



SAIN
ASSOCIATES

October 4, 2021
Traffic Impact Analysis
Nick Davis Road Subdivision
Limestone County, AL

PREPARED FOR:

Two Oaks Development, LLC
3801 Mary Taylor Road
Birmingham, AL 35235

PREPARED BY:

Sain Associates, Inc.
Two Perimeter Park South
Suite 500 East
Birmingham, Alabama 35243
205-940-6420

SAIN PROJECT #:

210273

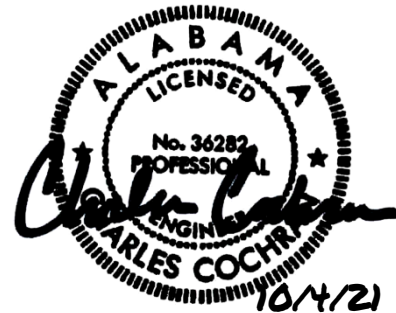


Table of Contents

Executive Summary	1
Purpose	2
Existing Conditions	2
Site Description	2
Analysis Boundaries	4
Roadway Characteristics	4
Site Accessibility	5
Existing Traffic Volumes	5
Capacity Analysis and Levels of Service	5
Future Conditions	7
Background Growth Rate	7
Trip Generation	7
Trip Distribution	8
Trip Assignment	8
Capacity Analysis and Levels of Service	12
Turn Lane Warrant Evaluation	12
Recommendations/Conclusions	14

Figures

Figure 1: Site Location	3
Figure 2: Site Plan	4
Figure 3: Existing Traffic Volumes	6
Figure 4: New Trip Distribution	9
Figure 5: Site-Generated Trips – Full Build-Out	10
Figure 6: Future Volumes – Full Build-Out 2031	11

Tables

Table 1: Existing Levels of Service	5
Table 2: Trip Generation Estimate	7
Table 3: Future Levels of Service	12
Table 4: Right Turn Lane Warrant Evaluation Summary	13
Table 5: Left Turn Lane Warrant Evaluation Summary	13

Appendices

- A. Conceptual Layout
- B. Raw Traffic Count Data
- C. Description of Levels of Service
- D. Existing Conditions Capacity Analysis
- E. Future Traffic Volumes by Phase
- F. Future Conditions Capacity Analysis

Other Information

Sources of information other than Sain Associates used in preparation of this traffic impact analysis include:

- Limestone County
- Traffic Data, LLC
- Two Oaks Development, LLC
- Goodwyn Mills Cawood
- Pugh Wright McAnally, Inc.
- Transportation Research Board (TRB)
- National Cooperative Highway Research Program (NCHRP)
- Google Earth

Executive Summary

Sain Associates, Inc. examined the traffic impacts associated with a proposed residential development in Limestone County, Alabama. The purpose of this study is to analyze the traffic conditions in the vicinity of the proposed development, determine any impacts that the proposed development may have on the existing traffic network, and recommend any improvements that may be necessary to mitigate any impacts.

The proposed development is located on the southern side of Nick Davis Road near its intersection with William F Immer Drive. The development is proposed to contain 320 single-family homes. They will be built in six phases. The first five phases are expected to include 60 homes each built on an annual basis starting in 2022.

Sain Associates noted the following existing deficiencies before any proposed development traffic was added:

- At the intersection of Nick Davis Road and CR-111/Menefee Road, an eastbound right turn lane is warranted with existing traffic volumes. The County should consider constructing one so that it has 295' of full width length and 180' of bay taper length (475' total). The traffic volumes at this intersection should be monitored as development in the area increases.

Based on our analysis of the proposed development, Sain Associates makes the following recommendations/conclusions ordered by the development phases:

- Phase 1 (60 homes)
 - No improvements are recommended.
- Phase 2 (+60 homes, 120 homes total)
 - No improvements are recommended.
- Phase 3 (+60 homes, 180 homes total)
 - At the Proposed Western Access, construct an eastbound right turn lane with 295' of full width length and 180' of bay taper length (475' total).
 - At the Proposed Eastern Access, construct a westbound left turn lane with 295' of full width length and 180' of bay taper length (475' total).
- Phase 4(+60 homes, 240 homes total)
 - At the Proposed Eastern Access, construct an eastbound right turn lane with 295' of full width length and 180' of bay taper length (475' total).
- Phase 5 (+60 homes, 300 homes total)
 - At the Proposed Western Access, construct a westbound left turn lane with 295' of full width length and 180' of bay taper length (475' total).
- Phase 6 (+20 homes, 320 homes total)
 - The study intersections are projected to operate with acceptable LOS during the future peak periods through the full build-out.

Purpose

Sain Associates, Inc. examined the traffic impacts associated with a proposed residential development in Limestone County, Alabama. The purpose of this study is to analyze the traffic conditions in the vicinity of the proposed development, determine any impacts that the proposed development may have on the existing traffic network, and recommend any improvements that may be necessary to mitigate any impacts.

Existing Conditions

Site Description

The proposed development is located on the southern side of Nick Davis Road near its intersection with William F Immer Drive. The site is currently undeveloped.

According to the site plan, the proposed development will contain 320 single-family homes at full build-out. They will be built in six phases. The first five phases are expected to include 60 homes each built on an annual basis starting in 2022.

Figure 1 shows the site location as it relates to the surrounding roadway network. Figure 2 illustrates the site plan. The conceptual layout is included in Appendix A.



Figure 1: Site Location

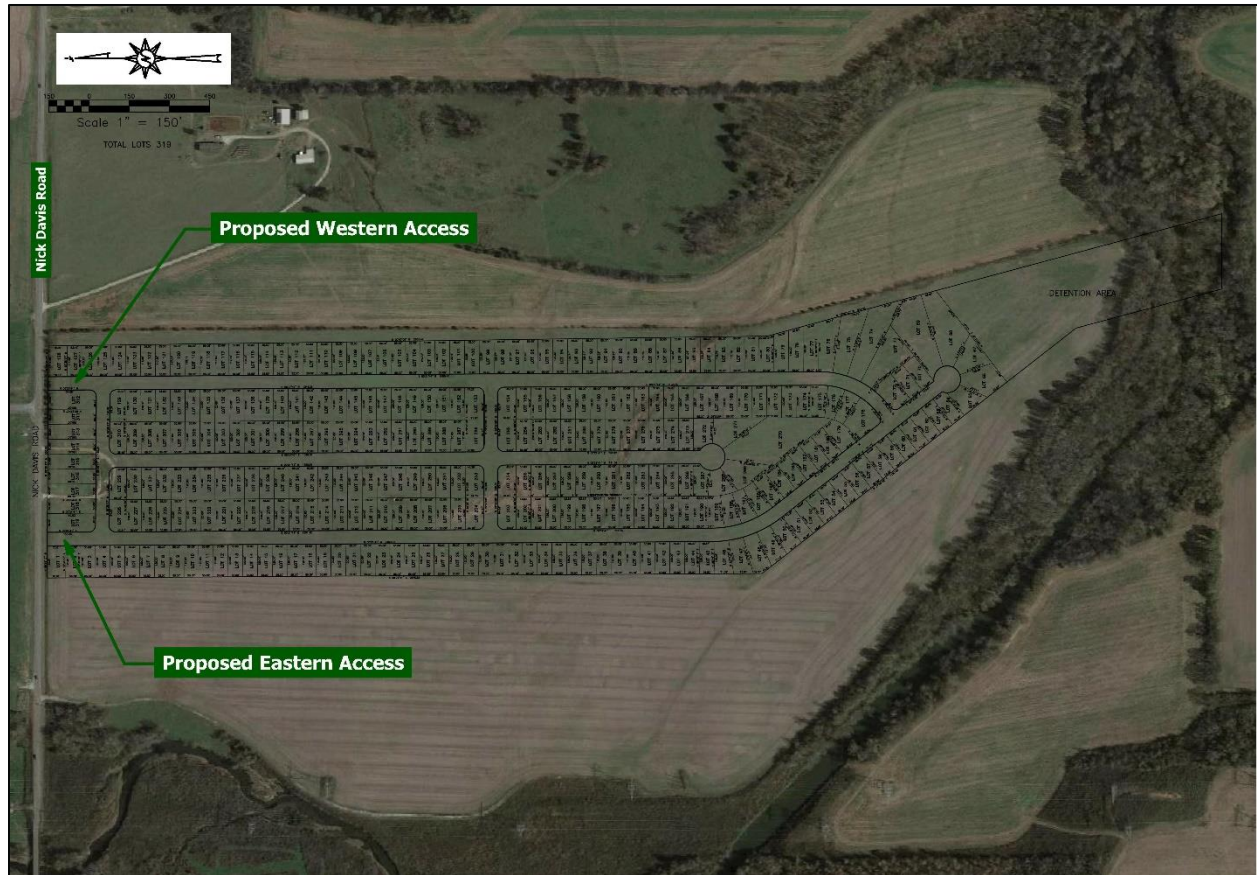


Figure 2: Site Plan

Analysis Boundaries

Our analysis includes a review of traffic operations at the following locations:

- Nick Davis Road at CR-111/Menefee Road
- Nick Davis Road at Proposed Western Access
- Nick Davis Road at William F Immer Road/Proposed Eastern Access
- Nick Davis Road at County Line Road/Sanderson Road

Roadway Characteristics

Roadways within the study boundary exhibit the following characteristics:

- Nick Davis Road is a two-lane, undivided roadway that is classified as a major collector. It has a posted speed limit of 55 miles per hour.
- CR-111/Menefee Road is a two-lane, undivided roadway that is classified as a local road. It has a posted speed limit of 50 miles per hour.
- Sanderson Road/County Line Road is a two-lane, undivided roadway that is classified as a major collector. It has a posted speed limit of 45 miles per hour.
- William F Immer Road is a two-lane, undivided roadway that provides a gated access to the nearby correctional facility. It has no posted speed limit.

Site Accessibility

The site is currently undeveloped. There are two proposed access connections; both are proposed as full access driveways along Nick Davis Road (Proposed Eastern Access and Proposed Western Access).

Existing Traffic Volumes

Sain Associates performed traffic data collection through sub-consultant Traffic Data, LLC. The turning movement count data was collected at the study intersections during the periods of 7:00 – 9:00 AM and 2:30 – 6:00 PM on Wednesday, September 22, 2021. The AM and PM peak hours of traffic flow were determined to be 7:00 – 8:00 AM and 4:45 – 5:45 PM, respectively. The existing peak hour traffic volumes are illustrated in Figure 3, and the raw traffic count reports are included in Appendix B.

Capacity Analysis and Levels of Service

Using the methods described in the *Highway Capacity Manual*, published by the Transportation Research Board, we analyzed the existing traffic conditions within the study area. According to this method of analysis, traffic capacities are expressed as levels of service (LOS) ranging from “A” to “F.” A detailed description of each LOS designation is included in Appendix C. Generally, LOS “C” is considered desirable, while LOS “D” is considered acceptable during peak hours of traffic flow.

Full printouts of the existing conditions capacity analysis are provided in Appendix D, with the results summarized in Table 1.

Table 1: Existing Levels of Service

Intersection	Approach		Level of Service	
			AM Peak	PM Peak
Nick Davis Rd @ CR-111/Menefee Rd	NB	CR-111/Menefee Rd	B	C
	SB	CR-111/Menefee Rd	C	B
	EB	Nick Davis Rd	A	A
	WB	Nick Davis Rd	A	A
Nick Davis Rd @ William F Immer Dr	SB	William F Immer Dr	B	B
	EB	Nick Davis Rd	A	A
	WB	Nick Davis Rd	A	A
Nick Davis Rd @ County Line Rd/Sanderson Rd	NB	Sanderson Rd	A	A
	SB	County Line Rd	A	A
	EB	Nick Davis Rd	B	B

According to the existing conditions capacity analysis, each approach is currently operating with acceptable LOS during each of the peak periods.

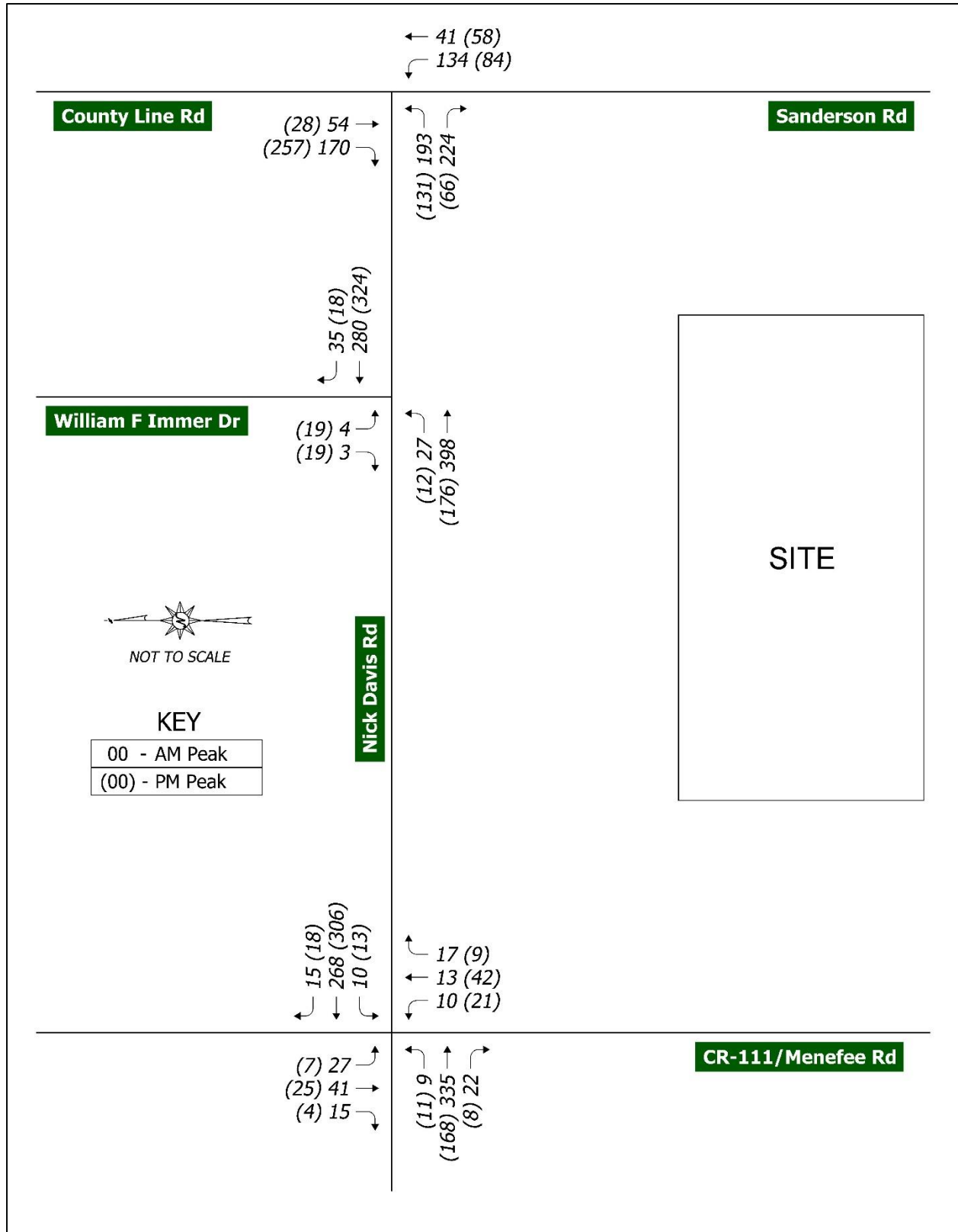


Figure 3: Existing Traffic Volumes

Future Conditions

Background Growth Rate

To estimate the future traffic conditions without the additional site traffic, a background growth rate was applied to the existing volumes. The growth rate was provided by Goodwyn Mills Cawood, who is in the process of conducting a corridor study along Nick Davis Road west of the study area. The growth rate determined from that project was 6.6% over 10 years, or 0.66% per year. This straight-line growth rate was applied to each phase of development. While the full build-out conditions are expected to be completed by 2027, 2031 was used in order to apply the full 6.6% projected growth to the traffic volumes.

