DRAFT

MEMORANDUM

TO: **Christopher Brady, P.E.**
City Engineer
City of Vestavia Hills

FROM: **Jennifer Brown, P.E., RSP**
David Coggin, P.E.

DATE: **December 18, 2020**

SUBJECT: **Sicard Hollow Road at Blue Lake Drive and Cahaba Heights Road**
Proposed Roundabout
Vestavia Hills, AL
SA #20-0098

Purpose

The Regional Planning Commission of Greater Birmingham (RPCGB) administers the Advanced Planning, Programming, and Logical Engineering (APPLE) program. In June of 2019, Sain Associates completed the Vestavia Hills Traffic Operations APPLE Study (Phase 1). This study recommended a roundabout at the Sicard Hollow Road at Blue Lake Drive/Cahaba Heights Road intersection in Vestavia Hills, Alabama. Figure 1 shows a conceptual improvement map of the recommended roundabout from the Vestavia Hills Traffic Operations APPLE Study (Phase 1).

In May 2020, the City of Vestavia Hills contracted with Sain Associates to perform further due diligence for the proposed roundabout. The purpose of this memorandum is to summarize the additional traffic operations analysis of the proposed roundabout. This memorandum includes:

- Consideration of nearby proposed developments,
- Identification of impacts that the proposed developments may have on the previous recommendation of a roundabout, and
- Recommendations for improvements that may be necessary to mitigate any impacts.

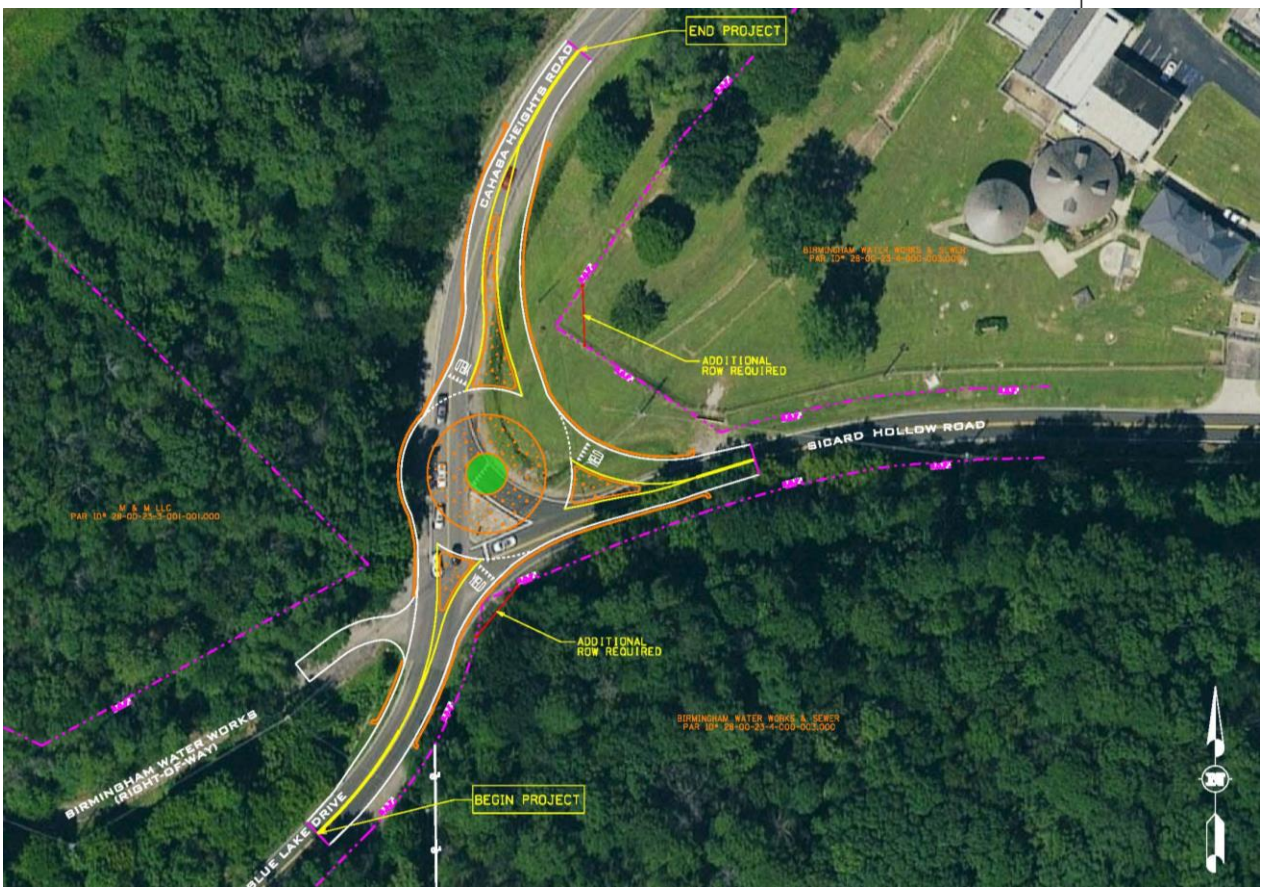

Figure 1: Roundabout Concept from Vestavia Hills Traffic Operations APPLE Study (Phase 1)

