Lavista Road at Chamblee Tucker Road & Fellowship Road Traffic Study

Tucker, Georgia

PREPARED FOR: City of Tucker
CHA PROJECT NO. 20-TF-025

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1. EXECUTIVE SUMMARY

The intersection of Lavista Road, Chamblee Tucker Road, and Fellowship Road, commonly known as the "Tucker Triangle" within the local community, is a major crossroads located near the City of Tucker's central business district. The roads converge at three intersections, each forming the corner of a triangle. Land use in the immediate vicinity of the Tucker Triangle consists primarily of commercial and retail properties, educational property, and to a lesser extent, residential properties.

In 2020, the City of Tucker requested that a traffic study be performed to address congestion and safety concerns associated with the Tucker Triangle. CHA was hired to evaluate existing and future conditions in the study area and to develop potential solutions for addressing congestion and safety issues identified through the analysis. This report summarizes the analysis process and provides recommendations for implementing improvements in the study area.

1.1 STUDY AREA

The project study area includes portions of Lavista Road, Fellowship Road, Chamblee Tucker Road, and Main Street. During the alternative development phase, Lynburn Drive was also incorporated into the analysis. The following intersections were evaluated as part of the study:

1. SR 236 /Lavista Road & Fellowship Road
2. SR 236/Lavista Road & Chamblee Tucker Road
3. Chamblee Tucker Road & Fellowship Road
4. SR 236/Lavista Road at Main Street

1.2 LOCAL PROJECTS

Dekalb County and the City of Tucker have been working with VHB to evaluate a potential road diet on Chamblee Tucker Road, just north of this project study area. The proposed road diet would eliminate one travel lane in each direction. The new roadway configuration would include one travel lane in each direction, a center two-way left-turn lane (TWLTL) and bike lanes. A key goal of the project is to improve pedestrian safety and access along the corridor.

In addition to the Chamblee Tucker Road diet, Dekalb County is promoting greater pedestrian and bicycle accessibility throughout the county through the Tucker Last Mile Connectivity plan. Lavista Road and Main Street have been identified as priority network links within the Dekalb County Transportation Plan.

The City of Tucker Comprehensive Plan, known as *Tucker Tomorrow*, includes goals to create community gateways and install pedestrian enhancements on Main Street. In addition, the plan would add a trail system connection on the east leg at the intersection of Lavista Road and Main Street.

1.3 DATA COLLECTION

A variety of information was gathered and analyzed to determine existing congestion and safety concerns within the study area.

A site visit was performed in September 2020. The site visit was originally intended to be conducted while school was in session so that typical school-related traffic could be observed. Unfortunately Dekalb County Schools was operating on a virtual platform in the fall of 2020 in response to the ongoing COVID-19 pandemic. In lieu of field observations, the project team was able to get some feedback from local community members whose children attend Tucker High School and are familiar with the typical travel patterns in the area.

Crash data was obtained for a recent 5-year period from Numetric, a traffic safety analytics platform employed by Georgia Department of Transportation (GDOT).

2018 traffic counts were provided by the City of Tucker. A growth rate was calculated for the study area based on historical traffic volumes in the area, population counts, and travel demand model data. Due to COVID-19 impacts on the volumes of traffic and travel patterns, instead of performing new traffic counts, the 2018 traffic counts were grown to the year 2020 using the study area growth rate.

Early in the study process, meetings were held with local stakeholders to identify any community concerns that should be considered during the development of mitigation strategies. The stakeholders included City of Tucker City Council members, City of Tucker staff, Dekalb County staff, and the Tucker High School principal. The stakeholders provided a variety of comments including ideas to evaluate as well as information regarding typical travel patterns in the study area.

1.4 SAFETY ANALYSIS

The crash history for the three Tucker Triangle intersections was evaluated to identify any safety concerns at the study intersections. Key findings include:

- No fatalities were reported at any of the study intersections during the analysis period.
- A high volume of crashes were reported at the intersection of Lavista Road and Fellowship Road over the 5-year analysis period.
- 43% of reported crashes at Lavista Road and Fellowship Road were classified as angle crashes.
- 36% of reported crashes at Lavista Road and Fellowship Road were classified as rear end crashes.

1.5 OPERATIONAL ANALYSIS

Opening and Design Years were determined for the project to be used in the analysis process. An Opening Year of 2025 was assumed. The Design Year is typically set 20 years beyond the Opening Year according to GDOT policies. A Design Year of 2045 was used for this project.

Standard capacity analysis methodologies were applied to evaluate traffic operations for the Existing Year and Future Years traffic. Methodologies are outlined in detail in this report.

Existing Year analysis indicates that overall intersection operations are adequate, but some intersection approaches experience long delays, particularly during the morning peak hour. Although the analysis indicates that the intersections operate adequately, queuing is an issue during both peak hours with some queues backing up to adjacent intersections. Due to limitations

within the modeling software, the intersection delays could be underestimated. In the Future Years, both delays and queues are expected to worsen during the peak hours.

The analysis results indicate that the evening peak hour experiences worse congestion than the morning peak hour. In the Future Year 2045, only the intersection at Lavista Road and Chamblee Tucker Road would be expected to operate adequately in the evening peak hour; the other three study intersections would experience long delays and excessive queuing. The southbound Chamblee Tucker Road approach at Lavista Road would also experience long delays.

1.6 ALTERNATIVE DEVELOPMENT PROCESS

Potential mitigation measures were identified based on the delay and queuing concerns identified during the No Build analysis. Stakeholder feedback, City of Tucker planning goals, Dekalb County planning goals, and school traffic concerns were taken into consideration during the development process. Key elements that impacted potential improvement ideas included:

- Minimizing right-of-way and utility impacts
- Avoiding impacts the privately owned property inside the triangle
- Maintaining access for the property inside the triangle.
- Maintaining access to local businesses
- Maintaining or improving pedestrian access and safety
- Incorporating improvements into the proposed Chamblee Tucker Road diet

In 2017, GDOT implemented a new Intersection Control Evaluation (ICE) policy intended to serve as a tool for identifying preferred intersection designs as part of the traffic engineering analysis process. The ICE tool was explored as a potential tool for evaluating mitigation strategies in the study area. Typically, the GDOT ICE tool is used to evaluate alternatives for an isolated intersection; however, the Tucker Triangle presents a unique set of circumstances where the three intersections impact operations at each other but are not arranged in a linear sequence.

Early in the improvement development process, the study team made the decision to abandon use of the ICE tool for the study intersections. Instead, the methodology applied in the ICE tool was used to develop an alternative evaluation process that would better apply to the study area.

A two-stage process was developed to analyze potential improvements for the study area. In the first stage, potential improvements were modeled using the Design Year traffic only. A comparison matrix was developed to inform the decision-making process. Three alternatives were selected from among the alternatives evaluated and were evaluated further in a second stage of analysis. During the second stage, concept layouts were developed and cost estimates were refined.

1.7 ALTERNATIVE DEVELOPMENT

A variety of mitigation strategies were evaluated to determine the preferred approach to reduce congestion within the study area. Potential improvements ranged from installing turn lanes to eliminating intersections to altering travel patterns. In total, 24 strategies were evaluated to determine the operational impacts of the proposed improvements.

The alternatives were compared based on two primary performance metrics: the impact to Design Year peak hour network delay (versus the No Build conditions) and the expected cost of the

proposed improvements. For the first stage of evaluating improvements, each alternative was assigned a cost range based on the extent of the proposed improvements.

Design Alternative 1 - Reverse Lynburn Dr

This improvement proposes to reverse the direction of travel on Lynburn Drive from one-way southbound to one-way northbound. The Lynburn Drive approach at Lavista Road would include a full length through/left turn lane and an exclusive left turn lane with 245 feet of storage. The existing traffic signal at Lavista Road and Chamblee Tucker Road would be converted to split phasing on the side street approaches. A raised concrete island would be installed to channelize the westbound right turn lane on Lavista Road. The need for pedestrian crossings at this location should be evaluated further. Existing pedestrian counts at this location are low and there are nearby crossings that would still be convenient for pedestrians.

The existing split-phasing at the intersection of Lavista Road and Main Street would be converted to a standard four-phase signal by shifting the dual left turn movements to Lynburn Drive. The signal timing would be reoptimized to provide additional green time to the Lavista Road approaches. In addition, removing the left turn movements from the Main Street approach would eliminate some potential conflict points at the intersection.

A northbound left turn lane would be installed on Main Street at Lynburn Drive. The existing parallel parking spaces on the northbound approach of Main Street would be eliminated to accommodate the left turn lane. The intersection would remain unsignalized.

The existing on-street parking spaces on Lynburn Drive would be removed; however, additional parking spaces could be installed along Main Street between Lynburn Drive and Lavista Road.

The proposed improvements would require GDOT signal permit revisions at both the Lavista Road intersections (Lavista Road at Lynburn Drive and Lavista Road at Main Street).

Design Alternative 2 - Turn lane on Fellowship Road

This improvement would install an exclusive left turn lane with 200 feet of storage on the northbound approach of Fellowship Road at Lavista Road. The existing, shared left turn/through lane would be converted to a through only lane. The northbound left turn lane would not warrant protected phasing and would, therefore, be served by permissive only phasing.

Installation of an additional lane on Fellowship Road would require widening the northbound approach; however, the conceptual layout indicates that the additional capacity could be achieved without impacting the large utility pole existing on the southeast corner of the study intersection. The design would potentially require replacing up to two mast arms. A GDOT signal permit revision would be required.

Design Alternative 3 - Combined Alternative

This alternative includes all the above-mentioned modifications from alternatives 1 and 2. The proposed improvements could be implemented simultaneously or in stages depending on available funding sources.

1.8 PREFERRED ALTERNATIVE ANALYSIS

The three preferred alternatives were evaluated based on operational benefits. In addition, cost estimates were developed based on the concept layouts developed for each alternative. Alternative 3, which combines the improvements proposed in Alternatives 1 and 2, would provide the greatest benefits to the study area versus doing nothing.