Trip Generation

Sain Associates estimated the number of vehicle trips to be generated by the proposed development using the methods outlined in the Institute of Transportation Engineers' (ITE) publication *Trip Generation* (10th Edition). Traffic generated by a proposed development is often classified in two ways: new trips or pass-by trips. New trips are defined as vehicles whose primary destination is the proposed development; these trips are assumed to return to the same direction in which they arrived. Pass-by trips are defined as vehicles that stop into a development while headed to another destination. All of the trips generated by the proposed subdivision are projected to be new trips.

Summaries of the trip generation estimates for the AM and PM peak hours are shown in Table 2 by phase.

Table 2: Trip Generation Estimate

Phase	Cumulative Homes	Weekday	AM Peak			PM Peak		
			IN	OUT	TOTAL	IN	OUT	TOTAL
1	60	650	11	36	47	39	23	62
2	120	1230	22	68	90	76	45	121
3	180	1786	33	100	133	113	66	179
4	240	2327	44	131	175	148	87	235
5	300	2857	54	164	218	184	108	292
6	320	3032	58	174	232	195	115	310

Trip Distribution

The directional distribution of trips expected to be generated by the proposed development was estimated based on existing traffic patterns within the study area. The directional distribution percentages of site-generated new trips are illustrated in Figure 4.

Trip Assignment

Using the aforementioned patterns of distribution, Sain Associates assigned the projected new trips to the site's proposed access system. The assigned volumes were then added to the existing traffic volumes in order to produce future traffic volumes. The projected site-generated trips are illustrated in Figure 5, and the combined future traffic volumes are illustrated in Figure 6. For the purposes of this report, only the traffic volumes for the full build-out condition are illustrated. The future traffic volumes for each phase are provided in Appendix E.

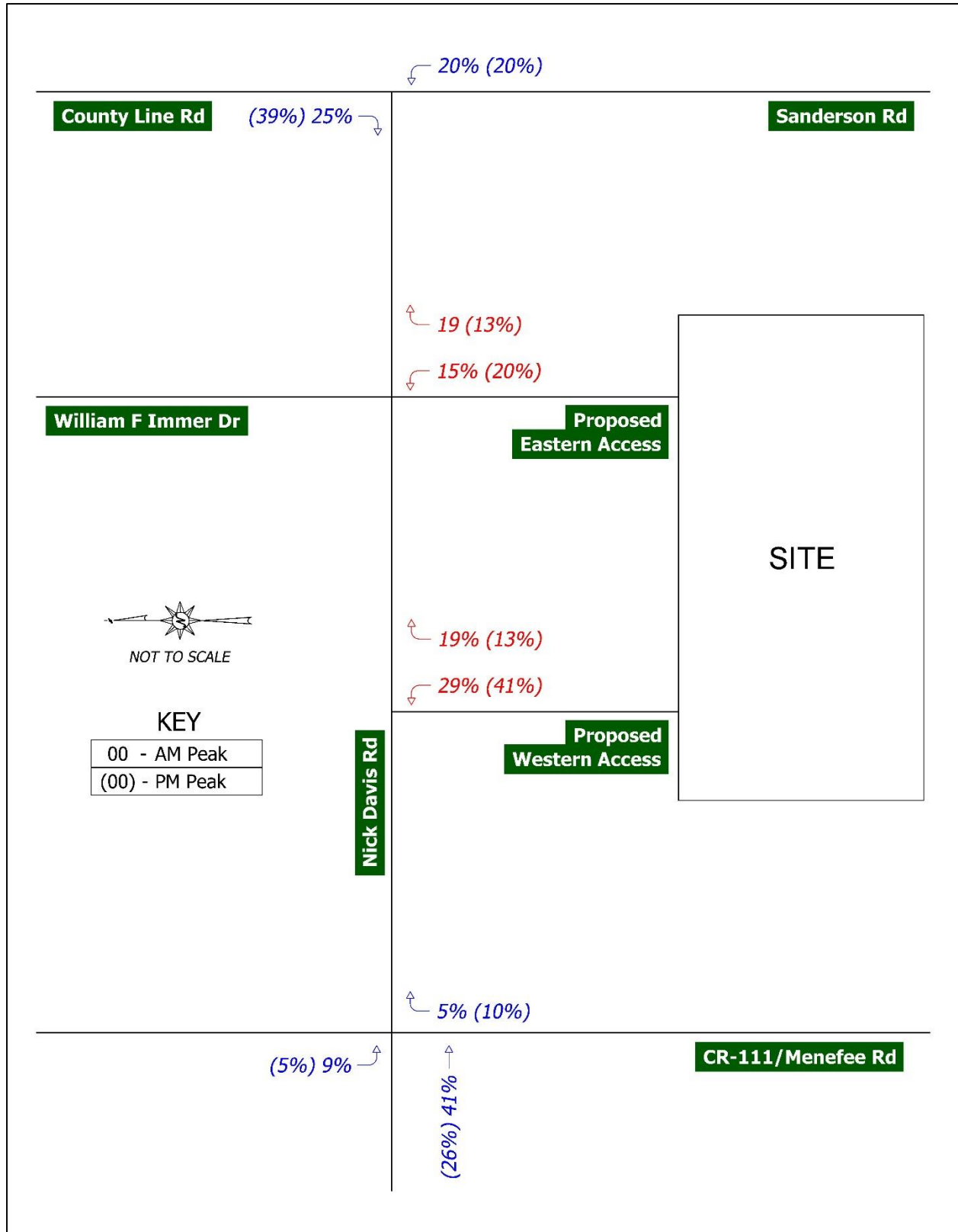


Figure 4: New Trip Distribution

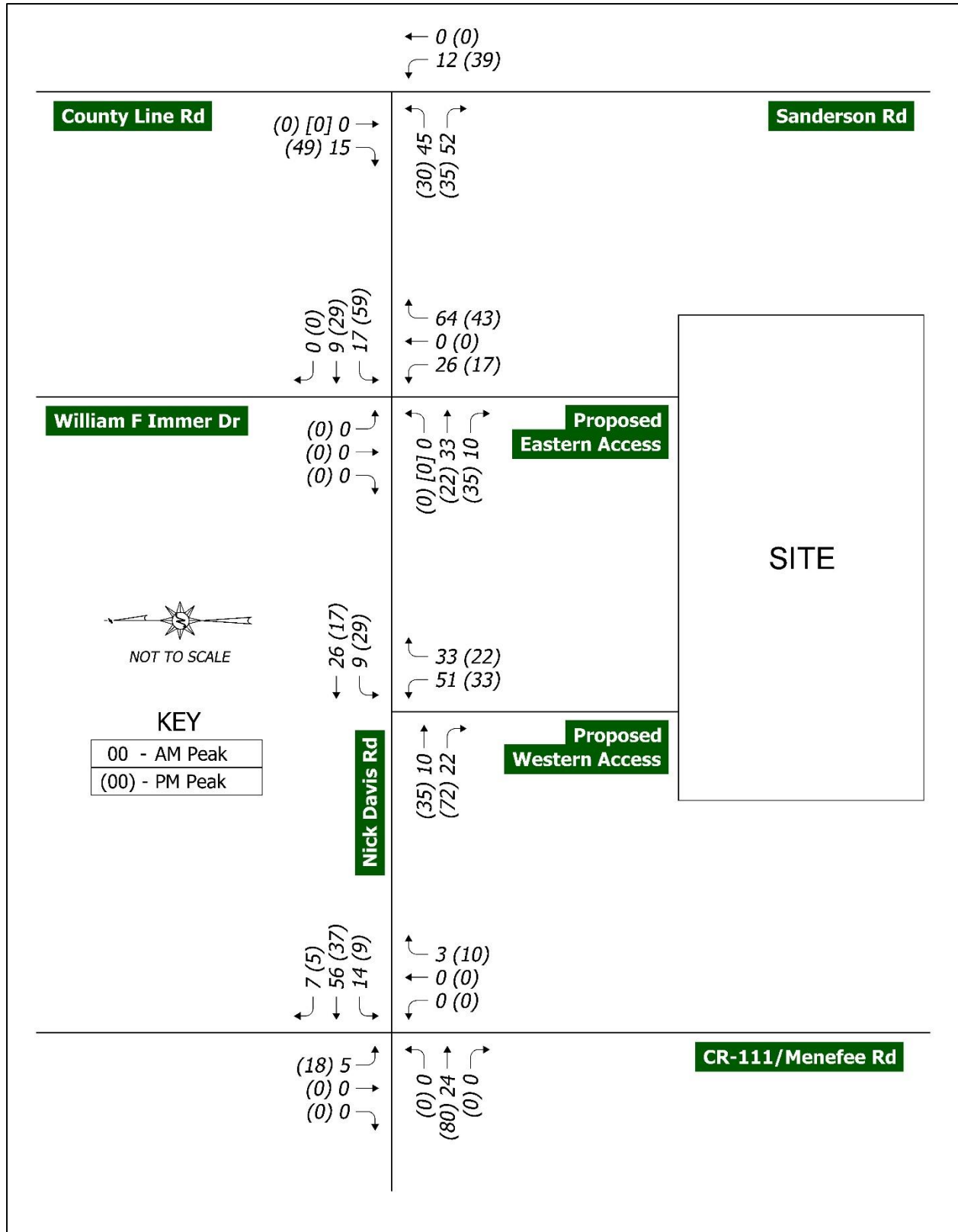


Figure 5: Site-Generated Trips – Full Build-Out

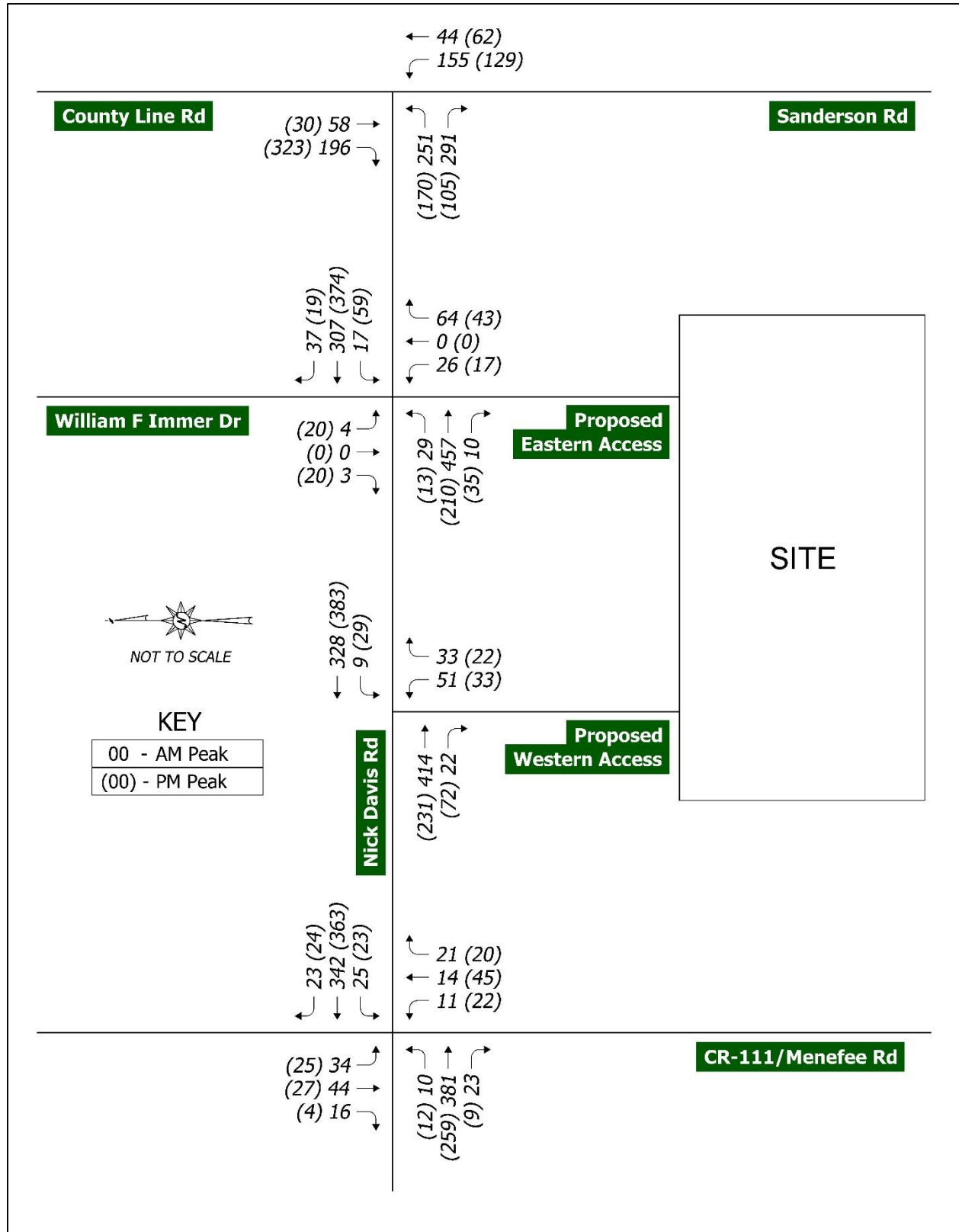


Figure 6: Future Volumes – Full Build-Out 2031

Capacity Analysis and Levels of Service

Using the *Highway Capacity Manual* methods previously described for existing capacity analysis, future traffic conditions (including proposed improvements) within the study area were analyzed. Full printouts of the future conditions capacity analysis are provided in Appendix F. The LOS results are summarized in Table 3. For the purposes of this report, only the capacity analysis results for the full build-out condition is provided.

