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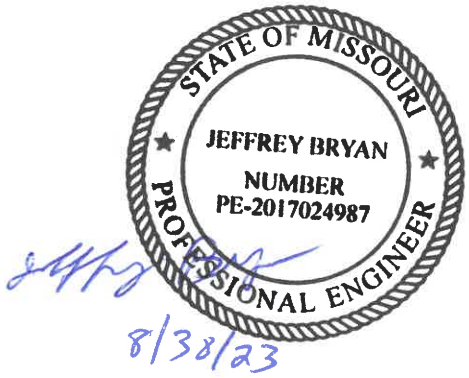
MEMO

Date: August 30, 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 2020 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. 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. This 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 11th 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 10th 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 also included in the memo.

Note, Parcel 11 will consist of an automated car wash which also provides gasoline sales to the general public. To account for the gasoline service, land use code (LUC) 944 was used along with the 6 vehicle fueling positions (vfp). This resulted in a total trip generation of 83 vehicles in the PM peak hour. When considering the 155 vehicles for the automated car wash, an additional 83 vehicles for this land use seems high. A review of pass-by trips for LUC 944 from the *Trip Generation Handbook*, 2nd Edition shows four studies with 6 vfp. The average pass-by trip percentage for those four studies is 53%. The pass-by trip percentage was used to reduce the gas station trip generation to a reasonable volume for the gas station land use. This resulted in an additional 20 entering and 19 exiting trips, which are included in the trip generation for Parcel 11. The following 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
2020 Study Update	12655	407	365	772	593	443	1036
2023 Study Update	12197	441	476	917	648	552	1200
Difference	-458	34	111	145	35	90	164
% Change	-3.6%	8.4%	30.4%	18.8%	5.9%	20.3%	15.8%

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 164 evening peak hour trips. Note, these trip generation numbers could be considered conservative as pass-by trips and internal capture were not included in the determination. Not including the pass-by trips or internal capture is consistent with the previous study.

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 2018 distribution rates were utilized as it was expected that the percentages would not have changed much since that time, nor that a minor change in the rates would have much of an impact on the traffic study. The exhibits from the 2018 study showing the distribution percentages used are included in this memo. Summing 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. Chipman Road at Black Twig Lane could be considered a minor arterial roadway. This would require a right turn lane to be constructed if the right turn volume exceeds 60 vehicles in any hour. The study indicates there are 31 AM and 46 PM right turn vehicles, thus not meeting the right turn lane requirement. Note, there are no additional right turn vehicles on Chipman Road at Black Twig Lane because of this study update.

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 to match the existing conditions:

- 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.
- Chipman Road at Black Twig Lane was changed to show a TWLTL in the east-west direction.
- Black Twig Lane and Lowenstein Drive was changed from two-way stop control to all-way stop control.
- At Black Twig Lane and Lowenstein Drive, a left turn lane was added to the northwest bound direction.
- On Lowenstein Drive between Black Twig Lane 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 the eastbound left turn movement on Lowenstein Drive at Pryor Road in the PM peak hour. Optimization of the cycle length improved movement from LOS F to LOS E. 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	16.8
Summit Woods Xing& Pryor Rd	C	20.1	C	30.2
Eastbound RIRO at Pryor Rd	B	11.3	C	16.5
Lowenstein Dr & Pryor Rd	B	19.7	C	32.9
Chipman Rd & Pryor Rd	C	28.1	C	31.1
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. The analysis also shows the southbound direction on Black Twig Lane at Chipman Road to get better (from LOS E to LOS C, in the PM peak hour). This improvement largely came about by the changes made at the intersection listed on the previous page. The addition of the TWLTL provides a place for southbound left turn vehicles to wait as part of a two-stage movement. This results in the LOS improving with the updated analysis.

The next step is a review of the 95th percentile queue length. To be consistent, the queue lengths are shown based on SimTraffic results, as done in the 2020 update. The 95th percentile queue for each movement at an intersection is shown in the exhibit along with the LOS. The intersection of Summit Woods Crossing and Pryor Road shows a few noteworthy queue lengths, as listed in the following Table 4:

Table 4 – Queue Lengths at Summit Woods & Pryor

Location	Queue Length	Space Available	Comment
PM NB thru on Pryor Rd	516’	±940’	Sufficient storage space
AM EB left on Summit Woods Xing	267’	±200’	Left turn storage space will be full

For the eastbound movement on Summit Woods Crossing, there is a concrete median located at the first access point on Summit Woods Crossing, approximately 240 feet west of the stop bar location. The median provides right-in/right-out only movements for this access point. Therefore, the listed queue length for the eastbound vehicles will not hinder the RIRO movements. In addition, the queue is anticipated to end where the eastbound road is approximately 20 feet wide between the curb and concrete median. This should allow space for any vehicles wanting to make an eastbound through or right turn to get around the left turn queue.

A review of the queue lengths at Lowenstein Drive and Pryor Road also shows a few noteworthy values, which are listed in the following Table 5:

Table 5 – Queue Lengths at Lowenstein & Pryor

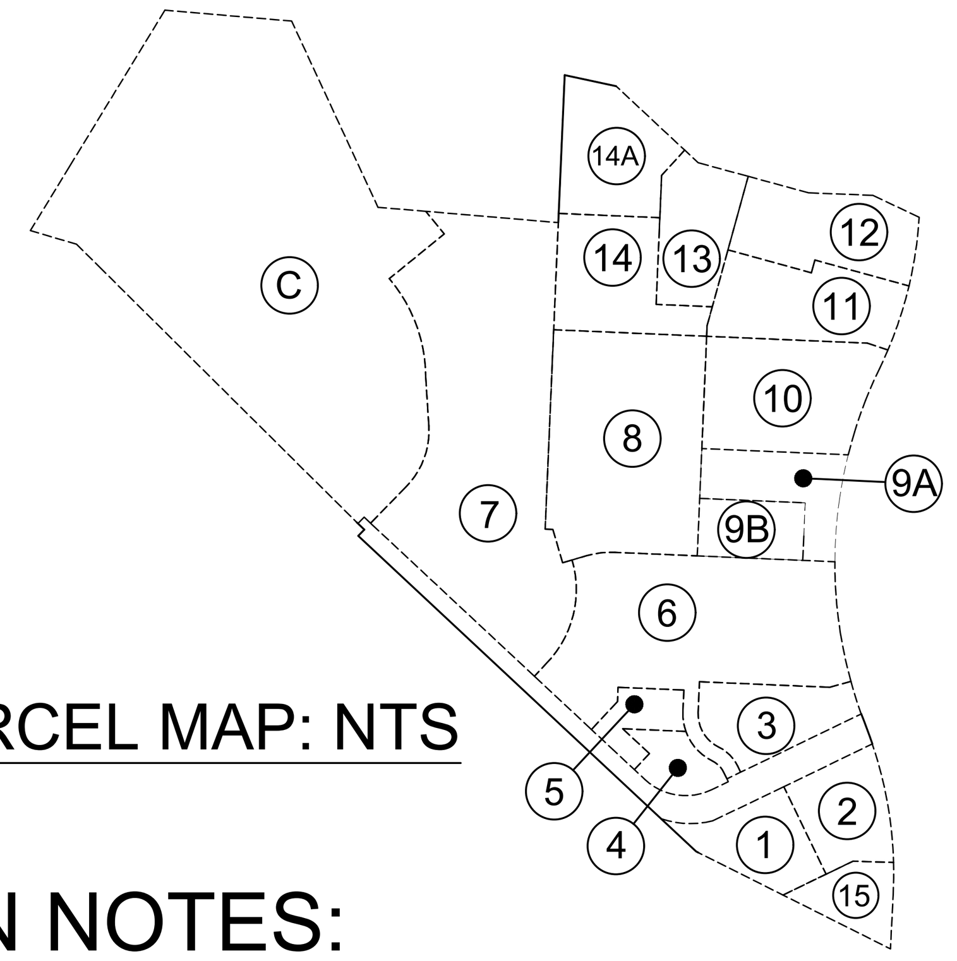
Location	Queue Length	Space Available	Comment
PM SB thru on Pryor Rd	459’	±370’	Queue expected to reach the RIRO
AM EB left on Lowenstein Dr	145’	±150’	Sufficient left turn storage space
AM EB thru on Lowenstein Dr	179’	±325’	Sufficient storage space

The southbound through movement queue length shown would be expected to go back just to the north of the RIRO location. This would mean eastbound right turning vehicles from the RIRO would not be able to complete that movement until the queue had cleared. The PM eastbound RIRO queue length is shown to be 151 feet. The distance between the eastbound stop bar and the next access road to the west is over 320 feet. Therefore, it is not anticipated that a southbound queue backup past the RIRO would impact/hinder the internal circulation.

The eastbound dual left turn lanes on Lowenstein Drive have 150 feet of storage available. The anticipated queue length is expected to fit in this storage space. However, the eastbound through queue length is expected to reach 179 feet. If this happens, the presence of the concrete median on Lowenstein Drive could starve the left turn lane by preventing vehicles from getting around the through lane queue to the left turn lane when desired. It is recommended to monitor this location to see if signal timing changes may be needed in the future.

The westbound left turn lane on Chipman Road at Pryor Road shows a queue length of 288 feet in the PM peak hour. The available storage for this movement is approximately 230 feet. Therefore, this queue is likely to spill out to the inner westbound through lane. Note, no development traffic was anticipated to make this movement. Therefore, it is recommended the City monitor this location and make any future signal timing or geometric changes as may be necessary.

No other study intersections show queue lengths which appear to be problematic.



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-77_9/25/20

PARCEL 1: RESTAURANT (PARCEL 67,758 SQFT = 1.56 ACRES)
- 5,549 SQFT FULL SERVICE DINE-IN RESTAURANT WITH SURFACE PARKING & PATIO

PARCEL 2: RESTAURANT (PARCEL 71,216 SQFT = 1.63 ACRES)
- 3,200 (SOUTH PAD) SQFT FULL SERVICE DINE-IN RESTAURANT WITH SURFACE PARKING & PATIO

PARCEL 3: RESTAURANT (PARCEL 76,395 SQFT = 1.75 ACRES)
- 2,503 SQFT RESTAURANT WITH DRIVE THRU, PATIO AND SURFACE PARKING
- 2,403 SQFT TENANT WITH SURFACE PARKING
- 2,003 SQFT TENANT WITH PATIO AND SURFACE PARKING

PARCEL 4: DRIVE THRU RESTAURANT (PARCEL 33,424 SQFT = .77 ACRES)
- 706 SQFT DRIVE UP RESTAURANT WITH SURFACE PARKING

PARCEL 5: MEDICAL (PARCEL 32,821 SQFT = .75 ACRES)
- 6,500 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 7: SENIOR LUXURY APARTMENT COMPLEX (PARCEL 666,437 SQFT = 10.01 ACRES)
- 165 UNIT AGE RESTRICTED 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: MULTI-TENANT BUILDING (PARCEL 71,401 SQFT = 1.64 ACRES)
- 4,000 SQFT RESTAURANT COMMON WALL BUILDING WITH SITE FEATURES & SURFACE PARKING
- 4,000 SQFT RETAIL COMMON WALL BUILDING WITH SITE FEATURES & SURFACE PARKING

PARCEL 9B: RESTAURANT (PARCEL 48,528 SQFT = 1.11 ACRES)
- 4,000 SQFT BUILDING WITH SITE FEATURES & SURFACE PARKING

PARCEL 10: MULTI-TENANT BUILDING (PARCEL145,724 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
- 4,600 SQFT COMMON WALL BUILDING WITH SITE FEATURES & SURFACE PARKING

PARCEL 11: FREE STANDING RESTAURANT (PARCEL 111,008 SQFT = 2.55 ACRES)
- 7,500 SQFT FULL SERVICE DINE-IN RESTAURANT WITH SITE FEATURES & SURFACE PARKING

PARCEL 12: FREE STANDING RESTAURANT (PARCEL 108,275 SQFT = 2.49 ACRES)
- 7,500 SQFT FULL SERVICE DINE-IN RESTAURANT WITH SITE FEATURES & SURFACE PARKING

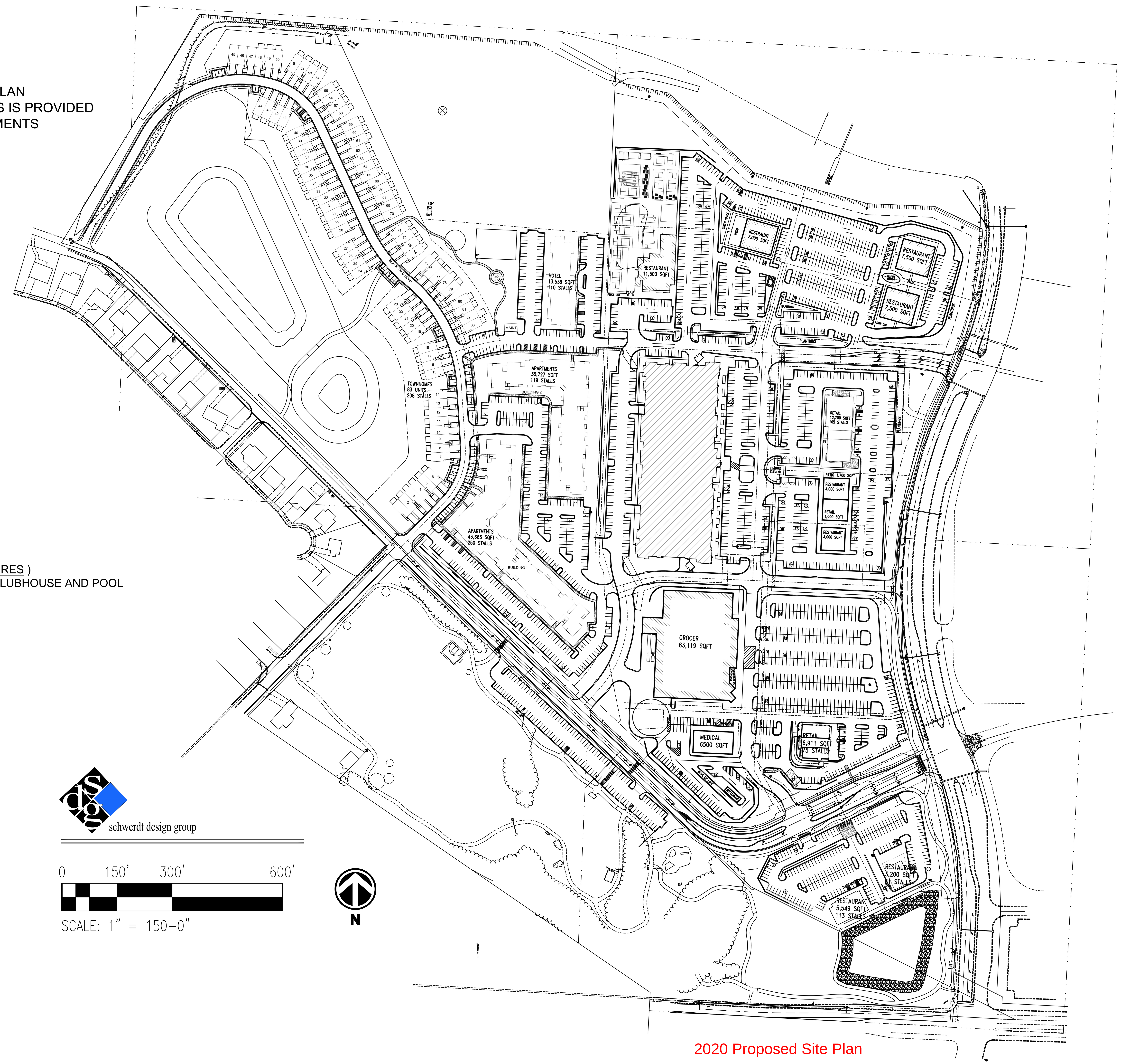
PARCEL 13: RESTAURANT (PARCEL 81,134 SQFT = 1.86 ACRES)
- 7,000 SQFT RESTAURANT WITH SURFACE PARKING

PARCEL 14: RESTAURANT (PARCEL 106,702 SQFT = 2.44 ACRES)
- RESTAURANT WITH BALL COURTS AND SURFACE PARKING

PARCEL 14A: RESTAURANT BALL COURTS (PARCEL 102,110 SQFT = 2.35 ACRES)
- BALL COURTS FOR PARCEL 14 RESTAURANT WITH SURFACE PARKING

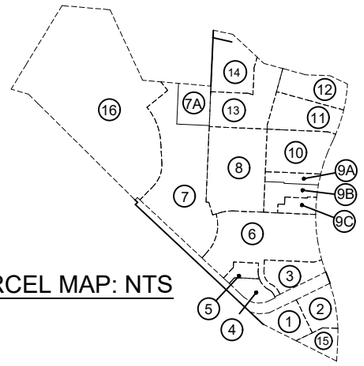
PARCEL 15: POND/ WATER FEATURE (PARCEL 44,366 SQFT = 1.02 ACRES)
- WATER FEATURE