Existing Conditions

Blue Lake Road/Cahaba Heights Road and Sicard Hollow Road are classified as two-lane major collectors with speed limits of 35 MPH. The intersection is unsignalized and has four legs including a Birmingham Water Works access. The intersection serves as a hub for access between three areas: Cahaba Heights, the Colonnade and Patchwork Farms, and Liberty Park.

Photo 1: View of the Sicard Hollow Road at Blue Lake Drive/Cahaba Heights Road Intersection

Traffic Data

24-hour turning movement counts were collected at the study intersection on Wednesday, February 6, 2019. The morning peak hour occurs between 7:15 AM and 8:15 AM, while the afternoon peak hour occurs between 4:30 PM and 5:30 PM. Table 1 shows the peak hour traffic volumes at the intersection.

Table 1: Existing Peak Hour Traffic Volumes and Heavy Vehicle Percentages (2019)

Approach	Movement	Traffic Volume	
		AM Peak Hour	PM Peak Hour
Blue Lake Drive Northbound	Through	597	464
	Right	80	256
Cahaba Heights Road Southbound	Left	92	184
	Through	253	320
Sicard Hollow Road Westbound	Left	230	90
	Right	272	79

Existing Documents and Adjacent Projects

Several existing documents and nearby planned projects were reviewed and evaluated for impacts associated with the intersection of Sicard Hollow Road and Blue Lake Drive. This section also contains discussion regarding the methodology used to integrate impacts into the future conditions traffic analysis of this memorandum.

Sain Associates provided an advanced planning report to the City of Vestavia Hills as a part of the RPCGB's APPLE program in June 2019. The report entitled Vestavia Hills Traffic Operations Study (Phase 1) documented nine study intersections for traffic operations and safety analysis. Sicard Hollow Road at Blue Lake Drive/Cahaba Heights Road was included as one of the study intersections. 24-hour turning movement counts, which are shown in Table 1, were collected at the intersection on Tuesday, February 6, 2019. The following analysis tasks were performed as a part of the study:

- Capacity analysis,
- Signal warrant,
- Sight distance measurements,
- Curve Analysis Reporting Services (CARS) runs, and
- Crash data analysis.

The results from each analysis task are summarized in Table 2. Refer to the Vestavia Hills Traffic Operations Study (Phase 1) document submitted in June 2019 for further details.

Table 2: Analysis Results Summary from Vestavia Hills Traffic Operations Study (Phase 1)

Analysis Type	Result
Capacity Analysis	See Tables 3 – 5
Signal Warrant	Not warranted with 2019 volumes.
Sight Distance Measurements	Required intersection sight distance (ISD) for 35 MPH (390') not met from Sicard Hollow westbound stop line. Looking northbound on Cahaba Heights Road, there is 350' of ISD. Looking southbound on Blue Lake Drive, there is 305' of ISD.
CARS Runs	The advisory speed traveling northbound along Blue Lake Drive is 25 MPH, while the advisory speed traveling southbound along Cahaba Heights Road is 20 MPH.
Crash Data Analysis	No conclusive trends were established due to limited sample size.

Several scenarios were included in the capacity analysis including existing volumes with existing geometry, existing volumes with a traffic signal, and existing volumes with a roundabout. The results can be found in Tables 3 – 5.

Table 3: Existing Peak Hour LOS at Sicard Hollow Road and Blue Lake Drive/Cahaba Heights Road (2019)

Approach (Existing Conditions)	AM LOS	PM LOS
	Left/Through/Right	Left/Through/Right
Blue Lake Drive – Northbound	A	A
Cahaba Heights Road – Southbound	A	A
Driveway – Eastbound	N/A*	N/A*
Sicard Hollow Road – Westbound	F	F

*No volume recorded on eastbound approach.

Table 4: Peak Hour LOS with Signalization (2019)

Approach (Signalized)	AM Peak LOS		PM Peak LOS	
	Left	Through/ Right	Left	Through/ Right
Blue Lake Drive – Northbound	D		B	
Cahaba Heights Road – Southbound	B	B	A	A
Driveway – Eastbound	N/A*		N/A*	
Sicard Hollow Road – Westbound	F		C	

*No volume recorded on eastbound approach.

