Section 3C:

Dean Road Corridor

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INTRODUCTION

This section documents the results of traffic operations evaluations for the Dean Road Corridor from E. E. University Drive (South) to E. University Drive (North) Road in Auburn, Alabama. The intersections analyzed in this corridor include:

- Dean Road at E. University Drive (South)
- Dean Road at Moores Mill Road
- Dean Road at Samford Avenue
- Dean Road at Thach Avenue
- Dean Road at Glenn Avenue
- Dean Road at Harper Avenue
- Dean Road at Annalue Drive
- Dean Road at Stage Road
- Dean Road at Opelika Road
- Dean Road at E. University Drive (North)

The locations of the study intersections along the Dean Road Corridor are illustrated in **Figure 1**. In order to accomplish the traffic operations evaluations for the Dean Road 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;
- existing capacity analyses were conducted for the study intersections;
- segment capacity analyses were conducted for Dean Road;
- current traffic operational deficiencies were identified;
- projections for ten (10) year growth in traffic through the corridor were developed;
- geometric and traffic control improvements were developed for the study intersections to address traffic operational and safety deficiencies for existing and projected ten (10) year conditions.

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.

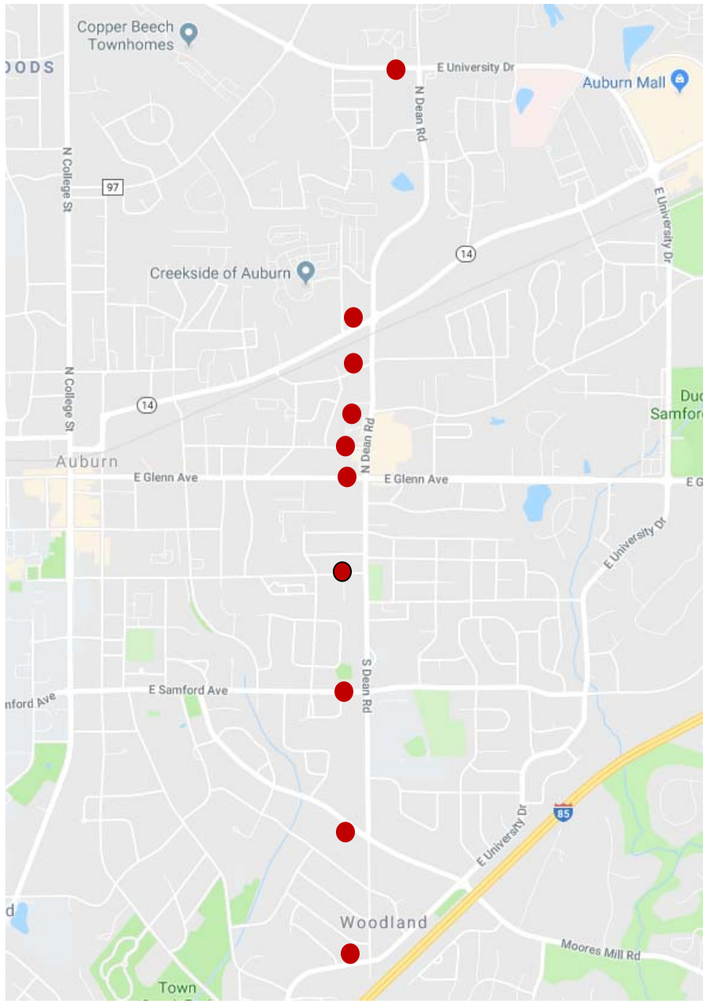

Figure 1—Dean Road Corridor and Study Intersections

BACKGROUND INFORMATION

Study Area Roadways

Dean Road is a major collector roadway from E. University Drive (South) to E. University Drive (North). With a north-south orientation, Dean Road operates as a connector route between several minor arterials on the eastern side of Auburn. It intersects with multiple residential streets for the southern and central segments and serves a combination of commercial retail, business and residential for its northern segments.

The Dean Road study corridor is approximately 3.0 miles in length. General characteristics of the roadway segments within the corridor are summarized in **Table 1**.

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 Dean Road Corridor at study intersections in years 2016 or 2018. Traffic count data utilized for the analyses of these intersections is summarized in **Figure 2.**

Table 1 - Corridor Roadway Characteristics

Roadway	Bicycle Lanes	# of Thru Lanes	Travel Direction	Posted Speed Limit (MPH)	Classification
Dean Road (E. University Dr. to Moores Mill Rd.)	Yes	2	North/South	35	Minor Collector
Dean Road (Moores Mill Rd. to East Samford Ave.)	No	4	North/South	35	Minor Collector
Dean Road (East Samford Ave. to East Thach Ave.)	No	4	North/South	35	Minor Collector
Dean Road (East Thach to East Glenn Ave.)	No	4	North/South	35	Minor Collector
Dean Road (East Glenn Ave. to Harper Ave.)	No	4 (plus TWLTL)	North/South	35	Minor Collector
Dean Road (Harper Ave. to Annalue Dr.)	No	4	North/South	35	Minor Collector
Dean Road (Annalue Dr. to Stage Rd.)	No	4	North/South	35	Minor Collector
Dean Road (Stage Rd. to Opelika Rd.)	No	4	North/South	35	Minor Collector
Dean Road (Opelika Rd. to E. University Dr.)	No	2 (plus TWLT)	North/South	35	Minor Collector

