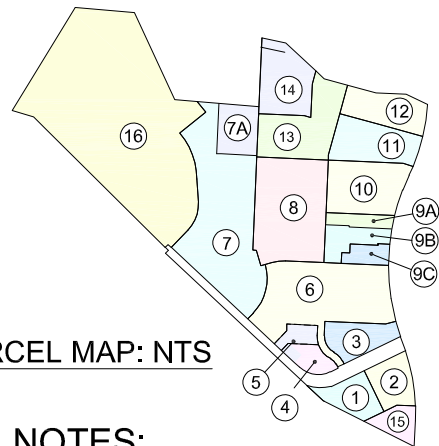
An exhibit showing the LOS for each movement at each study intersection is included in this memo. This exhibit also shows the latest LOS for each movement as shown in the 2020 TIS Update, for comparison. Table 3 compares the intersection LOS from the 2020 update to the 2023 update.

**Table 3 – Level of Service Comparison**

Intersection	2020 Update		2023 Update	
	AM	PM	AM	PM
I-470 South Ramp & Pryor Rd	B	C	A	B
Summit Woods Xing& Pryor Rd	B	C	C	C
Eastbound RIRO at Pryor Rd	B	C	B	C
Lowenstein Dr & Pryor Rd	B	B	B	C
Chipman Rd & Pryor Rd	C	C	C	C
Black Twig Ln & Lowenstein Dr	B	B	A	A
Southbound Black Twig Ln at Chipman Rd	B	E	B	C

As can be seen in the LOS comparison, most of the intersections remain at the same LOS or improved. Summit Woods Crossing and Pryor Road shows a decreased LOS during the morning peak hour, going from LOS B to C. In addition, Lowenstein Drive and Pryor Road shows a LOS C during the evening peak hour, compared to LOS B from the original 2018 study. Based on this information, no improvements are recommended as a result of the proposed changes in land use and/or building size/number of units.





PARCEL MAP: NTS

**SETBACK & HEIGHT RESTRICTIONS:**

MIXED USE - TO BE DETERMINED

**PARKING NOTES:**

- 1) SURFACE PARKING IS SHOWN IN PLAN
- 2) APARTMENT PARKING OF 300 PLUS IS PROVIDED BY PARKING DECK UNDER APARTMENTS (PARKING DECK NOT SHOWN)

**PLAN NOTES:**

**STREETS OF WEST PRYOR - DEVELOPMENT PLAN  
SK-109\_12/6/22**

**PARCEL 1:** RESTAURANT ( PARCEL 67,758 SQFT = 1.56 ACRES )  
- 6,500 SQFT FULL SERVICE DINE-IN RESTAURANT WITH SURFACE PARKING & PATIO

**PARCEL 2:** RESTAURANT ( PARCEL 71,216 SQFT = 1.63 ACRES )  
- 3,000 (NORTH PAD) SQFT FULL SERVICE DINE-IN RESTAURANT WITH SURFACE PARKING & PATIO  
- 3,500 (SOUTH PAD) SQFT FULL SERVICE DINE-IN RESTAURANT WITH SURFACE PARKING & PATIO

**PARCEL 3:** RESTAURANT ( PARCEL 76,395 SQFT = 1.75 ACRES )  
- 2,100 SQFT RESTAURANT WITH DRIVE THRU, PATIO AND SURFACE PARKING  
- 2,000 SQFT TENANT WITH SURFACE PARKING  
- 1,600 SQFT TENANT WITH PATIO AND SURFACE PARKING

**PARCEL 4:** DRIVE THRU RESTAURANT ( PARCEL 40,106 SQFT = .92 ACRES )  
- 2,000 SQFT DRIVE UP RESTAURANT WITH SURFACE PARKING

**PARCEL 5:** MEDICAL ( PARCEL 26,229 SQFT = .60 ACRES )  
- 6,000 SQFT MEDICAL WITH SURFACE PARKING

**PARCEL 6:** GROCERY STORE ( PARCEL 311,668 SQFT = 7.15 ACRES )  
- 63,119 SQFT GROCERY STORE WITH SURFACE PARKING

**PARCEL 7A:** SCHOOL ( PARCEL 72,600 SQFT = 1.67 ACRES )  
- PRE-SCHOOL WITH SURFACE PARKING & PLAYGROUNDS

**PARCEL 7:** APARTMENT COMPLEX ( PARCEL 593,837 SQFT = 9.04 ACRES )  
- APARTMENTS WITH SURFACE PARKING & COURTYARD

**PARCEL 8:** APARTMENTS WITH CLUBHOUSE & RETAIL/RESTAURANT ( PARCEL 268,862 SQFT = 6.17 ACRES )  
- MULTI STORY APARTMENTS WITH UNDERGROUND PARKING DECK (PARKING DECK NOT SHOWN), CLUBHOUSE AND POOL  
- 250 UNITS  
- 15,000 SQFT RETAIL/ RESTAURANT & SURFACE PARKING

**PARCEL 9A:** BANK BUILDING ( PARCEL 32,115 SQFT = .74 ACRES )  
- BANK, ATM DRIVE LANE, SITE FEATURES & SURFACE PARKING

**PARCEL 9B:** FUTURE MULTI TENANT BUILDING ( PARCEL 55,816 SQFT = 1.28 ACRES )  
- FUTURE PAD SITE TO BE DEVELOPED, SITE FEATURES & SURFACE PARKING

**PARCEL 9C:** BANK BUILDING ( PARCEL 32,004 SQFT = .73 ACRES )  
- BANK, ATM DRIVE LANE, SITE FEATURES & SURFACE PARKING

**PARCEL 10:** MULTI-TENANT BUILDING ( PARCEL 145,724 SQFT = 3.35 ACRES )  
- 6,500 SQFT COMMON WALL BUILDING WITH SITE FEATURES & SURFACE PARKING  
- 1,600 SQFT COMMON WALL BUILDING WITH SITE FEATURES & SURFACE PARKING  
- 4,000 SQFT COMMON WALL BUILDING WITH SITE FEATURES & SURFACE PARKING

**PARCEL 11:** MULTI-TENANT BUILDING ( PARCEL 111,008 SQFT = 2.55 ACRES )  
- COMMON WALL BUILDING WITH SITE FEATURES & SURFACE PARKING

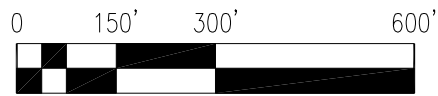
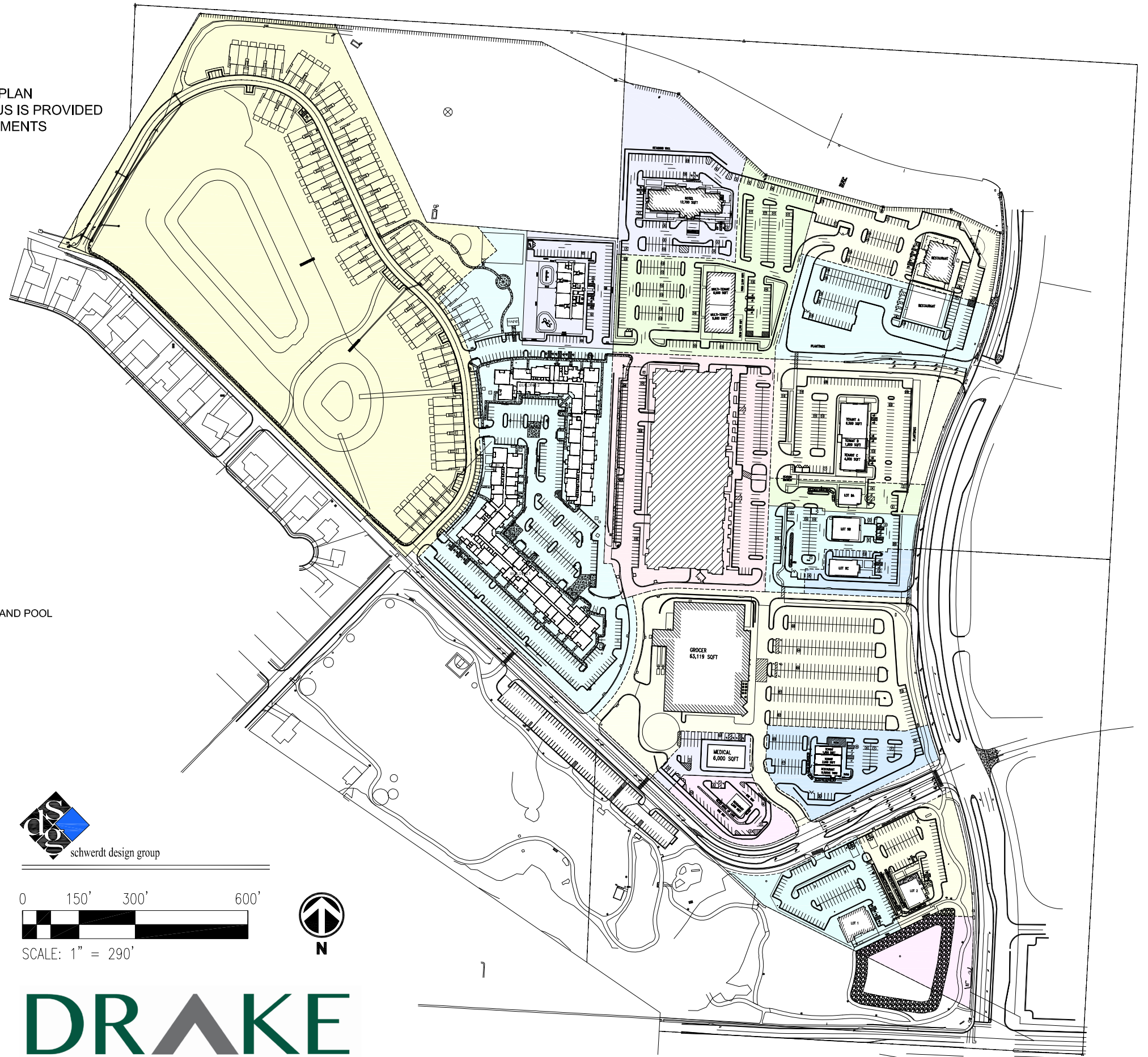
**PARCEL 12:** FREE STANDING MULTI TENANT RESTAURANT ( PARCEL 108,275 SQFT = 2.49 ACRES )  
- FULL SERVICE DINE-IN RESTAURANTS WITH PATIO & SURFACE PARKING  
- COMMON WALL MULTI-TENANT BUILDING

**PARCEL 13:** MULTI-TENANT ( PARCEL 162,155 SQFT = 3.72 ACRES )  
- 12,000 SQFT MULTI-TENANT ( 6,500 SQFT / 5,500 SQFT ) WITH 255 SURFACE PARKING STALLS

**PARCEL 14:** HOTEL ( PARCEL 127,789 SQFT = 2.93 ACRES )  
- HOTEL WITH 102 SURFACE PARKING STALLS

**PARCEL 15:** POND/ WATER FEATURE ( PARCEL 44,366 SQFT = 1.02 ACRES )  
- WATER FEATURE

**PARCEL 16:** SINGLE FAMILY RESIDENTIAL ( PARCEL 1,051,916 SQFT = 24.1 ACRES )  
- SINGLE FAMILY LOTS SURROUNDING WATER FEATURE



SCALE: 1" = 290'



2023 Proposed Site Plan



# Trip Generation - Changed Parcels

Parcel #	Phase #	Proposed Land Use	Dwelling Units or Rooms	Building Size (ft <sup>2</sup> )	ITE Land Use Code	2023 Study Update						From 2020 Study Update							
						Daily Trips	AM Peak Hour			PM Peak Hour			Daily Trips	AM Peak Hour			PM Peak Hour		
							Entering	Exiting	Total	Entering	Exiting	Total		Entering	Exiting	Total	Entering	Exiting	Total
1	1	Sit down restaurant		6500	932	697				36	23	59	729				39	24	63
2	1	Fast food restaurant w/drive through window		6500	934	3039	148	142	290	112	103	215	1507	66	63	129	54	50	104
3	1	Fast food restaurant w/drive through window		4100	934	1917	93	90	183	71	65	136	2190	95	92	187	79	73	152
3	1	Strip retail plaza		1600	822	297	5	4	9	10	11	21	457	95	58	153	16	17	33
4	1	Fast food restaurant w/drive through window		2000	934	935	45	44	89	34	32	66	326	12	12	24	15	15	30
5	1	Medical Building		6000	630	226	14	3	17	7	15	22	248	19	5	24	6	15	21
7	4	Apartments (low-rise)	188		220	1281	19	62	81	64	38	102	1001	16	46	62	49	31	80
7a	4	Hotel	80		310	444	18	15	33	16	15	31							
16	4	Apartments (villa)	83		220	607	12	37	49	35	21	56	587	9	31	40	32	19	51
9a	3	Bank		2585	911		30	28	58	14	17	31	897				48	30	78
9b	3	Cava (high-turnover restaurant)		2558	932	274				14	9	23	674	95	58	153	24	26	50
9b	3	Scissors and Scotch (hair salon)		1804	918		1	1	2	1	2	3							
9c	3	Bank		3245	911		38	35	73	17	22	39							
11	2	Car wash	2		948					78	77	155	954				51	32	83
12	2	Restaurant		7000	932	750				38	25	63	954				51	32	83
13	2	Restaurant		7000	932	750				38	25	63							
13	2	Restaurant		5000	932	536				27	18	45	841				45	28	73
14	2	Hotel	80		310	444	18	15	33	16	15	31	1290				84	51	135
<b>Total</b>						12197	441	476	917	628	533	1161	12655	407	365	772	593	443	1036

### Trip End Comparison - Changed Parcels

	Daily Trips	AM Entering	AM Exiting	AM Total	PM Entering	PM Exiting	PM Total
<b>2020 Study Update</b>	12655	407	365	772	593	443	1036
<b>2023 Study Update</b>	12197	441	476	917	628	533	1161
<b>Difference</b>	-458	34	111	145	35	90	125
<b>% Change</b>	-3.6%	8.4%	30.4%	18.8%	5.9%	20.3%	12.1%

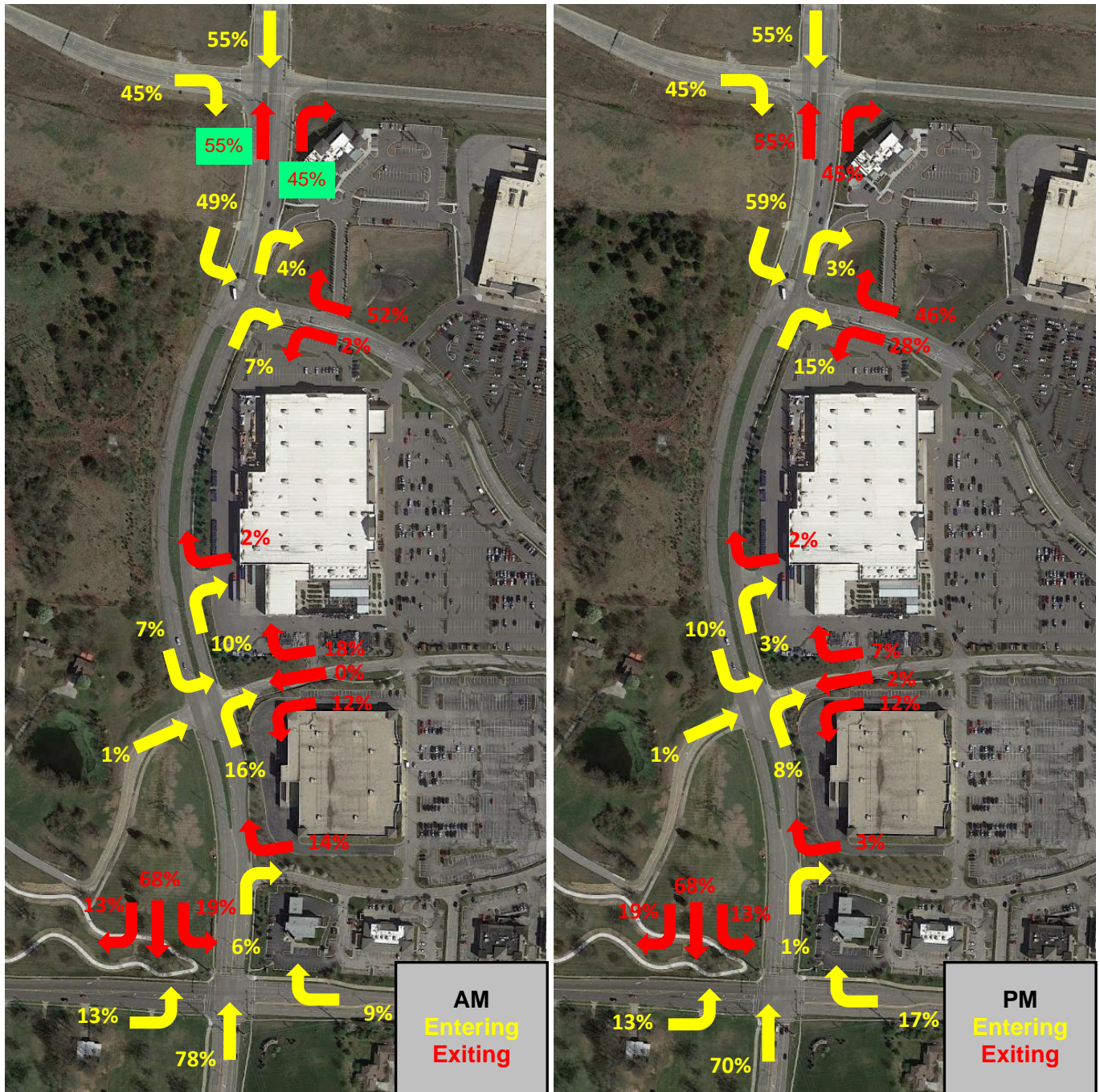
Note: 2020 numbers were taken from the 2020 TIS Update. Numbers in red were adjusted to show the correct summation.