Table 5: Peak Hour LOS with Roundabout

Type of Roundabout	Blue Lake Drive – NB		Cahaba Heights Road – SB		Driveway – EB		Sicard Hollow Road – WB		Roundabout LOS	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1-Lane by 1-Lane	B	B	A	A	B	B	E	A	C	B
1-Lane by 2-Lanes	A	B	A	A	A	A	B	A	A	A
2-Lanes by 1-Lane	A	A	A	A	A	A	C	A	B	A
2-Lanes by 2-Lanes	A	A	A	A	A	A	B	A	A	A

*Analysis includes 2019 traffic volumes grown 1% annually for 5 years at the request of the City.

Ultimately, a roundabout was recommended for the intersection due to its operational and safety benefits. With the installation of a traffic signal, the sight distance concerns would not be mitigated without realigning Cahaba Heights Road and Blue Lake Drive.

Liberty Park Traffic Study (February 2017)

In February 2017, Atkins provided a traffic impact study entitled Liberty Park Traffic Study for Liberty Park Joint Venture, LLP. The study performed trip generation for planned development throughout Liberty Park and included traffic data collected in September 2016.

The Liberty Park Traffic Study methodology included the following assumptions:

- All new traffic within Liberty Park is based on new or intercept trips per ITE *Trip Generation Manual*.
- New trip distribution for proposed development was based on the Birmingham Area Travel Demand Model.
- No travel demand modeling was performed with the new connection in place between Liberty Parkway and Sicard Hollow Road (Liberty Park Town Center Access.
- 12% of proposed residential development new trips were assigned to the Sicard Hollow Road at Liberty Park Town Center Access intersection. All proposed single-family residential new trips assigned to Overton Road South, which amounts to 30% of all new trips from proposed residential developments, were diverted to the Sicard Hollow Road access instead.
- 1% of all new trips for proposed commercial development were assigned to the Sicard Hollow Road access.
- An aggressive growth rate was used on Sicard Hollow Road to account for a potential Cahaba Beach Road to US-280 connection. This is evident in the projected 2030 peak hour volumes included in the document.

The Sicard Hollow Road at Blue Lake Drive/Cahaba Heights Road intersection was included for data collection in the Liberty Park Traffic Study. However, the intersection was not included in traffic analysis or recommendations. Turning movement counts were performed at this location on November 1, 2016, and 48-hour tube counts were collected along Sicard Hollow Road just west of Cahaba Beach Road on September 27 and 28, 2016. The peak hour volumes from both data collection efforts are summarized in Tables 6 and 7. The daily traffic volumes on September 27, 2016 and September 28, 2016 were 4,989 vehicles and 4,812 vehicles, respectively.

Table 6: Peak Hour Traffic Volumes on Sicard Hollow Road (2016)

Tube Count Location (Date)	AM Peak Hour		PM Peak Hour	
	Eastbound	Westbound	Eastbound	Westbound
Sicard Hollow Road east of Cahaba Beach Road (9/27/2016)	168	410	375	160
Sicard Hollow Road east of Cahaba Beach Road (9/28/2016)	183	426	340	176

Table 7: Peak Hour Volumes at Sicard Hollow Rd and Blue Lake Dr/Cahaba Heights Rd Intersection (2016)

Approach	Movement	Traffic Volume	
		AM Peak Hour	PM Peak Hour
Blue Lake Drive Northbound	Through	645	503
	Right	80	232
Cahaba Heights Road Southbound	Left	94	202
	Through	207	329
Sicard Hollow Road Westbound	Left	157	69
	Right	267	108

The Liberty Park Traffic Study provides future volumes for two horizon years, 2018 and 2030. The document designates certain development to be open to traffic by these horizon years. Table 8 lists the new trips generated by the proposed development within Liberty Park according to the Liberty Park Traffic Study. Table 9 shows the estimated 2030 peak hour volumes at the proposed Sicard Hollow Road intersection with the Liberty Park Town Center Access, while Table 10 shows the LOS for the same intersection. Ultimately, the study's recommended traffic control at this intersection is a signalized intersection and turn lanes.

Table 8: New Trips from Proposed Development - Liberty Park Traffic Study

Time Period	Proposed Development New Trips by Horizon Year		
	2018	2030	Total
AM Peak Hour	13	339	352
PM Peak Hour	17	393	410
Daily	160	4,197	4,357

Table 9: Peak Hour Volumes at Proposed Sicard Hollow Road at Liberty Park Town Center Access (2030)

Approach	Movement	Year 2030 Peak Hour Volume	
		AM Peak	PM Peak
Sicard Hollow Road Eastbound	Left	94	254
	Through	314	821
Sicard Hollow Road Westbound	Through	1054	376
	Right	27	76
Liberty Park Town Center Access	Left	77	43
	Right	250	150

Table 10: Peak Hour LOS at Proposed Sicard Hollow Road and Liberty Park Town Center Access (2030)

Approach	Year 2030	
	AM Peak*	PM Peak*
Sicard Hollow Road Eastbound	A	A
Sicard Hollow Road Westbound	B	A
Liberty Park Town Center Access	C	A
Intersection	B	A

*Analysis includes the installation of recommended improvements.