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



schwerdt design group

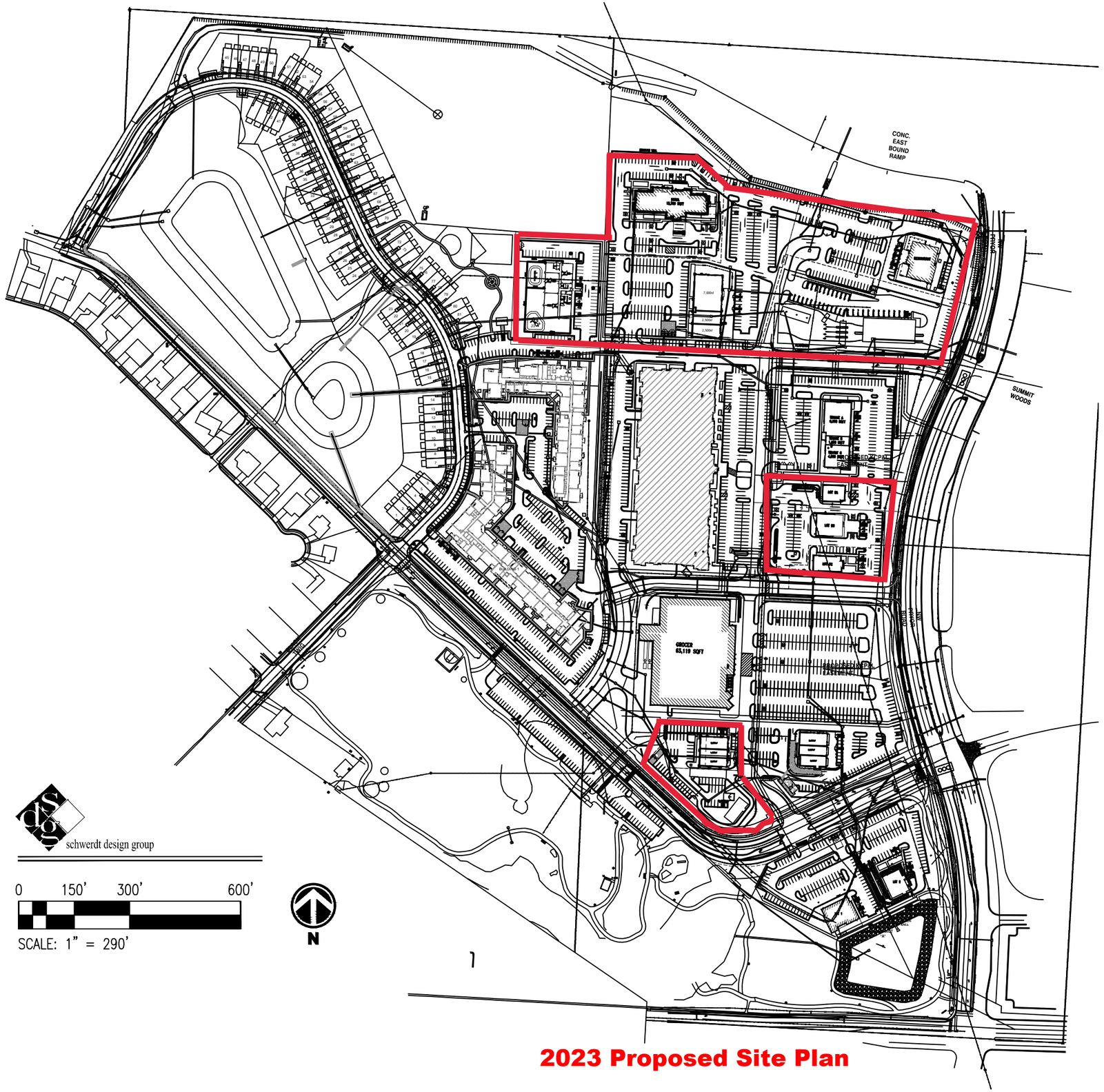
2020 Proposed Site Plan



PARCEL MAP: NTS

Parcels that have been revised from the 2020 Proposed Site Plan

Parcels: 4, 5, 9, 11, 12, 13 and 14



2023 Proposed Site Plan

Trip Generation - 10th Edition - October 2020

							Trip Ends						
Parcel	**Building Use**	**Phase 1 or 2**	**Dwelling Units**	**Building Size Sq Ft**	**ITE Land Use Code**	**Comments**	**Daily**	**AM Total**	**PM Total**	**AM Enter**	**AM Exit**	**PM Enter**	**PM Exit**
(#)	(text)		(#)	(sq ft)	(#)	(text)	(trips)	(trips)	(trips)	(trips)	(trips)	(trips)	(trips)
1	Sit down Restaurant	1		6,500	932	High Turnover (Sit-Down) Restaurant	729		64			39	24
2	Fast food restaurant	1		3,200	934	Fast-Food Restaurant with Drive-Through Window	1,507	129	105	66	63	54	50
3	Fast food restaurant	1		4,650	934	Fast-Food Restaurant with Drive-Through Window	2,190	187	152	95	92	79	73
3	Retail	1		2,260	820	Shopping Center	457	153	33	95	58	16	17
4	Drive Through Only Restaurant	1		710	935	Fast-Food Restaurant Drive-Through No Indoor Seating	326	24	30	12	12	15	15
5	Medical	1		6,500	630	Clinic	248	24	21	19	5	6	15
6	Grocery	1		63,500	850	Peak Hour of Adjacent Street Used	5,714	243	557	146	97	284	273
7 (Plat 2 Replat Lot2)	Apartments	4	184		221	Multifamily Housing (Mid-Rise)	1001	62	80	16	46	49	31
8	Apartments & Clubhouse	3	237		220	Peak Hour of Adjacent Street Used	1751	108	127	25	83	80	47
8	Retail	3		6,000	820	Shopping Center	887	155	68	96	59	33	35
8	Dine-in Restaurant	3		11,000	932	High Turnover (Sit-Down) Restaurant	1,234	109	107	60	49	67	41
8	Office	3		2,000	715	Single Tenant Office Building	23	4	3	3	1	0	3
8	Fitness	3		3,500	492	Health/Fitness Club		5	12	3	2	7	5
9	Sit down Restaurant	3		8,000	932	High Turnover (Sit-Down) Restaurant	897		78			48	30
9	Retail	3		4,000	820	Shopping Center	674	154	50	95	58	24	26
10	Sit down Restaurant	3		11,250	932	High Turnover (Sit-Down) Restaurant	1,262		110			68	42
10	Retail	3		1,600	820	Shopping Center	361	153	25	95	58	12	13
11	Sit down Restaurant	2		8,500	932	High Turnover (Sit-Down) Restaurant	954		83			51	32
12	Sit down Restaurant	2		8,500	932	High Turnover (Sit-Down) Restaurant	954		83			51	32
13	Sit down Restaurant	2		7,500	932	High Turnover (Sit-Down) Restaurant	841		73			45	28
14	Sit down Restaurant w/ courts*	2		11,500	932	High Turnover (Sit-Down) Restaurant	1,290		112			84	51
Plat 2 Lot 3	Hotel	Tract C	88		310	Hotel	1262	84	82	50	34	44	38
Plat 2 Lot 1	Townhomes	5	83		220	Multifamily Housing (Low-Rise)	587	40	50	9	31	32	19
	Total		**0**				**19,939**	**1,632**	**2,107**	**884**	**749**	**1,190**	**939**

* This restaurant includes athletic/activity courts. An extra 20% trips was added to the generated trips to account for busier than normal activity.

	Daily	**AM Total**	**PM Total**	**AM Enter**	**AM Exit**	**PM Enter**	**PM Exit**
Original Study Site	19,334	1,339	1,741	655	684	968	773
2018 Updated Site Plan	21,084	1,307	1,781	678	629	988	793
2020 Updated Site Plan	19,939	1,632	2,107	884	749	1,190	939
Difference between 2018 Update and 2020 Updated Site	-1,145	325	326	206	120	202	146

Trip Generation - Changed Parcels

						2023 Study Update							From 2020 Study Update						
							AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour		
Parcel #	Phase #	Proposed Land Use	Dwelling Units or Rooms	Building Size (ft^2)	ITE Land Use Code	Daily Trips	Entering	Exiting	Total	Entering	Exiting	Total	Daily Trips	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							
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
11	2	Gasoline/Service Station	6 vfp		944					20	19	39							
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
16	4	Apartments (villa)	83		220	607	12	37	49	35	21	56	587	9	31	40	32	19	51
		Total				12197	441	476	917	648	552	1200	12655	407	365	772	593	443	1036

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

Trip End Comparison

	Daily Trips	AM Entering	AM Exiting	AM Total	PM Entering	PM Exiting	PM Total
2020 Study Update	12655	407	365	772	593	443	1036
2023 Study Update	12197	441	476	917	648	552	1200
Differernce	-458	34	111	145	55	109	164
% Change	-3.6%	8.4%	30.4%	18.8%	9.3%	24.6%	15.8%

Trip Generation Differences by Parcel

						2023 Study Update						
							AM Peak Hour			PM Peak Hour		
Parcel #	Phase #	Proposed Land Use	Dwelling Units or Rooms	Building Size (ft^2)	ITE Land Use Code	Daily Trips	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
11	2	Gasoline/Service Station	6 vfp		944		0	0	0	20	19	39
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
			Total			12197	34	111	145	55	109	164

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

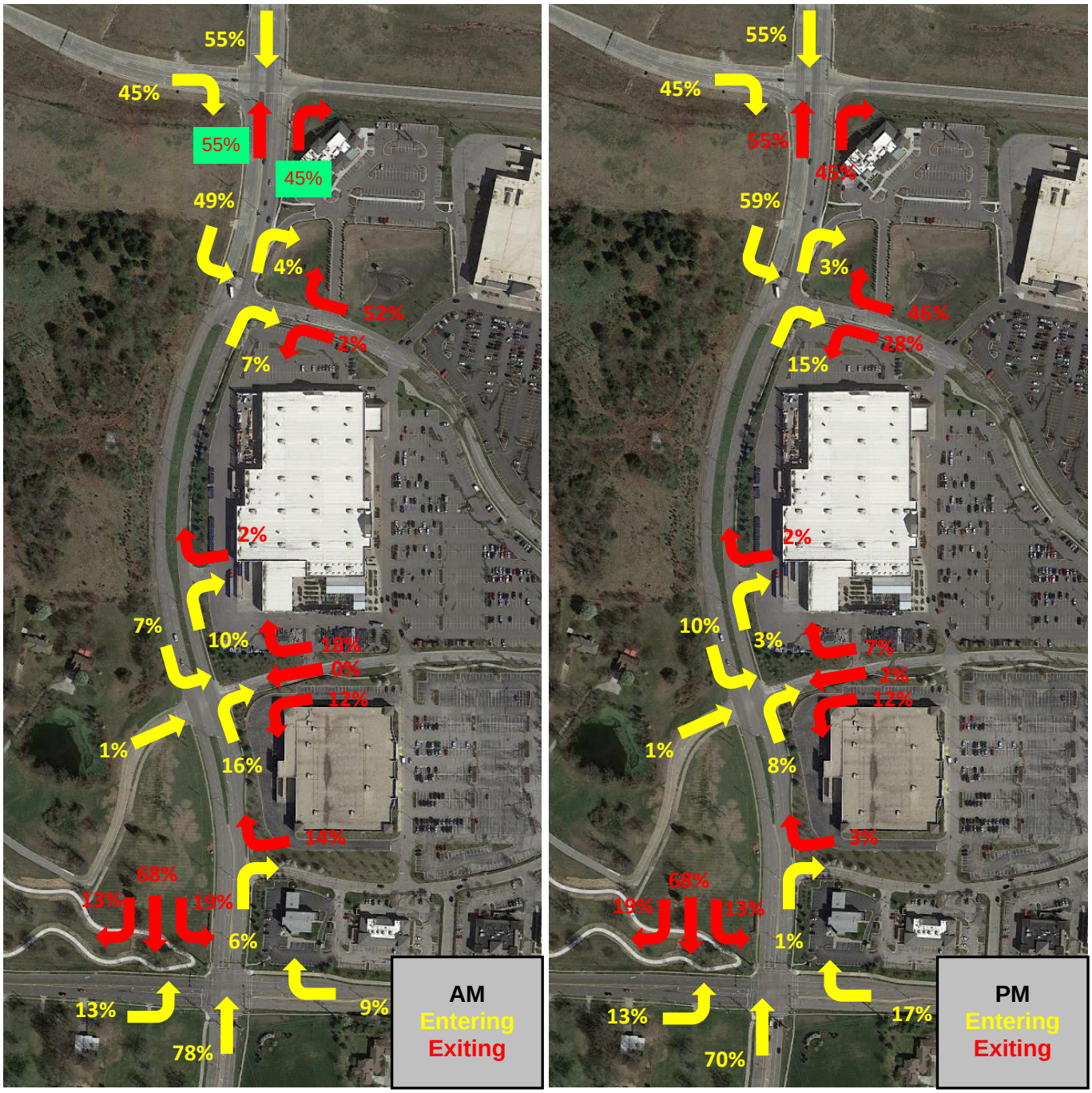
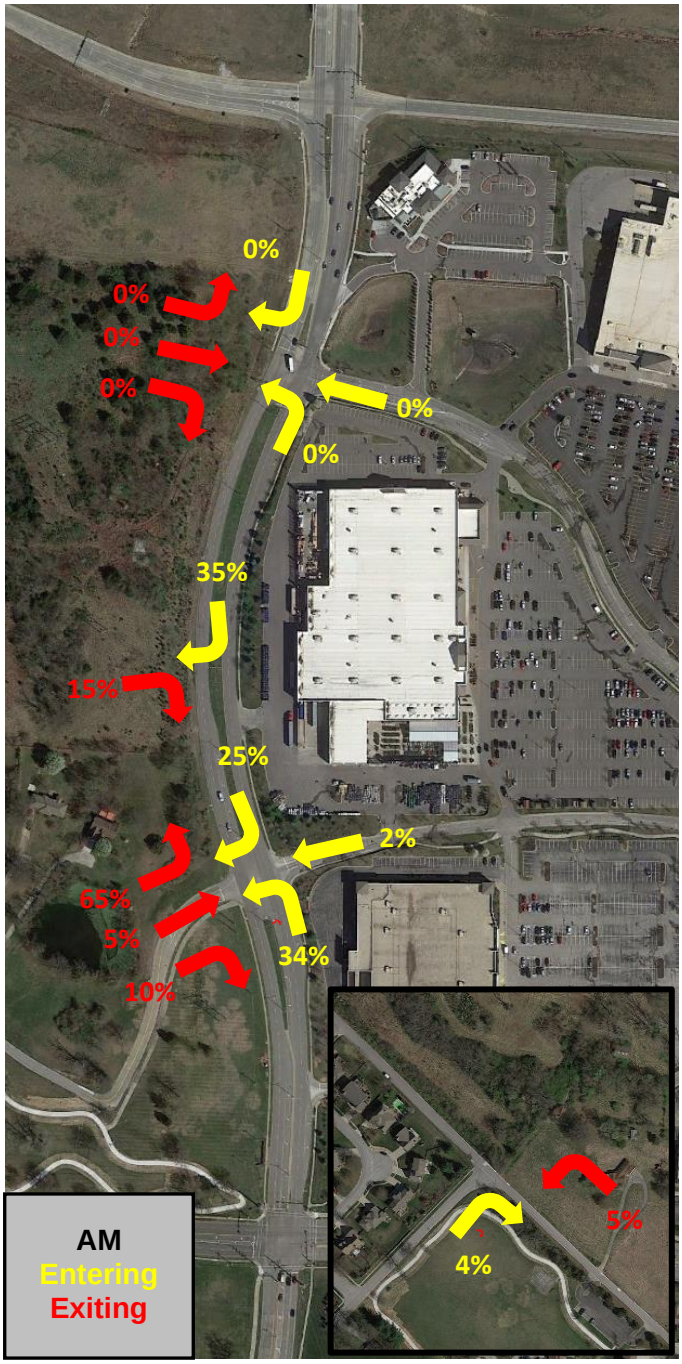