Table 3: Future Levels of Service

Intersection	Approach		Level of Service	
			AM Peak	PM Peak
Nick Davis Rd @ CR-111/Menefee Rd	NB	CR-111/Menefee Rd	C	C
	SB	CR-111/Menefee Rd	D	C
	EB	Nick Davis Rd	A	A
	WB	Nick Davis Rd	A	A
Nick Davis Rd @ Proposed Western Access	NB	Proposed Western Access	C	B
	EB	Nick Davis Rd	A	A
	WB	Nick Davis Rd	A	A
Nick Davis Rd @ William F Immer Dr/Proposed Eastern Access	NB	Proposed Eastern Access	D	C
	SB	William F Immer Dr	D	D
	EB	Nick Davis Rd	A	A
	WB	Nick Davis Rd	A	A
Nick Davis Rd @ County Line Rd/Sanderson Rd	NB	Sanderson Rd	A	A
	SB	County Line Rd	A	A
	EB	Nick Davis Rd	C	B

According to the future conditions capacity analysis, each approach is projected to continue to operate with acceptable LOS during both of the peak periods.

Turn Lane Warrant Evaluation

Utilizing the information contained in NCHRP Report 457, turn lane warrant analyses were performed using the projected future volumes at the study intersections. The results from these warrants are summarized in Tables 4 and 5. Full printouts of the turn lane warrants can be provided upon request.

Table 4: Right Turn Lane Warrant Evaluation Summary

Intersection	Approach	Peak Period	Meets Warrant Volume Threshold?						
			Existing	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Full Build Out
Nick Davis Rd @ CR-111/Menefee Rd	EB Right	AM	Y	Y	Y	Y	Y	Y	Y
		PM	N	N	N	N	N	N	N
	WB Right	AM	N	N	N	N	Y	Y	Y
		PM	N	N	N	Y	Y	Y	Y
Nick Davis Rd @ Proposed Western Access	EB Right	AM	-	N	N	N	Y	Y	Y
		PM	-	N	N	Y	Y	Y	Y
Nick Davis Rd @ Proposed Eastern Access	EB Right	AM	-	N	N	N	N	N	N
		PM	-	N	N	N	Y	Y	Y

Table 5: Left Turn Lane Warrant Evaluation Summary

Intersection	Approach	Peak Period	Meets Warrant Volume Threshold?						
			Existing	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Full Build Out
Nick Davis Rd @ CR-111/Menefee Rd	EB Left	AM	N	N	N	N	N	N	N
		PM	N	N	N	N	N	N	N
	WB Left	AM	N	N	N	N	N	Y	Y
		PM	N	N	N	N	N	N	N
Nick Davis Rd @ Proposed Western Access	WB Left	AM	-	N	N	N	N	N	N
		PM	-	N	N	N	N	Y	Y
Nick Davis Rd @ Proposed Eastern Access	WB Left	AM	-	N	N	N	N	N	N
		PM	-	N	N	Y	Y	Y	Y
Nick Davis Rd @ Sanderson Rd/County Line Rd	NB Left	AM	N	N	N	N	N	N	N
		PM	N	N	N	N	N	N	N

As shown in Table 4, the intersection of Nick Davis Road and CR-111/Menefee Road meets the volume warrant for an eastbound right turn lane with the existing traffic volumes. Additionally, right turn lanes and left turn lanes are warranted at the two proposed accesses at various phases of development. Traffic volumes at the intersection of Nick Davis Road and Sanderson Road/County Line Road do not meet the threshold for warranting a northbound left turn lane.

Although westbound turn lanes are warranted at the intersection of Nick Davis Road and CR-111/Menefee Road, they are not recommended as part of this project due to the low turning movements being added with the development. The volumes at this intersection should be monitored as phases of development are constructed.

Recommendations/Conclusions

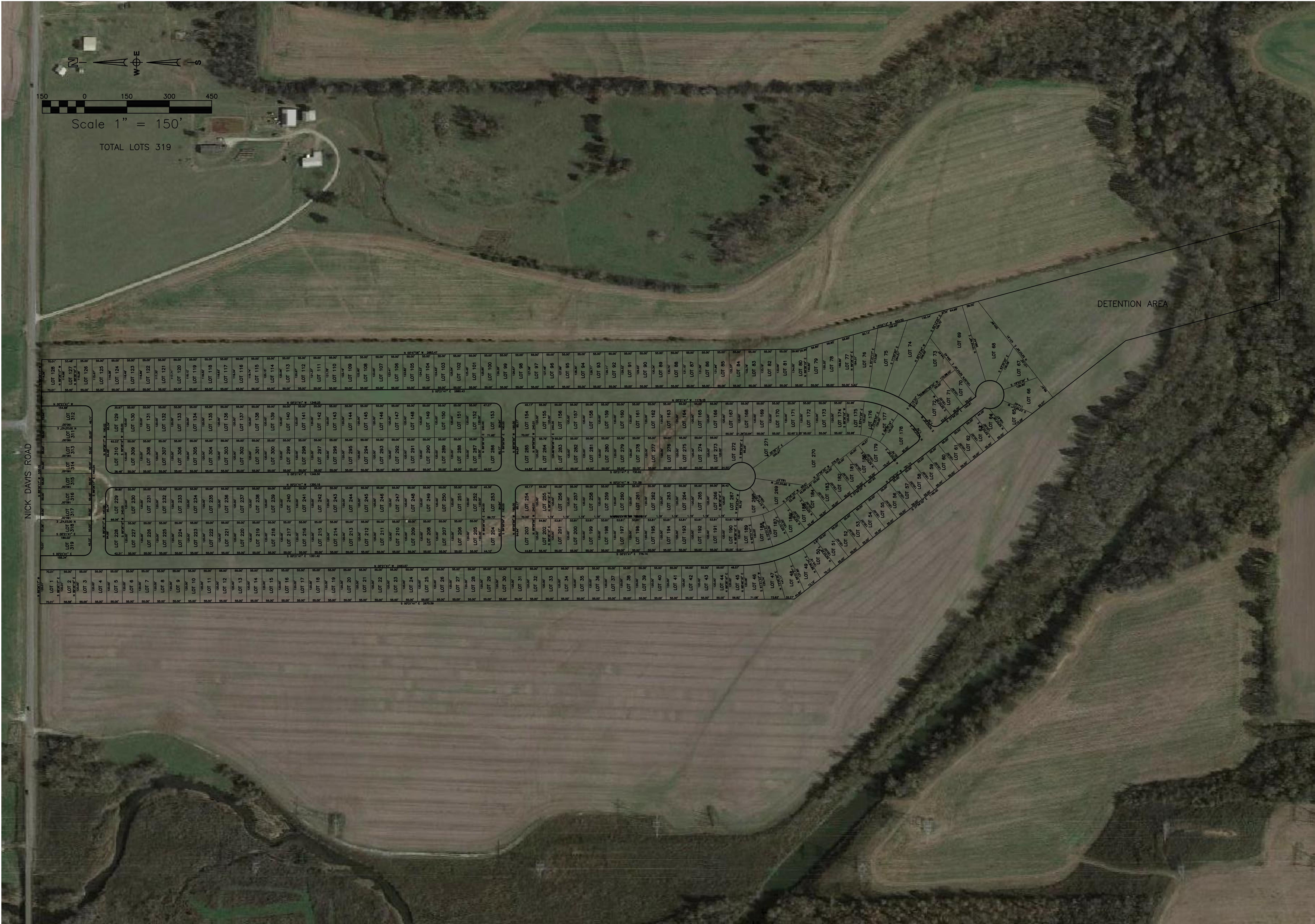
Sain Associates noted the following existing deficiencies before any proposed development traffic was added:

- At the intersection of Nick Davis Road and CR-111/Menefee Road, an eastbound right turn lane is warranted with existing traffic volumes. The County should consider constructing one so that it has 295' of full width length and 180' of bay taper length (475' total). The traffic volumes at this intersection should be monitored as development in the area increases.

Based on our analysis of the proposed development, Sain Associates makes the following recommendations/conclusions ordered by the development phases:

- Phase 1 (60 homes)
 - No improvements are recommended.
- Phase 2 (+60 homes, 120 homes total)
 - No improvements are recommended.
- Phase 3 (+60 homes, 180 homes total)
 - At the Proposed Western Access, construct an eastbound right turn lane with 295' of full width length and 180' of bay taper length (475' total).
 - At the Proposed Eastern Access, construct a westbound left turn lane with 295' of full width length and 180' of bay taper length (475' total).
- Phase 4(+60 homes, 240 homes total)
 - At the Proposed Eastern Access, construct an eastbound right turn lane with 295' of full width length and 180' of bay taper length (475' total).
- Phase 5 (+60 homes, 300 homes total)
 - At the Proposed Western Access, construct a westbound left turn lane with 295' of full width length and 180' of bay taper length (475' total).
- Phase 6 (+20 homes, 320 homes total)
 - The study intersections are projected to operate with acceptable LOS during the future peak periods through the full build-out.

APPENDIX A Conceptual Layout



PUGH WRIGHT

MCANALLY

CIVIL ENGINEERS

310 8th AVENUE NE -- DECATUR, AL -- (256) 353-3937

www.pughwrightmcanally.com

REVISIONS		
5	..	..
4	..	..
3	..	..
2	..	..
1	..	..
Rev#	Description	Date

ROBINSON AND COMPANY
NICK DAVIS ROAD SUBDIVISION
LIMESTONE COUNTY
SECTION 11, TOWNSHIP 3 SOUTH, RANGE 3 WEST
LIMESTONE COUNTY, ALABAMA

CONCEPTUAL LAYOUT 55'x 120'

Date: 07/02/2021
Drawn By: NLT
Approved By: NA
Scale: 1"=150'

CONCEPT ONLY
NOT FOR
CONSTRUCTION

Job Number:
623-21

Sheet Number:
C000

APPENDIX B
Raw Traffic Count Data



TRAFFIC DATA, LLC

1409 Turnham Lane
Birmingham, AL 35216
205-824-0125

Toney, AL

File Name : toney01
Site Code : 00000000
Start Date : 09/22/2021
Page No : 1

Groups Printed- Group 1

	MENEFEED RD Southbound			NICK DAVIS RD Westbound			MENEFEED RD Northbound			NICK DAVIS RD Eastbound			Int. Total
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
02:30 PM	0	2	5	1	35	1	3	8	1	2	54	7	119
02:45 PM	0	6	1	2	37	2	9	10	1	3	34	3	108
Total	0	8	6	3	72	3	12	18	2	5	88	10	227
03:00 PM	2	3	0	4	72	4	9	19	1	0	43	4	161
03:15 PM	0	11	1	1	68	5	4	11	7	6	42	5	161
03:30 PM	0	4	1	1	64	4	7	10	1	5	47	5	149
03:45 PM	1	5	1	0	70	2	4	11	3	5	57	0	159
Total	3	23	3	6	274	15	24	51	12	16	189	14	630
04:00 PM	0	2	2	1	58	9	3	7	0	4	57	4	147
04:15 PM	0	2	1	1	54	0	1	9	2	5	42	3	120
04:30 PM	0	4	2	2	66	3	3	6	4	1	38	3	132
04:45 PM	1	1	2	2	59	4	2	7	2	0	51	2	133
Total	1	9	7	6	237	16	9	29	8	10	188	12	532
05:00 PM	1	4	2	6	90	11	4	7	0	4	51	1	181
05:15 PM	3	2	1	4	83	0	6	16	5	0	32	3	155
05:30 PM	0	8	0	3	73	3	4	11	3	4	47	2	158
05:45 PM	3	11	1	0	60	4	7	8	1	3	38	2	138
Total	7	25	4	13	306	18	21	42	9	11	168	8	632
07:00 AM	12	15	2	2	59	1	1	3	4	3	115	1	218
07:15 AM	7	6	6	4	79	2	2	1	6	0	105	6	224
07:30 AM	6	13	2	2	88	4	4	7	4	3	63	7	203
07:45 AM	2	7	5	2	42	1	3	2	3	3	52	8	130
Total	27	41	15	10	268	8	10	13	17	9	335	22	775
08:00 AM	4	7	3	2	39	0	1	0	1	0	36	10	103
08:15 AM	3	5	1	3	27	0	1	1	3	0	64	1	109
08:30 AM	1	6	2	1	28	2	0	3	4	1	46	4	98
08:45 AM	0	2	0	0	15	0	1	1	0	0	40	1	60
Total	8	20	6	6	109	2	3	5	8	1	186	16	370
Grand Total	46	126	41	44	1266	62	79	158	56	52	1154	82	3166
Apprch %	21.6	59.2	19.2	3.2	92.3	4.5	27.0	53.9	19.1	4.0	89.6	6.4	
Total %	1.5	4.0	1.3	1.4	40.0	2.0	2.5	5.0	1.8	1.6	36.4	2.6	

	MENEFEED RD Southbound				NICK DAVIS RD Westbound				MENEFEED RD Northbound				NICK DAVIS RD Eastbound				Int. Total
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour From 02:30 PM to 05:45 PM - Peak 1 of 1																	
Intersection	05:00 PM				05:00 PM				05:15 PM				05:00 PM				
Volume	7	25	4	36	13	306	18	337	21	42	9	72	11	168	8	187	632
Percent	19.4	69.4	11.1		3.9	90.8	5.3		29.2	58.3	12.5		5.9	89.8	4.3		
05:00	1	4	2	7	6	90	11	107	4	7	0	11	4	51	1	56	181
Volume																	
Peak Factor																	0.873
High Int.	05:45 PM				05:00 PM				05:15 PM				05:00 PM				
Volume	3	11	1	15	6	90	11	107	6	16	5	27	4	51	1	56	
Peak Factor				0.600				0.787				0.667				0.835	

