TRAFFIC IMPACT STUDY

Prepared For FALCON DESIGN CONSULTANTS, LLC

GARDEN LAKES DEVELOPMENT OF REGIONAL IMPACT (DRI) HENRY COUNTY, GA

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INTRODUCTION

This study includes an analysis of the traffic-related impacts expected from a proposed Single Family and Townhome Development in Henry County, Georgia. The project location is shown in Figure 1.



Figure 1: PROJECT LOCATION MAP

Aerial view of the site location is shown in Figure 2.



Figure 2: AERIAL VIEW OF PROJECT LOCATION

The intersections included in the study are shown in Figure 3.



Figure 3: STUDY INTERSECTIONS MAP

PROPOSED DEVELOPMENT

The site plan dated August 20, 2019 for the proposed development is shown below in Figure 4. The full site plan is located in Appendix A The following is a list of the proposed driveways and the roads they are connected to:

- (A) Driveway connected to North Steele Drive
- (B) Driveway connected to SR 81
- (C, D) Driveways connected to Lovejoy Road



Figure 4: SITE PLAN

EXISTING CONDITIONS

An existing conditions inventory was conducted of the current conditions at the study intersections, including roadway geometry, traffic control, and traffic volumes.

INVENTORY OF EXISTING GEOMETRY AND TRAFFIC CONTROL

The existing roadway geometry and traffic control in the study area are shown in Figure 5 below. Also illustrated near the intersection of Lovejoy Road and Talmadge Road is a Norfolk Southern Railway crossing. At that intersection the railroad crossing is approximatley 25 feet from the edge of the payment on Lovejoy Road. The estimated number of train movements are 1 during the day time hours (6AM – 6PM) and 1 during the night time hours (6PM – 6AM) with a speed range of 15 - 25 mph. A crossing inventory form of this railway crossing is included in Appendix B

Figure 5: EXISTING CONDITIONS





EXISTING TRAFFIC VOLUMES

Turning Movement Counts (TMCs) were conducted at the study intersections on Wednesday, October 2, 2019 from 6:00 AM to 9:00 AM and 4:00 PM to 7:00 PM. Existing peak hour turning movement volumes are shown in Figure 6 below. The Turning movement data is provided in Appendix C.



Figure 6: EXISTING TRAFFIC VOLUMES

PROJECTED CONDITIONS

TRIP GENERATION

Estimates of traffic volumes expected to be generated by the land uses within the proposed development were obtained using *TripGen 10* sofeetware from Trafficware. Trip rates were provided in the ITE publication *Trip Generation*, 10^{th} Edition.

Table 1 shows the estimated generated trips for the proposed land uses within the proposed development based on the June 14, 2019 dated site plan which has 1,138 total dwelling units. The most recent site plan, dated August 20, 2019, has 1,135 total dwelling units. The study was completed with the units from the original site plan. The full report from the Trip Generation will be provided in Appendix D

The proposed farm-to-table land use will serve as an amenity to the development. It was assumed that half of the generated trips by this land use would be internally captured.

ITE		DAILY		AM	РЕАК НС	OUR	PM	РЕАК НС	DUR
CODE	LAND USE	SIZE	SIZE 2-WAY TRIPS		EXIT	TOTAL	ENTER	EXIT	TOTAL
210	Single Family Houses	613* du	5787	114	340	454	382	225	607
220	Townhomes	525 du	3846	55	187	242	186	108	294
817	Nursery (Garden Center)	14 acres	1513	19	20	39	57	56	113
	INTER	NAL CAPTURE	-757	-10	-10	-20	-28	-28	-57
ADJUSTED VOLUME (TOTAL NEW TRIPS)		10,389	178	537	715	597	361	957	

Table 1: TRIP	GENERATION - LA	AND USES
---------------	-----------------	----------

du is dwelling units

*=Trip Generation based on 6/14/2019 site plan with 613 total units, 3 more than the 8/20/2019 site plan with 610

TRIP DISTRIBUTION

In order to assign generated trips to the roadway network, it was necessary to determine how new trips should be distributed to and from the site. Nearby GDOT count stations were examined to determine the distribution pattern for vehicles entering and exiting the site. Figure 7 below shows the GDOT count stations that were used to determine this pattern.



Figure 7: GDOT COUNT STATIONS

Trip distribution percentages were developed from the count stations using the AM Peak Hour, which was established to be 7:15 AM to 8:15 AM. The AM pattern was assumed to best represent the residential distribution. Figure 8 provides the Trip Distribution percentages for the expected trip patterns for the residential land use.



Figure 8: TRIP DISTRIBUTION PERCENTAGES (RESIDENTIAL)

The following assumptions were made regarding the entering and exiting of the different driveways located on the site plan.

- The townhomes located next to Lovejoy Road will only use Driveways C at D at a 50/50 percentage
- The single family houses will use Driveways A, B, at D relative to the distance from them

In order to assign the farm-to-table trips to the roadway network, it was necessary to determine how the trips should be distributed to and from the site. A distribution pattern was developed to define the origin and destination of the new trips.

The majority of trip-making associated with commercial land use is home-based on one end. The distribution of the population within a reasonable driving distance of the site and the locations of commercial centers in surrounding census tracts were used to develop a market area by which to assign newly generated trips. Figure 8 shows the market area superimposed onto the census tracts.

The market area was defined by the distance that can be traveled to and from the site within approximately ten minutes. The market area was divided into four sectors (A, B, C, and D) that correspond to the travel routes to and from the site. The distribution of the market area within the four sectors establishes the basis for distributing the generated traffic. The market distribution is summarized in Table 2 on the following page.



Figure 9: MARKET AREA

SECTOR	CENSUS TRACT	TOTAL POPULATION OF TRACT	% OF TRACT IN SECTOR	POPULATION OF TRACT IN SECTOR	TOTAL SECTOR POPULATION	% OF MARKET AREA
	406.06	3,624	10%	362	_	
А	703.05	7,928	20%	1,586	2,388	8.4
	705.02	14,656	3%	440		
	703.06	9,124	25%	2,281		
В	705.01	7,056	10%	706	8,849	31.2
	705.02	14,656	40%	5,862	_	
С	705.01	7,056	45%	3,175	3,175	11.2
	406.06	3,624	45%	1,631		
	406.08	11,426	20%	2,285	-	
	406.20	3,430	10%	343	-	
D	406.21	9,202	80%	7,362	13,983	49.2
	406.22	7,446	25%	1,862	-	
	705.01	7,056	5%	353		
	705.02	14,656	1%	147		
				TOTAL	28,395	100%

Table 2: MARKET AREA DISTRIBUTION

Based on the market area described in Figure 9 and Table 2, the distribution shown in Figure 10 was developed for assigning new trips to and from the Farm-to-Table onto the roadway. The assumption was made that all trips will enter and exit through Driveway A.



Figure 10: TRIP DISTRIBUTION PERCENTAGES (FARM-TO-TABLE)

TRAFFIC ASSIGNMENT

The generated traffic was assigned to the road network based on weighted movements analyzed at the study intersections during the AM and PM Peak Hours. Tables 7 and 8 show how the assigned trips are expected to reach the development, according to the direction traveled.

To at From	0/	AM		PM	
	70	IN	OUT	IN	OUT
McDonough Road West	12%	20	63	68	40
SR 3 North	41%	69	216	233	137
McDonough Road East	12%	20	63	68	40
SR 81	8%	14	42	46	26
SR 3 South	27%	46	143	153	90
Total Trips	100%	169	527	568	333

Table 3: NEW TRIPS ASSIGNMENT, SINGLE OCCUPANCY VEHICLES (RESIDENTIAL)

Table 4: NEW TRIPS ASSIGNMENT, SIN	GLE OCCUPANCY VEHICLES	(COMMERCIAL)
---	------------------------	--------------

To at From	%	AM		PM	
		IN	OUT	IN	OUT
McDonough Road West	24.6	2	2	7	7
SR 3 North	24.6	2	2	7	7
McDonough Road East	8.4	0	1	2	2
SR 81	15.6	2	2	5	5
Old Highway 3	15.6	2	2	5	4
SR 3 South	11.2	1	1	3	3
Total Trips	100%	9	10	29	28

New Trips

Figure 11 shows the residential generated trips for the development and Figure 12 shows the commercial trips generated from the development. Figure 13 shows the total combined generated trips from the development. These trips were assigned in accordance with the distributions and assumptions listed on the previous pages.



Figure 11: NEW RESIDENTIAL TRIPS

Figure 12: NEW COMMERCIAL TRIPS



TOTAL NEW TRIPS

Figure 13: TOTAL NEW TRIPS



TRAFFIC PROJECTION METHODOLOGY

The methodology used to estimate future traffic growth included the examination of Henry County census data, historic trends from the GDOT count stations, and data from the GDOT statewide travel demand model.

CENSUS DATA

The census data from the Henry County Comprehensive Plan (2016-2040) is shown in Table 3.

HENRY COUNTY							
YEAR	POPULATION	% CHANGE	% CHANGE PER YEAR				
1990	58,741	-	-				
2000	119,514	103.5	7.36				
2010	203,922	70.6	5.49				
2015	218,659	7.3	1.41				
2040	399,790	83.0	2.44				

Table 5: CENSUS DATA

Source: Henry County Comprehensive Plan (2016)

The data shows an increase of the population in Henry County of 83%, or a yearly rate of 2.44%, between 2015-2040.

The most recent Henry County population data from the Atlanta Regional Commission (ARC) was developed in 2015 and is shown in Table 4.

Table 6: CENSUS DATA: ATLANTA REGIONAL COMMISSION

HENRY COUNTY									
YEAR	POPULATION	% CHANGE	% CHANGE PER YEAR						
2015	218,364	-	-						
2040	351,691	61.0%	1.92%						
Source: Atlanta Regiona	Commission Forecast 2	040: Henry County							

Source: Atlanta Regional Commission, Forecast 2040: Henry County

According to the ARC data, the population will see an increase of 61%, or a yearly rate of 1.92%, between 2015 and 2040.

TREND ANALYSIS

Five-year and ten-year trend analyses were conducted to establish growth rates around the study area. Table 5 shows the data collected from the GDOT count stations and the resulting trend rates for each count station. Figure 11 on the next page shows graphs of these resultant trend rates for each corridor.

ROADWAY	GDOT Count Stations	5-year	10-year
Hastings Pridge Bood	063-0001	0.00%	0.00%
Hastings bridge Road	151-0138	-1.74%	-0.42%
McDonough Bood	063-0223	0.18%	-0.86%
NicDollough Koad	063-0221	-1.20%	1.02%
CD 91	151-0189	-1.32%	0.61%
SK 81	151-0187	6.32%	7.17%
	151-0145	0.00%	1.20%
SR 3	151-0149	0.00%	-0.92%
	063-0005	0.00%	0.00%

Table 7: TREND ANALYSIS FOR COUNT STATION DATA

Note: Rates are calculated based on annual compounding.