Exhibit 4 - Existing Summit Woods Traffic Distribution

Estimated Phase 1 Traffic Distribution



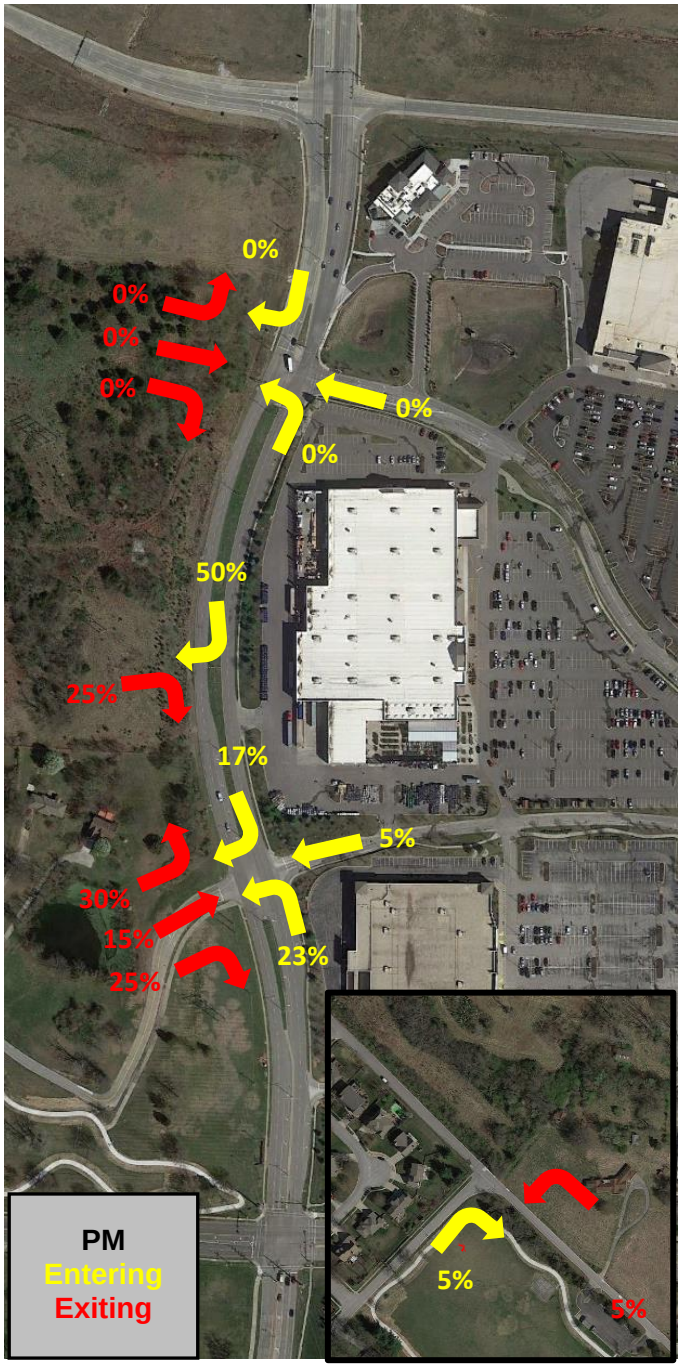
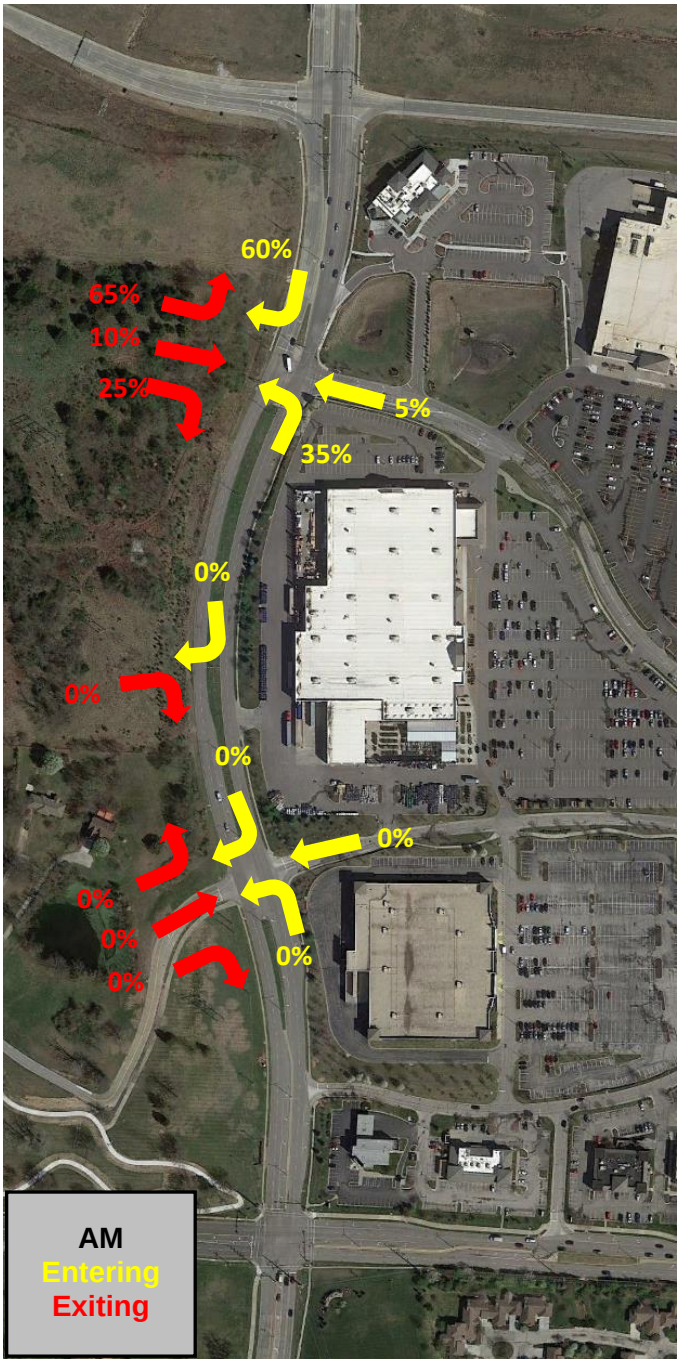


Exhibit 4 - Phase One Traffic Distribution

Estimated Phase Two Traffic Distribution



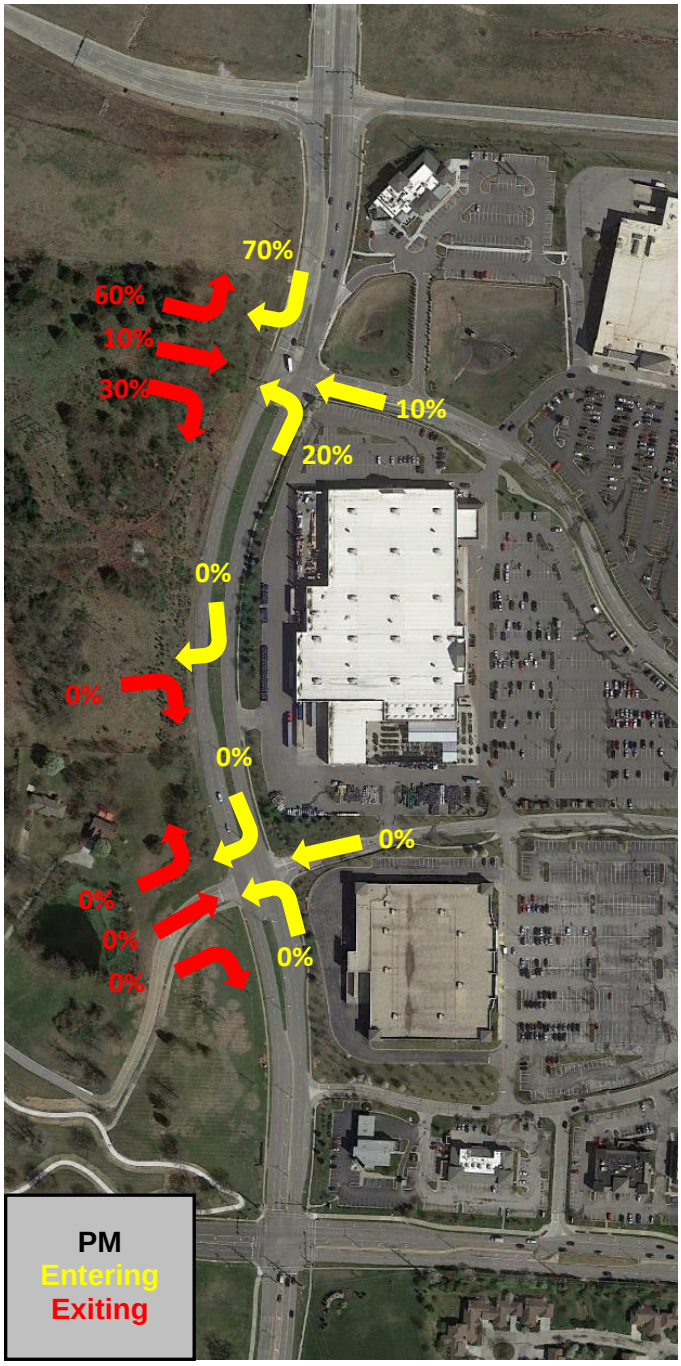
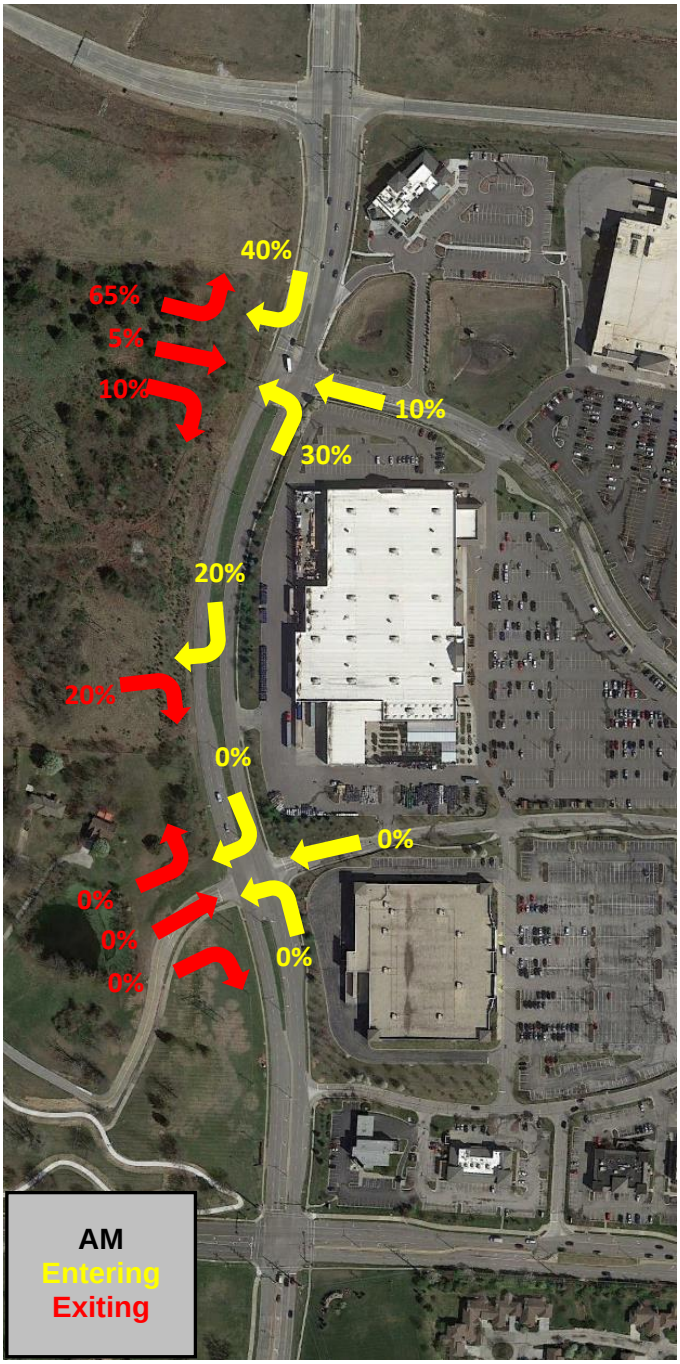