TRAFFIC DATA, LLC

1409 Turnham Lane
Birmingham, AL 35216
205-824-0125

File Name : toney01
Site Code : 00000000
Start Date : 09/22/2021
Page No : 2

	MENEFFEE RD Southbound				NICK DAVIS RD Westbound				MENEFFEE RD Northbound				NICK DAVIS RD Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour From 02:30 PM to 05:45 PM - Peak 1 of 1																	
By Approach	05:00 PM				04:45 PM				02:45 PM				03:15 PM				
Volume	7	25	4	36	15	305	18	338	29	50	10	89	20	203	14	237	
Percent	19.4	69.4	11.1		4.4	90.2	5.3		32.6	56.2	11.2		8.4	85.7	5.9		
High Int.	05:45 PM				05:00 PM				03:00 PM				04:00 PM				
Volume	3	11	1	15	6	90	11	107	9	19	1	29	4	57	4	65	
Peak Factor	0.600				0.790				0.767				0.912				
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Intersection	07:00 AM																
Volume	27	41	15	83	10	268	8	286	10	13	17	40	9	335	22	366	775
Percent	32.5	49.4	18.1		3.5	93.7	2.8		25.0	32.5	42.5		2.5	91.5	6.0		
07:15	7	6	6	19	4	79	2	85	2	1	6	9	0	105	6	111	224
Volume																	0.865
Peak Factor																	
High Int.	07:00 AM				07:30 AM				07:30 AM				07:00 AM				
Volume	12	15	2	29	2	88	4	94	4	7	4	15	3	115	1	119	
Peak Factor	0.716				0.761				0.667				0.769				
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1																	
By Approach	07:00 AM				07:00 AM				07:00 AM				07:00 AM				
Volume	27	41	15	83	10	268	8	286	10	13	17	40	9	335	22	366	
Percent	32.5	49.4	18.1		3.5	93.7	2.8		25.0	32.5	42.5		2.5	91.5	6.0		
High Int.	07:00 AM				07:30 AM				07:30 AM				07:00 AM				
Volume	12	15	2	29	2	88	4	94	4	7	4	15	3	115	1	119	
Peak Factor	0.716				0.761				0.667				0.769				

TRAFFIC DATA, LLC

1409 Turnham Lane
Birmingham, AL 35216
205-824-0125

Toney, AL

File Name : toney02
Site Code : 00000000
Start Date : 09/22/2021
Page No : 1

Groups Printed- Group 1

	WILLIAM F IMMER DR Southbound		NICK DAVIS RD Westbound		NICK DAVIS RD Eastbound		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
02:30 PM	2	0	36	0	0	60	98
02:45 PM	1	1	58	0	1	32	93
Total	3	1	94	0	1	92	191
03:00 PM	3	2	82	1	3	54	145
03:15 PM	7	0	70	0	0	48	125
03:30 PM	2	1	76	0	0	51	130
03:45 PM	0	2	58	1	1	56	118
Total	12	5	286	2	4	209	518
04:00 PM	4	8	61	1	0	61	135
04:15 PM	2	1	61	1	0	46	111
04:30 PM	7	2	78	1	0	45	133
04:45 PM	3	1	75	2	0	59	140
Total	16	12	275	5	0	211	519
05:00 PM	17	16	92	1	1	50	177
05:15 PM	1	0	87	0	3	42	133
05:30 PM	1	2	79	7	3	47	139
05:45 PM	0	1	66	10	5	37	119
Total	19	19	324	18	12	176	568
07:00 AM	1	0	65	5	4	145	220
07:15 AM	1	0	89	4	9	121	224
07:30 AM	1	2	83	11	5	79	181
07:45 AM	1	1	43	15	9	53	122
Total	4	3	280	35	27	398	747
08:00 AM	0	1	38	4	3	37	83
08:15 AM	1	1	30	2	3	71	108
08:30 AM	4	0	29	1	0	61	95
08:45 AM	1	1	14	1	1	40	58
Total	6	3	111	8	7	209	344
Grand Total	60	43	1370	68	51	1295	2887
Apprch %	58.3	41.7	95.3	4.7	3.8	96.2	
Total %	2.1	1.5	47.5	2.4	1.8	44.9	

	WILLIAM F IMMER DR Southbound			NICK DAVIS RD Westbound				NICK DAVIS RD Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour From 02:30 PM to 05:45 PM - Peak 1 of 1											
Intersection 04:45 PM											
Volume	22	19	41	333	10	343	0	7	198	205	589
Percent	53.7	46.3		97.1	2.9			3.4	96.6		
05:00 Volume	17	16	33	92	1	93	0	1	50	51	177
Peak Factor											0.832
High Int. 05:00 PM				05:00 PM			2:15:00 PM	04:45 PM			
Volume	17	16	33	92	1	93	0	0	59	59	
Peak Factor			0.311			0.922				0.869	

TRAFFIC DATA, LLC

1409 Turnham Lane
Birmingham, AL 35216
205-824-0125

File Name : toney02
Site Code : 00000000
Start Date : 09/22/2021
Page No : 2

WILLIAM F IMMER DR Southbound				NICK DAVIS RD Westbound				NICK DAVIS RD Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour From 02:30 PM to 05:45 PM - Peak 1 of 1											
By Approach	04:15 PM			04:45 PM			02:30 PM	03:15 PM			
Volume	29	20	49	333	10	343	0	1	216	217	
Percent	59.2	40.8		97.1	2.9			0.5	99.5		
High Int.	05:00 PM			05:00 PM			-	04:00 PM			
Volume	17	16	33	92	1	93	-	0	61	61	
Peak Factor			0.371			0.922	-			0.889	
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1											
Intersection	07:00 AM										
Volume	4	3	7	280	35	315	0	27	398	425	747
Percent	57.1	42.9		88.9	11.1			6.4	93.6		
07:15 Volume	1	0	1	89	4	93	0	9	121	130	224
Peak Factor											0.834
High Int.	07:30 AM			07:30 AM				07:00 AM			
Volume	1	2	3	83	11	94	0	4	145	149	
Peak Factor			0.583			0.838				0.713	
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1											
By Approach	07:45 AM			07:00 AM			07:00 AM	07:00 AM			
Volume	6	3	9	280	35	315	0	27	398	425	
Percent	66.7	33.3		88.9	11.1			6.4	93.6		
High Int.	08:30 AM			07:30 AM			-	07:00 AM			
Volume	4	0	4	83	11	94	-	4	145	149	
Peak Factor			0.563			0.838	-			0.713	

TRAFFIC DATA, LLC

1409 Turnham Lane
Birmingham, AL 35216
205-824-0125

Harvest, AL

File Name : toney03
Site Code : 00000000
Start Date : 09/22/2021
Page No : 1

Groups Printed- Group 1

	COUNTY LINE RD Southbound		SANDERSON RD Northbound		NICK DAVIS RD Eastbound		
Start Time	Thru	Right	Left	Thru	Left	Right	Int. Total
02:30 PM	11	28	7	6	29	32	113
02:45 PM	15	26	32	8	20	19	120
Total	26	54	39	14	49	51	233
03:00 PM	4	38	50	19	32	20	163
03:15 PM	5	36	28	8	44	20	141
03:30 PM	3	55	18	9	27	19	131
03:45 PM	3	38	23	8	41	14	127
Total	15	167	119	44	144	73	562
04:00 PM	6	50	16	19	51	19	161
04:15 PM	6	49	11	18	39	10	133
04:30 PM	13	62	15	15	33	14	152
04:45 PM	10	62	18	11	47	18	166
Total	35	223	60	63	170	61	612
05:00 PM	9	59	30	17	41	22	178
05:15 PM	5	69	15	14	36	12	151
05:30 PM	9	69	17	15	29	20	159
05:45 PM	5	60	22	12	25	12	136
Total	28	257	84	58	131	66	624
07:00 AM	15	44	25	11	59	84	238
07:15 AM	22	49	45	13	37	85	251
07:30 AM	12	44	43	8	62	34	203
07:45 AM	5	33	21	9	35	21	124
Total	54	170	134	41	193	224	816
08:00 AM	6	37	11	4	22	15	95
08:15 AM	4	23	6	5	51	22	111
08:30 AM	8	21	8	2	39	26	104
08:45 AM	9	10	4	7	30	14	74
Total	27	91	29	18	142	77	384
Grand Total	185	962	465	238	829	552	3231
Apprch %	16.1	83.9	66.1	33.9	60.0	40.0	
Total %	5.7	29.8	14.4	7.4	25.7	17.1	

	COUNTY LINE RD Southbound				SANDERSON RD Northbound			NICK DAVIS RD Eastbound			
Start Time	Thru	Right	App. Total	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour From 02:30 PM to 05:45 PM - Peak 1 of 1											
Intersection	04:45 PM										
Volume	33	259	292	0	80	57	137	153	72	225	654
Percent	11.3	88.7			58.4	41.6		68.0	32.0		
05:00 Volume	9	59	68	0	30	17	47	41	22	63	178
Peak Factor											0.919
High Int.	05:30 PM			2:15:00 PM	05:00 PM			04:45 PM			
Volume	9	69	78	0	30	17	47	47	18	65	
Peak Factor			0.936				0.729			0.865	

TRAFFIC DATA, LLC

1409 Turnham Lane
Birmingham, AL 35216
205-824-0125

File Name : toney03
Site Code : 00000000
Start Date : 09/22/2021
Page No : 2

	COUNTY LINE RD Southbound				SANDERSON RD Northbound				NICK DAVIS RD Eastbound			
Start Time	Thru	Right	App. Total	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total	
Peak Hour From 02:30 PM to 05:45 PM - Peak 1 of 1												
By Approach	04:45 PM			02:30 PM	02:45 PM			03:15 PM				
Volume	33	259	292	0	128	44	172	163	72	235		
Percent	11.3	88.7			74.4	25.6		69.4	30.6			
High Int.	05:30 PM			-	03:00 PM			04:00 PM				
Volume	9	69	78	-	50	19	69	51	19	70		
Peak Factor			0.936	-			0.623			0.839		
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1												
Intersection	07:00 AM											
Volume	54	170	224	0	134	41	175	193	224	417	816	
Percent	24.1	75.9			76.6	23.4		46.3	53.7			
07:15 Volume	22	49	71	0	45	13	58	37	85	122	251	
Peak Factor											0.813	
High Int.	07:15 AM				07:15 AM			07:00 AM				
Volume	22	49	71	0	45	13	58	59	84	143		
Peak Factor			0.789				0.754			0.729		
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1												
By Approach	07:00 AM			07:00 AM	07:00 AM			07:00 AM				
Volume	54	170	224	0	134	41	175	193	224	417		
Percent	24.1	75.9			76.6	23.4		46.3	53.7			
High Int.	07:15 AM			-	07:15 AM			07:00 AM				
Volume	22	49	71	-	45	13	58	59	84	143		
Peak Factor			0.789	-			0.754			0.729		

APPENDIX C

Description of Levels of Service



Levels of Service Signalized Intersections

Level of service criteria for signalized intersections is defined in terms of *delay*. Delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. Specifically, level-of-service criteria are stated in terms of the average stopped delay per vehicle for a 15-minute analysis period.

Level of service A describes operations with very low delay, less than 10 seconds per vehicle. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

Level of service B describes operations with delay in the range of > 10 to 20 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.

Level of service C describes operations with delay in the range of > 20 to 35 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.

Level of service D describes operations with delay in the range of > 35 to 55 seconds per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high vehicle/capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

Level of service E describes operations with delay in the range of > 55 to 80 seconds per vehicle. This is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high vehicle/capacity ratios. Individual cycle failures are frequent occurrences.

Level of service F describes operations with delay in excess of 80 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with over saturation, i.e., when arrival flow rates exceed the capacity of the intersection. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Levels of Service Unsignalized Intersections

Level of service criteria for unsignalized intersections is stated in terms of average control delay. Control delay is defined as the total elapsed time from a vehicle joining the queue until its departure from the stopped position at the head of the queue. The criteria for each level of service are cited in the table below.

Level of Service	Average Control Delay (seconds/vehicle)
A	0 - 10
B	> 10 – 15
C	> 15 – 25
D	> 25 – 35
E	> 35 – 50
F	> 50

APPENDIX D
Existing Conditions Capacity Analysis



Intersection												
Int Delay, s/veh	2.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	335	22	10	268	15	10	13	17	27	41	15
Future Vol, veh/h	9	335	22	10	268	15	10	13	17	27	41	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	10	364	24	11	291	16	11	14	18	29	45	16
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	307	0	0	388	0	0	748	725	376	733	729	299
Stage 1	-	-	-	-	-	-	396	396	-	321	321	-
Stage 2	-	-	-	-	-	-	352	329	-	412	408	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1254	-	-	1170	-	-	329	352	670	336	350	741
Stage 1	-	-	-	-	-	-	629	604	-	691	652	-
Stage 2	-	-	-	-	-	-	665	646	-	617	597	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1254	-	-	1170	-	-	285	345	670	311	343	741
Mov Cap-2 Maneuver	-	-	-	-	-	-	285	345	-	311	343	-
Stage 1	-	-	-	-	-	-	623	598	-	684	645	-
Stage 2	-	-	-	-	-	-	599	639	-	580	591	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			0.3			14.9			18		
HCM LOS							B			C		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	408	1254	-	-	1170	-	-	366				
HCM Lane V/C Ratio	0.107	0.008	-	-	0.009	-	-	0.246				
HCM Control Delay (s)	14.9	7.9	0	-	8.1	0	-	18				
HCM Lane LOS	B	A	A	-	A	A	-	C				
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	-	1				

Intersection

Int Delay, s/veh 7.7

Movement EBL EBR NBL NBT SBT SBRLane Configurations 

Traffic Vol, veh/h 193 224 134 41 54 170

Future Vol, veh/h 193 224 134 41 54 170

Conflicting Peds, #/hr 0 0 0 0 0 0

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - None

Storage Length 130 0 - - - 130

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 210 243 146 45 59 185

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 396 59 244 0 - 0

Stage 1 59 - - - - -

Stage 2 337 - - - - -

Critical Hdwy 6.42 6.22 4.12 - - -

Critical Hdwy Stg 1 5.42 - - - - -

Critical Hdwy Stg 2 5.42 - - - - -

Follow-up Hdwy 3.518 3.318 2.218 - - -

Pot Cap-1 Maneuver 609 1007 1322 - - -

Stage 1 964 - - - - -

Stage 2 723 - - - - -

Platoon blocked, % - - -

Mov Cap-1 Maneuver 540 1007 1322 - - -

Mov Cap-2 Maneuver 540 - - - - -

Stage 1 855 - - - - -

Stage 2 723 - - - - -

Approach EB NB SB

HCM Control Delay, s 12.5 6.2 0

HCM LOS B

Minor Lane/Major Mvmt NBL NBT EBLn1 EBLn2 SBT SBR

Capacity (veh/h) 1322 - 540 1007 - -

HCM Lane V/C Ratio 0.11 - 0.388 0.242 - -

HCM Control Delay (s) 8.1 0 15.8 9.7 - -

HCM Lane LOS A A C A - -

HCM 95th %tile Q(veh) 0.4 - 1.8 0.9 - -

HCM 6th TWSC
3: Nick Davis Road & William F Immer Drive

09/24/2021

Intersection

Int Delay, s/veh 0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	27	398	280	35	4	3
Future Vol, veh/h	27	398	280	35	4	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
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	29	433	304	38	4	3

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	342	0	814
Stage 1	-	-	323
Stage 2	-	-	491
Critical Hdwy	4.12	-	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.518
Pot Cap-1 Maneuver	1217	-	347
Stage 1	-	-	734
Stage 2	-	-	615
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1217	-	336
Mov Cap-2 Maneuver	-	-	336
Stage 1	-	-	711
Stage 2	-	-	615

