

Section 3G:

# Magnolia Avenue Corridor



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## INTRODUCTION

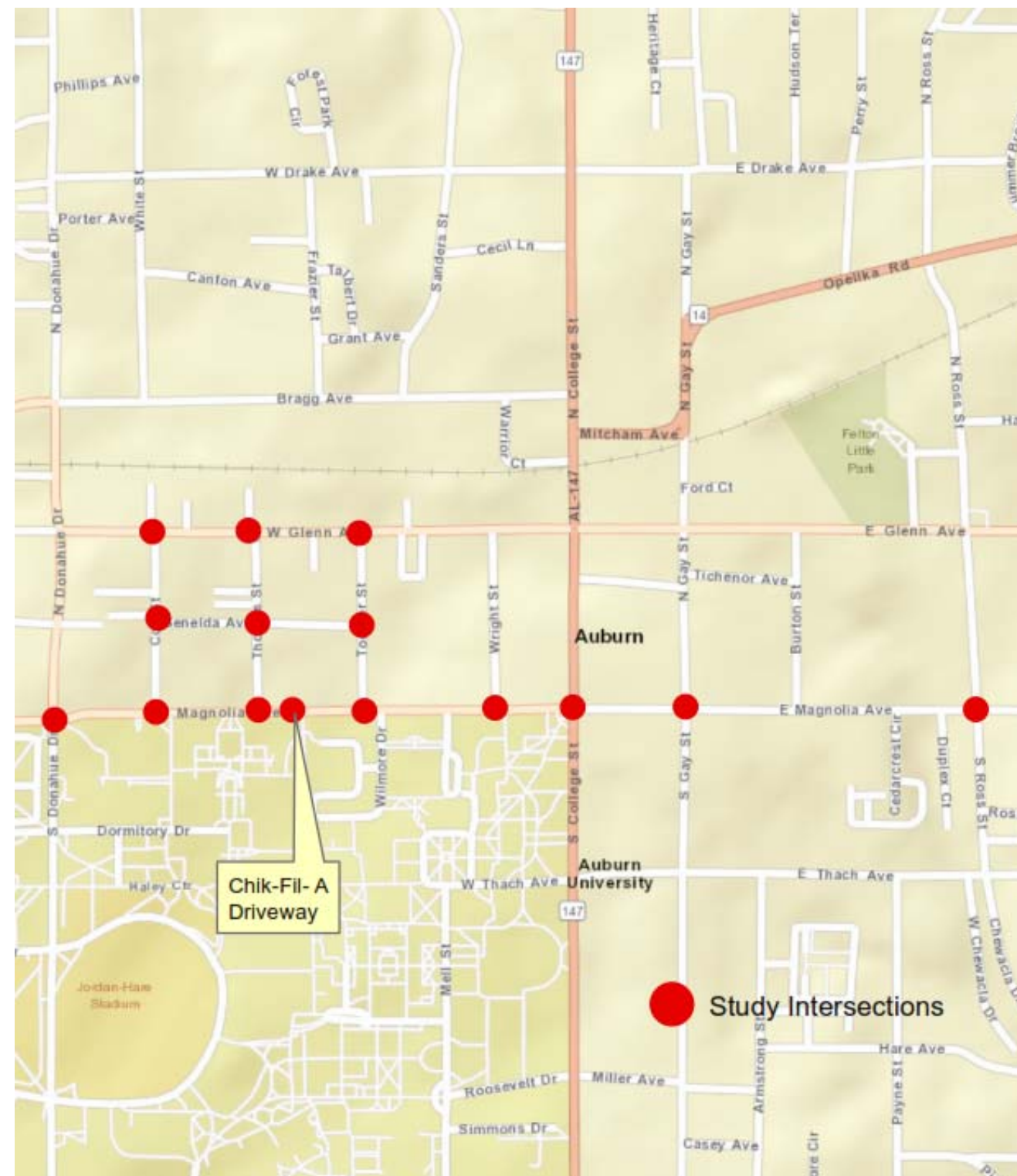
This section documents the results of traffic operations evaluations for the Magnolia Avenue Corridor from Donahue Drive to Ross Street in Auburn, Alabama. The intersections analyzed in this corridor include:

- Magnolia Avenue at Donahue Drive
- Magnolia Avenue at Cox Street
- Magnolia Avenue at Thomas Street
- Magnolia Avenue at Chick-Fil-A
- Magnolia Avenue at Toomer Street
- Magnolia Avenue at Wright Street
- Magnolia Avenue at College Street
- Magnolia Avenue at Gay Street
- Magnolia Avenue at Ross Street
- Cox Street at Genelda Avenue
- Thomas Street at Genelda Avenue
- Toomer Street at Genelda Avenue
- Glenn Avenue at Cox Street
- Glenn Avenue at Thomas Street
- Glenn Avenue at Toomer Street

The locations of the study intersections along the Magnolia Avenue Corridor are illustrated in **Figure 1**. In order to accomplish the traffic operations evaluations for the Magnolia Avenue Corridor, the following tasks were undertaken:

- existing peak hour turning movement counts were conducted for the study intersections;
- drive times were collected for the morning and afternoon commuter peak periods;
- capacity analyses were conducted for the study intersections;
- arterial capacity analyses were conducted for Magnolia Avenue;
- current traffic operational deficiencies were identified;
- projections for ten (10) year growth in traffic through the corridor were developed; and
- geometric and traffic control improvements were developed for the study intersections to address traffic operational and safety deficiencies.

Sources of information used in this section include: the City of Auburn, Alabama; the Institute of Transportation Engineers; American Association of State Highway and Transportation Officials; the manual on Uniform Traffic Control Devices; the Transportation Research Board; and the files and field reconnaissance efforts of Skipper Consulting, Inc.



**Figure 1 — Magnolia Avenue Corridor and Study Intersections**

## BACKGROUND INFORMATION

### Study Area Roadways

Magnolia Avenue from Donahue Drive to Ross Street functions as a collector roadway with various retail and residential land uses being accessed from Magnolia Avenue. Magnolia Avenue is approximately 0.9 miles in length through the corridor. Characteristics of the roadways within the Magnolia Avenue Corridor are summarized in **Table 1**.

**Table 1 - Corridor Roadway Characteristics**

Roadway	Parking	# of Lanes	Travel Direction	Travel Speeds (mph)	Classification
Magnolia Avenue (Donahue Drive to Ross Street)	None (Angled between Wright St & College St)	3	East/West	25	Collector
Donahue Drive (North of Magnolia Avenue)	None	3	North/South	25	Arterial
Donahue Drive (South of Magnolia Avenue)	None	2	North/South	25	Arterial
Cox Street	Parallel	2	North/South	25	Local Roadway
Thomas Street	Parallel	2	North/South	25	Local Roadway
Genelda Avenue	Parallel	2	East/West	25	Local Roadway
Chick-Fil-A Driveway	None	2	North/South	25	Access Driveway
Toomer Street	Parallel	2	North/South	25	Local Roadway
Wright Street	Angled & Parallel	2	North/South	25	Local Roadway
College Street (North of Magnolia Avenue)	Angled	2	North/South	25	Arterial
College Street (South of Magnolia Avenue)	Parallel (northbound)	4	North/South	25	Arterial
Gay Street (North of Magnolia Avenue)	None	3	North/South	25	Arterial
Gay Street (South of Magnolia Avenue)	Parallel (southbound)	3	North/South	25	Arterial
Ross Street	None	2	North/South	25	Collector

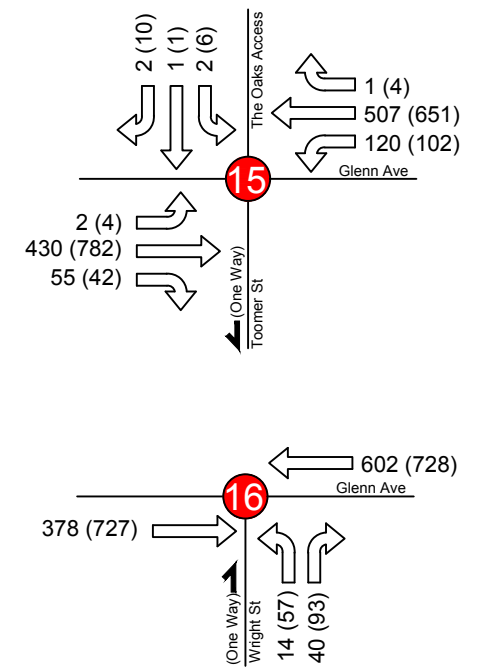
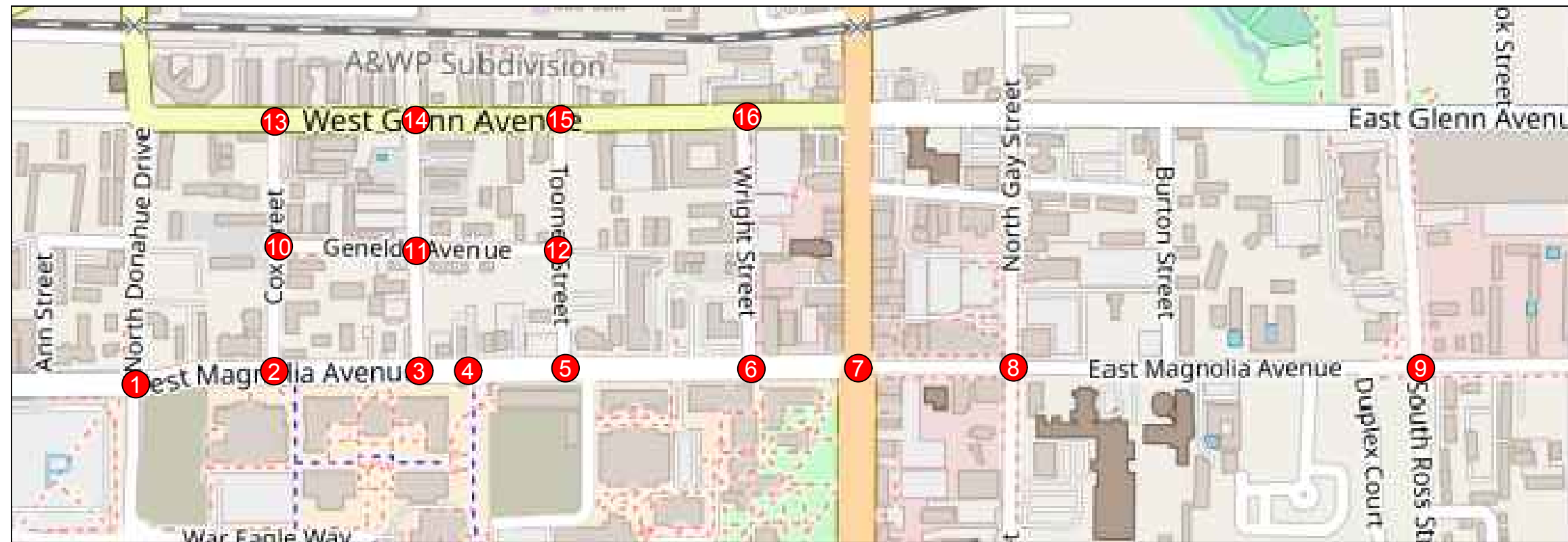
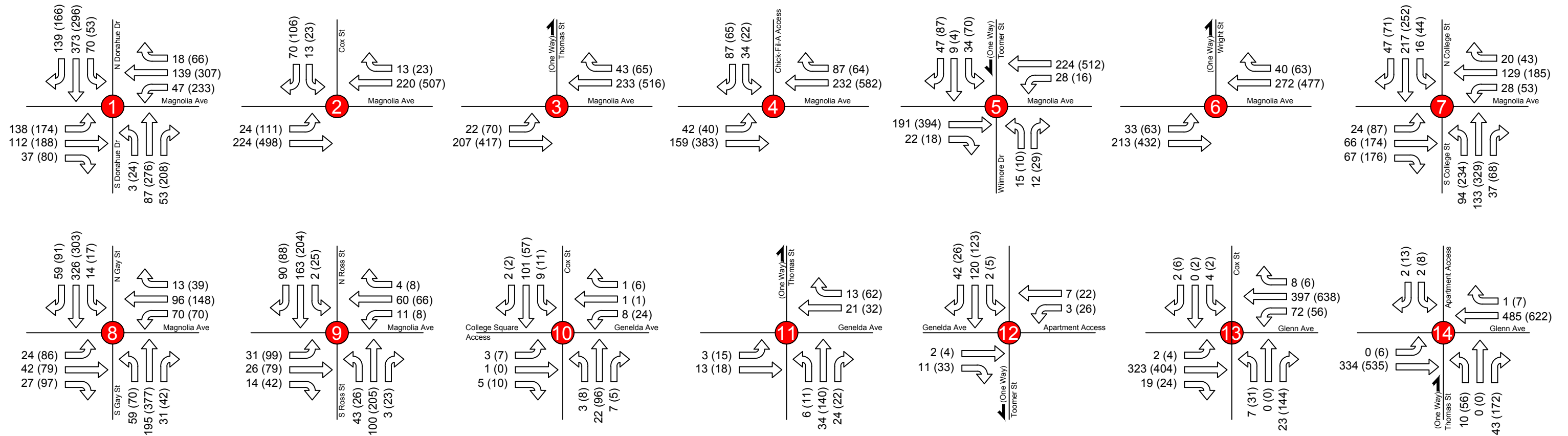
### Peak Hour Traffic Counts