Benefit-Cost (B/C) ratios were developed based on the operational benefits and the cost estimates calculated for each alternative. The costs, benefits, and the ratios are summarized in Table 1.1.

TABLE 1.1 - PREFERRED ALTERNATIVES B/C SUMMARY

Alternative	Cost	Design Life Benefits	B/C Ratio
Build (Reverse Lynburn Drive)	$ 1,037,396	$ 12,815,630	12.4
Build (Turn lanes on Fellowship Road)	$ 785,626	$ 4,662,386	5.9
Build (Combined Alternative)	$ 1,854,223	$ 16,072,774	8.7

Alternative 1 (Reverse Lynburn Drive) would provide the greatest benefit-to-cost ratio; however, Alternative 3 (Combined Alternative) would provide the greatest overall design life benefits.

The City should consider implementing the combined alternative. Because the improvements can function independently, the two design alternatives could be designed and constructed in phases depending on available funding sources.

2. INTRODUCTION

The intersection of Lavista Road, Chamblee Tucker Road, and Fellowship Road, commonly known as the "Tucker Triangle" within the local community, is a major crossroads located near the City of Tucker's central business district. The roads converge at three intersections, each forming the corner of a triangle. In mid-2020, the City of Tucker requested that a traffic study be performed to evaluate the congestion and safety concerns created by heavy traffic within the Tucker Triangle.

2.1 STUDY AREA

The project study area includes portions of Lavista Road, Fellowship Road, Chamblee Tucker Road, and Main Street. During the alternative development phase, Lynburn Drive was also incorporated into the analysis. The following intersections were evaluated as part of the study:

1. SR 236 /Lavista Road & Fellowship Road
2. SR 236/Lavista Road & Chamblee Tucker Road
3. Chamblee Tucker Road & Fellowship Road
4. SR 236/Lavista Road at Main Street

Land uses in the immediate vicinity of the Tucker Triangle consist primarily of commercial and retail properties, educational property, and to a lesser extent, residential properties. A project location map showing the study area has been provided in Figure 2.1.

2.2 PLANNED TRANSPORTATION IMPROVEMENTS

2.2.1 GDOT PROJECTS

A search was performed in the Georgia Department of Transportation (GDOT) GeoPi web application (http://www.dot.ga.gov/BS/Projects/ProjectSearch) to identify any GDOT projects in or near the study area. No ongoing or upcoming projects were identified in the vicinity of the study area.

2.2.2 DEKALB COUNTY PROJECTS

The Dekalb County 2014 Transportation Plan includes three tiers of projects. Tier 1 projects have current available funding. Tier 2 projects would require a new revenue source. Tier 3 projects include all remaining "high priority" projects. Two Tier 1 projects are planned in the vicinity of the study area:

- Chamblee Tucker Road Diet- Phase I (Project ID # 2063) is intended to modify the Chamblee Tucker Road lane configuration to include one travel lane in each direction, a center two-way left-turn lane, and bike lanes. Operational and pedestrian improvements will be made at key locations along the corridor.
- Tucker Last Mile Connectivity (Project ID # 6021) is planned to connect pedestrian facilities in and around Tucker.

In addition, the Dekalb County Transportation plan identifies Lavista Road and Main Street as First Tier Priority Bicycle Network links. The priority network is not a specific project list but is a long-range vision for bicycle mobility throughout the County.

2.2.3 CITY OF TUCKER COMPREHENSIVE PLAN

The City of Tucker Comprehensive Plan, known as *Tucker Tomorrow*, has listed five major community goals along with recommended policies and actions which significantly contribute to the achievement of the goals. The goals directly related to this project are as follows:

- Goal 1, "Enhance Downtown Tucker", aims to create more attractive and safer "Downtown Gateways" at the intersections of Main Street at Lawrenceville Highway, and Lavista Road at Main Street. Options considered include replacing low volume exclusive turn lanes along Main Street with raised, landscaped islands that would enhance community aesthetics and serve as pedestrian refuge islands at intersections.
- Goal 2, "Improve Transportation Connections" intends to develop a citywide trail system to connect downtown with Tucker High School, the Tucker Nature Preserve and the Tucker Recreation Center on Lavista Road. A connection point is planned on the east leg of the intersection at Lavista Road and Main Street in the study area.

2.3 STAKEHOLDER FEEDBACK

Early in the study process, meetings were held with local stakeholders to identify any community concerns that should be considered during the development of mitigation strategies. The stakeholders included City of Tucker City Council members, City of Tucker staff, Dekalb County staff, and the Tucker High School principal. The following guidance was provided:

- Everyone was open to suggestions as to what might improve the area.
- The idea of converting the Tucker Triangle to a single intersection was brought up as a potential solution to evaluate.
- Tucker High School students typically use the existing crossings at Lavista Road & Main Street.
- Questions were raised about the volume of pedestrians using the crossings at Lavista Road & Chamblee Tucker Road. Would there be potential to eliminate any crossings or alter the pedestrian signal timing?
- The commercial property inside the Tucker Triangle is currently occupied by a veterinarian office. Relocating this business would require moving heavy and specialized equipment.
- Could a roundabout be installed in the area?
- Could the access at Main Street be altered to improve access to/from the high school?
- The northbound approach on Fellowship Road currently includes a shared left turn/through lane; however, the shared lane often operates as a defacto left turn lane during peak hours.

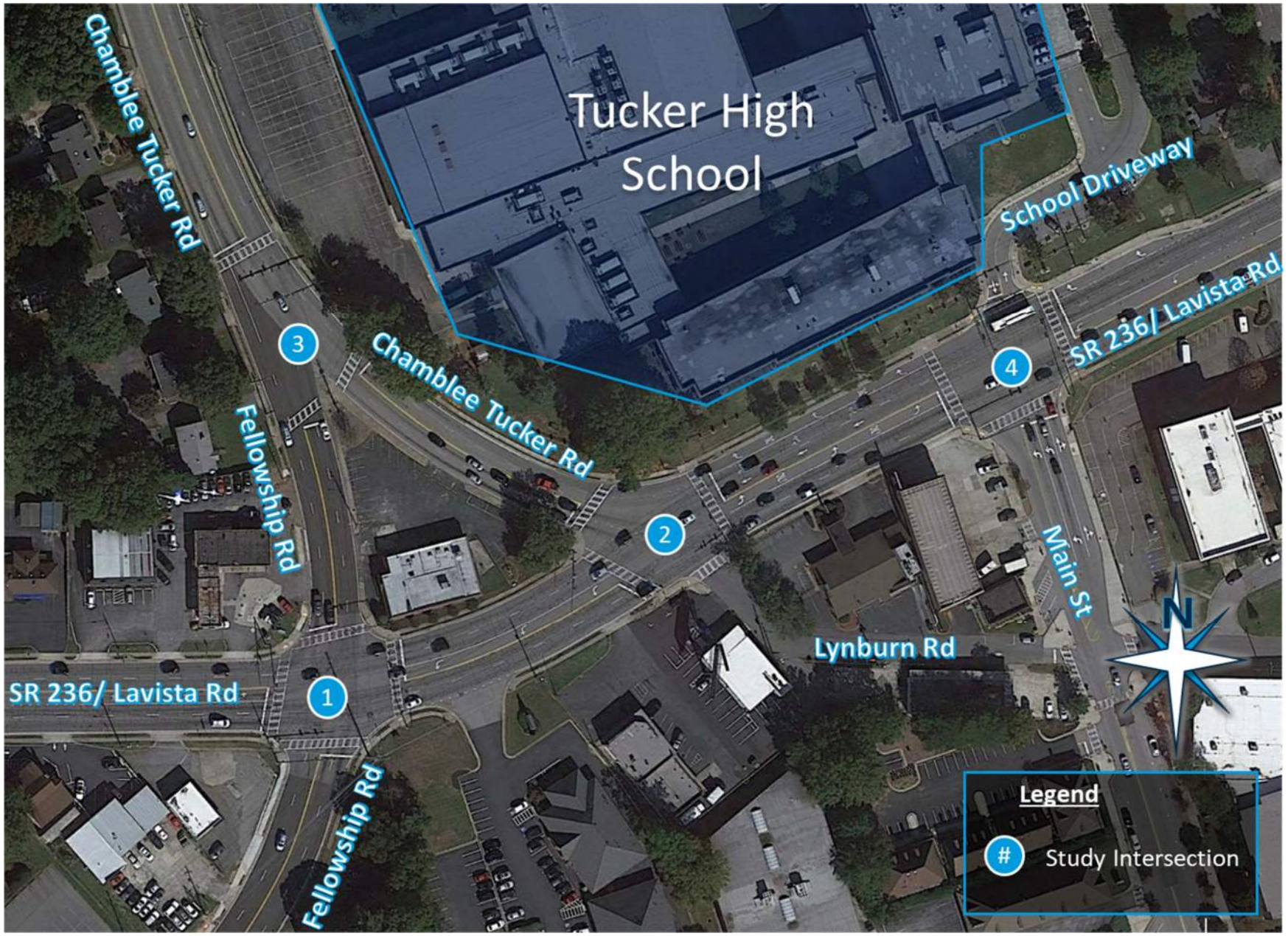

FIGURE 2.1 - AERIAL VIEW OF STUDY AREA

3. EXISTING CONDITIONS

Existing conditions in the vicinity of the project were surveyed in the field. A site visit was performed on Thursday, September 10th, 2020. Unfortunately, typical school related traffic and pedestrian activity were unable to be observed because Dekalb County schools were operating on a virtual learning platform in response to the ongoing COVID-19 pandemic.

3.1 ROADWAYS

SR 236/Lavista Road is a minor arterial that follows an east-west alignment and includes two lanes in each direction with a two-way left-turn lane (TWLTL). Within the study area, the posted speed limit is 45 mph. Adjacent land uses are a mix of commercial and institutional developments. Lavista Road begins at in intersection with Cheshire Bridge Road to the west of the study area and extends east to a terminus at US 29/SR 8/Lawrenceville Highway east of the study area.