# Trip Generation Differences by Parcel

						2023 Study Update						
Parcel #	Phase #	Proposed Land Use	Dwelling Units or Rooms	Building Size (ft <sup>2</sup> )	ITE Land Use Code	Daily Trips	AM Peak Hour			PM Peak Hour		
							Entering Diff	Exiting Diff	Total Diff	Entering Diff	Exiting Diff	Total Diff
1	1	Sit down restaurant		6500	932	697	0	0	0	-3	-1	-4
2	1	Fast food restaurant w/drive through window		6500	934	3039	82	79	161	58	53	111
3	1	Fast food restaurant w/drive through window		4100	934	1917	-2	-2	-4	-8	-8	-16
3	1	Strip retail plaza		1600	822	297	-90	-54	-144	-6	-6	-12
4	1	Fast food restaurant w/drive through window		2000	934	935	33	32	65	19	17	36
5	1	Medical Building		6000	630	226	-5	-2	-7	1	0	1
7	4	Apartments (low-rise)	188		220	1281	3	16	19	15	7	22
7a	4	Hotel	80		310	444	18	15	33	16	15	31
16	4	Apartments (villa)	83		220	607	3	6	9	3	2	5
9a	3	Bank		2585	911		30	28	58	-34	-13	-47
9b	3	Cava (high-turnover restaurant)		2558	932	274	-95	-58	-153	-10	-17	-27
9b	3	Scissors and Scotch (hair salon)		1804	918		1	1	2	1	2	3
9c	3	Bank		3245	911		38	35	73	17	22	39
11	2	Car wash	2		948		0	0	0	27	45	72
12	2	Restaurant		7000	932	750	0	0	0	-13	-7	-20
13	2	Restaurant		7000	932	750	0	0	0	38	25	63
13	2	Restaurant		5000	932	536	0	0	0	-18	-10	-28
14	2	Hotel	80		310	444	18	15	33	-68	-36	-104
<b>Total</b>						<b>12197</b>	<b>34</b>	<b>111</b>	<b>145</b>	<b>35</b>	<b>90</b>	<b>125</b>

Existing Trip Distribution into the Existing Summit Woods Crossing  
Development and Along Pryor Road Corridor



**Exhibit 4 - Existing Summit Woods Traffic Distribution**

Estimated Phase 1 Traffic Distribution

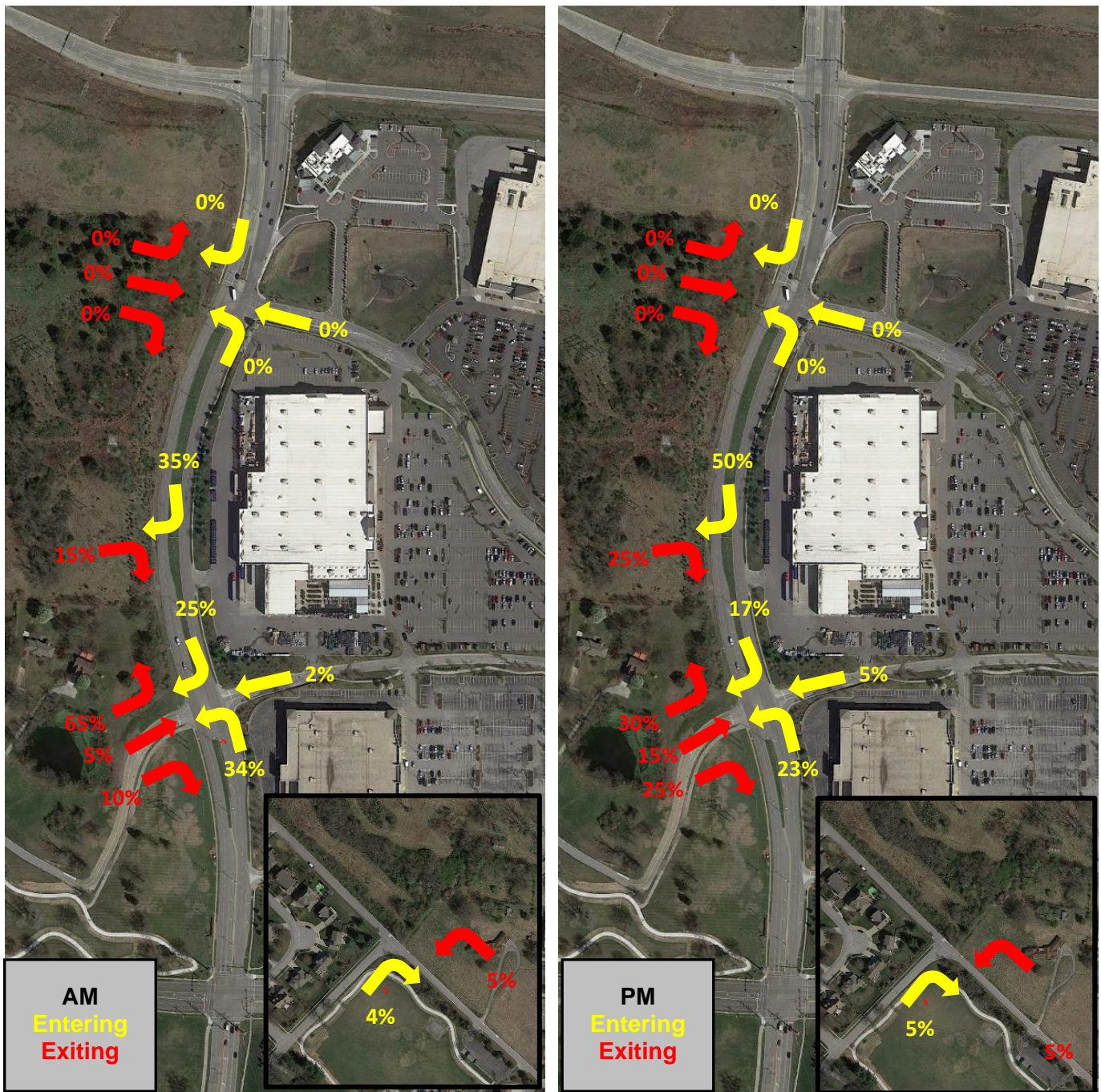


Exhibit 4 - Phase One Traffic Distribution

Estimated Phase Two Traffic Distribution

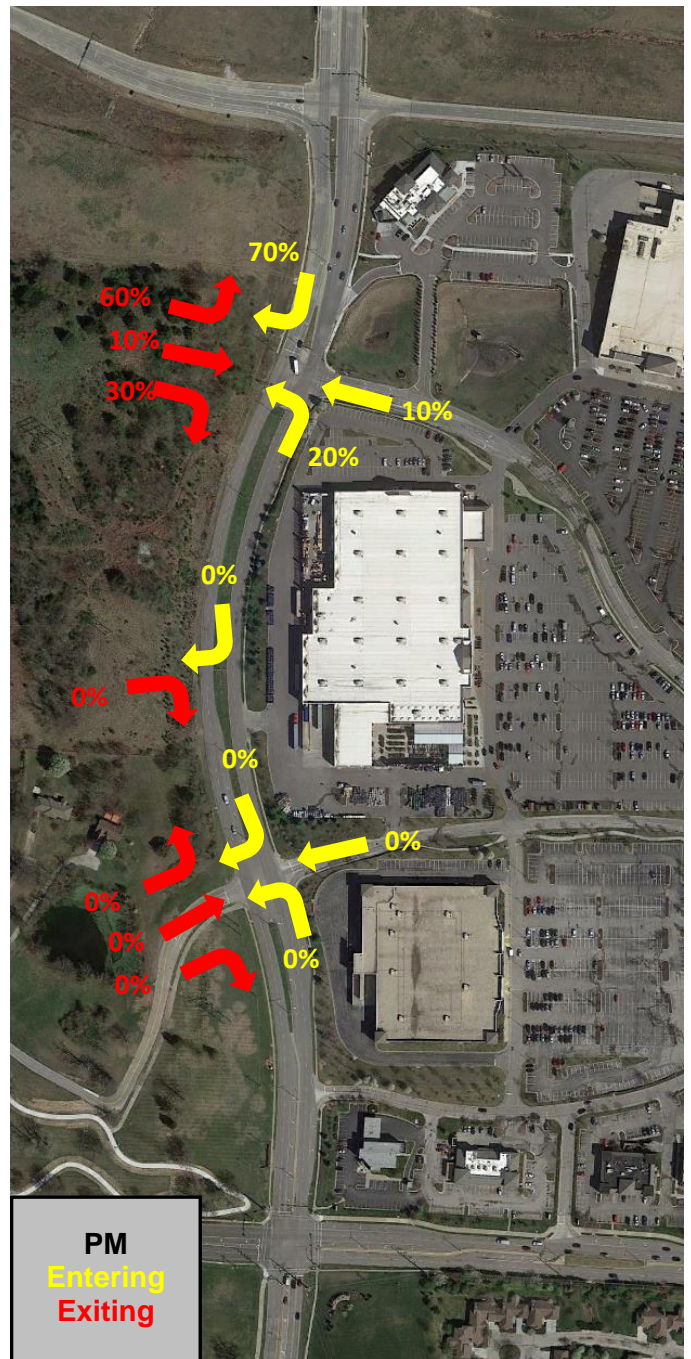
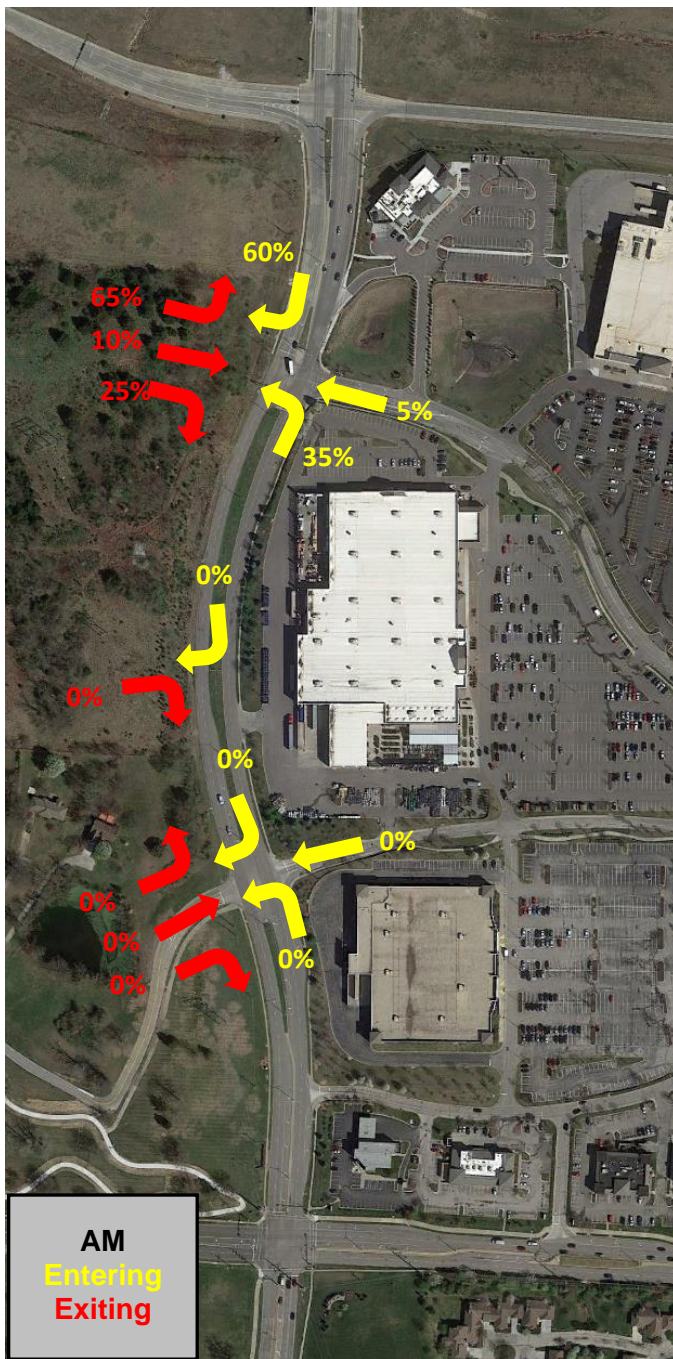
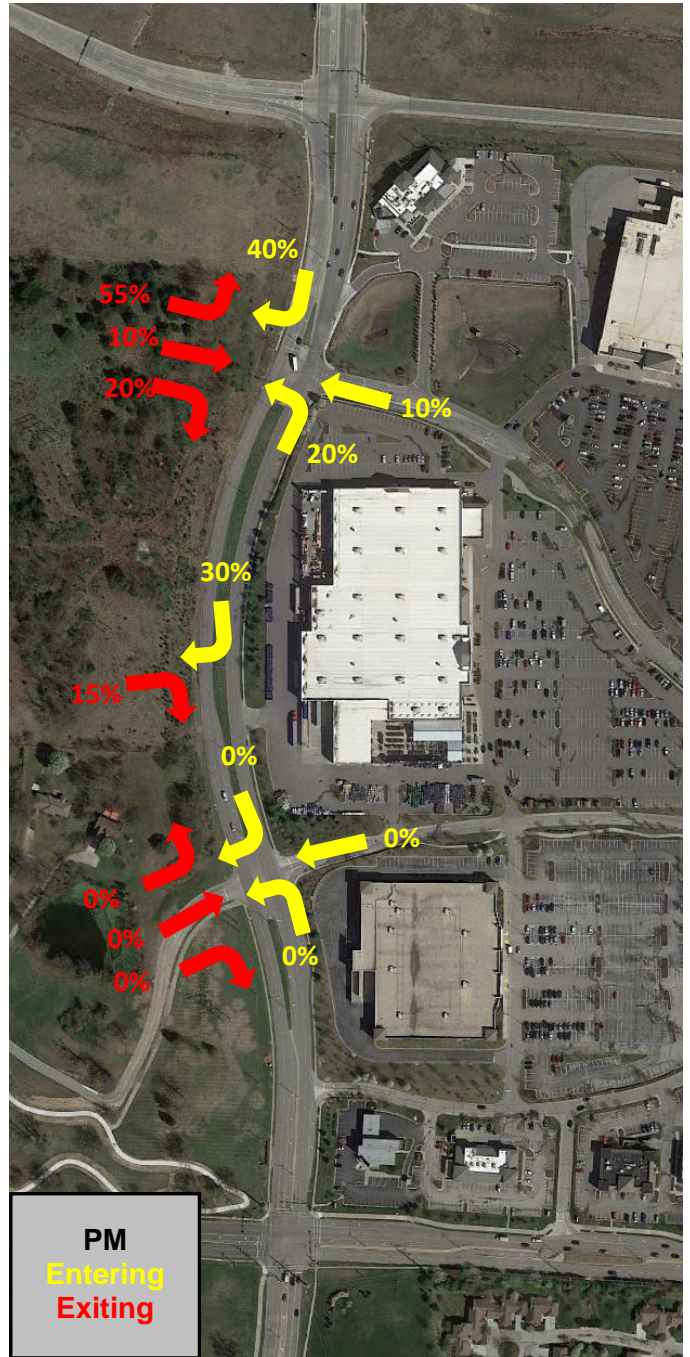
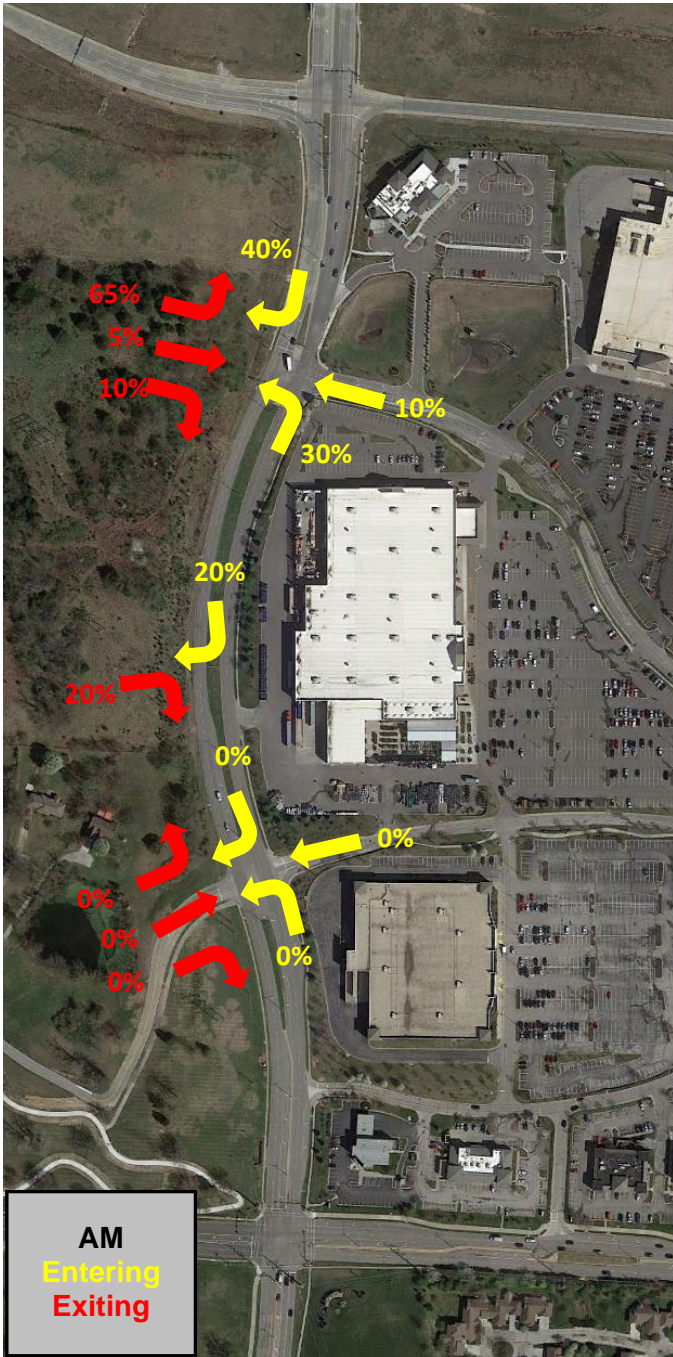


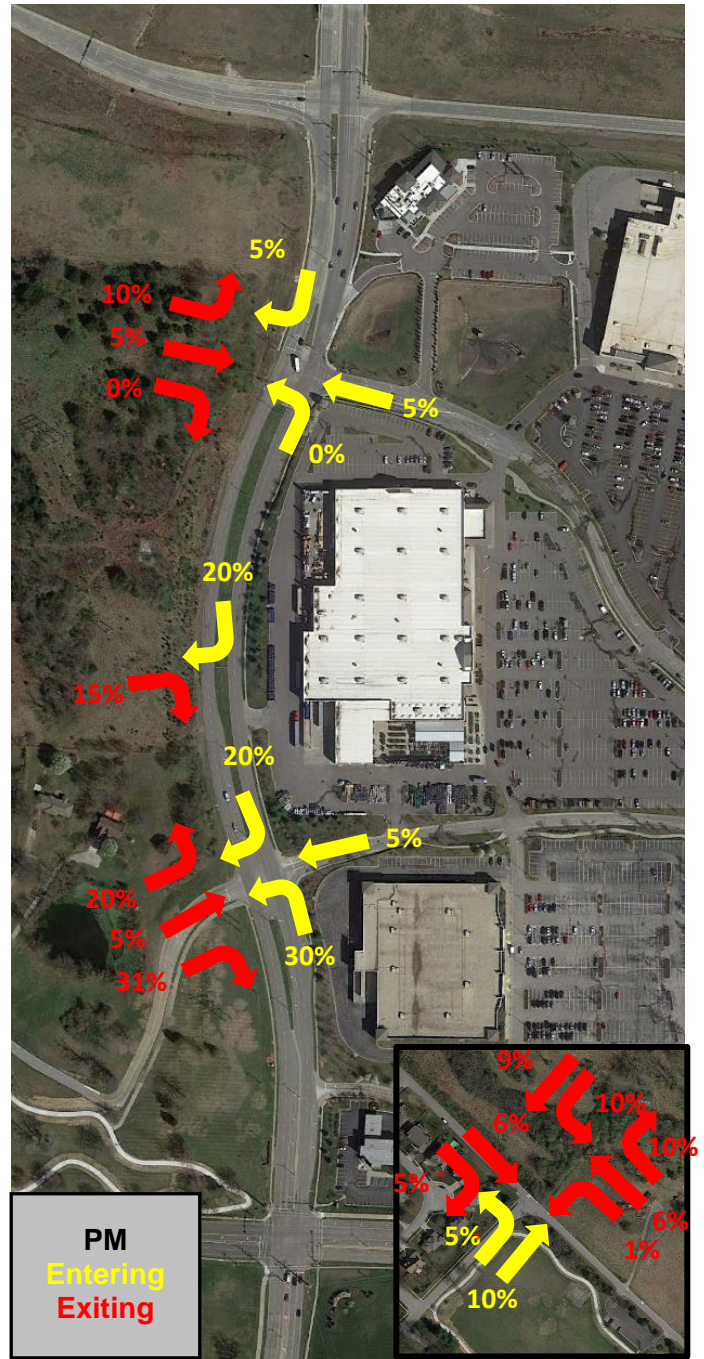
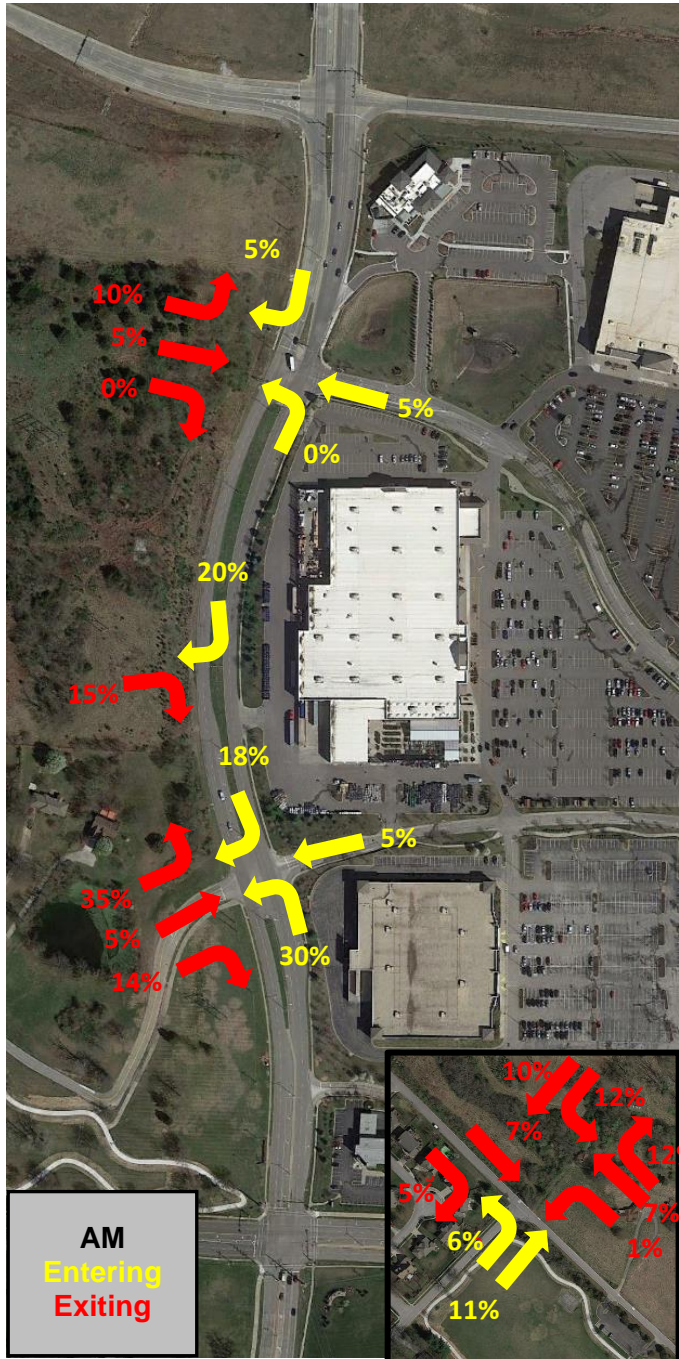
Exhibit 4 - Phase Two Traffic Distribution