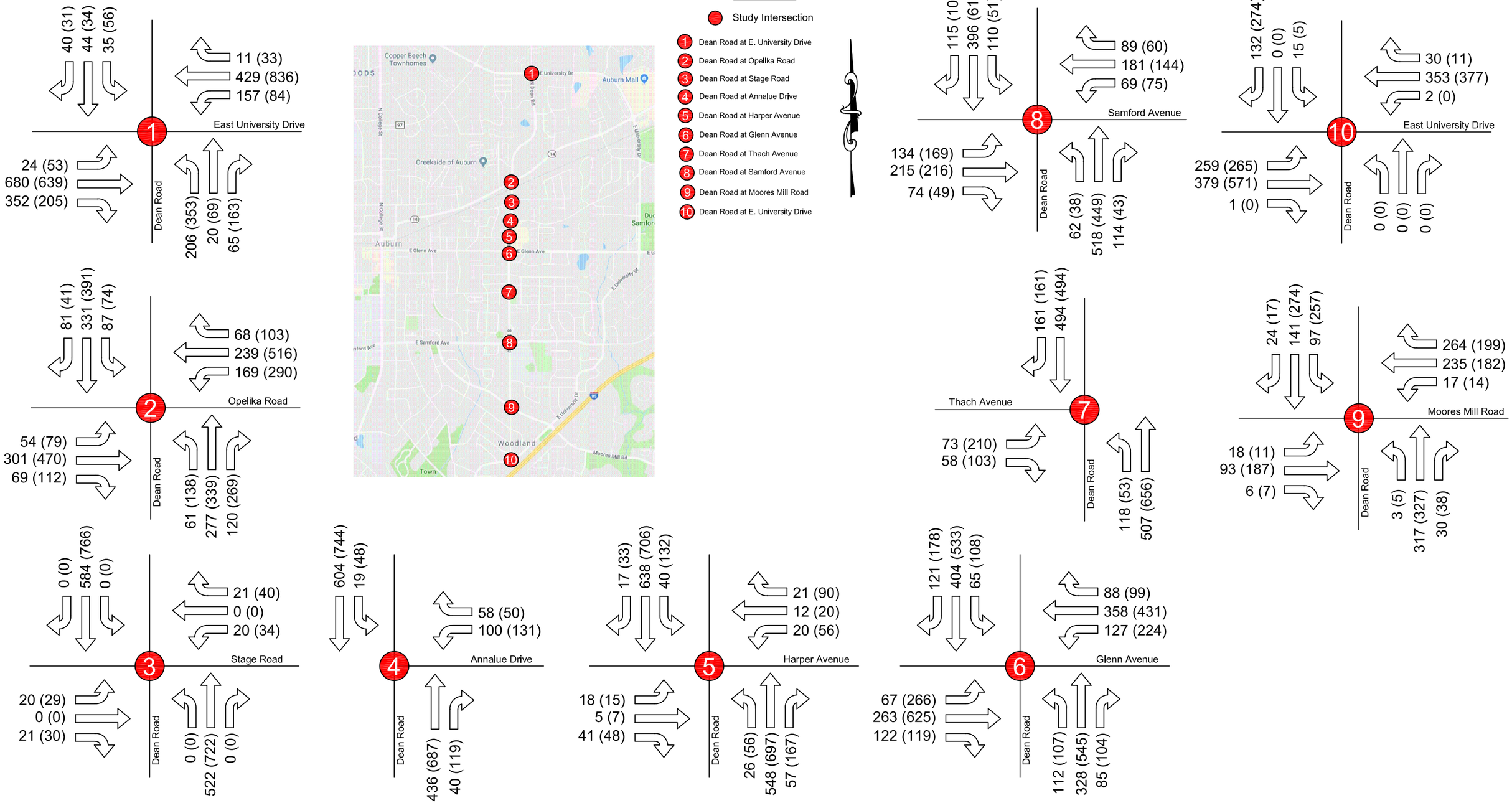

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Figure 2 - Existing Traffic Volumes
Dean Road Corridor
Auburn, Alabama

LEGEND

AM(PM) Peak Hour Volumes

X Study Intersection

Scale: Not to Scale
Date: SPRING 2018

Peak Period Observations and General Traffic Operations

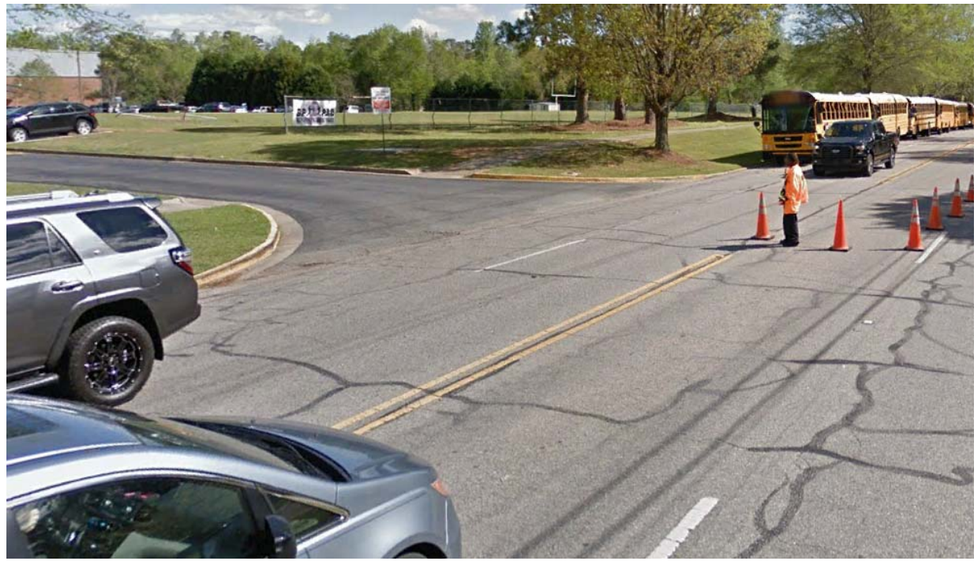
Peak period observations were conducted throughout the corridor to develop an understanding for recurring delay or queueing which adversely affects operations or safety at the intersections or along corridor segments. Key observations in terms of traffic operations and/or safety during peak and non-peak times are outlined in the following items:

Dean Road at Moores Mill Road – The intersection operates with one through lane for both the northbound and southbound approaches; effectively creating a two-lane roadway type operation for the corridor segment in terms of capacity.

Dean Road Segment from Moores Mill Road to Samford Avenue - This segment operates as a 4-lane undivided roadway. Left turning traffic must use the inside through lane to initiate the maneuver often obstructing through traffic as the left turning vehicles wait for an acceptable gap between opposing through traffic. Rear-end crashes or unexpected vehicle lane changes can result.

The junior high school traffic plan designates the southbound through lane for operation to facilitate left turning maneuvers into and out of the high school driveway for two hours each weekday corresponding to the morning start and afternoon dismissal times as shown in the following photographs. This effectively changes the operation from a four-lane undivided roadway to a two-lane divided roadway for the corridor segment for periods of time in the morning and afternoon.

Junior High School Traffic Plan Designates Inside Southbound Lane for Lefts Turns Only



Junior High School Dismissal Traffic Plan with Traffic Cones for Makeshift Turn Lane Operations

Dean Road Segment from Samford Avenue to Thach Avenue - This segment operates as a 4-lane undivided roadway. Left turning traffic must use the inside through lane to initiate the maneuver often obstructing through traffic as the left turning vehicles wait for an acceptable gap between opposing through traffic. rear-end crashes or unexpected vehicle lane changes can result.

Dean Road Elementary School traffic plan utilizes the northbound through lane as storage for queued traffic related to parent pickup for the afternoon school dismissal. This effectively changes the operation from a four-lane undivided roadway to having only one lane for northbound through traffic for the corridor segment for a period of time in the afternoon.

Dean Road Elementary School Afternoon Pickup Time Traffic Queueing

EXISTING CONDITIONS ANALYSES

Existing Intersection Capacity Analysis

Capacity analyses for peak hour conditions at the study intersections along the Dean Road Corridor were conducted for the morning 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 2**. As shown throughout **Table 2**, all study intersections evaluated along the Dean Road Corridor operate at acceptable levels of service for both peak periods tested.

Table 2 – Existing Intersection Levels of Service

Intersection (Traffic Control)	Approach	Movement/Lane Group	Level of Service	
			A.M. PEAK	P.M. PEAK
Dean Road at E. University Dr.-South (Unsignalized)	Dean Road NB	Left/Thru/Right	A	A
	Dean Road SB	Left	C	D
		Through/Right	B	C
	E. University Drive EB	Left	A	A
		Through/Right	A	A
	E. University Drive WB	Left	A	A
		Through/Right	A	A
	Overall LOS		**A**	**A**
Dean Road at Moores Mill Rd. (traffic signal)	Dean Road NB	Left	A	A
		Through	B	C
		Right	A	A
	Dean Road SB	Left	A	B
		Through	B	B
		Right	A	A
	Moores Mill Road EB	Left	B	B
		Through/Right	B	B
	Moores Mill Road WB	Left	B	B
		Through	B	B
		Right	A	A
	Overall LOS		**B**	**B**
Dean Road at Samford Ave. (traffic signal)	Dean Road NB	Left	B	B
		Through/Right	C	C
	Dean Road SB	Left	B	B
		Through/Right	C	C
	Samford Avenue EB	Left	B	B
		Through/Right	C	C
	Samford Avenue WB	Left	B	B
		Through	C	C
		Right	A	A
	Overall LOS		**C**	**C**
Dean Road at Thach Ave. (traffic signal)	Dean Road NB	Left/Through	A	B
	Dean Road SB	Through	A	A
		Right	A	A
	Thach Avenue EB	Left	B	B
		Right	A	A
	Overall LOS		**A**	**A**
Dean Road at Glenn Ave. (traffic signal)	Dean Road NB	Left	B	C
		Through/Right	C	D
	Dean Road SB	Left	B	C
		Through/Right	C	D
	Glenn Avenue EB	Left	B	C
		Through/Right	C	D
	Glenn Avenue WB	Left	B	D
		Through/Right	C	D
	Overall LOS		**C**	**D**