Morning (7:00-9:00 am) and afternoon (4:00-6:00 pm) peak hour turning movement counts were conducted along the Magnolia Avenue Corridor at the study intersections. Traffic count data utilized for the analyses of these intersections is summarized in **Figure 2**.

### Peak Period Observations

Observations of traffic operations were conducted within the Magnolia Avenue Corridor during the morning and afternoon peak periods. The following items were noted in these observations:

- During the afternoon peak period, some delays were caused by pedestrians crossing Magnolia Avenue.
- During the morning and afternoon peak periods, traffic entering Chick-Fil-A queues onto Magnolia Avenue blocking the through lane. Vehicles traveling westbound are using the center two-way left-turn lane to bypass the Chick-Fil-A traffic. Auburn University's transit experiences delay at the cut-out bus stop due to traffic entering Chick-Fil-A.
- During the afternoon peak period, delays along Magnolia Avenue were caused by vehicles picking up and dropping off people to and from the University. Most vehicles stopped in front of Lowder Business Building and Shelby Center Building.



**Figure 2 - Existing Traffic Volumes  
Magnolia Avenue Corridor  
Auburn, Alabama**

**LEGEND**

← AM(PM) Peak Hour Volumes

⊗ Study Intersection

Scale: Not to Scale  
Date: OCT 2018

## Travel Time

GPS-based Travel time runs were performed on Magnolia Avenue from Donahue Drive to Ross Street on Thursday, April 26, 2018. Travel time runs were performed during the a.m., midday, and p.m. peak periods of traffic flow. Six runs were performed in each direction during each time period. The results of the travel time runs are shown in **Table 2**.

**Table 2 – Travel Time Runs**

AM Peak				Midday Peak				PM Peak			
Start Time	Dir.	Elapsed Time	Avg. Speed	Start Time	Dir.	Elapsed Time	Avg. Speed	Start Time	Dir.	Elapsed Time	Avg. Speed
6:53	EB	5:04	28.4	11:16	WB	4:41	30.7	4:08	WB	4:13	34.1
7:00	WB	5:06	28.2	11:22	EB	5:20	26.9	4:15	EB	6:08	23.4
7:07	EB	4:46	30.1	11:29	WB	7:18	19.7	4:23	WB	4:44	30.4
7:14	WB	5:03	28.5	11:39	EB	5:46	24.9	4:29	EB	5:54	24.4
7:21	EB	5:28	26.3	11:46	WB	4:37	31.1	4:39	WB	5:03	28.5
7:30	WB	5:45	25.0	11:53	EB	4:18	33.4	4:46	EB	4:59	28.8
7:38	EB	5:01	28.6	12:04	WB	4:14	33.9	4:52	WB	4:24	32.7
7:45	WB	4:47	30.0	12:10	EB	5:03	28.5	4:59	EB	5:09	27.9
7:53	EB	5:49	24.7	12:17	WB	4:44	30.4	5:06	WB	4:48	29.9
8:01	WB	5:25	26.5	12:24	EB	4:46	30.1	5:12	EB	5:20	26.9
8:09	EB	4:47	30.0	12:31	WB	4:16	33.7	5:20	WB	4:47	30.0
8:16	WB	4:08	34.8	12:38	EB	5:52	24.5	5:26	EB	7:15	19.8

## EXISTING CONDITIONS ANALYSES

### Existing Intersection Capacity Analysis

Capacity analyses for peak hour conditions at the study intersections along the Magnolia Avenue Corridor were conducted for the morning, midday, and afternoon peak hour periods using methods outlined in the *Highway Capacity Manual, 2010*. According to methods of the *Highway Capacity Manual*, capacity is expressed as levels of service ranging from “A” (best) through “F” (worst). In general, a level of service “C” is considered desirable while a level of service “D” is considered acceptable during peak hour operations. Results of these capacity analyses for existing conditions are summarized in **Table 3**.

**Table 3 - Existing Intersection Levels of Service**

Intersection (traffic control)	Approach	Movement/Lane Group	Level of Service	
			AM Peak Hour	PM Peak Hour
Magnolia Avenue at Donahue Drive (Traffic Signal)	EB Magnolia Avenue	Left	B	B
		Through	B	C
		Right	B	C
		Overall	B	C
	WB Magnolia Avenue	Left	B	B
		Through	B	C
		Right	B	B
		Overall	B	C
	NB Donahue Drive	Left	B	B
		Through	B	C
		Right	B	C
	SB Donahue Drive	Left	B	B
		Through	C	C
		Right	B	B
	<b>Overall Intersection LOS</b>			<b>B</b>
Magnolia Avenue at Cox Street (Side Street Stop)	EB Magnolia Avenue	Left	A	A
		Through	A	A
		Overall	A	A
	WB Magnolia Avenue	Through/Right	A	A
SB Cox Street	Left/Right	B	C	
Magnolia Avenue at Chick-Fil-A (Side Street Stop)	EB Magnolia Avenue	Left	A	B
		Through	A	A
		Overall	A	A
	WB Magnolia Avenue	Through/Right	A	A
SB Chick-Fil-A Driveway	Left/Right	C	F	

Table 3 Cont. – Existing Intersection Levels of Service

Intersection (traffic control)	Approach	Movement/Lane Group	Level of Service	
			AM Peak Hour	PM Peak Hour
Magnolia Avenue at Wilmore Drive/ Toomer Street (Side Street Stop)	EB Magnolia Avenue	Through/Right	A	A
		Left	A	A
	WB Magnolia Avenue	Through/Right	A	A
		Overall	A	A
	NB Wilmore Drive	Left/Right	C	C
	SB Toomer Street	Left/Through	C	C
		Right	B	C
Overall	B	C		
Magnolia Avenue at College Street (Traffic Signal)	EB Magnolia Avenue	Left	B	C
		Through/Right	C	E
		Overall	C	D
	WB Magnolia Avenue	Left	B	C
		Through/Right	C	C
		Overall	C	C
	NB College Street	Left	B	C
		Through	B	C
		Right	B	B
	SB College Street	Overall	B	C
		Left	B	C
		Through/Right	C	C
	<b>Overall Intersection LOS</b>			<b>B</b>
Magnolia Avenue at Gay Street (Traffic Signal)	EB Magnolia Avenue	Left	C	C
		Through/Right	C	C
		Overall	C	C
	WB Magnolia Avenue	Left	C	C
		Through/Right	C	C
		Overall	C	C
	NB Gay Street	Left	B	B
		Through/Right	B	B
		Overall	B	B
	SB Gay Street	Left	B	B
		Through	B	B
		Right	B	B
	Overall	B	B	
<b>Overall Intersection LOS</b>			<b>B</b>	<b>C</b>
Magnolia Avenue at Ross Street (Four Way Stop)	EB Magnolia Avenue	Left	A	B
		Through/Right	A	B
		Overall	A	B
	WB Magnolia Avenue	Left/Through/Right	B	B
		Left	A	A
		Through/Right	A	B
	NB Ross Street	Overall	A	B
		Left	A	A
		Through/Right	B	B
	SB Ross Street	Overall	B	B

Table 3 Cont. - Existing Intersection Levels of Service

Intersection (traffic control)	Approach	Movement/Lane Group	Level of Service	
			AM Peak Hour	PM Peak Hour
Cox Street at Genelda Avenue (Side Street Stop)	EB Condo Access	Left/Through/Right	B	A
		WB Genelda Avenue	Left/Through/Right	B
	NB Cox Street	Left/Through/Right	A	A
		SB Cox Street	Left/Through/Right	A
Thomas Street at Genelda Avenue (Side Street Stop)	EB Genelda Avenue	Left/Through/Right	B	B
	WB Genelda Avenue	Left/Through/Right	A	B
	NB Thomas Street	Left/Through/Right	A	A
Toomer Street at Genelda Avenue (Side Street Stop)	EB Genelda Avenue	Through/Right	A	A
	WB Apartment Access	Left/Through	B	B
	SB Toomer Street	Left/Through/Right	A	A
Glenn Avenue at Cox Street (Side Street Stop)	EB Glenn Avenue	Left	A	A
		Through/Right	A	A
		Overall	A	A
	WB Glenn Avenue	Left	A	A
		Through/Right	A	A
		Overall	A	A
	NB Cox Street	Left/Through/Right	C	E
SB Apartment Access	Left/Through/Right	D	D	
Glenn Avenue at Thomas Street (Side Street Stop)	EB Glenn Avenue	Left	A	A
		Through/Right	A	A
		Overall	A	A
	WB Glenn Avenue	Through/Right	A	A
		Overall	B	C
SB Apartment Access	Left/Right	B	C	
Glenn Avenue at Toomer Street (Side Street Stop)	EB Glenn Avenue	Left	A	A
		Through/Right	A	A
		Overall	A	A
	WB Glenn Avenue	Left	A	B
		Through/Right	A	A
		Overall	A	A
	SB Apartment Access	Left/Through/Right	D	E

As shown in **Table 2**, most of the study intersections evaluated operate at acceptable levels of service under existing peak hour conditions. The poor level of service on certain side street approaches reflect the delay vehicles experience while waiting for gaps in the Magnolia Avenue and Glenn Avenue traffic flow. This is typical for a minor roadway at a side street stop condition with a major roadway. The other deficiency noted is the Magnolia Avenue eastbound through movement at College street during the p.m. peak hour of traffic flow.

### Existing Arterial Segment Capacity Analysis

Arterial segment capacity analyses for peak hour conditions along the Magnolia Avenue Corridor were conducted for the morning and afternoon peak hour periods using methods outlined in the *Highway Capacity Manual, 2010*. Levels of service for the arterial analyses conducted for Magnolia Avenue are summarized in **Table 4**.