Fellowship Road is a major collector that runs along a north-south alignment. Within the study area, the roadway includes two travel lanes in each direction. Fellowship Road begins at the intersection with Chamblee Tucker Road and extends south to a dead end just north of SR 410/Stone Mountain Freeway. The posted speed limit is 35 mph.

Chamblee Tucker Road is a minor arterial with two lanes in each direction that runs north-south in the vicinity of the study intersections. The posted speed limit is 40 mph. Chamblee Tucker Road begins to the north of the study area in the City of Pittsburg and extends south to a terminus at the intersection with Lavista Road.

Main Street is a two-lane local road that runs north-south in the vicinity of the study area. The posted speed limit is 25 mph and a mix of angled and parallel on street parking is provided on both sides of the roadway. Main Street extends between Lavista Road and US 29/SR 8/Lawrenceville Highway. The City of Tucker central business district is located on Main Street.

Lynburn Drive is a one-way, one-lane local road which begins at an intersection with Lavista Road and extends east to US 29/SR 8/Lawrenceville Highway. The posted speed limit is 25 mph.

Tucker High school is on the north east corner of the triangle. The campus includes two main access points: one on Lavista Road at the intersection with Main Street and another on Chamblee Tucker Road, north of the study area.

Table 3.1 summarizes the existing conditions on each study area roadway.

TABLE 3.1 - EXISTING STUDY AREA ROADWAYS

ROADWAY	FUNCTIONAL CLASSIFICATION	ORIENTATION (STUDY AREA)	NO. TRAVEL LANES	MEDIAN TYPE	SPEED LIMIT (MPH)
SR 236/Lavista Rd	Minor Arterial	East/West	4	TWLTL	45
Fellowship Rd	Major Collector	North/South	4	None	35
Chamblee-Tucker Rd	Minor Arterial	North/South	4	None	40
Main St	Local Road	North/South	2	None	25
Lynburn Dr	Local Road	East/West	1	None	25

Note – Functional Classifications were taken from the GDOT Functional Classification Map

3.2 INTERSECTIONS

The study area includes four intersections:

5. SR 236 /Lavista Road & Fellowship Road
6. SR 236/Lavista Road & Chamblee Tucker Road
7. Chamblee Tucker Road & Fellowship Road
8. SR 236/Lavista Road at Main Street

All four intersections are controlled by traffic signals with coordinated timings. Each intersection includes striped crosswalks with ADA ramps, pedestrian signals, and push buttons. The existing lane geometries and intersection controls are shown in Figure 3.1.

3.3 EXISTING TRAFFIC

Existing traffic counts were not collected as part of this study. Turning movement counts (TMCs) were provided by the City of Tucker. Counts had been collected in October 2018 for two hours in the morning (7:00-8:00 am) and two hours in the evening (4:30-6:30 pm). The TMCs included passenger vehicles, trucks/heavy vehicles, and pedestrians. The raw count data is included in **Appendix A**.

An Existing Year of 2020 was assumed for this study. Due to the ongoing COVID-19 pandemic new counts were not collected in the field. Instead, the 2018 counts provided by the City of Tucker were grown to 2020 Year volumes using the growth rate established for the study area.

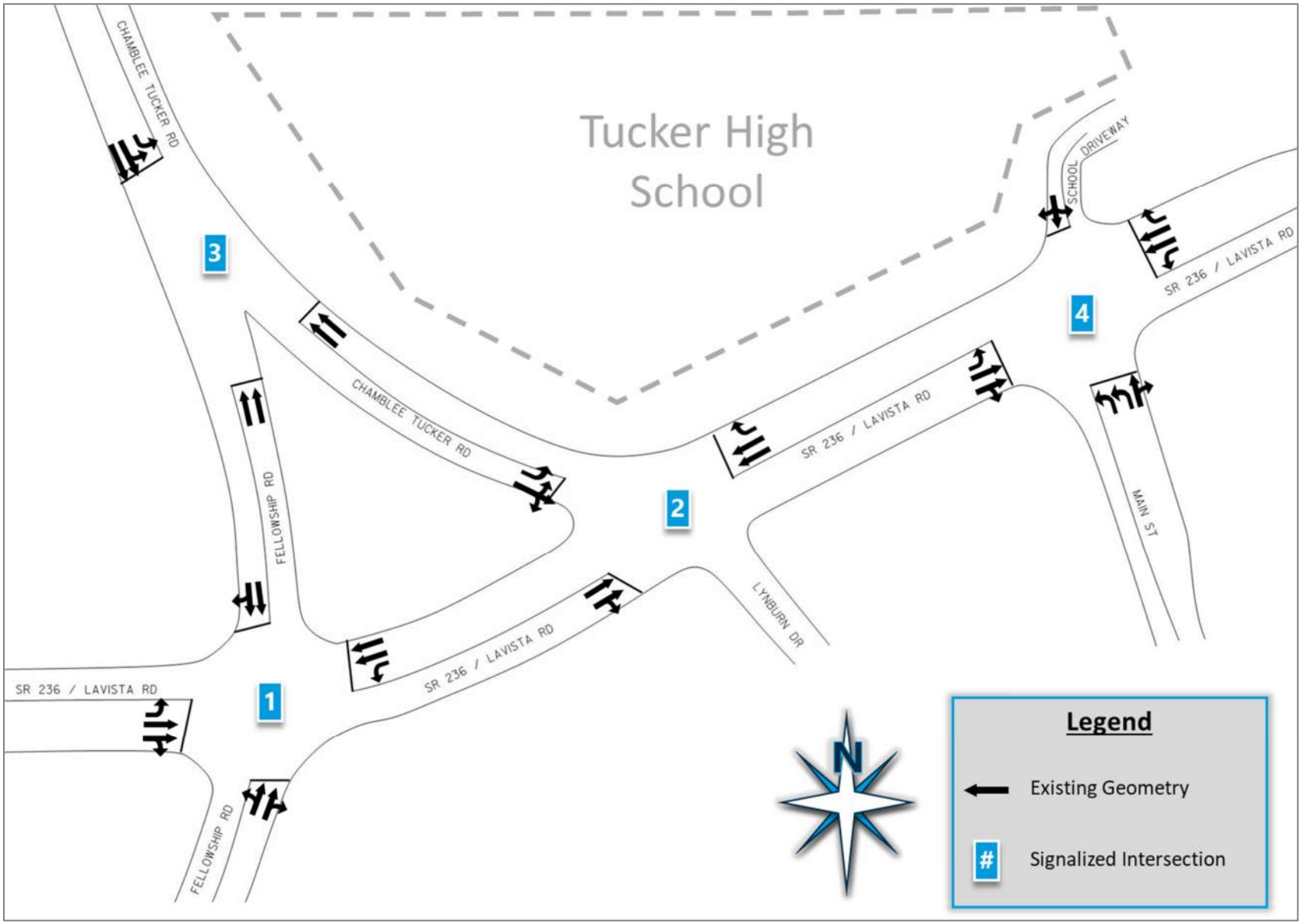

Figure 3.1 - Existing Lane Geometries and Intersection Control

3.4 CRASH HISTORY

Crash data for the years 2013 through 2018 were obtained from the Numetric database, a traffic safety analytics platform used by GDOT. The Numetric crash summary is provided in **Appendix B**. Crash histories were evaluated for the three intersections located in the Tucker Triangle:

1. Lavista Road & Fellowship Road
2. Lavista Road & Chamblee Tucker Road
3. Chamblee Tucker Road & Fellowship Road

Table 3.2 summarizes the crash history for each intersection by crash severity and by manner of collision. A total of 329 crashes were reported at the three triangle intersections between January 2013 and December 2018.

200 crashes were reported at the intersection of Lavista Road and Fellowship Road. No fatalities were reported. Approximately 27 percent of reported crashes involved some level of injury. Over the 5-year analysis period, 7 head on collisions were reported. 43 percent of the reported crashes were classified as angle crashes, including 46 left turn angle crashes.

Over the 5-year analysis period, 85 crashes were reported at the intersection of Lavista Road and Chamblee Tucker Road. No fatalities were reported and 24 crashes involved some level of reported injury. Of the 85 reported crashes, 3 were classified as head on. 41 percent of the reported crashes were angle crashes with 16 listed as left angle crashes.

Between 2013 and 2018, 44 crashes were reported at the intersection of Chamblee Tucker Road and Fellowship Road. No fatal crashes were reported and 6 crashes involved reported injuries. During the analysis period, 2 head on crashes and 5 angle crashes were reported.

Crash diagrams are presented in Figure 3.2 and in Figure 3.3.