Table 2 (Cont't) – Existing Intersection Levels of Service

Intersection (traffic control)	Approach	Movement/Lane Group	Level of Service	
			A.M. Peak	P.M. Peak
Dean Road at Harper Ave. (Unsignalized)	Dean Road NB	Left	A	A
		Through/Right	A	A
	Dean Road SB	Left	A	B
		Through/Right	A	A
	Harper Avenue EB	Left	C	D
		Through/Right	B	B
	Harper Avenue WB	Left	C	D
		Through/Right	B	B
	Overall LOS		A	A
Dean Road at Annalue Dr. (traffic signal)	Dean Road NB	Through/Right	A	A
	Dean Road SB	Left/Through	A	A
	Annalue Drive WB	Left	B	B
		Right	A	A
	Overall LOS		A	A
Dean Road at Stage Rd. (Unsignalized)	Dean Road NB	Left/Through/Right	A	A
	Dean Road SB	Left/Through/Right	A	A
	Stage Road EB	Left/Through/Right	B	C
	Stage Road WB	Left/Through/Right	B	C
	Overall LOS		A	A
Dean Road at Opelika Rd. (traffic signal)	Dean Road NB	Left	B	C
		Through	C	C
		Right	A	A
	Dean Road SB	Left	B	B
		Through	C	D
		Right	A	A
	Opelika Road EB	Left	C	C
		Through	C	D
		Right	A	A
	Opelika Road WB	Left	C	D
		Through	C	C
		Right	A	A
	Overall LOS		C	C
Dean Road at E. University Dr.-North (traffic signal)	Dean Road NB	Left	C	C
		Through	C	C
		Right	A	A
	Dean Road SB	Left	C	C
		Through/Right	D	C
	E. University Drive EB	Left	B	B
		Through	C	C
		Right	A	A
	E. University Drive WB	Left	B	B
		Through	B	C
		Right	A	A
	Overall LOS		**B**	**C**

Existing Roadway Segment Capacity Analysis

Segment capacity analyses for daily and also for peak hour conditions along the Dean Road Corridor were conducted for the morning and afternoon peak hour periods using methods outlined in the *Highway Capacity Manual, 2010*. To develop levels of service based upon the Daily Capacity as shown in **Table 3** and compared to Level of Service Chart, included in **Table 4**, two-way capacity was divided in half to develop one-way capacity for the segment. Each segment was verified to have an existing daily flow rate ranging in volumes thresholds between LOS C and LOS D or better.

Table 3 – Existing Roadway Daily Segment Levels of Service

Segment Description	Two-Way Daily Volume	Travel Direction	Directional Daily Volume	Number of Lanes	Roadway LOS by Segment
South of Drew Ln. 2-Lane (Divided)	10,346	Northbound	5,310	1	C
		Southbound	5,036	1	B
North of Annalue Dr. 4-Lane (Undivided)	16,180	Northbound	8,597	2	D
		Southbound	7,583	2	C
South of Harper Dr. 4-Lane (Divided)	19,192	Northbound	10,334	2	D
		Southbound	8,858	2	D
South of Park Ave. 4-Lane (Undivided)	12,648	Northbound	6,476	2	B
		Southbound	6,172	2	B
North of EUD (S.) 2-Lane (Undivided)	7,000	Northbound	3,500	1	B
		Southbound	3,500	1	B

Table 4 – 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

Levels of service (Peak Hour) for the segment analyses conducted for Dean Road are summarized in **Table 5**.

Table 5 - Existing Segment Levels of Service

Northbound Dean Road Segment LOS Analysis				
From	To	Segment Length	Arterial LOS by Segment	
			AM Peak	PM Peak
East University Dr	Moores Mill Rd	0.41	B	C
Moores Mill Rd	East Samford Ave	1.3	D	D
East Samford Ave	East Thach Ave	0.39	A	A
East Thach Ave	East Glenn Ave	0.31	A	A
East Glenn Ave	Harper Ave	0.1	A	B
Harper Ave	Annalue Dr	0.12	A	A
Annalue Dr	Stage Rd	0.16	A	A
Stage Rd	Opelika Rd	0.15	A	A
Opelika Rd	East University Dr	0.9	C	D
Southbound Dean Road Segment LOS Analysis				
From	To	Segment Length	Arterial LOS by Segment	
			AM Peak	PM Peak
East University Dr	Moores Mill Rd	0.41	B	C
Moores Mill Rd	East Samford Ave	1.3	D	D
East Samford Ave	East Thach Ave	0.39	A	A
East Thach Ave	East Glenn Ave	0.31	A	A
East Glenn Ave	Harper Ave	0.1	A	A
Harper Ave	Annalue Dr	0.12	A	A
Annalue Dr	Stage Rd	0.16	A	A
Stage Rd	Opelika Rd	0.15	A	A
Opelika Rd	East University Dr	0.9	C	D

Table 5 indicates the overall segments level of service along Dean Road is a level of service "C", "D" or better for each direction of travel during both the morning and afternoon peak hours.

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. A review of existing right turn volumes for intersections throughout the corridor were assessed along with considering the feasibility, constructability, and required traffic operations. The locations considered and shown below along with site specific details and characteristics.

Dean Road at Harper Avenue Right Turn Lane(s)

Northbound Dean Road at Harper Avenue/Commercial Driveway - A northbound right-turn lane warrant evaluation was conducted for traffic entering the commercial driveway which is opposite Harper Avenue. The afternoon existing peak hour traffic volumes are sufficient to meet the criteria for a northbound right-turn lane.

Dean Road at Glenn Avenue Right Turn Lanes(s)

Right-turn lane warrant evaluations were conducted for the intersection for each of the following approaches:

- Southbound Dean Road at Glenn Avenue – The afternoon existing peak hour traffic volumes are sufficient to meet the criteria for a southbound right-turn lane. It should be noted that existing large high voltage utility poles are prohibitive for installing right turn lanes.

- Northbound Dean Road at Glenn Avenue – The morning and afternoon existing peak hour traffic volumes are not sufficient to meet the criteria for a northbound right-turn lane. It should be noted that existing large high voltage utility poles are prohibitive for installing right turn lanes.

- Eastbound Glenn Avenue at Dean Road - During the afternoon peak hour, existing peak hour traffic volumes are sufficient to meet the criteria for a right-turn lane. However, rather than installing right turn lanes, preference is given for utilizing R-O-W for widening for dual left turn lanes on Glenn Ave.

- Westbound Glenn Avenue at Dean Road – During the afternoon peak hour, existing peak hour traffic volumes are sufficient to meet the criteria for a right-turn lane. However, rather than installing right turn lane, preference is given for utilizing R-O-W for widening for dual left turn lanes on Glenn Ave.