Figure 14: TREND LINES FOR GDOT COUNT STATIONS

BACKGROUND GROWTH RATES

Growth rates for the study area were established based on the data collected from GDOT count stations. Table 6 shows the compounded growth rates for the study area from the GDOT count stations.

Table 8: GROWTH RATES

Road Namos	COMPOUNDED RATES				
Road Names	5-YEAR	10-YEAR			
SR 3, SR 81, SR 20, Old Hwy 3, Hastings Bridge Road	0.5%**	2.08%			

** Trend was negative, assumed 0.5%

For the purpose of this study an annual background growth rate of 1.5% will be used.

BACKGROUND GROWTH FACTORS

Growth factors were established by applying the growth rate to the following equation:

Growth Factor = $(1+r)^n$

Where: **r** = growth rate **n** = number of years

The period between 2019 and 2029 was calculated using n = 10 and r = 0.015. In using the equation above, the growth factor was calculated to be 1.16.

GENERATED TRIPS

The generated peak hour traffic was assigned to the network based on the existing traffic patterns, taking into account planned construction projects in the near future.

TOTAL PROJECTED TRAFFIC

The total project traffic volumes was developed by superimposing the project trips generated by the development onto the background 2029 volumes. The projected traffic are shown in Figure 12.

BACKGROUND TRAFFIC VOLUMES

Figure 15: 2029 BACKGROUND TRAFFIC VOLUMES



TOTAL PEAK HOUR TRAFFIC VOLUMES

The Total Peak Hour Traffic Volumes for the build year 2029 are derived by combining the New Trips (Figure 15) and the Projected Peak Hour Volumes (Figure 12). The Total Peak Hour Traffic Volumes are shown in Figure 16.



Figure 16: TOTAL PEAK HOUR TRAFFIC VOLUMES

CRASH HISTORY

Crash data for each of the study corridors was obtained from the Georgia Department of Transportation (GDOT) using the GEARS website. Each studied intersection has a table below that summarizes the crash frequency, for the most recent five-year period of available data (2014-2018). The raw data is provided in Appendix E.

YEAR	TOTAL CRASHES	INJURY CRASHES /INJURIES	FATALITIES	RIGHT ANGLE	VEHICLE With OT HEAD ON	COLLIS HER VEH REAR END	ION IICLE SIDESWIPE	VEHICLE COLLISION With ANIMAL/STRUCTURE
2014	35	11/14	0	7	0	14	3	11
2015	33	12/23	0	10	1	13	5	4
2016	19	5/10	0	2	0	11	4	2
2017	19	5/13	0	1	0	17	1	0
2018	21	5/6	0	3	0	17	0	1
Totals	127	38/66	0	23	1	72	13	18

Table 9: YEARLY CRASH FREQUENCY – SR 3 at SR 81

Table 10: YEARLY CRASH FREQUENCY – SR 81 at LOVEJOY ROAD

YEAR	TOTAL CRASHES	INJURY CRASHES /INJURIES	FATALITIES	RIGHT ANGLE	VEHICLE With OT HEAD ON	COLLIS HER VEH REAR END	ION IICLE SIDESWIPE	VEHICLE COLLISION With ANIMAL/STRUCTURE
2014	1	1/1	0	0	0	0	0	1
2015	1	0/0	0	1	0	0	0	0
2016	0	0/0	0	0	0	0	0	0
2017	1	1/1	0	0	0	0	0	1
2018	0	0/0	0	0	0	0	0	0
Totals	3	2/2	0	1	0	0	0	2

Table 11: YEARLY CRASH FREQUENCY – SR 81 at N STEELE DRIVE

VEAD	TOTAL				VEHICLE With OT	VEHICLE COLLISION		
TEAR	CRASHES	/INJURIES	FATALITIES	RIGHT ANGLE	HEAD ON	REAR END	SIDESWIPE	ANIMAL/STRUCTURE
2014	0	0/0	0	0	0	0	0	0
2015	2	1/1	0	0	0	0	0	2
2016	1	0/0	0	0	0	0	0	1
2017	1	0/0	0	0	0	0	0	1
2018	1	0/0	0	0	0	0	0	1
Totals	5	1/1	0	0	0	0	0	5

Table 12: YEARLY CRASH FREQUENCY – SR 81 at HASTINGS BRIDGE ROAD/ OLD HWY 3

YFAR	TOTAL	INJURY CRASHES	Γ ΔΤΔΙ ΙΤΙΕS		VEHICLE With OT	VEHICLE COLLISION With		
	CRASHES	/INJURIES		RIGHT ANGLE	HEAD ON	REAR END	SIDESWIPE	ANIMAL/STRUCTURE
2014	2	0/0	0	0	1	0	0	1
2015	3	1/2	0	1	0	2	0	0
2016	3	2/2	0	1	0	1	1	0
2017	8	1/1	0	2	0	3	2	1
2018	10	3/3	0	3	0	2	3	2
Totals	26	7/8	0	7	1	8	6	4

Table 13: YEARLY CRASH FREQUENCY – SR 81 at MT CARMEL ROAD

YEAR	TOTAL CRASHES	INJURY CRASHES /INJURIES	FATALITIES	RIGHT ANGLE	VEHICLE With OT HEAD ON	COLLIS HER VEH REAR END	ION HICLE SIDESWIPE	VEHICLE COLLISION With ANIMAL/STRUCTURE
2014	7	5/7	1	3	0	3	1	0
2015	8	3/3	0	1	0	5	0	2
2016	6	1/1	0	2	0	3	0	1
2017	6	1/1	0	1	2	1	1	1
2018	5	3/5	0	2	0	3	0	0
Totals	32	13/17	1	9	2	15	2	4

Table 14: YEARLY CRASH FREQUENCY – MT CARMEL ROAD at MT CARMEL ELEMENTARY SCHOOL BUS ENTRANCE

YEAR	TOTAL CRASHES	INJURY CRASHES /INJURIES	FATALITIES	RIGHT	VEHICLE With OT HEAD ON	E COLLIS HER VEH REAR END	ION IICLE SIDESWIPE	VEHICLE COLLISION With ANIMAL/STRUCTURE
2014	0	0/0	0	0	0	0	0	0
2015	0	0/0	0	0	0	0	0	0
2016	0	0/0	0	0	0	0	0	0
2017	0	0/0	0	0	0	0	0	0
2018	0	0/0	0	0	0	0	0	0
Totals	0	0/0	0	0	0	0	0	0

Table 15: YEARLY CRASH FREQUENCY – MT CARMEL ROAD at MT CARMEL ELEMENTARY SCHOOL ENTRANCE

VEAD	TOTAL		EATALITIES		VEHICL With OT	ON ICLE		
TEAN	CRASHES	/INJURIES	FATALITIES	RIGHT ANGLE	HEAD ON	REAR END	SIDESWIPE	ANIMAL/STRUCTURE
2014	1	1/1	0	0	0	0	0	1
2015	0	0/0	0	0	0	0	0	0
2016	0	0/0	0	0	0	0	0	0
2017	1	0/0	0	0	0	1	0	0
2018	0	0/0	0	0	0	0	0	0
Totals	2	1/1	0	0	0	1	0	1

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Table 16: YEARLY CRASH FREQUENCY – LOVEJOY ROAD at N STEELE ROAD

YEAR	TOTAL	INJURY CRASHES	INJURY CRASHES FATALITIES		VEHICLE With OT	E COLLIS HER VEH	VEHICLE COLLISION With	
	CRASHES	/INJURIES		RIGHT ANGLE	HEAD ON	REAR END	SIDESWIPE	ANIMAL/STRUCTURE
2014	0	0/0	0	0	0	0	0	0
2015	0	0/0	0	0	0	0	0	0
2016	0	0/0	0	0	0	0	0	0
2017	0	0/0	0	0	0	0	0	0
2018	1	0/0	0	0	0	0	0	1
Totals	1	0/0	0	0	0	0	0	1

Table 17: YEARLY CRASH FREQUENCY – LOVEJOY ROAD at TALMADGE ROAD

YEAR	TOTAL CRASHES	INJURY CRASHES /INJURIES	FATALITIES	RIGHT ANGLE	VEHICLE With OT HEAD ON	COLLIS HER VEH REAR END	ION IICLE SIDESWIPE	VEHICLE COLLISION With ANIMAL/STRUCTURE
2014	1	0/0	0	0	0	1	0	0
2015	2	0/0	0	1	0	1	0	0
2016	1	0/0	0	0	0	0	0	1
2017	1	0/0	0	1	0	0	0	0
2018	2	0/0	0	0	0	1	0	1
Totals	7	0/0	0	2	0	3	0	2

Table 18: YEARLY CRASH FREQUENCY – SR 3 at LOVEJOY ROAD

YEAR	TOTAL CRASHES	INJURY CRASHES /INJURIES	FATALITIES	RIGHT	VEHICLE With OT HEAD ON	E COLLIS HER VEH REAR END	ION IICLE SIDESWIPE	VEHICLE COLLISION With ANIMAL/STRUCTURE
2014	24	4/6	0	7	4	6	3	4
2015	34	4/13	0	13	0	13	7	1
2016	27	3/4	0	5	1	14	6	1
2017	30	6/8	0	8	1	13	3	5
2018	15	3/4	0	5	2	7	1	0
Totals	130	20/35	0	38	8	53	20	11

Table 19: YEARLY CRASH FREQUENCY – HASTINGS BRIDGE ROAD at N STEELE DRIVE/ CARL PARKER ROAD

VEAD	TOTAL		URY VEHICLE COLLISION With OTHER VEHICLE				ION IICLE	VEHICLE COLLISION
TLAN	CRASHES	/INJURIES	FATALITIES	RIGHT ANGLE	HEAD ON	REAR END	SIDESWIPE	ANIMAL/STRUCTURE
2014	0	0/0	0	0	0	0	0	0
2015	3	0/0	0	1	0	1	0	1
2016	4	2/4	0	0	0	4	0	0
2017	5	0/0	0	1	0	1	0	3
2018	5	2/2	0	3	0	1	1	0
Totals	17	4/6	0	5	0	7	1	4

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Table 20: YEARLY CRASH FREQUENCY – HASTINGS BRIDGE ROAD at TALMAGE ROAD

YEAR	TOTAL	INJURY CRASHES	FATALITIES	VEHICLE COLLISION With OTHER VEHICLE			VEHICLE COLLISION With	
	CRASHES	/INJURIES		RIGHT	HEAD ON	REAR END	SIDESWIPE	ANIMAL/STRUCTURE
2014	3	0/0	0	0	0	0	1	2
2015	5	0/0	0	0	0	3	2	0
2016	0	0/0	0	0	0	0	0	0
2017	0	0/0	0	0	0	0	0	0
2018	1	0/0	0	1	0	0	0	0
Totals	9	0/0	0	1	0	3	3	2