The Sicard Hollow Road at Blue Lake Drive/Cahaba Heights Road intersection was not included in traffic analysis or recommendations within the Liberty Park Traffic Study. At the proposed intersection of Sicard Hollow Road and Liberty Park Town Center Access, the Liberty Park Traffic Study recommends the following improvements by 2030:

- Intersection
  - Install a traffic signal
- Sicard Hollow Road Eastbound Approach
  - Install a left turn lane
- Sicard Hollow Road Westbound Approach
  - Install a right turn lane
- Liberty Park Town Center Southbound Approach
  - Install a left turn lane
  - Install a right turn lane

The future conditions traffic analysis section contains methodology and assumptions on how the findings of the Liberty Park Traffic Study were incorporated into analysis for this memorandum.

Cahaba Beach Road – US-280 Connector

Cahaba Beach Road is a two-lane local roadway from US-280 to Sicard Hollow Road. However, the road is narrow, partially unpaved, not continuous, and crosses the Little Cahaba River watershed. An iron bridge no longer sufficient for vehicle travel exists at its crossing of the Little Cahaba River. Cahaba Beach Road provides access to several single-family residential homes with an average annual daily traffic (AADT) volume of less than 100 vehicles per day in most locations along the roadway. The Little Cahaba River also presents environmental concerns for any major upgrades to the roadway.

The Regional Planning Commission of Greater Birmingham (RPCGB) Transportation Improvement Plan (TIP) for fiscal years 2020-2023 was finalized in September of 2019 and includes a project (sponsored by Shelby County) to extend Cahaba Beach Road from

Swan Drive (CR-346) to Sicard Hollow Road. This project would require a bridge over the Little Cahaba River. Per the TIP this project has a construction start date of November 4, 2021; however, in 2018 The City of Birmingham passed a resolution opposing the project and the City of Vestavia Hills passed a resolution opposing proposed options. There has been no forward progression of the proposed project since 2018 and there is a considerable amount of opposition from private citizens and organizations like the Cahaba River Society. Therefore, the proposed extension of Cahaba Beach Road is not included in the analysis summarized in this memorandum.

Grants Mill Road

Grants Mill Road is classified as a major collector and connects State Route 119 in Leeds to US-78 (State Route 4) in Irondale. Other significant intersecting roads include I-459, Old Leeds Road, Overton Road, Sicard Hollow Road, and Rex Lake Road. There has been discussion of a potential extension or widening on the southern side of this roadway. This could affect traffic volumes on Sicard Hollow Road, because it intersects Grants Mill Road approximately 6.7 miles east of Blue Lake Drive.

If Grants Mill Road was widened south of Sicard Hollow Road or extended to Dunnavant Valley Road (CR-41) in Shelby County, traffic volumes could increase along Sicard Hollow Road. There are no programmed projects on Grants Mill Road south of Sicard Hollow Road in the Birmingham Metropolitan Planning Organization's 2020 – 2023 Transportation Improvement Plan (TIP) or the 2045 Long Range Transportation Plan (LRTP). Considering how large of a project widening or extending Grants Mill Road would be, it is unlikely that either will occur within the horizon year of this study.

Future Conditions Traffic Analysis

Our future conditions traffic analysis will evaluate how the additional information provided within the Liberty Park Traffic Study might affect the recommendations of the Vestavia Hills Traffic Operations Study (Phase 1) at the intersection of Sicard Hollow Road and Blue Lake Drive/Cahaba Heights Road. To establish the future conditions for further analysis at the intersection, the 2019 turning movement volumes collected during the APPLE Study were added to the new trips generated by the proposed development and provided in the Liberty Park Traffic Study. Figure 2 shows a descriptive equation to summarize how the future traffic volumes were calculated. The 2019 turning movement counts can be found in Table 1, and the new trips generated by proposed development can be found in Table 8.

Figure 2: Future Conditions Traffic Volumes Description

The resulting future conditions traffic volumes are shown in Table 11.