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. A summary of the findings for the Dean Road Corridor is included in the paragraphs below along with recommendations:

Dean Road at Glenn Avenue

The citywide crash study noted the intersection of Dean Road at Glenn Avenue as a "High" priority in terms of addressing crash occurrence. The primary trends noted for the intersection include rear-end crashes for both Glenn Avenue directions approaching the intersection with Dean Road. Additionally, left turning traffic on Glenn Avenue for both approach directions are experiencing a trend for left turn opposing angle crashes when turning onto Dean Road. The traffic signal operation for this intersection currently uses a 5-section signal head with permitted-protected indications for left turning traffic. The implementation of a Flashing Yellow Arrow (FYA) indication to facilitate left turning traffic should be considered for the intersection as an immediate crash mitigation measure.

Dean Road at Opelika Road

The primary trends noted for the intersection include rear-end crashes for the eastbound and westbound approaches. A notable trend for the intersection includes rear-end crashes for northbound right turning vehicles. This is likely attributable to the right turn yielding operation in combination with the available acceleration lane. Modification of the right turn at a smaller approach angle to the crossing street addresses this.

Travel Time

GPS-based travel time runs were performed on Dean Road between EUD (South) and EUD (North). The roadway segment is approximately 3 miles in length. Travel time runs were performed during the AM, Midday, and PM peak periods of traffic flow in late March 2018. The results of the travel time runs are shown in **Table 6.**

Table 6 – Travel Time Runs

AM Peak				Midday Peak				PM Peak			
Start Time	Dir.	Elapsed Time	Avg. Speed (mph)	Start Time	Dir.	Elapsed Time	Avg. Speed (mph)	Start Time	Dir.	Elapsed Time	Avg. Speed (mph)
7:01	SB	6:04	31.0	11:01	SB	5:58	30.7	4:15	SB	6:54	26.7
7:24	NB	6:45	27.7	11:20	NB	6:27	28.9	4:30	NB	6:44	27.6
7:30	SB	6:33	28.7	11:31	SB	8:10	28.5	4:47	SB	5:37	33.2
7:37	NB	7:12	26.0	11:45	NB	7:11	28.9	5:02	NB	6:45	27.6
7:45	SB	8:01	23.1	11:58	SB	6:48	27.2	5:24	SB	7:00	27.0
7:56	NB	7:07	26.2	12:10	NB	8:10	27.5	5:37	NB	6:38	27.8
8:10	SB	7:15	25.8	12:22	SB	7:34	26.7	5:50	SB	7:08	25.9
8:20	NB	7:30	24.8	12:35	NB	7:03	26.1	6:06	NB	7:04	26.0
8:34	SB	6:15	33.0	12:45	SB	6:27	28.5	6:16	SB	8:23	22.1
8:50	NB	5:55	31.1	12:59	NB	6:20	29.4	6:31	NB	7:14	25.8
9:05	SB	6:47	29.4	1:10	SB	6:45	27.3	6:44	SB	5:42	34.8
9:24	NB	6:50	27.1	1:30	NB	7:36	24.5	6:57	NB	6:24	28.8

Existing Intersection Capacity Analysis with Improvements

The Dean Road corridor has been identified as a favorable candidate for a road diet in particular sections. Several of the corridor intersections already operate in a manner supporting a road diet. With this in mind, the determination for successfully implementing a road diet is primarily dependent on future traffic growth as addressed in the next report sections. Secondarily, chosen intersection improvements should complement the operational needs of the road diet in the long term with the necessary supporting operational improvements to various intersections. Therefore, it should be assumed a successful operation for a road diet using projected traffic volumes and associated improvements equates to successful operations and desirable LOS for the corridor for the existing conditions; hence detailed LOS analysis of the road diet with existing traffic volumes is not addressed further.

PROJECTED TRAFFIC GROWTH

Growth rates were calculated for the study roadways based on historical traffic volumes and growth trends. The historical growth rate calculated of Dean Road varies between 0.9% to 2.6% per year for different corridor segments. The annual growth rate by applicable segment was applied for a ten (10) year period to determine the projected future traffic volumes for the corridor. Projected future traffic volumes for the Dean Road corridor are shown in **Figure 3**.

Analyses were conducted utilizing projected peak hour traffic volumes for the study area roadways and intersections to assess traffic operations within the corridor. Capacity deficiencies were identified for projected conditions to aid in development of potential roadway and traffic control improvements within the corridor to address capacity and traffic operations.

Right-Turn Lane Warrant Evaluations with Projected Volumes

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.

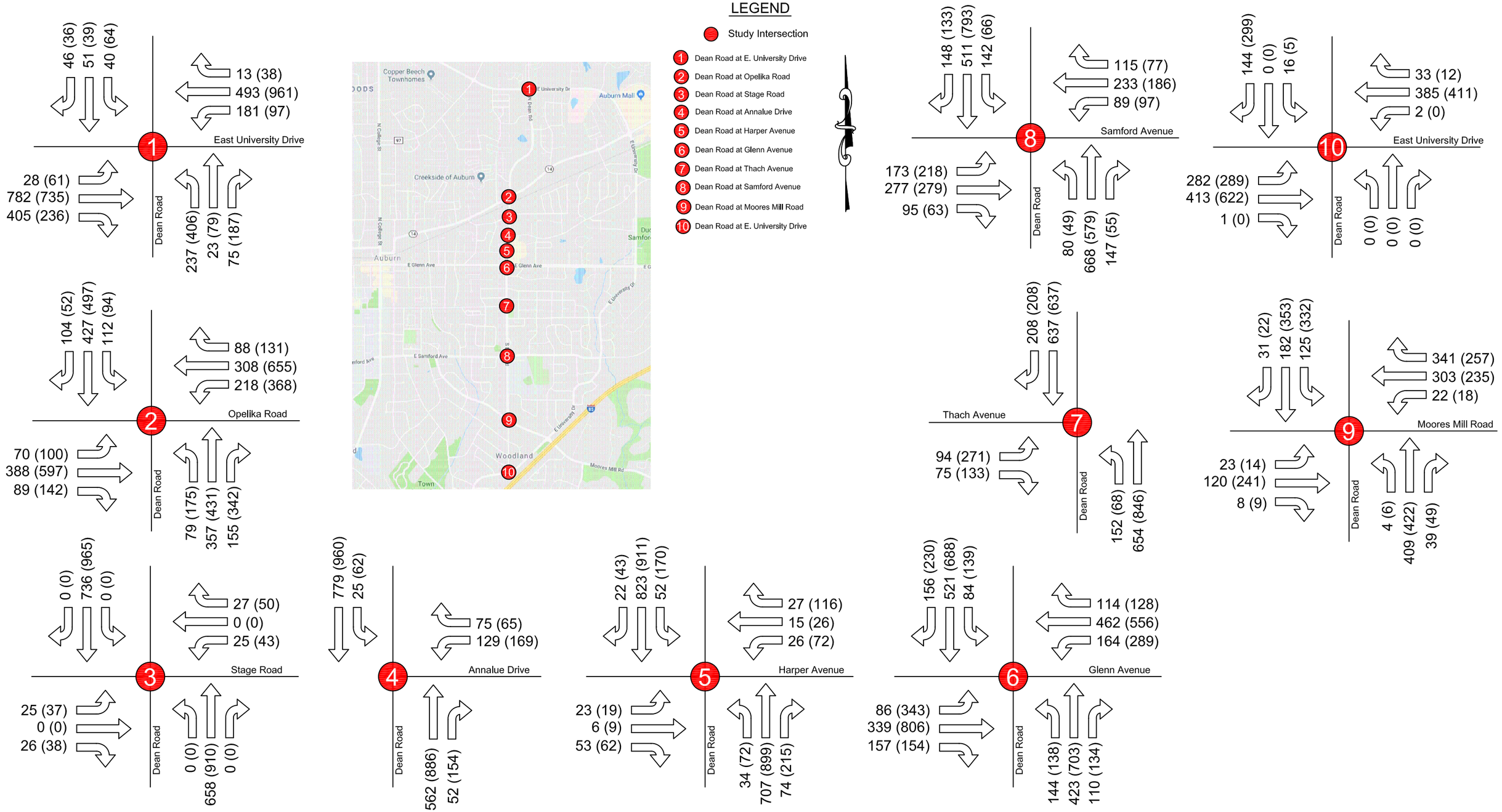
<u>Dean Road at Harper Avenue Right Turn Lane(s)</u>

Northbound Dean Road at Harper Avenue/Commercial Driveway - A northbound right-turn lane warrant evaluation was conducted for traffic entering the commercial driveway which is opposite Harper Avenue. The afternoon forecasted peak hour traffic volumes are sufficient to meet the criteria for a northbound right-turn lane.