Exhibit 4 - Phase Two Traffic Distribution

Estimated Phase Three Traffic Distribution



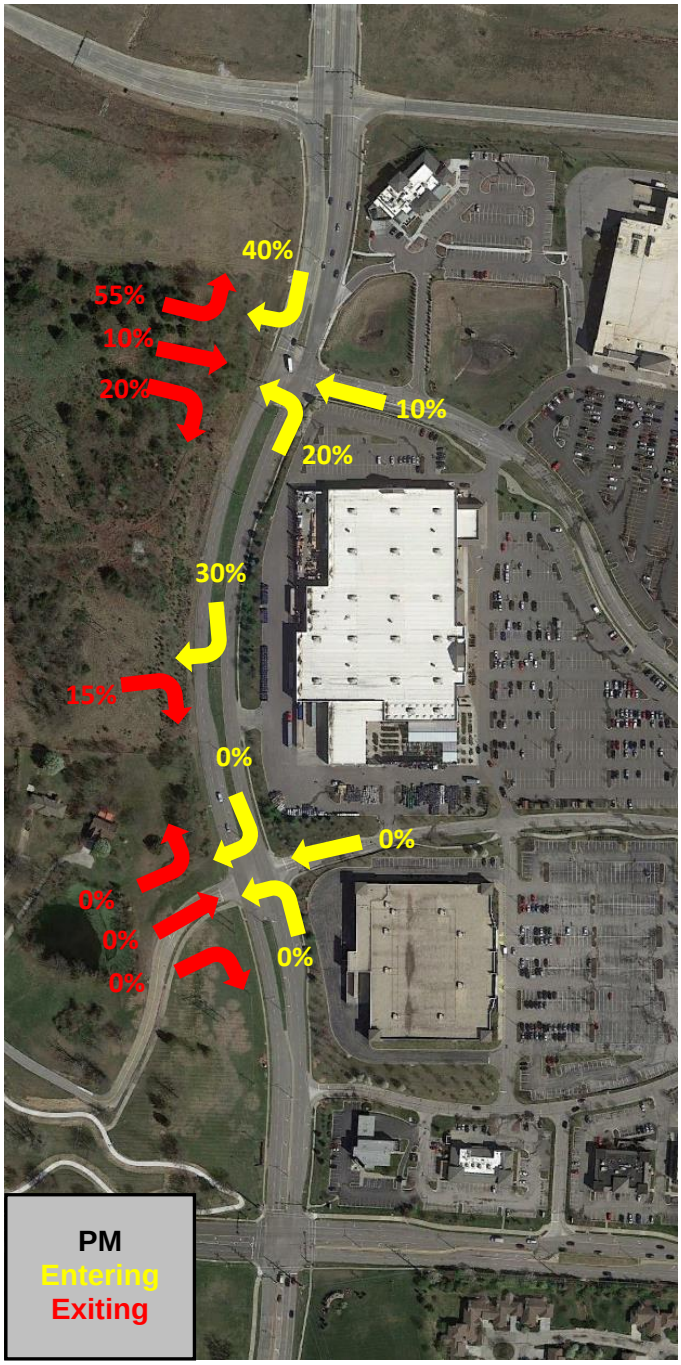


Exhibit 4 - Phase Three Traffic Distribution

Estimated Phases Four & Five Traffic Distribution

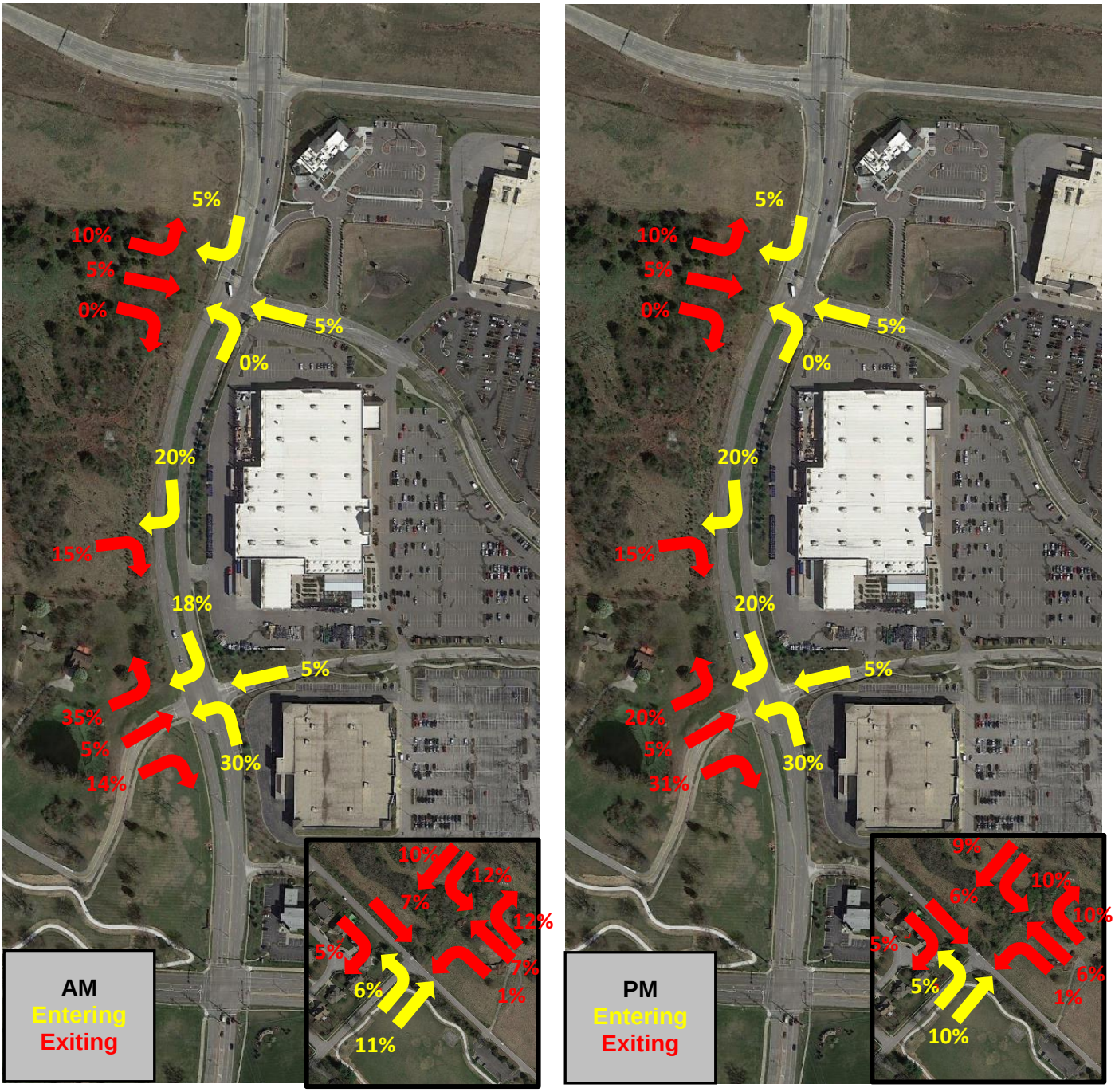
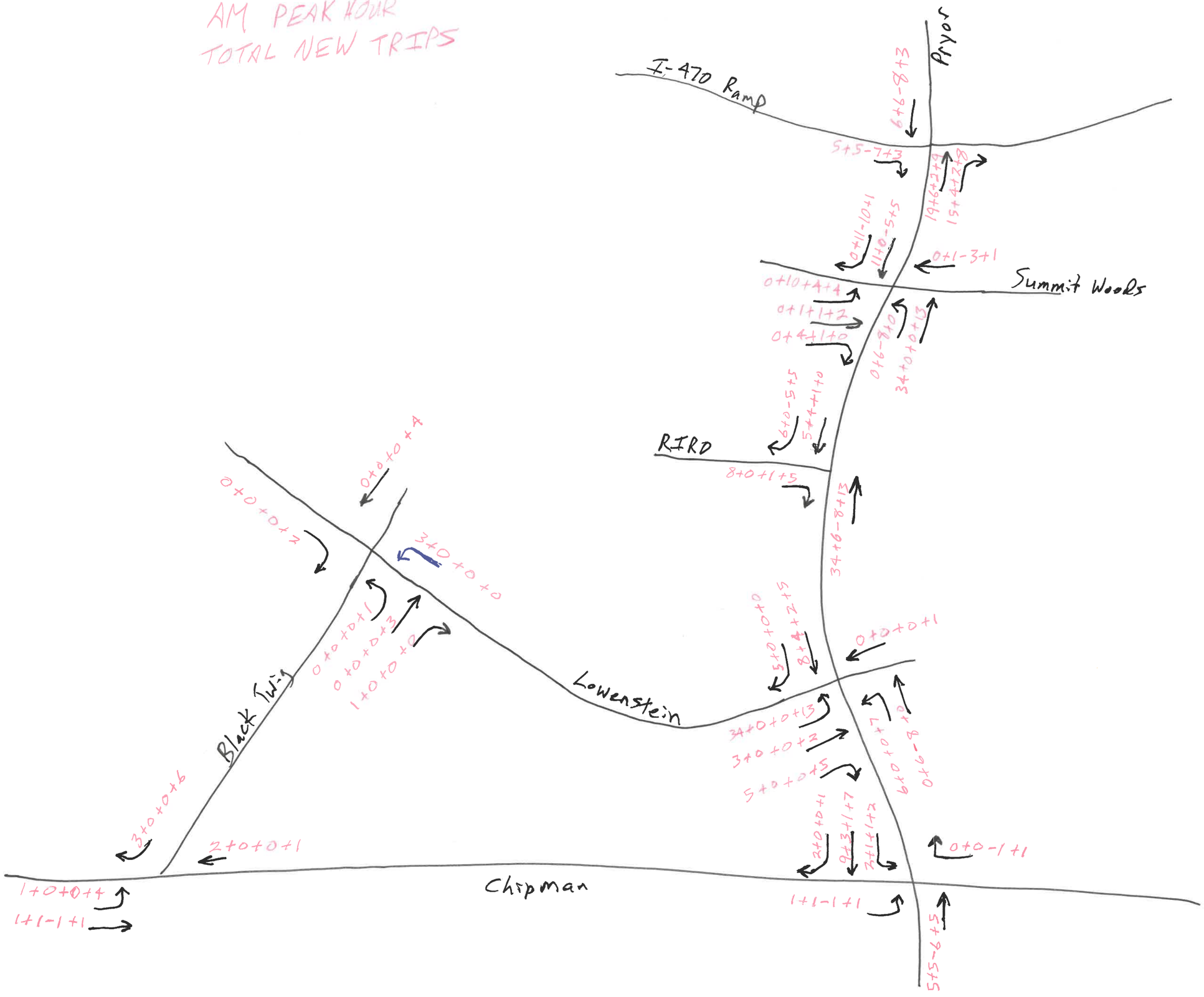
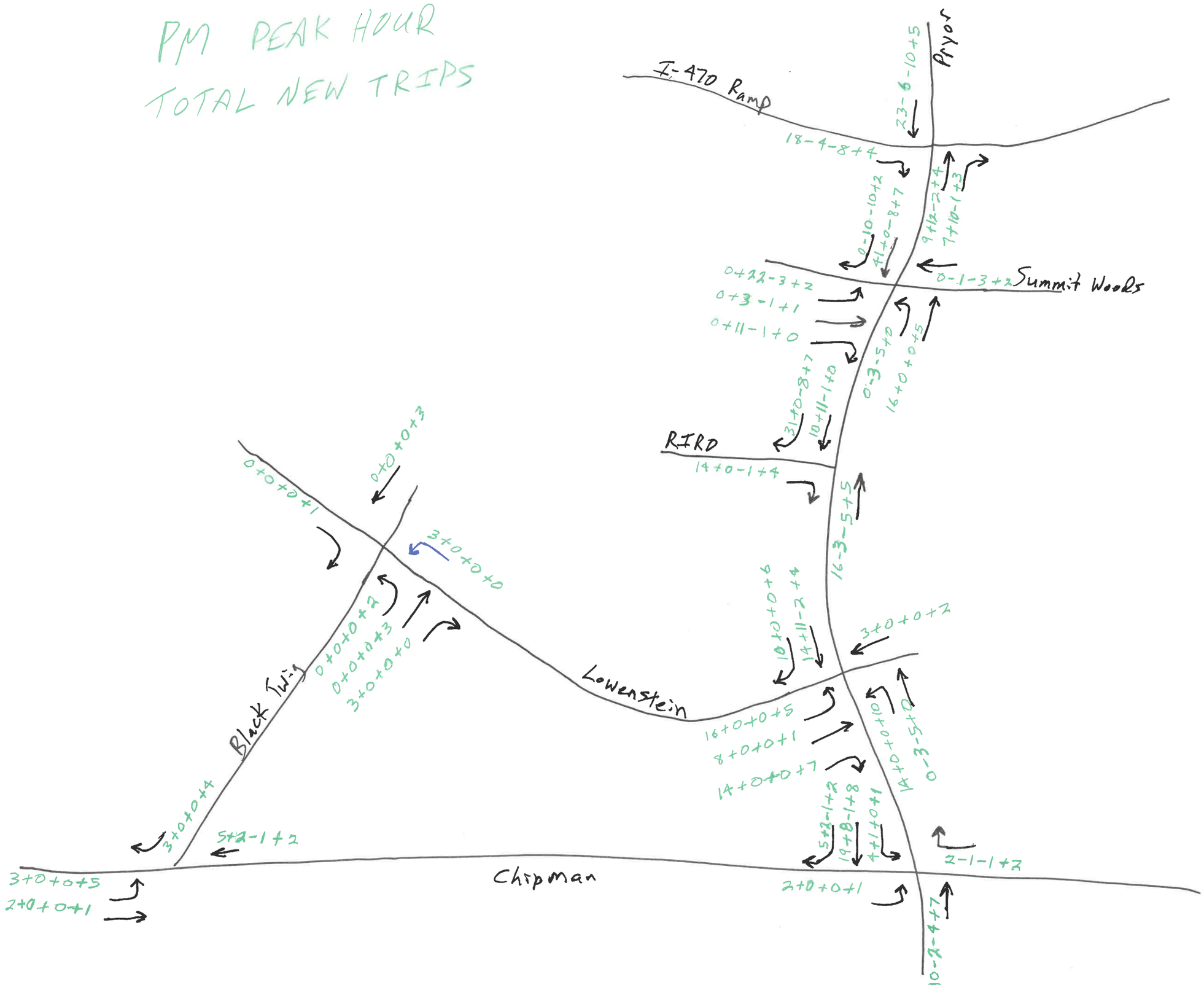