**Table 4 – Existing Arterial Segment Levels of Service**

Eastbound Magnolia Avenue Arterial Analysis				
From	To	Segment Length	Arterial LOS by Segment	
			AM Peak	PM Peak
Donahue Drive	College Street	0.50	C	D
College Street	Gay Street	0.11	E	F
<b>Arterial LOS</b>			<b>C</b>	<b>D</b>
Westbound Magnolia Avenue Arterial Analysis				
Cross Street	To	Segment Length	Arterial LOS by Segment	
			AM Peak	PM Peak
Gay Street	College Street	0.11	E	F
College Street	Donahue Drive	0.50	C	C
<b>Arterial LOS</b>			<b>C</b>	<b>D</b>

**Table 4** indicates the overall arterial level of service along Magnolia Avenue is a level of service “C” or “D” for each direction of travel during the peak hours. **Table 4** also indicates Magnolia Avenue between College Street and Gay Street would operate at a level of service “E” during the morning peak hour and “F” during the afternoon peak hour. The poor levels of service are a result of signal spacing between College Street and Gay Street coupled with the on-street angled parking and high volume of pedestrians crossing Magnolia Avenue, which reduces the travel speeds on Magnolia Avenue. There are no reasonable improvements which will correct this deficiency, in that the nature of the area dictates that parking needs to be maintained, pedestrian traffic will remain high, and traffic signals are needed at both College Street and Gay Street for vehicular and pedestrian traffic flow.

### Existing Daily Roadway Segment Capacity Analysis

Roadway segment capacity analyses for daily traffic conditions along the Magnolia Avenue Corridor were performed using the daily capacity and level of service chart obtained from the Alabama Department of Transportation. This chart is included in **Table 5**. Levels of service for the daily roadway segment capacity analyses conducted for Magnolia Avenue are summarized in **Table 6**.

**Table 5 – Daily Capacity and Level of Service Chart**

Functional Classification	Number of Lanes	Maximum Daily Flow Rate Related to Level of Service					
		A	B	C	D	E	F
Freeway	4	23,800	34,000	42,160	51,000	68,000	>68,000
	6	35,700	51,000	63,240	76,500	102,000	>102,000
	8	47,600	68,000	84,320	102,000	136,000	>136,000
	10	59,500	85,000	105,400	127,500	170,000	>170,000
Expressway	4	17,500	25,000	31,000	37,500	50,000	>50,000
	6	26,250	37,500	46,500	56,250	75,000	>75,000
	8	35,000	50,000	62,000	75,000	100,000	>100,000
Arterial (Divided)	2	7,700	11,000	13,640	16,500	22,000	>22,000
	4	11,865	16,950	21,018	25,425	33,900	>33,900
	6	17,500	25,000	31,000	37,500	50,000	>50,000
	8	25,760	36,800	45,632	55,200	73,600	>73,600
Arterial (Undivided)	2	6,230	8,900	11,036	13,350	17,800	>17,800
	4	10,850	15,500	19,220	23,250	31,000	>31,000
	6	16,030	22,900	28,396	34,350	45,800	>45,800
	8	22,085	31,550	39,122	47,325	63,100	>63,100
Collector (Divided)	2	7,280	10,400	12,896	15,600	20,800	>20,800
	4	9,975	14,250	17,670	21,375	28,500	>28,500
	6	14,700	21,000	26,040	31,500	42,000	>42,000
Collector (Undivided)	2	5,810	8,300	10,292	12,450	16,600	>16,600
	4	9,170	13,100	16,244	19,650	26,200	>26,200
	6	13,545	19,350	23,994	29,025	38,700	>38,700

**Table 6 – Existing Roadway Segment Levels of Service**

Magnolia Avenue					
From	To	Segment Length (miles)	Cross Section	Daily Volume	Roadway LOS by Segment
Thomas Street	Toomer Street	.10	3 Lane	7,307	B
Toomer Street	Wright Street	.13	3 Lane	7,297	B



### Right-Turn Lane Warrant Evaluations

Existing peak hour traffic volumes were compared with the turn lane warrant criteria outlined in the National Cooperative Highway Research Program (NCHRP) Report 457 *Evaluating Intersection Improvements: An Engineering Study Guide*, published by the Transportation Research Board. For evaluation purposes, the posted speed limit was utilized for roadways. **Table 7** outlines the results of the turn lane warrant analysis efforts.

**Table 7 – Right-Turn Lane Warrant Evaluation Results**

Intersection	Approach	Turn Lane Warrant Status
Magnolia Avenue at Cox Street	Westbound	Right Turn Lane Not Warranted
Magnolia Avenue at Thomas Street	Westbound	Right Turn Lane Not Warranted
Magnolia Avenue at Chick-Fil-A Driveway	Westbound	Right Turn Lane Not Warranted
Magnolia Avenue at Toomer Street/Wilmore Drive	Eastbound	Right Turn Lane Not Warranted
Magnolia Avenue at Wright Street	Westbound	Right Turn Lane Not Warranted
Magnolia Avenue at College Street	Eastbound	Right Turn Lane Not Warranted
	Westbound	Right Turn Lane Not Warranted
	Southbound	Right Turn Lane Not Warranted
Magnolia Avenue at Gay Street	Eastbound	Right Turn Lane Not Warranted
	Westbound	Right Turn Lane Not Warranted
	Northbound	Right Turn Lane Not Warranted
Magnolia Avenue at Ross Street	Eastbound	Right Turn Lane Not Warranted
	Westbound	Right Turn Lane Not Warranted

### Intersection Crash Evaluation

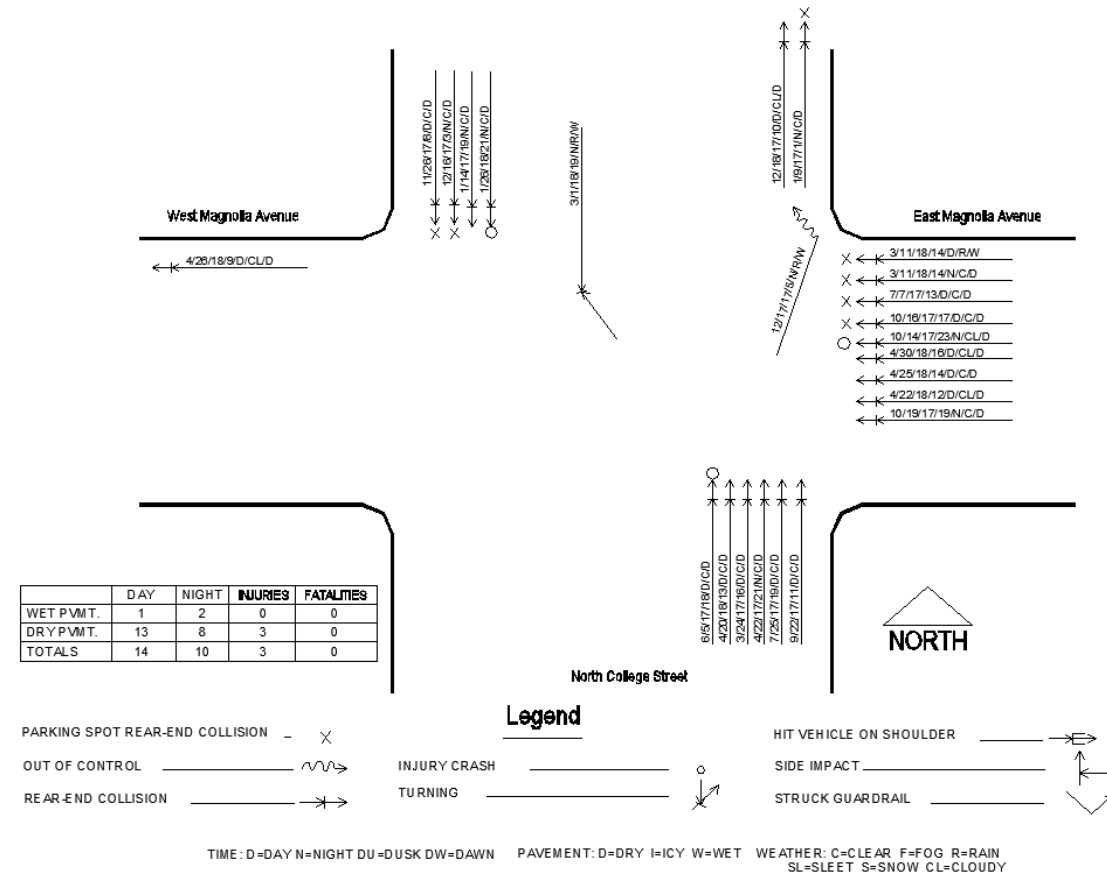
Skipper Consulting, Inc. performed a citywide crash study for intersections and roadway segments maintained by the City of Auburn. The results of this crash study have been documented in a separate bound report. The citywide crash study included the study intersections along Magnolia Avenue. Screening procedures and crash analyses were conducted to determine any locations that are worthy of safety-based roadway improvements. The crash analysis indicated the following:

- Low Priority Intersections - this indicates the crash experience should be considered when completing other roadway improvements at this location. However, the crash experience does not warrant an immediate safety improvement project.
  - Magnolia Avenue at Thomas Street
  - Magnolia Avenue at Wright Street
  - Magnolia Avenue at Ross Street
- Moderate Priority Intersections - this indicates the crash experience should be monitored in the near future and could be worthy of a safety-based roadway improvement if crash experience trends upward. This does not warrant a safety-based improvement at this time, but a safety-based improvement should be incorporated in any roadway improvement at this location.
  - Magnolia Avenue at Donahue Drive
  - Magnolia Avenue at Gay Street
- High Priority Intersections – this indicates that improvements are recommended for each location identified based upon the detailed crash evaluation.
  - Magnolia Avenue at College Street

At the intersection of Magnolia Avenue at College Street (the only high priority intersection) a total of 24 crashes were reported in 2017 and 2018. The crash diagram is shown on the following page. Of the 24 crashes:

- Seven (7) were related to parking maneuvers
- 15 were rear-end crashes
- One (1) was a right-angle crash
- One (1) was a single vehicle out-of-control

The recommendation based on the crash patterns is a review of signal clearance intervals.



Magnolia Avenue has a significant concentration of pedestrian-vehicle crashes. Thirteen (13) crashes, including three (3) serious injury crashes were reported from 2012 to 2016. There were also nine (9) vehicle-bicycle crashes on the Magnolia Avenue corridor in this same time period, with one (1) of these crashes being a serious injury.

### ONE-WAY TO TWO-WAY CONVERSION ANALYSIS – THOMAS STREET AND TOOMER STREET

Currently, the roadway network between Magnolia Avenue and Glenn Avenue between Donahue Drive and College Street is characterized as a mixture of one-way and two-way streets. The current configuration of the roadways is shown in Figure 3.

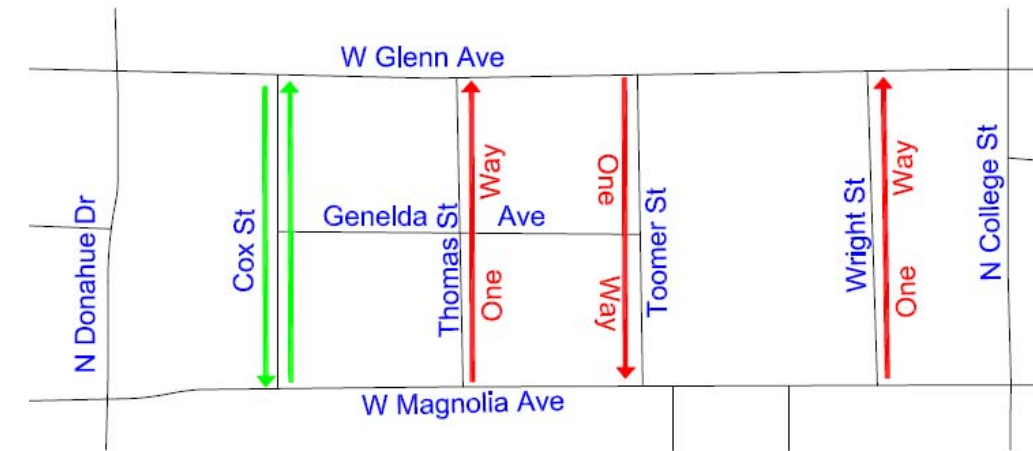


Figure 3 – Current One-Way and Two-Way Streets

However, the City has impending plans to convert Wright Street to two-way flow, so that the near-term future condition of roadways will be as shown in Figure 4.