TABLE 3.2 - CRASH SUMMARY BY SEVERITY AND MANNER OF COLLISION

No.	Intersecting Street	Year	Severity						Manner of Collision									Total
			(K) Fatality	(A) Suspected Serious Injury	(B) Suspected Minor/Visible Injury	(C) Possible Injury / Complaint	(O) No Injury	Unknown	Angle (Other)	Head On	Left Angle Crash	Not a Collision with Motor Vehicle	Rear End	Right Angle Crash	Sideswipe Opposite Direction	Sideswipe Same Direction	Unknown	
1	SR 236/Lavista Rd & Fellowship Rd	2013	0	0	1	8	16	0	5	1	9	0	9	0	1	0	0	**25**
		2014	0	0	0	6	25	0	9	1	4	0	9	2	1	5	0	**31**
		2015	0	0	3	10	31	0	9	1	13	0	14	0	0	7	0	**44**
		2016	0	1	0	5	29	1	5	0	8	1	14	0	1	7	0	**36**
		2017	0	0	2	6	29	0	2	2	6	0	18	1	0	8	0	**37**
		2018	0	0	2	10	15	0	6	2	6	0	9	1	1	2	0	**27**
		Total	**0**	**1**	**8**	**45**	**145**	**1**	**36**	**7**	**46**	**1**	**73**	**4**	**4**	**29**	**0**	**200**
2	SR 236/Lavista Rd & Chamblee Tucker Rd/Lynburn Dr	2013	0	0	1	3	8	0	2	0	2	0	7	0	0	1	0	**12**
		2014	0	0	0	4	9	0	2	0	1	0	8	0	0	2	0	**13**
		2015	0	1	0	3	11	0	3	0	2	2	6	0	0	2	0	**15**
		2016	0	0	0	2	10	1	1	2	3	2	3	0	0	2	0	**13**
		2017	0	0	1	4	13	0	5	0	4	1	5	0	0	3	0	**18**
		2018	0	0	0	5	9	0	5	1	4	0	2	1	0	1	0	**13**
		Total	**0**	**1**	**2**	**21**	**60**	**1**	**18**	**3**	**16**	**4**	**31**	**1**	**1**	**11**	**0**	**85**
3	Chamblee Tucker Rd & Fellowship Rd	2013	0	0	0	0	2	0	0	0	0	1	1	0	0	0	0	**2**
		2014	0	0	0	1	2	0	0	0	0	0	0	1	0	2	0	**3**
		2015	0	0	0	1	2	0	0	1	0	1	0	0	0	1	0	**3**
		2016	0	0	1	0	9	0	2	0	0	1	3	0	0	4	0	**10**
		2017	0	0	1	1	10	0	1	1	0	0	3	0	0	7	0	**12**
		2018	0	0	0	1	13	0	2	0	0	1	4	0	0	6	1	**14**
		Total	**0**	**0**	**2**	**4**	**38**	**0**	**5**	**2**	**0**	**4**	**11**	**1**	**0**	**20**	**1**	**44**

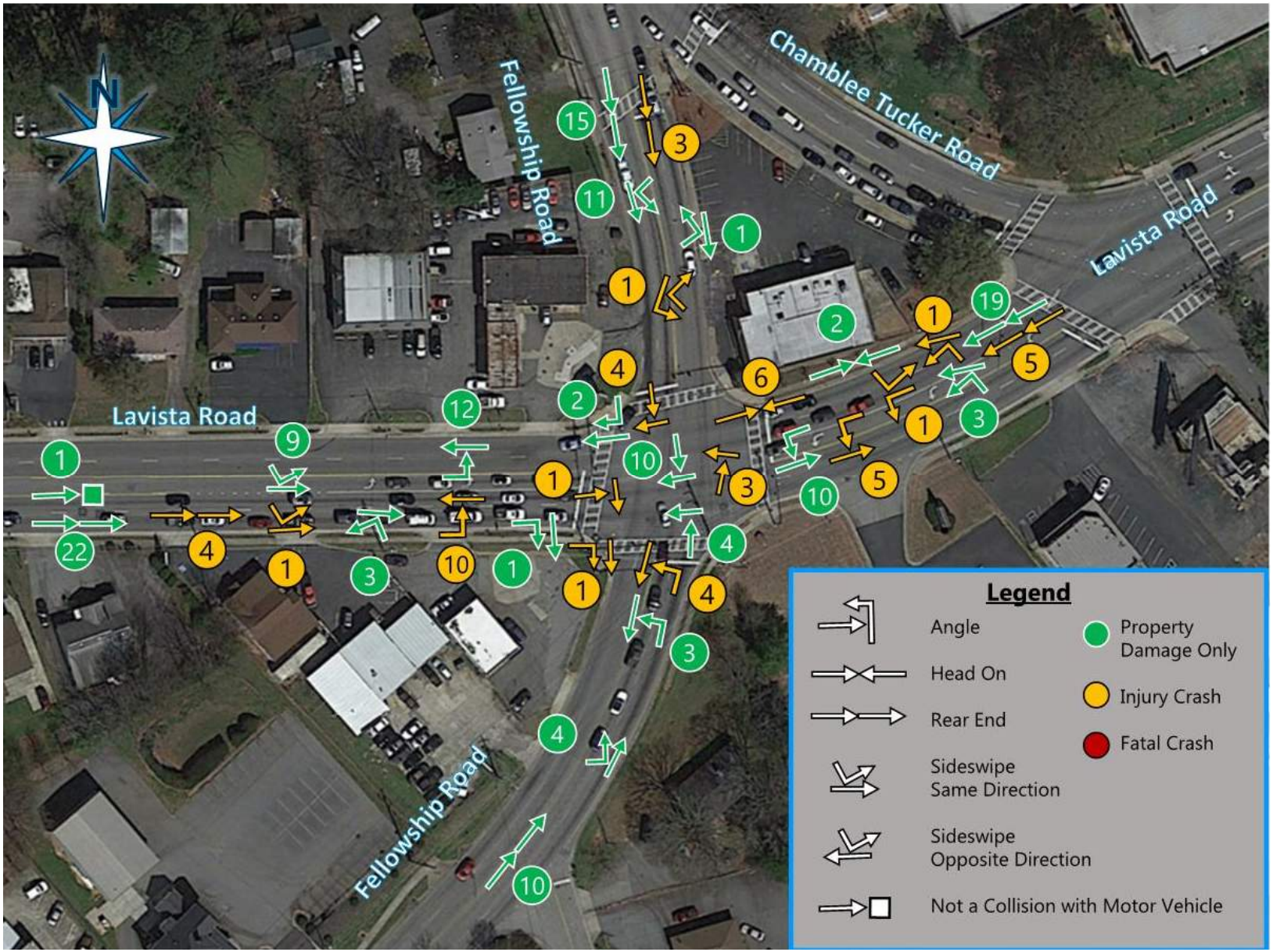

Figure 3.2 – Crash Diagram at the Intersection of Lavista Road and Fellowship Road

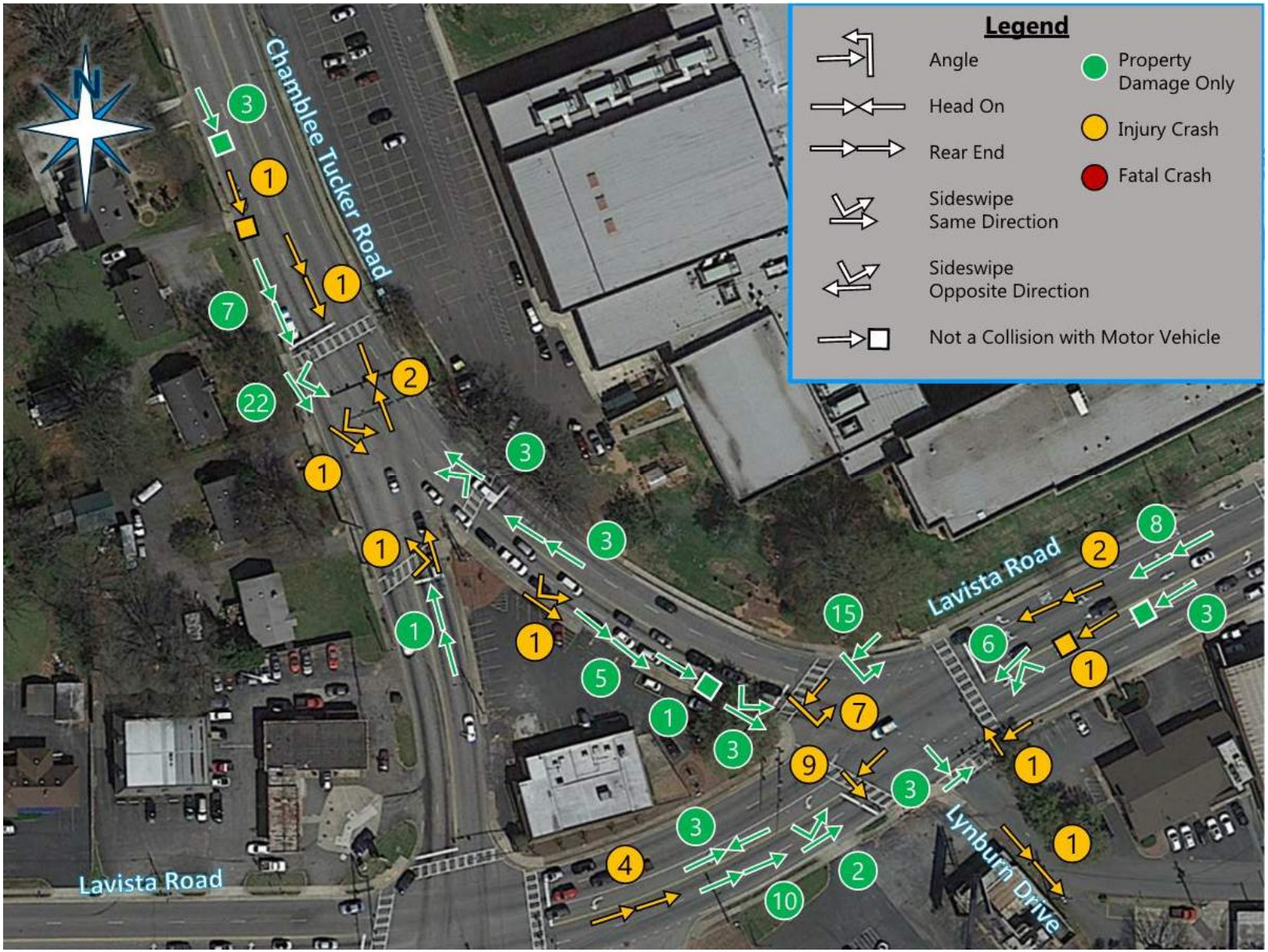

Figure 3.3 – Crash Diagram at the Intersections on Chamblee Tucker Road

4. TRAFFIC PROJECTIONS

4.1 DEVELOPMENT OF GROWTH RATE

The growth rate for the area was calculated using annual volume statistics from GDOT Traffic Analysis & Data Application (TADA), DeKalb County census data, and the Atlanta Regional Commission (ARC) MPO Travel Demand Model (TDM). The general growth rate equation is as follows:

$$Annual\ Growth\ Rate = \left(\frac{End\ Count}{Begin\ Count}\right)^{\frac{1}{End\ Year - Begin\ Year}} - 1$$

Using the historical count data, a growth rate was determined for each station by plotting an exponential trendline from the actual counts obtained over the last 10 years. An average annual growth rate for each station was calculated using the annual growth rate formula. The growth rates for each count station were averaged to determine a single annual growth rate for the study area.