Table 21: YEARLY CRASH FREQUENCY – MCDONOUGH ROAD at HASTINGS BRIDGE ROAD/OLD HWY 3

YEAR	TOTAL CRASHES	INJURY CRASHES /INJURIES	FATALITIES	RIGHT ANGLE	VEHICLE With OT HEAD ON	E COLLIS HER VEH REAR END	ION IICLE SIDESWIPE	VEHICLE COLLISION With ANIMAL/STRUCTURE
2014	22	2/4	0	2	0	19	0	1
2015	39	6/8	0	2	0	35	0	2
2016	46	5/8	0	7	2	32	2	3
2017	28	2/3	0	3	1	20	1	3
2018	30	3/3	0	3	1	24	1	1
Totals	165	18/26	0	17	4	130	4	10

Table 22: YEARLY CRASH FREQUENCY – SR 3 at MCDONOUGH ROAD

YEAR	TOTAL CRASHES	INJURY CRASHES /INJURIES	FATALITIES	RIGHT ANGLE	VEHICLE With OT HEAD ON	COLLIS HER VEH REAR END	ION IICLE SIDESWIPE	VEHICLE COLLISION With ANIMAL/STRUCTURE
2014	110	25/49	0	29	5	57	16	3
2015	133	19/31	0	33	5	72	17	6
2016	97	19/33	0	19	2	56	18	2
2017	64	13/26	0	17	1	36	10	0
2018	41	5/9	0	14	2	21	3	1
Totals	445	81/148	0	112	15	242	64	12

Table 23: YEARLY CRASH FREQUENCY – MCDONOUGH ROAD at McELROY/ COUNTY LINE ROAD

VEAR					VEHICLE With OT	VEHICLE COLLISION		
TEAN	CRASHES	/INJURIES		RIGHT ANGLE	HEAD ON	REAR END	SIDESWIPE	ANIMAL/STRUCTURE
2014	6	1/3	0	2	1	1	0	2
2015	12	6/12	0	6	0	4	0	2
2016	12	5/7	0	6	0	5	0	1
2017	10	3/6	0	3	2	4	1	0
2018	13	7/10	0	2	3	6	0	2
Totals	53	22/38	0	19	6	20	1	7

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YEAR	TOTAL CRASHES	INJURY CRASHES /INJURIES	FATALITIES	RIGHT ANGLE	VEHICLE With OT HEAD ON	E COLLIS HER VEH REAR END	ION IICLE SIDESWIPE	VEHICLE COLLISION With ANIMAL/STRUCTURE
2014	36	14/19	0	3	1	24	7	1
2015	48	19/25	0	16	2	27	3	0
2016	44	15/29	0	6	1	36	1	0
2017	38	11/15	0	9	1	20	4	4
2018	41	16/24	1	13	0	21	4	3
Totals	206	75/112	1	47	5	128	19	8

Table 24: YEARLY CRASH FREQUENCY - SR 3 at MUNDYS MILL ROAD

During the analysis period (2014 through 2018), the most common crash types were rear end collisions, which account for 54% of all crashes. Two fatalities were recorded over this span. One fatality occured at SR 81 and Mt Carmel Road (Table 8). The report for this incident failed to give a description on how the accident occurred. Therefore, it could not be determined if it was roadway related or not. The second was recorded at SR 3 and Mundys Mill Road (Table 19). The report for this incident stated that the driver failed to see someone laying in the road. The deceased was reported by the officer to possibly have been be under the influence of alcohol/drugs at the scene. The third accident was recorded at SR 3 and McDonough Road (Table 17). The report for this incident states that this was a right angle crash possibly due to lack of awareness from one or both of the drivers involved. The reports for the three recorded fatalities are included at the end of Appendix E.

Figure 17 below illustrates a diagram of the crashes for the intersection SR 81 at Mt Carmel Road.





Figure 18 below illustrates a diagram of the crashes for the intersection Hastings Bridge Road/ Old Hwy 3 at McDonough Road.



Figure 18: COLLISION DIAGRAM FOR HASTINGS BRIDGE ROAD/OLD HWY 3 at MCDONOUGH ROAD
Figure 19 below illustrates a diagram of the crashes for the intersection SR 3 at McDonough Road



Figure 19: COLLISION DIAGRAM FOR SR 3 at MCDONOUGH ROAD

CAPACITY ANALYSIS

Existing and projected conditions were evaluated using capacity analysis techniques described in the *Highway Capacity Manual, Special Report 209*, published by the Transportation Research Board, 2010, and with the use of *Synchro 10* from Trafficware. HCM Level of Service (LOS) definitions are shown in Table 24.

LEVEL OF	DELAY PER VEHICLE (SECONDS)		
SERVICE	SIGNALIZED INTERSEC+TIONS	UNSIGNALIZED INTERSECTIONS	
А	≤10.0	≤10.0	
В	10.1 to 20.0	10.1 to 15.0	
С	20.1 to 35.0	15.1 to 25.0	
D	35.1 to 55.0	25.1 to 35.0	
E	55.1 to 80.0	35.1 to 50.0	
F	>80.0	>50.0	

Table 25: LEVEL OF SERVICE CRITERIA

Source: Highway Capacity Manual, Special Report 209, Transportation Research Board, 2010

EXISTING CONDITIONS

The intersections included in the study were first evaluated using the existing geometry and volumes. The results of the capacity analysis for the signalized intersections are summarized in Table 25. The capacity analysis for the unsignalized intersections are summarized in Table 26. For each condition, the level of service is shown, followed parenthetically by the average delay per vehicle, in seconds. The capacity analysis reports for the intersections under existing conditions are provided in Appendix F.

	INTERSECTION	EXISTING CONDITIONS		
INTERSECTION	NUMBER	AM PEAK HOUR	PM PEAK HOUR	
SR 3 at SR 81/ Upper Woosley Rd	1	B (18.2)	B (19.7)	
SR 81 at Old Highway 3/ Hastings Bridge Rd	4	B (17.3)	B (16.7)	
SR 3 at N Steele Rd/ Lovejoy Rd	10	B (17.5)	C (23.3)	
Hastings Bridge Rd at Talmadge Rd	12	B (10.8)	A (9.7)	
SR 3 at McDonough Rd	14	E (60.8)	D (41.6)	
County Line Road/ McElroy Rd at McDonough Rd	15	B (17.0)	C (27.6)	
SR 3 at Mundys Mill Rd	16	D (43.5)	D (50.6)	

Table 26: CAPACITY ANALYSIS RESULTS, EXISTING CONDITIONS (SIGNALIZED)

Capacity results indicate that the intersection of SR and McDonough Rd currently operates at LOS'E' in the AM Peak Hour. The remaining intersections operate at LOS 'D' or better in both Peak Hours.

	INTERCECTION		EXISTING CONDITIONS	
INTERSECTION	NUMBER	MOVEMENT	AM PEAK	PM PEAK
		50. (T	HOUR	HOUR
		EBL/T	A (8.0)	A (7.8)
SR 81 at Loveyjoy Rd	2	WBT/R	A (0.0)	A (0.0)
		SBL/R	B (11.2)	B (10.5)
		EBL/T	A (7.9)	A (7.7)
SR 81 at N Steele Dr	3	WBT/R	A (0.0)	A (0.0)
		SBL/R	B (11.0)	A (9.5)
		EBL/T	B (11.0)	A (8.9)
SR 81 at Mt Carmel Rd	5	WBT/R	A (0.0)	A (0.0)
		SBL/R	C (22.7)	E (35.5)
		EBL	A (9.4)	A (8.5)
Mt Carmel Rd at Mt Carmel Elementary School Bus		EBT	A (0.0)	A (0.0)
Entrance	6	WBT	A (0.0)	A (0.0)
		WBR	A (0.0)	A (0.0)
		SBL/R	D (33.4)	B (13.5)
		EBL	A (9.3)	A (8.2)
		EBT	A (0.0)	A (0.0)
Mt Carmol Rd at Mt Carmol Elementary School Entrance	7	WBT	A (0.0)	A (0.0)
Wit Carmer Ru at Wit Carmer Elementary School Entrance	/	WBR	A (0.0)	A (0.0)
		SBL	F (414.8)	C (19.0)
		SBR	B (14.7)	B (11.0)
		WBL/R	A (8.9)	A (9.4)
Lovejoy Rd at N Steele Rd	8	NBT/R	A (0.0)	A (0.0)
		SBL/T	A (7.4)	A (7.5)
		EBL/T/R	A (8.6)	A (7.8)
Louisu Dd at Talmadga Dd	10	WBL/T/R	A (7.5)	A (7.6)
Lovejoy ku at Talmadge ku	12	NBL/R	B (13.5)	B (12.2)
		SBT/R	C (19.3)	D (28.9)
		EBL/T/R	A (8.4)	A (8.3)
N Staala Dr./ Carl Darker Dd at Haatinga Dridga Dd	11	WBL/T/R	A (7.7)	A (0.0)
N Steele Dry Carl Parker Ku at Hastings Bridge Ku		NBL/T/R	C (22.2)	C (16.7)
		SBL/T/R	B (14.0)	B (14.0)
	13	EBL/T	A (0.0)	A (0.0)
McDonough Rd at Hastings Bridge Rd		WBT/R	A (0.0)	A (0.0)
		SBL/R	B (10.0)	B (10.0)

Table 27: CAPACITY ANALYSIS RESULTS, EXISTING CONDITIONS (UNSIGNALIZED)

Capacity results indicate that all movements of the unsignalized intersections currently operate at LOS 'D' or better in the AM and the PM Peak Hour, with the exception of SR 81 at Mt Carmel Rd southbound approach and the Mt Carmel Rd at Mt Carmel Elementary School Entrance southbound left. These intersections have movements that operate at LOS 'E' or worse in one of the Peak Hours.

PROJECTED NO BUILD CONDITIONS

The capacity analysis results for each study signalized intersections under projected no build conditions are provided in Table 27 below. The capacity analysis results for each study unsignalized intersections under projected no build conditions are provided in Table 28. The capacity analysis reports for the intersections listed in Table 27 and 28 under projected no build conditions can be found in Appendix G.

		PROJECTED CONDITIONS		
INTERSECTION	NUMBER	AM PEAK HOUR	PM PEAK HOUR	
SR 3 at SR 81/ Upper Woosley Rd	1	C (20.8)	D (20.9)	
SR 81 at Old Highway 3/ Hastings Bridge Rd	4	B (18.0)	B (17.5)	
SR 3 at N Steele Rd/ Lovejoy Rd	10	C (21.9)	D (39.4)	
Hastings Bridge Rd at Talmadge Rd	12	B (12.9)	B (12.5)	
SR 3 McDonough Rd	14	F (104.7)	E (65.3)	
County Line Road/ McElroy Rd at McDonough Rd	15	C (20.8)	D (36.3)	
SR 3 at Mundys Mill Rd	16	F (87.9)	F (82.3)	

Table 28: CAPACITY ANALYSIS RESULTS, PROJECTED NO BUILD CONDITIONS (SIGNALIZED)

Capacity results indicate that the intersections of SR 3 at McDonough Road and SR 3 at Mundys Mill Road operates at LOS'E' or worse for both Peak Hours.