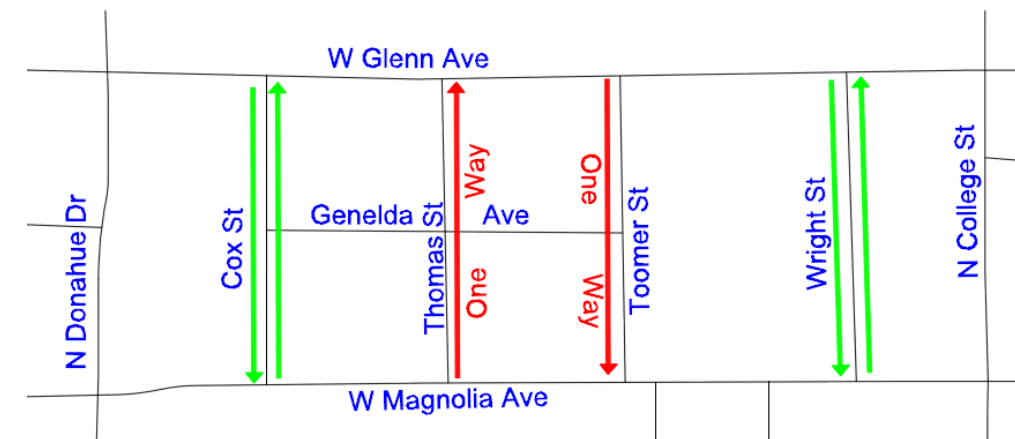


Figure 4 – One-Way and Two-Way Streets – Near-Term Future

An analysis was performed to determine the benefits and drawbacks to converting Thomas Street and Toomer Street to two-way operation. In order to perform the analyses, traffic volume projections were performed for the proposed conversion. The projected traffic volumes are shown in **Figure 5**.

The primary benefit in converting Thomas Street and Toomer Street to two-way operation is the fact that several of the turning movement traffic counts which are high for unsignalized conditions are reduced to more reasonable levels, while, at the same time, the new movements introduced do not have excessive traffic volumes for unsignalized movements. This is an overall effect of spreading the traffic out over a grid network. Specifically, the following intersections and traffic movements are projected to experience significant decreases in traffic volume as a result of the two-way conversion of Thomas Street and Toomer Street:

Magnolia Avenue at Cox Street			
Eastbound Left Turn	PM Peak	existing-111	proposed-50
Southbound Right Turn	AM Peak	existing-70	proposed-25
	PM Peak	existing-106	proposed-52
Magnolia Avenue at Toomer Street			
Southbound Left Turn	PM Peak	existing-70	proposed-28
Glenn Avenue at Cox Street			
Westbound Left Turn	AM Peak	existing-72	proposed-39
Northbound Right Turn	PM Peak	existing-144	proposed-87
Glenn Avenue at Thomas Street			
Northbound Right Turn	PM Peak	existing-172	proposed-99
Glenn Avenue at Toomer Street			
Westbound Left Turn	AM Peak	existing-120	proposed-48
	PM Peak	existing-102	proposed-40

The primary drawback in converting Thomas Street and Toomer Street to two-way operation is the loss of on-street parking. Thomas Street is approximately 28 feet wide, and currently has on-street parking on both sides of the roadway, leaving a travel lane of approximately 12-13 feet for the single lane of travel. If the roadway is converted to two-way traffic, then parking would be removed from both sides. Removing parking from one side would result in two 10 foot travel lanes. Removal of all parking results in two 14 foot travel lanes. If all on-street parking is removed, the loss of parking would be approximately 20 spaces.

Toomer Street is approximately 24 feet wide, and currently has on-street parking on the west side of the roadway, leaving a travel lane of approximately 16-17 feet for the single lane of travel. If the roadway is converted to two-way traffic, then parking would be removed, resulting in two 12 foot travel lanes. Removal of on-street parking would result in the loss of approximately 16 spaces.

Based on the improvements to turning movement traffic volumes, it is recommended that the Thomas Street and Toomer Street be converted to two-way operation.

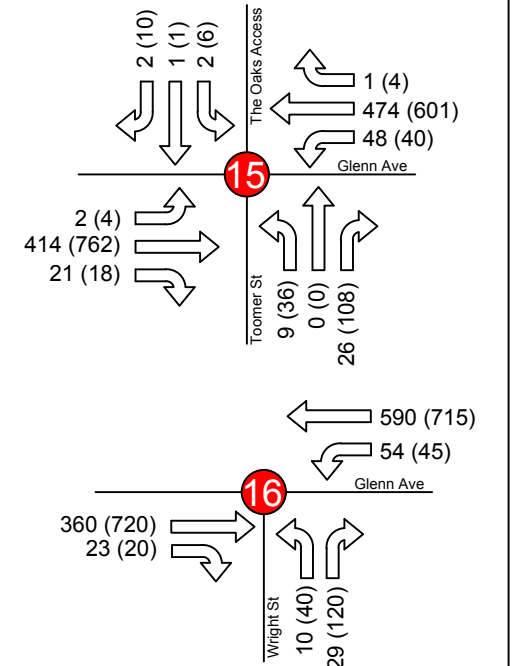
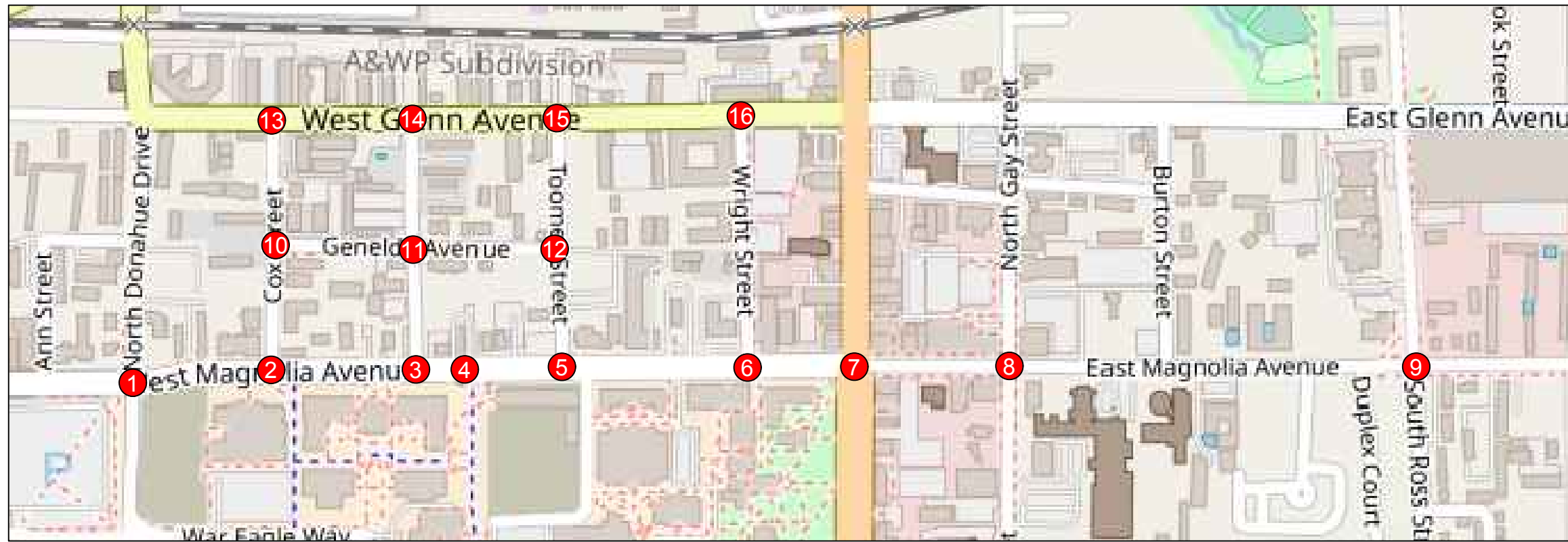
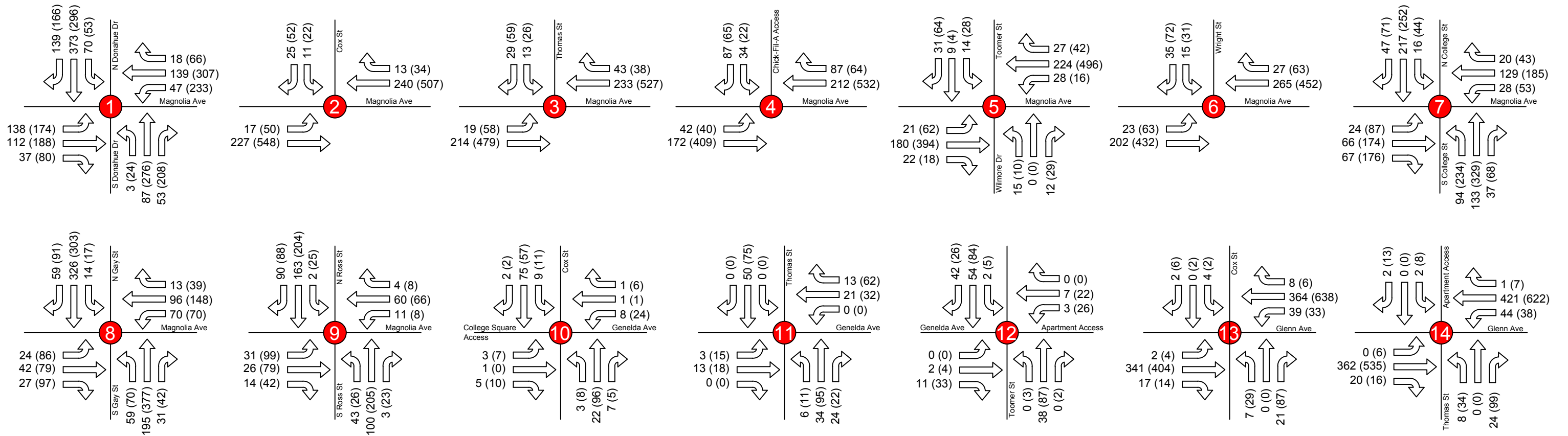
Thomas Street

- Restripe Thomas Street to a two-way road with one lane northbound and one lane southbound. Thomas Street will intersect Magnolia Avenue at a side street stop condition.

Toomer Street

- Restripe Toomer Street to a two-way road with one lane northbound and one lane southbound. Toomer Street will intersect Glenn Avenue at a side street stop condition.

The proposed conversion plan is shown in **Figure 6**.



