Isolated Study Intersections

PREPARED FOR:

THE CITY OF AUBURN

PREPARED BY:

SKIPPER CONSULTING INC.

JUNE 2006

ISOLATED STUDY INTERSECTIONS

Prepared for:
The City of Auburn

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Skipper Consulting, Inc.

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INTRODUCTION

This section of the Auburn Traffic Study documents the results of traffic operational and safety analyses conducted for five isolated intersections located throughout the City of Auburn, Alabama. The analyses included an independent evaluation of each location using existing traffic data, lane geometry and existing traffic signal timings. The isolated study intersections (illustrated in **Figure 1**) where traffic operational and safety evaluations were conducted include:

- Magnolia Avenue at Donahue Drive
- Magnolia Avenue at Gay Street
- Opelika Road at East University Drive
- Opelika Road at Ross Street
- Shelton Mill Road at East University Drive

To undertake the traffic operational and safety evaluations for each study location, the following tasks were performed:

- existing morning and afternoon peak hour turning movement traffic counts were conducted for each intersection;
- capacity analyses were conducted for each isolated study intersection for existing conditions;
- current traffic operational deficiencies were identified;
- crash histories were evaluated and significant trends were identified;
- geometric and traffic control improvements were developed for each study intersection to address operational and safety deficiencies, and
- recommended improvements were tested for effectiveness in addressing deficiencies.

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

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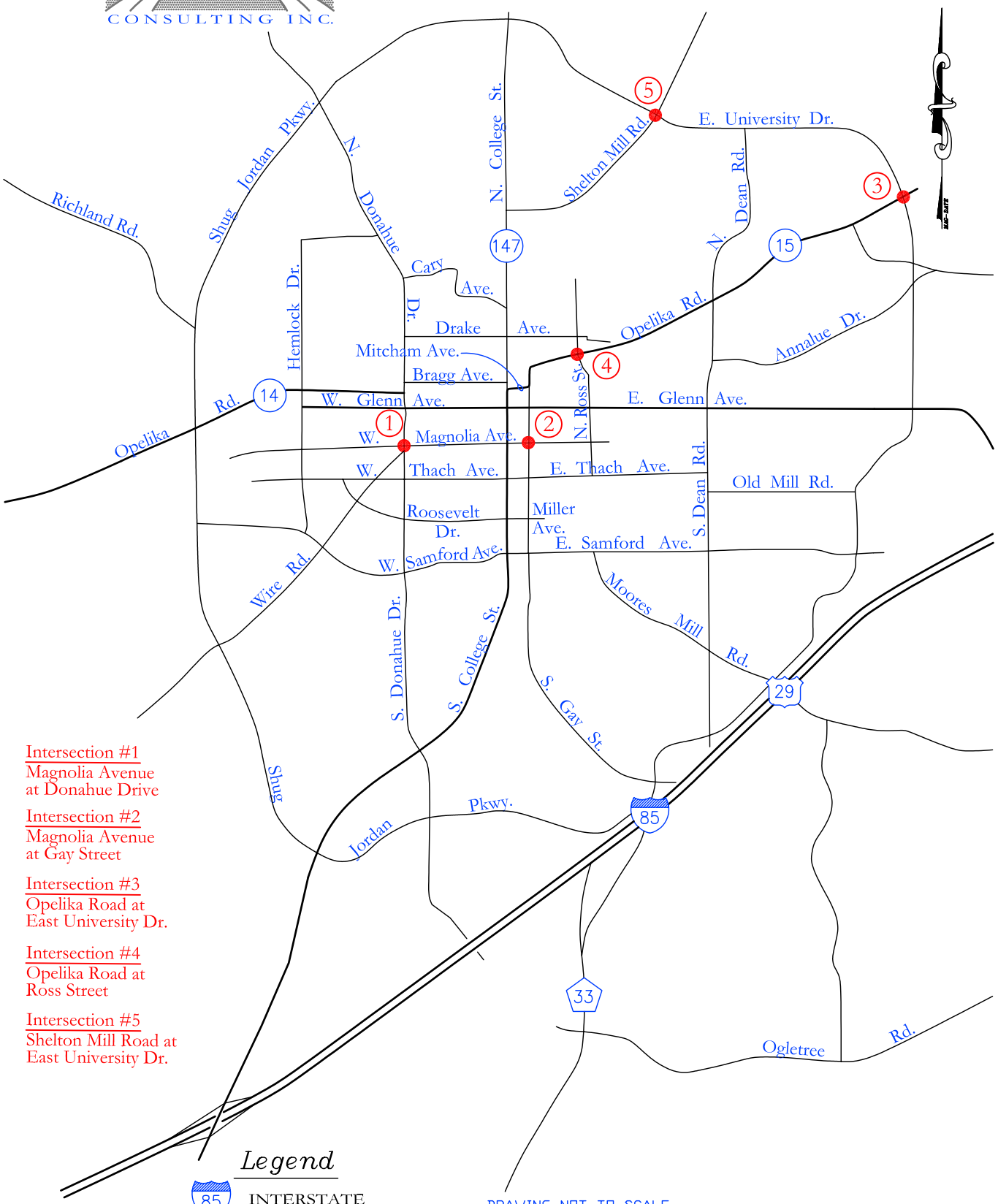


Intersection #1
Magnolia Avenue
at Donahue Drive

Intersection #2
Magnolia Avenue
at Gay Street

Intersection #3
Opelika Road at
East University Dr.

Intersection #4
Opelika Road at
Ross Street

Intersection #5
Shelton Mill Road at
East University Dr.