Estimated Phase Three Traffic Distribution



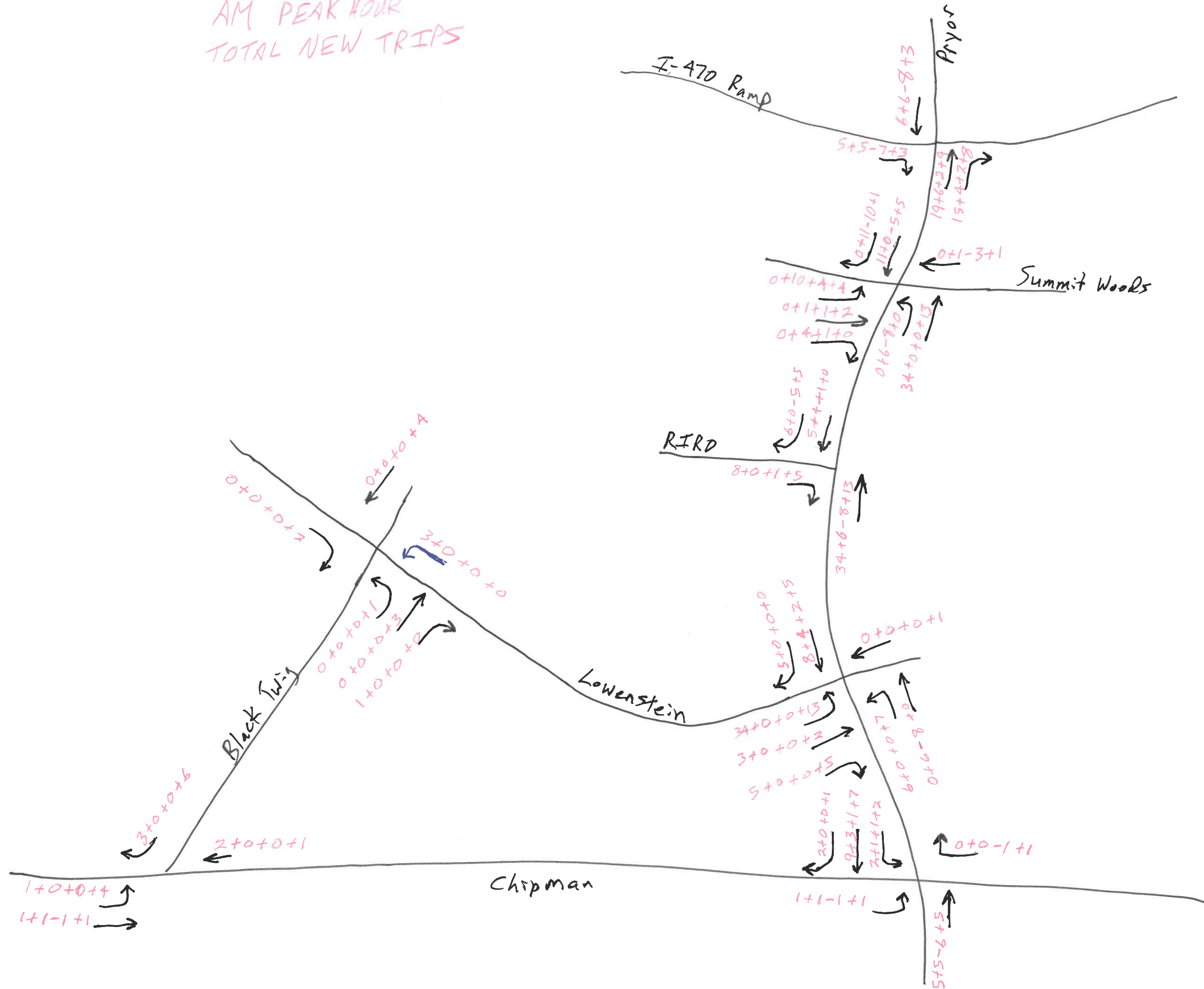
**Exhibit 4 - Phase Three Traffic Distribution**