<u>Dean Road at Glenn Avenue Right Turn Lanes(s)</u>

Right-turn lane warrant evaluations were conducted for the intersection for each of the following approaches:

- Southbound Dean Road at Glenn Avenue – The morning and afternoon projected peak hour traffic volumes are sufficient to meet the criteria for a southbound right-turn lane. However, existing large high voltage utility poles are prohibitive for installing right turn lanes.
- Northbound Dean Road at Glenn Avenue – During the afternoon peak hour, projected peak hour traffic volumes are sufficient to meet the criteria for a length right-turn lane. However, existing large high voltage utility poles are prohibitive for installing right turn lanes.
- Eastbound Glenn Avenue at Dean Road – During the afternoon peak hour, projected peak hour traffic volumes are sufficient to meet the criteria for a length right-turn lane. However, rather than installing right turn lanes, preference is given for utilizing R-O-W for widening for dual left turn lanes on Glenn Ave.
- Westbound Glenn Avenue at Dean Road – During the afternoon peak hour, projected peak hour traffic volumes are sufficient to meet the criteria for a right-turn lane. However, rather than installing right turn lanes, preference is given for utilizing R-O-W for widening for dual left turn lanes on Glenn Ave.



SKIPPER CONSULTING INC

Figure 3 - Future Traffic Volumes
Dean Road Corridor
Auburn, Alabama

LEGEND

AM(PM) Peak Hour Volumes

X Study Intersection

Scale: Not to Scale
Date: YEAR 2028

RECOMMENDED IMPROVEMENTS

Based upon the analyses and evaluations conducted for the Dean Road Corridor for existing and projected ten (10) year conditions, recommendations are made to help improve traffic operations along the corridor at study intersections and to address any capacity or safety deficiencies identified. The following outlines the recommended improvements for the Dean Road Corridor that may be classified as either short term or long term improvements in terms of funding needs. However, the corridor would benefit in terms of traffic operations and safety with as many of these improvements implemented as soon as feasible.

Dean Road Signal System

It is recommended that a coordinated traffic signal system be implemented on Dean Road from Moores Mill Road to Opelika Road. As part of the traffic signal system implementation, adjustment to the signal head indications for the intersection of Dean Road at Glenn Avenue for the installation of Flashing Yellow Arrows (FYA) on both approaches to Dean Road from Glenn Avenue for the safety benefit for mitigating angle crashes. This should remain in place until such time as dual left turns can be constructed for the Glenn Avenue approaches to the intersections as discussed in the following report sections.

Dual Left Turn Lanes Operation for Specific Intersections

A typical Rule-of-Thumb for considering dual left turn lanes type operations are left turning volumes during the peak hour approaching or surpassing 300 vehicles per hour. To implement this improvement, the affected movement should have the correct number of downstream travel lanes to receive the dual left turning traffic. The following intersections should be considered for improvements with dual left turn lane operations:

- Dean Road (NB Approach Dual Left Turn Lanes) at E. University Drive (North) – The NB left turn movement already experiences an existing traffic volume of 353 left turns in the PM Peak Hour. The projected 10-year growth for the intersection NB approach left turning movement is expected to need to service 406 left turning vehicles.
- Glenn Avenue Approaching Dean Road – High left turn volumes existing and projected approaching or surpassing the typical dual left turn lane volume threshold were noted turning onto Dean Road from Glenn Avenue.
- Dean Road (NB Approach Dual Left Turn lanes) at Opelika Road – Short storage length for existing northbound left turn lane (160 feet of storage) results in traffic queuing beyond the nearby railroad crossing. Installation of dual northbound left turn lanes shortens vehicle queueing to acceptable levels of 75 feet from the stop line.

Road Diet for Segments to Operate as 3-Lane Cross-section for Complete Corridor

Multiple segments of Dean Road currently operate as an undivided 4-lane roadway without left turn lanes. These segments are recommended for a Road Diet which is an effective low-cost conversion of an existing 4-lane undivided roadway to a 3-lane cross-section operating as two though lanes with a two-way left-turn lane. A Road Diet offers improved safety, mobility, and better access for the various transportation modes with bicycle users benefiting most from the ability to provide dedicated bicycle lanes as part of the changes to roadway laneage. The corridor with a 3-lane cross-sections in segments where feasible is shown as **Figures 4A** through **4L**.

Segment and Intersection Modifications

As part of implementing a 3-lane cross-section for a majority of the Dean Road corridor and to address existing laneage deficiencies at intersections the following items outline the required corridor operational characteristics:

Dean Road Segment (E. University Drive (South) to Moores Mill Road) – Maintain 2-lane cross section with bicycle lanes, but with adjusted widths and added buffer area. The cross-section includes 2 – 12 feet travel lanes and 3 feet buffer areas to separate the vehicle travel lanes from 6 feet bicycle lanes.

Dean Road at Moores Mill Road – A dedicated left lane, a dedicated though lane, and a dedicated right lane for the southbound approach transitioning from the 3-lane cross-section. The other three approaches will continue with the current operation.

Dean Road Segment (Moores Mill Road to Samford Avenue) – Restripe the segment as a 3-lane cross-section with bicycle lanes. The cross-section includes 3 – 11 feet travel lanes and 5 feet bicycle lanes.

Dean Road at Samford Avenue - A dedicated left lane, a dedicated though lane, and a dedicated right lane for all four approaches to the intersection is required. This improvement will require modification to the traffic signal for proper alignment with the new laneage.

Dean Road Segment (Samford Avenue to Thach Avenue) - Restripe the segment as a 3-lane cross-section with bicycle lanes. The cross-section includes 3 – 11 feet travel lanes and 5 feet bicycle lanes.

Dean Road at Thach Avenue – Restripe the intersection to incorporate the 3-lane cross-section on both the north and south sides of the intersection. This improvement will require modification to the traffic signal for proper alignment with the new laneage. North of Thach Avenue, the 3-lane cross-section with bicycle lanes will transition into the existing 4-lane roadway approach laneage for the intersection of Dean Road at Glenn Avenue approximately 600 feet prior to the Glenn Avenue intersection.

Dean Road at Glenn Avenue - The level of service analysis for this intersection assumes dual left turn lanes, both eastbound and westbound are constructed as part of the Glenn Ave corridor improvements since the left turn volumes are approaching or already surpassing the typical volume thresholds for constructing and implementing dual left turn lane intersection operations.