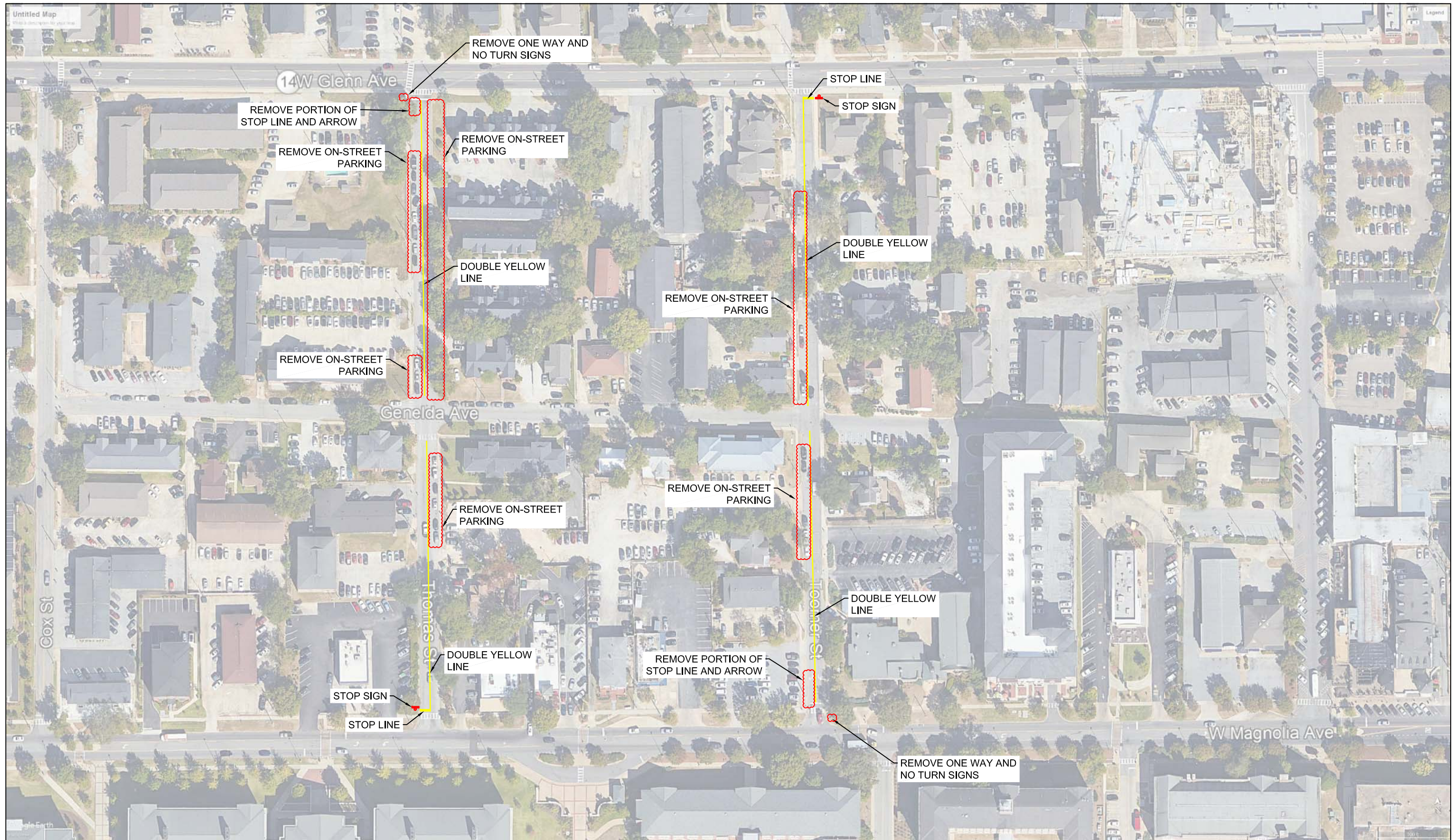
**Figure 5 - Existing Traffic Volumes with Two Way Conversions - Magnolia Avenue Corridor Auburn, Alabama**

**LEGEND**

← AM(PM) Peak Hour Volumes

⊗ Study Intersection



Scale: Not to Scale  
Date: OCT 2018



**Figure 6 - Two-Way Traffic Conversion  
Thomas Street and Toomer Street  
Auburn, Alabama**



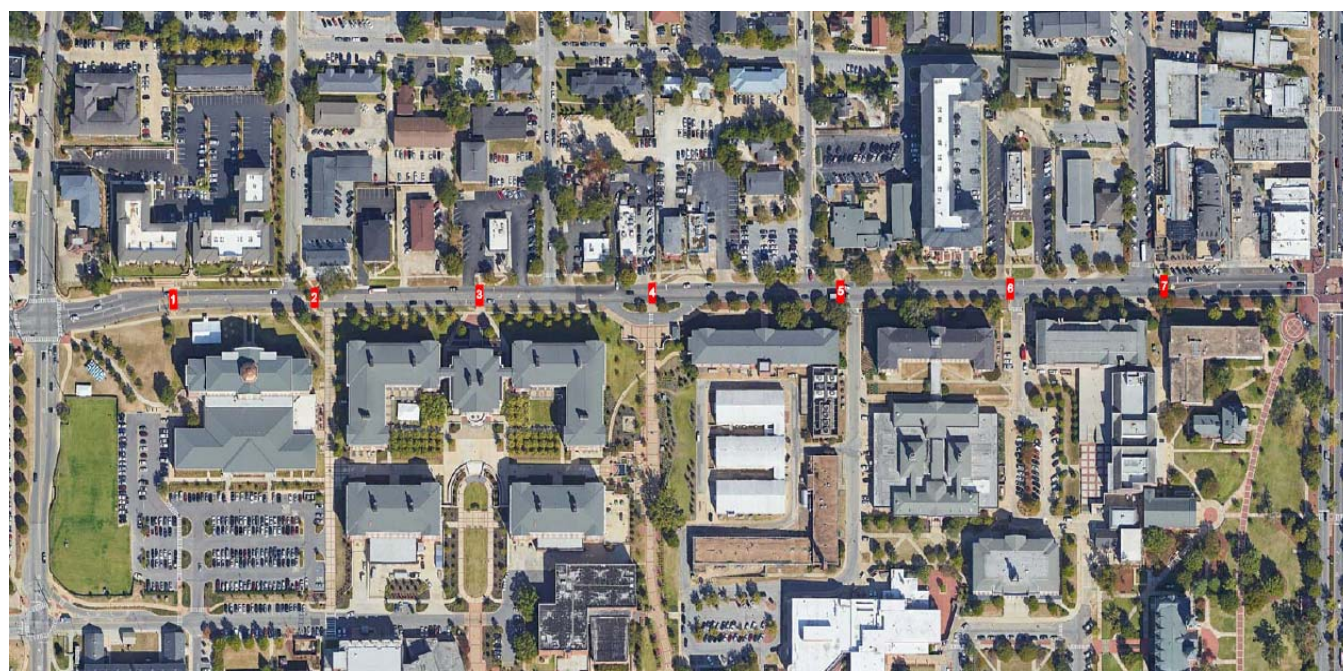
**LEGEND**

-  AM(PM) Peak Hour Volumes
-  Study Intersection

Scale: Not to Scale  
Date: Feb. 2019

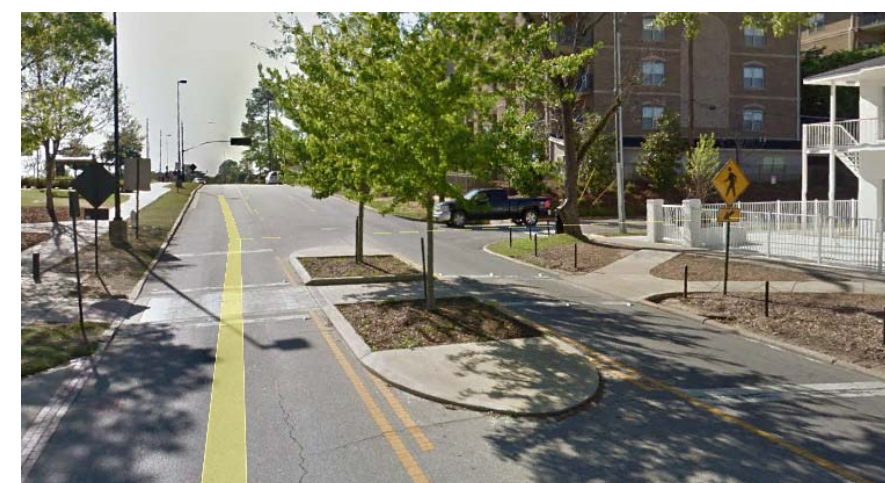
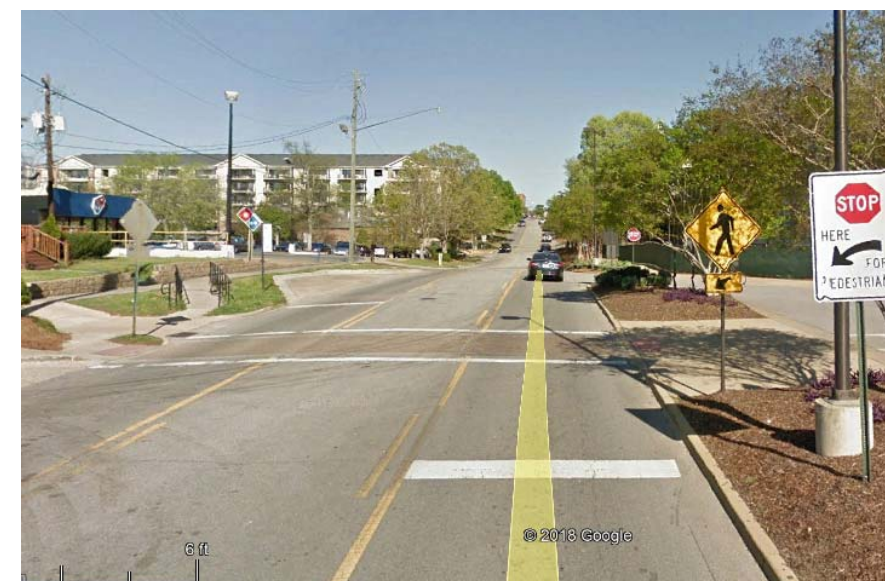
## PEDESTRIAN SAFETY IMPROVEMENTS

Magnolia Avenue has the highest concentrations of pedestrian and bicycle-related crashes in the City of Auburn. In 2010, Auburn University and the City of Auburn cooperated in preparing a detailed study of the unsignalized pedestrian crossings of Magnolia Avenue between Donahue Drive and College Street. This study resulted in a construction project which installed seven crosswalks crossing Magnolia Avenue between Donahue Drive and College Street. The locations of the seven crosswalks are shown in **Figure 7**. Two of the crosswalks also included construction of refuge medians in the center lane of Magnolia Avenue.



**Figure 7 — Magnolia Avenue Midblock Pedestrian Crossing Locations**

With the exception of the center refuge islands, the construction of each of the seven pedestrian crossings was similar. The crosswalks consisted of a brick inlay pattern bordered by a flush concrete header and solid white painted crosswalk lines outside the concrete headers. White stop lines are painted in advance of each crosswalk. The raised islands at crossings #1 and #7 consist of concrete islands with planting areas and a flush cut-through for the pedestrian crosswalk path. Center refuge islands were installed only at crossings #1 and #7 because all other locations had left turning traffic which would have been impeded by a center refuge island. Pictures of typical crosswalk features follows.



Pedestrian crossing volumes for each of the seven crosswalks are depicted in **Figure 8**. The counts are two-hour total counts, and include information from current counts conducted in 2017 and 2018 and counts from the previous 2010 traffic study.