Table 11: Future Conditions Traffic Volumes (2030)

Approach	Movement	Traffic Volume	
		AM Peak Hour	PM Peak Hour
Blue Lake Drive Northbound	Through	597	464
	Right	129	423
Cahaba Heights Road Southbound	Left	149	304
	Through	253	320
Sicard Hollow Road Westbound	Left	343	156
	Right	405	136

Methodology

Future conditions traffic volumes were calculated as described in Figure 2. The growth in traffic volumes represented by the new trips generated by the proposed Liberty Park development encompasses a reasonable growth rate that would typically be used to grow existing traffic volumes in a typical traffic study. The new trips generated represents greater than 25% growth in peak hour traffic volume at the intersection by the horizon year 2030. For this reason, no additional growth rate was used to calculate the future conditions traffic volumes used in this memorandum's traffic analysis. Additionally, several assumptions must be made:

- The trip generation, assignment, and distribution performed in the Liberty Park Traffic Study was accepted for the purposes of traffic analysis performed in this memorandum. The process used to develop some of this information is not immediately clear in the Liberty Park Traffic Study document.
- The Liberty Park Traffic Study identified new trips from the proposed Liberty Park developments that were assigned to Sicard Hollow Road west of its intersection with the Liberty Park Town Center Access. These new trips on Sicard Hollow Road were distributed through the intersection of Sicard Hollow Road at Blue Lake Drive and Cahaba Heights Road based on existing turning movement percentages from the 2019 peak hour turning movement counts.

- It is assumed that the land use and development plans have not changed from what is described and used in trip generation in the Liberty Park Traffic Study.
- The turning movement counts from the Liberty Park Traffic Study estimated for horizon year 2030 at the proposed Sicard Hollow Road at Liberty Park Town Center Access were not used in future conditions traffic analysis for this memorandum as an aggressive annual growth rate was applied to Sicard Hollow Road to account for the proposed extension of Cahaba Beach Road (see discussion on page 8).
- Travel demand modeling was not performed with the link connecting Liberty Parkway and Sicard Hollow Road. Existing travel patterns could change after this new connection is established between Liberty Parkway and Sicard Hollow Road. In the Liberty Park Traffic Study, there were no existing traffic volumes diverted through the new connection to Sicard Hollow Road.

Traffic Volume Growth Evaluation

This section contains detailed discussion about the future conditions traffic volume methodology and how it compares to other transportation planning efforts. Supplemental data is provided to contextualize the assumptions made for the future conditions traffic analysis. Estimating future traffic volumes is not an exact science, and the landscape of cities can change quickly after a study is performed. In the transportation planning process, it is typical to utilize one of the following methods to estimate traffic volume growth:

1. Assume a straight-line growth trend in the form of an annual growth rate. The annual growth rate is typically based on historical traffic data or previous transportation planning efforts in the area. In theory, this accounts for all "background" growth that could potentially affect the study area prior to the horizon year. This method is typically more useful for large transportation planning efforts or areas adjacent to a large amount of undeveloped land.
2. Perform trip generation for all known proposed development surrounding the study area by the methods described in the ITE *Trip Generation Manual*. This method is typically more useful in locations that are essentially fully developed apart from specific known developments.
3. Use a combination of methods #1 and #2. Account for known developments by performing trip generation and add a straight-line annual growth rate to existing volumes for a conservative estimation of future "background" traffic volumes.

The Liberty Park Traffic Study utilized method #2 to estimate future traffic volumes in horizon year 2030. A qualitative examination of any growth rate as "aggressive" or "modest" is speculative in nature, but a comparison between methods can be performed and compared to growth rates in other locations. An annual growth rate equivalent can be back-calculated from the number of new trips generated by the proposed Liberty Park development. Table 12 shows the comparison of a four-year period

of historical data and the equivalent growth rate calculated using the new trips generated in the Liberty Park Traffic Study.

ALDOT's Traffic Data website was used to study how historic growth trends compare to the proposed development plans in Liberty Park. Using 2019 volumes with the new trips generated by proposed development in Liberty Park accounts for aggressive growth on Sicard Hollow Road that outpaces historical traffic data trends since 2015 to 2019. This also accounts for modest growth from Blue Lake Drive and Cahaba Heights Road, which falls in line with historic traffic data trends from 2015 to 2019. The historic traffic data trend on Cahaba Heights Road reveals a slight decline in traffic volumes from 2015 to 2019.

Table 12: Growth Rate Comparison – Peak Hours

Roadway	Annual Growth Rate* (2015 – 2019)	Equivalent Annual Growth Rate* represented by New Trips from Liberty Park Development (2020 – 2030)
Sicard Hollow Road	2.8%	5 – 7%
Blue Lake Drive	3.3%	1 – 3%
Cahaba Heights Road	-1.2%	1 – 3%

*per year average

Figure 3 shows a visual representation of how each growth method would be applied to this study.