Dean Road Segment (Glenn Avenue to Annalue Drive) – Maintain 5 – lane cross-section

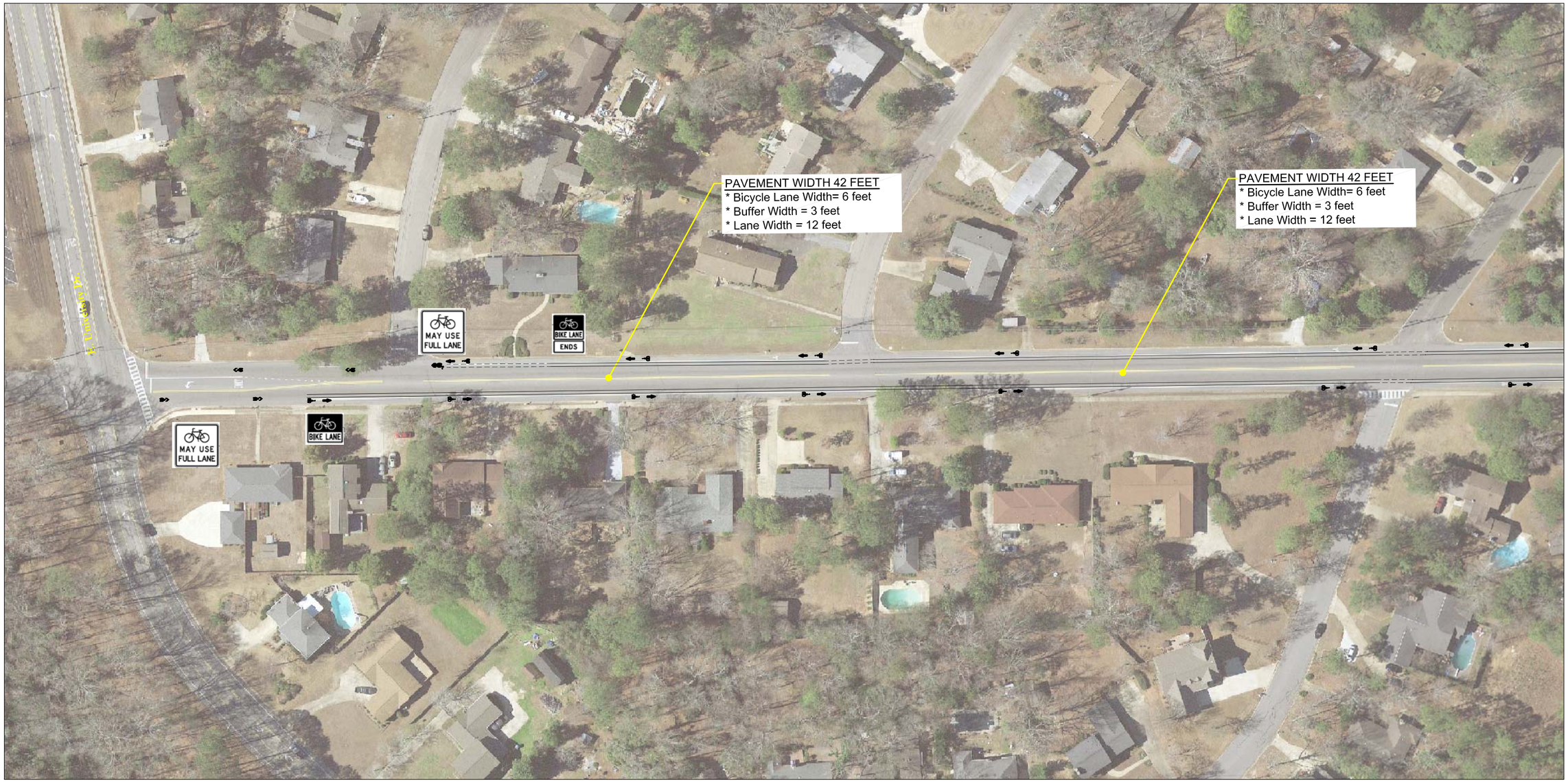
Dean Road Segment (200 Feet N. of Annalue Drive to the Railroad Crossing) – Restripe the segment as a 3-lane cross-section with bicycle lanes. This improvement will require modification to the traffic signal operations for the Annalue Drive intersection; primarily for the southbound approach.

Dean Road at Opelika Road - The level of service analysis for this intersection assumes dual left lanes for the northbound approach are to be installed to address traffic queuing back across the railroad crossing.

Dean Road Segment (Opelika Road to E. University (North) – Maintain existing 3 – lane cross-section.

Dean Road at E. University Road - The level of service analysis for this intersection assumes reassigning the laneage for the northbound approach as a left, a shared left-thru, and a right turn lane. This improvement will require modification to the traffic signal operations as “split -phasing” for the northbound and southbound approaches.

Dean Road (3-Lane Cross-section with Bicycle Lanes) at East University Drive South