Legend

- 85 INTERSTATE
- 29 U.S. HIGHWAY
- 15 STATE ROUTE
- 33 COUNTY ROAD
- STUDY INTERSECTION

DRAWING NOT TO SCALE

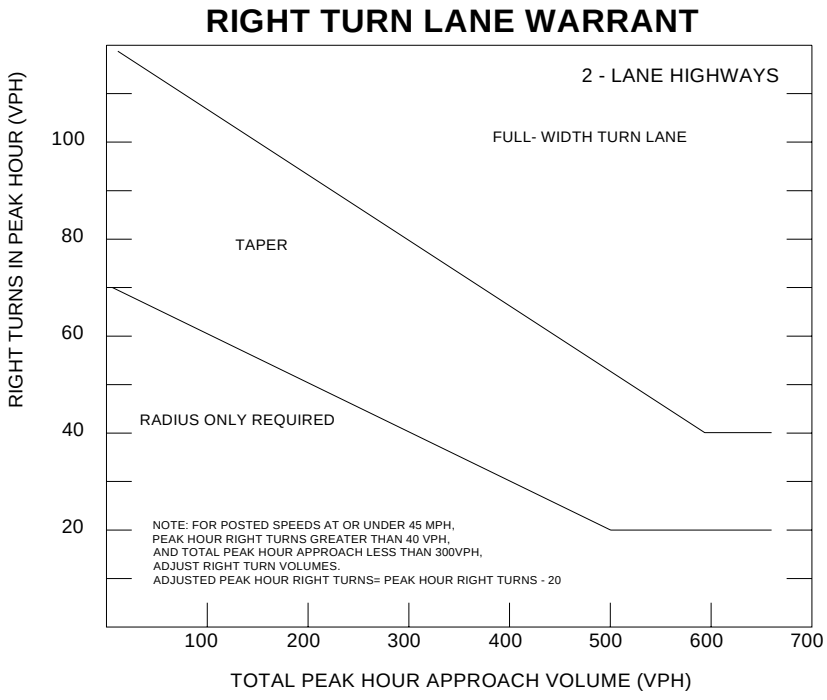
FIGURE 1
STUDY INTERSECTIONS
ISOLATED STUDY INTERSECTIONS
AUBURN, ALABAMA

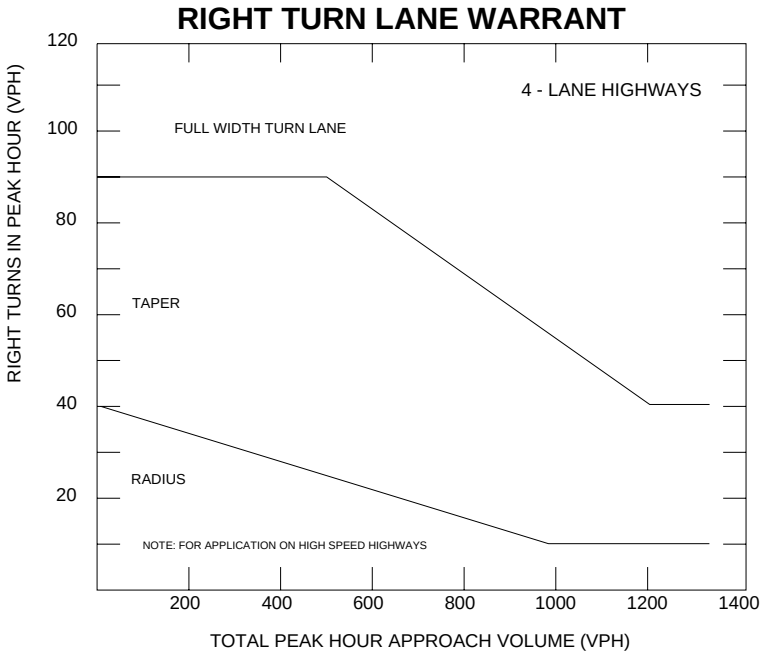
1103.007

RIGHT-TURN LANE WARRANT GUIDELINES

Assessments of the need for right turn lanes for each of the study intersections were conducted. These assessments were conducted for each approach at the study intersections. The criteria utilized are based upon information contained in the *Intersection Channelization Design Guide, Report 279*, published by the Transportation Research Board. Existing peak hour traffic volumes were compared with right-turn lane warrant criteria as presented in the *Intersection Channelization Design Guide, Report 279*.

Right turn lane guidelines, as presented in the *Intersection Channelization Design Guide, Report 279*, are provided for reference in the following charts.





** Taken from Figure 4-23, Intersection Channelization Design Guide, Report 279, published by the Transportation Research Board.*

Locations at which right turn and advancing through volumes meet the criteria for right turn lanes are summarized under each of the study intersections in following sections of this document.

INTERSECTION #1: MAGNOLIA AVENUE AT DONAHUE DRIVE

Study Roadways

Donahue Drive is one of the primary north/south roadways serving the Auburn area, providing an alternate route to downtown. At the intersection with Magnolia Avenue, all approaches have an exclusive left-turn lane and a through/right lane with the exception of the northbound approach which also has a right turn lane. This intersection is currently signalized with permissive left-turns for all approaches. **Figure 1** illustrates the location of this intersection and its relationship to the greater Auburn area.

Peak Hour Traffic Counts

Morning and afternoon peak hour traffic counts were conducted on the Magnolia Avenue/Donahue Drive intersection on October 18, 2005. During the afternoon peak hour (4:15-5:15 p.m.), 2,227 vehicles traveled through the intersection, while during the morning peak hour (7:30-8:30 a.m.), 1,286 vehicles traveled through the intersection. Peak hour turning movement count data utilized for analysis of this intersection is summarized in **Table 1**. Complete traffic count data for this location is provided in **Appendix A**.

Table 1
Magnolia Avenue at Donahue Drive
Existing Peak Hour Turning Movement Counts

Peak Hour	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Morning (7:30-8:30 a.m.)	14	103	70	44	399	119	32	132	21	160	157	35
Afternoon (4:15-5:15 p.m.)	34	348	244	67	340	121	183	344	50	131	286	79

Intersection Capacity Analysis

The peak hour capacity and operation of the intersection of Magnolia Avenue at Donahue Drive was evaluated using methods outlined in the *Highway Capacity Manual, 2000 Edition*. 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" or better is considered desirable while a level of service "D" is considered acceptable during peak hour operations. A summary description of each range of level of service is provided in **Appendix B** for reference. Results of intersection capacity analyses for existing conditions are summarized in **Table 2**. Existing intersection capacity printouts, which present details of the capacity analyses, are provided in **Appendix C** for reference.

Table 2
Magnolia Avenue at Donahue Drive
Existing Intersection Levels of Service

Intersection (traffic control)	Approach	Movement/ Lane Group	Level of Service	
			AM Peak	PM Peak
Magnolia Avenue at Donahue Drive (traffic signal)	EB Magnolia Avenue	Left	B	C
		Through/Right	B	B
	WB Magnolia Avenue	Left	B	B
		Through/Right	B	B
	NB Donahue Drive	Left	B	B
		Through	B	B
		Right	B	B
	SB Donahue Drive	Left	B	B
		Through/Right	D	B
	OVERALL LOS		**C**	**B**

As indicated in **Table 2**, each movement/lane group at the intersection currently operates with acceptable levels of service (overall LOS C) for both peak hours evaluated.

Intersection Crash Analysis

According to the initial crash screening of this intersection, it has approximately 1.46 crashes per million vehicles entering the intersection for 2003-2004. The City of Auburn provided crash data at this intersection for the purposes of crash pattern analysis. After a review of the latest crash data provided, no sustainable pattern in crashes was observed to indicate contributing conditions to a crash at the intersection. Based on a physical review of the intersection as well as the crash information, it is recommended that no corrective measures would be required at this time to mitigate any crashes for the Magnolia Avenue at Donahue Drive intersection. It is recommended, however, that the performance of this

intersection be monitored considering it experienced approximately 1.46 crashes per million vehicles entering for the 2003-2004 period.

Right Turn Lane Assessment

A comparison of the current peak hour traffic volumes and the right turn lane criteria indicates right turn lanes should be considered for the following approaches at the Donahue Drive and Magnolia Avenue intersection:

- Southbound Donahue Drive; and
- Westbound Magnolia Avenue.