INTEDEFCTION	INTERSECTION		PROJECTED CONDITIONS	
INTERSECTION	NUMBER	MOVEMENT	AM PEAK HOUR	PM PEAK HOUR
		EBL/T	A (8.2)	A (8.0)
SR 81 at Loveyjoy Rd	2	WBT/R	A (0.0)	A (0.0)
		SBL/R	B (11.9)	B (11.0)
		EBL/T	A (8.0)	A (7.8)
SR 81 at N Steele Dr	3	WBT/R	A (0.0)	A (0.0)
		SBL/R	B (11.5)	A (9.8)
		EBL/T	B (12.4)	A (9.4)
SR 81 at Mt Carmel Rd	5	WBT/R	A (0.0)	A (0.0)
		SBL/R	F (60.4)	F (112.6)
		EBL	A (9.9)	A (8.7)
Nt Cormal Dd at Nt Cormal Elementary School Dus		EBT	A (0.0)	A (0.0)
	6	WBT	A (0.0)	A (0.0)
Entrance		WBR	A (0.0)	A (0.0)
		SBL/R	E (46.9)	B (14.9)
		EBL	A (9.7)	A (8.4)
		EBT	A (0.0)	A (0.0)
Nt Carmel Dd at Nt Carmel Flamentary School Entrance	7	WBT	A (0.0)	A (0.0)
INIT Carmer Ru at Mit Carmer Elementary School Entrance		WBR	A (0.0)	A (0.0)
		SBL	F (732.9)	C (22.6)
		SBR	C (16.6)	B (11.6)
		WBL/R	A (9.0)	A (9.8)
Lovejoy Rd at N Steele Rd	8	NBT/R	A (0.0)	A (0.0)
		SBL/T	A (7.4)	A (7.6)
		EBL/T/R	A (9.0)	A (7.9)
Lougiou Pd at Talmadge Pd	10	WBL/T/R	A (7.5)	A (7.6)
	12	NBL/R	C (15.3)	B (13.5)
		SBT/R	D (27.4)	F (59.6)
		EBL/T/R	A (8.6)	A (8.5)
N Steele Dr/ Carl Parker Rd at Hastings Bridge Rd	11	WBL/T/R	A (7.8)	A (0.0)
		NBL/T/R	D (27.8)	C (19.9)
		SBL/T/R	C (16.4)	C (16.3)
		EBL/T	A (0.0)	A (0.0)
McDonough Rd at Hastings Bridge Rd	13	WBT/R	A (0.0)	A (0.0)
		SBL/R	B (10.3)	B (10.3)

Table 29: CAPACITY ANALYSIS RESULTS, PROJECTED NO BUILD CONDITIONS (UNSIGNALIZED)

Capacity results for no build conditions indicate that all movements of the unsignalized intersections are projected to operate at LOS 'D' or better in the AM and PM Peak Hours, with the exception of SR 81 at Mt Carmel Rd southbound approach, Mt Carmel Rd at Mt Carmel Elementary School Bus Entrance southbound approach, Mt Carmel Rd at Mt Carmel Elementary School Entrance southbound left turn approach, and Lovejoy Rd at Talmadge Rd southbound approach. These movements operate at LOS 'E' or worse for one or both Peak Hours.

PROJECTED BUILD CONDITIONS

The capacity analysis results for each study signalized intersections under projected build conditions are provided in Table 29. The capacity analysis results for each unsignalized intersections under projected build conditions are provided in Table 30. The capacity analysis reports for the intersections listed in Table 29 and 30 under projected build conditions can be found in Appendix H.

	INTERSECTION	PROJECTED CONDITIONS		
INTERSECTION	NUMBER	AM PEAK HOUR	PM PEAK HOUR	
SR 3 at SR 81/ Upper Woosley Rd	1	C (22.4)	C (24.4)	
SR 81 at Old Highway 3/ Hastings Bridge Rd	4	B (18.2)	B (17.8)	
SR 3 at N Steele Rd/ Lovejoy Rd	10	C (25.6)	D (40.1)	
Hastings Bridge Rd at Talmadge Rd	12	B (16.5)	B (16.1)	
SR 3 at McDonough Rd	14	F (128.0)	F (87.8)	
County Line Road/ McElroy Rd at McDonough Rd	15	C (22.9)	D (42.5)	
SR 3 at Mundys Mill Rd	16	F (103.3)	F (105.6)	

Capacity results indicate that two of the seven signalized intersections are expected to operate at poor LOS in at least one of the Peak Hours for projected build conditions.

Table 31: CAPACITY ANALYSIS RESULTS, P	PROJECTED BUILD CONDITIONS	(UNSIGNALIZED)
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	INTERSECTION NUMBER	MOVEMENT	PROJECTED CONDITIONS	
INTERSECTION			AM PEAK HOUR	PM PEAK HOUR
		EBL/T	A (8.6)	A (8.9)
SR 81 at Loveyjoy Rd	2	WBT/R	A (0.0)	A (0.0)
		SBL/R	B (13.8)	B (13.8)
		EBL/T	A (8.0)	A (7.9)
SR 81 at N Steele Dr	3	WBT/R	A (0.0)	A (0.0)
		SBL/R	B (11.9)	B (10.1)
		EBL/T	B (12.9)	C (22.4)
SR 81 at Mt Carmel Rd	5	WBT/R	A (0.0)	A (0.0)
		SBL/R	F (91.3)	F (*)
		EBL	A (9.9)	A (8.8)
Mt Coursel Dd at Mt Coursel Flow outows School Due		EBT	A (0.0)	A (0.0)
	6	WBT	A (0.0)	A (0.0)
Entrance		WBR	A (0.0)	A (0.0)
		SBL/R	E (49.5)	C (15.4)
		EBL	A (9.8)	A (8.5)
		EBT	A (0.0)	A (0.0)
Mit Commel Del et Mit Commel Elementem Colored Entropy	_	WBT	A (0.0)	A (0.0)
Nit Carmel Rd at Nit Carmel Elementary School Entrance	/	WBR	A (0.0)	A (0.0)
		SBL	F (773.7)	C (23.8)
		SBR	C (16.8)	B (11.7)
		WBL/R	B (12.2)	B (12.3)
Lovejoy Rd at N Steele Rd	8	NBT/R	A (0.0)	A (0.0)
		SBL/T	A (8.1)	A (8.4)
		EBL/T/R	A (9.0)	A (7.9)
	10	WBL/T/R	A (7.6)	A (7.8)
Lovejoy Rd at Talmadge Rd	12	NBL/R	F (250.2)	F (*)
		SBT/R	F(*)	F (*)
		EBL/T/R	A (8.7)	A (8.6)
		WBL/T/R	A (7.8)	A (0.0)
N Steele Dr/ Carl Parker Rd at Hastings Bridge Rd	11	NBL/T/R	D (28.1)	C (20.4)
		SBL/T/R	C (16.6)	C (16.7)
		EBL/T	A (0.0)	A (0.0)
McDonough Rd at Hastings Bridge Rd	13	WBT/R	A (0.0)	A (0.0)
		SBL/R	B (10.7)	B (11.1)
		EBT/R	A (0.0)	A (0.0)
N Steele Rd at Driveway A		WBL/T	A (0.0)	A (0.0)
		NBL/R	A (9.3)	A (9.5)
		EBL/T	A (8.0)	A (8.1)
SR 81 at Driveway B		WBT/R	A (0.0)	A (0.0)
		SBL/R	B (12.9)	B (13.3)
		WBL/R	A (9.2)	A (9.3)
Lovejoy Rd at Driveway C		NBT/R	A (0.0)	A (0.0)
		SBL/T	A (0.0)	A (0.0)
		WBL/R	A (9.2)	A (8.9)
Lovejoy Rd at Driveway D		NBT/R	A (0.0)	A (0.0)
		SBL/T	A (7.3)	A (7.6)

* =Delay time of over 1000 seconds

Capacity results for build conditions indicate that all movements of the unsignalized intersections are projected to operate at LOS 'D' or better in the AM and PM Peak Hours, with the exception of SR 81 at Mt Carmel Rd southbound approach, Mt Carmel Rd at Mt Carmel Elementary School Bus Entrance southbound approach, Mt Carmel Rd at Mt Carmel Elementary School Entrance southbound left turn approach, and Lovejoy Rd at Talmadge Rd southbound approach. These movements operate at LOS 'E' or worse for one or both Peak Hours.

GDOT INTERSECTION CONTROL EVALUATION (ICE)

The GDOT Intersection Control Evaluation (ICE) tool was used to evaluate potential traffic control alternates to the concept plan for all study intersections.

Intersections mentioned below were waived from the ICE tool evaluation since they maintain acceptable operations in the build conditions, have plans to install a traffic signal, and/or have limited access control.

Of the study intersections, the following were waived of ICE evaluation:

- SR 3 at SR 81/ Upper Woosley Road
- SR 81 at Old Highway 3/ Hastings Bridge Road
- SR 81 at Lovejoy Road
- SR 81 N Steele Drive

The capacity analysis results determined in the Build Conditions section for these intersections will be carried through for alternatives results.

Results from the ICE tool for these studied intersections are provided in Appendix I.

SR 3 at McDonough Road

The ICE tool was used to determine feasible types of controls at the intersection of SR 3 at McDonough Road. The following alternatives were identified in ICE for further analysis:

- Multilane Roundabout
- Additional Left Turn Lanes

Of the alternatives analyzed, the GDOT ICE tool identified that the Additional Left Turn Lanes as the most suitable method of traffic control at this intersection for the 2029 Build Conditions. Capacity analysis results for both alternatives are provided in Tables 32 and 33 below.

APPROACH	AM PEAK HOUR	PM PEAK HOUR
Eastbound	F (194.6)	F (455.6)
Westbound	F (438.8)	F (704.1)
Northbound	F (405.7)	F (55.5)
Southbound	C (17.8)	F (235.2)

Table 32: CAPACITY ANALYSIS RESULTS, MULTILANE ROUNDABOUT

Capacity analysis results indicate that all of the approaches are expected operate at LOS 'F'in at least one of the Peak Hours for projected build conditions.

APPROACH	AM PEAK HOUR	PM PEAK HOUR
SR 3 at McDonough Rd	F (91.4)	D (51.2)

Capacity analysis results indicate that the intersection is expected to operate at LOS 'F' in the AM Peak Hour and LOS 'D' in the PM Peak Hour.

SR 3 at Mundys Mill Rd

The ICE tool was used to determine feasible types of controls at the intersection of SR 3 at Mundys Mill Road. The following alternatives were identified in ICE for further analysis:

- Multilane Roundabout
- Additional Left Turn Lanes

Of the alternatives analyzed, the GDOT ICE tool identified that the Additional Left Turn Lanes as the most suitable method of traffic control at this intersection for the 2029 Build Conditions. Capacity analysis results for both alternatives are provided in Tables 32 and 33 below.