Estimated Phases Four & Five Traffic Distribution

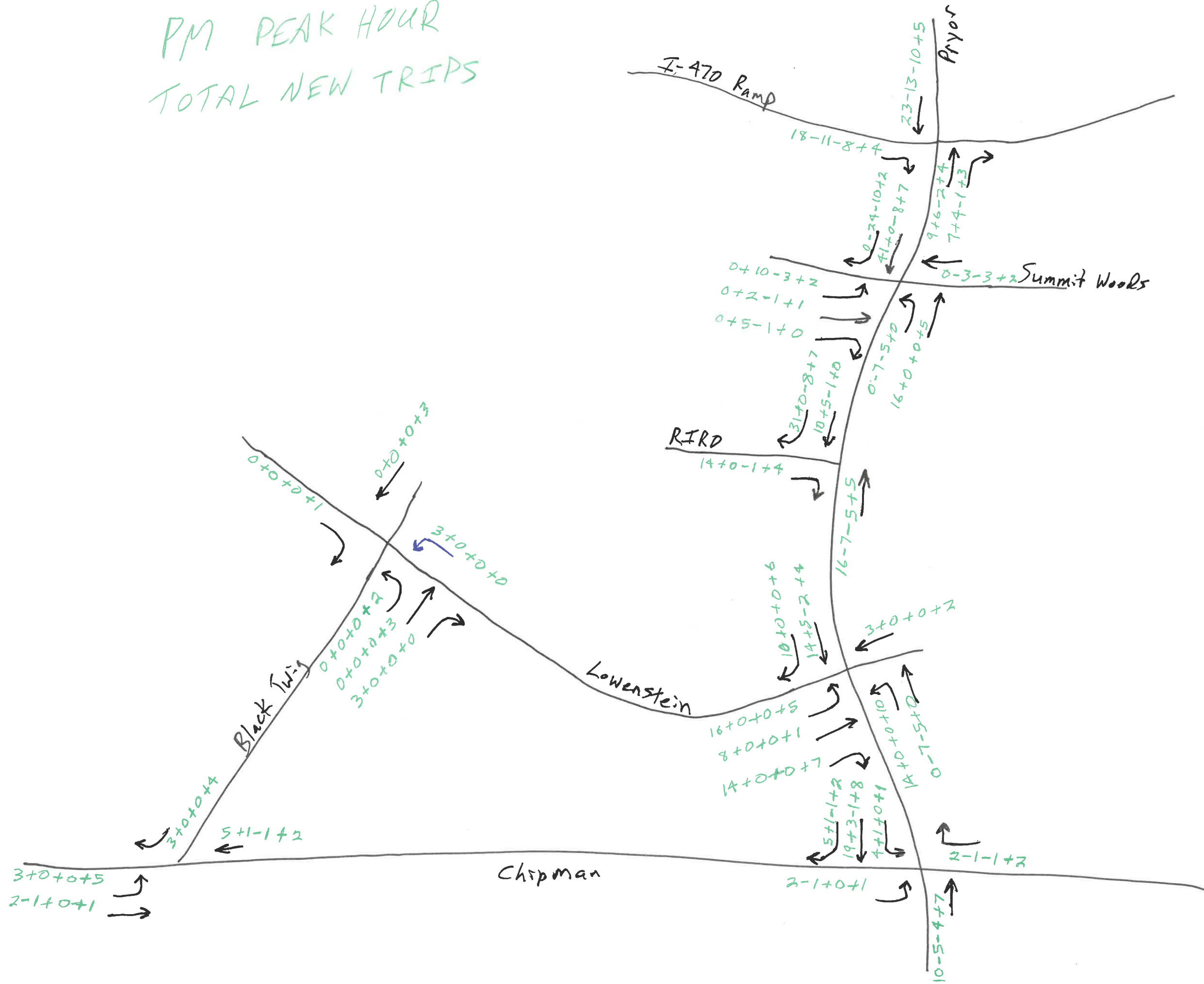


**Exhibit 4 - Phase Four & Five Traffic Distribution**

AM PEAK HOUR  
TOTAL NEW TRIPS



PM PEAK HOUR  
TOTAL NEW TRIPS





Overall Layout

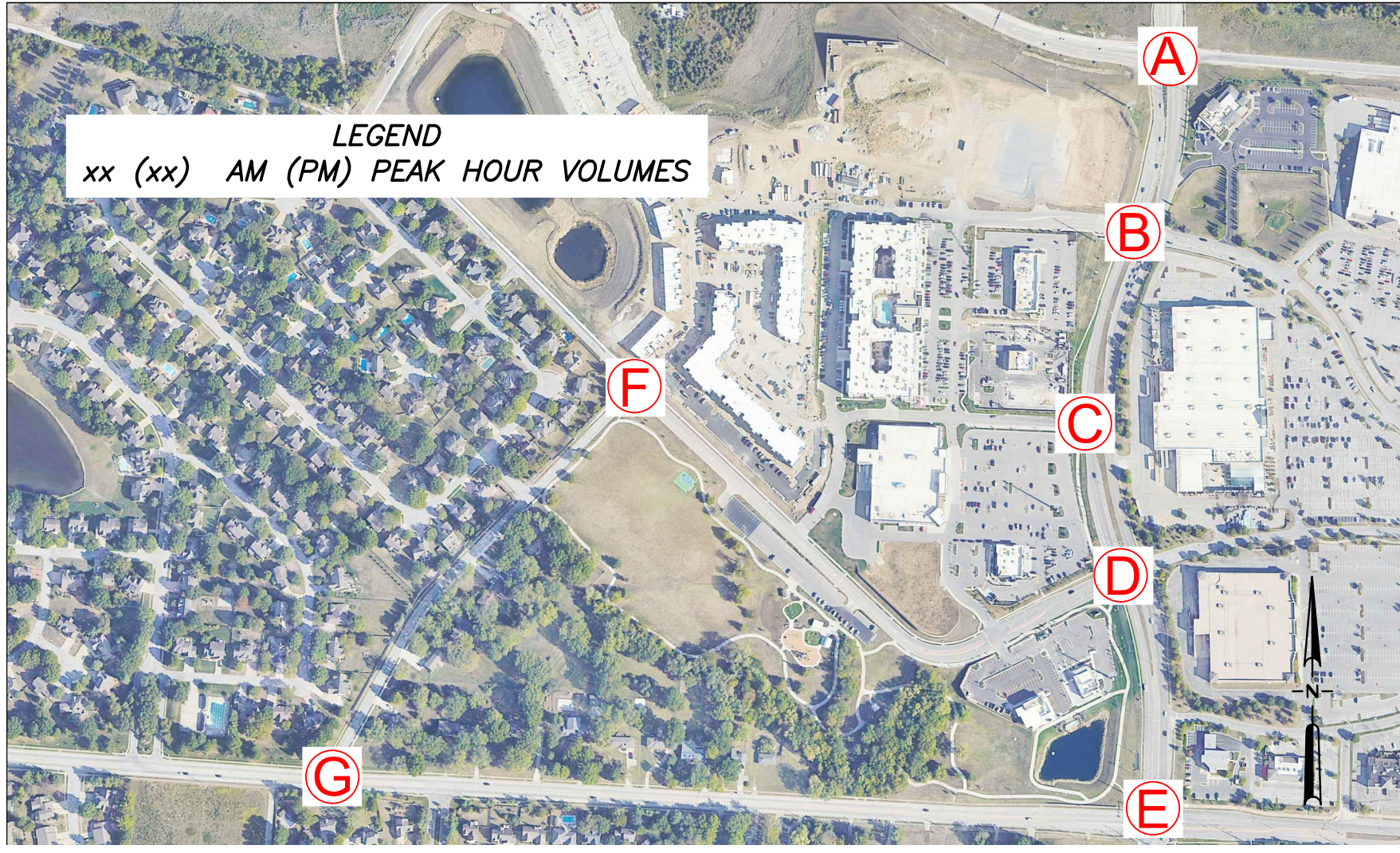


Exhibit A

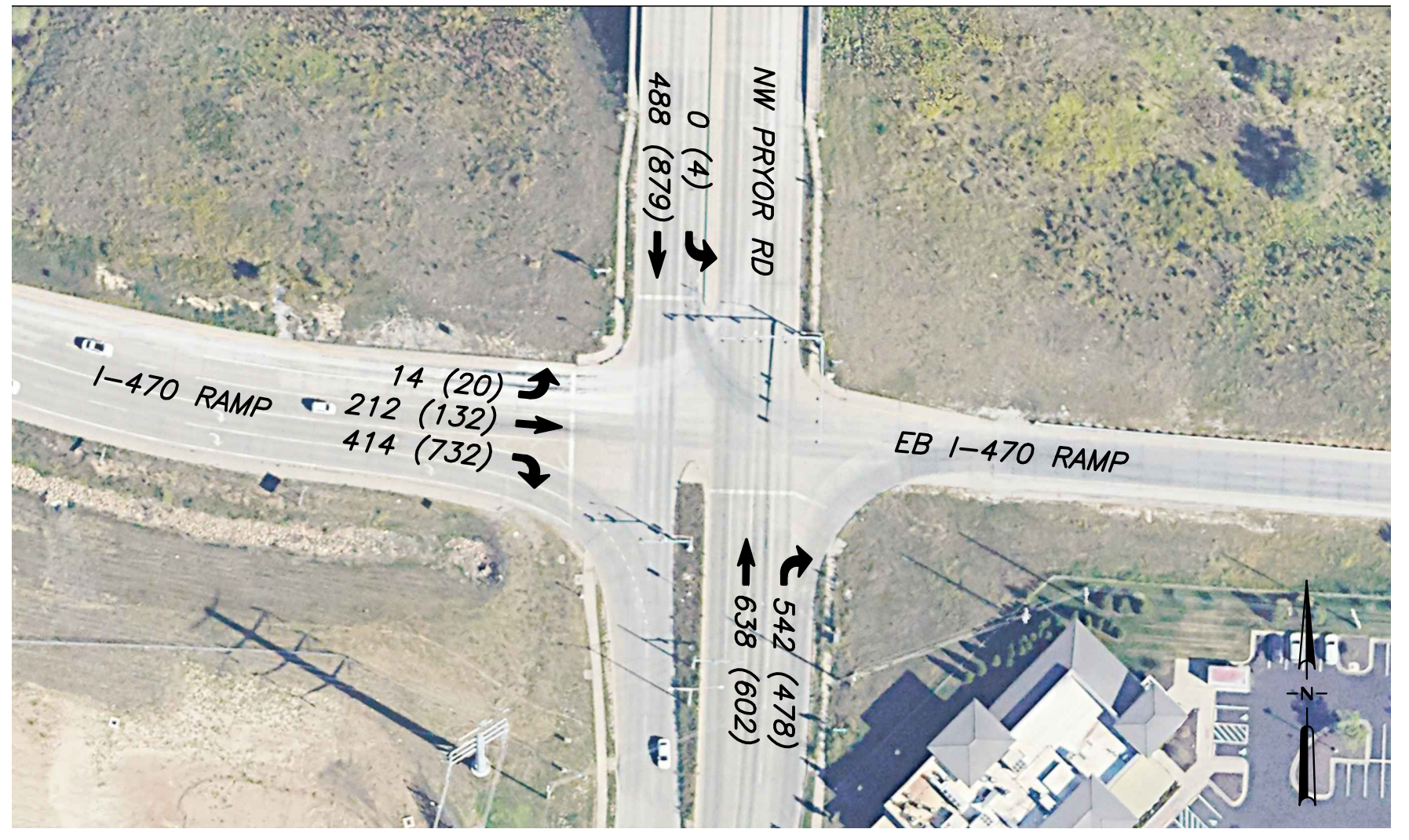


Exhibit B

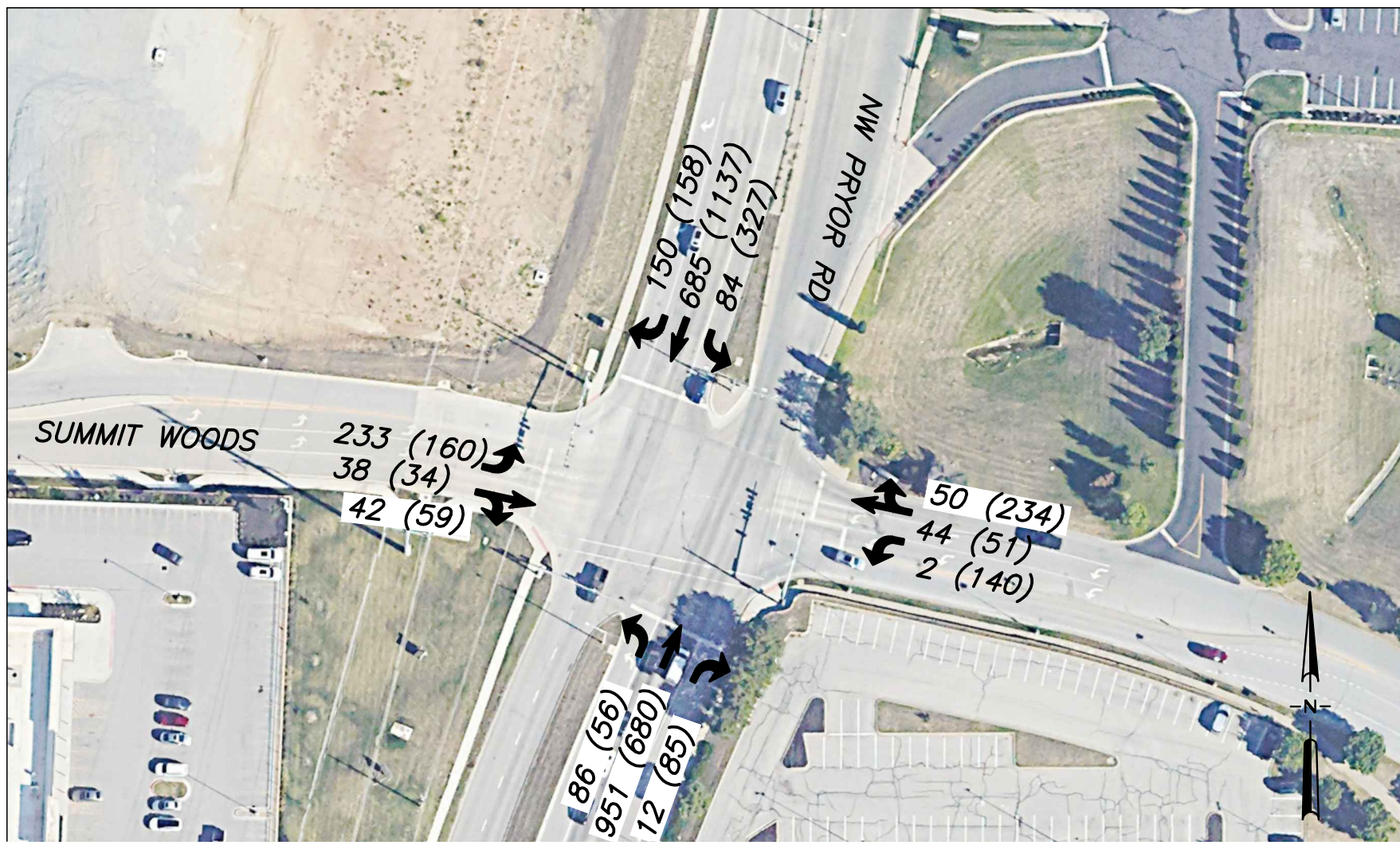


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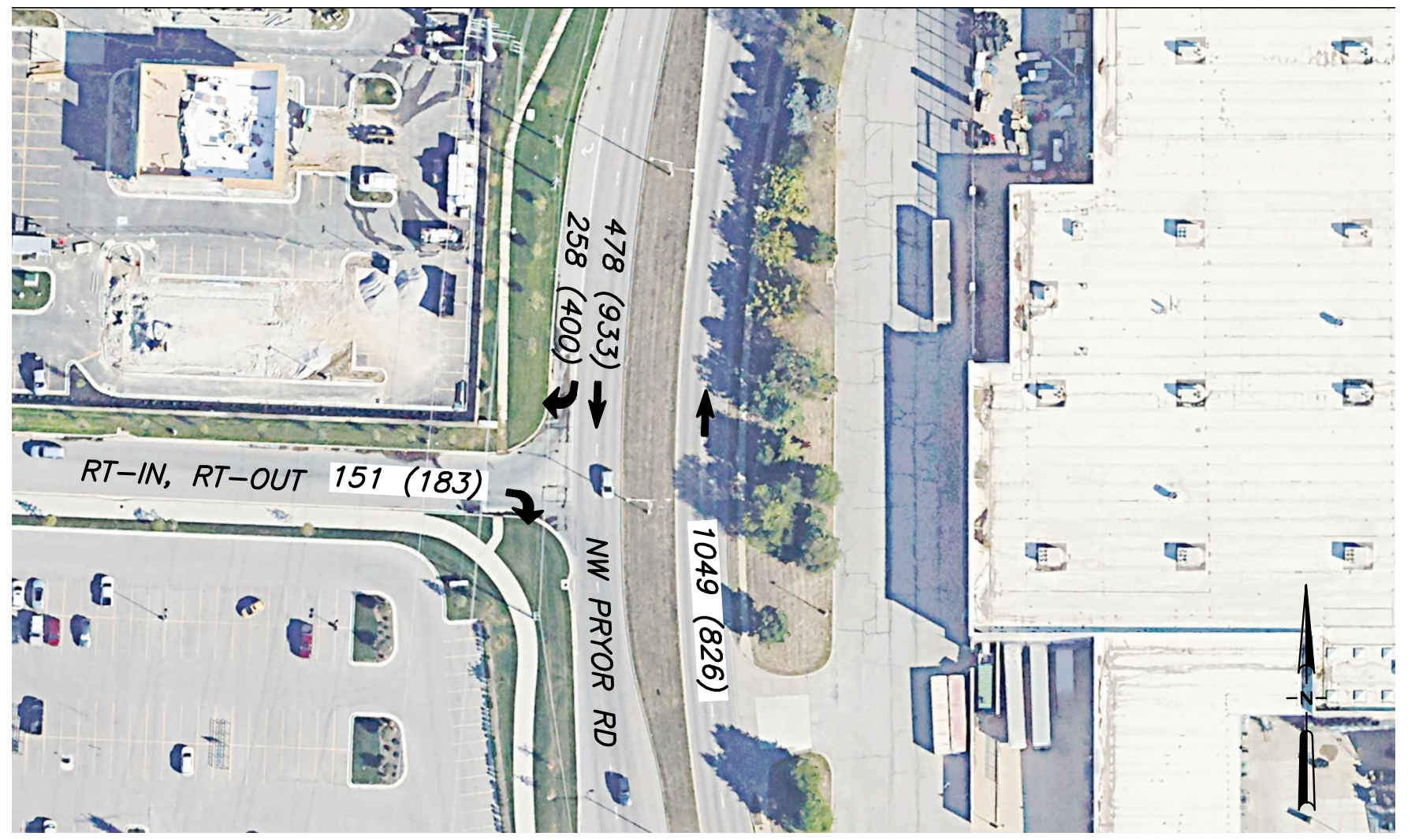


Exhibit D

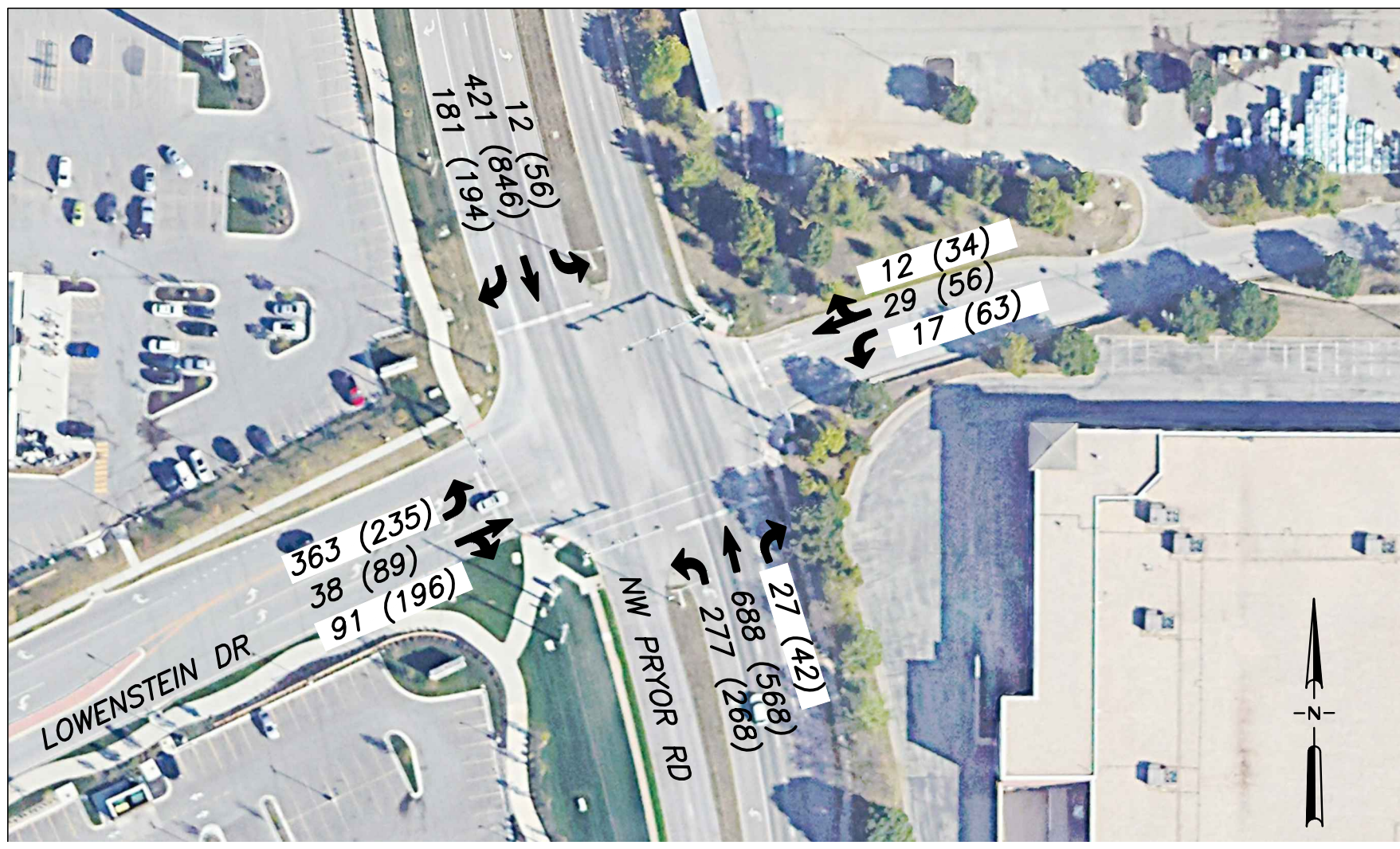


Exhibit E

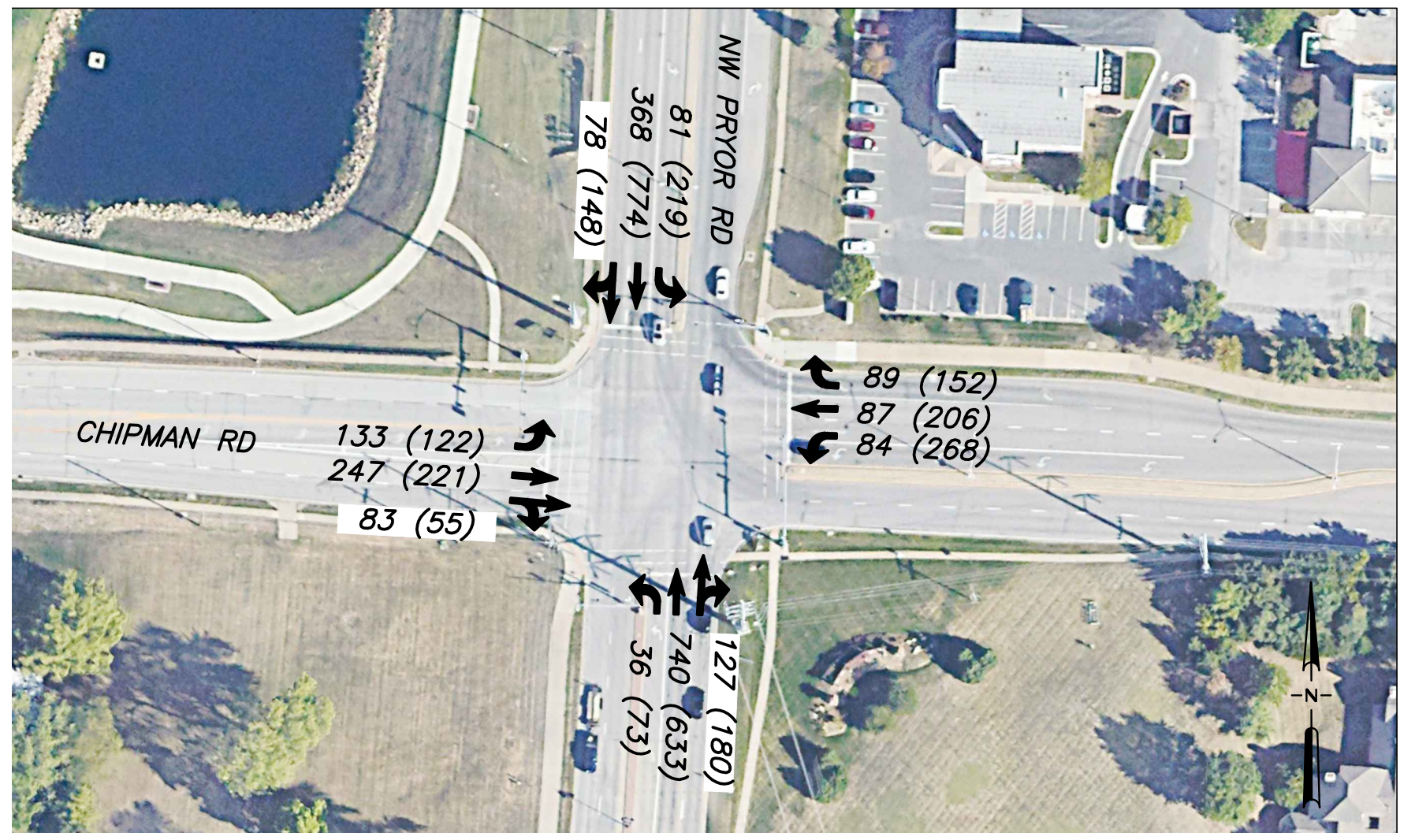


Exhibit F

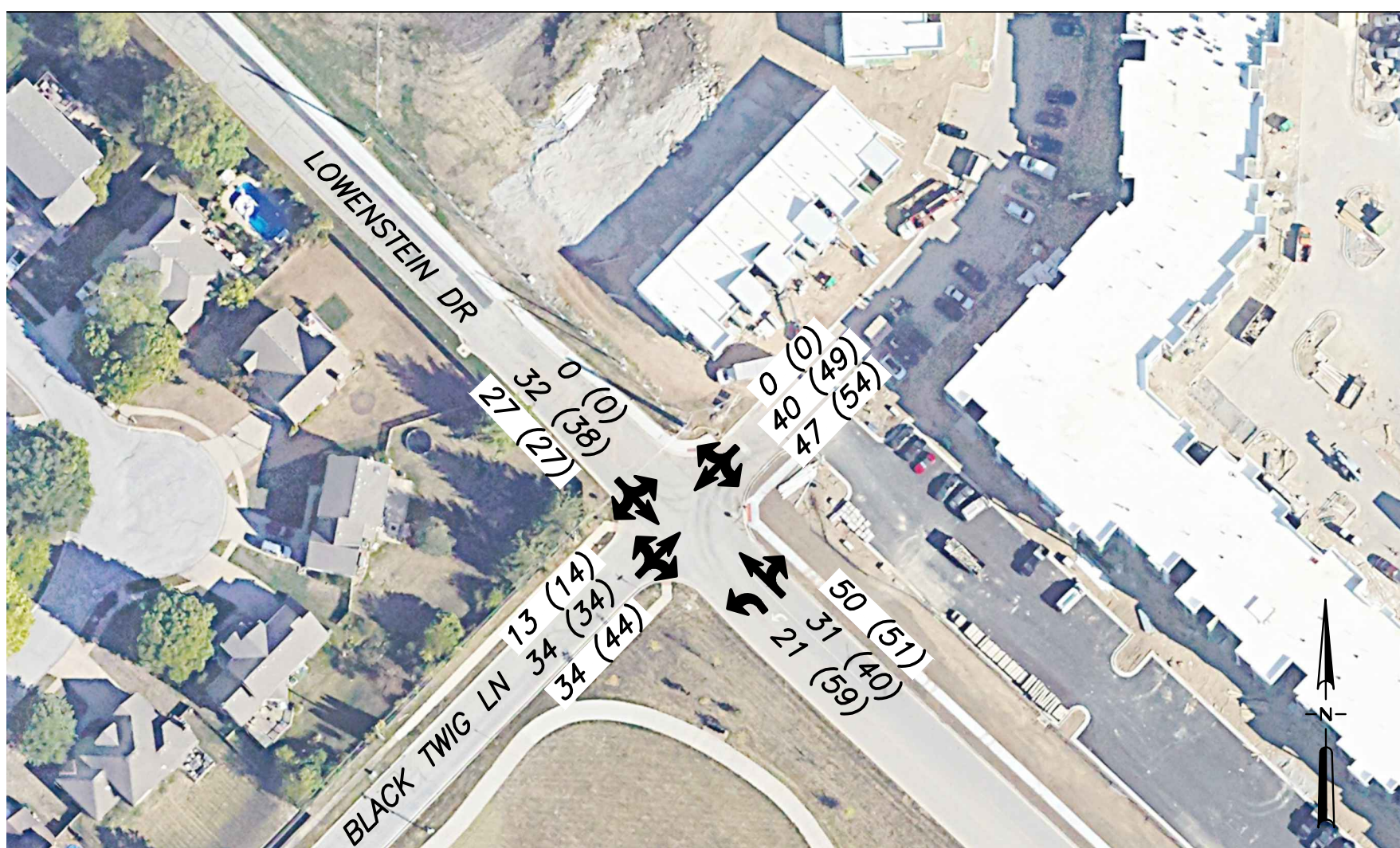
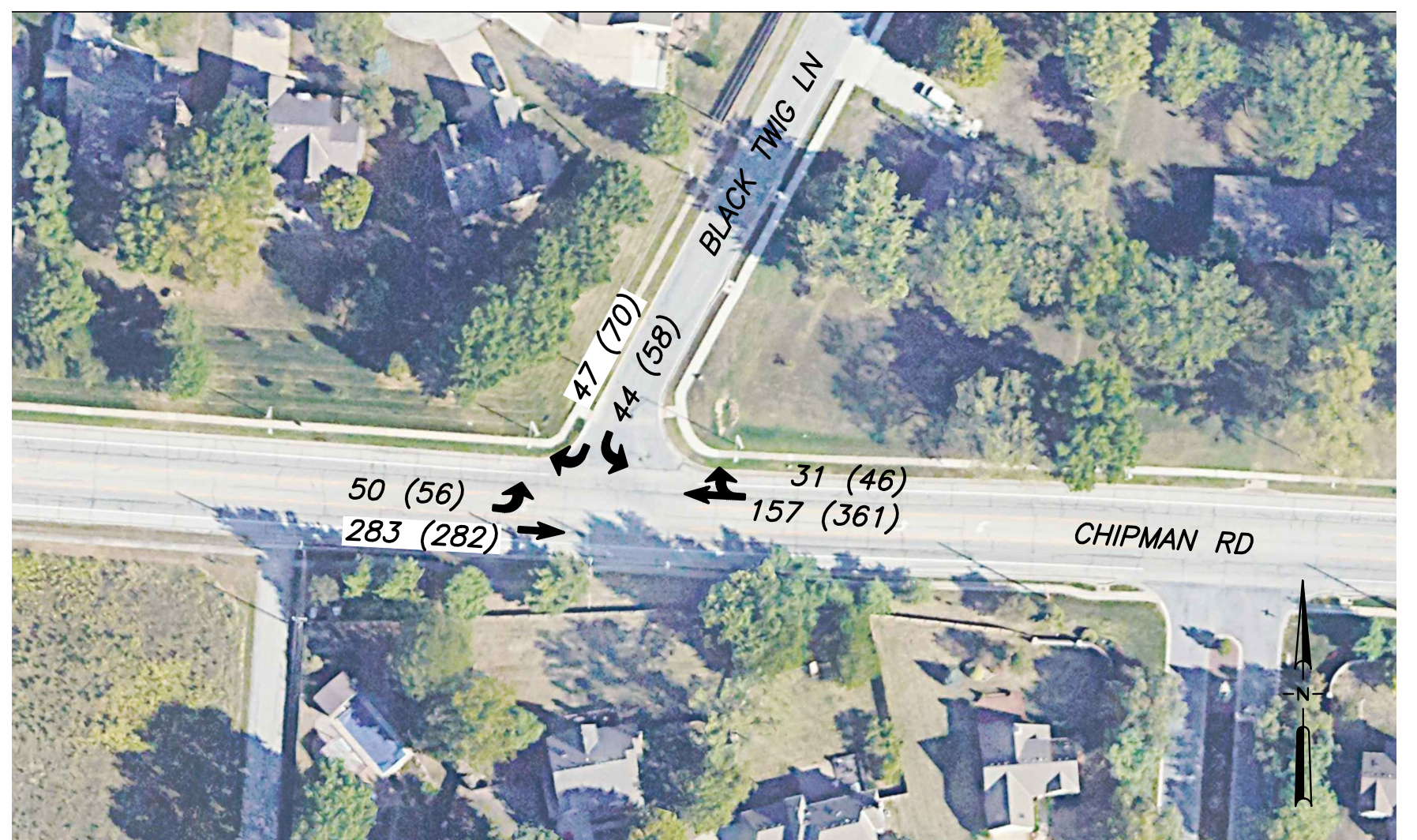