A right turn lane is presently provided on northbound Donahue Drive at Magnolia Avenue.

Recommended Improvements

The recommended improvements developed for Donahue Drive at Magnolia Avenue intersection were based upon providing improved capacity while maintaining current traffic flows for the intersection movements. Alternative improvements, consisting of restrictions for left turns, were also evaluated and are introduced as part of study efforts included in the Donahue Drive Corridor Traffic Operational Evaluation. Further discussion concerning the alternative of restricted left turn lanes at this intersection is provided in the Donahue Drive Corridor Traffic Operational Evaluation.

The following outlines roadway and traffic control improvements recommended for the Magnolia Avenue at Donahue Drive intersection without restricting left turn movements:

- Extend the northbound right turn lane on Donahue Drive;
- Construct a southbound left turn lane on Donahue Drive resulting in three southbound approach lanes on Donahue Drive (one left turn lane, one through lane, and one right turn lane);

- Extend the westbound left turn lane on Magnolia Avenue to the existing three lane section to the east;
- Construct a right turn lane on westbound Magnolia Avenue;
- Implement protected/permissive left turn phasing for the eastbound and westbound approaches on Magnolia Avenue at Donahue Drive; and
- Extend the current sidewalk in the northeast quadrant of the intersection to the west along Magnolia Avenue and north along Donahue Drive.

Figure 2 illustrates the recommended improvements for the Magnolia Avenue at Donahue Drive intersection.

Table 3 indicates that overall levels of service "C" would be provided during each peak period with the implementation of the recommended improvements. In addition, each movement/lane group would operate at a level of service "C" or better during each peak period evaluated. **Table 3** provides a summary of levels of service with implementation of the signal phasing/timing and roadway improvements. Capacity printouts are provided in **Appendix D**.

Table 3
Magnolia Avenue at Donahue Drive
Intersection Levels of Service with Recommended Improvements

Intersection (traffic control)	Approach	Movement/ Lane Group	Level of Service	
			AM Peak	PM Peak
Magnolia Avenue at Donahue Drive (traffic signal)	EB Magnolia Avenue	Left	B	B
		Through/Right	C	C
	WB Magnolia Avenue	Left	B	B
		Through	C	C
		Right	C	C
	NB Donahue Drive	Left	C	C
		Through	C	C
		Right	B	B
	SB Donahue Drive	Left	C	C
		Through	C	C
		Right	B	B
	OVERALL LOS		**C**	**C**

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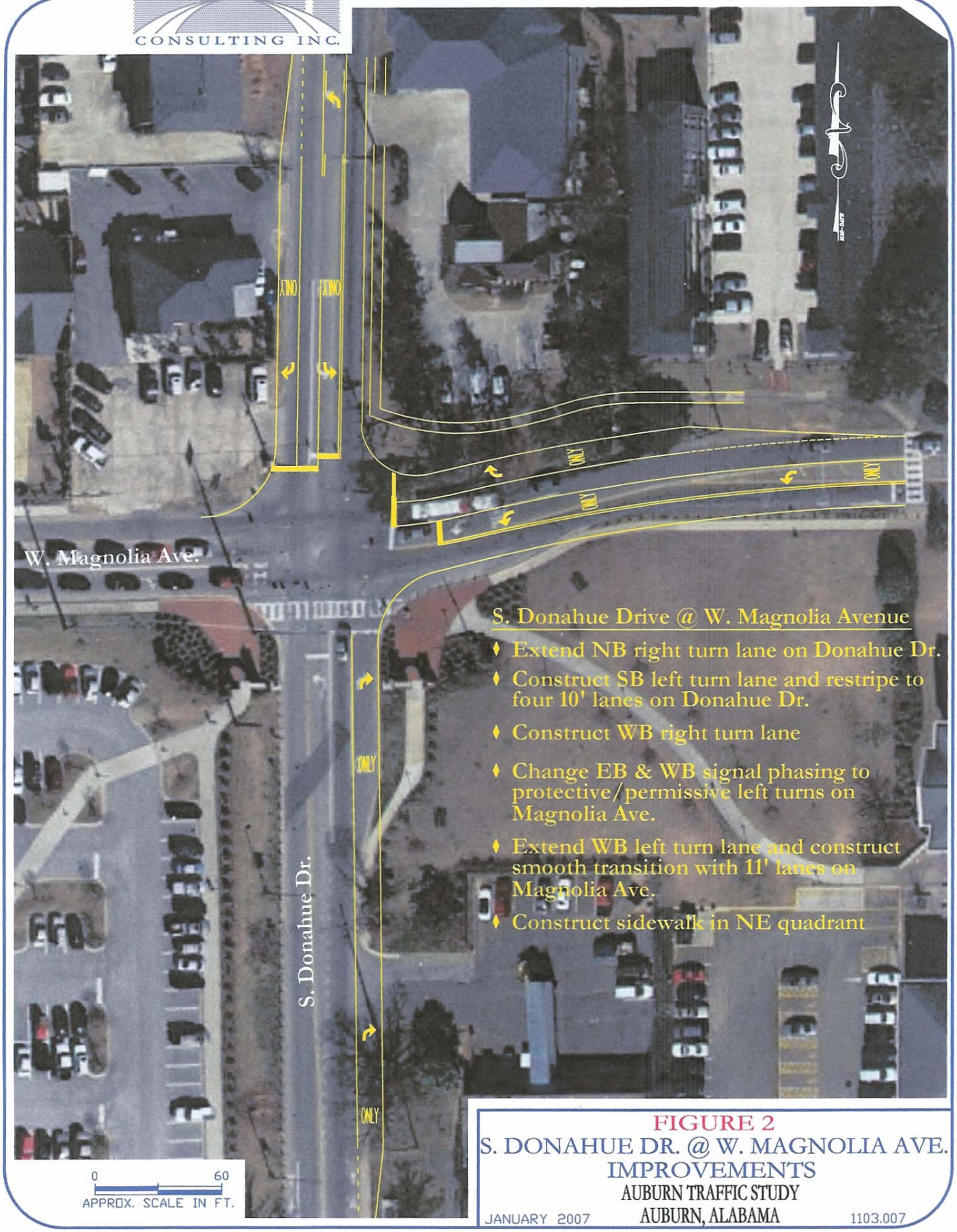

FIGURE 2
S. DONAHUE DR. @ W. MAGNOLIA AVE.
IMPROVEMENTS
AUBURN TRAFFIC STUDY
AUBURN, ALABAMA
JANUARY 2007
1103.007

INTERSECTION #2: MAGNOLIA AVENUE AT GAY STREET

Study Roadways

Gay Street is a north/south roadway one block east of College Street. At the Magnolia Avenue/Gay Street intersection, the eastbound, westbound, and northbound approaches all have an exclusive left-turn lane and a through/right lane. The remaining southbound approach has an exclusive left-turn lane, a through lane, and an exclusive right-turn lane. This intersection is currently signalized with permissive left-turns for all approaches. **Figure 1**, as previously presented, illustrates the location of this intersection.