Exhibit 4 - Phase Four & Five Traffic Distribution

AM PEAK HOUR
TOTAL NEW TRIPS



PM PEAK HOUR
TOTAL NEW TRIPS



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8/29/2023

Overall Layout

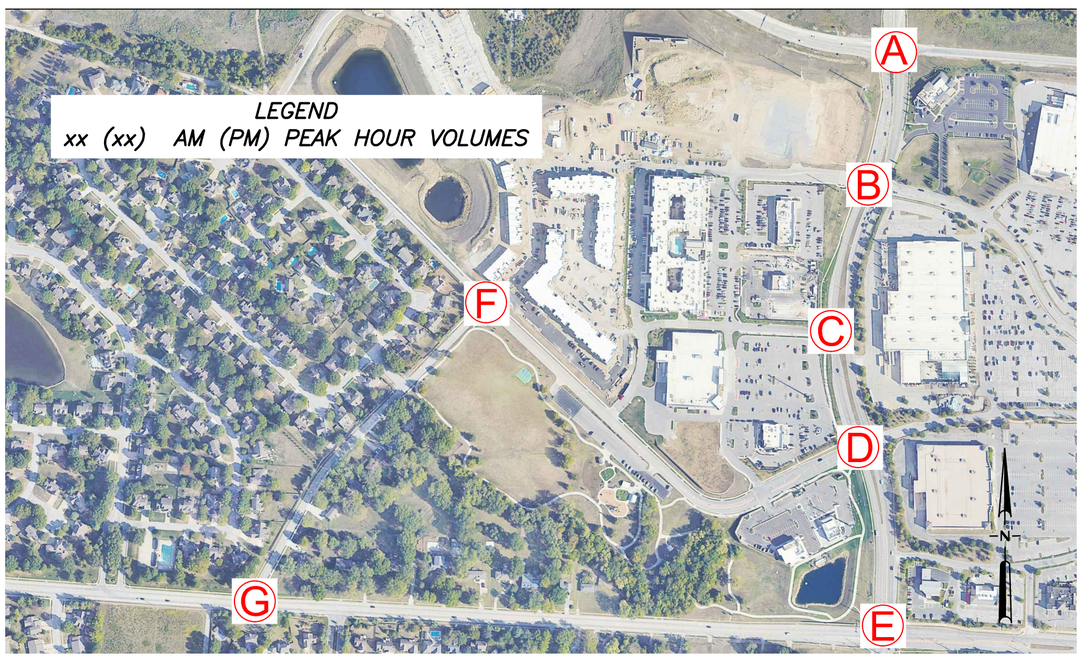


Exhibit A

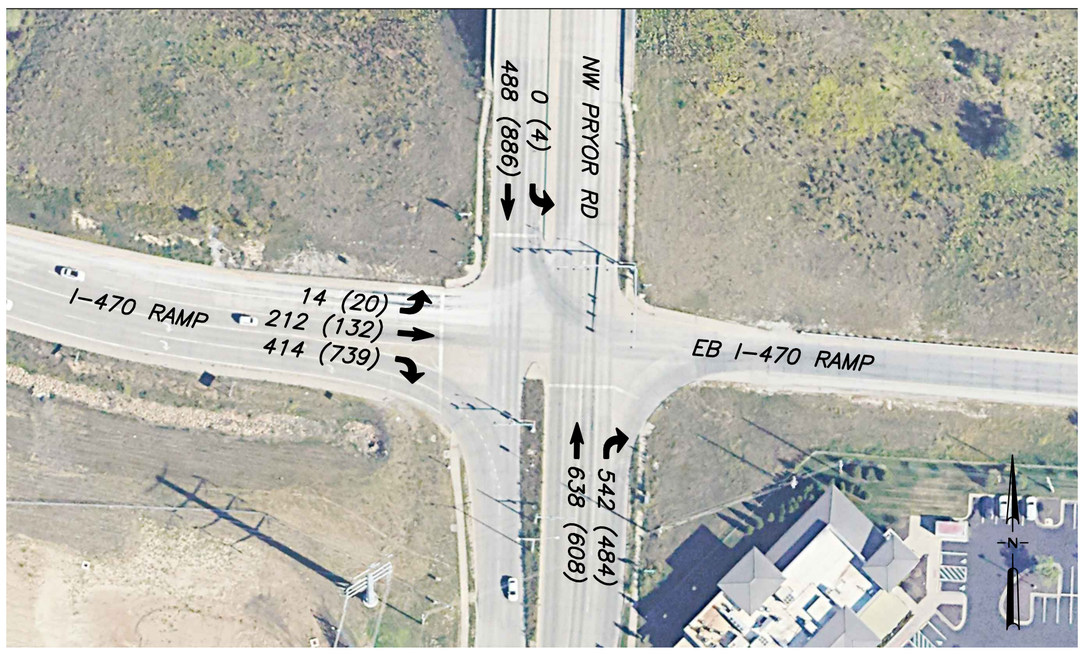


Exhibit B

Exhibit C

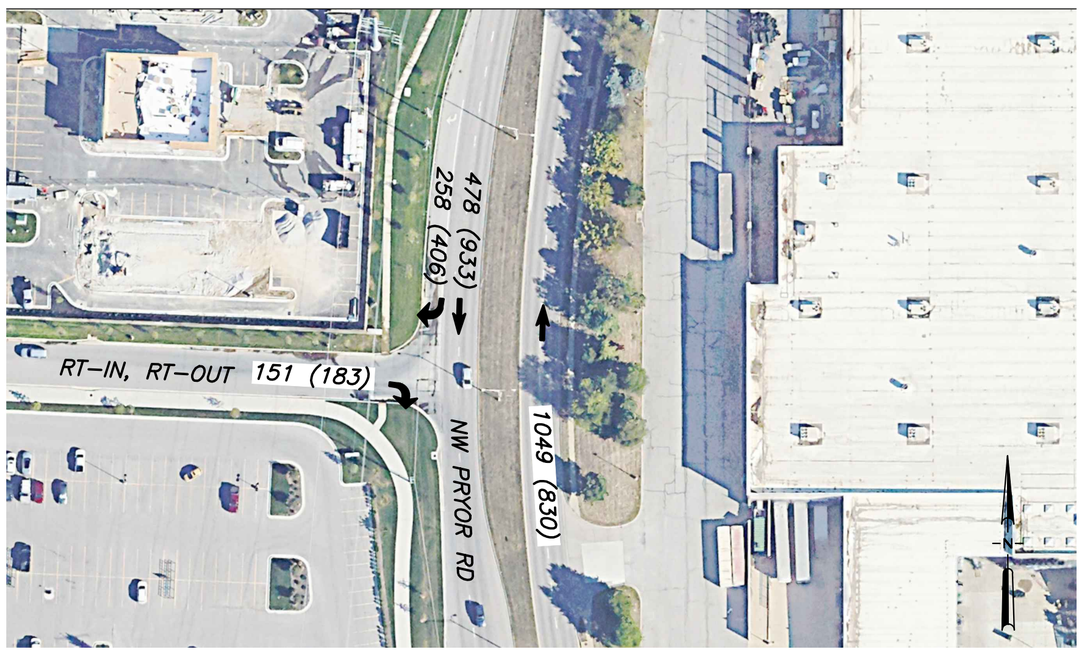


Exhibit D

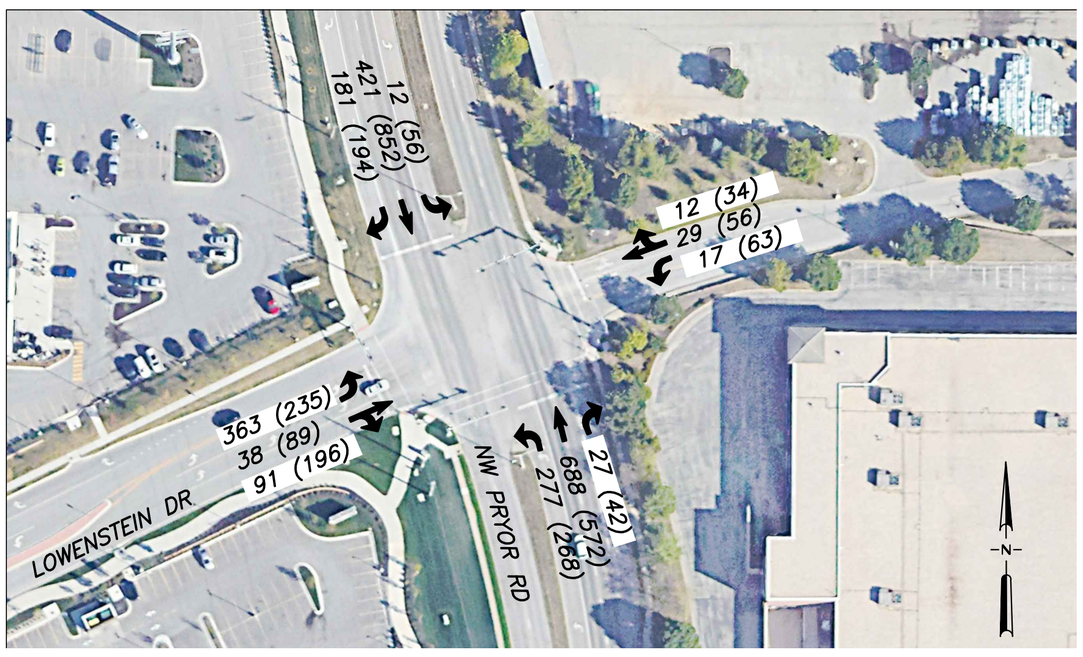


Exhibit E

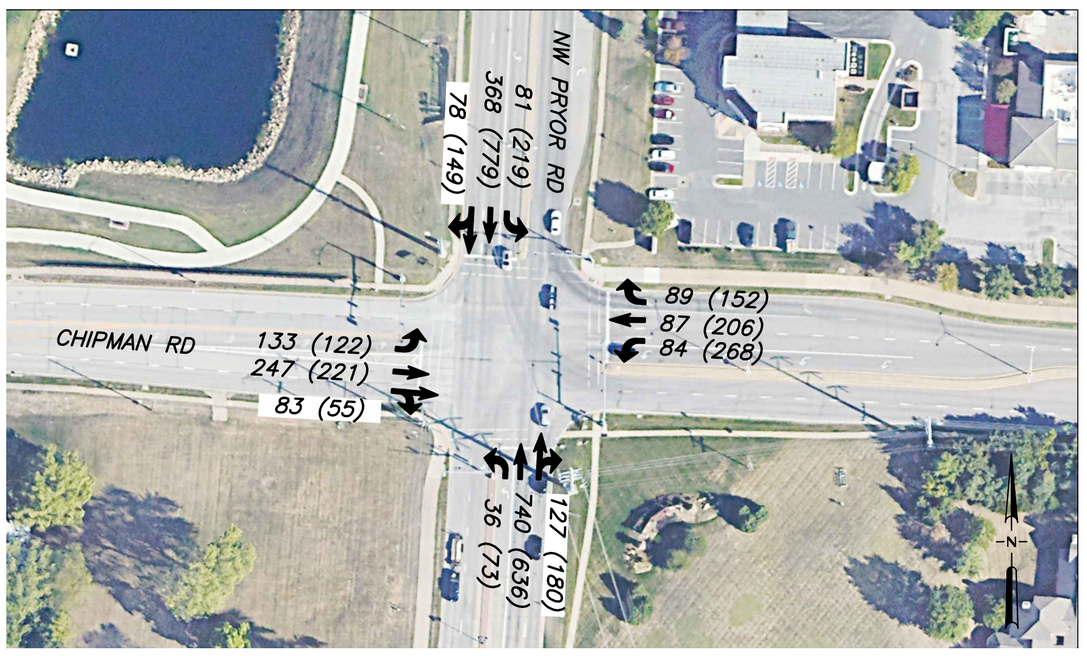
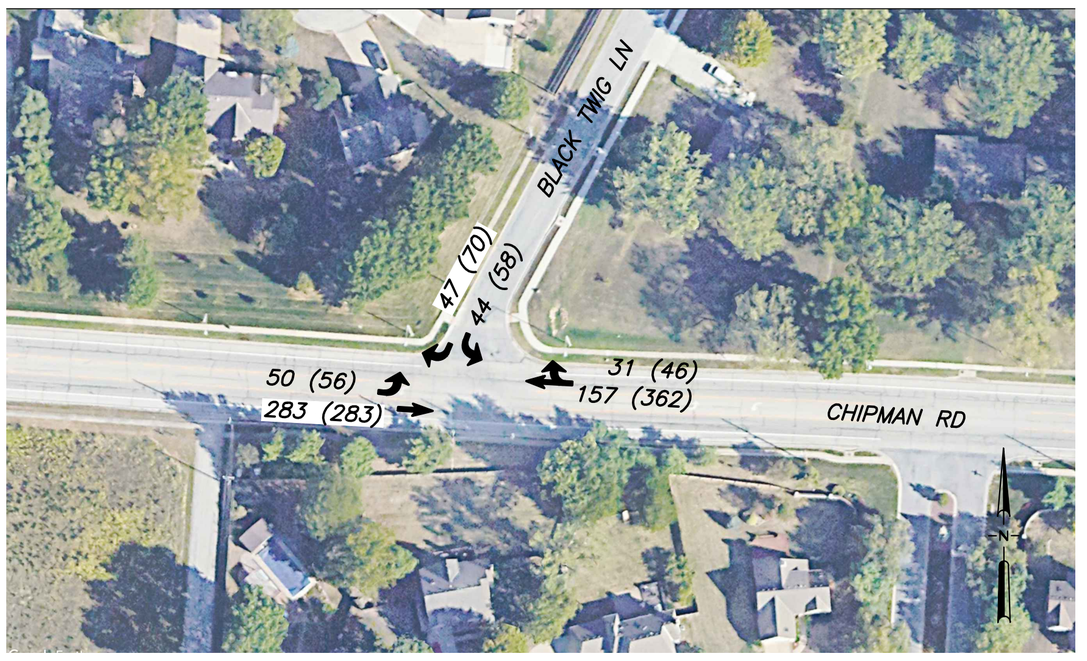


Exhibit F

Exhibit G



1
1 OF 1

CITY OF LEE'S SUMMIT, MISSOURI

2023 WEST PRYOR RD TIS UPDATE

TOTAL INTERSECTION VOLUMES

Affinis corp
ENGINEERS • SURVEYORS
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Overland Park, Kansas 66210
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Issued: Notes: Drawn: Checked: Approved:

Filename:
Job #
Drawer:

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
Warrant 1, Eight-Hour Vehicular Volume		
	No	
Condition A or B Met?	No	0 Hours met (8 required)
Condition A and B Met?	No	0 Hours met (8 required)
Warrant 2, Four-Hour Vehicular Volume		
	No	0 Hours met (4 required)
Warrant 3, Peak Hour		
	No	
Condition A Met?	No	0 Hours met (1 required)
Condition B Met?	No	0 Hours met (1 required)
Warrant 4, Pedestrian Volume		
	No	
Condition A Met?	No	0 Hours met (4 required)
Condition B Met?	No	0 Hours met (1 required)
Warrant 5, School Crossing		
	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
07:30 to 08:30	**0**		**333**		No	No	No	No
Condition A	Volume >= 100% column (500)?	No	Volume >= 100% column (200)?	Yes				
	Volume >= 80% column (400)?	No	Volume >= 80% column (160)?	Yes				
Condition B	**Volume >= 100% column (750)?**	No	**Volume >= 100% column (100)?**	Yes				
	Volume >= 80% column (600)?	No	**Volume >= 80% column (80)?**	Yes				
07:45 to 08:45	**0**		**251**		No	No	No	No
Condition A	Volume >= 100% column (500)?	No	Volume >= 100% column (200)?	Yes				
	Volume >= 80% column (400)?	No	Volume >= 80% column (160)?	Yes				
Condition B	**Volume >= 100% column (750)?**	No	**Volume >= 100% column (100)?**	Yes				
	Volume >= 80% column (600)?	No	**Volume >= 80% column (80)?**	Yes				
08:00 to 09:00	**0**		**168**		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)?	Yes				
Condition B	**Volume >= 100% column (750)?**	No	**Volume >= 100% column (100)?**	Yes				
	Volume >= 80% column (600)?	No	**Volume >= 80% column (80)?**	Yes				
08:15 to 09:15	**0**		**84**		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)?**	Yes				

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

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

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

17:45 to 18:45	0		103		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				

Warrant 2: Four-hour Vehicular Volume

1: Chipman Road & Black Twig Lane

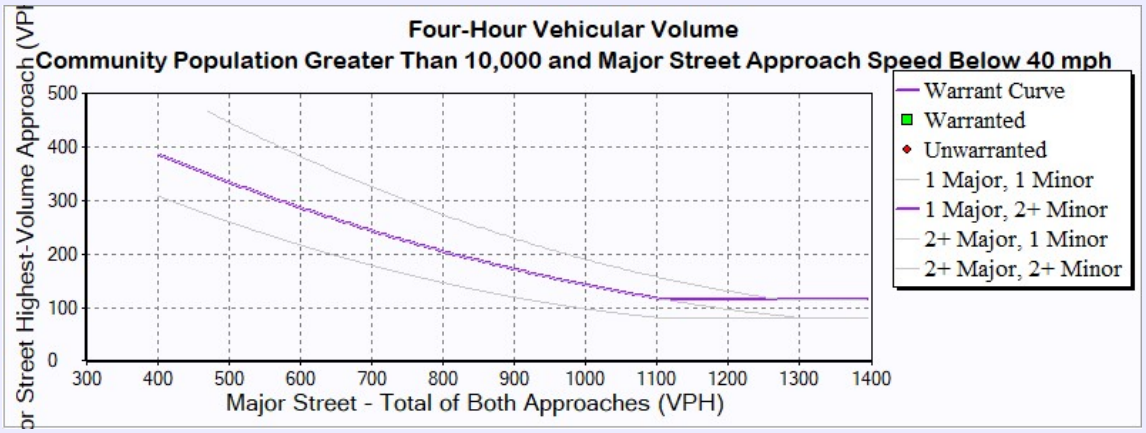
Intersection Information:

	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?	No



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? No

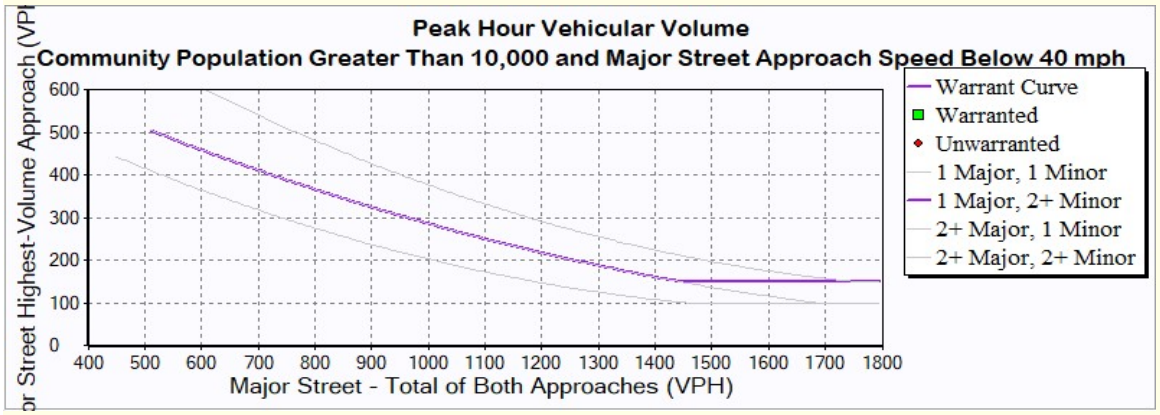
Condition A Met? No

Notes 0 Hours met (1 required)

Condition B Met? No

Notes 0 Hours met (1 required)

Minor Approach Time Delay Condition Met?	Not Met
Minor Approach Volume Condition Met?	Met
Total Entering Intersection Volume Condition Met?	Not Met



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

Warrant 4: Pedestrian Volume

1: Chipman Road & Black Twig Lane

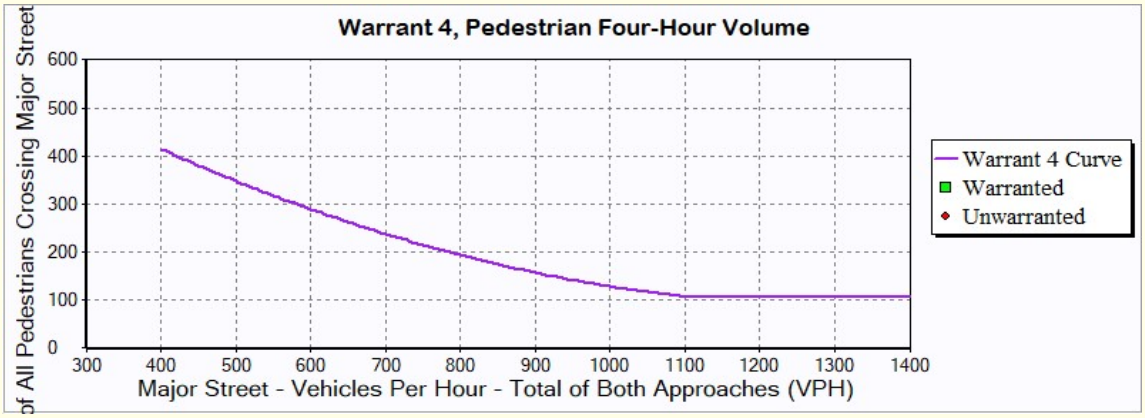
Intersection Information:

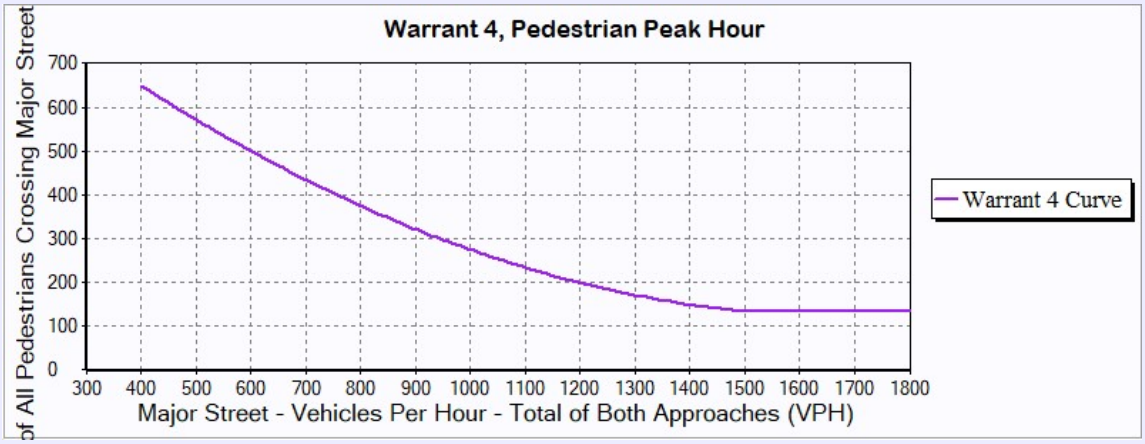
	Major Street	Minor Street
Street Name	-	Black Twig Lane
Direction		EB/WB/SB
Number of Lanes	1	2
Approach Speed	0	35

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)	Distance to Closest Signal (Must be N/A or > 1000)
No	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	No	0	No
07:45 to 08:45	0	251	No	No	0	No	0	No
08:00 to 09:00	0	168	No	No	0	No	0	No
08:15 to 09:15	0	84	No	No	0	No	0	No
17:00 to 18:00	0	407	No	No	0	No	0	No
17:15 to 18:15	0	306	No	No	0	No	0	No
17:30 to 18:30	0	205	No	No	0	No	0	No
17:45 to 18:45	0	103	No	No	0	No	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

Condition A, Total Entering Volume

Existing Peak Hour	873
Years	0.00
Future Peak Hour	873
Warrant 1 in 5 Years?	No
Warrant 2 in 5 Years?	No
Warrant 3 in 5 Years?	No

Condition B, Non-normal Business Day

	Existing	Future
Highest Hour	0	0
Second Highest Hour	0	0
Third Highest Hour	0	0
Fourth Highest Hour	0	0
Fifth Highest Hour	0	0
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

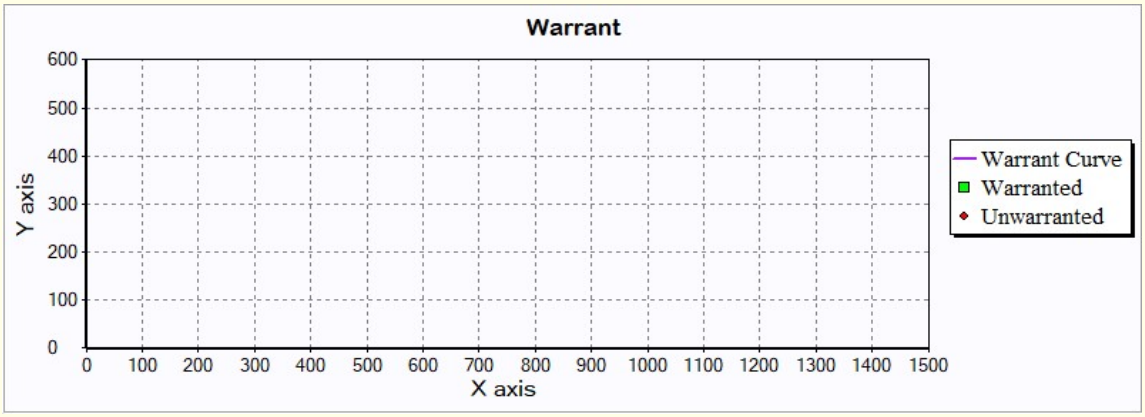
Distance from the center of the track to the stop or yield line — Interpolated

Number of occurences 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 uknown, 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?	No	Qualifying Crashes	0
Condition B Met?	No	Major Street 85th %-tile Speed	0.00
Condition C Met?	No	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	Minor Street	
					Veh Vol > 210	Avg(Veh + Ped + Bicycle) > 200	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
Warrant 1, Eight-Hour Vehicular Volume		
	No	
Condition A or B Met?	No	0 Hours met (8 required)
Condition A and B Met?	No	0 Hours met (8 required)
Warrant 2, Four-Hour Vehicular Volume		
	No	0 Hours met (4 required)
Warrant 3, Peak Hour		
	No	
Condition A Met?	No	0 Hours met (1 required)
Condition B Met?	No	0 Hours met (1 required)
Warrant 4, Pedestrian Volume		
	No	
Condition A Met?	No	0 Hours met (4 required)
Condition B Met?	No	0 Hours met (1 required)
Warrant 5, School Crossing		
	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
07:30 to 08:30	**0**		**102**		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				
07:45 to 08:45	**0**		**78**		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				
08:00 to 09:00	**0**		**53**		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				
08:15 to 09:15	**0**		**27**		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				