Exhibit G



# Warrants Summary Report

## 1: Chipman Road & Black Twig Lane

### Intersection Information:

	Major Street	Minor Street
Street Name	-	Black Twig Lane
Direction		EB/WB/SB
Number of Lanes	1	2
Approach Speed	-	35

Warrant	Met?	Notes
<b>Warrant 1, Eight-Hour Vehicular Volume</b>		
	No	
Condition A or B Met?	No	0 Hours met (8 required)
Condition A and B Met?	No	0 Hours met (8 required)
<b>Warrant 2, Four-Hour Vehicular Volume</b>		
	No	0 Hours met (4 required)
<b>Warrant 3, Peak Hour</b>		
	No	
Condition A Met?	No	0 Hours met (1 required)
Condition B Met?	No	0 Hours met (1 required)
<b>Warrant 4, Pedestrian Volume</b>		
	No	
Condition A Met?	No	0 Hours met (4 required)
Condition B Met?	No	0 Hours met (1 required)
<b>Warrant 5, School Crossing</b>		
	No	

**Warrant 6, Coordinated Signal System**

No

**Warrant 7, Crash Experience**

No

Traffic Volume Cond.? No 0 Hours met (8 required)

Ped Condition? No 0 Hours met (8 required)

**Warrant 8, Roadway Network**

No

**Warrant 9, Intersection Near a Grade Crossing**

No

**AWSC Warrant, Multiway Stop Application**

No

Condition A Met? No

Condition B Met? No

Condition C Met? No

# Warrant 1: Eight-hour Vehicular Volume

## 1: Chipman Road & Black Twig Lane

### Intersection Information:

Major Street Name: -  
 Major Street Direction:  
 Minor Street Direction: EB/WB/SB

**WARRANT 1 MET? No**

### Details:

Condition A Met? **No** 0 Hours met (8 required) at 100%  
 Condition B Met? **No** 0 Hours met (8 required) at 100%

Hour	Major Street Vehicles (Total of Both Approaches)	High Volume Minor Approach Vehicles	100% Standard Met? Cond. A OR Cond. B		80% Standard Met? Cond. A AND Cond. B	
			Condition A 100% Column	Condition B 100% Column	Condition A 80% Column	Condition B 80% Column
<b>07:30 to 08:30</b>	<b>0</b>	<b>333</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>
Condition A	Volume >= 100% column (500)?	<b>No</b>	Volume >= 100% column (200)?	<b>Yes</b>		
	Volume >= 80% column (400)?	<b>No</b>	Volume >= 80% column (160)?	<b>Yes</b>		
Condition B	Volume >= 100% column (750)?	<b>No</b>	Volume >= 100% column (100)?	<b>Yes</b>		
	Volume >= 80% column (600)?	<b>No</b>	Volume >= 80% column (80)?	<b>Yes</b>		
<b>07:45 to 08:45</b>	<b>0</b>	<b>251</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>
Condition A	Volume >= 100% column (500)?	<b>No</b>	Volume >= 100% column (200)?	<b>Yes</b>		
	Volume >= 80% column (400)?	<b>No</b>	Volume >= 80% column (160)?	<b>Yes</b>		
Condition B	Volume >= 100% column (750)?	<b>No</b>	Volume >= 100% column (100)?	<b>Yes</b>		
	Volume >= 80% column (600)?	<b>No</b>	Volume >= 80% column (80)?	<b>Yes</b>		
<b>08:00 to 09:00</b>	<b>0</b>	<b>168</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>
Condition A	Volume >= 100% column (500)?	<b>No</b>	Volume >= 100% column (200)?	<b>No</b>		
	Volume >= 80% column (400)?	<b>No</b>	Volume >= 80% column (160)?	<b>Yes</b>		
Condition B	Volume >= 100% column (750)?	<b>No</b>	Volume >= 100% column (100)?	<b>Yes</b>		
	Volume >= 80% column (600)?	<b>No</b>	Volume >= 80% column (80)?	<b>Yes</b>		
<b>08:15 to 09:15</b>	<b>0</b>	<b>84</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>
Condition A	Volume >= 100% column (500)?	<b>No</b>	Volume >= 100% column (200)?	<b>No</b>		
	Volume >= 80% column (400)?	<b>No</b>	Volume >= 80% column (160)?	<b>No</b>		
Condition B	Volume >= 100% column (750)?	<b>No</b>	Volume >= 100% column (100)?	<b>No</b>		
	Volume >= 80% column (600)?	<b>No</b>	Volume >= 80% column (80)?	<b>Yes</b>		

<b>17:00 to 18:00</b>		<b>0</b>	<b>407</b>		<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>
Condition A	Volume >= 100% column (500)?	<b>No</b>	Volume >= 100% column (200)?	<b>Yes</b>				
	Volume >= 80% column (400)?	<b>No</b>	Volume >= 80% column (160)?	<b>Yes</b>				
Condition B	Volume >= 100% column (750)?	<b>No</b>	Volume >= 100% column (100)?	<b>Yes</b>				
	Volume >= 80% column (600)?	<b>No</b>	Volume >= 80% column (80)?	<b>Yes</b>				

<b>17:15 to 18:15</b>		<b>0</b>	<b>306</b>		<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>
Condition A	Volume >= 100% column (500)?	<b>No</b>	Volume >= 100% column (200)?	<b>Yes</b>				
	Volume >= 80% column (400)?	<b>No</b>	Volume >= 80% column (160)?	<b>Yes</b>				
Condition B	Volume >= 100% column (750)?	<b>No</b>	Volume >= 100% column (100)?	<b>Yes</b>				
	Volume >= 80% column (600)?	<b>No</b>	Volume >= 80% column (80)?	<b>Yes</b>				

<b>17:30 to 18:30</b>		<b>0</b>	<b>205</b>		<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>
Condition A	Volume >= 100% column (500)?	<b>No</b>	Volume >= 100% column (200)?	<b>Yes</b>				
	Volume >= 80% column (400)?	<b>No</b>	Volume >= 80% column (160)?	<b>Yes</b>				
Condition B	Volume >= 100% column (750)?	<b>No</b>	Volume >= 100% column (100)?	<b>Yes</b>				
	Volume >= 80% column (600)?	<b>No</b>	Volume >= 80% column (80)?	<b>Yes</b>				

<b>17:45 to 18:45</b>		<b>0</b>	<b>103</b>		<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>
Condition A	Volume >= 100% column (500)?	<b>No</b>	Volume >= 100% column (200)?	<b>No</b>				
	Volume >= 80% column (400)?	<b>No</b>	Volume >= 80% column (160)?	<b>No</b>				
Condition B	Volume >= 100% column (750)?	<b>No</b>	Volume >= 100% column (100)?	<b>Yes</b>				
	Volume >= 80% column (600)?	<b>No</b>	Volume >= 80% column (80)?	<b>Yes</b>				

# Warrant 2: Four-hour Vehicular Volume

## 1: Chipman Road & Black Twig Lane

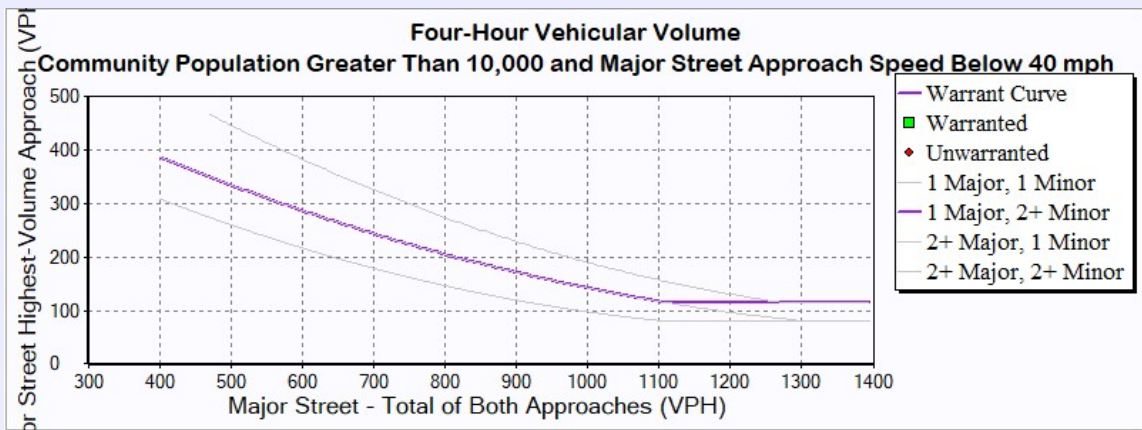
### Intersection Information:

Major Street		Minor Street
Street Name	-	Black Twig Lane
Direction		EB/WB/SB
Number of Lanes	1	2
Approach Speed	0	35

Warrant 2 Met? **No**

### Details:

Notes	0 Hours met (4 required)
Low population?	<b>No</b>



### Hourly Volumes

Hour	Major Street Total All Approaches (vph)	Minor Street Highest Volume Approach (vph)
00:00:00 - 01:00:00	0.00	0.00
01:00:00 - 02:00:00	0.00	0.00
02:00:00 - 03:00:00	0.00	0.00
03:00:00 - 04:00:00	0.00	0.00
04:00:00 - 05:00:00	0.00	0.00
05:00:00 - 06:00:00	0.00	0.00
06:00:00 - 07:00:00	0.00	0.00
07:00:00 - 08:00:00	0.00	165.00
08:00:00 - 09:00:00	0.00	168.00
09:00:00 - 10:00:00	0.00	0.00
10:00:00 - 11:00:00	0.00	0.00
11:00:00 - 12:00:00	0.00	0.00
12:00:00 - 13:00:00	0.00	0.00
13:00:00 - 14:00:00	0.00	0.00
14:00:00 - 15:00:00	0.00	0.00
15:00:00 - 16:00:00	0.00	0.00
16:00:00 - 17:00:00	0.00	0.00
17:00:00 - 18:00:00	0.00	407.00
18:00:00 - 19:00:00	0.00	0.00
19:00:00 - 20:00:00	0.00	0.00
20:00:00 - 21:00:00	0.00	0.00
21:00:00 - 22:00:00	0.00	0.00
22:00:00 - 23:00:00	0.00	0.00
23:00:00 - 00:00:00	0.00	0.00

### Warranted Volumes

Hour	Major Street Total All Approaches (vph)	Minor Street Highest Volume Approach (vph)

# Warrant 3: Peak Hour

## 1: Chipman Road & Black Twig Lane

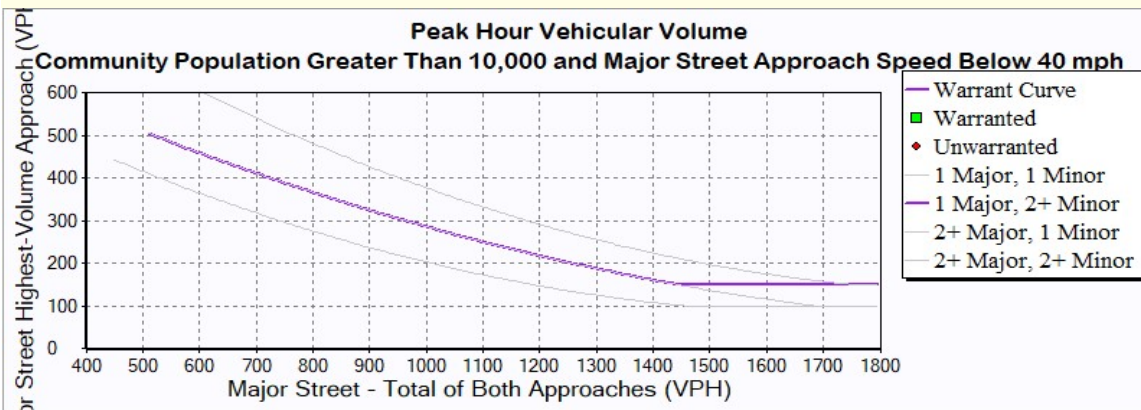
### Intersection Information:

	Major Street	Minor Street
Street Name	-	Black Twig Lane
Direction		EB/WB/SB
Number of Lanes	1	2
Approach Speed	0	35

Warrant 3 Met? **No**

### Details

Low Population?	<b>No</b>		
Condition A Met?	<b>No</b>	Condition B Met?	<b>No</b>
Notes	0 Hours met (1 required)	Notes	0 Hours met (1 required)
Minor Approach Time Delay Condition Met?	<b>Not Met</b>		
Minor Approach Volume Condition Met?	<b>Met</b>		
Total Entering Intersection Volume Condition Met?	<b>Not Met</b>		





<b>Hour</b>	<b>Major Street</b> Total All Approaches (vph)	<b>Minor Street</b> Highest Volume Approach (vph)

# Warrant 4: Pedestrian Volume

## 1: Chipman Road & Black Twig Lane

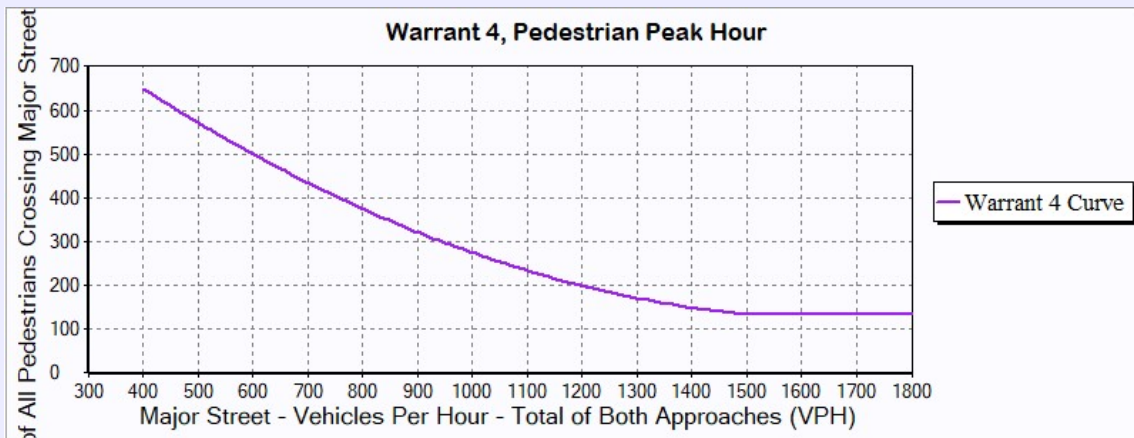
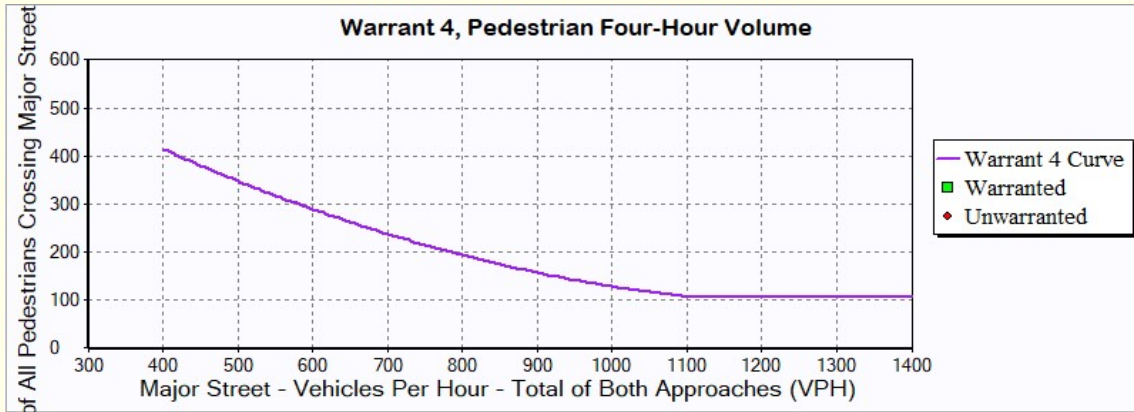
### Intersection Information:

Major Street		Minor Street
Street Name	-	Black Twig Lane
Direction		EB/WB/SB
Number of Lanes	1	2
Approach Speed	0	35

**WARRANT 4 MET ?** No

### Details

Pedestrian Four Hour Volume Warrant Met?	No	
Pedestrian Peak Hour Warrant Met?	No	Notes 0 Hours met (4 required)
Speed Limit or 85th Percentile Speed on Major Street > 35mph, or Intersection lies within an Isolated Community with Population < 10,000?	No	



## Warrant 5: School Crossing

### 1: Chipman Road & Black Twig Lane

#### Intersection Information:

Major Street Name -

Major Street Direction

**WARRANT 5 MET?** **No**

#### Details:

Time Period Interval for Students Crossing (min) 0

Number of Students Crossing in Time Period 0

Number of Adequate Gaps in Time Period 0

Other Remedial Measures Attempted? **No**

No major approach **-**

Distance to signal on - Approach (ft) 0

No 2nd Major Approach **-**

-

Will New Signal Restrict Progressive Traffic? **No**

# Warrant 6: Coordinated Signal System

## 1: Chipman Road & Black Twig Lane

### Intersection Information:

Major Street Name -  
Major Street Direction

**WARRANT 6 MET?** **No**

### Details:

Approach Direction & Name	Acceptable Platooning?	Adjacent Coordinating Signal?	Adjacent Intersection Distance
SB Approach (Black Twig Lane)	Yes	No	N/A
WB Approach (Chipmand Road)	Yes	No	N/A
EB Approach (Chipman Road)	Yes	No	N/A

Unacceptable Platooning?  
(At least one approach)

**No**

Distance to Closest Signal  
(Must be N/A or > 1000)

N/A

# Warrant 7: Crash Experience

## 1: Chipman Road & Black Twig Lane

### Intersection Information:

Major Street Name -  
 Major Street Direction  
 Minor Street Direction EB/WB/SB

**WARRANT 7 MET?** **No**

### Details:

Low Population? **No** Traffic Volume Condition Met? **No**  
 Major Street Speed Limit 0 0 Hours Met (8 Required)  
 Major Street 85th-% tile Speed 0.00 Ped Volume Condition Met? **No**  
 0 Hours Met (8 Required)  
 Qualifying Crashes **0**  
 Adequate Alternative Trials? **No**

Hour	Traffic Volumes				Pedestrian Volumes			
	Major Street Vehicles	Minor Street Vehicles	80% Standard Met? A or B		Eastbound Ped Volumes		Southbound Ped Volumes	
			Condition A	Condition B	Peds	> 80?	Peds	> 80?
07:30 to 08:30	0	333	No	No	0	<b>No</b>	0	No
07:45 to 08:45	0	251	No	No	0	<b>No</b>	0	No
08:00 to 09:00	0	168	No	No	0	<b>No</b>	0	No
08:15 to 09:15	0	84	No	No	0	<b>No</b>	0	No
17:00 to 18:00	0	407	No	No	0	<b>No</b>	0	No
17:15 to 18:15	0	306	No	No	0	<b>No</b>	0	No
17:30 to 18:30	0	205	No	No	0	<b>No</b>	0	No
17:45 to 18:45	0	103	No	No	0	<b>No</b>	0	No