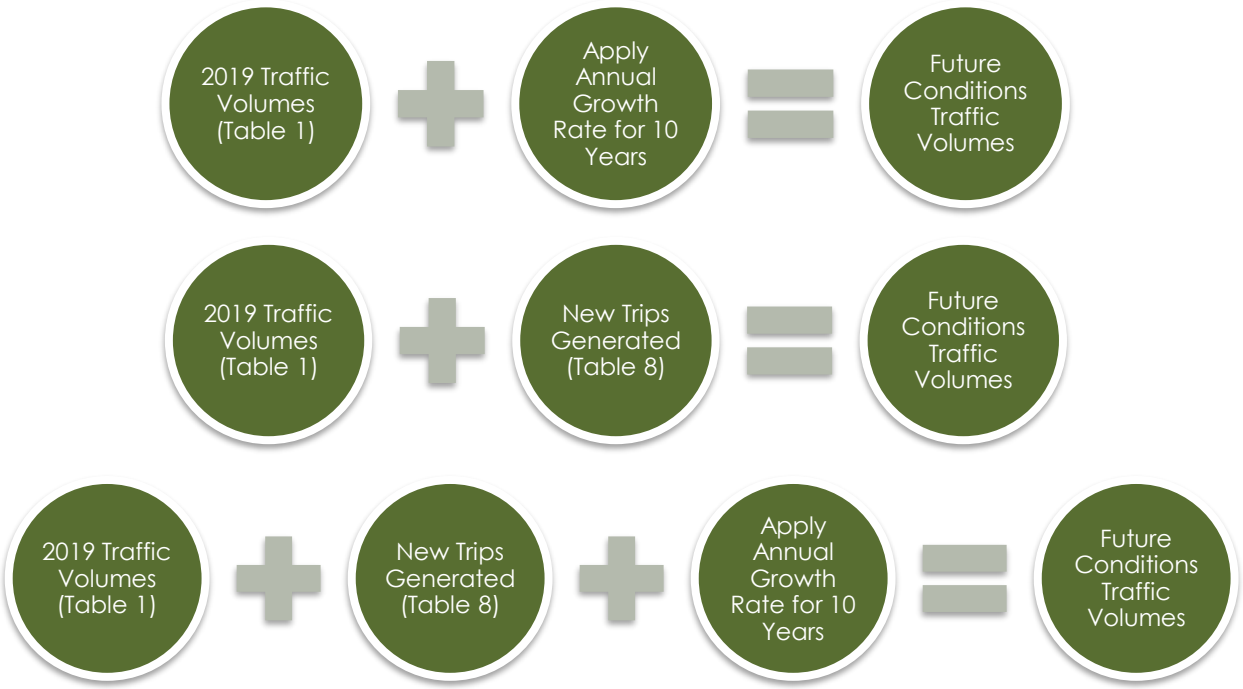

Figure 3: Descriptive Equation of Method #1 (Top), Method #2 (Middle), Method #3 (Bottom)

To summarize, using a background growth rate in addition to the new trips generated by Liberty Park development (Method #3) would be considered a very conservative projection. Using a straight-line trend annual growth rate (Method #1) would likely yield lower traffic volumes than the volumes used for future conditions traffic analysis in this memorandum. The future conditions traffic volumes (Method #2) used in this memorandum is also considered conservative, based on historical traffic data trends and growth rates used across the Birmingham metropolitan area.

Capacity Analysis

Sain Associates conducted a capacity analysis for vehicular traffic at the study intersection using ALDOT's Capacity Analysis for Planning of Roundabouts tool. Traffic capacities are expressed as levels of service (LOS) ranging from "A" (free-flow conditions) to "F" (very congested conditions). Generally, LOS "C" is desirable, while LOS "D" is considered acceptable during peak hours of traffic flow. Level of service criteria for unsignalized intersections is stated in terms of average control delay. Control delay is defined as the total elapsed time from a vehicle joining the queue until its departure from the stopped position at the head of the queue. The criteria for each level of service are cited in the Table 13.

Table 13: Unsignalized LOS Delay

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

Table 14 shows a breakdown of the levels of service (LOS) during the 2030 AM and PM peak hours based on projected future post-development volumes with a single-lane roundabout installed without right turn bypass lanes. During the AM peak hour, the heavy northbound through movement volume conflicts with the heavy westbound approach volume to cause LOS F on the Blue Lake Drive northbound approach. During the PM peak hour, the heavy northbound approach volume conflicts with the heavy southbound left turn volume, causing LOS F on the northbound approach.