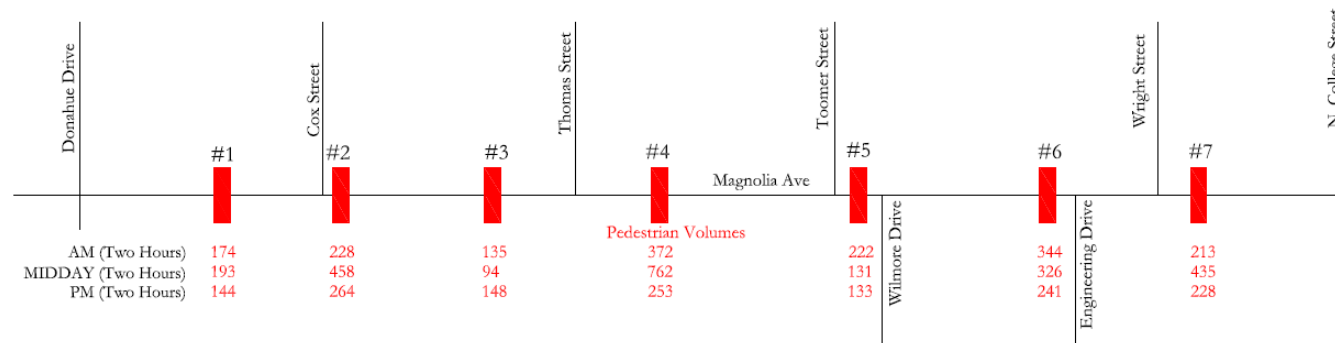
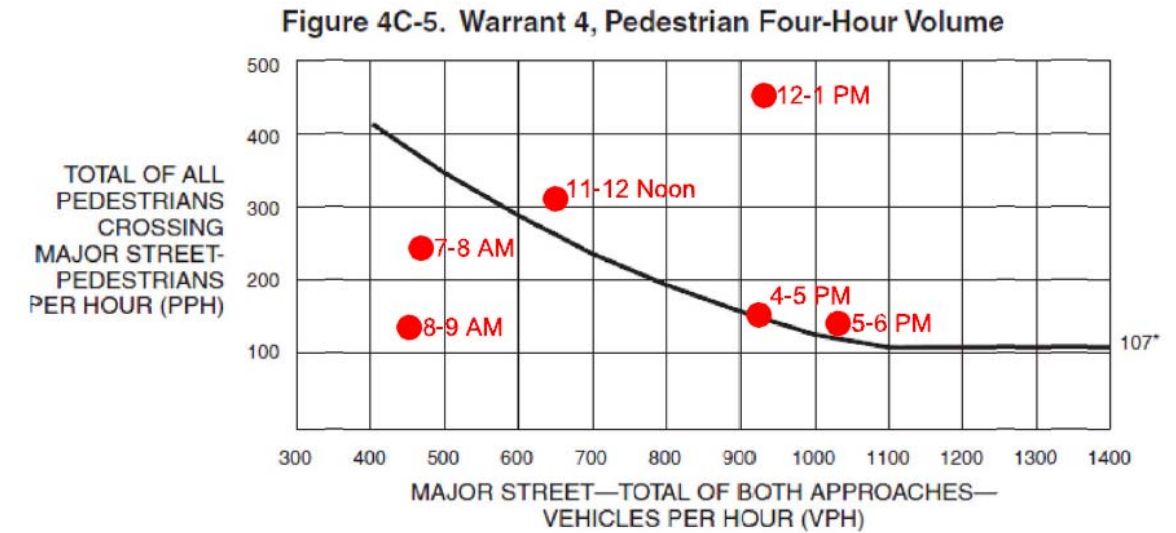


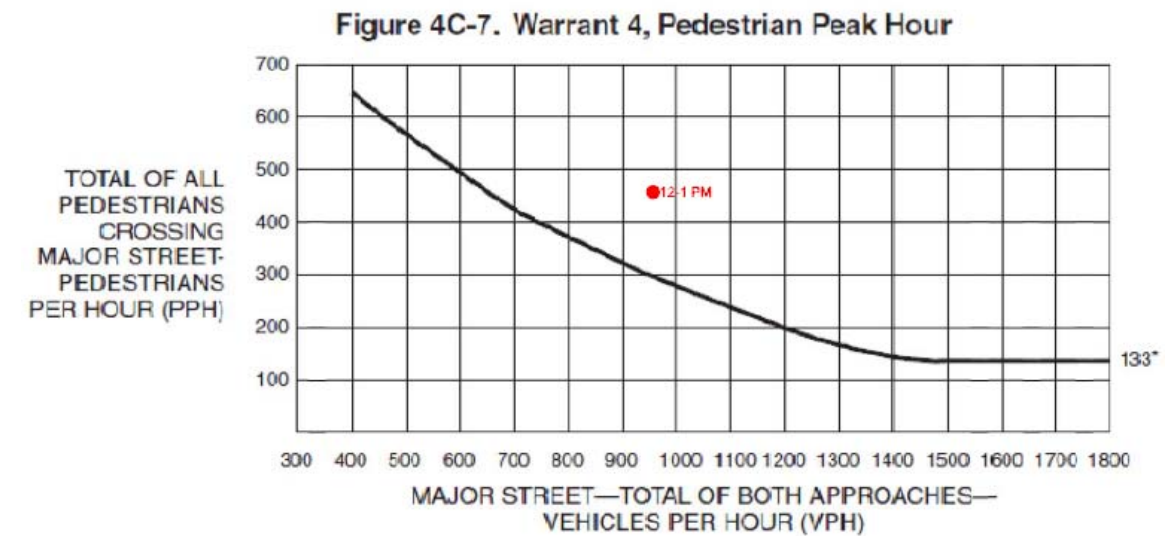
Figure 8 — Magnolia Avenue Midblock Pedestrian Crossing Counts

In order to further improve safety of pedestrian crossings of Magnolia Avenue, some form of traffic signalization is proposed. The proposal would not signalize every crossing. The most logical crossing to signalize would be crossing #4 near the Chick-fil-A. This crossing is almost exactly half-way between Donahue Drive and College Street, and also experiences the highest pedestrian crossing volume, particularly during the midday peak period.

The existing vehicle traffic and pedestrian counts at Crosswalk #4 were compared to minimum volumes required to warrant traffic signalization under Warrant 4, Pedestrian Four Hour and Pedestrian Peak Hour warrants. The analysis graphs are shown below and indicate that signalization is warranted at Crosswalk #4 based on the combination of pedestrian and vehicular traffic volumes.



\*Note: 107 pph applies as the lower threshold volume.



\*Note: 133 pph applies as the lower threshold volume.

In order to test the effect of a midblock pedestrian crossing signal on vehicle and pedestrian levels of service, delays, and queues, a Synchro/SimTraffic model was prepared for Crosswalk #4 for midday peak hour conditions for both signalized and unsignalized conditions. The analysis includes both pedestrian and vehicular traffic volumes. The results of the analysis comparison are documented in **Table 8**.

**Table 8 – Pedestrian Crossing #4 Traffic Control Comparison  
Midday Peak Hour**

Measure of Effectiveness		Unsignalized	Signalized
Vehicle Delay – Overall Intersection		74.9 secs	18.2 secs
Level of Service	Eastbound Left	B	C
	Eastbound Through	--	A
	Westbound	--	C
	Southbound	F	B
95 <sup>th</sup> Percentile Vehicle Queue	Eastbound Left	1175'	560'
	Eastbound Through	2065'	220'
	Westbound	2510'	380'
	Southbound	850'	85'

Based on the results of the analyses documented in **Table 8**, installation of a traffic signal on Magnolia Avenue at Crosswalk #4 (Chick-fil-A) would be beneficial to overall traffic operations.

Two different types of midblock crossing signals are currently available. One type would be a standard traffic signal. The other type is a HAWK signal. A HAWK signal would allow vehicles to proceed on flashing red if there are no pedestrians in their part of the crosswalk. However, due to short pedestrian crossing distance, a HAWK signal would not be the best solution. In addition, a standard traffic control signal could also provide for signalization for vehicles exiting Chick-fil-A. This was assumed in the analysis presented.

#### Recommended Pedestrian Improvements

The following are recommended improvements to provide for increased pedestrian safety on Magnolia Avenue.

- 1) Install enhanced active warning (such as a Rapid Rectangular Flashing Beacon) on Magnolia Avenue at Crosswalk #4 (Chick-fil-A) as an interim measure before progressing to installation of a traffic signal.
- 2) add bicycle shared lane markings (“sharrows”) spaced every 250' to the full extent of this study corridor.
- 3) add "Bikes May Use Full Lane" (MUTCD R4-11) signage to reinforce shared lane markings.

4) add 2' white longitudinal high-visibility crosswalk markings to the existing brick crosswalks - research shows this improves visibility for drivers

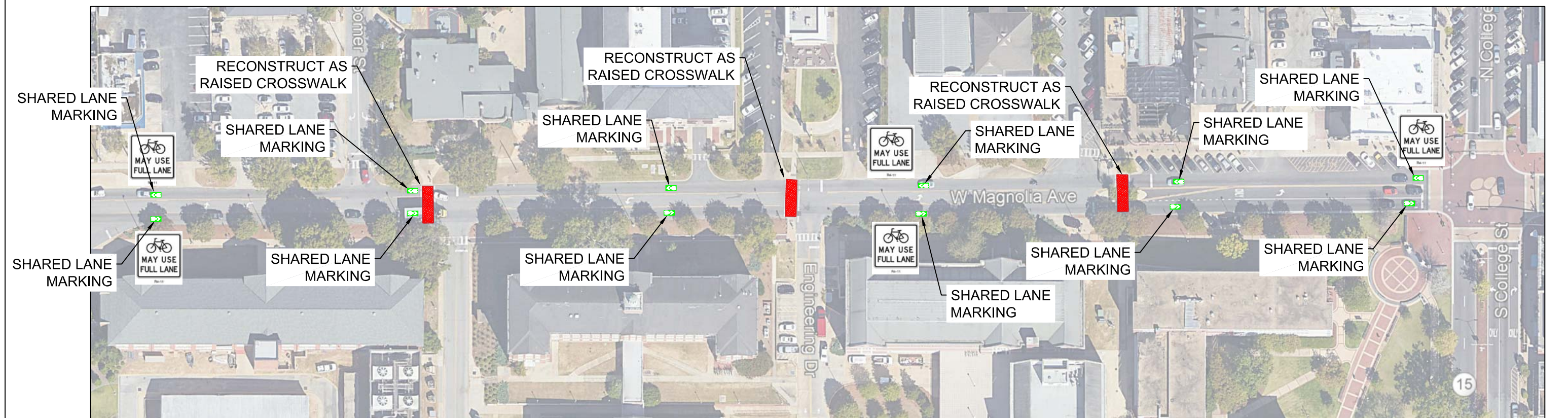
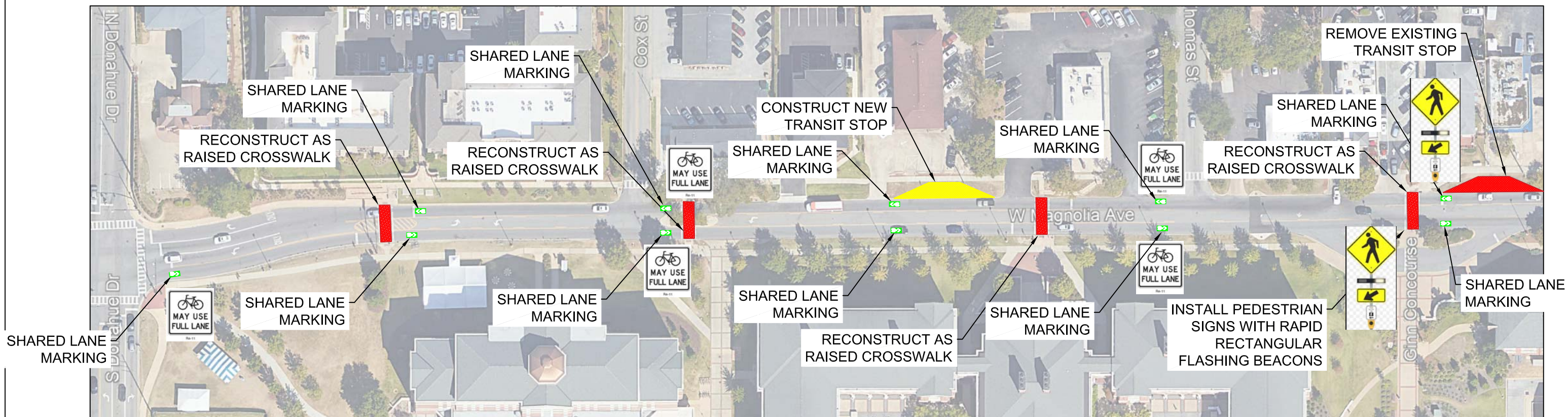
5) the westbound transit stop in front of Chick-Fil-A should be relocated to the west of Thomas Street. Queues resulting from Chick-Fil-A restrict the transit's accessibility to both the transit stop and Magnolia Avenue. The transit experiences delay from these queues.