# Warrant 8: Roadway Network

## 1: Chipman Road & Black Twig Lane

### Intersection Information:

Major Street Name -  
 Major Street Direction  
 Minor Street Direction EB/WB/SB

**WARRANT 8 MET? ( A or B) No**

### Details:

	Growth Rates % (per year)		
	SB	EB	WB
L	0.00	0.00	0.00
T	0.00	0.00	0.00
R	0.00	0.00	0.00

<u>Condition A, Total Entering Volume</u>		<u>Condition B, Non-normal Business Day</u>		
			<u>Existing</u>	<u>Future</u>
Existing Peak Hour	873	Highest Hour	0	0
Years	0.00	Second Highest Hour	0	0
Future Peak Hour	873	Third Highest Hour	0	0
Warrant 1 in 5 Years?	<span style="background-color: red; color: white; padding: 2px;">No</span>	Fourth Highest Hour	0	0
Warrant 2 in 5 Years?	<span style="background-color: red; color: white; padding: 2px;">No</span>	Fifth Highest Hour	0	0
Warrant 3 in 5 Years?	<span style="background-color: red; color: white; padding: 2px;">No</span>	Yearly Growth Rate (%)	0.00	
		Years	0.00	

**Condition A Met? No      Condition B Met? No**

# Warrant 9: Intersection Near a Grade Crossing

## 1: Chipman Road & Black Twig Lane

### Intersection Information:

	Major Street	Minor Street
Street Name	-	Black Twig Lane
Direction		EB/WB/SB
Number of Lanes	1	2
Approach Speed	0	35

WARRANT 9 MET ? **No**

### Details

Note **No approach with a railroad grade crossing**

Minor street approach having a grade crossing

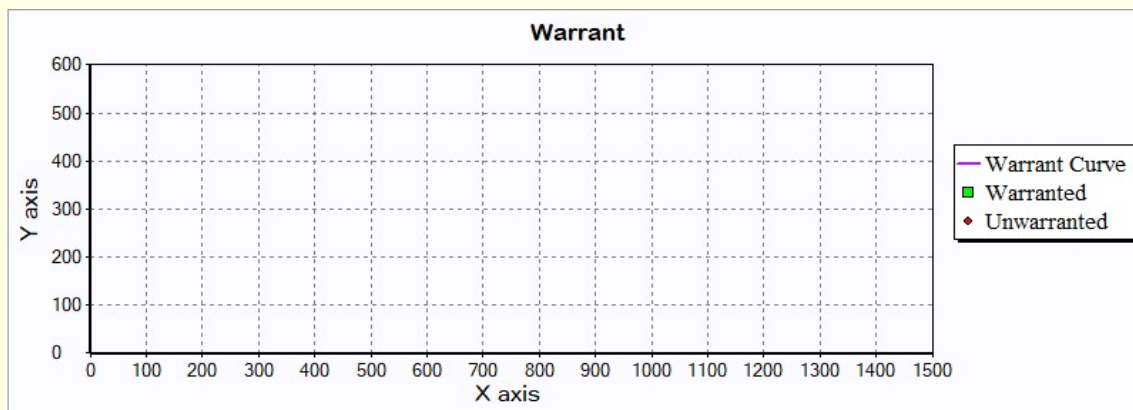
Distance from the center of the track to the stop or yield line Interpolated

Number of occurrences of rail traffic per day Adjustment Factor

Percentage of high-occupancy buses crossing the track (%) Adjustment Factor

Percentage of tractor-trailer trucks crossing the track (%) Adjustment Factor

The rail traffic arrival times are unknown, the highest traffic volume hour of the day is used



Hour	Major Street Total of Both Approaches (vph)	Minor Street Adjusted Volume Crossing Tracks (vph)

# All-Way Stop Control Warrant: Multiway Stop Applications

## 1: Chipman Road & Black Twig Lane

### Intersection Information:

Major Street Name: -  
 Major Street Direction:  
 Minor Street Direction: EB/WB/SB

**AWSC WARRANT MET? No**

### Details:

Condition A Met?	<b>No</b>	Qualifying Crashes	0
Condition B Met?	<b>No</b>	Major Street 85th %-tile Speed	0.00
Condition C Met?	<b>No</b>	Major Street Speed Limit	0
Notes: 0 Hours Met (8 Required)			

Hour	Traffic Volumes		Bicycle Volumes	Ped Volumes	Condition C		
	Major Street	Minor Street	East Bound Bicycle Volumes	East Bound Ped Volumes	Major Street Veh Vol > 210	Minor Street Avg(Veh + Ped + Bicycle) > 200	Minor Street Delay > 30



# Warrants Summary Report

## 1: Lowenstein Drive & Black Twig Lane

### Intersection Information:

	Major Street	Minor Street
Street Name	-	Black Twig Lane
Direction		EB/WB/NB/SB
Number of Lanes	1	2
Approach Speed	-	35

Warrant	Met?	Notes
<b>Warrant 1, Eight-Hour Vehicular Volume</b>		
	No	
Condition A or B Met?	No	0 Hours met (8 required)
Condition A and B Met?	No	0 Hours met (8 required)
<b>Warrant 2, Four-Hour Vehicular Volume</b>		
	No	0 Hours met (4 required)
<b>Warrant 3, Peak Hour</b>		
	No	
Condition A Met?	No	0 Hours met (1 required)
Condition B Met?	No	0 Hours met (1 required)
<b>Warrant 4, Pedestrian Volume</b>		
	No	
Condition A Met?	No	0 Hours met (4 required)
Condition B Met?	No	0 Hours met (1 required)
<b>Warrant 5, School Crossing</b>		
	No	

**Warrant 6, Coordinated Signal System**

No

**Warrant 7, Crash Experience**

No

Traffic Volume Cond.? No 0 Hours met (8 required)

Ped Condition? No 0 Hours met (8 required)

**Warrant 8, Roadway Network**

No

**Warrant 9, Intersection Near a Grade Crossing**

No

**AWSC Warrant, Multiway Stop Application**

No

Condition A Met? No

Condition B Met? No

Condition C Met? No

# Warrant 1: Eight-hour Vehicular Volume

## 1: Lowenstein Drive & Black Twig Lane

### Intersection Information:

Major Street Name: -  
 Major Street Direction:  
 Minor Street Direction: EB/WB/NB/SB

**WARRANT 1 MET? No**

### Details:

Condition A Met? **No** 0 Hours met (8 required) at 100%  
 Condition B Met? **No** 0 Hours met (8 required) at 100%

Hour	Major Street Vehicles (Total of Both Approaches)	High Volume Minor Approach Vehicles	100% Standard Met? Cond. A OR Cond. B		80% Standard Met? Cond. A AND Cond. B	
			Condition A 100% Column	Condition B 100% Column	Condition A 80% Column	Condition B 80% Column
<b>07:30 to 08:30</b>	<b>0</b>	<b>102</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>
Condition A	Volume >= 100% column (500)?	<b>No</b>	Volume >= 100% column (200)?	<b>No</b>		
	Volume >= 80% column (400)?	<b>No</b>	Volume >= 80% column (160)?	<b>No</b>		
Condition B	Volume >= 100% column (750)?	<b>No</b>	Volume >= 100% column (100)?	<b>Yes</b>		
	Volume >= 80% column (600)?	<b>No</b>	Volume >= 80% column (80)?	<b>Yes</b>		
<b>07:45 to 08:45</b>	<b>0</b>	<b>78</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>
Condition A	Volume >= 100% column (500)?	<b>No</b>	Volume >= 100% column (200)?	<b>No</b>		
	Volume >= 80% column (400)?	<b>No</b>	Volume >= 80% column (160)?	<b>No</b>		
Condition B	Volume >= 100% column (750)?	<b>No</b>	Volume >= 100% column (100)?	<b>No</b>		
	Volume >= 80% column (600)?	<b>No</b>	Volume >= 80% column (80)?	<b>No</b>		
<b>08:00 to 09:00</b>	<b>0</b>	<b>53</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>
Condition A	Volume >= 100% column (500)?	<b>No</b>	Volume >= 100% column (200)?	<b>No</b>		
	Volume >= 80% column (400)?	<b>No</b>	Volume >= 80% column (160)?	<b>No</b>		
Condition B	Volume >= 100% column (750)?	<b>No</b>	Volume >= 100% column (100)?	<b>No</b>		
	Volume >= 80% column (600)?	<b>No</b>	Volume >= 80% column (80)?	<b>No</b>		
<b>08:15 to 09:15</b>	<b>0</b>	<b>27</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>
Condition A	Volume >= 100% column (500)?	<b>No</b>	Volume >= 100% column (200)?	<b>No</b>		
	Volume >= 80% column (400)?	<b>No</b>	Volume >= 80% column (160)?	<b>No</b>		
Condition B	Volume >= 100% column (750)?	<b>No</b>	Volume >= 100% column (100)?	<b>No</b>		
	Volume >= 80% column (600)?	<b>No</b>	Volume >= 80% column (80)?	<b>No</b>		

<b>17:00 to 18:00</b>		<b>0</b>		<b>150</b>		No	No	No	No
Condition A	Volume >= 100% column (500)?	No	Volume >= 100% column (200)?	No					
	Volume >= 80% column (400)?	No	Volume >= 80% column (160)?	No					
Condition B	Volume >= 100% column (750)?	No	Volume >= 100% column (100)?	Yes					
	Volume >= 80% column (600)?	No	Volume >= 80% column (80)?	Yes					

<b>17:15 to 18:15</b>		<b>0</b>		<b>114</b>		No	No	No	No
Condition A	Volume >= 100% column (500)?	No	Volume >= 100% column (200)?	No					
	Volume >= 80% column (400)?	No	Volume >= 80% column (160)?	No					
Condition B	Volume >= 100% column (750)?	No	Volume >= 100% column (100)?	Yes					
	Volume >= 80% column (600)?	No	Volume >= 80% column (80)?	Yes					

<b>17:30 to 18:30</b>		<b>0</b>		<b>76</b>		No	No	No	No
Condition A	Volume >= 100% column (500)?	No	Volume >= 100% column (200)?	No					
	Volume >= 80% column (400)?	No	Volume >= 80% column (160)?	No					
Condition B	Volume >= 100% column (750)?	No	Volume >= 100% column (100)?	No					
	Volume >= 80% column (600)?	No	Volume >= 80% column (80)?	No					

<b>17:45 to 18:45</b>		<b>0</b>		<b>38</b>		No	No	No	No
Condition A	Volume >= 100% column (500)?	No	Volume >= 100% column (200)?	No					
	Volume >= 80% column (400)?	No	Volume >= 80% column (160)?	No					
Condition B	Volume >= 100% column (750)?	No	Volume >= 100% column (100)?	No					
	Volume >= 80% column (600)?	No	Volume >= 80% column (80)?	No					

# Warrant 2: Four-hour Vehicular Volume

## 1: Lowenstein Drive & Black Twig Lane

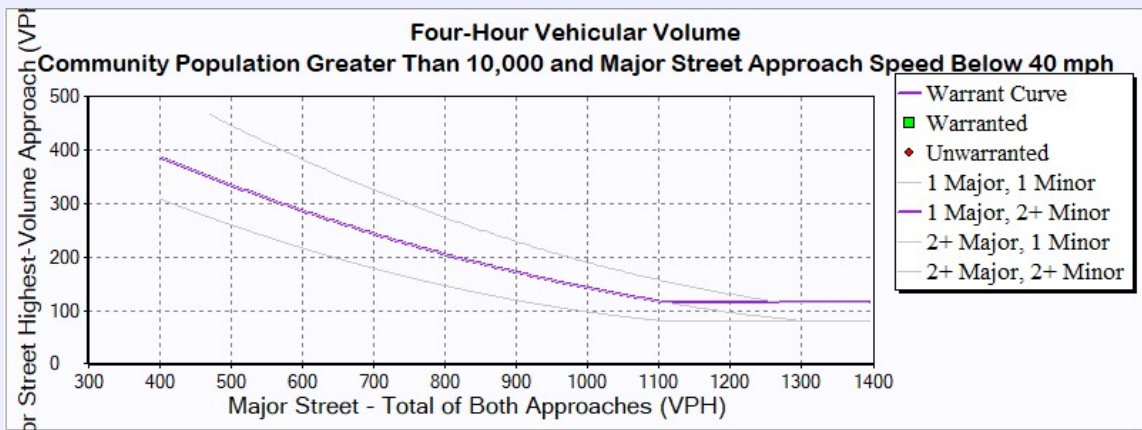
### Intersection Information:

Major Street		Minor Street
Street Name	-	Black Twig Lane
Direction		EB/WB/NB/SB
Number of Lanes	1	2
Approach Speed	0	35

Warrant 2 Met? **No**

### Details:

Notes	0 Hours met (4 required)
Low population?	<b>No</b>



### Hourly Volumes

Hour	Major Street Total All Approaches (vph)	Minor Street Highest Volume Approach (vph)
00:00:00 - 01:00:00	0.00	0.00
01:00:00 - 02:00:00	0.00	0.00
02:00:00 - 03:00:00	0.00	0.00
03:00:00 - 04:00:00	0.00	0.00
04:00:00 - 05:00:00	0.00	0.00
05:00:00 - 06:00:00	0.00	0.00
06:00:00 - 07:00:00	0.00	0.00
07:00:00 - 08:00:00	0.00	49.00
08:00:00 - 09:00:00	0.00	53.00
09:00:00 - 10:00:00	0.00	0.00
10:00:00 - 11:00:00	0.00	0.00
11:00:00 - 12:00:00	0.00	0.00
12:00:00 - 13:00:00	0.00	0.00
13:00:00 - 14:00:00	0.00	0.00
14:00:00 - 15:00:00	0.00	0.00
15:00:00 - 16:00:00	0.00	0.00
16:00:00 - 17:00:00	0.00	0.00
17:00:00 - 18:00:00	0.00	150.00
18:00:00 - 19:00:00	0.00	0.00
19:00:00 - 20:00:00	0.00	0.00
20:00:00 - 21:00:00	0.00	0.00
21:00:00 - 22:00:00	0.00	0.00
22:00:00 - 23:00:00	0.00	0.00
23:00:00 - 00:00:00	0.00	0.00

### Warranted Volumes

Hour	Major Street Total All Approaches (vph)	Minor Street Highest Volume Approach (vph)

# Warrant 3: Peak Hour

## 1: Lowenstein Drive & Black Twig Lane

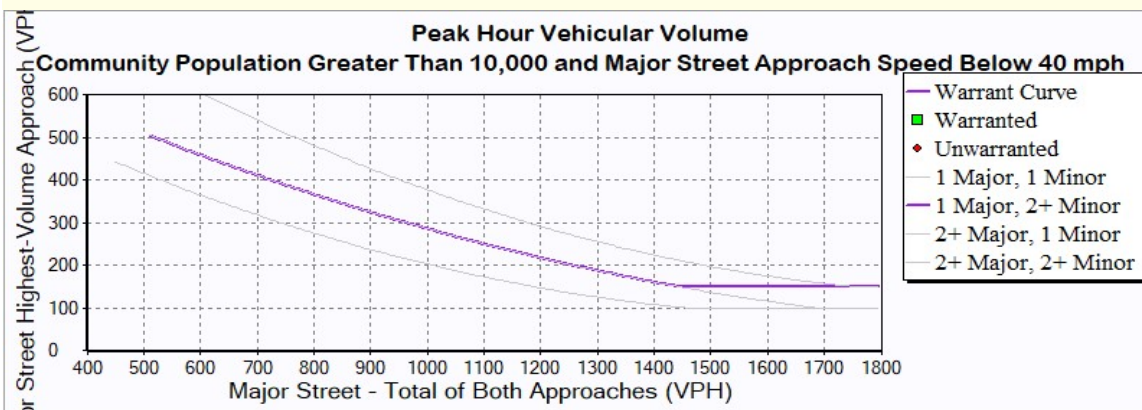
### Intersection Information:

	Major Street	Minor Street
Street Name	-	Black Twig Lane
Direction		EB/WB/NB/SB
Number of Lanes	1	2
Approach Speed	0	35

Warrant 3 Met? **No**

### Details

Low Population?	<b>No</b>		
Condition A Met?	<b>No</b>	Condition B Met?	<b>No</b>
Notes	0 Hours met (1 required)	Notes	0 Hours met (1 required)
Minor Approach Time Delay Condition Met?	<b>Not Met</b>		
Minor Approach Volume Condition Met?	<b>Met</b>		
Total Entering Intersection Volume Condition Met?	<b>Not Met</b>		



<b>Hour</b>	<b>Major Street</b> Total All Approaches (vph)	<b>Minor Street</b> Highest Volume Approach (vph)



# Warrant 4: Pedestrian Volume

## 1: Lowenstein Drive & Black Twig Lane

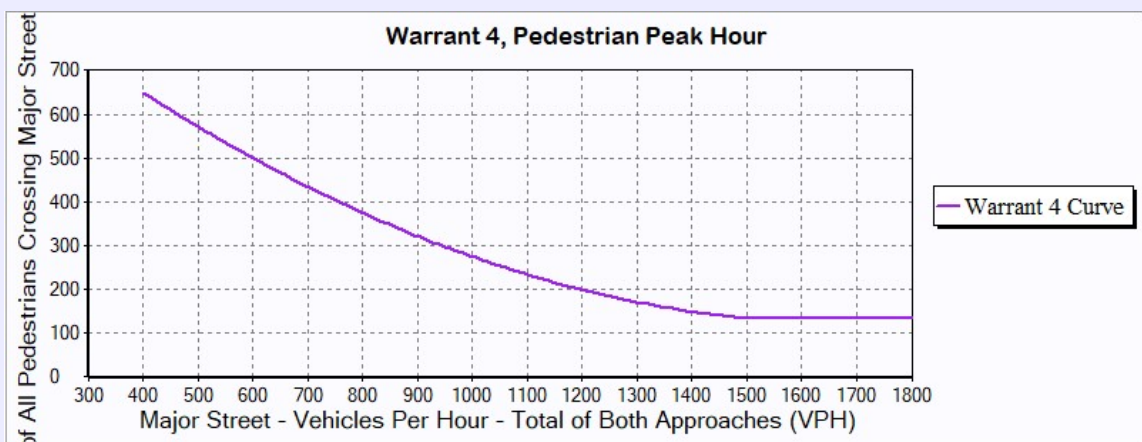
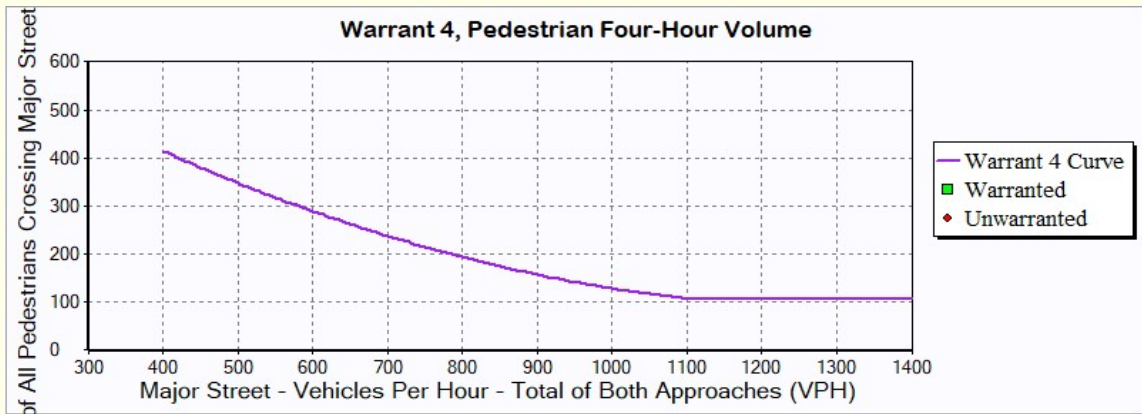
### Intersection Information:

Major Street		Minor Street
Street Name	-	Black Twig Lane
Direction		EB/WB/NB/SB
Number of Lanes	1	2
Approach Speed	0	35