Peak Hour Traffic Counts

Morning and afternoon peak hour traffic counts were conducted at the Magnolia Avenue/Gay Street intersection on September 21, 2005. During the morning peak hour (7:15-8:15 a.m.), 1,223 vehicles traveled through the intersection. The afternoon peak hour (4:30-5:30 p.m.) produced a volume of 1,627 vehicles. Traffic count data utilized for analysis of this intersection is summarized in **Table 4**. Complete traffic count data is provided in **Appendix A** for reference.

Table 4
Magnolia Avenue at Gay Street
Existing Peak Hour Turning Movement Counts

Peak Hour	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Morning (7:15-8:15 a.m.)	61	273	48	21	400	77	28	48	41	59	143	24
Afternoon (4:30-5:30 p.m.)	70	421	43	20	412	101	97	147	80	80	133	23

Intersection Capacity Analysis

Capacity analyses for peak hour conditions at the intersection of Magnolia Avenue at Gay Street were conducted for morning and afternoon peak hour periods. Results of these intersection capacity analyses for existing conditions are summarized in **Table 5**. Existing intersection capacity printouts are provided in **Appendix C**.

Table 5
Magnolia Avenue at Gay Street
Existing Intersection Levels of Service

Intersection (traffic control)	Approach	Movement/ Lane Group	Level of Service	
			AM Peak	PM Peak
Magnolia Avenue at Gay Street (traffic signal)	EB Magnolia Avenue	Left	B	B
		Through/Right	B	B
	WB Magnolia Avenue	Left	B	B
		Through/Right	B	B
	NB Gay Street	Left	A	A
		Through/Right	A	A
	SB Gay Street	Left	A	A
		Through	A	A
		Right	A	A
	OVERALL LOS		**A**	**B**

Table 5 indicates the study intersection presently operates with acceptable levels of service during the morning (overall LOS A) and afternoon (overall LOS B) peak periods.

Intersection Crash Analysis

According to the initial crash screening of this intersection, it has approximately 1.19 crashes per million vehicles entering the intersection for 2003-2004. The City of Auburn provided crash data at this intersection for the purposes of crash pattern analysis. After a review of the latest crash data provided, no sustainable pattern in crashes was observed to indicate contributing conditions to a crash at the intersection. Based on a physical review of the intersection as well as the crash information, it is recommended that no corrective measures would be required at this time to mitigate any crashes for the Magnolia Avenue at Gay Street intersection. It is recommended, however, that the performance of this intersection be monitored considering it experienced approximately 1.19 crashes per million vehicles entering for the 2003-2004 period.

Right Turn Lane Assessment

A comparison of the current peak hour traffic volumes and the right turn lane criteria indicates right turn lanes should be considered for the following approaches at the Gay Street and Magnolia Avenue intersection.

- Northbound right turn lane on Gay Street.

A right turn lane is presently provided on southbound Gay Street at Magnolia Avenue.

Recommended Improvements

Based upon the current levels of service and observations during peak periods, minimal improvements are recommended for the Magnolia Avenue at Gay Street intersection to include:

- Adjust signal timings to improve traffic operations and to meet the cycle length requirements for a coordinated signal system on Gay Street.
- Modify signal phasing to include eastbound and westbound protected/permissive left turn phasing as well as northbound left turn protected/permissive phasing.
- Construct a right turn lane on northbound Gay Street at Magnolia Avenue.

Recommended improvements for the Gay Street at Magnolia Avenue intersection are illustrated in **Figure 3**.

Table 6 provides a summary of the levels of service that would be provided with implementation of the Recommended Improvements for the Gay Street at Magnolia Avenue intersection. Capacity printouts are provided in **Appendix D**.

Table 6
Magnolia Avenue at Gay Street
Intersection Levels of Service with Recommended Improvements

Intersection (traffic control)	Approach	Movement/ Lane Group	Level of Service	
			AM Peak	PM Peak
Magnolia Avenue at Gay Street (traffic signal)	EB Magnolia Avenue	Left	B	C
		Through/Right	C	C
	WB Magnolia Avenue	Left	B	C
		Through/Right	C	C
	NB Gay Street	Left	B	B
		Through	B	B
		Right	B	B
	SB Gay Street	Left	B	B
		Through	C	B
		Right	B	B
	OVERALL LOS		**B**	**C**

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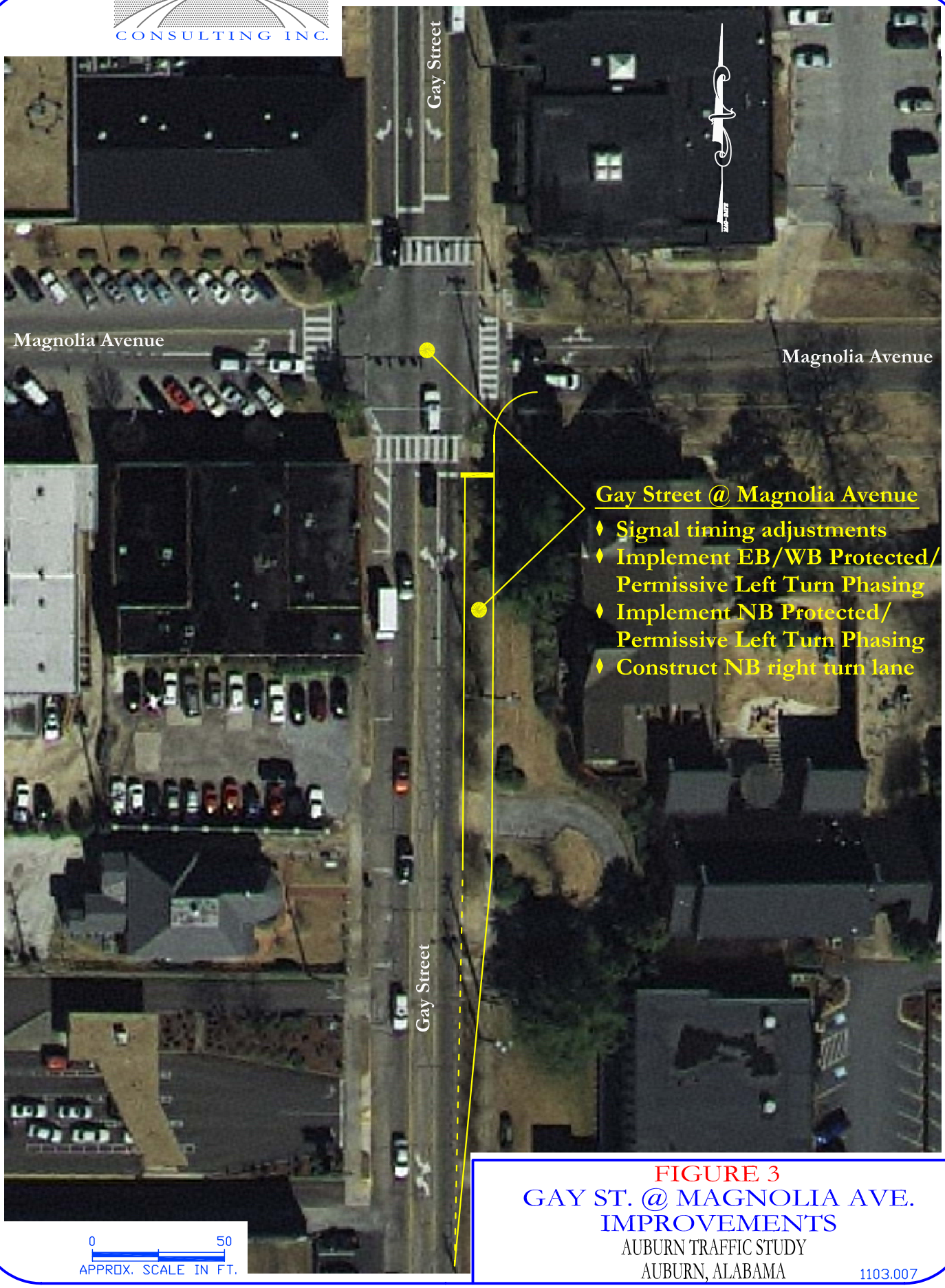