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	13.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1217	-	-	-	435
HCM Lane V/C Ratio	0.024	-	-	-	0.017
HCM Control Delay (s)	8	0	-	-	13.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Intersection												
Int Delay, s/veh	2.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	11	168	8	13	306	18	21	42	9	7	25	4
Future Vol, veh/h	11	168	8	13	306	18	21	42	9	7	25	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	183	9	14	333	20	23	46	10	8	27	4
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	353	0	0	192	0	0	599	593	188	611	587	343
Stage 1	-	-	-	-	-	-	212	212	-	371	371	-
Stage 2	-	-	-	-	-	-	387	381	-	240	216	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1206	-	-	1381	-	-	413	418	854	406	422	700
Stage 1	-	-	-	-	-	-	790	727	-	649	620	-
Stage 2	-	-	-	-	-	-	637	613	-	763	724	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1206	-	-	1381	-	-	383	408	854	361	412	700
Mov Cap-2 Maneuver	-	-	-	-	-	-	383	408	-	361	412	-
Stage 1	-	-	-	-	-	-	781	719	-	642	612	-
Stage 2	-	-	-	-	-	-	597	605	-	699	716	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.5			0.3			15.3			14.5		
HCM LOS							C			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	428	1206	-	-	1381	-	-	420				
HCM Lane V/C Ratio	0.183	0.01	-	-	0.01	-	-	0.093				
HCM Control Delay (s)	15.3	8	0	-	7.6	0	-	14.5				
HCM Lane LOS	C	A	A	-	A	A	-	B				
HCM 95th %tile Q(veh)	0.7	0	-	-	0	-	-	0.3				

Intersection						
Int Delay, s/veh	4.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	131	66	84	58	28	257
Future Vol, veh/h	131	66	84	58	28	257
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	130	0	-	-	-	130
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	142	72	91	63	30	279
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	275	30	309	0	-	0
Stage 1	30	-	-	-	-	-
Stage 2	245	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	715	1044	1252	-	-	-
Stage 1	993	-	-	-	-	-
Stage 2	796	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	661	1044	1252	-	-	-
Mov Cap-2 Maneuver	661	-	-	-	-	-
Stage 1	919	-	-	-	-	-
Stage 2	796	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	10.8	4.8		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1252	-	661	1044	-	-
HCM Lane V/C Ratio	0.073	-	0.215	0.069	-	-
HCM Control Delay (s)	8.1	0	11.9	8.7	-	-
HCM Lane LOS	A	A	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	0.8	0.2	-	-

HCM 6th TWSC
3: Nick Davis Road & William F Immer Drive

09/24/2021

Intersection

Int Delay, s/veh 1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	12	176	324	18	19	19
Future Vol, veh/h	12	176	324	18	19	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	191	352	20	21	21

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	372	0	0 579 362
Stage 1	-	-	- 362 -
Stage 2	-	-	- 217 -
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	1186	-	- 477 683
Stage 1	-	-	- 704 -
Stage 2	-	-	- 819 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1186	-	- 471 683
Mov Cap-2 Maneuver	-	-	- 471 -
Stage 1	-	-	- 696 -
Stage 2	-	-	- 819 -

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	12
HCM LOS			B

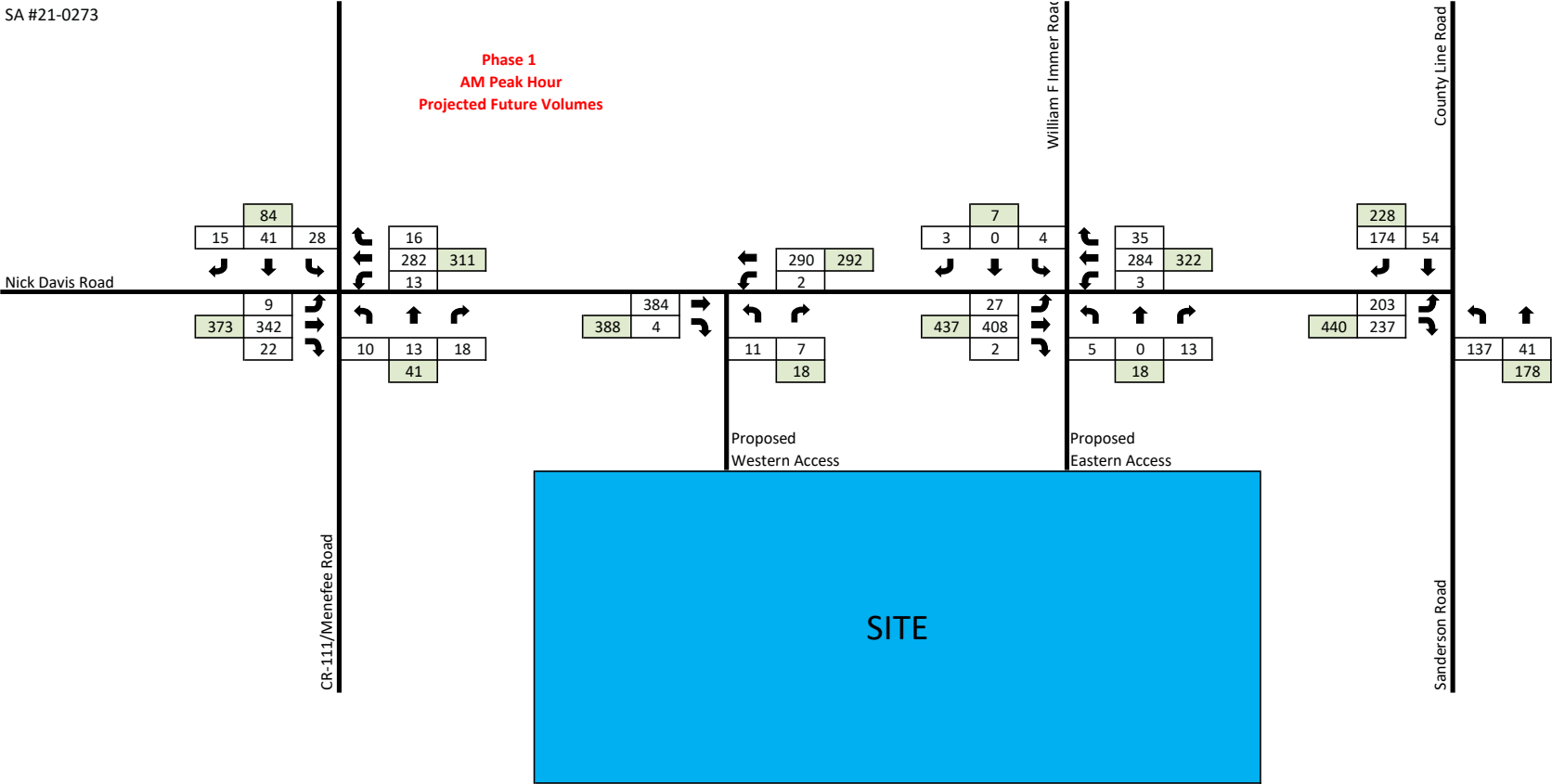
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1186	-	-	-	558
HCM Lane V/C Ratio	0.011	-	-	-	0.074
HCM Control Delay (s)	8.1	0	-	-	12
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