**WARRANT 4 MET ?** No

### Details

Pedestrian Four Hour Volume Warrant Met?	No	
Pedestrian Peak Hour Warrant Met?	No	Notes 0 Hours met (4 required)
Speed Limit or 85th Percentile Speed on Major Street > 35mph, or Intersection lies within an Isolated Community with Population < 10,000?	No	



## Warrant 5: School Crossing

### 1: Lowenstein Drive & Black Twig Lane

#### Intersection Information:

Major Street Name -

Major Street Direction

**WARRANT 5 MET?** **No**

#### Details:

Time Period Interval for Students Crossing (min) 0

Number of Students Crossing in Time Period 0

Number of Adequate Gaps in Time Period 0

Other Remedial Measures Attempted? **No**

No major approach **-**

Distance to signal on - Approach (ft) 0

No 2nd Major Approach **-**

-

Will New Signal Restrict Progressive Traffic? **No**

# Warrant 6: Coordinated Signal System

## 1: Lowenstein Drive & Black Twig Lane

### Intersection Information:

Major Street Name -  
Major Street Direction

**WARRANT 6 MET?** **No**

### Details:

Approach Direction & Name	Acceptable Platooning?	Adjacent Coordinating Signal?	Adjacent Intersection Distance
SB Approach (Black Twig Lane)	Yes	No	N/A
NB Approach (Black Twig Lane)	Yes	No	N/A
WB Approach (Lowenstein Drive)	Yes	No	N/A
EB Approach (Lowenstein Drive)	Yes	No	N/A

Unacceptable Platooning?  
(At least one approach)

**No**

Distance to Closest Signal  
(Must be N/A or > 1000)

N/A

# Warrant 7: Crash Experience

## 1: Lowenstein Drive & Black Twig Lane

### Intersection Information:

Major Street Name -  
 Major Street Direction  
 Minor Street Direction EB/WB/NB/S

**WARRANT 7 MET? No**

### Details:

Low Population? **No** Traffic Volume Condition Met? **No**  
 Major Street Speed Limit 0 0 Hours Met (8 Required)  
 Major Street 85th-% tile Speed 0.00 Ped Volume Condition Met? **No**  
 0 Hours Met (8 Required)  
 Qualifying Crashes **0**  
 Adequate Alternative Trials? **No**

Hour	Traffic Volumes				Pedestrian Volumes			
	Major Street Vehicles	Minor Street Vehicles	80% Standard Met? A or B		Eastbound Ped Volumes		Southbound Ped Volumes	
			Condition A	Condition B	Peds	> 80?	Peds	> 80?
07:30 to 08:30	0	102	No	No	0	<b>No</b>	0	No
07:45 to 08:45	0	78	No	No	0	<b>No</b>	0	No
08:00 to 09:00	0	53	No	No	0	<b>No</b>	0	No
08:15 to 09:15	0	27	No	No	0	<b>No</b>	0	No
17:00 to 18:00	0	150	No	No	0	<b>No</b>	0	No
17:15 to 18:15	0	114	No	No	0	<b>No</b>	0	No
17:30 to 18:30	0	76	No	No	0	<b>No</b>	0	No
17:45 to 18:45	0	38	No	No	0	<b>No</b>	0	No

# Warrant 8: Roadway Network

## 1: Lowenstein Drive & Black Twig Lane

### Intersection Information:

Major Street Name -  
 Major Street Direction  
 Minor Street Direction EB/WB/NB/S

**WARRANT 8 MET? ( A or B) No**

### Details:

	Growth Rates % (per year)			
	NB	SB	EB	WB
<b>L</b>	0.00	0.00	0.00	0.00
<b>T</b>	0.00	0.00	0.00	0.00
<b>R</b>	0.00	0.00	0.00	0.00

<u>Condition A, Total Entering Volume</u>		<u>Condition B, Non-normal Business Day</u>		
			<u>Existing</u>	<u>Future</u>
Existing Peak Hour	410	Highest Hour	0	0
Years	0.00	Second Highest Hour	0	0
Future Peak Hour	410	Third Highest Hour	0	0
Warrant 1 in 5 Years?	<span style="background-color: red; color: white; padding: 2px;">No</span>	Fourth Highest Hour	0	0
Warrant 2 in 5 Years?	<span style="background-color: red; color: white; padding: 2px;">No</span>	Fifth Highest Hour	0	0
Warrant 3 in 5 Years?	<span style="background-color: red; color: white; padding: 2px;">No</span>	Yearly Growth Rate (%)	0.00	
		Years	0.00	

**Condition A Met? No      Condition B Met? No**

# Warrant 9: Intersection Near a Grade Crossing

## 1: Lowenstein Drive & Black Twig Lane

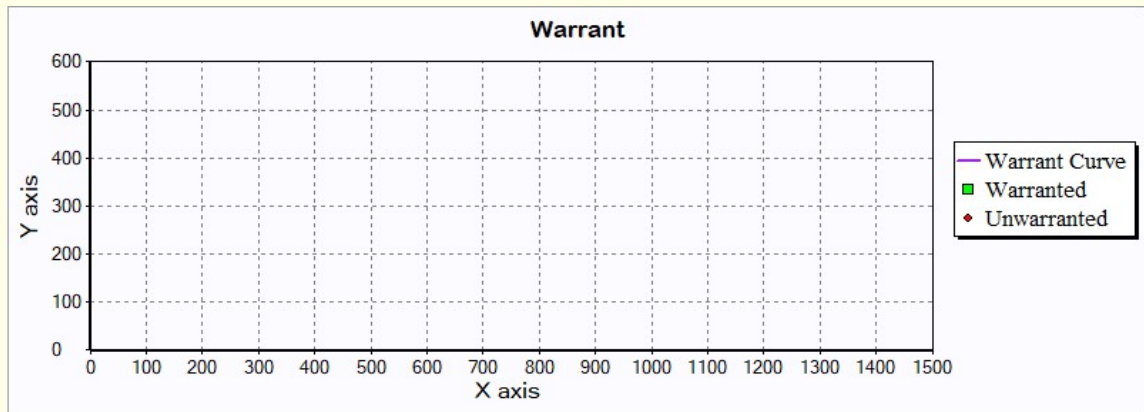
### Intersection Information:

Major Street		Minor Street
Street Name	-	Black Twig Lane
Direction		EB/WB/NB/SB
Number of Lanes	1	2
Approach Speed	0	35

WARRANT 9 MET ? **No**

### Details

Note	<b>No approach with a railroad grade crossing</b>	
Minor street approach having a grade crossing		
Distance from the center of the track to the stop or yield line	Interpolated	
Number of occurrences of rail traffic per day		Adjustment Factor
Percentage of high-occupancy buses crossing the track (%)		Adjustment Factor
Percentage of tractor-trailer trucks crossing the track (%)		Adjustment Factor
The rail traffic arrival times are unknown, the highest traffic volume hour of the day is used		



Hour	Major Street Total of Both Approaches (vph)	Minor Street Adjusted Volume Crossing Tracks (vph)

# All-Way Stop Control Warrant: Multiway Stop Applications

## 1: Lowenstein Drive & Black Twig Lane

### Intersection Information:

Major Street Name: -  
 Major Street Direction:  
 Minor Street Direction: EB/WB/NB/S

**AWSC WARRANT MET? No**

### Details:

Condition A Met?	<b>No</b>	Qualifying Crashes	0
Condition B Met?	<b>No</b>	Major Street 85th %-tile Speed	0.00
Condition C Met?	<b>No</b>	Major Street Speed Limit	0

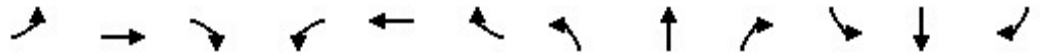
Notes: 0 Hours Met (8 Required)

Hour	Traffic Volumes		Bicycle Volumes	Ped Volumes	Condition C		
	Major Street	Minor Street	East Bound Bicycle Volumes	East Bound Ped Volumes	Major Street Veh Vol > 210	Minor Street Avg(Veh + Ped + Bicycle) > 200	Minor Street Delay > 30

Phasings

6: W Pryor Rd & I-470 Ramp

07/24/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	212	414	0	0	0	0	638	542	0	488	0
Future Volume (vph)	14	212	414	0	0	0	0	638	542	0	488	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		400	0		0	0		311	550		0
Storage Lanes	1		2	0		0	0		1	1		0
Taper Length (ft)	100			25			25			50		
Lane Util. Factor	1.00	0.95	0.88	1.00	1.00	1.00	1.00	0.86	1.00	1.00	0.95	1.00
Frt			0.850						0.850			
Flt Protected	0.950											
Satd. Flow (prot)	1770	3539	2787	0	0	0	0	6408	1583	1863	3539	0
Flt Permitted	0.950											
Satd. Flow (perm)	1770	3539	2787	0	0	0	0	6408	1583	1863	3539	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			445						510			
Link Speed (mph)		30			30			35				35
Link Distance (ft)		297			425			276				300
Travel Time (s)		6.8			9.7			5.4				5.8
Lane Group Flow (vph)	15	228	445	0	0	0	0	686	583	0	525	0
Turn Type	Prot	NA	Perm					NA	Perm	Prot	NA	
Protected Phases	7	4						2		1		6
Permitted Phases			4						2			
Total Split (s)	48.0	48.0	48.0					75.5	75.5	11.5		87.0
Total Lost Time (s)	5.6	5.6	5.6					5.5	5.5	5.5		5.5
Act Effct Green (s)	11.5	15.8	15.8					108.1	108.1			108.1
Actuated g/C Ratio	0.09	0.12	0.12					0.80	0.80			0.80
v/c Ratio	0.10	0.55	0.62					0.13	0.43			0.19
Control Delay	54.0	60.8	8.5					0.6	0.8			3.6
Queue Delay	0.0	0.0	0.0					0.0	0.2			0.0
Total Delay	54.0	60.8	8.5					0.6	1.0			3.6
LOS	D	E	A					A	A			A
Approach Delay		26.8						0.8				3.6
Approach LOS		C						A				A
Queue Length 50th (ft)	13	100	0					4	0			47
Queue Length 95th (ft)	33	138	51					6	0			77
Internal Link Dist (ft)		217			345			196				220
Turn Bay Length (ft)	200		400						311			
Base Capacity (vph)	555	1111	1180					5133	1369			2835
Starvation Cap Reductn	0	0	0					0	232			0
Spillback Cap Reductn	0	0	0					0	0			0
Storage Cap Reductn	0	0	0					0	0			0
Reduced v/c Ratio	0.03	0.21	0.38					0.13	0.51			0.19

Intersection Summary

Area Type: Other  
 Cycle Length: 135  
 Actuated Cycle Length: 135  
 Offset: 29 (21%), Referenced to phase 2:NBT, Start of Green  
 Control Type: Actuated-Coordinated



# Phasings

## 6: W Pryor Rd & I-470 Ramp

07/24/2023

Maximum v/c Ratio: 0.62

Intersection Signal Delay: 8.6

Intersection LOS: A

Intersection Capacity Utilization 48.7%

ICU Level of Service A

Analysis Period (min) 15

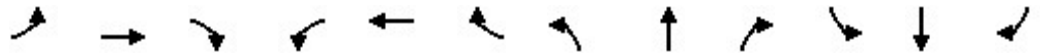
Splits and Phases: 6: W Pryor Rd & I-470 Ramp



Phasings

9: W Pryor Rd & Summit Crossing

07/24/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↗		↔↔	↗		↖	↕↕	↖	↖	↕↕	↖
Traffic Volume (vph)	233	38	42	2	44	50	86	951	12	84	665	150
Future Volume (vph)	233	38	42	2	44	50	86	951	12	84	665	150
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	210		0	150		0	150		150	300		150
Storage Lanes	2		0	2		0	1		1	1		1
Taper Length (ft)	150			100			75			100		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.921			0.920				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1716	0	3433	1714	0	1770	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.698			0.312			0.179		
Satd. Flow (perm)	3433	1716	0	2522	1714	0	581	3539	1583	333	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		41			53				162			162
Link Speed (mph)		30			30			35				35
Link Distance (ft)		800			358			534				288
Travel Time (s)		18.2			8.1			10.4				5.6
Lane Group Flow (vph)	265	91	0	2	107	0	98	1081	14	95	756	170
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases				8			2		2	6		6
Total Split (s)	22.0	43.0		43.0	64.0		13.0	38.0	38.0	11.0	36.0	36.0
Total Lost Time (s)	6.0	6.0		6.0	6.0		5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)	14.6	28.4		16.2	10.2		87.0	78.9	78.9	89.4	80.1	80.1
Actuated g/C Ratio	0.11	0.21		0.12	0.08		0.64	0.58	0.58	0.66	0.59	0.59
v/c Ratio	0.71	0.23		0.01	0.60		0.22	0.52	0.01	0.30	0.36	0.17
Control Delay	69.2	26.6		37.5	45.4		6.9	13.9	0.0	9.9	14.6	2.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	69.2	26.6		37.5	45.4		6.9	13.9	0.0	9.9	14.6	2.3
LOS	E	C		D	D		A	B	A	A	B	A
Approach Delay		58.3			45.2			13.1			12.1	
Approach LOS		E			D			B			B	
Queue Length 50th (ft)	116	35		0	46		14	299	0	25	151	3
Queue Length 95th (ft)	160	85		4	102		m35	363	m0	45	215	18
Internal Link Dist (ft)		720			278			454			208	
Turn Bay Length (ft)	210			150			150		150	300		150
Base Capacity (vph)	406	500		942	766		453	2067	992	320	2098	1004
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.65	0.18		0.00	0.14		0.22	0.52	0.01	0.30	0.36	0.17

Intersection Summary

Area Type: Other  
 Cycle Length: 135  
 Actuated Cycle Length: 135  
 Offset: 31 (23%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Control Type: Actuated-Coordinated

# Phasings

## 9: W Pryor Rd & Summit Crossing

07/24/2023

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 20.1

Intersection LOS: C

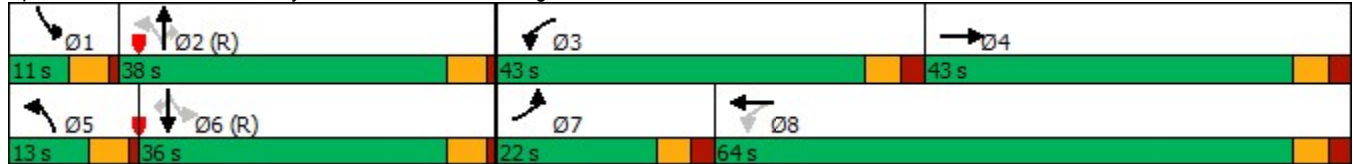
Intersection Capacity Utilization 57.9%

ICU Level of Service B

Analysis Period (min) 15

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

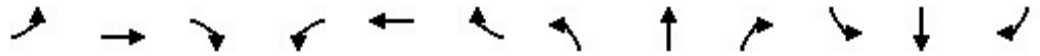
Splits and Phases: 9: W Pryor Rd & Summit Crossing



Phasings

11: Lowenstein Rd & W Pryor Rd

07/24/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↖		↖	↖		↖	↖↗	↖	↖	↖↗	↖
Traffic Volume (vph)	363	38	91	17	29	12	277	688	27	12	421	181
Future Volume (vph)	363	38	91	17	29	12	277	688	27	12	421	181
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	200		150	215		190
Storage Lanes	2		0	1		0	1		1	1		1
Taper Length (ft)	125			25			100			100		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.894			0.957				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1665	0	1770	1783	0	1770	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.950			0.402			0.362		
Satd. Flow (perm)	3433	1665	0	1770	1783	0	749	3539	1583	674	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		97			13				170			222
Link Speed (mph)		30			25			35				35
Link Distance (ft)		243			227			220				555
Travel Time (s)		5.5			6.2			4.3				10.8
Lane Group Flow (vph)	403	143	0	19	45	0	308	764	30	13	468	201
Turn Type	Prot	NA		Prot	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2		2	6		6
Total Split (s)	29.0	51.5		14.0	36.5		26.0	55.5	55.5	14.0	43.5	43.5
Total Lost Time (s)	6.0	5.5		6.0	5.5		6.5	5.0	5.0	6.5	5.0	5.0
Act Effct Green (s)	20.4	26.6		6.9	8.1		90.8	87.2	87.2	75.0	70.4	70.4
Actuated g/C Ratio	0.15	0.20		0.05	0.06		0.67	0.65	0.65	0.56	0.52	0.52
v/c Ratio	0.78	0.35		0.21	0.38		0.50	0.33	0.03	0.03	0.25	0.22
Control Delay	66.0	19.2		66.5	54.8		6.2	6.5	0.0	8.8	13.1	4.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.0	19.2		66.5	54.8		6.2	6.5	0.0	8.8	13.1	4.7
LOS	E	B		E	D		A	A	A	A	B	A
Approach Delay		53.7			58.3			6.2				10.5
Approach LOS		D			E			A				B
Queue Length 50th (ft)	176	31		16	27		22	25	0	3	116	33
Queue Length 95th (ft)	230	97		43	68		53	248	m0	m13	213	116
Internal Link Dist (ft)		163			147			140				475
Turn Bay Length (ft)	150						200		150	215		190
Base Capacity (vph)	584	631		104	419		654	2284	1082	441	1845	931
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.23		0.18	0.11		0.47	0.33	0.03	0.03	0.25	0.22

Intersection Summary

Area Type: Other  
 Cycle Length: 135  
 Actuated Cycle Length: 135  
 Offset: 52 (39%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Control Type: Actuated-Coordinated

# Phasings

## 11: Lowenstein Rd & W Pryor Rd

07/24/2023

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 19.7

Intersection LOS: B

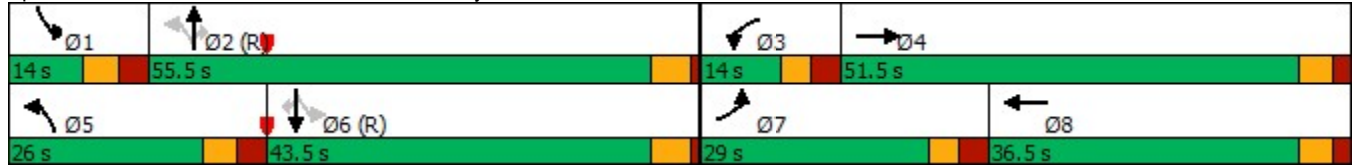
Intersection Capacity Utilization 58.2%

ICU Level of Service B

Analysis Period (min) 15

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

Splits and Phases: 11: Lowenstein Rd & W Pryor Rd



Phasings

18: Chipman Rd & W Pryor Rd

07/24/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	133	247	83	84	87	89	36	740	127	81	368	78
Future Volume (vph)	133	247	83	84	87	89	36	740	127	81	368	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		170	170		0	260		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	70			100			80			100		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.962				0.850		0.978			0.974	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3405	0	1770	3539	1583	1770	3461	0	1770	3447	0
Flt Permitted	0.666			0.292			0.462			0.224		
Satd. Flow (perm)	1241	3405	0	544	3539	1583	861	3461	0	417	3447	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		32				113		18			25	
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		651			831			351			533	
Travel Time (s)		12.7			16.2			6.8			10.4	
Lane Group Flow (vph)	146	362	0	92	96	98	40	953	0	89	490	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	17.0	38.0		17.0	38.0	38.0	13.0	63.0		17.0	67.0	
Total Lost Time (s)	6.0	5.0		6.0	5.0	5.0	6.0	5.0		6.0	5.0	
Act Effct Green (s)	28.3	18.5		26.7	17.8	17.8	82.2	76.5		86.0	80.2	
Actuated g/C Ratio	0.21	0.14		0.20	0.13	0.13	0.61	0.57		0.64	0.59	
v/c Ratio	0.48	0.73		0.46	0.21	0.32	0.07	0.48		0.26	0.24	
Control Delay	46.7	59.6		46.9	51.9	8.9	9.6	19.0		20.0	15.6	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	46.7	59.6		46.9	51.9	8.9	9.6	19.0		20.0	15.6	
LOS	D	E		D	D	A	A	B		B	B	
Approach Delay		55.9			35.5			18.7			16.3	
Approach LOS		E			D			B			B	
Queue Length 50th (ft)	104	148		64	40	0	12	251		23	86	
Queue Length 95th (ft)	160	196		106	65	39	28	349		96	182	
Internal Link Dist (ft)		571			751			271			453	
Turn Bay Length (ft)	200			200		170	170			260		
Base Capacity (vph)	305	856		211	865	472	576	1969		381	2057	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.48	0.42		0.44	0.11	0.21	0.07	0.48		0.23	0.24	