6) convert existing midblock pedestrian crossings to raised crossings similar to those installed by Auburn University on Samford Avenue (see picture below). This has several benefits, including potential to improve rates of yielding to pedestrians, providing a safety benefit for all users by reducing speeds, and improves comfort for bicyclist by reducing speed differential since this is a shared lane context.



The recommended pedestrian improvement plan is shown in **Figure 9**.





**Figure 9 - Pedestrian Improvements  
Magnolia Avenue Corridor  
Auburn, Alabama**

**LEGEND**

- ← AM(PM) Peak Hour Volumes
- ⊗ Study Intersection

## VEHICULAR CIRCULATION ALTERNATIVES

Several proposals to radically modify traffic operations on Magnolia Avenue have been discussed during the course of this study. These include the following alternatives:

- 1) convert Magnolia Avenue to one-way westbound from College Street to Donahue Drive
- 2) convert Magnolia Avenue to one-way eastbound from Donahue Drive to College Street
- 3) close Magnolia Avenue at College Street

The common concern with all these alternatives is the impact to the intersection of College Street at Glenn Avenue. Analyses were performed for future 2028 p.m. peak hour conditions at the intersection of College Street at Glenn Avenue for: 1) base conditions (no change to Magnolia Avenue), 2) conditions with Magnolia Avenue one-way westbound, and 3) conditions with Magnolia Avenue one-way eastbound. It was assumed that 70% of traffic on Magnolia Avenue would divert to Glenn Avenue in these analyses. The levels of service for these three conditions is shown in **Table 9**. As shown, either alternative will result in failing levels of service at the intersection of College Street at Glenn Avenue. It is therefore recommended that no further consideration be given to making radical modifications to the traffic operations on Magnolia Avenue.

**Table 9 - Intersection Levels of Service Comparison – College St at Glenn Ave**

Approach	Movement	Level of Service		
		Baseline	Magnolia One-Way Westbound	Magnolia One-Way Eastbound
EB Glenn Ave	Left	D	F	E
	Through/Right	D	E	D
WB Glenn Ave	Left	C	D	D
	Through/Right	E	F	F
NB College St	Left	C	D	D
	Through	D	E	D
	Right	D	D	D
SB College St	Left	D	D	D
	Through	D	D	E
	Right	D	D	E
<b>Overall Intersection</b>		<b>D</b>	<b>E</b>	<b>F</b>

## ACCESS MANAGEMENT

Due to the compartmentalized nature of development fronting Magnolia Avenue, there does not currently exist significant opportunities for access management. The design of several sites, particularly those with drive-through facilities requires two access points on Magnolia Avenue. As any redevelopment occurs, opportunities to limit the number of access points to Magnolia Avenue should be taken. In particular, sites should be limited to one access point to Magnolia Avenue and internal circulation provided to access drive-throughs and parking. Shared access points between adjacent sites should also be required where possible.

## EXISTING CONDITIONS ANALYSES WITH IMPROVEMENTS

### Recommended improvements

Based upon the analyses and evaluations conducted for the Magnolia Avenue Corridor, recommendations are being made to improve traffic flow along the corridor at study intersections and to address any capacity or safety deficiencies identified. The following outlines the recommended improvements for the Magnolia Avenue Corridor:

- 1) convert Thomas Street and Toomer Street to two-way traffic flow
- 2) install a traffic signal on Magnolia Avenue at Crosswalk #4 (Chick-fil-A) – future potential improvement based on the outcome of installation of Rapid Rectangular Flashing Beacons
- 3) make other transit, pedestrian and bicycle safety improvements as documented in an earlier section of this report (these improvements do not impact traffic volumes or levels of service)

### Existing Intersection Capacity Analysis with Improvements

Capacity analyses for peak hour conditions at the study intersections along the Magnolia Avenue Corridor were conducted assuming improvements for existing conditions would be in place. Capacity analyses were conducted using methods outlined in the *Highway Capacity Manual, 2010*. Results of these capacity analyses are summarized in **Table 10**.

**Table 10 - Existing Intersection Levels of Service with Improvements**

Intersection (traffic control)	Approach	Movement/Lane Group	Level of Service	
			AM Peak Hour	PM Peak Hour
Magnolia Avenue at Cox Street (Side Street Stop)	EB Magnolia Avenue	Left	A	A
		Through	A	A
		Overall	A	A
	WB Magnolia Avenue	Through/Right	A	A
		SB Cox Street	Left/Right	B
Magnolia Avenue at Thomas Street (Side Street Stop)	EB Magnolia Avenue	Left	A	A
		Through	A	A
		Overall	A	A
	WB Magnolia Avenue	Through/Right	A	A
		SB Thomas Street	Left/Right	B
Magnolia Avenue at Chick-fil-A (Traffic Signal)	EB Magnolia Ave	Left	A	A
		Through	A	A
		Overall	A	A
	WB Magnolia Ave	Through/Right	A	A
		SB Chick-fil-A	Left/Right	B
	Overall Intersection		A	A
Magnolia Avenue at Toomer Street/ Wilmore Drive (Side Street Stop)	EB Magnolia Avenue	Left	A	A
		Through/Right	A	A
	WB Magnolia Avenue	Left	A	A
		Through/Right	A	A
	NB Wilmore Drive	Overall	A	A
		SB Toomer Street	Left/Right	D
Magnolia Avenue at Wright Street (Side Street Stop)	EB Magnolia Avenue	Left	A	A
		Through	A	A
		Overall	A	A
	WB Magnolia Avenue	Through/Right	A	A
		SB Wright Street	Left/Right	C
Cox Street at Genelda Avenue (Side Street Stop)	EB Condo Access	Left/Through/Right	B	A
	WB Genelda Avenue	Left/Through/Right	B	B
	NB Cox Street	Left/Through/Right	A	A
	SB Cox Street	Left/Through/Right	A	A
Thomas Street at Genelda Avenue (Side Street Stop)	EB Genelda Avenue	Left/Through/Right	B	B
	WB Genelda Avenue	Left/Through/Right	B	B
	NB Thomas Street	Left/Through/Right	A	A
	SB Thomas Street	Left/Through/Right	A	A
Toomer Street at Genelda Avenue (Side Street Stop)	EB Genelda Avenue	Left/Through/Right	A	A
	WB Apartment Access	Left/Through/Right	B	B
	NB Toomer Street	Left/Through/Right	A	A
	SB Toomer Street	Left/Through/Right	A	A

**Table 10 Cont. - Existing Intersection Levels of Service with Improvements**

Intersection (traffic control)	Approach	Movement/Lane Group	Level of Service	
			AM Peak Hour	AM Peak Hour
Glenn Avenue at Cox Street (Side Street Stop)	EB Glenn Avenue	Left	A	A
		Through/Right	A	A
		Overall	A	A
	WB Glenn Avenue	Left	A	A
		Through/Right	A	A
		Overall	A	A
	NB Cox Street	Left/Through/Right	C	D
SB Apartment Access				
Glenn Avenue at Thomas Street (Side Street Stop)	EB Glenn Avenue	Left	A	A
		Through/Right	A	A
		Overall	A	A
	WB Glenn Avenue	Left	A	A
		Through/Right	A	A
		Overall	A	A
	NB Thomas Street	Left/Through/Right	C	F
	SB Apartment Access	Left/Through/Right	C	F
Glenn Avenue at Toomer Street (Side Street Stop)	EB Glenn Avenue	Left	A	A
		Through/Right	A	A
		Overall	A	A
	WB Glenn Avenue	Left	A	A
		Through/Right	A	A
		Overall	A	A
	NB Toomer Street	Left/Through/Right	C	F
	SB Apartment Access	Left/Through/Right	D	F

## PROJECTED TRAFFIC GROWTH

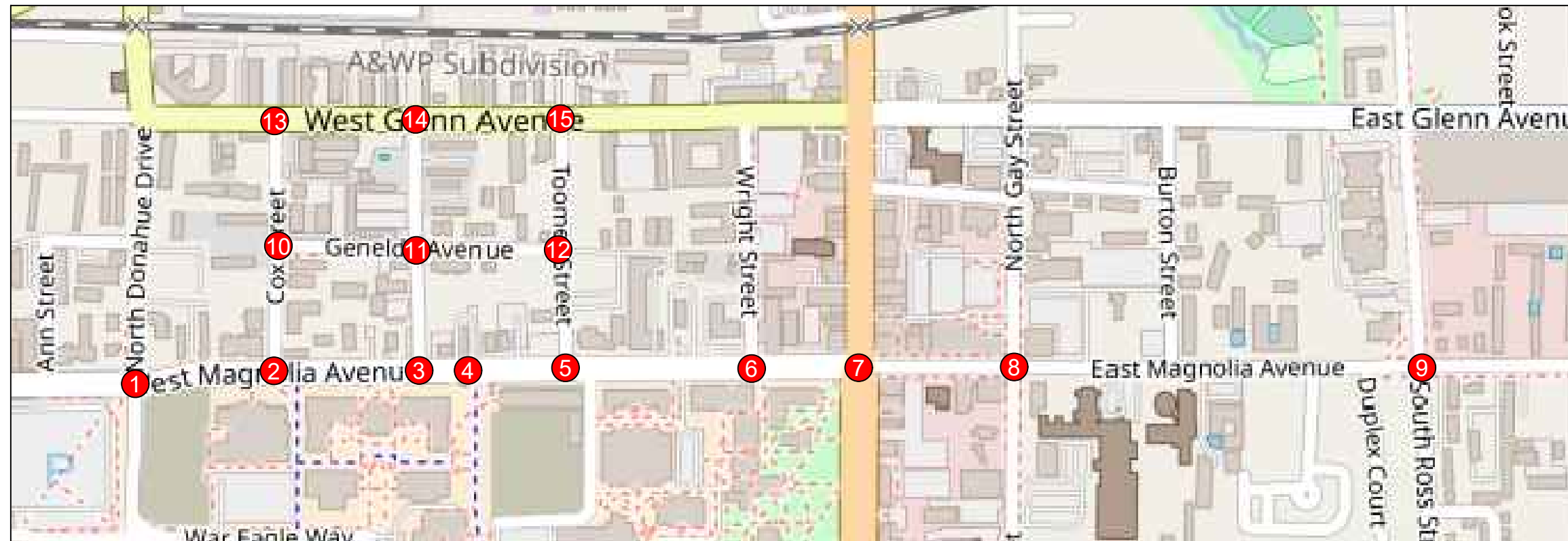
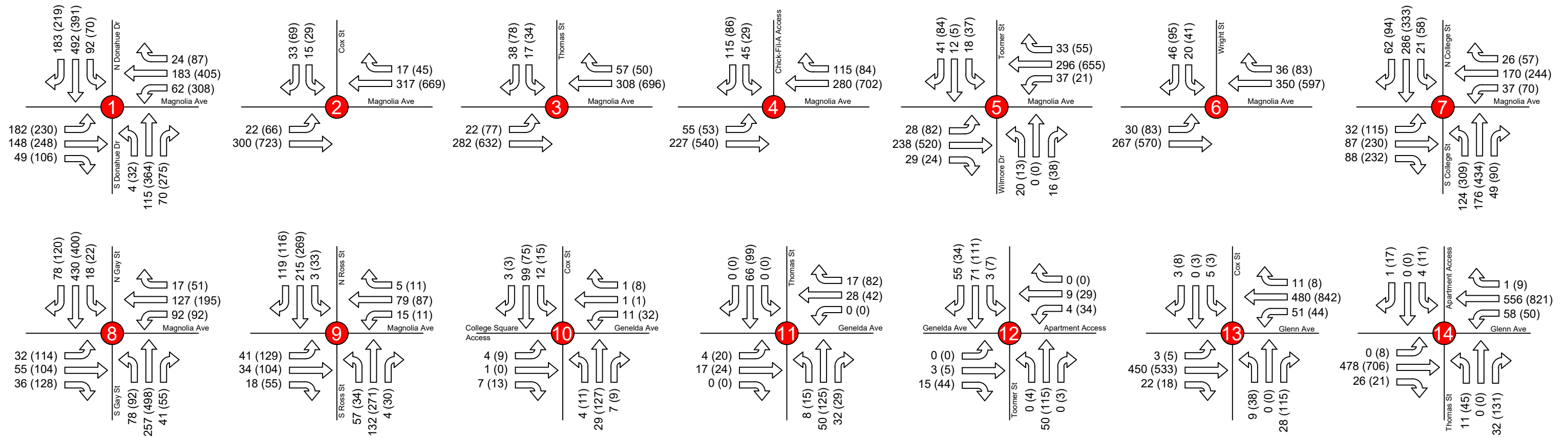
Growth rates were calculated for the study roadways based on historical traffic volumes and growth trends. The historical growth rate calculated for roadways in the vicinity of Magnolia Avenue was 3.2% per year. The annual growth rate was applied for a ten (10) year period to result in an overall growth rate of 32% percent for study area traffic volumes. Existing peak hour traffic volumes were increased 32% to reflect ten (10) year projected traffic volumes for the Magnolia Avenue corridor. Future 2028 traffic volumes are depicted in **Figure 10**.