APPROACH	AM PEAK HOUR	PM PEAK HOUR
Eastbound	F (99.4)	F (601.9)
Westbound	F (90.8)	F (250.4)
Northbound	F (319.9)	C (16.1)
Southbound	B (11.3)	F (177.9)

Table 34: CAPACITY ANALYSIS RESULTS, MULTILANE ROUNDABOUT

Capacity analysis results indicate that all of the intersections are expected operate at LOS 'F' or better in the at least one of the Peak Hours for projected build conditions.

Table 35: CAPACITY ANALYSIS RESULTS, ADDITIONAL LEFT TURN LANES

APPROACH	AM PEAK HOUR	PM PEAK HOUR
SR 3 at McDonough Rd	F (85.7)	F (100.5)

Capacity analysis analysis results indicate that the intersection is expected to operate at LOS 'F' or better in both peak hours.

SR 81 at Mt Carmel Rd

The ICE tool was used to determine feasible types of controls at the intersection of SR 3 at McDonough Road. The following alternatives were identified in ICE for further analysis:

- All Way Stop Control
- Added Left Turn Lanes
- Traffic Signal
- Singlelane Roundabout

Of the alternatives analyzed, the GDOT ICE tool identified that the Additional Left Turn Lanes as the most suitable method of traffic control at this intersection for the 2029 Build Conditions. Capacity analysis results for both alternatives are provided in Tables 32 and 33 below.

APPROACH	AM PEAK HOUR	PM PEAK HOUR
EBL/T	F (358.8)	F (98.2)
WBT/R	F (71.8)	E (38.8)
SBL/R	D (28.5)	D (31.9)

Table 36: CAPACITY ANALYSIS RESULTS, ALL WAY STOP CONTROL

Capacity analysis results indicate that both the eastbound and westbound approach is expected to experience a LOS 'F' in at least one Peak Hour under All Way Stop Control conditions. The southbound approach is expected to have a LOS 'D' in both Peak Hours.

APPROACH	AM PEAK HOUR	PM PEAK HOUR
EBL	B (12.9)	C (22.4)
EBT	A (0.0)	A (0.0)
WBT/R	A (0.0)	A (0.0)
SBL/R	F (54.5)	F (*)

Table 37: CAPACITY ANALYSIS RESULTS, ADDED LEFT TURN LANES

Capacity analysis results indicate that two of the seven signalized intersections are expected operate at LOS 'F' or better in theat least one of the Peak Hours for projected build conditions.

SIGNAL WARRANTS #1 AND #2

In order to determine if a signal would be warranted at the intersection, the 8th highest hour volume was estimated and compared to the volume thresholds of Warrants #1 and #2, which are established in the *MUTCD* handbook. The daily volume was estimated from the highest peak hour volume and the K-factor, which was found by the closest GDOT count station to be 9.2%. The 8th highest hour, which is estimated to be 5.6% of the daily traffic, was then calculated from the daily volume through the intersection. Table 7 indicates that using the volume warrants that a signal would not warrant at this intersection.

Table 38: VOLUME SIGNAL WARRANT

Highest Peak	8 th Highest Hour	Warr	ant 1A	Warr	ant 1B	War	rant 2
Hour Volumes	Volume Mainline/Side Street	100% 500/150	70% 350/105	100% 750/75	70% 525/53	100% 500/260	70% 300/205
1279/5	779/3	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N

Based on the volumes presented in Table 5 above this intersection does not meet the requirements for Warrants #1 and #2.

APPROACH	AM PEAK HOUR	PM PEAK HOUR
Eastbound	B (9.1)	A (7.2)
Westbound	B (10.3)	A (7.9)
Southbound	A (7.1)	B (9.6)

Table 39: CAPACITY ANALYSIS RESULTS, SINGLE-LANE ROUNABOUT

Capacity analysis results for a single-lane roundabout indicate that all approaches are expected to operate at LOS 'B' or better in both peak hours

SR 81 at DRIVEWAY B

The ICE tool was used to determine feasible types of controls at the intersection of SR 81 at Driveway B. The following alternatives were identified in ICE for further analysis:

- Minor Street Stop Control
- All Way Stop Control
- Added Turn Lanes

Of the alternatives analyzed, the GDOT ICE tool identified that the all way stop control as the most suitable method of traffic control at this intersection for the 2029 Build Conditions. Capacity analysis results for both alternatives are provided in Tables 32 and 33 below.

Table 40: CAPACITY ANALYSIS RESULTS, MINOR STREET STOP

APPROACH	AM PEAK HOUR	PM PEAK HOUR
Eastbound	A (8.0)	A (8.1)
Westbound	A (0.0)	A (0.0)
Southbound	B (12.9)	B (14.3)

Capacity analysis results indicate that all approaches are expected to operate at a LOS 'B' or better in both Peak Hours.

APPROACH	AM PEAK HOUR	PM PEAK HOUR
Eastbound	A (9.4)	B (11.9)
Westbound	B (10.7)	B (10.8)
Southbound	A (8.8)	A (8.9)

Table 41: CAPACITY ANALYSIS RESULTS, ALL WAY STOP CONTROL

Capacity analysis results indicate that all of the approaches are expected to operate at LOS 'B' or better in both Peak Hours.

APPROACH	AM PEAK HOUR	PM PEAK HOUR
EBL	A (8.0)	A (8.1)
EBT	A (0.0)	A (0.0)
WBT	A (0.0)	A (0.0)
WBR	A (0.0)	A (0.0)
SBL	B (13.5)	C (15.5)
SBR	B (10.3)	B (10.0)

Table 42: CAPACITY ANALYSIS RESULTS, ADDED TURN LANES

• Capacity analysis results indicate that All approaches are expected to operate at LOS 'C' or better in both Peak Hours.

NON ICE ALTERNATIVES

The intersection of Lovejoy Rd at Talmadge Rd is failing in the no build conditions and need to be addressed before the project is built. Results from the following alternatives are provided in Appendix J

Lovejoy Road at Talmadge Road

The following alternatives were chosen for further analysis for the intersection of Lovejoy Road at Talmadge Road.

- All Way Stop Control
- Mini Roundabout/ Mini Roundabout w/ slip lane

APPROACH	AM PEAK HOUR	PM PEAK HOUR
EBL/T/R	C (16.6)	C (16.6)
WBL/T/R	F (113.6)	F (89.8)
NBL/T/R	F (103.2)	D (30.1)
SBL/T/R	D (28.9)	F (191.3)

Table 43: CAPACITY ANALYSIS RESULTS, ALL WAY STOP CONTROL

Capacity analysis results indicate all approaches are expected operate at LOS 'F' in at least one of the Peak Hours. Execpt for the eastbound approach which is expected to operate at LOS 'C' in both Peak Hours.

		NO SLIF	P LANE		SLIP LANE			
APPROACH	AM PEAK HOUR	QUEUE LENGTH (FEET)	PM PEAK HOUR	QUEUE LENGTH (FEET)	AM PEAK HOUR	QUEUE LENGTH (FEET)	PM PEAK HOUR	QUEUE LENGTH (FEET)
EBL/T/R	A (5.3)	15	B (11.3)	39	A (5.3)	16	B (11.1)	38
WBL/T/R	B (14.7)	211	B (11.2)	121	A (6.4)	64	A (5.2)	43
NBL/T/R	A (9.9)	95	A (8.7)	69	A (9.9)	94	A (8.7)	69
SBL/T/R	A (6.2)	47	C (21.5)	431	A (6.1)	44	C (15.2)	406

Table 44: CAPACITY ANALYSIS RESULTS, MINI ROUNDABOUT

Capacity analysis results for no slip lane indicate that all approaches are expected to operate at LOS 'C' or better in both Peak Hours with. The longest queue experienced in the no slip lane alternative in the AM is the westbound approach with 211 feet length and the southbound approach at 431 feet in the PM. The longest queue length in the slip lane alternative in the AM is the northboung approach at 94 feet and in the PM the southbound approach at 406 feet. Figure 20 on the following page illustrates the improvement.

This alternative would include moving the intersection 150 feet southwest of its current location then constructing a mini roundabout with 80 foot inscribed diameter with added westbound slip lane. This would improve the overall operation of the intersection and diminish possible queuing on the westbound approach over the railway.



Figure 20: LOVEJOY ROAD AT TALMADGE ROAD MINI-ROUNDABOUT CONFIGURATION

However achieving the right of way for this alternative would be at the cost of the possible displacement of two houses on the south side and purchashing property on the north side.

SEGMENT ANALYSIS

Capacity analysis was also conducted for each roadway segment using the *Highway Capacity Sofeetware* from McTrans. Existing and Projected Volumes were evaluated. The HCM level-of-service definitions for two lane highways (Class II) and multilane highways are summarized in Table 12. The results for Segment Analysis will be provided in Appendix K

LEVEL	TWO LANE HIGWAYS (CLASS II)	MULTILANE HIGHWAYS
OF SERVICE	PERCENT TIME SPENT FOLLOWING (%)	DENSITY (PASSENGER CAR/MILE/LANE)
А	≤40	0 to 11
В	>40 - 55	>11 - 18
С	>55 - 70	>18 - 26
D	>70 - 85	>26 - 35
E	> 85	>35 – 45
F	Volume/Capacity (V/C) > 1	>45

Table 45: ROADWAY SEGMENT LEVEL OF SERVICE CRITERIA

Source: Highway Capacity Manual, Transportation Research Board, 2010

The two-lane highway segment analysis provides the directional volume, volume/capacity ratio (v/c), and LOS based on Percent Time Spent Following (PTSF). The multilane highway segment analysis provides the directional volume and LOS based on passenger cars/mile/lane (pc/mi/ln).

The Existing Volumes and Background Volumes were evaluated with the existing roadway segments. The 2025 Projected Volumes were evaluated to determine the minimum improvements necessary to provide the LOS 'D' standard. Only the 2025 Projected Volumes were evaluated for required mitigations because it will show the worst-case scenario LOS with the improvements.

EXISTING CONDITIONS

Table 42 summarizes the results of the roadway segment analysis for the existing volumes. Poor operating conditions are highlighted.