Intersection Summary

Area Type: Other  
 Cycle Length: 135  
 Actuated Cycle Length: 135  
 Offset: 1 (1%), Referenced to phase 2:NBT, Start of Green  
 Control Type: Actuated-Coordinated

# Phasings

## 18: Chipman Rd & W Pryor Rd

07/24/2023

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 28.1









Intersection LOS: C

Intersection Capacity Utilization 61.5%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 18: Chipman Rd & W Pryor Rd

 Ø1  Ø2 (R)	 Ø3  Ø4
17 s   63 s	17 s   38 s
 Ø5  Ø6	 Ø7  Ø8
13 s   67 s	17 s   38 s

Intersection						
Int Delay, s/veh	1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↕↕	↕↕	↗
Traffic Vol, veh/h	0	151	0	1049	478	258
Future Vol, veh/h	0	151	0	1049	478	258
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	Free
Storage Length	-	0	-	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	164	0	1140	520	280

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	-	260	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	6.94	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.32	-
Pot Cap-1 Maneuver	0	739	0
Stage 1	0	-	0
Stage 2	0	-	0
Platoon blocked, %			-
Mov Cap-1 Maneuver	-	739	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.3	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT EBLn1	SBT
Capacity (veh/h)	- 739	-
HCM Lane V/C Ratio	- 0.222	-
HCM Control Delay (s)	- 11.3	-
HCM Lane LOS	- B	-
HCM 95th %tile Q(veh)	- 0.8	-



Intersection						
Int Delay, s/veh	2.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	50	283	157	31	44	47
Future Vol, veh/h	50	283	157	31	44	47
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	75	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	57	325	180	36	51	54

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	216	0	-	0	637 198
Stage 1	-	-	-	-	198 -
Stage 2	-	-	-	-	439 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1354	-	-	-	441 843
Stage 1	-	-	-	-	835 -
Stage 2	-	-	-	-	650 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1354	-	-	-	422 843
Mov Cap-2 Maneuver	-	-	-	-	515 -
Stage 1	-	-	-	-	800 -
Stage 2	-	-	-	-	650 -

Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	11.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1354	-	-	-	645
HCM Lane V/C Ratio	0.042	-	-	-	0.162
HCM Control Delay (s)	7.8	-	-	-	11.7
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.6

Intersection	
Intersection Delay, s/veh	8.6
Intersection LOS	A

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕		↕	↕			↕			↕	
Traffic Vol, veh/h	0	32	27	21	31	50	13	34	34	47	40	0
Future Vol, veh/h	0	32	27	21	31	50	13	34	34	47	40	0
Peak Hour Factor	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	51	43	33	49	79	21	54	54	75	63	0
Number of Lanes	0	1	0	1	1	0	0	1	0	0	1	0

Approach	SE	NW	NE	SW
Opposing Approach	NW	SE	SW	NE
Opposing Lanes	2	1	1	1
Conflicting Approach Left	SW	NE	SE	NW
Conflicting Lanes Left	1	1	1	2
Conflicting Approach Right	NE	SW	NW	SE
Conflicting Lanes Right	1	1	2	1
HCM Control Delay	8.3	8.6	8.4	8.9
HCM LOS	A	A	A	A

Lane	NELn1	NWLn1	NWLn2	SELn1	SWLn1
Vol Left, %	16%	100%	0%	0%	54%
Vol Thru, %	42%	0%	38%	54%	46%
Vol Right, %	42%	0%	62%	46%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	81	21	81	59	87
LT Vol	13	21	0	0	47
Through Vol	34	0	31	32	40
RT Vol	34	0	50	27	0
Lane Flow Rate	129	33	129	94	138
Geometry Grp	2	7	7	5	2
Degree of Util (X)	0.161	0.053	0.172	0.119	0.184
Departure Headway (Hd)	4.495	5.754	4.816	4.593	4.8
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	797	622	743	778	746
Service Time	2.53	3.492	2.553	2.635	2.837
HCM Lane V/C Ratio	0.162	0.053	0.174	0.121	0.185
HCM Control Delay	8.4	8.8	8.6	8.3	8.9
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.6	0.2	0.6	0.4	0.7

Phasings  
6: I-470 Ramp

07/25/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	132	732	0	0	0	0	602	478	4	879	0
Future Volume (vph)	20	132	732	0	0	0	0	602	478	4	879	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		400	0		0	0		311	550		0
Storage Lanes	1		2	0		0	0		1	1		0
Taper Length (ft)	100			25			25			50		
Lane Util. Factor	1.00	0.95	0.88	1.00	1.00	1.00	1.00	0.86	1.00	1.00	0.95	1.00
Frt			0.850						0.850			
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1770	3539	2787	0	0	0	0	6408	1583	1770	3539	0
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1770	3539	2787	0	0	0	0	6408	1583	1770	3539	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			175						503			
Link Speed (mph)		30			30			35				35
Link Distance (ft)		297			425			276				300
Travel Time (s)		6.8			9.7			5.4				5.8
Lane Group Flow (vph)	21	139	771	0	0	0	0	634	503	4	925	0
Turn Type	Prot	NA	Perm					NA	Perm	Prot	NA	
Protected Phases	7	4						2		1	6	
Permitted Phases			4						2			
Total Split (s)	53.0	53.0	53.0					54.0	54.0	13.0	67.0	
Total Lost Time (s)	5.6	5.6	5.6					5.5	5.5	5.5	5.5	
Act Effct Green (s)	21.1	36.0	36.0					70.5	70.5	6.1	72.9	
Actuated g/C Ratio	0.18	0.30	0.30					0.59	0.59	0.05	0.61	
v/c Ratio	0.07	0.13	0.81					0.17	0.44	0.04	0.43	
Control Delay	32.5	29.1	36.0					5.2	1.6	55.0	14.4	
Queue Delay	0.0	0.0	0.0					0.0	0.3	0.0	0.0	
Total Delay	32.5	29.1	36.0					5.2	1.9	55.0	14.4	
LOS	C	C	D					A	A	D	B	
Approach Delay		34.9						3.7			14.5	
Approach LOS		C						A			B	
Queue Length 50th (ft)	16	41	246					20	2	3	189	
Queue Length 95th (ft)	27	58	291					m32	m40	15	290	
Internal Link Dist (ft)		217			345			196			220	
Turn Bay Length (ft)	200		400						311	550		
Base Capacity (vph)	699	1397	1206					3765	1137	110	2151	
Starvation Cap Reductn	0	0	0					0	207	0	0	
Spillback Cap Reductn	0	0	0					0	0	0	0	
Storage Cap Reductn	0	0	0					0	0	0	0	
Reduced v/c Ratio	0.03	0.10	0.64					0.17	0.54	0.04	0.43	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 1 (1%), Referenced to phase 2:NBT, Start of Green  
 Control Type: Actuated-Coordinated

# Phasings

## 6: I-470 Ramp

07/25/2023

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 16.7

Intersection LOS: B

Intersection Capacity Utilization 59.2%

ICU Level of Service B

Analysis Period (min) 15

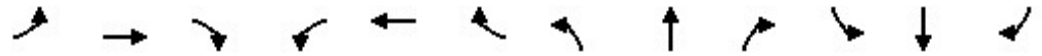
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: I-470 Ramp



Phasings  
9: Pryor Rd & Summit Woods Crossing

07/25/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↔		↔↔	↔		↔	↕↕	↔	↔	↕↕	↔
Traffic Volume (vph)	160	34	59	140	51	234	56	680	85	327	1137	158
Future Volume (vph)	160	34	59	140	51	234	56	680	85	327	1137	158
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	210		0	150		0	150		150	300		150
Storage Lanes	2		0	2		0	1		1	1		1
Taper Length (ft)	150			100			75			100		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.905			0.877				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1686	0	3433	1634	0	1770	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.690			0.220			0.112		
Satd. Flow (perm)	3433	1686	0	2493	1634	0	410	3539	1583	209	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		66			198				182			182
Link Speed (mph)		25			25			35				35
Link Distance (ft)		589			358			534				288
Travel Time (s)		16.1			9.8			10.4				5.6
Lane Group Flow (vph)	178	104	0	156	317	0	62	756	94	363	1263	176
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases				8			2		2	6		6
Total Split (s)	32.5	63.5		12.0	43.0		11.0	31.5	31.5	13.0	33.5	33.5
Total Lost Time (s)	6.0	6.0		6.0	6.0		5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)	11.6	21.3		21.7	15.7		37.9	30.6	30.6	75.7	65.5	65.5
Actuated g/C Ratio	0.10	0.18		0.18	0.13		0.32	0.26	0.26	0.63	0.55	0.55
v/c Ratio	0.54	0.29		0.31	0.82		0.29	0.84	0.17	0.56	0.65	0.19
Control Delay	57.4	17.6		33.0	35.5		19.9	51.9	0.7	28.1	18.8	2.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.4	17.6		33.0	35.5		19.9	51.9	0.7	28.1	18.8	2.1
LOS	E	B		C	D		B	D	A	C	B	A
Approach Delay		42.7			34.6			44.4			19.1	
Approach LOS		D			C			D			B	
Queue Length 50th (ft)	69	25		47	91		17	276	0	149	324	1
Queue Length 95th (ft)	103	64		61	179		47	#435	0	347	#546	30
Internal Link Dist (ft)		509			278			454			208	
Turn Bay Length (ft)	210			150			150		150	300		150
Base Capacity (vph)	758	842		498	640		213	901	538	653	1932	947
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.12		0.31	0.50		0.29	0.84	0.17	0.56	0.65	0.19

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 112 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Control Type: Actuated-Coordinated

# Phasings

## 9: Pryor Rd & Summit Woods Crossing

07/25/2023

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 29.8

Intersection LOS: C

Intersection Capacity Utilization 77.4%

ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 9: Pryor Rd & Summit Woods Crossing



Phasings

11: Lowenstein Rd & Pryor Rd

07/25/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↔		↔	↔		↔	↕↕	↔	↔	↕↕	↔
Traffic Volume (vph)	235	89	196	63	56	34	268	568	42	56	846	194
Future Volume (vph)	235	89	196	63	56	34	268	568	42	56	846	194
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	200		150	215		190
Storage Lanes	2		0	1		0	1		1	1		1
Taper Length (ft)	125			25			100			100		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.897			0.943				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1671	0	1770	1757	0	1770	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.950			0.121			0.421		
Satd. Flow (perm)	3433	1671	0	1770	1757	0	225	3539	1583	784	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		130			35				172			194
Link Speed (mph)		30			25			35				35
Link Distance (ft)		244			227			220				555
Travel Time (s)		5.5			6.2			4.3				10.8
Lane Group Flow (vph)	253	307	0	68	97	0	288	611	45	60	910	209
Turn Type	Prot	NA		Prot	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases							2		2	6		6
Total Split (s)	15.0	39.5		12.0	36.5		13.0	31.0	31.0	12.5	30.5	30.5
Total Lost Time (s)	6.0	5.5		6.0	5.5		6.5	5.0	5.0	6.5	5.0	5.0
Act Effct Green (s)	9.0	16.7		6.0	13.6		56.7	47.1	47.1	33.3	27.7	27.7
Actuated g/C Ratio	0.09	0.18		0.06	0.14		0.60	0.50	0.50	0.35	0.29	0.29
v/c Ratio	0.78	0.77		0.61	0.35		0.55	0.35	0.05	0.17	0.88	0.35
Control Delay	59.6	33.5		67.6	25.8		22.6	18.7	0.1	14.1	44.5	7.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.6	33.5		67.6	25.8		22.6	18.7	0.1	14.1	44.5	7.0
LOS	E	C		E	C		C	B	A	B	D	A
Approach Delay		45.3			43.0			19.0				36.3
Approach LOS		D			D			B				D
Queue Length 50th (ft)	78	103		41	34		99	124	0	15	271	6
Queue Length 95th (ft)	#137	177		#103	72		#248	206	0	40	#412	60
Internal Link Dist (ft)		164			147			140				475
Turn Bay Length (ft)	150						200		150	215		190
Base Capacity (vph)	325	681		111	596		525	1752	870	349	1030	598
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.45		0.61	0.16		0.55	0.35	0.05	0.17	0.88	0.35

Intersection Summary

Area Type: Other  
 Cycle Length: 95  
 Actuated Cycle Length: 95  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Control Type: Actuated-Coordinated

# Phasings

## 11: Lowenstein Rd & Pryor Rd

07/25/2023

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 32.7

Intersection LOS: C

Intersection Capacity Utilization 78.3%

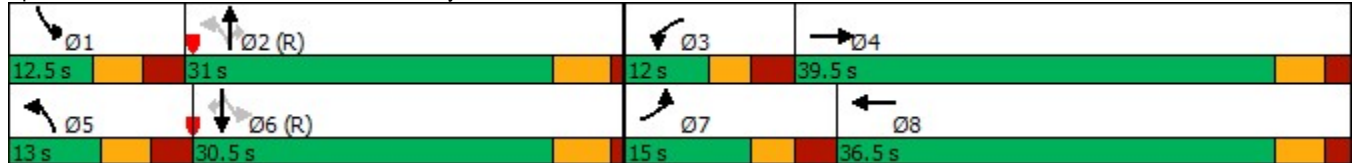
ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 11: Lowenstein Rd & Pryor Rd





Phasings

18: Chipman Rd & Pryor Rd

07/25/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕	↗	↖	↕		↖	↕	
Traffic Volume (vph)	122	221	55	268	206	152	73	633	180	219	774	148
Future Volume (vph)	122	221	55	268	206	152	73	633	180	219	774	148
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		170	170		0	260		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	70			100			80			100		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	1.00	1.00		1.00		0.99	1.00	1.00		1.00	1.00	
Frt		0.970				0.850		0.967			0.976	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3423	0	1770	3539	1583	1770	3412	0	1770	3446	0
Flt Permitted	0.616			0.275			0.239			0.192		
Satd. Flow (perm)	1145	3423	0	512	3539	1561	445	3412	0	358	3446	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24				182		31				22
Link Speed (mph)		30			30			30				30
Link Distance (ft)		651			831			351				533
Travel Time (s)		14.8			18.9			8.0				12.1
Lane Group Flow (vph)	128	291	0	282	217	160	77	855	0	231	971	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	12.0	32.0		23.0	43.0	43.0	12.0	42.0		23.0	53.0	
Total Lost Time (s)	6.0	5.0		6.0	5.0	5.0	6.0	5.0		6.0	5.0	
Act Effct Green (s)	19.7	14.7		36.3	25.3	25.3	58.0	51.2		71.7	61.3	
Actuated g/C Ratio	0.16	0.12		0.30	0.21	0.21	0.48	0.43		0.60	0.51	
v/c Ratio	0.58	0.66		0.86	0.29	0.34	0.26	0.58		0.58	0.55	
Control Delay	46.3	53.2		59.7	40.1	5.6	14.6	28.8		18.1	22.5	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	46.3	53.2		59.7	40.1	5.6	14.6	28.8		18.1	22.5	
LOS	D	D		E	D	A	B	C		B	C	
Approach Delay		51.1			40.1			27.6				21.6
Approach LOS		D			D			C				C
Queue Length 50th (ft)	74	105		180	74	0	24	253		79	266	
Queue Length 95th (ft)	119	147		#260	106	40	50	373		133	371	
Internal Link Dist (ft)		571			751			271				453
Turn Bay Length (ft)	200			200		170	170			260		
Base Capacity (vph)	219	788		332	1120	618	301	1472		429	1771	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.58	0.37		0.85	0.19	0.26	0.26	0.58		0.54	0.55	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 8 (7%), Referenced to phase 2:NBT, Start of Green

# Phasings

## 18: Chipman Rd & Pryor Rd

07/25/2023

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 31.0

Intersection LOS: C

Intersection Capacity Utilization 78.2%

ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 18: Chipman Rd & Pryor Rd



Intersection						
Int Delay, s/veh	1.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↕↕	↕↕	↗
Traffic Vol, veh/h	0	183	0	826	933	400
Future Vol, veh/h	0	183	0	826	933	400
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	Free
Storage Length	-	0	-	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	199	0	898	1014	435

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	-	507	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	6.94	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.32	-
Pot Cap-1 Maneuver	0	511	0
Stage 1	0	-	0
Stage 2	0	-	0
Platoon blocked, %			-
Mov Cap-1 Maneuver	-	511	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.5	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT EBLn1	SBT
Capacity (veh/h)	- 511	-
HCM Lane V/C Ratio	- 0.389	-
HCM Control Delay (s)	- 16.5	-
HCM Lane LOS	- C	-
HCM 95th %tile Q(veh)	- 1.8	-

HCM 6th TWSC  
 22: Chipman Rd & Black Twig Rd

07/27/2023

Intersection						
Int Delay, s/veh	4.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	56	282	361	46	58	70
Future Vol, veh/h	56	282	361	46	58	70
Conflicting Peds, #/hr	245	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	75	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	59	297	380	48	61	74

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	673	0	-	0	1064 649
Stage 1	-	-	-	-	649 -
Stage 2	-	-	-	-	415 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	918	-	-	-	247 470
Stage 1	-	-	-	-	520 -
Stage 2	-	-	-	-	666 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	731	-	-	-	144 374
Mov Cap-2 Maneuver	-	-	-	-	265 -
Stage 1	-	-	-	-	381 -
Stage 2	-	-	-	-	530 -

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	24.7
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	731	-	-	-	315
HCM Lane V/C Ratio	0.081	-	-	-	0.428
HCM Control Delay (s)	10.4	-	-	-	24.7
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	2.1

Intersection	
Intersection Delay, s/veh	8.3
Intersection LOS	A

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕		↕	↕			↕			↕	
Traffic Vol, veh/h	0	38	27	59	40	51	14	34	44	54	49	0
Future Vol, veh/h	0	38	27	59	40	51	14	34	44	54	49	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	42	30	65	44	56	15	37	48	59	54	0
Number of Lanes	0	1	0	1	1	0	0	1	0	0	1	0

Approach	SE	NW	NE	SW
Opposing Approach	NW	SE	SW	NE
Opposing Lanes	2	1	1	1
Conflicting Approach Left	SW	NE	SE	NW
Conflicting Lanes Left	1	1	1	2
Conflicting Approach Right	NE	SW	NW	SE
Conflicting Lanes Right	1	1	2	1
HCM Control Delay	8	8.5	8	8.6
HCM LOS	A	A	A	A

Lane	NELn1	NWLn1	NWLn2	SELn1	SWLn1
Vol Left, %	15%	100%	0%	0%	52%
Vol Thru, %	37%	0%	44%	58%	48%
Vol Right, %	48%	0%	56%	42%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	92	59	91	65	103
LT Vol	14	59	0	0	54
Through Vol	34	0	40	38	49
RT Vol	44	0	51	27	0
Lane Flow Rate	101	65	100	71	113
Geometry Grp	2	7	7	5	2
Degree of Util (X)	0.123	0.101	0.131	0.089	0.148
Departure Headway (Hd)	4.379	5.598	4.701	4.485	4.717
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	819	641	763	799	761
Service Time	2.406	3.324	2.427	2.516	2.745
HCM Lane V/C Ratio	0.123	0.101	0.131	0.089	0.148
HCM Control Delay	8	9	8.1	8	8.6
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.4	0.3	0.4	0.3	0.5