### Intersection Capacity Analysis with Projected Traffic Growth

Capacity analyses for projected ten (10) year peak hour conditions were conducted for the study intersections along the Magnolia Avenue Corridor using methods outlined in the *Highway Capacity Manual, 2010*. Results of these capacity analyses are summarized in **Table 11**.

As shown in **Table 11**, most study intersections evaluated along the Magnolia Avenue Corridor operate at acceptable levels of service under projected peak hour conditions. The poor level of service on the side streets at unsignalized intersections reflect the delay vehicles experience while waiting for gaps in the Magnolia Avenue and Glenn Avenue traffic flow. This is typical for a minor roadway at a side street stop condition with a major roadway.

Magnolia Avenue operates at a level of service “F” at its intersection with College Street during the afternoon peak period, with several traffic movements operating at a level of service “E” and “F”. For existing conditions, the only inadequate level of service was a level of service “E” on the Magnolia Avenue eastbound through/right lane. The significant increase in failing levels of service over the next ten years reflects the significant increase in traffic volumes due to continued development in the area, particularly redevelopment of lower-density parcels on Glenn Avenue. The inadequate levels of service are due in large part to the high pedestrian traffic flows at the intersection. If all pedestrian traffic were removed, all movements at the intersection would operate at acceptable levels of service for future 2028 conditions. Due to the environment of the intersection (limited right of way, intense development, pedestrian traffic) any roadway improvements which would be beneficial to traffic flow would be detrimental to the operation of other modes of transportation and adjacent land uses.



**Figure 10 - Projected Traffic Volumes  
Magnolia Avenue Corridor  
Auburn, Alabama**

**LEGEND**

← AM(PM) Peak Hour Volumes

⊗ Study Intersection

Scale: Not to Scale  
Date: OCT 2018

**Table 11 - Intersection Levels of Service with Projected Traffic Growth**

Intersection (traffic control)	Approach	Movement/Lane Group	Level of Service	
			AM Peak Hour	PM Peak Hour
Magnolia Avenue at Donahue Drive (Traffic Signal)	EB Magnolia Avenue	Left	B	C
		Through	B	C
		Right	B	C
		Overall	B	C
	WB Magnolia Avenue	Left	B	C
		Through	C	D
		Right	B	C
		Overall	C	C
	NB Donahue Drive	Left	B	C
		Through	C	C
		Right	B	C
		Overall	C	C
	SB Donahue Drive	Left	B	B
		Through	C	C
		Right	B	C
Overall		C	C	
<b>Overall Intersection LOS</b>			<b>C</b>	<b>C</b>
Magnolia Avenue at Cox Street (Side Street Stop)	EB Magnolia Avenue	Left	A	A
		Through	A	A
		Overall	A	A
	WB Magnolia Avenue	Through/Right	A	A
SB Cox Street	Left/Right	B	D	
Magnolia Avenue at Thomas Street (Side Street Stop)	EB Magnolia Avenue	Left	A	B
		Through	A	A
		Overall	A	A
	WB Magnolia Avenue	Through/Right	A	A
SB Thomas Street	Left/Right	B	D	
Magnolia Avenue at Chick-Fil-A (Traffic Signal)	EB Magnolia Avenue	Left	A	A
		Through	A	A
		Overall	A	A
	WB Magnolia Avenue	Through/Right	A	A
	SB Chick-Fil-A Driveway	Left/Right	B	C
Overall intersection			A	A

**Table 11 Cont. - Intersection Levels of Service with Projected Traffic Growth**

Intersection (traffic control)	Approach	Movement/Lane Group	Level of Service	
			AM Peak Hour	PM Peak Hour
Magnolia Avenue at Wilmore Drive/ Toomer Street (Side Street Stop)	EB Magnolia Avenue	Left	A	B
		Through/Right	A	A
		Overall	A	A
	WB Magnolia Avenue	Left	A	A
		Through/Right	A	A
		Overall	A	A
	NB Wilmore Drive	Left/Through/Right	F	F
SB Toomer Street	Left/Through/Right	E	F	
Magnolia Avenue at Wright Street (Side Street Stop)	EB Magnolia Avenue	Left	A	B
		Through	A	A
		Overall	A	A
	WB Magnolia Avenue	Through/Right	A	A
SB Wright Street	Left/Right	E	F	
Magnolia Avenue at College Street (Traffic Signal)	EB Magnolia Avenue	Left	C	D
		Through/Right	C	F
		Overall	C	F
	WB Magnolia Avenue	Left	C	D
		Through/Right	C	F
		Overall	C	E
	NB College Street	Left	B	D
		Through	B	C
		Right	B	B
		Overall	B	C
	SB College Street	Left	B	C
Through/Right		C	D	
Overall		C	D	
<b>Overall Intersection LOS</b>			<b>C</b>	<b>F</b>
Magnolia Avenue at Gay Street (Traffic Signal)	EB Magnolia Avenue	Left	C	C
		Through/Right	C	D
		Overall	C	C
	WB Magnolia Avenue	Left	C	C
		Through/Right	C	C
		Overall	C	C
	NB Gay Street	Left	B	B
		Through/Right	B	C
		Overall	B	C
	SB Gay Street	Left	B	B
		Through	C	C
		Right	B	B
		Overall	B	C
<b>Overall Intersection LOS</b>			<b>C</b>	<b>C</b>

**Table 11 Cont. - Intersection Levels of Service with Projected Traffic Growth**

Intersection (traffic control)	Approach	Movement/Lane Group	Level of Service		
			AM Peak Hour	PM Peak Hour	
Magnolia Avenue at Ross Street (Side Street Stop)	EB Magnolia Avenue	Left	B	B	
		Through/Right	B	B	
		Overall	B	B	
	WB Magnolia Avenue	Left/Through/Right	B	B	
		NB Ross Street	Left	B	B
			Through/Right	B	C
	Overall		B	C	
	SB Ross Street	Left	A	B	
		Through/Right	C	D	
Overall		C	D		
Cox Street at Genelda Avenue (Side Street Stop)	EB Condo Access	Left/Through/Right	B	B	
	WB Genelda Avenue	Left/Through/Right	B	B	
	NB Cox Street	Left/Through/Right	A	A	
	SB Cox Street	Left/Through/Right	A	A	
Thomas Street at Genelda Avenue (Side Street Stop)	EB Genelda Avenue	Left/Through/Right	B	B	
	WB Genelda Avenue	Left/Through/Right	B	B	
	NB Thomas Street	Left/Through/Right	A	A	
	SB Thomas Street	Left/Through/Right	A	A	
Toomer Street at Genelda Avenue (Side Street Stop)	EB Genelda Avenue	Left/Through/Right	A	B	
	WB Apartment Access	Left/Through/Right	B	B	
	NB Toomer Street	Left/Through/Right	A	A	
	SB Toomer Street	Left/Through/Right	A	A	
Glenn Avenue at Cox Street (Side Street Stop)	EB Glenn Avenue	Left	A	B	
		Through/Right	A	A	
		Overall	A	A	
	WB Glenn Avenue	Left	A	A	
		Through/Right	A	A	
		Overall	A	A	
	NB Cox Street	Left/Through/Right	D	F	
	SB Apartment Access	Left/Through/Right	E	F	
Glenn Avenue at Thomas Street (Side Street Stop)	EB Glenn Avenue	Left	A	B	
		Through/Right	A	A	
		Overall	A	A	
	WB Glenn Avenue	Left	A	A	
		Through/Right	A	A	
		Overall	A	A	
	NB Thomas Street	Left/Through/Right	D	F	
SB Apartment Access	Left/Through/Right	E	F		
Glenn Avenue at Toomer Street (Side Street Stop)	EB Glenn Avenue	Left	A	A	
		Through/Right	A	A	
		Overall	A	A	
	WB Glenn Avenue	Left	A	B	
		Through/Right	A	A	
		Overall	A	A	
	NB Toomer Street	Left/Through/Right	E	F	
SB Apartment Access	Left/Through/Right	E	F		

**Future Roadway Segment Capacity Analysis**

Roadway segment capacity analyses for daily traffic conditions along the Magnolia Avenue Corridor were performed using the daily capacity and level of service chart obtained from the Alabama Department of Transportation. Levels of service for the daily roadway segment capacity analyses conducted for Magnolia Avenue are summarized in **Table 12**.

**Table 12 – Future Roadway Segment Levels of Service**

Magnolia Avenue					
From	To	Segment Length (miles)	Cross Section	Daily Volume	Roadway LOS by Segment
Thomas Street	Toomer Street	.10	3 Lane	9,645	B
Toomer Street	Wright Street	.13	3 Lane	9,632	B

**Right-Turn Lane Warrant Evaluations with Projected Traffic Growth**

Projected peak hour traffic volumes were compared with the turn lane warrant criteria outlined in the National Cooperative Highway Research Program (NCHRP) Report 457 *Evaluating Intersection Improvements: An Engineering Study Guide*, published by the Transportation Research Board. For evaluation purposes, the posted speed limit was utilized for roadways. **Table 13** outlines the results of the turn lane warrant analysis efforts.

**Recommended Roadway Improvements with Projected Traffic Growth**

Based on the results of the 2028 analyses, no additional improvements beyond those recommended for existing conditions are recommended.

**Table 13 – Right-Turn Lane Warrant Evaluation Results**

Intersection	Approach	Turn Lane Warrant Status
Magnolia Avenue at Cox Street	Westbound	Right Turn Lane Not Warranted
Magnolia Avenue at Thomas Street	Westbound	Right Turn Lane Not Warranted
Magnolia Avenue at Chick-Fil-A Driveway	Westbound	Right Turn Lane Not Warranted
Magnolia Avenue at Toomer Street/Wilmore Drive	Eastbound	Right Turn Lane Not Warranted
Magnolia Avenue at Wright Street	Westbound	Right Turn Lane Not Warranted
Magnolia Avenue at College Street	Eastbound	Right Turn Lane Not Warranted
	Westbound	Right Turn Lane Not Warranted
	Southbound	Right Turn Lane Not Warranted
Magnolia Avenue at Gay Street	Eastbound	Right Turn Lane Not Warranted
	Westbound	Right Turn Lane Not Warranted
	Northbound	Right Turn Lane Not Warranted
Magnolia Avenue at Ross Street	Eastbound	Right Turn Lane Not Warranted
	Westbound	Right Turn Lane Not Warranted