		ΑΜ ΡΕΑΚ		PM PEAK	
ROADWAY	SEGMENT		HOUR		HOUR
		TWO-LANE	MULTILANE	TWO-LANE	MULTILANE
	SR 81 – Lovejoy Road	N/A	1654 vph (NB) A (10.5) 697 vph (SB) A (7.4)	N/A	1047 vph (NB) A (6.7) 1509 vph (SB) B (14.9)
SR 3	Lovejoy Road – McDonough Road	N/A	1942 vph (NB) B (13.8) 941 vph (SB) A (9.4)	N/A	981 vph (NB) A (6.8) 1778 vph (SB) B (16.7)
	McDonough Road – Mundys Mill Road	N/A	1869 vph (NB) C (18.2) 1011 vph (SB) A (9.8)	N/A	1178 vph (NB) A (10.9) 2048 vph (SB) C (18.9)
	Hastings Bridge Road - Mt Carmel Road	495 vph (EB) 573 vph (WB) 0.34 (v/c) C (73%)	N/A	447 vph (EB) 654 vph (WB) 0.27 (v/c) C (64%)	N/A
CD 91	Lovejoy Road - N Steele Drive	176 vph (EB) 272 vph (WB) 0.12 (v/c) B (45%)	N/A	281 vph (EB) 243 vph (WB) 0.17 (v/c) B (60%)	N/A
SK 81	N Steele Road - Hastings Bridge Road	215 vph (EB) 277 vph (WB) 0.15 (v/c) B (47%)	N/A	263 vph (EB) 320 vph (WB) 0.16 (v/c) B (49%)	N/A
	SR 3 - Lovejoy Road	171 vph (EB) 310 vph (WB) 0.11 (v/c) B (42%)	N/A	274 vph (EB) 296 vph (WB) 0.17 (v/c) B (60%)	N/A
Mt Carmel Road	Mt Carmel Elementary School Bus Entrance - Mt Carmel Elementary School Entrance	619 vph (EB) 551 vph (WB) 0.46 (v/c) D (82%)	N/A	366 vph (EB) 415 vph (WB) 0.23 (v/c) C (64%)	N/A
	SR 81 - Mt Carmel Elementary School Bus Entrance	483 vph (EB) 541 vph (WB) 0.36 (v/c) C (74%)	N/A	290 vph (EB) 426 vph (WB) 0.18 (v/c) C (54%)	N/A
N Steele Drive	SR 81 - Hastings Bridge Road	2 vph (EB) 8 vph (WB) 0.00 (v/c) A (9%)	N/A	4 vph (EB) 1 vph (WB) 0.00 (v/c) A (39%)	N/A
	SR 3 - Talmadge Road	151 vph (EB) 352 vph (WB) 0.11 (v/c) C (38%)	N/A	205 vph (EB) 214 vph (WB) 0.13 (v/c) C (56%)	N/A
Lovejoy Road	SR 81 - Lovejoy Road	19 vph (EB) 31 vph (WB) 0.01 (v/c) A (22%)	N/A	26 vph (EB) 116 vph (WB) 0.02 (v/c) B (12%)	N/A
	Lovejoy Road - Talmadge Road	74 vph (EB) 57 vph (WB) 0.05 (v/c) B (40%)	N/A	153 vph (EB) 63 vph (WB) 0.10 (v/c) B (53%)	N/A

Table 46: EVALUATION OF EXISTING VOLUMES

		AM	PEAK	PM	PEAK
ROADWAY	SEGMENT	HOUR		HOUR	
		TWO-LANE	MULTILANE	TWO-LANE	MULTILANE
	N Steele Drive - Talmadge Road	346 vph (EB) 502 vph (WB) 0.22 (v/c) B (59%)	N/A	486 vph (EB) 391 vph (WB) 0.30 (v/c) B (72%)	N/A
	SR 3 - McDonough Road	607 vph (EB) 526 vph (WB) 0.38 (v/c) D (77%)	N/A	591 vph (EB) 526 vph (WB) 0.36 (v/c) D (77%)	N/A
Hastings Bridge Road	SR 81 - N Steele Drive	249 vph (EB) 396 vph (WB) 0.19 (v/c) B (54%)	N/A	364 vph (EB) 404 vph (WB) 0.23 (v/c) B (63%)	N/A
	Talmadge Road - McDonough Road	151 vph (EB) 352 vph (WB) 0.10 (v/c) B (32%)	N/A	284 vph (EB) 330 vph (WB) 0.18 (v/c) B (53%)	N/A
	SR 3 - Countyline Road	445 vph (EB) 548 vph (WB) 0.28 (v/c) D (68%)	N/A	922 vph (EB) 514 vph (WB) 0.57 (v/c) E (89%)	N/A
Talmadge Road	Lovejoy Road - Hastings Bridge Road	227 vph (EB) 386 vph (WB) 0.15 (v/c) C (49%)	N/A	298 vph (EB) 321 vph (WB) 0.19 (v/c) C (61%)	N/A

Table 47: EVALUATION OF EXISTING VOLUMES (CONTINUED)

Without improvements, the results indicate that one roadway segment do not achieve the LOS 'D' standard for the Existing Conditions.

2029 BACKGROUND VOLUMES

Table 14 summarizes the results of the roadway segment analysis with the 2029 No Build Volumes. Poor operating conditions are highlighted.

ROADWAY	SEGMENT	AM PEAK HOUR		AM PEAK PM PEAK SEGMENT HOUR HOUR		M PEAK HOUR
ROADWAT	JEGMENT	TWO-LANE	MULTILANE	TWO-LANE	MULTILANE	
	SR 81 – Lovejoy Road	N/A	1919 vph (NB) B (12.2) 808 vph (SB) A (8.6)	N/A	1214 vph (NB) A (7.8) 1750 vph (SB) B (17.3)	
SR 3	Lovejoy Road – McDonough Road	N/A	2253 vph (NB) B (16.0) 1091 vph (SB) A (10.9)	N/A	1138 vph (NB) A (7.9) 2062 vph (SB) C (19.4)	
	McDonough Road – Mundys Mill Road	N/A	2168 vph (NB) C (21.1) 1173 vph (SB) B (11.4)	N/A	1367 vph (NB) B (12.7) 2376 vph (SB) C (21.9)	
	Hastings Bridge Road - Mt Carmel Road	575 vph (EB) 665 vph (WB) 0.39 (v/c) C (76%)	N/A	518 vph (EB) 758 vph (WB) 0.31 (v/c) C (69%)	N/A	
CD 01	Lovejoy Road - N Steele Drive	204 vph (EB) 316 vph (WB) 0.14 (v/c) B (49%)	N/A	326 vph (EB) 282 vph (WB) 0.20 (v/c) B (64%)	N/A	
2K 81	N Steele Drive - Hastings Bridge Road	249 vph (EB) 321 vph (WB) 0.17 (v/c) B (50%)	N/A	308 vph (EB) 371 vph (WB) 0.19 (v/c) B (52%)	N/A	
	SR 3 - Lovejoy Road	198 vph (EB) 359 vph (WB) 0.13 (v/c) B (45%)	N/A	317 vph (EB) 344 vph (WB) 0.20 (v/c) B (62%)	N/A	
Mt Carmel Road	Mt Carmel Elementary School Bus Entrance - Mt Carmel Elementary School Entrance	717 vph (EB) 620 vph (WB) 0.53 (v/c) D (85%)	N/A	422 vph (EB) 481 vph (WB) 0.27 (v/c) C (68%)	N/A	
	SR 81 - Mt Carmel Elementary School Bus Entrance	541 vph (EB) 626 vph (WB) 0.40 (v/c) D (77%)	N/A	337 vph (EB) 491 vph (WB) 0.21 (v/c) C (58%)	N/A	
N Steele Drive	SR 81 - Hastings Bridge Road	2 vph (EB) 9 vph (WB) 0.00 (v/c) A (8%)	N/A	4 vph (EB) 1 vph (WB) 0.00 (v/c) A (39%)	N/A	
	SR 3 - Talmadge Road	174 vph (EB) 409 vph (WB) 0.12 (v/c) C (40%)	N/A	238 vph (EB) 248 vph (WB) 0.16 (v/c) C (58%)	N/A	
Lovejoy Road	SR 81 - Lovejoy Road	36 vph (EB) 31 vph (WB) 0.02 (v/c) A (33%)	N/A	31 vph (EB) 135 vph (WB) 0.02 (v/c) B (13%)	N/A	
	Lovejoy Road - Talmadge Road	86 vph (EB) 66 vph (WB) 0.06 (v/c) B (42%)	N/A	178 vph (EB) 103 vph (WB) 0.12 (v/c) B (55%)	N/A	

Table 48: EVALUATION OF 2029 BACKGROUND VOLUMES

		AM PEAK		PM PEAK	
ROADWAY	SEGMENT	HOUR		HOUR	
		TWO-LANE	MULTILANE	TWO-LANE	MULTILANE
	N Steele Drive - Talmadge Road	401 vph (EB) 582 vph (WB) 0.26 (v/c) C (62%)	N/A	564 vph (EB) 454 vph (WB) 0.35 (v/c) C (75%)	N/A
	SR 3 - McDonough Road	704 vph (EB) 610 vph (WB) 0.44 (v/c) D (81%)	N/A	797 vph (EB) 685 vph (WB) 0.49 (v/c) E (84%)	N/A
Hastings Bridge Road	SR 81 - N Steele Drive	289 vph (EB) 459 vph (WB) 0.22 (v/c) B (57%)	N/A	423 vph (EB) 468 vph (WB) 0.26 (v/c) B (67%)	N/A
	Talmadge Road - McDonough Road	237 vph (EB) 352 vph (WB) 0.15 (v/c) B (47%)	N/A	330 vph (EB) 382 vph (WB) 0.20 (v/c) B (56%)	N/A
	SR 3 - Countyline Road	516 vph (EB) 635 vph (WB) 0.33 (v/c) D (71%)	N/A	1069 vph (EB) 586 vph (WB) 0.66 (v/c) E (91%)	N/A
Talmadge Road	Lovejoy Road - Hastings Bridge Road	263 vph (EB) 448 vph (WB) 0.18 (v/c) C (51%)	N/A	345 vph (EB) 372 vph (WB) 0.22 (v/c) C (63%)	N/A

Table 49: EVALUATION OF 2029 BACKGROUND VOLUMES (CONTINUED)

Without improvements, the results indicate that two roadway segments do not achieve the LOS 'D' standard for the 2029 Projected No Build Conditions.

2029 PROJECTED VOLUMES

Table 15 summarizes the results of the roadway segment analysis for the 2029 Projected Volumes. Poor operating conditions are highlighted.