FIGURE 3
GAY ST. @ MAGNOLIA AVE. IMPROVEMENTS
AUBURN TRAFFIC STUDY
AUBURN, ALABAMA
1103.007

INTERSECTION #3: OPELIKA ROAD AT EAST UNIVERSITY DRIVE

Study Roadways

East University Drive connects with Shug Jordan Parkway to provide a loop surrounding the Auburn area. Opelika Road begins at Gay Street and runs east/west to East University Drive, where it changes to Pepperell Parkway. At the intersection, westbound Opelika Road provides a left-turn lane, two through lanes, and one right-turn lane with the eastbound approach providing one left-turn lane, one through lane, and one shared through/right-turn lane. East University Drive provides a single left-turn lane, two through lanes, and one right-turn lane for the northbound approach, while providing a single left-turn lane, one through lane, and a single shared through/right-turn lane for the southbound approach. The intersection is currently controlled by a traffic responsive signal with protected only left-turn phasing for all approaches. The location of the intersection and its relationship to the area roadways is illustrated in **Figure 1.**

Peak Hour Traffic Counts

Morning and afternoon peak hour traffic counts were conducted at the Opelika Road/East University Drive intersection on October 3, 2005. During the afternoon peak hour (4:30-5:30 p.m.), 4,168 vehicles traveled through the intersection, while during the morning peak hour (7:15-8:15 a.m.), 2,313 vehicles traveled through the intersection. Traffic count data utilized for analysis of this intersection is summarized in **Table 7**. Complete traffic count data is provided in **Appendix A** for reference.

Table 7
Opelika Road at East University Drive
Existing Peak Hour Turning Movement Counts

Peak Hour	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Morning (7:15-8:15 a.m.)	62	373	232	175	266	72	39	365	55	155	403	116
Afternoon (4:30-5:30 p.m.)	149	466	342	278	405	143	165	678	169	414	738	221

Intersection Capacity Analysis

Capacity analyses for morning and afternoon peak hour conditions at the intersection of Opelika Road and East University Drive were conducted using the methods as previously outlined. Results of intersection capacity analyses for existing conditions are summarized in **Table 8**. Existing intersection capacity printouts are provided in **Appendix C**.

Table 8
Opelika Road at East University Drive
Existing Intersection Levels of Service

Intersection (traffic control)	Approach	Movement/ Lane Group	Level of Service	
			AM Peak	PM Peak
Opelika Road at East University Drive (traffic signal)	EB Opelika Road	Left	C	D
		Through/Right	C	F
	WB Opelika Road	Left	C	E
		Through	C	F
		Right	B	B
	NB E. University Drive	Left	C	E
		Through	C	D
		Right	B	B
	SB E. University Drive	Left	C	D
		Through/Right	C	D
	OVERALL LOS		**C**	**F**

Table 8 indicates the study intersection presently operates with acceptable levels of service during the morning peak period (overall level of service "C"). However, the overall intersection operates at a level of service "F" during the afternoon peak hour. The eastbound, westbound, and northbound approaches have movements with less than acceptable levels of service during the afternoon peak hour as described in the following:

- Eastbound through movement on Opelika Road;
- Westbound left and through movements on Opelika Road; and
- Northbound left turn movement on East University Drive.

Intersection Crash Analysis

According to the initial crash screening of this intersection, it has approximately 4.31 crashes per million vehicles entering the intersection for 2003-2004. The City of Auburn provided crash data at this intersection for the purposes of crash pattern analysis. After a review of the latest crash data provided, no sustainable pattern in crashes was observed to indicate contributing conditions to a crash at the intersection. Based on a physical review of the intersection as well as the crash information, it is recommended that no corrective measures would be required at this time to mitigate any crashes for the Opelika Road at East University Drive intersection. It is recommended, however, that the performance of this intersection be monitored considering it experienced approximately 4.31 crashes per million vehicles entering for the 2003-2004 period.

Right Turn Lane Assessment

A comparison of the current peak hour traffic volumes and the right turn lane criteria indicates right turn lanes should be considered for:

- Eastbound Opelika Road; and
- Southbound East University Drive.

Right turn lanes are presently provided on westbound Opelika Road and northbound East University Drive.

Recommended Improvements

Based upon the results of capacity analyses and peak period observations, improvements are recommended at the Opelika Road and East University Drive intersection to improve traffic operations. The improvements recommended at this intersection are included as two alternates. The improvements associated with Alternate One were developed in an effort to bring the intersection up to an overall level of service “D” during the afternoon peak hour. However, some movements would continue to operate at levels of service “E” during the afternoon peak hour. The improvements associated with Alternate Two were

developed to bring each movement to a level of service "D" or better. The following summarizes the improvements for both Alternate One and Alternate Two improvements.

Alternate One Improvements

Alternate One Improvements were developed to result in an overall level of service "D" for the study intersection during the afternoon peak hour. The Alternate One Improvements include:

- Extending the northbound right turn lane on East University Drive to enable the right turn traffic flow to access the right turn lane during periods when the existing right turn lane is blocked by queues for the northbound through movement;
- Construct a right turn lane on eastbound Opelika Road to enable the right turn traffic flow to access a right turn lane without being blocked by the through queues during peak periods; and
- Modify the signal phasing to allow protected/permissive left turns for the eastbound and westbound approaches on Opelika Road.