SKIPPER CONSULTING INC

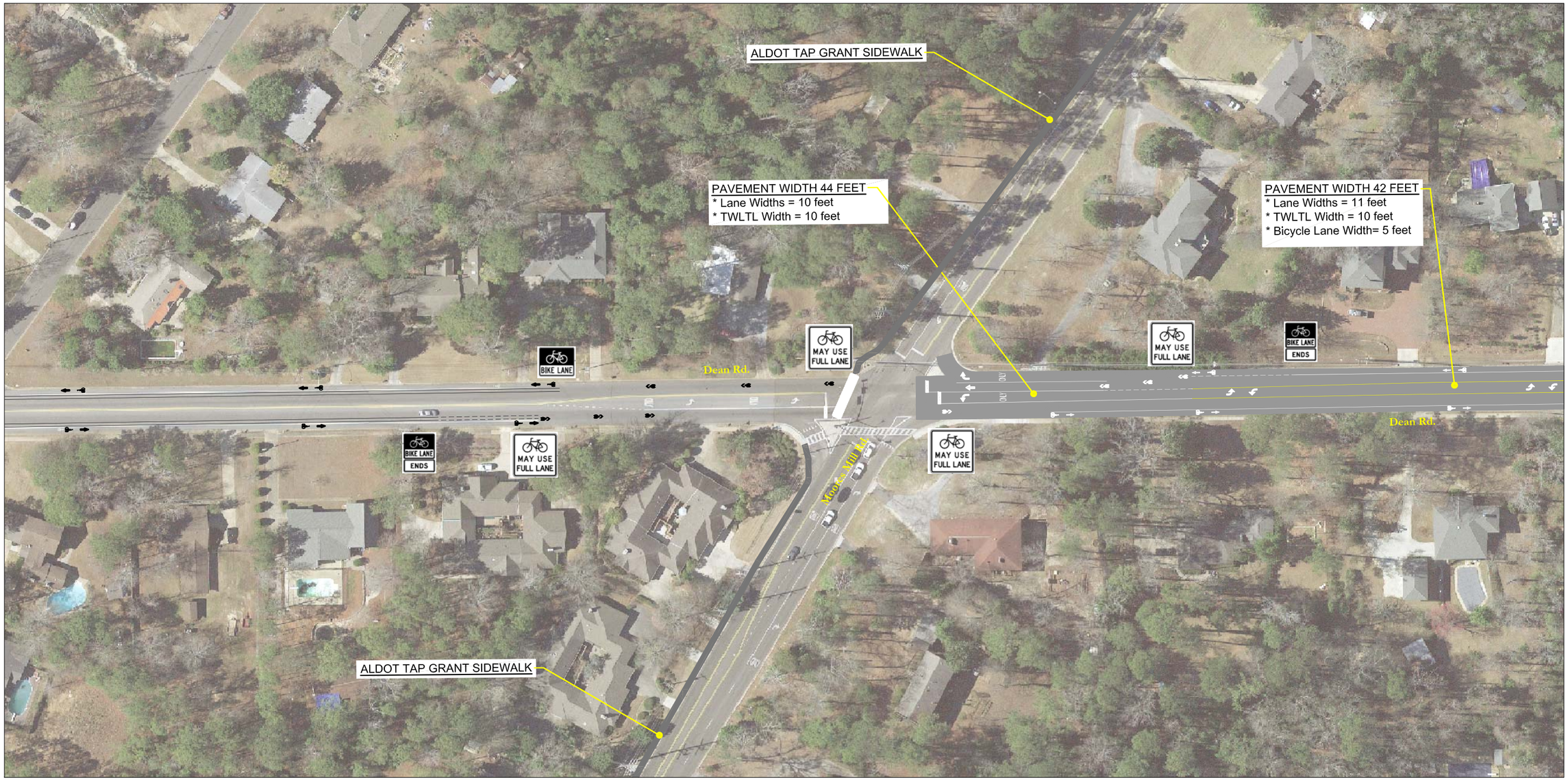
North

Graphic Scale: 1"-100'

January 2019

Figure 4A
Dean Road at
East University Drive
Dean Road
Auburn, Alabama

Dean Road (3-Lane Cross-section with Bicycle Lanes) at Moores Mill Road



SKIPPER CONSULTING INC

North

Graphic Scale: 1"-100'

January 2019

Figure 4B
Dean Road at
Moores Mill Road
Dean Road
Auburn, Alabama

Dean Road (3-Lane Cross-section with Bicycle Lanes) Near Junior High School

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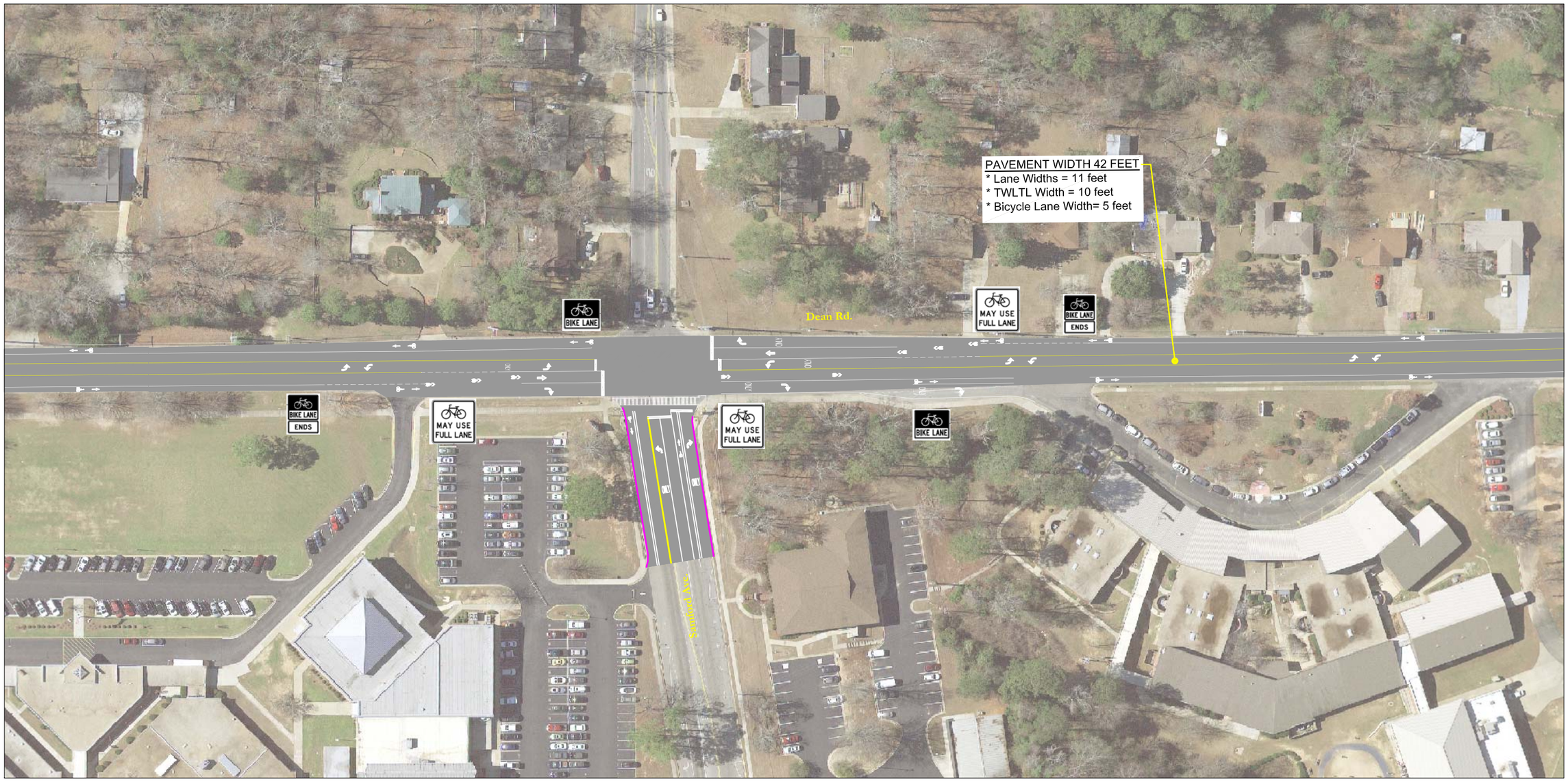
North

Graphic Scale: 1"-100'

Figure 4C
Dean Road
Near AJHS School
Dean Road
Auburn, Alabama

January 2019

Dean Road (3-Lane Cross-section with Bicycle Lanes) at Samford Avenue



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North

Graphic Scale: 1"-100'

Figure 4D
Dean Road
Near Middle School
Dean Road
Auburn, Alabama

January 2019

Dean Road (3-Lane Cross-section with Bicycle Lanes) at Thach Avenue

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North

Graphic Scale: 1"-100'

Figure 4E
Dean Road
at Thach Avenue
Dean Road
Auburn, Alabama

January 2019

Dean Road (3-Lane Cross-section with Bicycle Lanes) Approaching Glenn Avenue

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North

Graphic Scale: 1"-100'

January 2019

Figure 4F
Dean Road
Approaching Glenn Avenue
Dean Road
Auburn, Alabama

Dean Road at Glenn Avenue with Dual Left Turns for Glenn Avenue Approaches

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North

Graphic Scale: 1"-100'

Figure 4G
Dean Road
at Glenn Avenue
Dean Road
Auburn, Alabama

January 2019

Dean Road (3-Lane Cross-section with Bicycle Lanes Between Annalue and RRX) at Stage Road

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North

Graphic Scale: 1"-100'

January 2019

Figure 4H
Dean Road
at Stage Road
Dean Road
Auburn, Alabama

Dean Road (Dedicated Left, Though, and Right Lanes for NB/SB Approaches) at Opelika Road

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North

Graphic Scale: 1"-100'

January 2019

Figure 4I
Dean Road
at Opelika Road
Dean Road
Auburn, Alabama

Dean Road

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North

Graphic Scale: 1"-100'

Figure 4J

Dean Road

Dean Road
Auburn, Alabama

January 2019

Dean Road

SKIPPER CONSULTING INC

North

Graphic Scale: 1"-100'

January 2019

Figure 4K

Dean Road

Dean Road
Auburn, Alabama

Dean Road at E. University Drive

SKIPPER CONSULTING INC

North

Graphic Scale: 1"-100'

Figure 4L

Dean Road at E. Univ. Dr.