		AM PEAK		PI	M PEAK
ROADWAY	SEGMENT	HOUR			HOUR
		TWO-LANE	MULTILANE	TWO-LANE	MULTILANE
	SR 81 – Lovejoy Road	N/A	1919 vph (NB) B (12.2) 808 vph (SB) A (8.6)	N/A	1214 vph (NB) A (7.8) 1750 vph (SB) B (17.3)
SR 3	Lovejoy Road – McDonough Road	N/A	2537 vph (NB) C (18.1) 1184 vph (SB) B (11.8)	N/A	1329 vph (NB) A (9.2) 2377 vph (SB) C (22.3)
	McDonough Road – Mundys Mill Road	N/A	2387 vph (NB) C (23.3) 1245 vph (SB) B (12.1)	N/A	1511 vph (NB) B (14.1) 2616 vph (SB) C (24.1)
	Hastings Bridge Road - Mt Carmel Road	619 vph (EB) 681 vph (WB) 0.42 (v/c) C (79%)	N/A	549 vph (EB) 808 vph (WB) 0.33 (v/c) C (70%)	N/A
	Lovejoy Road - Driveway B	219 vph (EB) 340 vph (WB) 0.14 (v/c) B (49%)	N/A	378 vph (EB) 296 vph (WB) 0.24 (v/c) B (68%)	N/A
SR 81	Driveway B - N Steele Drive	254 vph (EB) 330 vph (WB) 0.17 (v/c) B (56%)	N/A	378 vph (EB) 327 vph (WB) 0.24 (v/c) B (68%)	N/A
	N Steele Drive - Hastings Bridge Road	291 vph (EB) 335 vph (WB) 0.20 (v/c) B (55%)	N/A	334 vph (EB) 416 vph (WB) 0.20 (v/c) B (54%)	N/A
	SR 3 - Lovejoy Road	245 vph (EB) 503 vph (WB) 0.16 (v/c) B (47%)	N/A	474 vph (EB) 473 vph (WB) 0.30 (v/c) C (73%)	N/A
Mt Carmel Road	Mt Carmel Elementary School Bus Entrance - Mt Carmel Elementary School Entrance	730 vph (EB) 626 vph (WB) 0.54 (v/c) D (86%)	N/A	432 vph (EB) 501 vph (WB) 0.28 (v/c) C (68%)	N/A
	SR 81 - Mt Carmel Elementary School Bus Entrance	554 vph (EB) 632 vph (WB) 0.41 (v/c) D (78%)	N/A	349 vph (EB) 511 vph (WB) 0.21 (v/c) C (58%)	N/A
N Steele Drive	SR 81 - Hastings Bridge Road	2 vph (EB) 9 vph (WB) 0.00 (v/c) A (8%)	N/A	4 vph (EB) 1 vph (WB) 0.00 (v/c) A (39%)	N/A

Table 50: EVALUATION OF 2029 PROJECTED VOLUMES

		AM HC	PEAK DUR	PM PEAK HOUR	
ROADWAY	SEGMENT	TWO-LANE	MULTILANE	TWO- LANE	MULTILANE
	SR 3 - Talmadge Road	267 vph (EB) 693 vph (WB) 0.19 (v/c) D (50%)	N/A	553 vph (EB) 439 vph (WB) 0.36 (v/c) D (78%)	N/A
	SR 81 - Driveway C	36 vph (EB) 31 vph (WB) 0.02 (v/c) A (33%)	N/A	31 vph (EB) 135 vph (WB) 0.02 (v/c) B (13%)	N/A
Lovejoy Road	Driveway C - Driveway D	1 vph (EB) 0 vph (WB) 0.00 (v/c) A (44%)	N/A	6 vph (EB) 0 vph (WB) 0.00 (v/c) A (45%)	N/A
	Driveway D - Lovejoy Road	218 vph (EB) 106 vph (WB) 0.14 (v/c) B (59%)	N/A	144 vph (EB) 372 vph (WB) 0.09 (v/c) C (35%)	N/A
	Talmadge Road - Lovejoy Road	237 vph (EB) 437 vph (WB) 0.16 (v/c) C (49%)	N/A	573 vph (EB) 315 vph (WB) 0.37 (v/c) D (79%)	N/A
	N Steele Drive - Talmadge Road	405 vph (EB) 586 vph (WB) 0.26 (v/c) C (62%)	N/A	573 vph (EB) 464 vph (WB) 0.35 (v/c) C (77%)	N/A
	SR 3 - McDonough Road	704 vph (EB) 610 vph (WB) 0.44 (v/c) D (81%)	N/A	797 vph (EB) 685 vph (WB) 0.49 (v/c) E (84%)	N/A
Hastings Bridge Road	SR 81 - N Steele Drive	293 vph (EB) 461 vph (WB) 0.22 (v/c) B (58%)	N/A	428 vph (EB) 477 vph (WB) 0.26 (v/c) C (68%)	N/A
	Talmadge Road - McDonough Road	256 vph (EB) 412 vph (WB) 0.16 (v/c) B (47%)	N/A	400 vph (EB) 424 vph (WB) 0.25 (v/c) C (63%)	N/A
	SR 3 - Countyline Road	538 vph (EB) 700 vph (WB) 0.34 (v/c) D (72%)	N/A	1144 vph (EB) 653 vph (WB) 0.71 (v/c) E (92%)	N/A
Talmadge Road	Lovejoy Road - Hastings Bridge Road	330 vph (EB) 472 vph (WB) 0.22 (v/c) C (60%)	N/A	396 vph (EB) 452 vph (WB) 0.25 (v/c) C (66%)	N/A
N Steele Road	Lovejoy Road - Driveway A	65 vph (EB) 135 vph (WB) 0.04 (v/c) B (25%)	N/A	188 vph (EB) 107 vph (WB) 0.12 (v/c) B (56%)	N/A

Table 51: EVALUATION OF 2029 PROJECTED VOLUMES (CONTINUED)

Without improvements, the results indicate that two roadway segments will not achieve the LOS 'D' standard with the 2029 Projected Build Volumes.

SUMMARY OF FINDINGS

The proposed Garden Lakes development will have four full access driveways:

- Driveway A will connect to North Steele Drive.
- Driveway B will connect to SR 81.
- Driveways C and D will connect to Lovejoy Road.

The development consists of 613 Single Family homes, 525 Townhomes and a 26 acre Farm-To-Table. It is expected to generate an estimated 10,389 new daily trips, 715 AM Peak Hour trips (178 entering and 537 exiting) and 957 PM Peak Hour trips (597 entering and 361 exiting).

Using data collected from the Henry County Comprehensive Plan, the Atlanta Regional Commission (ARC), and trend analysis from GDOT count stations the background growth rate was found to be 1.5%. Using that rate, the growth factor was calculated to be 1.16 for the year 2029.

Crash history for all sixteen intersections of the past full five years was obtained from the Georgia Department of Transportation (GDOT) using the GEARS website. During the full five year period, three fatalities were recorded:

- At the intersection of SR 81 and Mt Carmel Road. No description was given about this accident besides a visual diagram which showed an angle crash (as vehicle 1 was making a left turn NB vehicle 2 traveling WB impacted the right passenger side door of vehicle 1).
- At the intersection of SR 3 and Mundys Mill Road. The description given on the report stated that the driver traveling SB failed to see someone laying in the road. The reporting officer stated that the deceased might have been under the influence of alcohol/drugs at the scene.
- At the intersection of SR 3 and McDonough Road. The report stated that this was an angle crash, with driver 1 traveling NB and driver 2 traveling EB, possibly due to lack of awareness from one or both drivers.

Capacity analysis results for the existing signalized intersections indicate that all the intersections at the study area are operating at LOS 'D' or better in the AM and PM Peak Hours with the exception of the intersection of SR 3 and McDonough Road. The intersection operates at LOS 'E' in the AM Peak Hour and LOS 'D' in the PM Peak Hour.

Capacity analysis results for the existing unsignalized intersections indicate that all approaches are currently operating at LOS 'D' or better in both Peak Hours with the exception of the southbound approach of SR 81 at Mt Carmel Road which operates at LOS 'E', and the southbound left lane approach of Mt Carmel Road at Mt Carmel Elementary School Entrance which operates at LOS 'F' in at least one of the Peak Hours outside of school hours.

Capacity analysis results for the projected no build condition for signalized intersections indicate that all but two of the intersections at the study area are expected to operate at LOS 'D' or better in both Peak Hour with the exception of the following intersections:

- SR 3 at McDonough Road
- SR 3 at Mundys Mill Road.

These intersections are excpected to operate poorly in both Peak Hours.

Capacity analysis results for the projected no-build conditions for unsignalized intersections indicate that all movements are expected to operate at LOS 'D' or better with the execption of the following movements:

- Southbound approach of SR 81 at Mt Carmel Road
- Southbound approach of Mt Carmel Road at Mt Carmel Elementary School Bus Entrance
- Southbound left lane Mt Carmel Road at Mt Carmel Elementary School Entrance
- Southbound approach of Lovejoy Road at Talmadge Road.

These movements are all expected to operate at LOS 'F' in at least one of the Peak Hours.

Capacity analysis results for the projected build conditions for signalized intersections indicate that all of the intersections at the study area are expected to operate at LOS 'D' or better in both Peak Hour with the exception of the following intersections:

- SR 3 at McDonough Road
- SR 3 at Mundys Mill Road.

These intersections are excpected to operate at LOS 'F' or better in both Peak Hours.

Capacity analysis results for the projected build conditions for unsignalized intersections indicate that all movements are expected to operate at LOS 'D' or better with the execption of the following movements:

- Southbound approach of SR 81 at Mt Carmel Road
- Southbound approach of Mt Carmel Road at Mt Carmel Elementary School Bus Entrance
- Southbound left lane Mt Carmel Road at Mt Carmel Elementary School Entrance
- Southbound approach of Lovejoy Road at Talmadge Road.

These movements are all expected to operate at LOS 'F' in at least one of the Peak Hours.

Segment analysis results for the existing conditions indicate that all segments operate at LOS 'D' or better in both Peak Hours with the exception of the Hastings Bridge segment between SR 3 and Countyline Road. This segment is operating at LOS 'D' in the AM Peak Hour and LOS 'E' in the PM Peak Hour.

Segment analysis results for the projected no-build conditions indicate that all segments are expected to operate at LOS 'D' or better in both Peak Hours with the exception of the following two Hastings Bridge segments:

- Segment of SR 3 and McDonough Road
- Segment of SR 3 and Countyline Road

These segments are expected to operate at LOS 'D' in the AM Peak Hour and LOS 'E' in the PM Peak Hour.

Segment analysis results for the projected build conditions indicate that all segments are expected to operate at LOS 'D' or better in both Peak Hours with the exception of the following two Hastings Bridge segments:

- Segment of SR 3 and McDonough Road
- Segment of SR 3 and Countyline Road

These segments are expected to operate at LOS 'D' in the AM Peak Hour and LOS 'E' in the PM Peak Hour.