Alternate One Improvements are illustrated in **Figure 4**.

Alternate Two Improvements

Alternate Two Improvements were developed in an effort to provide a level of service "D" or better for each movement at the intersection during the afternoon peak hour. Alternate Two Improvements include:

- Extending the northbound right turn lane on East University Drive and construction of the eastbound right turn lane on Opelika Road, as mentioned in the Alternate One Improvements;
- Constructing dual left turn lanes on westbound Opelika Road to satisfy the demand for the left turn movement;
- Construction of dual left turn lanes on southbound East University Drive to satisfy the left turn movement demand; and

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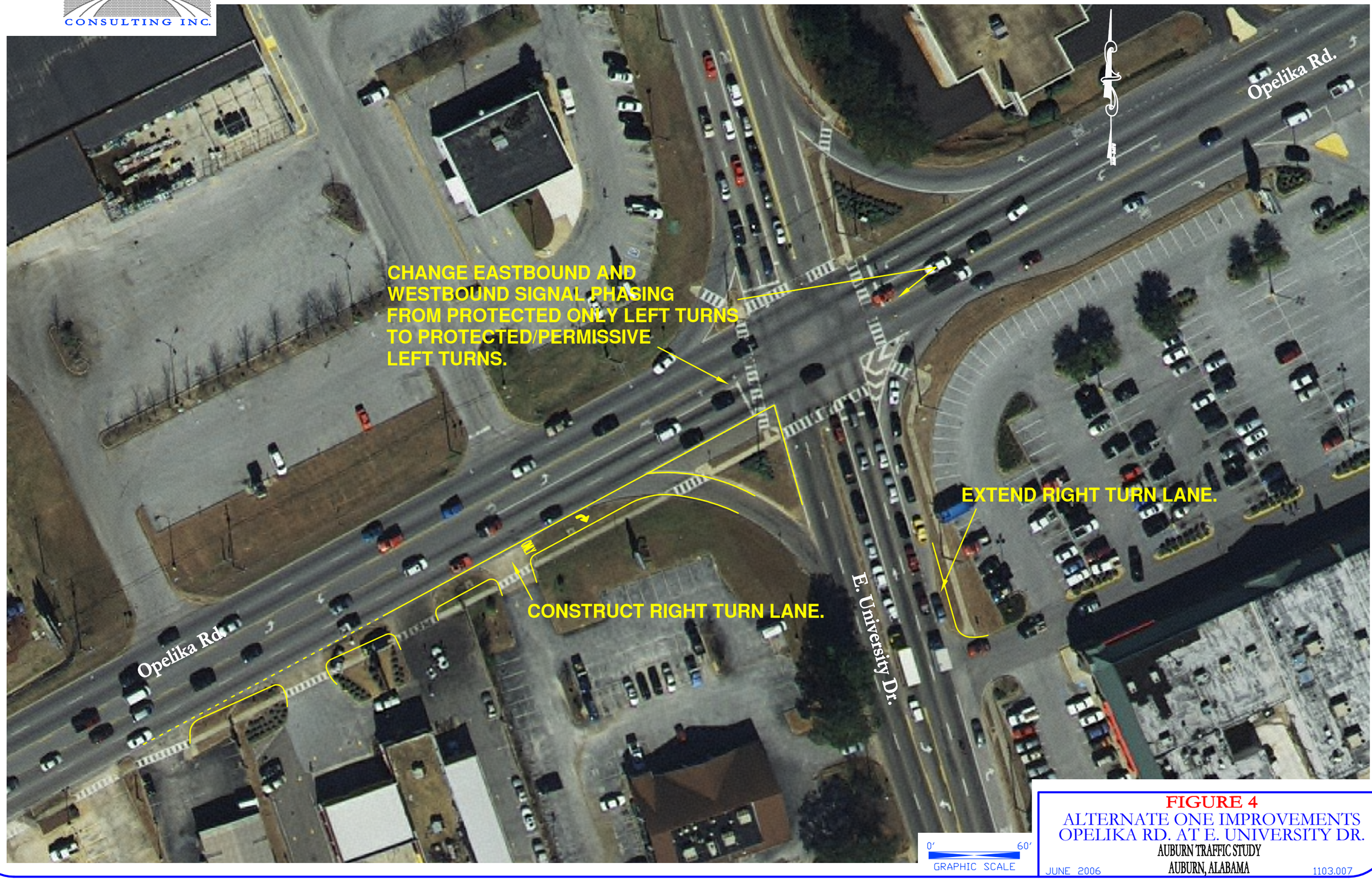

FIGURE 4

ALTERNATE ONE IMPROVEMENTS
OPELIKA RD. AT E. UNIVERSITY DR.

AUBURN TRAFFIC STUDY

AUBURN, ALABAMA

JUNE 2006

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- Construct a right turn lane on southbound East University Drive to accommodate the right turn movement and provide access to the right turn lane during peak periods.

It should be noted that with the construction of dual left turn lanes on westbound Opelika Road, protected only left turn phasing would be maintained for the westbound and eastbound left turn movements.

Alternate Two Improvements are illustrated in **Figure 5**.

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CONSTRUCT DUAL LEFT TURN LANES.

CONSTRUCT RIGHT TURN LANE.

Opelika Rd.

CONSTRUCT DUAL LEFT TURN LANES.

EXTEND RIGHT TURN LANE.

Match Line

Opelika Rd.

CONSTRUCT RIGHT TURN LANE.

E. University Dr.

Match Line

0' 60'

GRAPHIC SCALE

FIGURE 5

ALTERNATE TWO IMPROVEMENTS
OPELIKA RD. AT E. UNIVERSITY DR.

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AUBURN, ALABAMA

JUNE 2006

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Table 9 provides a summary of the levels of service that would be provided with both Alternate One Improvements and Alternate Two Improvements. As indicated previously, the overall intersection would operate at a level of service "D" or better with Alternate One Improvements in place. However, some movements would operate at a level of service "E" during the afternoon peak hour with the Alternate One Improvements in place. With the implementation of Alternate Two Improvements the overall levels of service as well as each movement would operate at a level of service "D" or better during each peak period evaluated. Capacity printouts are provided in **Appendix D**.

Table 9
Opelika Road at East University Drive
Intersection Levels of Service with Improvements

Intersection (traffic control)	Approach	Movement/ Lane Group	Level of Service			
			Alternate One Imp.		Alternate Two Imp.	
			AM Peak	PM Peak	AM Peak	PM Peak
Opelika Road at East University Drive (traffic signal)	EB Opelika Road	Left	B	C	C	D
		Through	C	D	C	D
		Right	B	C	B	B
	WB Opelika Road	Left	B	E	C	D
		Through	C	D	C	D
		Right	B	B	B	B
	NB E. University Drive	Left	C	E	C	D
		Through	C	E	C	D
		Right	B	C	B	C
	SB E. University Drive	Left	C	D	C	D
		Through	C	D	C	D
		Right			B	C
	OVERALL LOS		**C**	**D**	**C**	**D**

INTERSECTION #4: OPELIKA ROAD AT ROSS STREET

Study Roadways

Opelika Road begins at Gay Street and runs east/west to East University Drive, where it changes to Pepperell Parkway. Ross Street is a minor street extending from Opelika Road to Samford Avenue. At the intersection, all four approaches provide an exclusive left-turn lane and a through/right lane. The intersection is currently controlled by a traffic responsive signal with permissive left-turns for all approaches. **Figure 1** illustrates the location of this study intersection and its relationship to the area roadway system.