APPENDIX E
Future Traffic Volumes by Phase



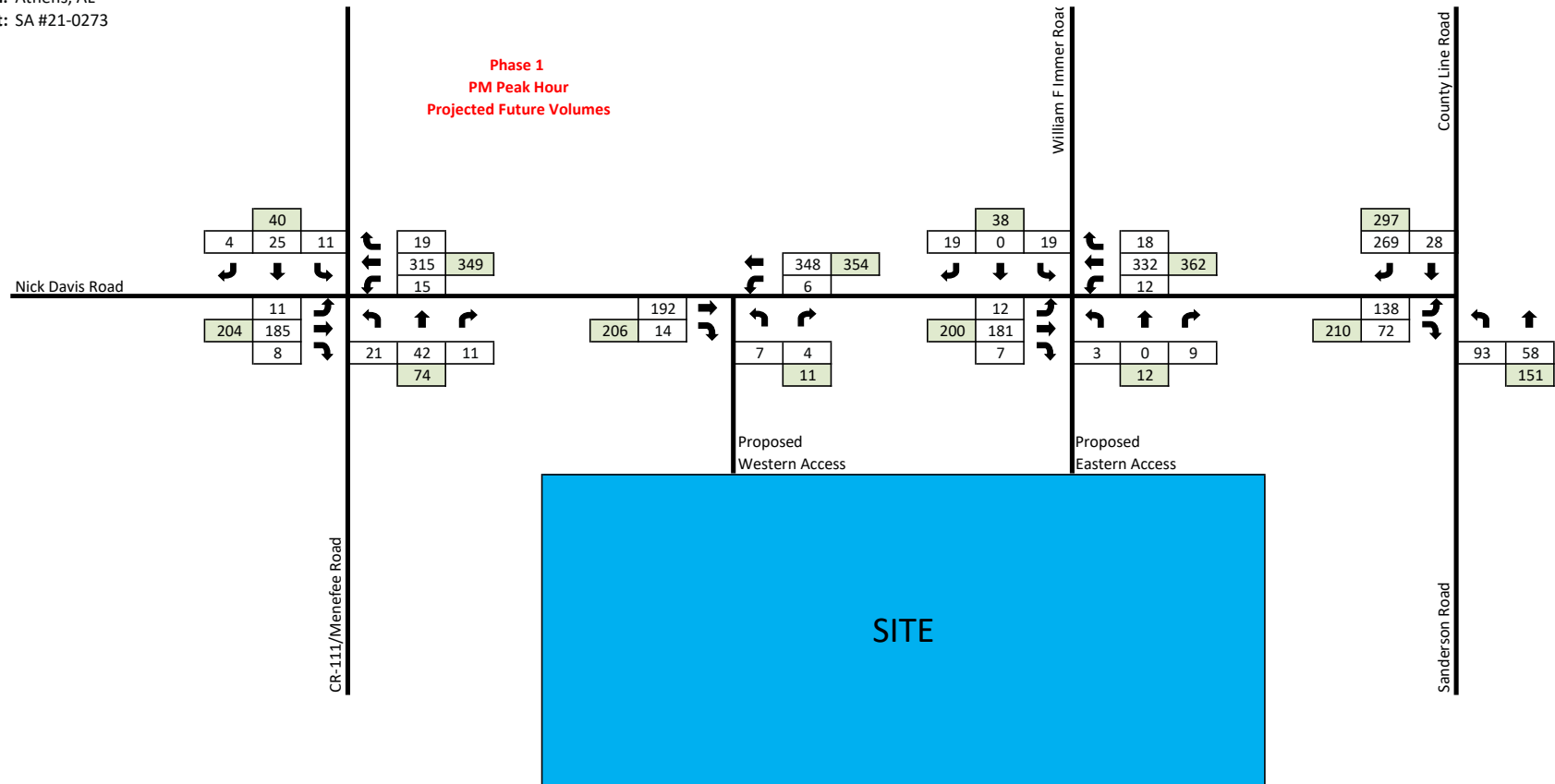
Location: Athens, AL

Project: SA #21-0273



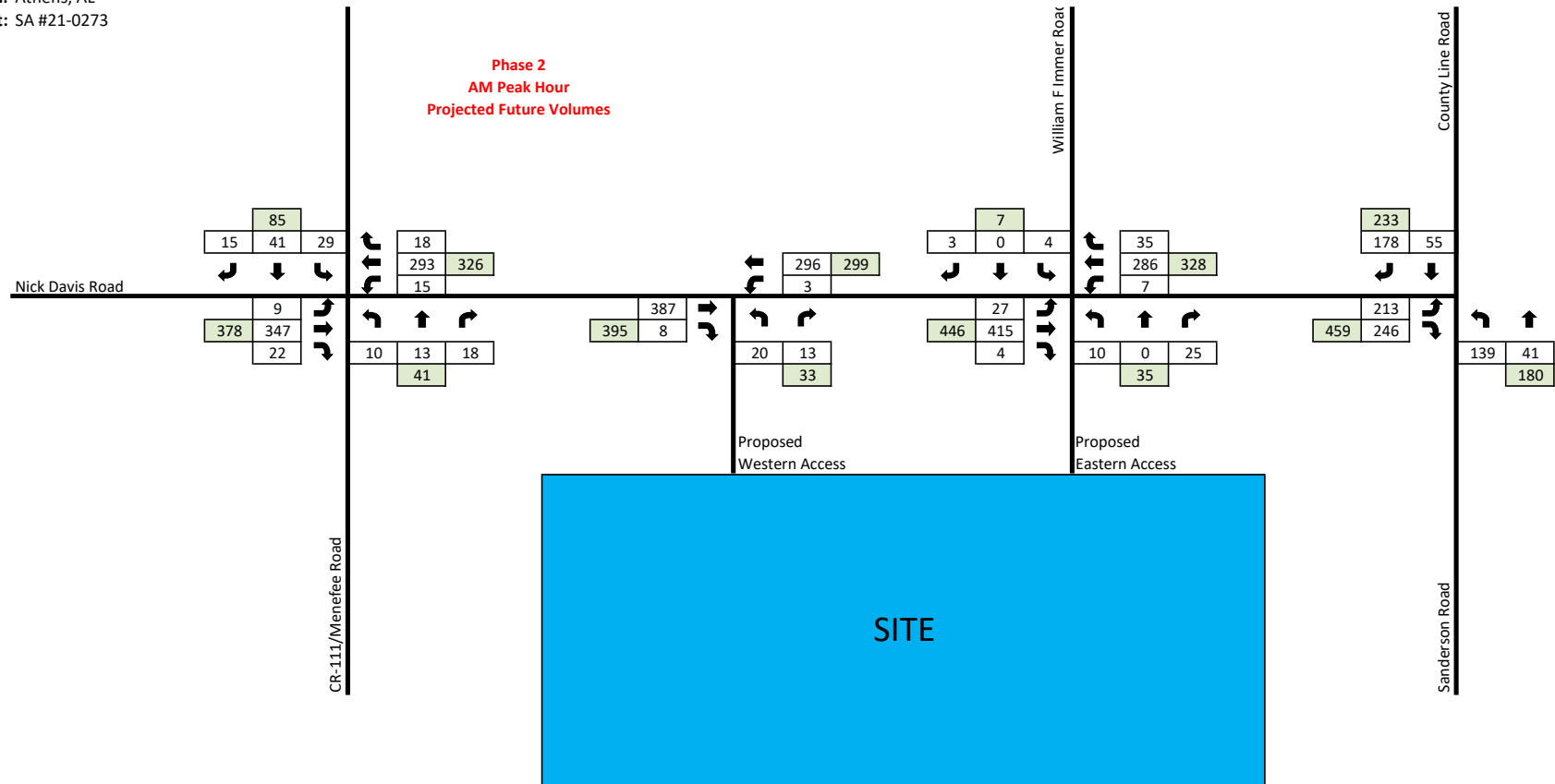
Location: Athens, AL

Project: SA #21-0273



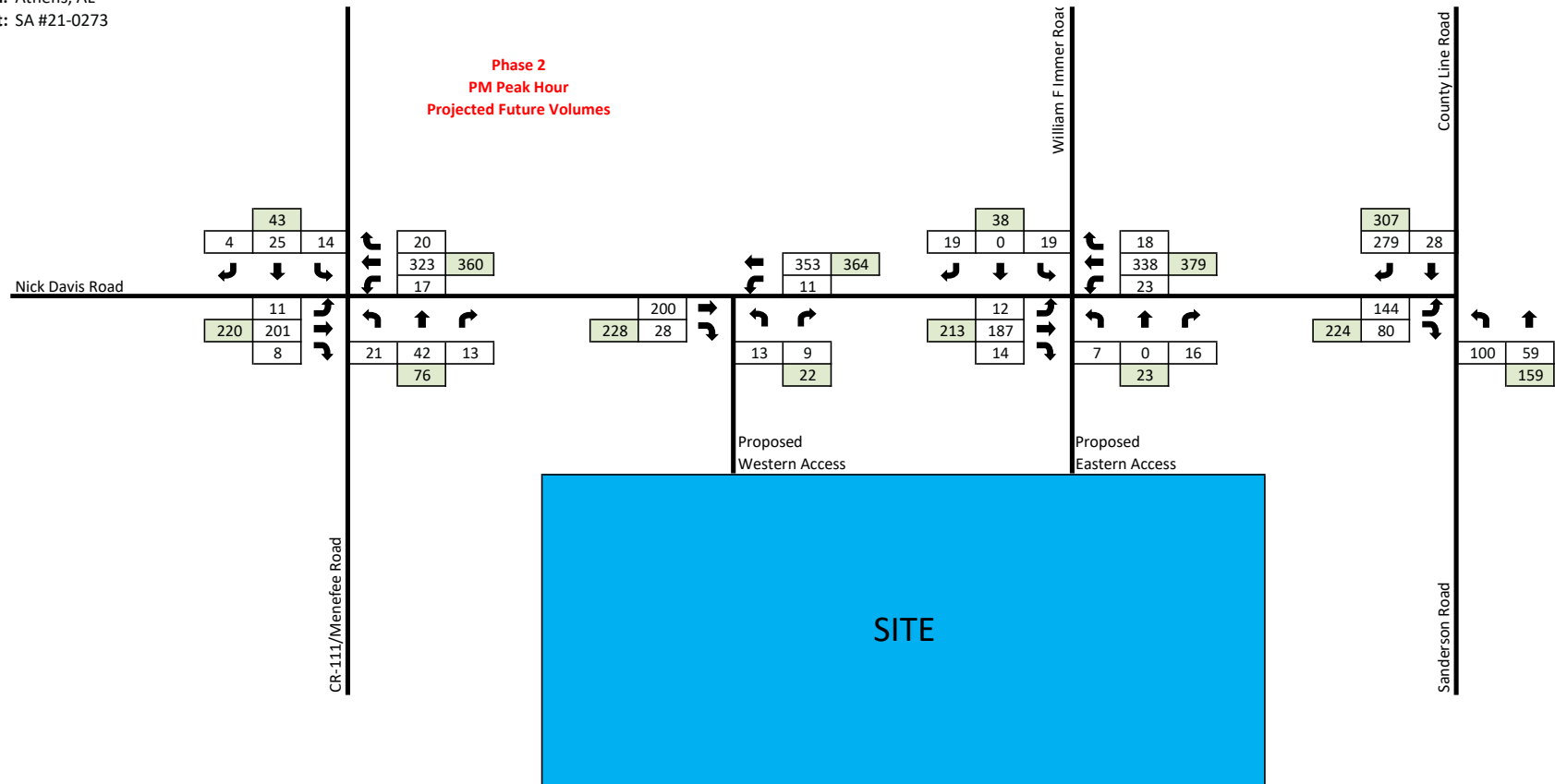
Location: Athens, AL

Project: SA #21-0273



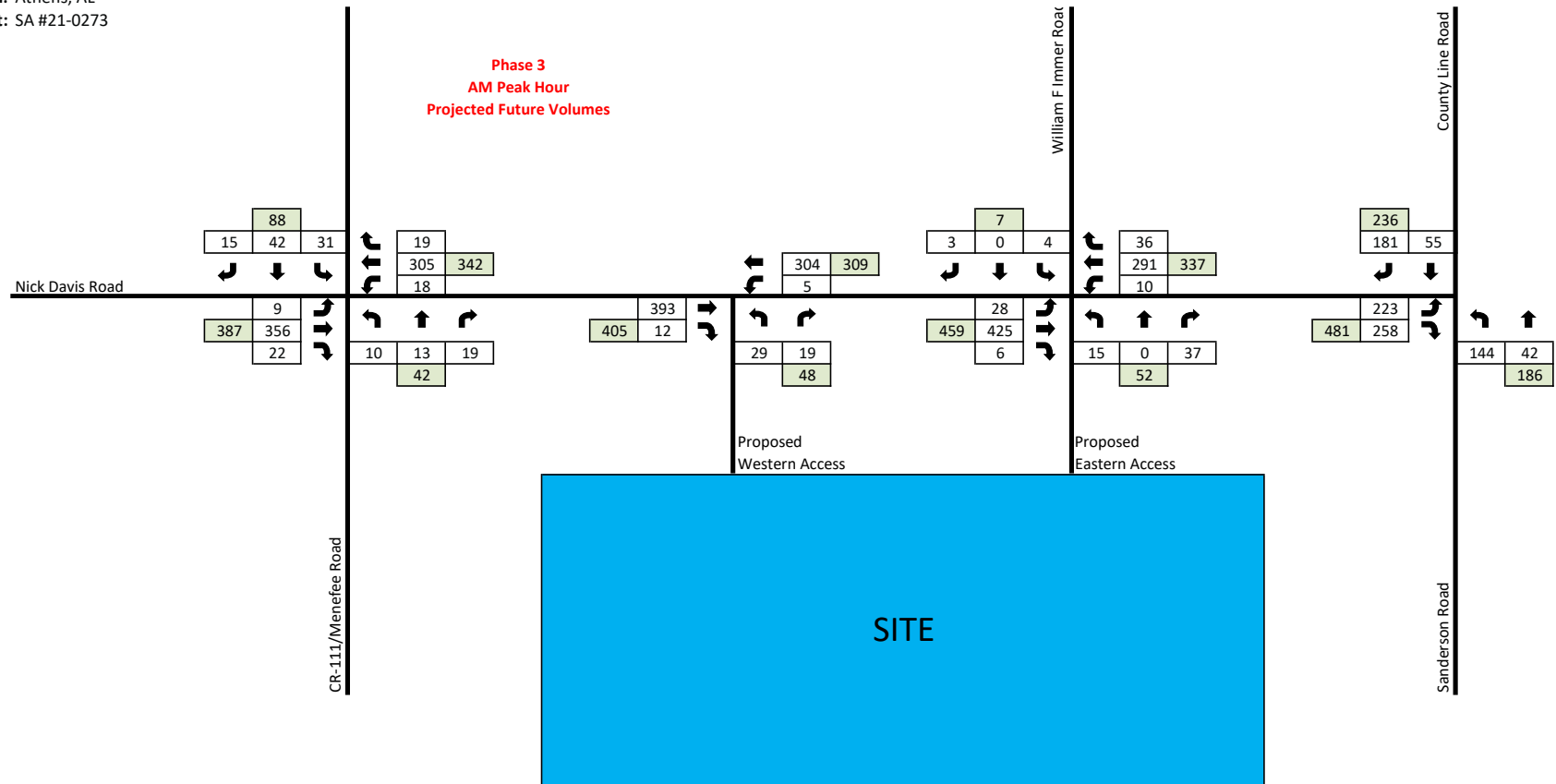
Location: Athens, AL

Project: SA #21-0273



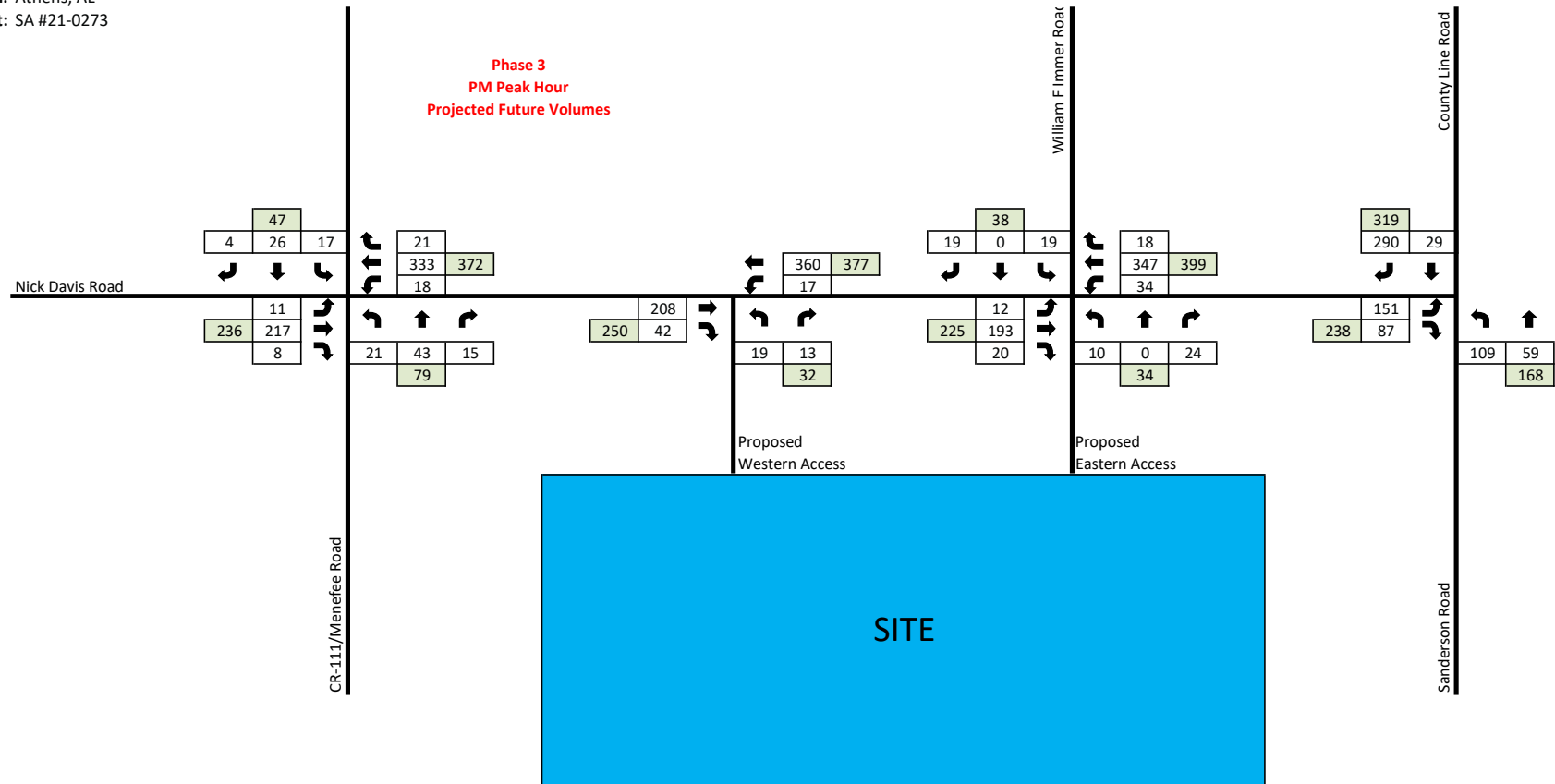
Location: Athens, AL

Project: SA #21-0273



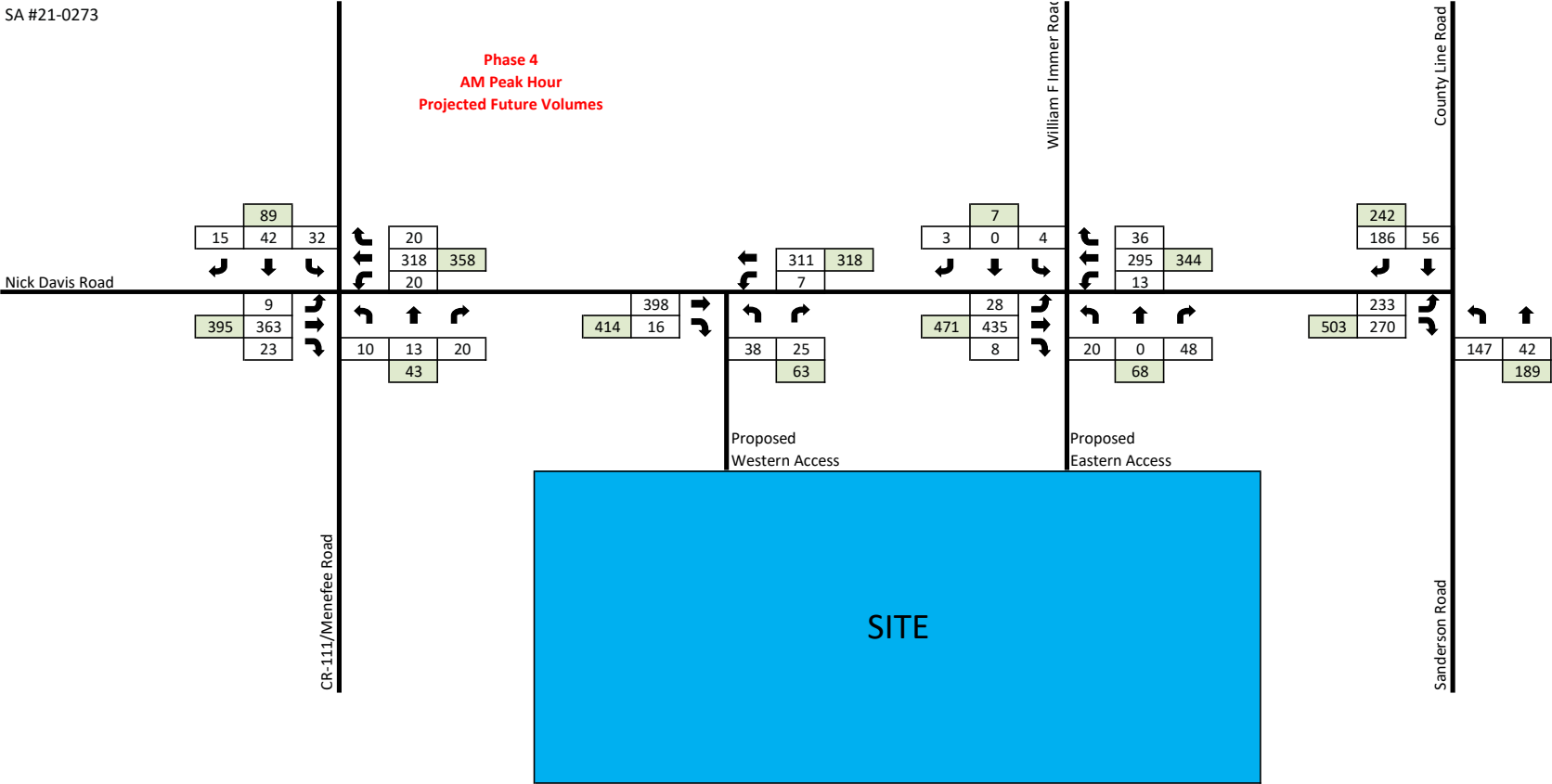
Location: Athens, AL

Project: SA #21-0273



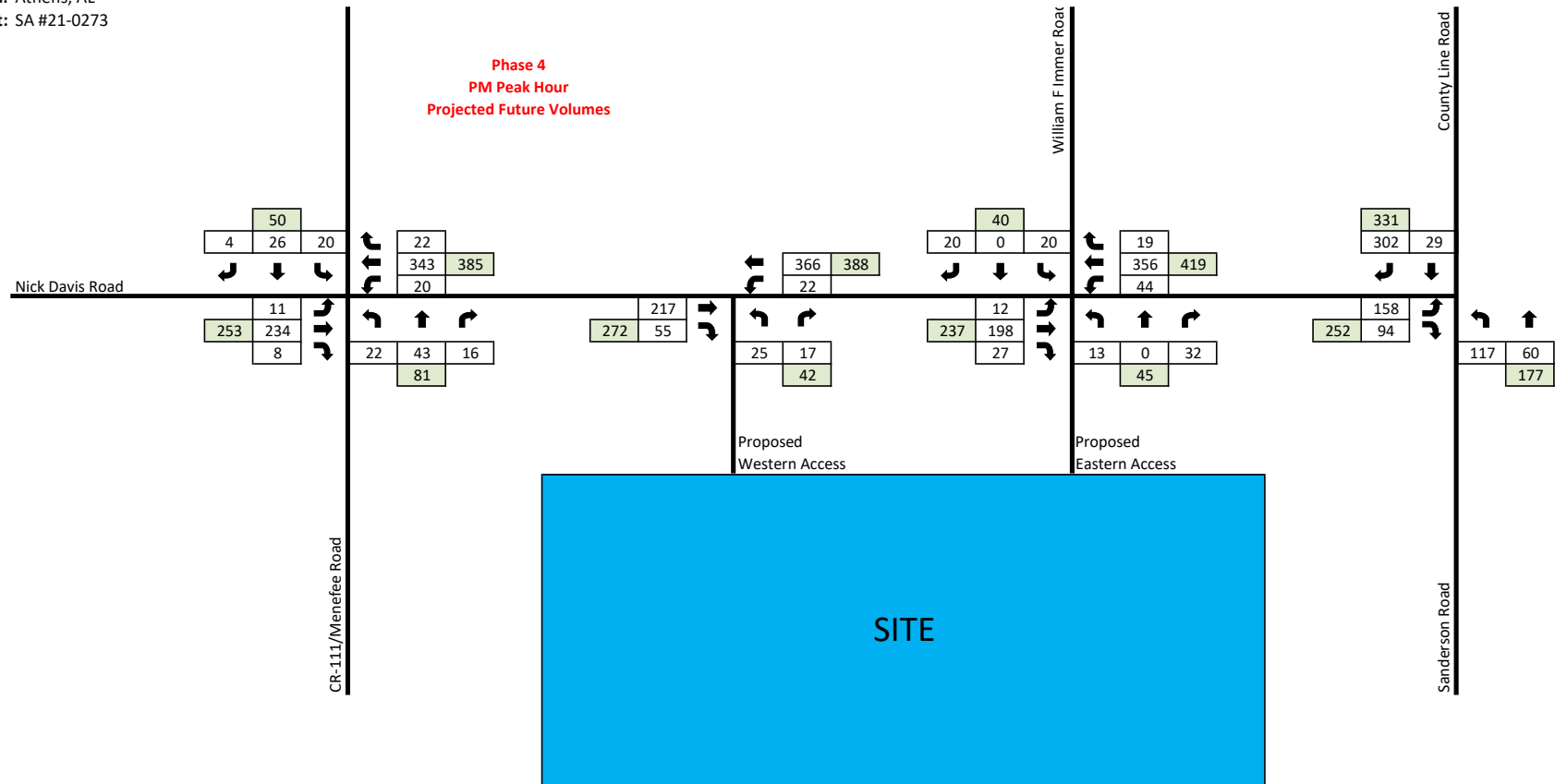
Location: Athens, AL

Project: SA #21-0273



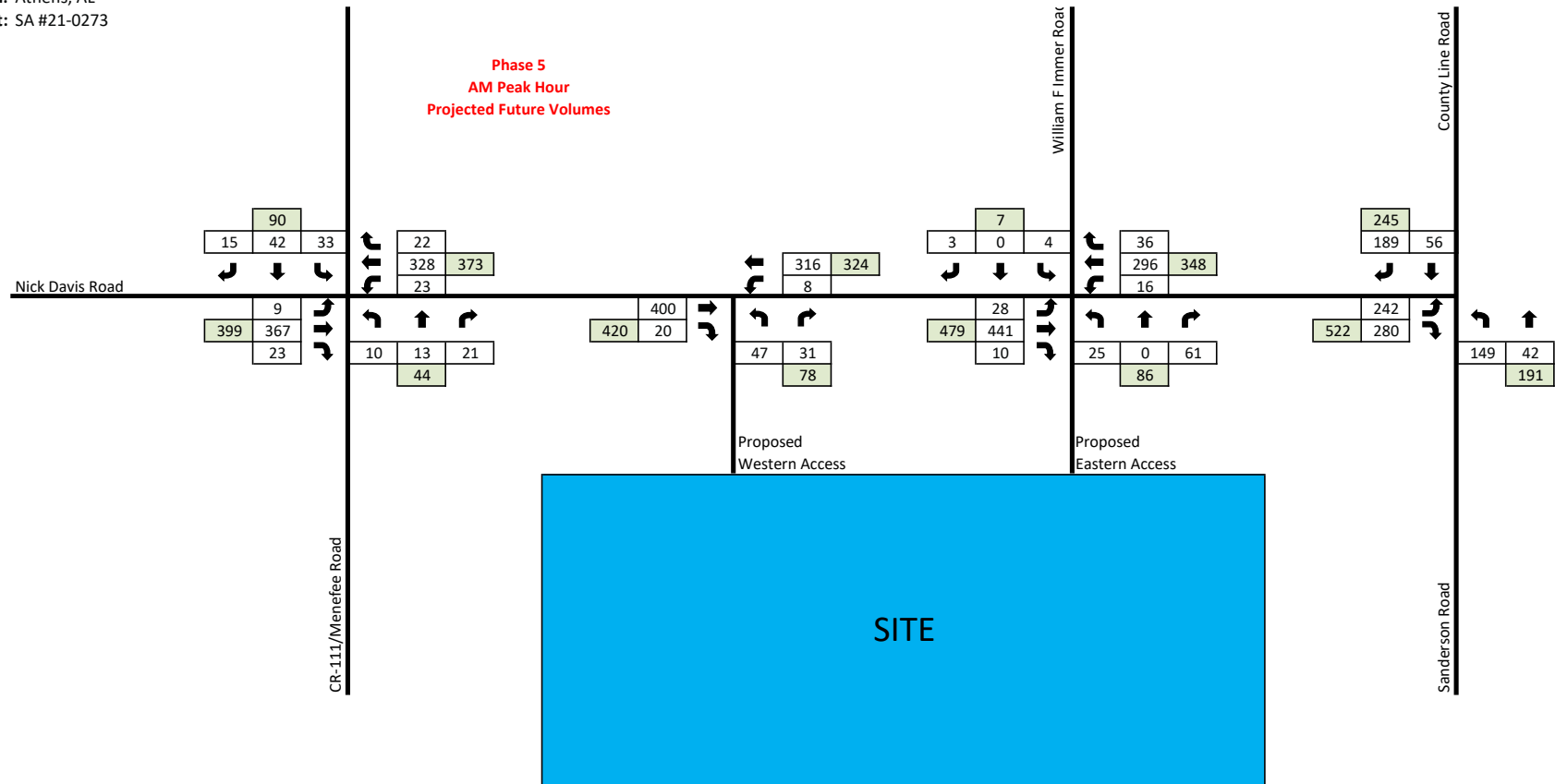
Location: Athens, AL

Project: SA #21-0273



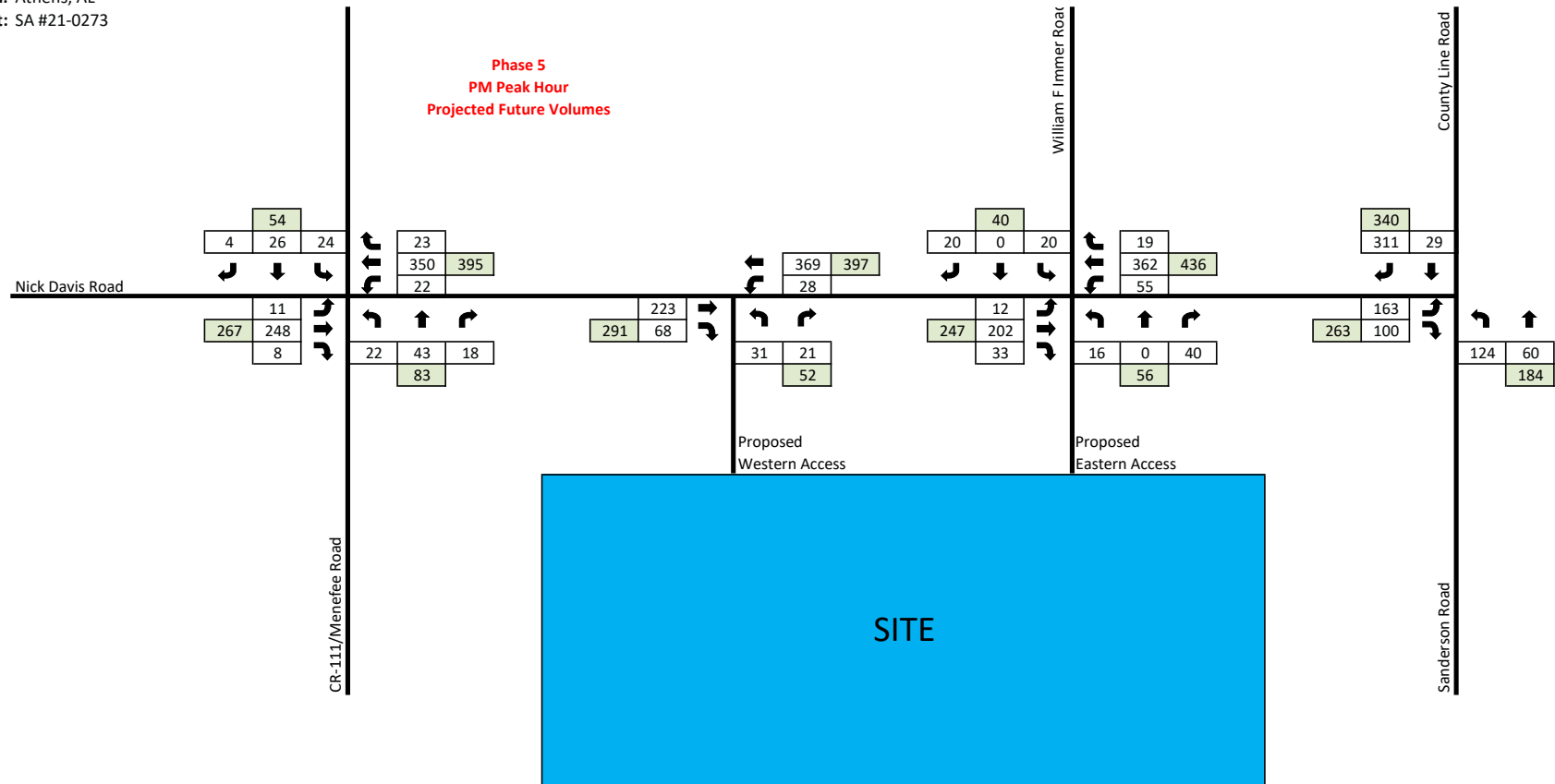
Location: Athens, AL

Project: SA #21-0273



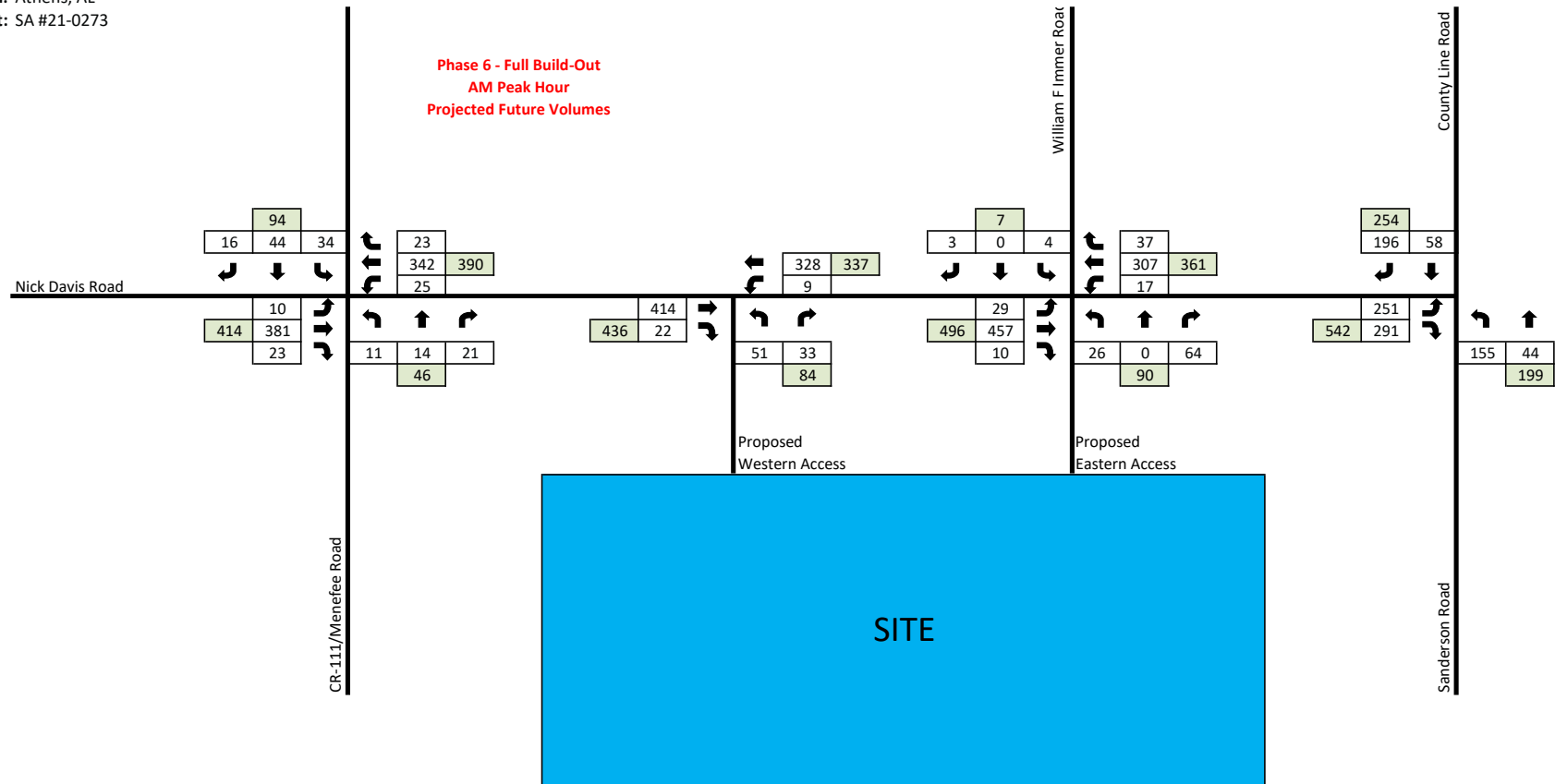
Location: Athens, AL

Project: SA #21-0273



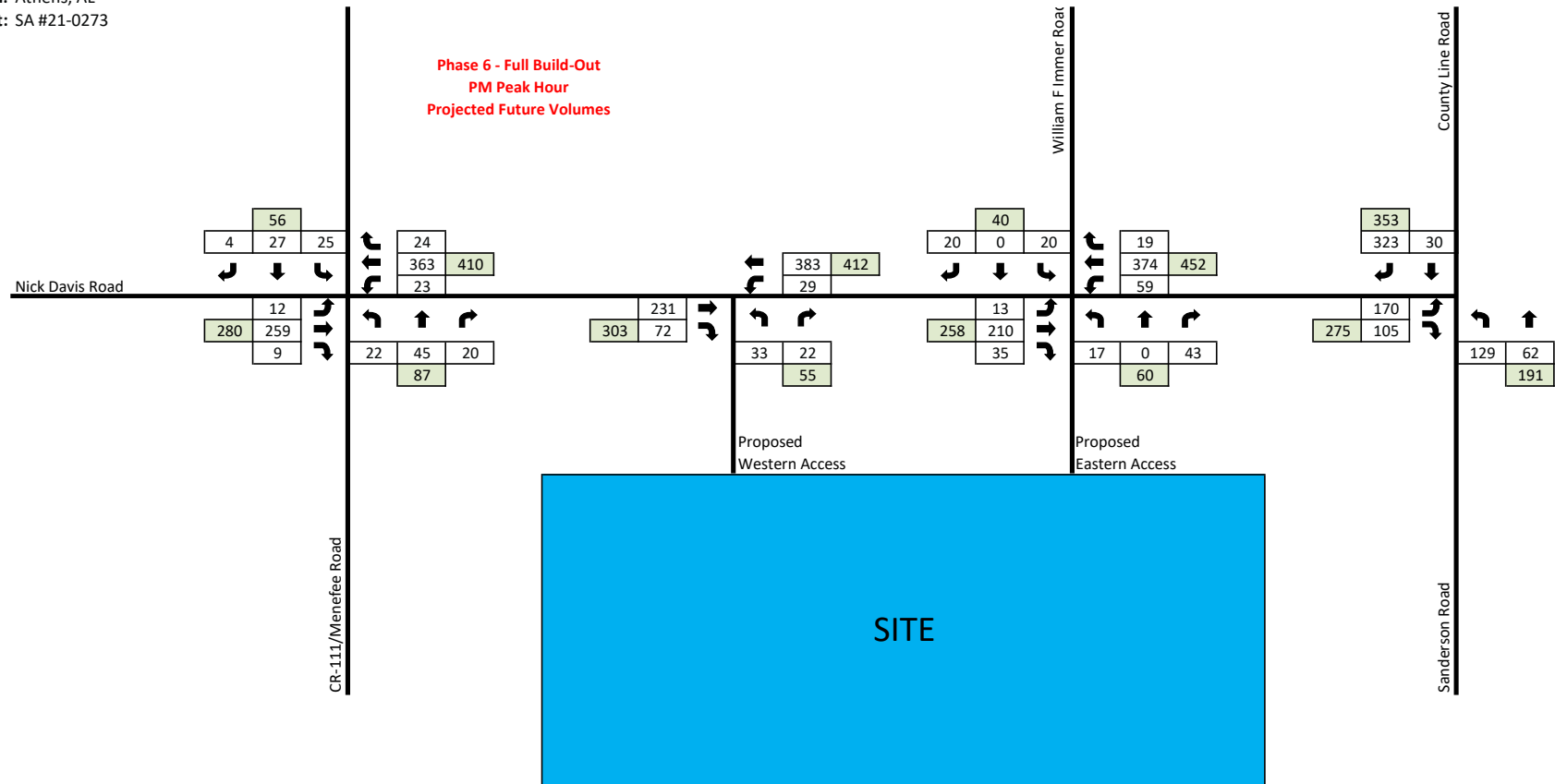
Location: Athens, AL

Project: SA #21-0273



Location: Athens, AL

Project: SA #21-0273



APPENDIX F
Future Conditions Capacity Analysis



Intersection												
Int Delay, s/veh	3.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	381	23	25	342	23	11	14	21	34	44	16
Future Vol, veh/h	10	381	23	25	342	23	11	14	21	34	44	16
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	414	25	27	372	25	12	15	23	37	48	17
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	397	0	0	439	0	0	920	900	427	907	900	385
Stage 1	-	-	-	-	-	-	449	449	-	439	439	-
Stage 2	-	-	-	-	-	-	471	451	-	468	461	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1162	-	-	1121	-	-	251	278	628	257	278	663
Stage 1	-	-	-	-	-	-	589	572	-	597	578	-
Stage 2	-	-	-	-	-	-	573	571	-	575	565	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1162	-	-	1121	-	-	204	266	628	229	266	663
Mov Cap-2 Maneuver	-	-	-	-	-	-	204	266	-	229	266	-
Stage 1	-	-	-	-	-	-	581	565	-	589	560	-
Stage 2	-	-	-	-	-	-	494	553	-	532	558	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			0.5			17.9			25.3		
HCM LOS							C			D		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	329	1162	-	-	1121	-	-	278				
HCM Lane V/C Ratio	0.152	0.009	-	-	0.024	-	-	0.368				
HCM Control Delay (s)	17.9	8.1	0	-	8.3	0	-	25.3				
HCM Lane LOS	C	A	A	-	A	A	-	D				
HCM 95th %tile Q(veh)	0.5	0	-	-	0.1	-	-	1.6				

Intersection						
Int Delay, s/veh	9.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	251	291	155	44	58	196
Future Vol, veh/h	251	291	155	44	58	196
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	130	0	-	-	-	130
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	273	316	168	48	63	213
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	447	63	276	0	-	0
Stage 1	63	-	-	-	-	-
Stage 2	384	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	569	1002	1287	-	-	-
Stage 1	960	-	-	-	-	-
Stage 2	688	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	493	1002	1287	-	-	-
Mov Cap-2 Maneuver	493	-	-	-	-	-
Stage 1	831	-	-	-	-	-
Stage 2	688	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	15.2	6.4		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1287	-	493	1002	-	-
HCM Lane V/C Ratio	0.131	-	0.553	0.316	-	-