Growth rates based on the census data and the ARC MPO data were calculated by entering the provided values directly into the general growth rate formula.

A final growth rate was calculated by averaging the three growth rates calculated from each data source mentioned above. The average annual growth rate was determined to be **1.6 percent**.

The data used to calculate the growth rate is provided in **Appendix C**.

4.2 FUTURE TRAFFIC

Future AADTs for the Opening Year (2025) and Design Year (2045) were calculated using the annual growth rate established for the intersection. Future DHVs for each year were estimated by applying the K-factor to the corresponding AADTs for the year. Design Hour Volumes (DHVs) for Opening Year (2025) and Design Year (2045) are presented in Figure 4.1 and Figure 4.2, respectively. The AADTs for both future years are shown in Figure 4.3.

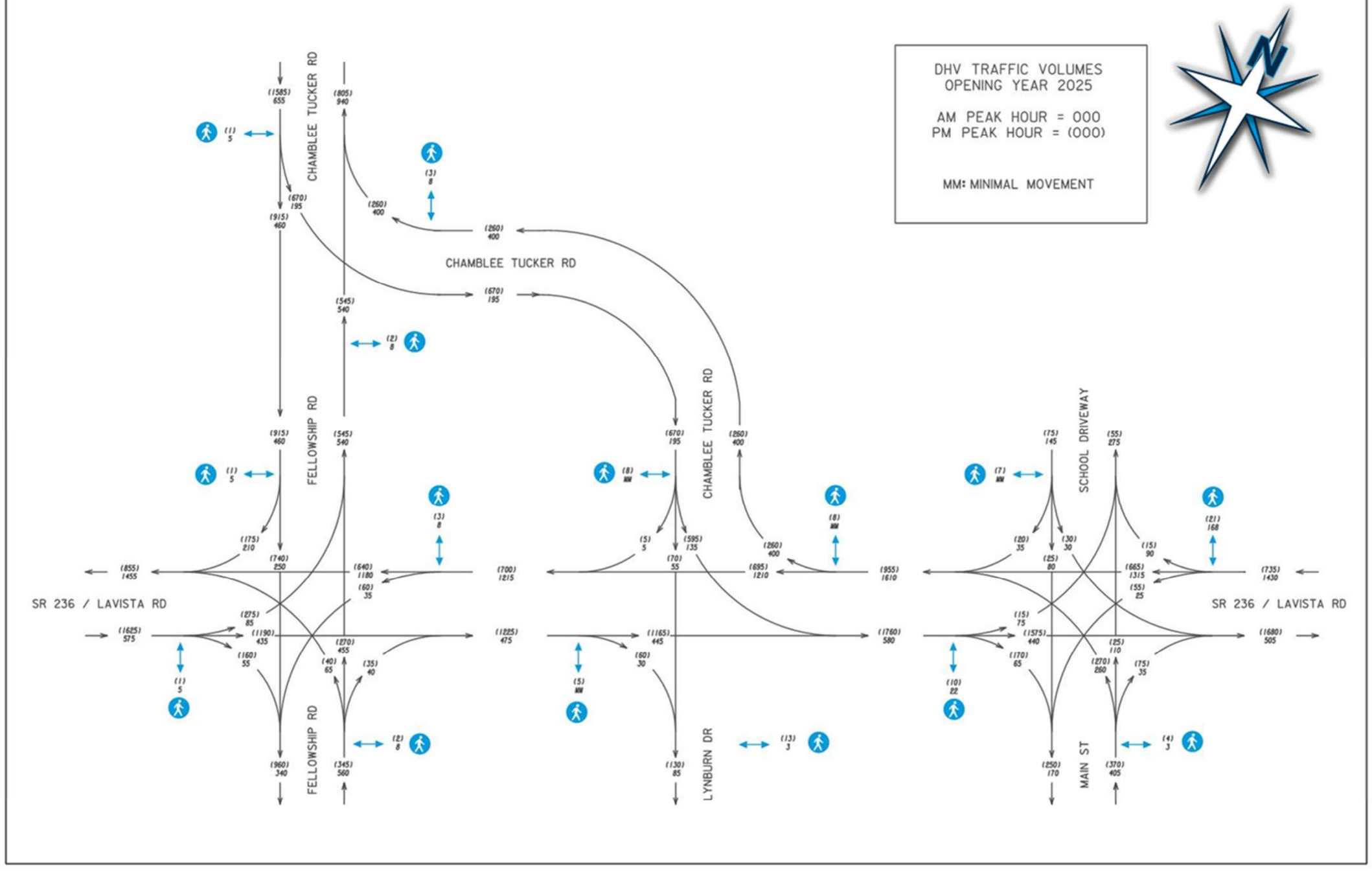

FIGURE 4.1 – OPENING YEAR 2025 PEAK HOUR VOLUMES

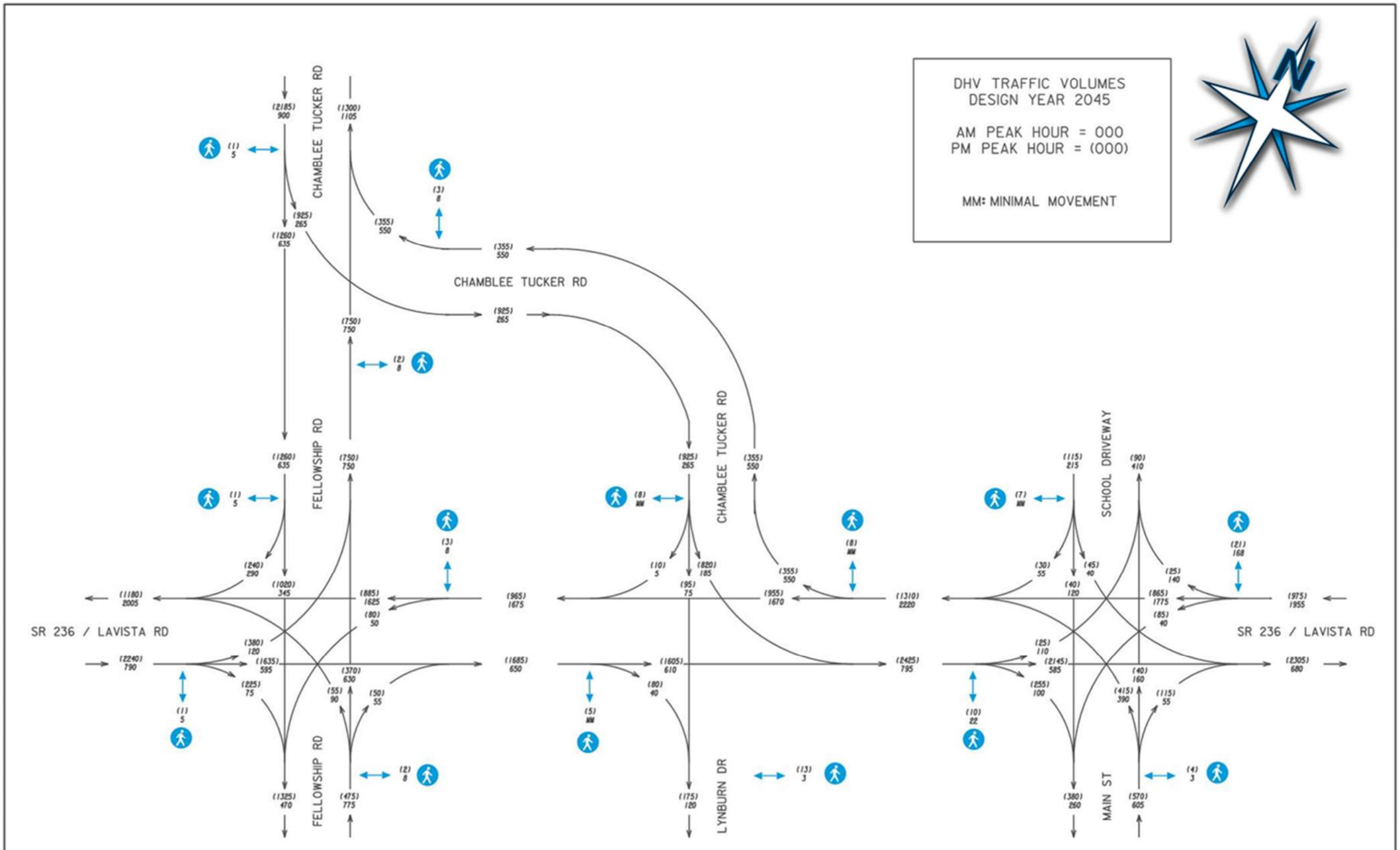

FIGURE 4.2 – DESIGN YEAR 2045 PEAK HOUR VOLUMES

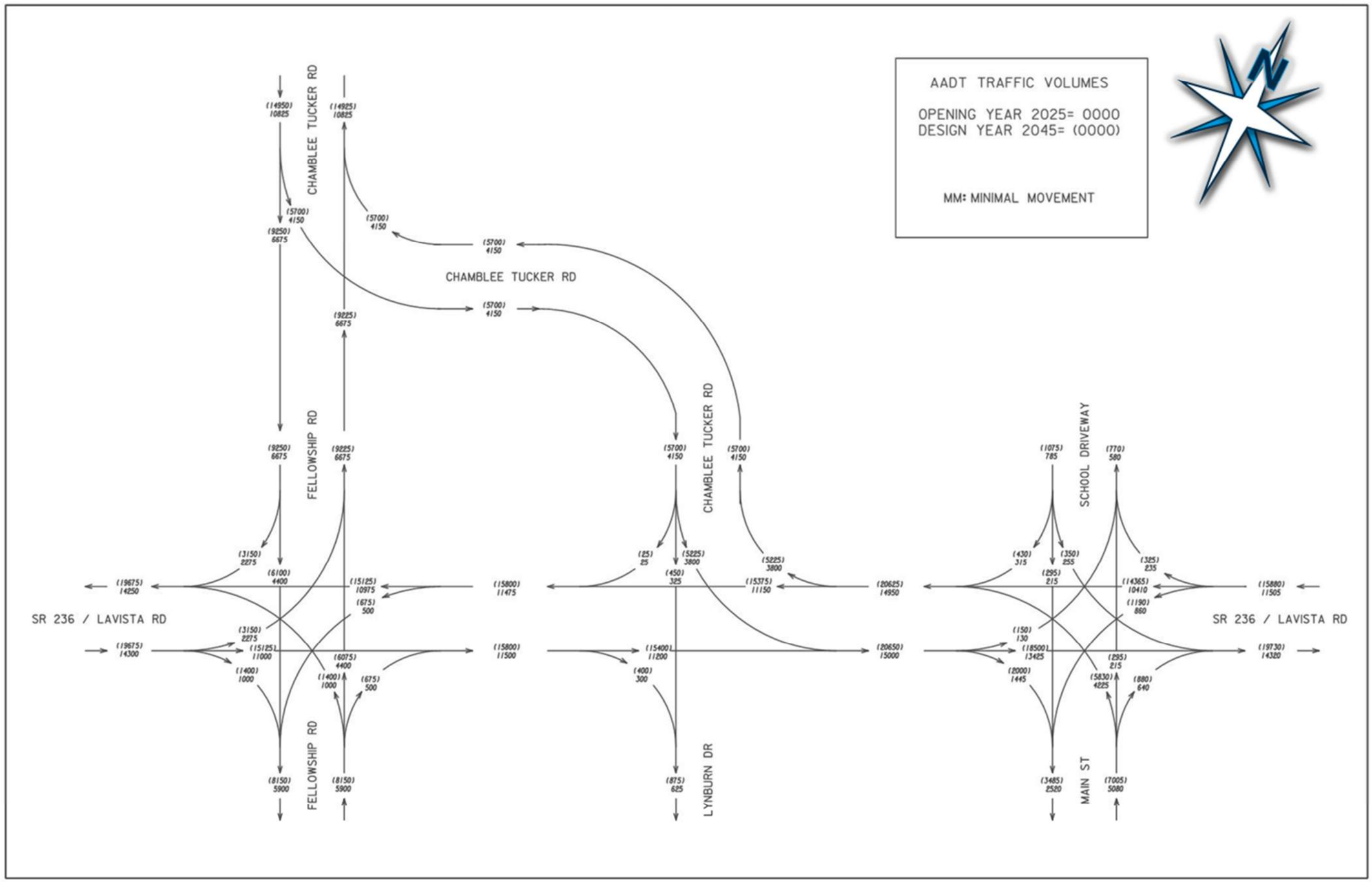

FIGURE 4.3 – FUTURE YEARS AADT

5. TRAFFIC ANALYSIS METHODOLOGY

Analysis methods outlined in the Highway Capacity Manual (HCM) were used to evaluate existing and future conditions in the study area. Operational concerns were identified based on the results of the analysis and potential mitigation strategies were developed. Additional details regarding how the analysis was performed are provided in the following section.

5.1 INTERSECTION CAPACITY ANALYSIS

Intersection capacity analysis was performed using *Synchro 11* software which automates the HCM methodology for evaluating signalized intersections. It should be noted that the analysis capabilities of the Synchro software can be limited under oversaturated conditions when queues can extend to adjacent intersections or spill out of the turn lanes. In such cases, the Synchro software can underrepresent delays versus field-observed conditions.

5.2 NETWORK OPERATIONAL ANALYSIS

Intersection operational analysis can provide a good indication of operational concerns and the effectiveness of proposed improvements at a specific intersection; however, the project study area includes several closely spaced intersections. In order to get a clearer understanding of congestion concerns within the study area as a whole and how implementing improvements at a particular intersection might impact operations at adjacent intersections, network operations were evaluated.

In addition to evaluating the individual study intersection operations using *Synchro* models, the overall network delay was also evaluated. *SimTraffic* is a companion software for *Synchro* and can be used to run simulations of traffic operations under various conditions. Unlike *Synchro*, *SimTraffic* is better able to reflect real-world delays and queuing under oversaturated conditions.

5.3 MEASURES OF EFFECTIVENESS

Measures of Effectiveness (MOEs) are factors that are used to quantify operational and safety objectives. MOEs provide a basis for evaluating the performance of a transportation network. A summary of the MOEs evaluated in this study is listed below:

- *Synchro*
  - Control Delay (sec/veh) at intersections
  - Level of Service
- *SimTraffic*
  - 95th Percentile Queue Lengths (feet)
  - Total Network Delay (hours)
  - Delay/Vehicle (seconds)

The HCM defines LOS in terms of the amount of control delay, including initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. GDOT has ranges of adequate LOS based on area classification. Rural, sparsely developed areas have a minimum LOS requirement of C. This is due to the expectancy of rural residents for relatively uncongested conditions and design flexibility related to lower right of way costs. The minimum LOS for urban areas is D. This reflects the greater acceptance of delay and congestion by urban residents. Additionally, the increased density of developments makes right of way costs much higher in urban areas. The study intersection is in the Atlanta metro area and, therefore, has a minimum