17:00 to 18:00	0		150		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				

17:15 to 18:15	0		114		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				

17:30 to 18:30	0		76		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				

17:45 to 18:45	0		38		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

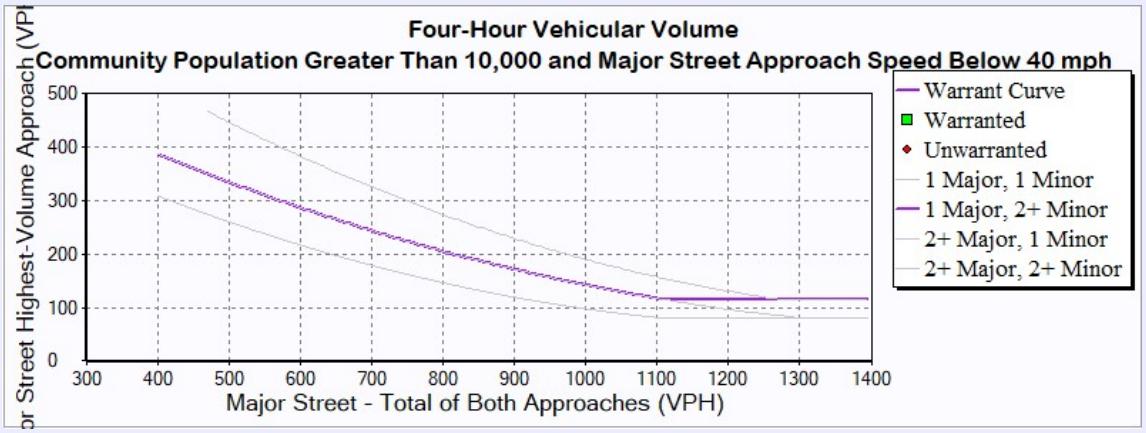
Intersection Information:

	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?	No



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? No

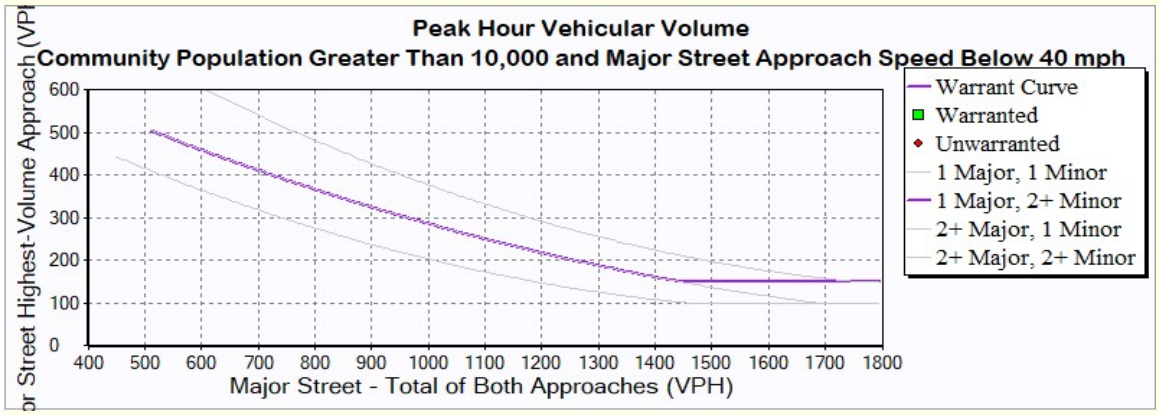
Condition A Met? No

Notes 0 Hours met (1 required)

Condition B Met? No

Notes 0 Hours met (1 required)

Minor Approach Time Delay Condition Met?	Not Met
Minor Approach Volume Condition Met?	Met
Total Entering Intersection Volume Condition Met?	Not Met



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

Warrant 4: Pedestrian Volume

1: Lowenstein Drive & Black Twig Lane

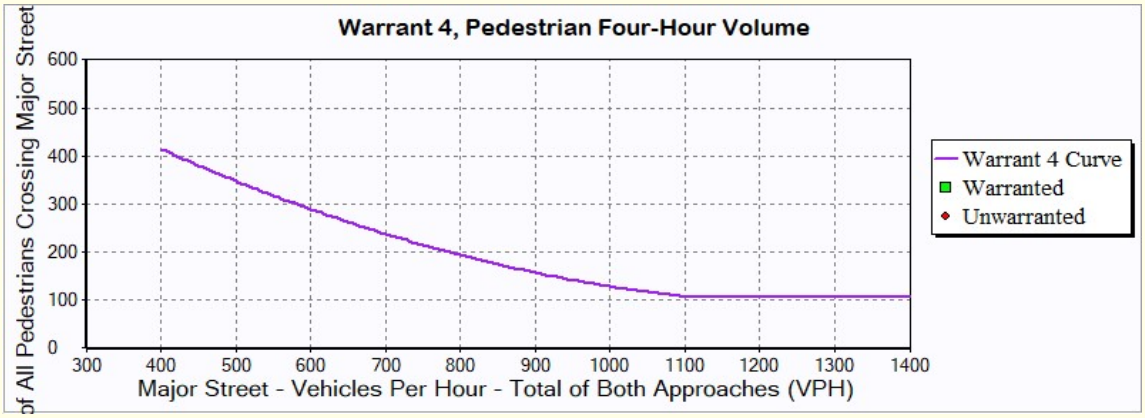
Intersection Information:

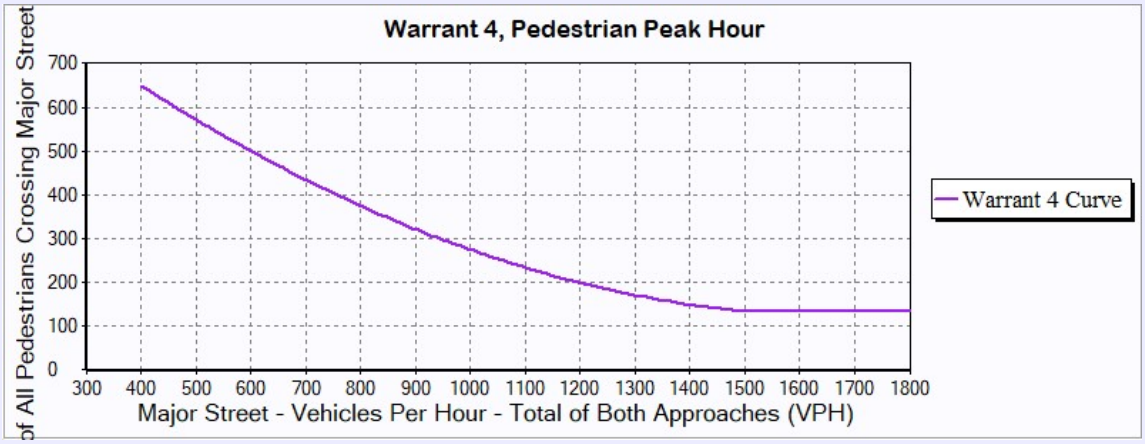
	Major Street	Minor Street
Street Name	-	Black Twig Lane
Direction		EB/WB/NB/SB
Number of Lanes	1	2
Approach Speed	0	35

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)	Distance to Closest Signal (Must be N/A or > 1000)
No	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	No	0	No
07:45 to 08:45	0	78	No	No	0	No	0	No
08:00 to 09:00	0	53	No	No	0	No	0	No
08:15 to 09:15	0	27	No	No	0	No	0	No
17:00 to 18:00	0	150	No	No	0	No	0	No
17:15 to 18:15	0	114	No	No	0	No	0	No
17:30 to 18:30	0	76	No	No	0	No	0	No
17:45 to 18:45	0	38	No	No	0	No	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
L	0.00	0.00	0.00	0.00
T	0.00	0.00	0.00	0.00
R	0.00	0.00	0.00	0.00

Condition A, Total Entering Volume

Existing Peak Hour	410
Years	0.00
Future Peak Hour	410
Warrant 1 in 5 Years?	No
Warrant 2 in 5 Years?	No
Warrant 3 in 5 Years?	No

Condition B, Non-normal Business Day

	Existing	Future
Highest Hour	0	0
Second Highest Hour	0	0
Third Highest Hour	0	0
Fourth Highest Hour	0	0
Fifth Highest Hour	0	0
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 **No approach with a railroad grade crossing**

Minor street approach having a grade crossing

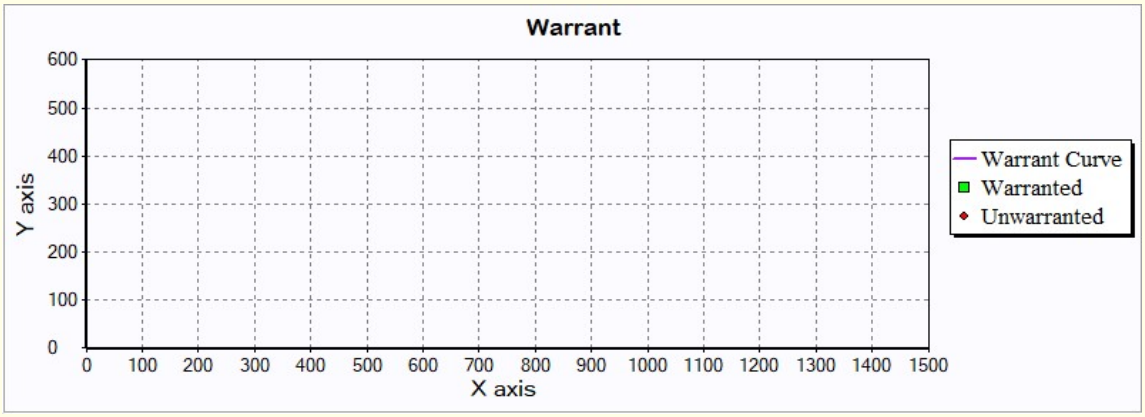
Distance from the center of the track to the stop or yield line — Interpolated

Number of occurences 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 uknown, 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?	No	Qualifying Crashes	0
Condition B Met?	No	Major Street 85th %-tile Speed	0.00
Condition C Met?	No	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

08/29/2023

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	

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
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

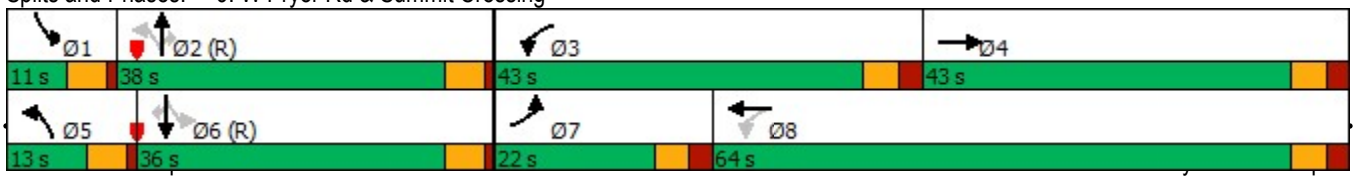
Splits and Phases: 6: W Pryor Rd & I-470 Ramp

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 (vphpl)	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	

Intersection Summary

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

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



Phasings
11: Lowenstein Rd & W Pryor Rd

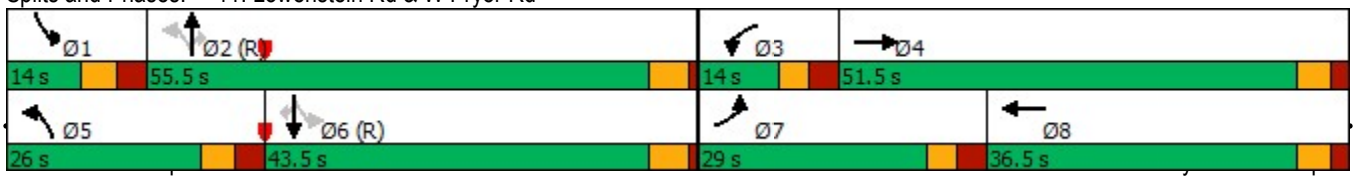
08/29/2023

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 (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		0.894			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	

Intersection Summary

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

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



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	

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

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	-	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	-	-	0
Stage 1	0	-	0	-	-	0
Stage 2	0	-	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

Intersection: 3: W Pryor Rd & Rt-In, Rt-Out

Movement	EB
Directions Served	R
Maximum Queue (ft)	101
Average Queue (ft)	49
95th Queue (ft)	80
Link Distance (ft)	403
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

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

Movement	EB	EB	EB	EB	EB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	T	T	R	R	T	T	T	T	R	T	T
Maximum Queue (ft)	49	222	167	93	143	110	88	40	16	117	95	162
Average Queue (ft)	12	149	78	46	64	29	30	6	2	63	37	57
95th Queue (ft)	36	204	174	76	101	82	74	22	9	117	80	117
Link Distance (ft)		241	241			175	175	175	175		276	276
Upstream Blk Time (%)		0										
Queuing Penalty (veh)		0										
Storage Bay Dist (ft)	200			400	400					311		
Storage Blk Time (%)		1										
Queuing Penalty (veh)		0										

Intersection: 9: W Pryor Rd & Summit Crossing

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	TR	L	TR	L	T	T	R	L	T	T
Maximum Queue (ft)	252	283	278	24	151	224	285	338	250	117	178	286
Average Queue (ft)	130	183	63	1	69	50	95	146	18	47	81	131
95th Queue (ft)	254	267	160	8	132	114	196	261	120	89	174	239
Link Distance (ft)			732		294		461	461			212	212
Upstream Blk Time (%)												2
Queuing Penalty (veh)												8
Storage Bay Dist (ft)	210	210		150		150			150	300		
Storage Blk Time (%)	0	6	0		0		2	7				6
Queuing Penalty (veh)	0	5	0		0		2	1				10

Intersection: 9: W Pryor Rd & Summit Crossing

Movement	SB	B2
Directions Served	R	T
Maximum Queue (ft)	200	128
Average Queue (ft)	49	6
95th Queue (ft)	136	48
Link Distance (ft)		175
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)	150	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: Lowenstein Rd & W Pryor Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	B4	B4	SB
Directions Served	L	L	TR	L	TR	L	T	T	R	T	T	L
Maximum Queue (ft)	132	143	202	89	105	146	237	256	146	129	115	47
Average Queue (ft)	99	112	95	25	34	110	103	80	6	9	9	11
95th Queue (ft)	124	145	179	66	85	157	232	182	49	50	55	33
Link Distance (ft)			143	162	162		146	146		448	448	
Upstream Blk Time (%)	0	1	3			4	5	1	0			
Queuing Penalty (veh)	0	0	5			0	25	8	0			
Storage Bay Dist (ft)	150	150				200			150			215
Storage Blk Time (%)	0	1	3			4	5	1	0			
Queuing Penalty (veh)	0	2	11			17	15	0	0			

Intersection: 11: Lowenstein Rd & W Pryor Rd

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	220	202	119
Average Queue (ft)	68	81	39
95th Queue (ft)	168	165	87
Link Distance (ft)	480	480	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			190
Storage Blk Time (%)	0	0	
Queuing Penalty (veh)	0	1	

Intersection: 16: Black Twig Rd & Lowenstein Rd

Movement	SE	NW	NW	NE	SW
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	72	30	78	56	77
Average Queue (ft)	34	17	42	35	40
95th Queue (ft)	52	41	67	54	63
Link Distance (ft)	837		1255	788	144
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		100			
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 18: Chipman Rd & W Pryor Rd

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	L	T	TR	L	T
Maximum Queue (ft)	223	183	198	134	138	30	93	249	319	319	113	158
Average Queue (ft)	112	111	130	68	66	6	43	29	163	179	40	62
95th Queue (ft)	199	171	204	137	113	26	81	105	311	322	80	150
Link Distance (ft)		566	566		777	777			304	304		448
Upstream Blk Time (%)									2	1		
Queuing Penalty (veh)									0	0		
Storage Bay Dist (ft)	200			200			170	170			260	
Storage Blk Time (%)	1	0							9			
Queuing Penalty (veh)	2	0							4			

Intersection: 18: Chipman Rd & W Pryor Rd

Movement	SB
Directions Served	TR
Maximum Queue (ft)	222
Average Queue (ft)	88
95th Queue (ft)	181
Link Distance (ft)	448
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 21: Chipman Rd & Black Twig Rd

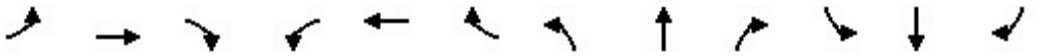
Movement	EB	SB
Directions Served	L	LR
Maximum Queue (ft)	50	85
Average Queue (ft)	8	28
95th Queue (ft)	32	63
Link Distance (ft)		556
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	75	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 116