HCM Control Delay (s)	8.2	0	21	10.2	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0.5	-	3.3	1.4	-	-

Intersection												
Int Delay, s/veh	6.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	29	457	10	315	46	0	26	0	64	4	0	3
Future Vol, veh/h	29	457	10	315	46	0	26	0	64	4	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	32	497	11	342	50	0	28	0	70	4	0	3
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	50	0	0	508	0	0	1303	1301	503	1336	1306	50
Stage 1	-	-	-	-	-	-	567	567	-	734	734	-
Stage 2	-	-	-	-	-	-	736	734	-	602	572	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1557	-	-	1057	-	-	138	161	569	130	160	1018
Stage 1	-	-	-	-	-	-	508	507	-	412	426	-
Stage 2	-	-	-	-	-	-	411	426	-	486	504	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1557	-	-	1057	-	-	100	104	569	83	104	1018
Mov Cap-2 Maneuver	-	-	-	-	-	-	100	104	-	83	104	-
Stage 1	-	-	-	-	-	-	493	492	-	400	284	-
Stage 2	-	-	-	-	-	-	273	284	-	414	489	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.4			8.8			29.6			32.8		
HCM LOS							D			D		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	242	1557	-	-	1057	-	-	137				
HCM Lane V/C Ratio	0.404	0.02	-	-	0.324	-	-	0.056				
HCM Control Delay (s)	29.6	7.4	0	-	10	0	-	32.8				
HCM Lane LOS	D	A	A	-	B	A	-	D				
HCM 95th %tile Q(veh)	1.8	0.1	-	-	1.4	-	-	0.2				

Intersection

Int Delay, s/veh 1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	414	22	9	328	51	33
Future Vol, veh/h	414	22	9	328	51	33
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	450	24	10	357	55	36

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	474
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.12
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.218
Pot Cap-1 Maneuver	-	-	1088
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1088
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	16.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	403	-	-	1088	-
HCM Lane V/C Ratio	0.227	-	-	0.009	-
HCM Control Delay (s)	16.5	-	-	8.3	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.9	-	-	0	-

Intersection												
Int Delay, s/veh	3.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	12	259	9	23	363	24	22	45	20	25	27	4
Future Vol, veh/h	12	259	9	23	363	24	22	45	20	25	27	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	282	10	25	395	26	24	49	22	27	29	4
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	421	0	0	292	0	0	788	784	287	807	776	408
Stage 1	-	-	-	-	-	-	313	313	-	458	458	-
Stage 2	-	-	-	-	-	-	475	471	-	349	318	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1138	-	-	1270	-	-	309	325	752	300	328	643
Stage 1	-	-	-	-	-	-	698	657	-	583	567	-
Stage 2	-	-	-	-	-	-	570	560	-	667	654	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1138	-	-	1270	-	-	277	312	752	249	315	643
Mov Cap-2 Maneuver	-	-	-	-	-	-	277	312	-	249	315	-
Stage 1	-	-	-	-	-	-	688	648	-	575	552	-
Stage 2	-	-	-	-	-	-	522	545	-	590	645	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.4			0.4			19.2			20.6		
HCM LOS							C			C		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	348	1138	-	-	1270	-	-	291				
HCM Lane V/C Ratio	0.272	0.011	-	-	0.02	-	-	0.209				