LOS requirement of D. The LOS definitions for both stop controlled and signal-controlled intersections are provided in Table 5.1**Error! Reference source not found.**.

TABLE 5.1 - LEVEL OF SERVICE CRITERIA

Level of Service (LOS)	Unsignalized Control Delay per Vehicle (sec)	Signalized Control Delay per Vehicle (sec)
A	≤ 10	≤ 10
B	> 10 and ≤ 15	> 10 and ≤ 20
C	> 15 and ≤ 25	> 20 and ≤ 35
D	> 25 and ≤ 35	> 35 and ≤ 55
E	> 35 and ≤ 50	> 55 and ≤ 80
F	> 50	> 80

Queue length, or the distance to which stopped vehicles accumulate in a lane at an intersection, is another performance measure of intersection operation. Lengthy queues may be indicative of intersection capacity or operational issues, such as absence of or insufficient dedicated turn lanes, inefficient signal timings or phasing. *SimTraffic* reports 95th percentile queue lengths in feet for each lane based on an average of 5 simulation runs.

Network delay provides a measure of the delay experienced within an area including multiple intersections. For the purposes of this study, network delay was used to evaluate operational concerns within the study area as a whole and how proposed mitigation measures would impact overall operations within the study area. Existing Traffic

5.4 EXISTING INTERSECTION CAPACITY ANALYSIS

Existing traffic operations at the study intersections were analyzed using methodologies outlined in Section 1.3 of this report. The LOS and delay results from Synchro 11 analysis reports are presented in **Table 5.2**. Analysis reports are included **in Appendix D**.

The results indicate that, in the Existing Year 2020 conditions, each of the study intersections operates with an overall LOS D or better; however, some of the individual approaches exhibit LOS E or F, including:

- Northbound Fellowship Road approach at Lavista Road (AM peak hour)
- Southbound Fellowship Road approach at Lavista Road (PM peak hour)
- Southbound Chamblee Tucker Road approach at Lavista Road (AM peak hour)
- Southbound School Driveway approach at Lavista Road (AM peak hour)

TABLE 5.2 - EXISTING YEAR INTERSECTION DELAY AND LOS RESULTS

No.	Intersecting Street	Approach	2020 Existing Year			
			AM Peak		PM Peak	
			Delay (s)	LOS	Delay (s)	LOS
1	SR 236/Lavista Rd & Fellowship Rd	*EB*	16.9	B	27.3	C
		WB	5.1	A	14.3	B
		NB	80.2	F	53.0	D
		SB	32.6	C	78.6	E
		Overall	***28.6***	***C***	***40.1***	***D***
2	SR 236/Lavista Rd & Chamblee Tucker Rd/Lynburn Dr	*EB*	1.5	A	3.7	A
		WB	2.7	A	7.0	A
		NB	---	---	---	---
		SB	63.0	E	43.9	D
		Overall	***7.8***	***A***	***14.1***	***B***
3	Chamblee Tucker Rd & Fellowship Rd	*WB*	16.1	B	24.3	C
		NB	9.0	A	11.7	B
		SB	6.6	A	24.5	C
		Overall	***9.7***	***A***	***21.6***	***C***
4	SR 236/Lavista Rd & Main St	*EB*	16.1	B	36.8	D
		WB	33.4	C	16.0	B
		NB	43.9	D	47.9	D
		SB	68.3	E	54.3	D
		Overall	***33.5***	***C***	***33.8***	***C***

5.5 QUEUEING ANALYSIS

A Back of Queue (BOQ) analysis was completed for the study intersections during the morning (AM) and evening (PM) peak hours. *SimTraffic* reports 95th percentile queue lengths in feet for each lane. These queue lengths are based on an average of 5 simulation runs. The Existing back of queue (BOQ) results are presented in **Table 5.3**. Analysis reports are included **in Appendix D.**

Based on the results of the analysis, the following movements experience queuing that extends beyond available storage during the Existing Year morning peak hour:

Intersection 1 – SR 236/Lavista Road and Fellowship Road

- WB through queue extends to the upstream intersection at Chamblee Tucker Rd. (AM peak hour)
- EB left turn extends to the TWLTL (PM peak hour)
- SB approach extends to the upstream intersection at Fellowship Rd. & Chamblee Tucker Rd. (PM peak hour)