Table 14: Future Conditions LOS with Single-Lane Roundabout – No Bypass Lanes (2030)

Approach	2030 AM Peak LOS	2030 PM Peak LOS
Blue Lake Drive Northbound	B	F
Cahaba Heights Road Southbound	B	B
Sicard Hollow Road Westbound	F	A
Intersection LOS	**F**	**E**

Table 15 shows a breakdown of the levels of service (LOS) during the 2030 AM and PM peak hours based on projected future post-development volumes with a single-lane roundabout installed with the recommended right turn bypass lanes on the westbound and northbound approaches. All approaches register satisfactory LOS. The issues described with a single-lane roundabout without bypass lanes are mitigated by separating the through and left turn lanes from the right turn lanes at the yield point. Instead of only one car per approach looking for an acceptable gap in traffic at any given time, the bypass lane allows one through or left turning car and one right turning car to look for acceptable gaps simultaneously. This results in less vehicle delay and a better LOS at each approach.

Table 15: Future Conditions LOS with Single-Lane Roundabout and Recommended Bypass Lanes (2030)

Approach	2030 AM Peak LOS	2030 PM Peak LOS
Blue Lake Drive Northbound Through/Left	B	B
Blue Lake Drive Northbound Right Turn Bypass Lane	A	B
Cahaba Heights Road Southbound	B	B
Sicard Hollow Road Westbound Through/Left	B	A
Sicard Hollow Road Westbound Right Turn Bypass Lane	C	A
Intersection LOS	**B**	**B**

Recommendations

As a result of the document review and traffic analysis, Sain Associates recommends the following improvements:

- Construct a single-lane roundabout at the intersection of Sicard Hollow Road at Blue Lake Drive/Cahaba Heights Road with right turn bypass lanes on the northbound and westbound approaches.

Roundabout Service Life

The LOS for each approach on a single-lane roundabout with right turn bypass lanes at the intersection of Sicard Hollow Road at Blue Lake Drive/Cahaba Heights Road is projected to be satisfactory in the 2030 (Table 15). In order to conservatively examine the possibility of additional growth, a service life or failure criteria can be estimated by calculating the untapped capacity of the proposed roundabout. It is typical in transportation planning to use a 20-year window in future capacity analysis, which would account for growth beyond the 2030 horizon year used for analysis in the Liberty Park Traffic Study and this memorandum.

In addition to the conservative future conditions traffic volumes in Table 11, the annual growth rates in Table 16 for existing traffic volumes would need to be sustained for a 20-year period (2020 to 2040) for any approach of the proposed roundabout to reach LOS F during peak hours.

Table 16: 20-Year Failure Criteria of Proposed Roundabout by Annual Growth Rate

What additional growth could be accommodated by the proposed roundabout before any approach reaches LOS F during peak hours?	
Approach	**Annual Growth Rate (2020 to 2040)**
Sicard Hollow Road Westbound	0.5% per year for 20 years
Blue Lake Drive Northbound	1.0% per year for 20 years
Cahaba Heights Road Southbound	1.0% per year for 20 years

Signalized Intersection Performance

One alternative to a roundabout at this location is a signalized intersection. However, preliminary capacity analysis indicates that the following improvements would likely be required to reach comparable LOS to the single-lane roundabout with right turn bypass lanes:

- Install a traffic signal;
- Widen the Sicard Hollow Road westbound approach to include two left turn lanes and a right turn lane;

- Widen Blue Lake Drive to four lanes, with two lanes in each direction;
- Widen Cahaba Heights Road to two northbound travel lanes;
- Install a left turn lane on Cahaba Heights Road southbound approach to Sicard Hollow Road;
- To avoid uneven queuing, the widening on Blue Lake Drive and Cahaba Heights Road would likely need to continue to US-280 and into Cahaba Heights, respectively; and
- Due to the poor geometry at the intersection, Blue Lake Drive and Cahaba Heights Road would need to be realigned in addition to all widening mentioned above.

A project including each of these improvements would come at a cost that far exceeds the cost of the recommended single-lane roundabout with right turn bypass lanes. Additionally, a signalized intersection would likely experience more severe crashes than the proposed roundabout.

SAIN ASSOCIATES

Supplemental Materials

Single-Lane Roundabout Capacity Analysis – No Right Turn Bypass Lanes

Capacity Analysis for Planning of Roundabouts

Output Worksheet

Project Name:	*Sicard Hollow at Blue Lake - Existing + New Trips (AM)*
Project Number:	*SA#20-0098*
Location	*Vestavia Hills, Alabama*
Date	December 10, 2020