The GDOT Intersection Control Evaluation (ICE) Tool was used for the following GDOT intersections:

- SR 3 at SR 81/ Upper Woosley Road
- SR 3 at McDonough Road
- SR 3 at Mundys Mill Road
- SR 3 at N Steele Road/ Lovejoy Road
- SR 81 at Old Highway 3/ Hastings Bridge Road
- SR 81 at Lovejoy Road
- SR 81 at N Steele Road
- SR 81 at Mt Carmel Road
- SR 81 at Driveway B

A waiver was prepared for the following intersections due to them operating at acceptable conditions through the build conditions:

- o SR 3 at SR 81/ Upper Woosley Road
- o SR 81 at Old Highway 3/ Hastings Bridge Road
- o SR 3 at N Steele Road/ Lovejoy Road
- o SR 81 at Lovejoy Road
- o SR 81 at N Steele Road

The following intersections and alternative improvements that were evaluated with the GDOT ICE Tool:

- $\circ \quad SR \ 3 \ at \ McDonough \ Road$
 - Multilane Roundabout
 - Additional Left Turn Lanes
- o SR 3 at Mundys Mill Road
 - Multilane Roundabout
 - Additional Left Turn Lanes
- o SR 81 at Mt Carmel Road
 - All Way Stop Control
 - Added Left Turn Lane
 - Traffic Signal
 - Single-lane Roundabout
- SR 81 at Driveway B
 - Minor Street Stop
 - All Way Stop Control
 - Added Turn Lanes

SR 3 at McDonough Road

For the intersection listed above the following alternatives were tested under 2029 build conditions:

- Multi-lane Roundabout
- Additional Left Turn Lanes

Tables 49 and 50 show the capacity analysis results for the alternatives.

APPROACH	AM PEAK HOUR	PM PEAK HOUR
Eastbound	F (194.6)	F (455.6)
Westbound	F (438.8)	F (704.1)
Northbound	F (405.7)	F (55.5)
Southbound	C (17.8)	F (235.2)

Table 52: CAPACITY ANALYSIS RESULTS, MULTI-LANE ROUNDABOUT

Capacity analysis results for the multi-lane roundabout alternative showed that all approaches are expected to operate at LOS 'F' in both peak hours with the exception of the southbound approach in the AM Peak Hours. This approach is excepted to operate at LOS 'C' or better in the AM Peak Hour.

Table 53: CAPACITY ANALYSIS RESULTS, ADDITIONAL LEFT TURN LANES

APPROACH	AM PEAK HOUR	PM PEAK HOUR
SR 3 at McDonough Rd	F (91.4)	D (51.2)

Capacity analysis results for the additional turn lanes alternative showed that the intersection is excpected to operate at LOS 'F' in the AM Peak Hour and LOS 'D' in the PM Peak Hour.

Out of the alternatives shown above the ICE Tool selected the additional left turn lanes alternative to be the preferred choice.

SR 3 at Mundys Mill Road

For the intersection listed above the following alternatives were tested:

- Multi-lane Roundabout
- Additional Left Turn Lanes

Tables 51 and 52 show the capacity analysis results for the alternatives.

APPROACH	AM PEAK HOUR	PM PEAK HOUR
Eastbound	F (99.4)	F (601.9)
Westbound	F (90.8)	F (250.4)
Northbound	F (319.9)	C (16.1)
Southbound	B (11.3)	F (177.9)

Table 54: CAPACITY ANALYSIS RESULTS, MULTI-LANE ROUNDABOUT

Capacity analysis results for the multi-lane roundabout alternative showed that all approaches are expected to operate at LOS 'F' in both peak hours with the exception of the southbound and the northbound approach. The northbound approach is excpected to operate at LOS 'C' or better in the PM Peak Hour and the southbound approach is excpected to operate at LOS 'B' or better in the AM Peak Hour.

Table 55: CAPACITY ANALYSIS RESULTS, ADDITIONAL LEFT TURN LANES

APPROACH	AM PEAK HOUR	PM PEAK HOUR
SR 3 at McDonough Rd	F (85.7)	F (100.5)

Capacity analysis results for the additional turn lanes alternative showed that the intersection is excpected to operate at LOS 'F' in both Peak Hours.

Out of the alternatives shown above the ICE Tool selected the additional left turn lanes alternative to be the preferred choice.

SR 81 at Mt Carmel Road

For the intersection listed above the following alternatives were tested:

- All Way Stop Control
- Added Left Turn Lane
- Traffic Signal (didn't meet requirements)
- Single-lane Roundabout

Tables 53 through 55 show the capacity analysis results for the alternatives.

APPROACH	AM PEAK HOUR	PM PEAK HOUR
Eastbound	F (358.8)	F (98.2)
Westbound	F (71.8)	E (38.8)
Southbound	D (28.5)	D (31.9)

Table 56: CAPACITY ANALYSIS RESULTS, ALL WAY STOP CONTROL

Capacity analysis results for the all way stop control alternative show that all approaches are expected to operate at LOS 'E' or worse in both Peak Hours with the exception of the southbound approach. This approach is expected to operate at LOS 'D' or better in both Peak Hours.

AM PEAK HOUR	PM PEAK HOUR
B (12.9)	C (22.4)
A (0.0)	A (0.0)
A (0.0)	A (0.0)
F (54.5)	F (*)
	AM PEAK HOUR B (12.9) A (0.0) A (0.0) F (54.5)

Table 57: CAPACITY ANALYSIS RESULTS, ADDED LEFT TURN LANE

*= delay over 1000 seconds

Capacity analysis results for the added turn lanes alternative show that all approaches are expected to operate at LOS 'C' or better in both peak hours with the exepction of the southbound approach. This approach is expected to operate at LOS 'F' in both Peak Hours.

APPROACH	AM PEAK HOUR	PM PEAK HOUR
Eastbound	A (9.1)	A (7.2)
Westbound	B (10.3)	A (7.9)
Southbound	A (7.1)	A (9.6)

Capacity analysis results for the single-lane roundabout alternative show that all approaches are expected to operate at LOS 'B' or better in both Peak Hours.

Out of the alternatives shown above the ICE Tool selected the single-lane roundabout alternative to be the preferred alternative.

SR 81 at Driveway B

For the intersection listed above the following alternatives were tested:

- Minor Street Stop
- All Way Street Stop
- Added Turn Lanes

Tables 56 through 58 show the capacity analysis results for the alternatives.

APPROACH	AM PEAK HOUR	PM PEAK HOUR
Eastbound	A (8.0)	A (8.1)
Westbound	A (0.0)	A (0.0)
Southbound	B (12.9)	B (14.3)

Table 59: CAPACITY ANALYSIS RESULTS, MINOR STREET STOP

Capacity analysis results for the minor street stop alternative show that all of the approaches are expected to operate at LOS 'B' or better in both Peak Hours.

APPROACH	AM PEAK HOUR	PM PEAK HOUR
Eastbound	A (9.4)	B (11.9)
Westbound	B (10.7)	B (10.8)
Southbound	A (8.8)	A (8.9)

Table 60: CAPACITY ANALYSIS RESULTS, ALL WAY STOP CONTROL

Capacity analysis results for the all way stop control alternative show that all of the approaches are expected to operate at LOS 'B' or better in both Peak Hours.

APPROACH	AM PEAK HOUR	PM PEAK HOUR
EBL	A (8.0)	A (8.1)
EBT	A (0.0)	A (0.0)
WBT	A (0.0)	A (0.0)
WBR	A (0.0)	A (0.0)
SBL	B (13.5)	C (15.5)
SBR	B (10.3)	B (10.0)

Table 61: CAPACITY ANALYSIS RESULTS, ADDED TURN LANES

Capacity analysis results for the added turn lanes alternative show that all the movements are expected to operate at LOS 'C' or better in both Peak Hours.

Out of the alternatives shown above the ICE Tool selected the all way stop control alternative to be the preferred alternative.

The following intersections are experiencing unacceptable LOS in the projected no-build conditions:

- Mt Carmel Road at Mt Carmel Elementary School Bus Entrance
- Mt Carmel Road at Mt Carmel Elementary School Entrance
- Lovejoy Road at Talmadge Road

The intersection of Mt Carmel Road at Mt Carmel Elementary School Bus Entrance projected volumes do not meet the 90/10 screening method for a roundabout. The existing geometry at Mt Carmel Road at Mt Carmel Elementary School Entrance consit of fully builtout turn lanes, and the projected volumes do not meet the thresholds for a roundabout. The volumes from the no build projections to the build projections does not effect either of the intersections enough to meet the roundabout thresholds Therefore these two were excluded from any recommendations.

The intersection of Lovejoy Road at Talmadge was tested for All Way Stop Control as well as a Mini Roundabout with and without an included slip lane on the westbound approach. Capacity analysis results for All Way Stop Control indicated that all approaches would operate at LOS 'F' in at least one of the Peak Hours with the exception of the eastbound approach. This approach would operate at LOS 'C' in both of the Peak Hours. Capacity analysis results for a single-lane roundabout with and without the added slip lane indicated that all approaches would operate at LOS 'C' or better in the Peak Hours. The longest queue length experienced without the slip lane is the westbound approach at 211 feet in the AM and the southbound approach at 431 feet in the AM and the southbound approach at 94 feet in the AM and the southbound approach at 406 feet in the PM. There is also a MARTA bus stop located approximately 115 feet southwest of the intersection.

The Garden Lakes Driveways meet the following requirements:

- Driveway B
 - \circ left turn lanes on the eastbound and southbound approach
 - right turn lane on the westbound approach
- Driveway C
 - o left turn lane on the westbound approach
 - o right turn lane on the northbound approach
- Driveway D
 - left turn lane on the southbound approach
 - right turn lane on the westbound approach

RECOMMENDATIONS

RESPONSIBILITY OF THE LOCAL JURISDICTION

Based on the findings from this study the following is recommended;

• At the intersection of SR 81 and Mt Carmel Road

• Construct 160 feet inscribed diameter single-lane roundabout.



Figure 21: SR 81 AT MT CARMEL ROAD ROUNDABOUT CONFIGURATION

• At the intersection of Lovejoy Road and Talmadge Road

 although the mini-roundabout shown in Figure 20 would operate at acceptable level of service it is recommended to be kept at the same two way stop control as it is in existing conditions due to the right of way cost of the properties that would need to be bought to achieve this.

RESPONSIBILITY OF THE PROJECT DEVELOPMENT

At the intersection of SR 81 and Driveway B, the ICE Tool indentified all way stop control. However the driveway intersects a state highway, with high volume with a speed limit of 55 mph, the recommendations are as follows:

- 350 feet left turn lane on eastbound approach
- 300 feet right turn lane on westbound approach
- 100 feet right turn lane on southbound approach

Figure 22 below is a visual representation of the proposed intersection.



Figure 22: SR 81 AT DRIVEWAY B MINOR STREET STOP CONFIGURATION

At the intersection of Lovejoy Road and Driveway C the recommendations are as follows:

- 100 feet full width storage left turn lane on the westbound approach
- 150 feet full width storage right turn lane on the northbound approach

These improvements are illustrated in Figure 23 below.



Figure 23: LOVEJOY ROAD AT DRIVEWAY C MINOR STREET STOP CONFIGURATION
At the intersection of Lovejoy Road and Driveway D the recommendations are as follows:

- 100 feet full width storage right turn lane on the westbound approach
- 200 feet full width storage left turn lane on the southbound approach

Figure 24 below show an illustration of the improvements listed.

200 ft full width storage 100 ft full width storage Driveway D

Figure 24: LOVEJOY ROAD AT DRIVEWAY D MINOR STREET STOP CONFIGURATION

APPENDICES

SITE PLAN	A
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