Intersection 2 – SR 236/Lavista Road and Chamblee Tucker Road/Lynburn Drive

- WB through queue extends to the upstream intersection at Main St. (AM peak hour)
- EB approach extends to upstream intersection (PM peak hour)

- SB approach extends to upstream intersection (PM peak hour)

Intersection 3 – Chamblee Tucker Road and Fellowship Road

- NB through extends to upstream intersection (PM peak hour)

Intersection 4 – SR 236/Lavista Road and Main Street

- WB right turn (AM peak hour)
- NB left turn (AM peak hour)
- NB through/right turn (AM peak hour)
- EB approach extends to upstream intersection (PM peak hour)
- NB approach extends to upstream intersection (PM peak hour)

TABLE 5.3 – EXISTING YEAR 2020 BOQ RESULTS

Int #	Intersection	Control	Movement	Storage Bay Length (ft)	Existing Year 2020	
					AM Peak	PM Peak
1	SR 236/Lavista Rd & Fellowship Rd	Signal	EBL	250	83	295
			EBT	---	117	408
			EBT+R	---	113	418
			WBL	215	38	88
			WBT	205	252	156
			NBT+L	---	313	287
			NBT+R	---	282	260
			SBT	245	185	250
			SBT+R	245	219	253
2	SR 236/Lavista Rd & Chamblee Tucker Rd/Lynburn Dr	Signal	EBT	215	33	275
			EBT+R	215	28	281
			WBT	215	237	184
			WBR	215	64	81
			SBL	230	129	256
			SBT+R+L	230	145	252
3	Chamblee Tucker Rd & Fellowship Rd	Signal	WBR	230	203	133
			NBT	175	82	228
			SBL	---	116	173
			SBT+L	---	113	164
4	SR 236/Lavista Rd & Main St	Signal	EBL	215	78	29
			EBT	215	167	395
			EBT+R	215	175	404
			WBL	180	86	84
			WBT	---	533	187
			WBR	100	126	31
			NBL	130	265	255
			NBT+R	130	236	206
			SBT+R+L	---	131	116

6. FUTURE NO BUILD TRAFFIC

6.1 INTERSECTION CAPACITY ANALYSIS

Capacity analysis was performed for the morning (AM) and evening (PM) peak hours in both the Opening Year 2025 and Design Year 2045 No Build conditions. *Synchro* and *SimTraffic* reports are included in **Appendix D**. The results of the analysis are listed in Table 6.1.

The results indicate that in the Opening Year, the study intersections would operate at an acceptable LOS D or better; however, some of the individual approaches exhibit LOS E or F, including:

- Northbound Fellowship Rd approach at Lavista Rd (both peak hours)
- Southbound Fellowship Rd approach at Lavista Rd (PM peak hour)
- Southbound Chamblee Tucker Rd approach at Lavista Rd (AM peak hour)
- Southbound School Driveway approach at Lavista Rd (AM peak hour)

During the Design Year, the following locations are expected to exhibit inadequate operations:

- Lavista Rd. & Fellowship Rd. (both peak hours)
- Southbound Chamblee Tucker Rd. approach at Lavista Rd. (both peak hours)
- Chamblee Tucker Rd. & Fellowship Rd (PM peak hour)
- Lavista Rd. & Main St. (both peak hours)

TABLE 6.1 - FUTURE YEARS NO BUILD INTERSECTION DELAY AND LOS RESULTS

No.	Intersecting Street	Approach	2025 Opening Year				2045 Design Year			
			AM Peak		PM Peak		AM Peak		PM Peak	
			Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
1	SR 236/Lavista Rd & Fellowship Rd	*EB*	17.5	B	32.5	C	23.7	C	165.2	F
		WB	7.0	A	16.2	B	38.7	D	26.5	C
		NB	124.8	F	85.3	F	464.0	F	264.6	F
		SB	33.9	C	109.0	F	45.6	D	291.3	F
		Overall	***39.1***	***D***	***53.9***	***D***	***127.5***	***F***	***177.9***	***F***
2	SR 236/Lavista Rd & Chamblee Tucker Rd/Lynburn Dr	*EB*	1.4	A	3.7	A	1.8	A	4.5	A
		WB	2.9	A	7.4	A	5.1	A	8.2	A
		NB	---	---	---	---	---	---	---	---
		SB	63.0	E	45.0	D	63.0	E	158.9	F
		Overall	***7.9***	***A***	***14.5***	***B***	***9.4***	***A***	***41.3***	***D***
3	Chamblee Tucker Rd & Fellowship Rd	*WB*	16.2	B	24.4	C	16.8	B	24.8	C
		NB	8.5	A	11.0	B	9.9	A	6.2	A
		SB	6.7	A	31.1	C	7.3	A	85.6	F
		Overall	***9.6***	***A***	***25.9***	***C***	***10.5***	***B***	***61.5***	***E***
4	SR 236/Lavista Rd & Main St	*EB*	16.8	B	52.0	D	19.6	B	286.8	F
		WB	39.4	D	16.7	B	177.6	F	22.1	C
		NB	44.3	D	48.4	D	51.8	D	57.0	E
		SB	73.0	E	54.3	D	150.7	F	60.0	E
		Overall	***37.3***	***D***	***42.9***	***D***	***118.4***	***F***	***181.3***	***F***

6.2 QUEUEING ANALYSIS

The expected queue lengths for No-Build conditions are shown in Table 6.2 for Opening Year 2025 and Design Year 2045. The highlighted queue lengths in Table 6.2 are the movements where the reported queue length value exceeds the storage length available for that turning movement. The *SimTraffic* output reports are included in **Appendix D**.

The results presented in Table 6.2 indicate the following intersection movements experience some queuing:

Intersection 1 – SR 236/Lavista Road and Fellowship Road

- EB left turn (PM peak hour)
- WB through extends to the upstream intersection (AM peak hour)
- WB through extends to the upstream intersection in the Design Year. (PM peak hour)
- SB approach extends to upstream intersection (both peak hours)

Intersection 2 – SR 236/Lavista Road and Chamblee Tucker Road/Lynburn Drive

- During both peak hours the queues extend to the upstream intersections on westbound through lanes.
- During the PM peak hour the queues extend to the upstream intersections on eastbound through lanes and southbound through lanes.
- During the PM peak hour the queues extend to the upstream intersections on southbound approach.

Intersection 3 – Chamblee Tucker Road and Fellowship Road

- During the PM peak hour the queues extend to the upstream intersection on Fellowship Road northbound through lanes.
- During the Design Year AM peak hour, the queue extends to the upstream intersection on Chamblee Tucker Rd through lanes.

Intersection 4 – SR 236/Lavista Road and Main Street

- During the PM peak hour the queues extend to the upstream intersection on eastbound approach.
- During the Design Year AM peak hour the queues extend to the upstream intersection on eastbound approach.
- During the AM and PM peak hours the queues on northbound right and left turn lanes extend into the through lane.
- During the AM peak hour the queue on westbound right turn lane extends into the through lane.

TABLE 6.2 – FUTURE YEARS NO BUILD BOQ ANALYSIS RESULTS

Int #	Intersection	Control	Movement	Storage Bay Length (ft)	No-Build Queue Length (ft)			
					Opening Year 2025		Design Year 2045	
					AM Peak	PM Peak	AM Peak	PM Peak
1	SR 236/Lavista Rd & Fellowship Rd	Signal	EBL	250	97	403	124	415
			EBT	---	131	941	163	1895
			EBT+R	---	130	913	165	1889
			WBL	215	38	85	48	101
			WBT	205	244	174	252	228
			NBT+L	---	351	320	681	641
			NBT+R	---	315	285	707	620
			SBT	245	195	247	235	249
			SBT+R	245	217	258	232	250
2	SR 236/Lavista Rd & Chamblee Tucker Rd/Lynburn Dr	Signal	EBT	215	27	279	58	297
			EBT+R	215	26	284	57	297
			WBT	215	256	207	364	247
			WBR	215	42	97	124	135
			SBL	230	128	253	180	265
			SBT+R+L	230	146	254	194	257
3	Chamblee Tucker Rd & Fellowship Rd	Signal	WBR	230	226	133	265	168
			NBT	175	82	233	105	231
			SBL	---	116	180	134	178
			SBT+L	---	120	171	175	181
4	SR 236/Lavista Rd & Main St	Signal	EBL	215	90	35	119	58
			EBT	215	177	393	209	398
			EBT+R	215	186	389	222	403
			WBL	180	93	84	159	158
			WBT	---	570	203	851	294
			WBR	100	133	28	186	61
			NBL	130	274	255	265	240
			NBT+R	130	240	191	239	248
			SBT+R+L	---	127	113	116	131

7. IMPROVEMENT ALTERNATIVES

Potential mitigation measures were identified based on the delay and queuing concerns identified during the No Build analysis. Stakeholder feedback, City of Tucker planning goals, Dekalb County planning goals, and school traffic concerns were taken into consideration during the development process. Key elements that impacted potential improvement ideas included:

- Minimizing right-of-way and utility impacts
- Avoiding impacts the privately owned property inside the triangle
- Maintaining access for the property inside the triangle.
- Maintaining access to local businesses
- Maintaining or improving pedestrian access and safety
- Incorporating improvements into the proposed Chamblee Tucker Road diet

In 2017, GDOT implemented a new Intersection Control Evaluation (ICE) policy intended to serve as a tool for identifying preferred intersection designs as part of the traffic engineering analysis process. The ICE tool was explored as a potential tool for evaluating mitigation strategies in the study area. Typically, the GDOT ICE tool is used to evaluate alternatives for an isolated intersection; however, the Tucker Triangle presents a unique set of circumstances where the three intersections impact operations at each other but are not arranged in a linear sequence.

Early in the improvement development process, the study team made the decision to abandon use of the ICE tool for the study intersections. Instead, the methodology applied in the ICE tool was used to develop an alternative evaluation process that would better apply to the study area.