Peak Hour Traffic Counts

Morning and afternoon peak hour traffic counts were conducted for the Opelika Road/Ross Street intersection on September 26, 2005. During the afternoon peak hour (4:45-5:45 p.m.), 1,966 vehicles were recorded traveling through the intersection, while during the morning peak hour (7:15-8:15 a.m.), 1,177 vehicles were recorded. Traffic count data utilized for analysis of this intersection is summarized in **Table 10**. Complete traffic count data is provided in **Appendix A** for reference.

Table 10
Opelika Road at Ross Street
Existing Peak Hour Turning Movement Counts

Peak Hour	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Morning (7:15-8:15 a.m.)	31	52	53	88	130	21	12	297	29	58	372	34
Afternoon (4:45-5:45 p.m.)	81	197	107	91	153	17	49	512	44	75	522	118

Intersection Capacity Analysis

Capacity analyses for peak hour conditions at the intersection of Opelika Road and Ross Street were conducted for morning and afternoon peak hour periods. Results of the intersection capacity analyses for existing conditions are summarized in **Table 11**. Existing intersection capacity printouts are provided in **Appendix C** for reference.

Table 11
Opelika Road at Ross Street
Existing Intersection Levels of Service

Intersection (traffic control)	Approach	Movement/ Lane Group	Level of Service	
			AM Peak	PM Peak
Opelika Road at Ross Street (traffic signal)	EB Opelika Road	Left	B	B
		Through/Right	B	B
	WB Opelika Road	Left	B	B
		Through/Right	B	C
	NB Ross Street	Left	B	B
		Through/Right	B	B
	SB Ross Street	Left	B	B
		Through/Right	B	B
	OVERALL LOS		**B**	**B**

As shown in the **Table 11**, acceptable levels of service are currently provided for both peak hours evaluated. Overall levels of service "B" are provided for both morning and afternoon peak hours.

Intersection Crash Analysis

According to the initial crash screening of this intersection, it has approximately 0.6 crashes per million vehicles entering the intersection for 2003-2004. The City of Auburn provided crash data at this intersection for the purposes of crash pattern analysis. A review of the latest crash data provided indicates a possible pattern involving rear end crashes. Detailed intersection crash analyses and crash mitigation recommendations are included as a part of the citywide crash study for this intersection.

Right Turn Lane Assessment

A comparison of the current peak hour traffic volumes and the right turn lane criteria indicates right turn lanes should be considered for the following approaches at the Opelika Road and Ross Street intersection.

- Northbound right turn lane on Ross Street; and
- Westbound right turn lane on Opelika Road.

Recommended Improvements

The Opelika Road at Ross Street intersection presently operates with acceptable levels of service. However, improvements would be realized during the afternoon peak hour with modifications to the existing signal timings. In addition, current volumes meet the criteria for right turn lanes on northbound Ross Street and westbound Opelika Road. Recommendations are based upon results of capacity analyses and observations conducted during peak periods. The following summarizes the recommended improvements for the Opelika Road and Ross Street intersection:

- Modify signal timings to extend the eastbound and westbound green times to accommodate current traffic flows; and
- Construct a right turn lane on westbound Opelika Road and northbound Ross Street.

Figure 6 provides and illustration of the recommended improvements for the Opelika Road at Ross Street intersection.

With implementation of the recommended improvements, each movement would operate at a level of service "B" or better during each peak period. Presently, the westbound through/right turn movement operates at a level of service "C" during the afternoon peak hour. Overall, levels of service "B" would be maintained for both peak periods with implementation of the recommended improvements. **Table 12** provides a summary of levels of service with implementation of the signal timings changes and roadway improvements. Capacity printouts are provided in **Appendix D**.

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0 50
APPROX. SCALE IN FT.

FIGURE 6
OPELIKA RD. @ ROSS ST.
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Table 12
Opelika Road at Ross Street
Existing Intersection Levels of Service with Improvements

Intersection (traffic control)	Approach	Movement/ Lane Group	Level of Service	
			AM Peak	PM Peak
Opelika Road at Ross Street (traffic signal)	EB Opelika Road	Left	B	B
		Through/Right	B	B
	WB Opelika Road	Left	B	B
		Through	B	B
		Right	B	B
	NB Ross Street	Left	B	B
		Through	B	B
		Right	B	B
	SB Ross Street	Left	B	B
		Through/Right	B	B
	OVERALL LOS		**B**	**B**

INTERSECTION #5: SHELTON MILL ROAD AT EAST UNIVERSITY DRIVE

Study Roadways

Shelton Mill Road provides access from U.S. Highway 280 into the downtown area. East University Drive connects with Shug Jordan Parkway to provide a loop surrounding the Auburn area. At the intersection, all four approaches provide an exclusive left-turn lane and a through/right lane. The intersection is currently controlled by a traffic responsive signal with protected/permissive left-turns for all approaches. **Figure 1** illustrates the location of this intersection.

Peak Hour Traffic Counts

Morning and afternoon peak hour traffic counts were conducted at the Shelton Mill Road/East University Drive intersection on October 4, 2005. During the morning peak hour (7:00-8:00 a.m.), 1,946 vehicles traveled through the intersection, while during the afternoon peak hour (4:30-5:30 p.m.), 2,229 vehicles traveled through the intersection. Traffic count data utilized for analysis of this intersection is summarized in **Table 13**. Complete traffic count data is provided in **Appendix A** for reference.

Table 13
Shelton Mill Road at East University Drive
Existing Peak Hour Turning Movement Counts

Peak Hour	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Morning (7:00-8:00 a.m.)	19	62	125	105	72	133	162	635	5	89	477	62
Afternoon (4:30-5:30 p.m.)	5	64	130	87	80	95	170	603	16	135	737	107

Intersection Capacity Analysis

Capacity analyses for peak hour conditions at the intersection of Shelton Mill Road and East University Drive were conducted for morning and afternoon peak hour periods. Results of intersection capacity analyses for existing conditions are summarized in **Table 14**. Existing intersection capacity analysis printouts are provided in **Appendix C**.