Phasings
6: I-470 Ramp

08/29/2023

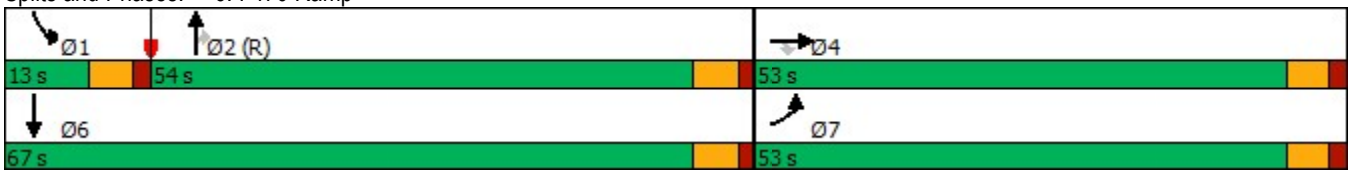


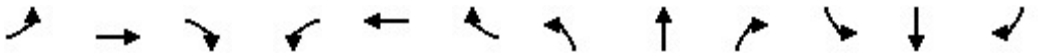
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	132	739	0	0	0	0	608	484	4	886	0
Future Volume (vph)	20	132	739	0	0	0	0	608	484	4	886	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	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)			172						509			
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	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	21	139	778	0	0	0	0	640	509	4	933	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	21	139	778	0	0	0	0	640	509	4	933	0
Turn Type	Prot	NA	Perm					NA	Perm	Prot	NA	
Protected Phases	7	4						2		1	6	
Permitted Phases			4						2			
Detector Phase	7	4	4					2	2	1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	11.6	40.6	40.6					35.5	35.5	11.5	41.5	
Total Split (s)	53.0	53.0	53.0					54.0	54.0	13.0	67.0	
Total Split (%)	44.2%	44.2%	44.2%					45.0%	45.0%	10.8%	55.8%	
Yellow Time (s)	3.8	3.8	3.8					4.0	4.0	4.0	4.0	
All-Red Time (s)	1.8	1.8	1.8					1.5	1.5	1.5	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0					0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.6	5.6	5.6					5.5	5.5	5.5	5.5	
Lead/Lag								Lag	Lag	Lead		
Lead-Lag Optimize?												
Recall Mode	None	None	None					C-Max	C-Max	None	None	
Act Effct Green (s)	21.2	36.5	36.5					70.0	70.0	6.1	72.4	
Actuated g/C Ratio	0.18	0.30	0.30					0.58	0.58	0.05	0.60	
v/c Ratio	0.07	0.13	0.80					0.17	0.45	0.04	0.44	
Control Delay	32.4	28.8	35.9					5.2	1.6	55.0	14.7	
Queue Delay	0.0	0.0	0.0					0.0	0.3	0.0	0.0	
Total Delay	32.4	28.8	35.9					5.2	1.9	55.0	14.7	
LOS	C	C	D					A	A	D	B	
Approach Delay		34.8						3.7			14.9	
Approach LOS		C						A			B	

Intersection Summary

Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 1 (1%), Referenced to phase 2:NBT, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 16.8		Intersection LOS: B	
Intersection Capacity Utilization 59.6%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 6: I-470 Ramp



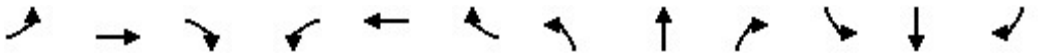


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	172	35	65	140	51	236	60	680	85	327	1137	172
Future Volume (vph)	172	35	65	140	51	236	60	680	85	327	1137	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage 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		0.903			0.877				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1682	0	3433	1634	0	1770	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.685			0.220			0.113		
Satd. Flow (perm)	3433	1682	0	2475	1634	0	410	3539	1583	210	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		72			199				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	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	191	39	72	156	57	262	67	756	94	363	1263	191
Shared Lane Traffic (%)												
Lane Group Flow (vph)	191	111	0	156	319	0	67	756	94	363	1263	191
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
Detector Phase	7	4		3	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	32.5	43.0		12.0	43.0		11.0	31.0	31.0	11.0	31.0	31.0
Total Split (s)	32.5	63.5		12.0	43.0		11.0	31.5	31.5	13.0	33.5	33.5
Total Split (%)	27.1%	52.9%		10.0%	35.8%		9.2%	26.3%	26.3%	10.8%	27.9%	27.9%
Yellow Time (s)	3.5	3.5		3.5	3.5		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.5	2.5		2.5	2.5		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0		6.0	6.0		5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	12.0	21.8		21.8	15.8		37.8	30.3	30.3	75.2	64.9	64.9
Actuated g/C Ratio	0.10	0.18		0.18	0.13		0.32	0.25	0.25	0.63	0.54	0.54
v/c Ratio	0.56	0.30		0.31	0.82		0.31	0.85	0.18	0.56	0.66	0.20
Control Delay	57.4	16.9		32.6	35.6		20.4	52.8	0.7	28.4	19.4	2.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.4	16.9		32.6	35.6		20.4	52.8	0.7	28.4	19.4	2.7
LOS	E	B		C	D		C	D	A	C	B	A
Approach Delay		42.5			34.6			45.1			19.5	
Approach LOS		D			C			D			B	

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		
Natural Cycle: 140		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.85		
Intersection Signal Delay: 30.2		Intersection LOS: C
Intersection Capacity Utilization 77.5%		ICU Level of Service D
Analysis Period (min) 15		

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

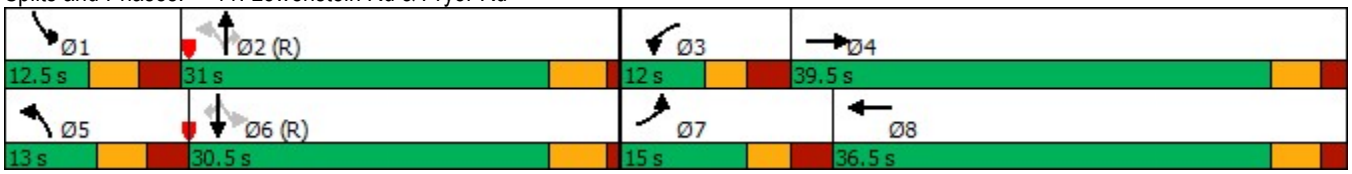


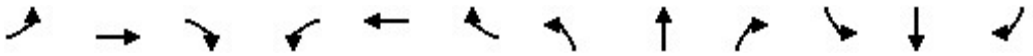
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	235	89	196	63	56	34	268	572	42	56	852	194
Future Volume (vph)	235	89	196	63	56	34	268	572	42	56	852	194
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage 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			0.419		
Satd. Flow (perm)	3433	1671	0	1770	1757	0	225	3539	1583	780	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		130			35				172			193
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	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	253	96	211	68	60	37	288	615	45	60	916	209
Shared Lane Traffic (%)												
Lane Group Flow (vph)	253	307	0	68	97	0	288	615	45	60	916	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
Detector Phase	7	4		3	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	12.0	39.5		12.0	36.5		12.5	30.0	30.0	12.5	30.0	30.0
Total Split (s)	15.0	39.5		12.0	36.5		13.0	31.0	31.0	12.5	30.5	30.5
Total Split (%)	15.8%	41.6%		12.6%	38.4%		13.7%	32.6%	32.6%	13.2%	32.1%	32.1%
Yellow Time (s)	3.0	3.5		3.0	3.5		3.5	4.0	4.0	3.5	4.0	4.0
All-Red Time (s)	3.0	2.0		3.0	2.0		3.0	1.0	1.0	3.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	5.5		6.0	5.5		6.5	5.0	5.0	6.5	5.0	5.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
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	0.89	0.35
Control Delay	59.6	33.5		67.6	25.8		22.6	18.7	0.1	14.1	45.1	7.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.6	33.5		67.6	25.8		22.6	18.7	0.1	14.1	45.1	7.1
LOS	E	C		E	C		C	B	A	B	D	A
Approach Delay		45.3			43.0			19.0			36.8	
Approach LOS		D			D			B			D	

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			
Natural Cycle: 95			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 32.9		Intersection LOS: C	
Intersection Capacity Utilization 78.6%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 11: Lowenstein Rd & Pryor Rd





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	636	180	219	779	149
Future Volume (vph)	122	221	55	268	206	152	73	636	180	219	779	149
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			0.237			0.190		
Satd. Flow (perm)	1145	3423	0	512	3539	1561	441	3412	0	354	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	
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	128	233	58	282	217	160	77	669	189	231	820	157
Shared Lane Traffic (%)												
Lane Group Flow (vph)	128	291	0	282	217	160	77	858	0	231	977	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		
Detector Phase	7	4		3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Minimum Split (s)	12.0	32.0		12.0	35.0	35.0	12.0	34.0		12.0	34.0	
Total Split (s)	12.0	32.0		23.0	43.0	43.0	12.0	42.0		23.0	53.0	
Total Split (%)	10.0%	26.7%		19.2%	35.8%	35.8%	10.0%	35.0%		19.2%	44.2%	
Yellow Time (s)	3.5	4.0		3.5	4.0	4.0	3.5	4.0		3.5	4.0	
All-Red Time (s)	2.5	1.0		2.5	1.0	1.0	2.5	1.0		2.5	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	5.0		6.0	5.0	5.0	6.0	5.0		6.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	None	C-Max		None	None	
Act Effct Green (s)	19.7	14.7		36.3	25.3	25.3	57.9	51.1		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	14.7	28.9		18.2	22.6	
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	14.7	28.9		18.2	22.6	
LOS	D	D		E	D	A	B	C		B	C	
Approach Delay		51.1			40.1			27.8			21.7	
Approach LOS		D			D			C			C	

Intersection Summary		
Area Type:	Other	
Cycle Length: 120		
Actuated Cycle Length: 120		
Offset: 8 (7%), Referenced to phase 2:NBTL, Start of Green		
Natural Cycle: 95		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.86		
Intersection Signal Delay: 31.1	Intersection LOS: C	
Intersection Capacity Utilization 78.2%	ICU Level of Service D	
Analysis Period (min) 15		

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	830	933	406
Future Vol, veh/h	0	183	0	830	933	406
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	902	1014	441

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	507	-	0	-	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	-	-	0
Stage 1	0	-	0	-	-	0
Stage 2	0	-	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	-

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	56	283	362	46	58	70
Future Vol, veh/h	56	283	362	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	298	381	48	61	74

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	674	0	-	0	1066	650
Stage 1	-	-	-	-	650	-
Stage 2	-	-	-	-	416	-
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	917	-	-	-	246	469
Stage 1	-	-	-	-	520	-
Stage 2	-	-	-	-	666	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	730	-	-	-	143	373
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)	730	-	-	-	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

Intersection: 3: Pryor Rd & Rt-In, Rt-Out

Movement	EB	NB	NB	SB	SB
Directions Served	R	T	T	T	T
Maximum Queue (ft)	193	175	272	58	76
Average Queue (ft)	82	16	47	3	4
95th Queue (ft)	151	113	202	35	42
Link Distance (ft)	465	484	484	456	456
Upstream Blk Time (%)			0		
Queuing Penalty (veh)			0		
Storage Bay Dist (ft)					
Storage Blk Time (%)					0
Queuing Penalty (veh)					0

Intersection: 6: I-470 Ramp

Movement	EB	EB	EB	EB	EB	NB	NB	NB	NB	NB	B2	SB
Directions Served	L	T	T	R	R	T	T	T	T	R	T	L
Maximum Queue (ft)	65	111	65	287	288	96	97	74	81	133	11	58
Average Queue (ft)	18	35	9	250	252	23	41	28	26	55	0	5
95th Queue (ft)	50	92	39	300	302	66	76	58	64	109	6	36
Link Distance (ft)		241	241			175	175	175	175		215	
Upstream Blk Time (%)				53	73		0			0		0
Queuing Penalty (veh)				0	0		0			0		0
Storage Bay Dist (ft)	200			400	400					311		550
Storage Blk Time (%)				53	73					0		0
Queuing Penalty (veh)				37	50					0		0

Intersection: 6: I-470 Ramp

Movement	SB	SB
Directions Served	T	T
Maximum Queue (ft)	305	304
Average Queue (ft)	240	241
95th Queue (ft)	336	334
Link Distance (ft)	276	276
Upstream Blk Time (%)	5	5
Queuing Penalty (veh)	0	0
Storage Bay Dist (ft)		
Storage Blk Time (%)	5	
Queuing Penalty (veh)	0	

Intersection: 9: Pryor Rd & Summit Woods Crossing

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB
Directions Served	L	L	TR	L	L	TR	L	T	T	R	L	T
Maximum Queue (ft)	191	225	215	136	249	312	224	453	472	250	214	326
Average Queue (ft)	47	138	79	23	94	163	81	288	365	120	201	292
95th Queue (ft)	154	216	158	81	198	282	215	465	516	307	240	328
Link Distance (ft)			523			294		456	456			215
Upstream Blk Time (%)						2		2	8		13	42
Queuing Penalty (veh)						0		10	34		0	360
Storage Bay Dist (ft)	210	210		150	150		150			150	300	
Storage Blk Time (%)	0	1	1	0	1	14	0	35	52	0	13	42
Queuing Penalty (veh)	0	1	1	0	5	23	0	23	49	0	82	153

Intersection: 9: Pryor Rd & Summit Woods Crossing

Movement	SB	SB	B2	B2
Directions Served	T	R	T	T
Maximum Queue (ft)	323	200	274	271
Average Queue (ft)	292	136	200	206
95th Queue (ft)	318	265	291	270
Link Distance (ft)	215		175	175
Upstream Blk Time (%)	47	0	24	30
Queuing Penalty (veh)	402	0	202	254
Storage Bay Dist (ft)		150		
Storage Blk Time (%)	52	0		
Queuing Penalty (veh)	99	0		

Intersection: 11: Lowenstein Rd & Pryor Rd

Movement	EB	EB	EB	B12	WB	WB	NB	NB	NB	NB	B4	B4
Directions Served	L	L	TR	T	L	TR	L	T	T	R	T	T
Maximum Queue (ft)	125	145	205	18	145	146	143	225	224	143	168	135
Average Queue (ft)	76	98	106	1	66	56	123	150	145	27	25	23
95th Queue (ft)	123	141	177	11	133	116	164	257	254	106	105	94
Link Distance (ft)			146	350	162	162		143	143		448	448
Upstream Blk Time (%)	0	1	4		2	0	9	14	12	0		
Queuing Penalty (veh)	0	0	6		0	0	0	67	57	0		
Storage Bay Dist (ft)	150	150					200			150		
Storage Blk Time (%)	0	1	4				9	14	12	0		
Queuing Penalty (veh)	0	2	9				29	40	5	0		

Intersection: 11: Lowenstein Rd & Pryor Rd

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	270	472	503	290
Average Queue (ft)	51	265	278	143
95th Queue (ft)	175	435	459	331
Link Distance (ft)		484	484	
Upstream Blk Time (%)		1	1	
Queuing Penalty (veh)		4	6	
Storage Bay Dist (ft)	215			190
Storage Blk Time (%)		21	27	0
Queuing Penalty (veh)		13	57	0

Intersection: 16: Black Twig Ln & Lowenstein Rd

Movement	SE	NW	NW	NE	SW
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	58	56	63	67	77
Average Queue (ft)	30	30	37	36	39
95th Queue (ft)	50	50	58	56	61
Link Distance (ft)	835		1203	830	326
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		100			
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 18: Chipman Rd & Pryor Rd

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	L	T	TR	L	T
Maximum Queue (ft)	166	187	197	291	363	253	131	232	328	330	300	395
Average Queue (ft)	78	94	111	185	144	55	54	67	231	262	120	222
95th Queue (ft)	138	158	175	288	291	181	98	174	349	368	227	369
Link Distance (ft)		576	576		784	784			304	304		448
Upstream Blk Time (%)									3	9		0
Queuing Penalty (veh)									0	0		0
Storage Bay Dist (ft)	200			200			170	170			260	
Storage Blk Time (%)	0	0		11	0	0	0		17		0	5
Queuing Penalty (veh)	0	0		12	1	0	0		13		2	11

Intersection: 18: Chipman Rd & Pryor Rd

Movement	SB
Directions Served	TR
Maximum Queue (ft)	419
Average Queue (ft)	257
95th Queue (ft)	406
Link Distance (ft)	448
Upstream Blk Time (%)	0
Queuing Penalty (veh)	1
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 22: Chipman Rd & Black Twig Rd

Movement	EB	WB	SB
Directions Served	L	TR	LR
Maximum Queue (ft)	61	56	123
Average Queue (ft)	23	5	44
95th Queue (ft)	52	32	90
Link Distance (ft)		1736	531
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	75		
Storage Blk Time (%)	0		
Queuing Penalty (veh)	0		