Dean Road
Auburn, Alabama

January 2019

TRAFFIC ANALYSES WITH RECOMMENDED IMPROVEMENTS

Intersection Capacity Analysis with Recommended Improvements

Capacity analyses were conducted for the study intersections assuming recommended improvements and projected ten (10) year traffic volumes would be in place. Capacity analyses were conducted using methods of the *Highway Capacity Manual*, as previously introduced. **Table 7** provides a summary of the levels of service for study intersections with recommended improvements and projected ten (10) year traffic volumes in place.

As shown throughout **Table 7**, all study intersections evaluated along the Dean Road Corridor operate at acceptable levels of service for both peak periods tested. The exception is the intersection of Dean Road at Opelika Road during the PM peak hour which shows several intersection movements at capacity when analyzing the projected 10-year traffic volumes.

Table 7 - Future Intersection Levels of Service for Projected Volumes (3-Lane Cross-section)

Intersection (Traffic Control)	Approach	Movement/Lane Group	Level of Service	
			A.M. PEAK	P.M. PEAK
Dean Road at E. University Dr.- South (Unsignalized)	Dean Road NB	Left/Thru/Right	A	A
	Dean Road SB	Left	D	D
		Through/Right	B	C
	E. University Drive EB	Left	A	A
		Through/Right	A	A
	E. University Drive WB	Left	A	A
		Through/Right	A	A
	Overall LOS		**A**	**A**
Dean Road at Moores Mill Rd. (traffic signal)	Dean Road NB	Left	A	A
		Through	C	C
		Right	A	A
	Dean Road SB	Left	A	C
		Through	B	B
		Right	A	A
	Moores Mill Road EB	Left	B	B
		Through/Right	B	C
	Moores Mill Road WB	Left	B	B
		Through	C	C
		Right	A	A
	Overall LOS		**B**	**B**
Dean Road at Samford Ave. (traffic signal)	Dean Road NB	Left	B	B
		Through	D	C
		Right	A	A
	Dean Road SB	Left	D	B
		Through	C	D
		Right	A	A
	Samford Avenue EB	Left	C	D
		Through	D	D
		Right	A	A
	Samford Avenue WB	Left	C	C
		Through	D	D
		Right	A	A
	Overall LOS		**C**	**C**
Dean Road at Thach Ave. (traffic signal)	Dean Road NB	Left	A	A
		Though/Right	B	C
	Dean Road SB	Through	B	B
		Right	A	A
	Thach Avenue EB	Left	D	D
		Right	B	A
	Overall LOS		**B**	**C**
Dean Road at Glenn Ave. (traffic signal)	Dean Road NB	Left	C	D
		Through/Right	C	D
	Dean Road SB	Left	B	D
		Through/Right	D	D
	Glenn Avenue EB	Left (Dual)	D	C
		Through/Right	D	D
	Glenn Avenue WB	Left (Dual)	C	D
		Through/Right	C	D
	Overall LOS		**C**	**D**

Table 7 (Cont't) - Future Intersection Levels of Service for Projected Volumes (3-Lane Cross-section)

Intersection (traffic control)	Approach	Movement/Lane Group	Level of Service	
			A.M. Peak	P.M. Peak
Dean Road at Harper Ave. (Unsignalized)	Dean Road NB	Left	B	B
		Through/Right	A	A
	Dean Road SB	Left	A	B
		Through/Right	A	A
	Harper Avenue EB	Left	C	E
		Through/Right	B	C
	Harper Avenue WB	Left	C	F
		Through/Right	C	D
	Overall LOS		A	A
Dean Road at Annalue Dr. (traffic signal)	Dean Road NB	Through/Right	A	A
	Dean Road SB	Left	A	A
		Through	B	B
	Annalue Drive WB	Left	C	D
		Right	A	B
	Overall LOS		A	B
Dean Road at Stage Rd. (Unsignalized)	Dean Road NB	Left	A	A
		Through/Right	A	A
	Dean Road SB	Left	A	A
		Through/Right	A	A
	Stage Road EB	Left	B	C
		Right	B	C
	Stage Road WB	Left	B	C
		Right	B	C
	Overall LOS		A	A
Dean Road at Opelika Rd. (traffic signal)	Dean Road NB	Left (Dual)	B	C
		Right	C	D
		Through/Right	A	C
	Dean Road SB	Left	B	C
		Through	C	E
		Right	A	A
	Opelika Road EB	Left	C	C
		Through	C	E
		Right	A	A
	Opelika Road WB	Left	D	E
		Through	C	D
		Right	A	A
	Overall LOS		C	D
Dean Road at E. University Dr.- North (traffic signal)	Dean Road NB (Split Phase)	Left	D	D
		Through	D	D
		Right	A	A
	Dean Road SB (Split Phase)	Left	D	D
		Through/Right	D	D
	E. University Drive WB	Left	B	B
		Through	B	C
		Right	A	A
	E. University Drive EB	Left	B	B
		Through	C	C
		Right	A	A
	Overall LOS		**C**	**C**

Segment Capacity Analysis with Recommended Improvements

Segment capacity analyses for peak hour conditions along the Dean Road Corridor were conducted assuming the recommended improvements, outlined above, and projected traffic growth would be in place along Dean Road. These capacity analyses were conducted using methods outlined in the *Highway Capacity Manual*, as previously introduced. Levels of service for the arterial analyses conducted for Dean Road are summarized in **Table 8**.

Table 8 - Segment Levels of Service w/Projected Traffic Growth

Northbound Dean Road Segment LOS Analysis				
From	To	Segment Length	Arterial LOS by Segment	
			AM Peak	PM Peak
East University Dr	Moores Mill Rd	0.41	C	C
Moores Mill Rd	East Samford Ave	1.3	D	E
East Samford Ave	East Thach Ave	0.39	A	B
East Thach Ave	East Glenn Ave	0.31	A	B
East Glenn Ave	Harper Ave	0.1	A	B
Harper Ave	Annalue Dr	0.12	A	B
Annalue Dr	Stage Rd	0.16	A	A
Stage Rd	Opelika Rd	0.15	A	B
Opelika Rd	East University Dr	0.9	C	D
Southbound Dean Road Segment LOS Analysis				
From	To	Segment Length	Arterial LOS by Segment	
			AM Peak	PM Peak
East University Dr	Moores Mill Rd	0.41	C	C
Moores Mill Rd	East Samford Ave	1.3	D	E
East Samford Ave	East Thach Ave	0.39	A	B
East Thach Ave	East Glenn Ave	0.31	A	A
East Glenn Ave	Harper Ave	0.1	A	B
Harper Ave	Annalue Dr	0.12	B	B
Annalue Dr	Stage Rd	0.16	A	B
Stage Rd	Opelika Rd	0.15	A	A
Opelika Rd	East University Dr	0.9	C	D

Implementation of Road Diet Recommendation

The implementation of a Road Diet in segments of Dean Road are advisable for consistency with the current operation of several intersections. This will improve safety of the corridor by providing opportunities to use the two-way-left-turn lane (TWLTL) for left turn maneuvers where previously left turns were made from inside through lanes which is not desirable. Additionally, the implementation of a Road Diet offers the opportunity for provision of bicycle lanes in multiple segments. Lastly, the existing and 10-year forecasted corridor traffic volumes are at favorable levels to pursue a Road Diet. In summary, the implementation of a corridor Road Diet is recommended for Dean Road.