Table 14
Shelton Mill Road at East University Drive
Existing Intersection Levels of Service

Intersection (traffic control)	Approach	Movement/ Lane Group	Level of Service	
			AM Peak	PM Peak
Shelton Mill Road at East University Drive (traffic signal)	EB East University Drive	Left	B	B
		Through/Right	E	C
	WB East University Drive	Left	B	B
		Through/Right	B	B
	NB Shelton Mill Road	Left	B	B
		Through/Right	C	D
	SB Shelton Mill Road	Left	C	C
		Through/Right	D	C
	OVERALL LOS		**D**	**C**

Table 14 indicates the overall intersection operates with acceptable levels of service (level of service "D" in the morning peak hour and level of service "C" in the afternoon peak hour) during each peak hour. However, the eastbound through/right turn movement operates at a level of service "E" during the morning peak hour.

Intersection Crash Analysis

According to the initial crash screening of this intersection, it has approximately 2.10 crashes per million vehicles entering the intersection for 2003-2004. The City of Auburn provided crash data at this intersection for the purposes of crash pattern analysis. After a review of the latest crash data provided, no sustainable pattern in crashes was observed to indicate contributing conditions to a crash at the intersection. Based on a physical review of the intersection as well as the crash information, it is recommended that no corrective measures would be required at this time to mitigate any crashes for the East University Drive at Shelton Mill Road intersection. It is recommended, however, that the performance of this intersection be monitored considering it experienced approximately 2.10 crashes per million vehicles entering for the 2003-2004 period.

Right Turn Lane Assessment

A comparison of the current peak hour traffic volumes and the right turn lane criteria indicates right turn lanes should be considered for the following approaches at the Shelton Mill Road and East University Drive intersection.

- Westbound right turn lane on East University Drive.

Recommended Improvements

To address current level of service deficiencies, improvements are recommended at the Shelton Mill Road and East University Drive intersection. These improvements consist of modifications to existing signal timings to accommodate peak directional traffic flows for both the morning peak hour and the afternoon peak hour. In addition, current volumes meet the criteria for a right turn lane on westbound East University Drive. Recommended improvements are illustrated in **Figure 7**.

With implementation of signal timing modifications and the westbound right turn lane on East University Drive, each movement would operate at a level of service "D" or better during each peak period evaluated. Overall, the intersection would operate at a level of service "C" during both the morning and afternoon peak hour. **Table 15** summarizes levels of service with implementation of improvements. Capacity printouts are provided in **Appendix D**.

Table 15
Shelton Mill Road at East University Drive
Intersection Levels of Service with Recommended Improvements

Intersection (traffic control)	Approach	Movement/ Lane Group	Level of Service	
			AM Peak	PM Peak
Shelton Mill Road at East University Drive (traffic signal)	EB East University Drive	Left	A	B
		Through/Right	D	C
	WB East University Drive	Left	C	B
		Through	C	B
		Right	B	A
	NB Shelton Mill Road	Left	C	B
		Through/Right	C	C
	SB Shelton Mill Road	Left	C	B
		Through/Right	D	C
	OVERALL LOS		**C**	**C**

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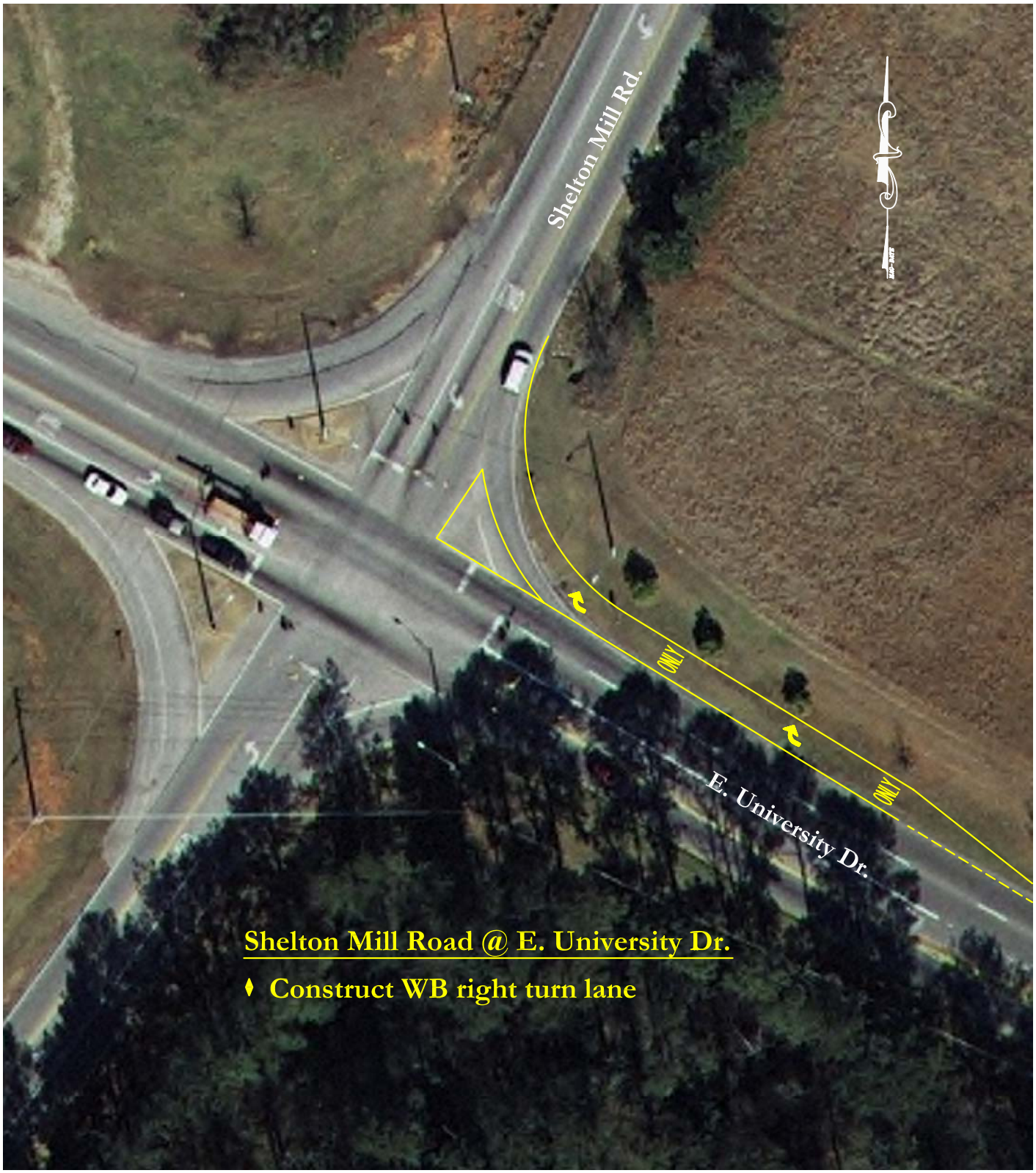

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FIGURE 7
SHELTON MILL RD. @ E. UNIVERSITY DR.
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