HCM Control Delay (s)	19.2	8.2	0	-	7.9	0	-	20.6				
HCM Lane LOS	C	A	A	-	A	A	-	C				
HCM 95th %tile Q(veh)	1.1	0	-	-	0.1	-	-	0.8				

Intersection						
Int Delay, s/veh	5.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	170	105	129	62	30	323
Future Vol, veh/h	170	105	129	62	30	323
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	130	0	-	-	-	130
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	185	114	140	67	33	351
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	380	33	384	0	-	0
Stage 1	33	-	-	-	-	-
Stage 2	347	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	622	1041	1174	-	-	-
Stage 1	989	-	-	-	-	-
Stage 2	716	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	545	1041	1174	-	-	-
Mov Cap-2 Maneuver	545	-	-	-	-	-
Stage 1	866	-	-	-	-	-
Stage 2	716	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	12.7	5.7		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1174	-	545	1041	-	-
HCM Lane V/C Ratio	0.119	-	0.339	0.11	-	-
HCM Control Delay (s)	8.5	0	15	8.9	-	-
HCM Lane LOS	A	A	C	A	-	-
HCM 95th %tile Q(veh)	0.4	-	1.5	0.4	-	-

Intersection												
Int Delay, s/veh	7.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	210	35	404	48	0	17	0	43	20	0	20
Future Vol, veh/h	13	210	35	404	48	0	17	0	43	20	0	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	14	228	38	439	52	0	18	0	47	22	0	22
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	52	0	0	266	0	0	1216	1205	247	1229	1224	52
Stage 1	-	-	-	-	-	-	275	275	-	930	930	-
Stage 2	-	-	-	-	-	-	941	930	-	299	294	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1554	-	-	1298	-	-	158	184	792	155	179	1016
Stage 1	-	-	-	-	-	-	731	683	-	321	346	-
Stage 2	-	-	-	-	-	-	316	346	-	710	670	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1554	-	-	1298	-	-	112	119	792	106	115	1016
Mov Cap-2 Maneuver	-	-	-	-	-	-	112	119	-	106	115	-
Stage 1	-	-	-	-	-	-	723	675	-	317	226	-
Stage 2	-	-	-	-	-	-	202	226	-	661	663	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.4			8.2			20.9			29.2		
HCM LOS							C			D		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	291	1554	-	-	1298	-	-	192				
HCM Lane V/C Ratio	0.224	0.009	-	-	0.338	-	-	0.226				
HCM Control Delay (s)	20.9	7.3	0	-	9.2	0	-	29.2				
HCM Lane LOS	C	A	A	-	A	A	-	D				
HCM 95th %tile Q(veh)	0.8	0	-	-	1.5	-	-	0.8				

Intersection						
Int Delay, s/veh	1.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	231	72	29	383	33	22
Future Vol, veh/h	231	72	29	383	33	22
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	251	78	32	416	36	24
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	329	0	770	290
Stage 1	-	-	-	-	290	-
Stage 2	-	-	-	-	480	-
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	-	-	1231	-	369	749
Stage 1	-	-	-	-	759	-
Stage 2	-	-	-	-	622	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1231	-	356	749
Mov Cap-2 Maneuver	-	-	-	-	356	-
Stage 1	-	-	-	-	759	-
Stage 2	-	-	-	-	601	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.6		14.2	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	451	-	-	1231	-	
HCM Lane V/C Ratio	0.133	-	-	0.026	-	
HCM Control Delay (s)	14.2	-	-	8	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	0.5	-	-	0.1	-	