ALABAMA DEPARTMENT OF TRANSPORTATION

Results for Roundabouts

#	TYPE OF ROUNDABOUT	Zone 1 (North)			Zone 3 (West)			Zone 2 (South)			Zone 4 (Eest)			Consolidated LOS	Ranking
		Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane		
1.0	1 X 1	LOS B		n/a	LOS B		n/a	LOS B		n/a	LOS F		n/a	LOS F	#DIV/0!
1.2	1 X 2	LOS A		n/a	LOS A	LOS A	n/a	LOS B		n/a	LOS B	LOS C	n/a	#DIV/0!	#DIV/0!
1.3	2 X 1	LOS A	LOS A	n/a	LOS A		n/a	LOS A	LOS A	n/a	LOS F		n/a	#DIV/0!	#DIV/0!
1.4	2 X 2	LOS A	LOS A	n/a	LOS A	LOS A	n/a	LOS A	LOS A	n/a	LOS B	LOS B	n/a	#DIV/0!	#DIV/0!

Capacity Analysis for Planning of Roundabouts

Output Worksheet

Project Name:	*Sicard Hollow at Blue Lake - Existing + New Trips (PM)*
Project Number:	*SA#20-0098*
Location	*Vestavia Hills, Alabama*
Date	December 10, 2020

ALABAMA DEPARTMENT OF TRANSPORTATION

Results for Roundabouts

#	TYPE OF ROUNDABOUT	Zone 1 (North)			Zone 3 (West)			Zone 2 (South)			Zone 4 (Eest)			Consolidated LOS	Ranking
		Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane		
1.0	1 X 1	LOS B		n/a	LOS B		n/a	LOS F		n/a	LOS A		n/a	LOS E	#DIV/0!
1.2	1 X 2	LOS A		n/a	LOS A	LOS A	n/a	LOS E		n/a	LOS A	LOS A	n/a	#DIV/0!	#DIV/0!
1.3	2 X 1	LOS A	LOS A	n/a	LOS A		n/a	LOS A	LOS B	n/a	LOS A		n/a	#DIV/0!	#DIV/0!
1.4	2 X 2	LOS A	LOS A	n/a	LOS A	LOS A	n/a	LOS A	LOS A	n/a	LOS A	LOS A	n/a	#DIV/0!	#DIV/0!

Proposed Roundabout Capacity Analysis – With Right Turn Bypass Lanes

Capacity Analysis for Planning of Roundabouts

Output Worksheet

Project Name:	*Sicard Hollow at Blue Lake - Improved Existing + New Trips (AM)*
Project Number:	*SA#20-0098*
Location	*Vestavia Hills, Alabama*
Date	December 10, 2020

ALABAMA DEPARTMENT OF TRANSPORTATION

Results for Roundabouts

#	TYPE OF ROUNDABOUT	Zone 1 (North)			Zone 3 (West)			Zone 2 (South)			Zone 4 (Eest)			Consolidated LOS	Ranking
		Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane		
1.0	1 X 1	LOS B		n/a	LOS B		n/a	LOS B		LOS A	LOS B		LOS C	LOS B	#DIV/0!
1.2	1 X 2	LOS A		n/a	LOS A	LOS A	n/a	LOS B		n/a	LOS B	LOS C	n/a	#DIV/0!	#DIV/0!
1.3	2 X 1	LOS A	LOS A	n/a	LOS A		n/a	LOS A	LOS A	n/a	LOS F		n/a	#DIV/0!	#DIV/0!
1.4	2 X 2	LOS A	LOS A	n/a	LOS A	LOS A	n/a	LOS A	LOS A	n/a	LOS B	LOS B	n/a	#DIV/0!	#DIV/0!

Capacity Analysis for Planning of Roundabouts

Output Worksheet

Project Name:	*Sicard Hollow at Blue Lake - Improved Existing + New Trips (PM)*
Project Number:	*SA#20-0098*
Location	*Vestavia Hills, Alabama*
Date	December 10, 2020

ALABAMA DEPARTMENT OF TRANSPORTATION

Results for Roundabouts

#	TYPE OF ROUNDABOUT	Zone 1 (North)			Zone 3 (West)			Zone 2 (South)			Zone 4 (Eest)			Consolidated LOS	Ranking
		Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane		
1.0	1 X 1	LOS B		n/a	LOS B		n/a	LOS B		LOS B	LOS A		LOS A	LOS B	#DIV/0!
1.2	1 X 2	LOS A		n/a	LOS A	LOS A	n/a	LOS E		n/a	LOS A	LOS A	n/a	#DIV/0!	#DIV/0!
1.3	2 X 1	LOS A	LOS A	n/a	LOS A		n/a	LOS A	LOS B	n/a	LOS A		n/a	#DIV/0!	#DIV/0!
1.4	2 X 2	LOS A	LOS A	n/a	LOS A	LOS A	n/a	LOS A	LOS A	n/a	LOS A	LOS A	n/a	#DIV/0!	#DIV/0!