Network Summary

Network wide Queuing Penalty: 2123

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8/29/2023

Overall Layout

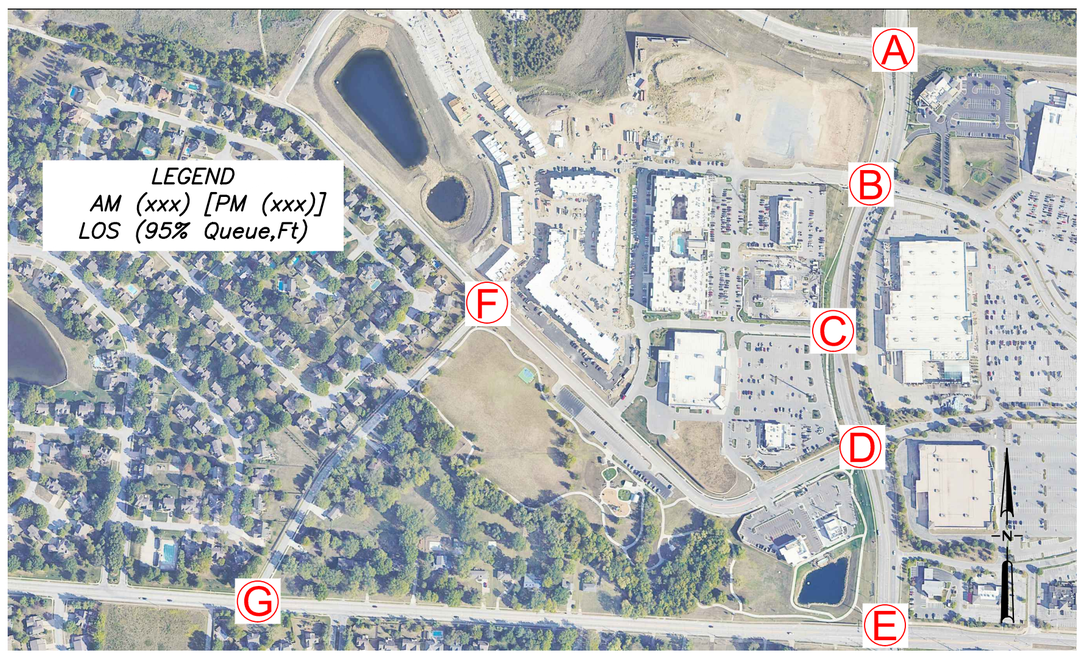
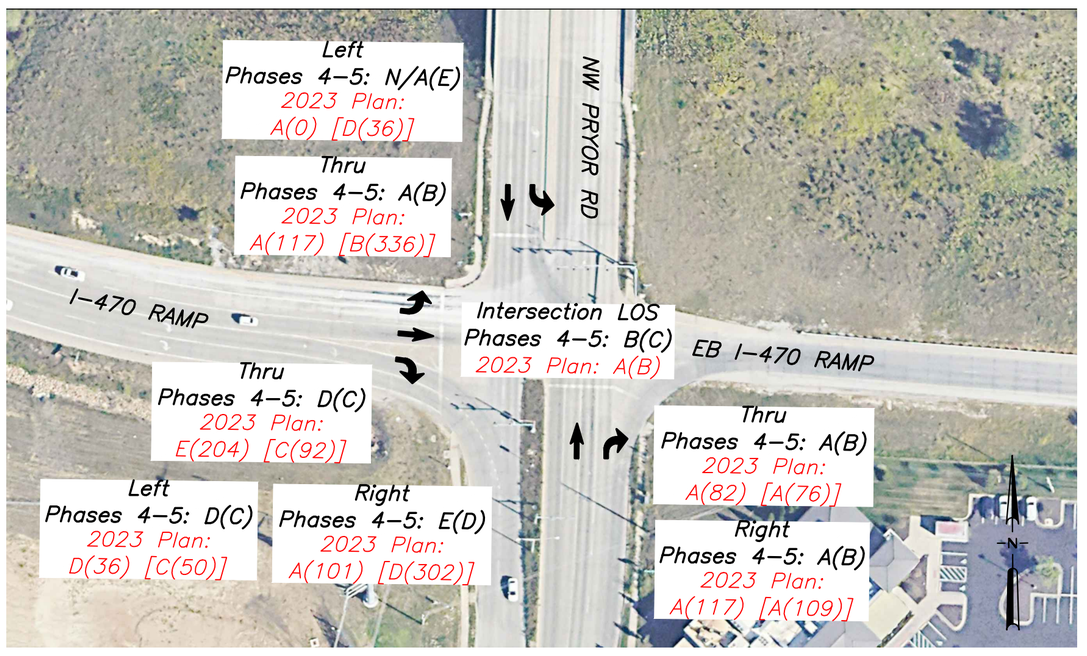


Exhibit A



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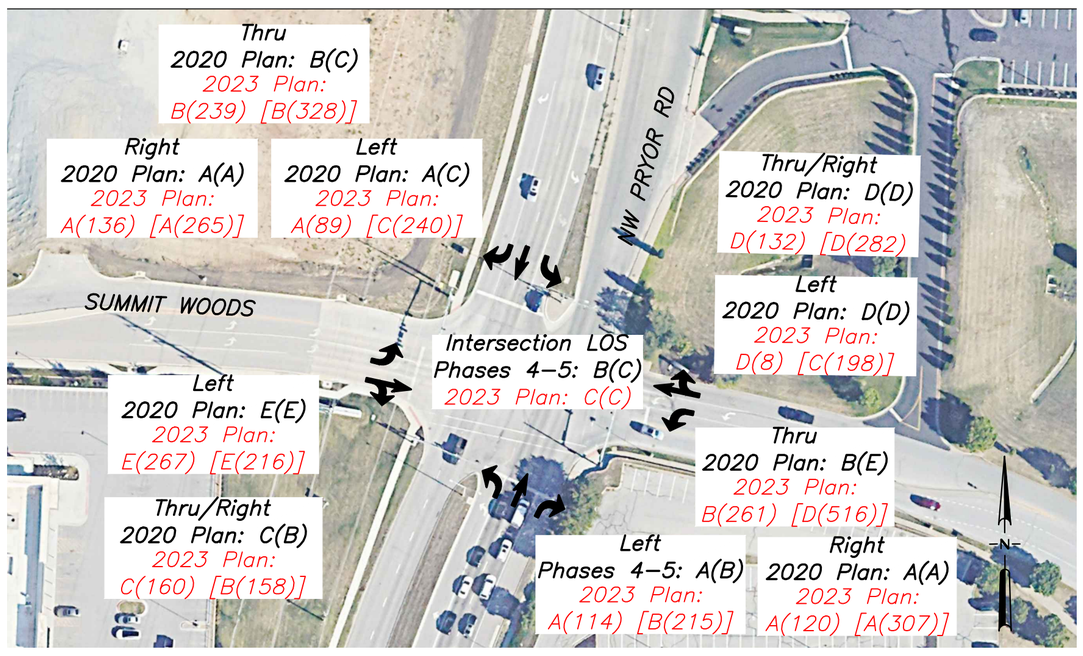

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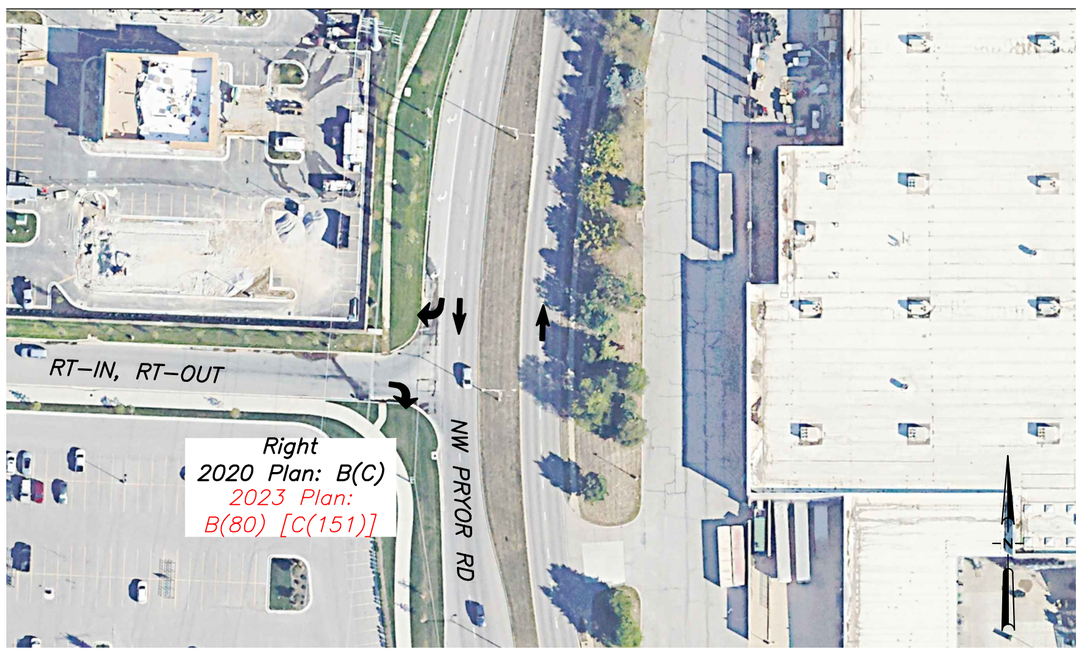

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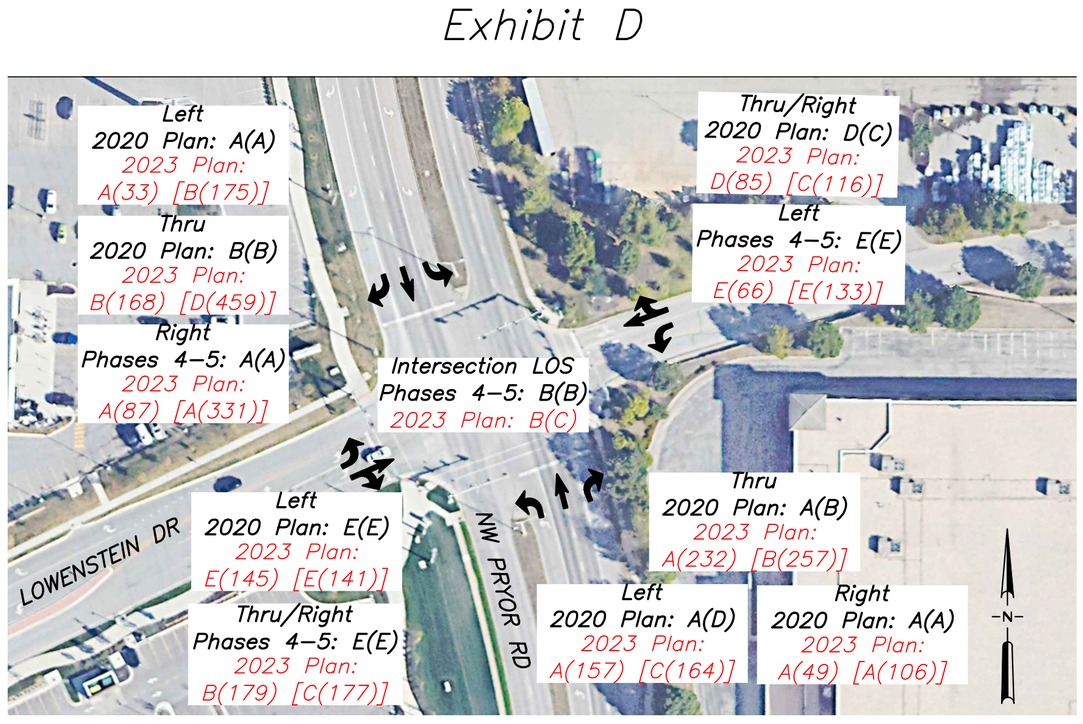

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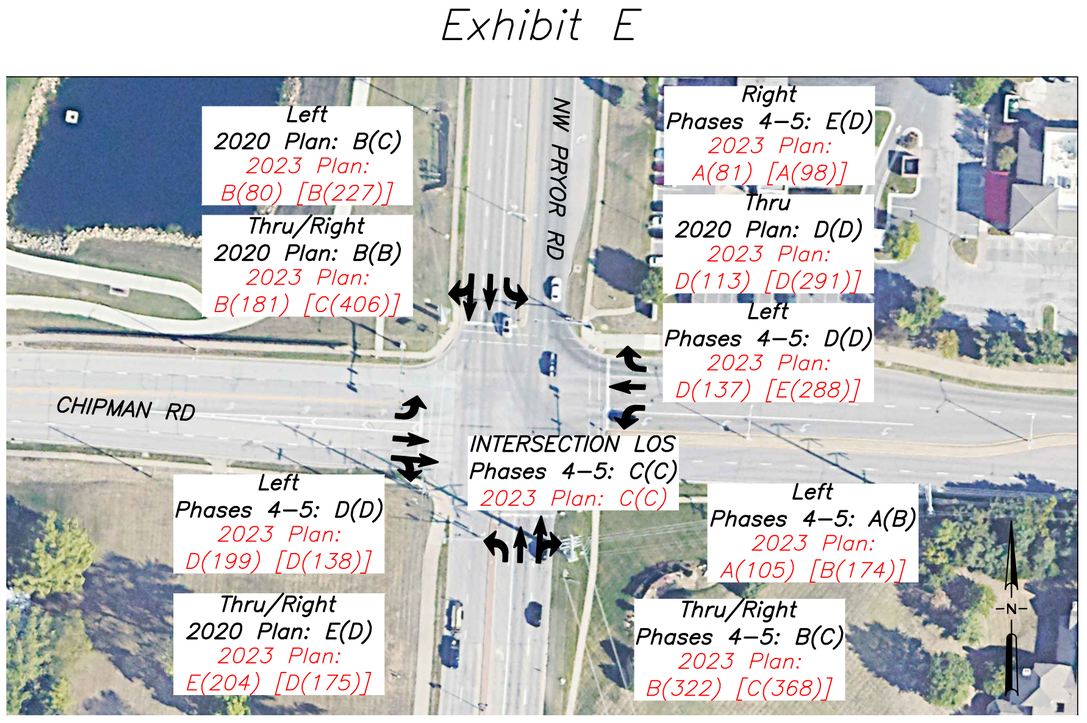

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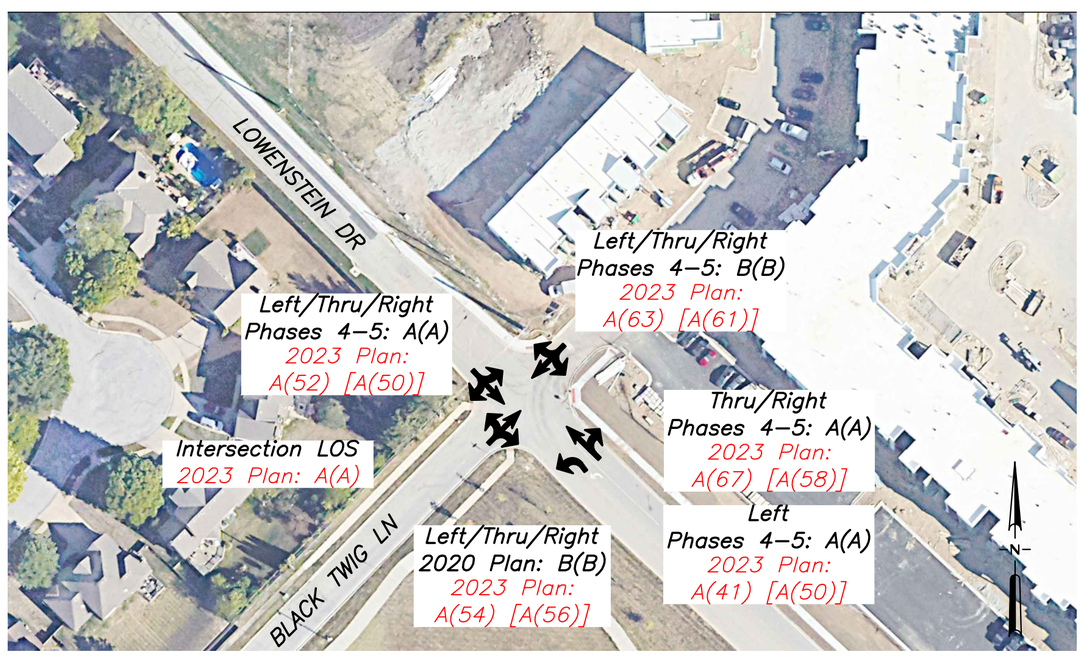

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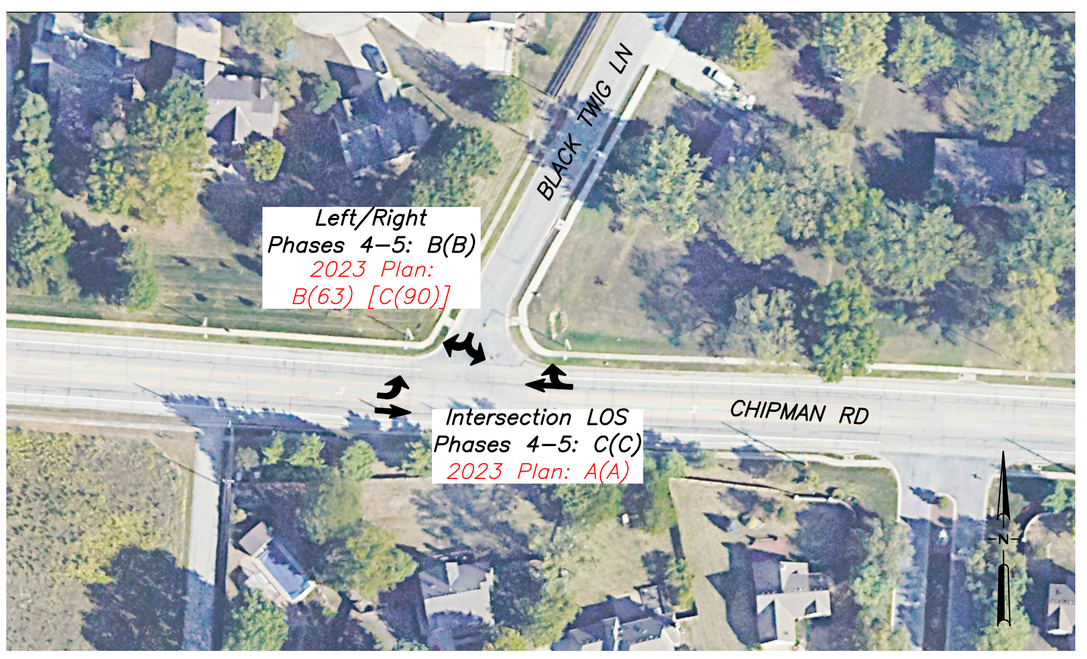

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