A two-stage process was developed to analyze potential improvements for the study area. In the first stage, potential improvements were modeled using the Design Year traffic only. A comparison matrix was developed to inform the decision-making process. Three alternatives were selected from among the alternatives evaluated and were evaluated further in a second stage of analysis. During the second stage, concept layouts were developed and cost estimates were refined.

7.1 STAGE 1 ALTERNATIVE COMPARISON

A variety of mitigation strategies were evaluated to determine the preferred approach to reduce congestion within the study area. Potential improvements ranged from installing turn lanes to eliminating intersections to altering travel patterns. In total, 24 strategies were evaluated to determine the operational impacts of the proposed improvements.

The alternatives were compared based on two primary performance metrics: the impact to Design Year peak hour network delay (versus the No Build conditions) and the expected cost of the proposed improvements. For the first stage of evaluating improvements, each alternative was assigned a cost range based on the extent of the proposed improvements. The ranges are defined in Table 7.1.

TABLE 7.1 - ALTERNATIVE COST RANGES

Cost	Range
Up to $200K	Low
$200K-$500K	Medium-Low
$500K-$1M	Medium
$1M-$3M	Medium-High
Over $3M	High

Table 7.2 summarizes 24 potential strategies that were evaluated as part of this study. In addition to the anticipated cost of improvement and the potential for improving the network delay, the table lists potential issues that were identified for each alternative and notes how the proposed alternative would improve the study area. Based on the comparison matrix, three alternatives were identified for further evaluation.

As a method of providing a non-biased assessment and comparison of alternatives, Synchro was used to optimize traffic signal parameters for the simulations. Traffic signal cycle length, intersection splits, and offsets were optimized for any alternative that modified the intersection geometry.

TABLE 7.2 – LIST OF POTENTIAL BUILD ALTERNATIVES

Alt No.	Name	Description	Cost of Improvement	% of Network Delay Improvement for Design Year		Issues	Potential Improvement
				AM	PM		
1A	Green-T at Chamblee Tucker Rd & Fellowship Rd	- Add SBR lane on Fellowship Rd - Provide dual SBL lanes on Chamblee Tucker Rd - Green-T intersection of Chamblee Tucker Rd at Fellowship Rd	Medium-Low	-37%	-24%	A single NBTR lane on Fellowship Rd cannot accommodate the design volume in the peak hours.	Reduced delay for NB traffic on Chamblee Tucker Rd by providing a Green-T intersection
1B	Green-T at Chamblee Tucker Rd & Fellowship Rd with added turn lane	- Add SBR and NBL lanes on Fellowship Rd - Provide dual SBL lanes on Chamblee Tucker Rd - Green-T intersection of Chamblee Tucker Rd at Fellowship Rd - Widen NB approach to Provide a dedicatedright turn lane.	Medium-Low	-20%	-12%	A single NBT lane on Fellowship Rd cannot accommodate the design volume in the peak hours.	Reduced delay for NB traffic on Chamblee Tucker Rd by providing a Green-T intersection
2	Single Intersection	Convert the Tucker Triangle to a single intersection at Fellowship Rd and Lavista Rd by: 1- Closing Chamblee Tucker Rd between Lavista Rd and Fellowship Rd. 2- Removing the signals at the intersections of Chamblee Tucker Rd & Lavista Rd and Chamblee Tucker Rd & Fellowship Rd.	Low	-346%	-28%	Delay increases significantly due to heavy turning volume, especially on SBL lane.	Fewer number of conflict points.
3	Multilane roundabout	Convert the Tucker Triangle to a multilane roundabout at Fellowship Rd and Lavista Rd by: 1- Closing Chamblee Tucker Rd between Lavista Rd and Fellowship Rd. 2- Removing the signals at the intersections of Chamblee Tucker Rd & Lavista Rd and Chamblee Tucker Rd & Fellowship Rd.	Medium-High	-28%	-399%	Delay increases significantly due to heavy volume on both roadays.	Fewer number of conflict points.
4	Entrance Only school driveway	Convert the school driveway to an entrance-only access. The exit volume is assumed to be added to the Ball Park Dr.	Low	6%	17%	Higher delay for the exiting traffic since they are rerouted to the Ball Park Dr	Reduced delay at school driveway by removing one signal phase.
5A	One way Pair Chamblee Tucker Rd & Fellowship Rd	- Convert Chamblee Tucker Rd to a one-way road to the north and Fellowship Rd to a one-way road to the south. - Remove WBL to Fellowship Rd movement. - Restripe the EB approach to have a single EBL, EBT, and EBTR lanes - Provide SBR, dual SBT, and dual SBL lanes on Fellowship Rd by widening to the west. - Restripe the NB approach on Fellowship Rd to have NBL and NBR lanes only	Low	-205%	-88%	Delay increases significantly due to heavy NBR volume on Fellowship Rd and EBL on Lavista Rd. Additional travel time for vehicles turning around the Animal Hospital.	Free flow movement on Chamblee Tucker Rd NB approach. Fewer number of conflict points.
5B	One way Pair with dual NBR	- Convert Chamblee Tucker Rd to a one-way road to the north and Fellowship Rd to a one-way road to the south. - Remove WBL to Fellowship Rd movement. - Restripe the EB approach to have a single EBL, EBT, and EBTR lanes - Provide SBR, dual SBT, and dual SBL lanes on Fellowship Rd by widening to the west. - Restripe the NB approach to have dual NBR lanes - Remove NBL at Fellowship Rd .	Low	-205%	-88%	Delay increased on Fellowship Rd NB approach and on Lavista EB approach. The NBT vehicles, added to the NBR volume, would use the outside NBR lane only, because they are taking the single EBL lane on Lavista Rd. One single EBL cannot accommodate the heavy volume. Additional travel time for vehicles turning around the Animal Hospital.	Free flow movement on Chamblee Tucker Rd NB approach. Fewer number of conflict points.
5C	One way Pair with dual NBR and shared EBTL lane	- Convert Chamblee Tucker Rd to a one-way road to the north and Fellowship Rd to a one-way road to the south. - Remove WBL to Fellowship Rd movement. - Restripe the EB approach to provide EBL, EBLT, and EBTR lanes. - Provide SBR, dual SBT, and dual SBL lanes on Fellowship Rd by widening to the west. - Restripe the NB approach to have dual NBR lanes and remove NBL at Fellowship Rd .	Low	-203%	-34%	High delay on Lavista EB approach due to heavy EBL volume. Additional travel time for vehicles turning around the Animal Hospital.	Free flow movement on Chamblee Tucker Rd NB approach. Fewer number of conflict points.
5D	One way Pair with new access to the school	- Convert Chamblee Tucker Rd to a one-way road to the north and Fellowship Rd to a one-way road to the south. - Remove WBL to Fellowship Rd movement. - Restripe the EB approach to provide EBL, EBLT, and EBTR lanes. - Provide SBR, dual SBT, and dual SBL lanes on Fellowship Rd by widening to the west. - Restripe the NB approach to have dual NBR lanes and remove NBL at Fellowship Rd . -Prohibit EBL to the school driveway - Add a right-in access for school buses to the school parking on Chamblee Tucker Rd, east side of the Chamblee Tucker Rd	Medium-Low	-3%	-3%	High delay on Lavista EB approach due to heavy EBL volume. Additional delay imposed to the vehicles entering the school. Additional travel time for vehicles turning around the Animal Hospital.	Free flow movement on Chamblee Tucker Rd NB approach. Fewer number of conflict points. Removed EBL phasing from the Main St signal Shorter ped phase time by replacing the EBL with a 12 ft concrete median and provide two-stage ped crossing Providing additional access point for school buses
5E	One way Pair with new access to the school and added EBL lane	- Convert Chamblee Tucker Rd to a one-way road to the north and Fellowship Rd to a one-way road to the south. - Remove WBL to Fellowship Rd movement. - Provide SBR, dual SBT, and dual SBL lanes on Fellowship Rd by widening to the west. - Restripe the NB approach to have dual NBR lanes - Remove NBL at Fellowship Rd . -Prohibit EBL to the school driveway - Add a right-in access for school buses to the school parking on Chamblee Tucker Rd, east side of the Chamblee Tucker Rd - Widen the EB approach to provide dual EBL, EBT, and EBTR lanes.	Medium-High	7%	13%	High cost of removing/relocating the utility pole on south-east corner of the Lavista Rd at Fellowship Rd intersection. Additional delay imposed to the vehicles entering the school. Additional travel time for vehicles turning around the Animal Hospital.	Free flow movement on Chamblee Tucker Rd NB approach. Fewer number of conflict points. Removed EBL phasing from the Main St signal Shorter ped phase time by replacing the EBL with a 12 ft concrete median and provide two-stage ped crossing Providing additional access point for school buses
6	One way Loop	Convert all the roads on Tucker Triangle one-way with traffic moving counterclockwise around a loop. WB through traffic on Lavista would have to turn right onto Chamblee Tucker, then left onto Fellowship, then right back onto Lavista. EB Lavista traffic would just continue through. Also, convert WBR at Main St to WBTR lane.	Medium-Low	-9%	-4%	High delay on Lavista Rd WB approach at Main St Intersection. Sharp NB u-turn on Chamblee Tucker Rd with heavy volume. Additional travel time for vehicles turning around the Animal Hospital.	Free flow movement on Lavista Rd EBR. Free flow movement on Chamblee Tucker Rd NBT. Free flow movement on Fellowship Rd SBR.

TABLE 8.2 CONTINUED

Alt No.	Name	Description	Cost of Improvement	% of Network Delay Improvement for Design Year		Issues	Potential Improvement
				AM	PM		
6	One way Loop	Convert all the roads on Tucker Triangle one-way with traffic moving counterclockwise around a loop. WB through traffic on Lavista would have to turn right onto Chamblee Tucker, then left onto Fellowship, then right back onto Lavista. EB Lavista traffic would just continue through. Also, convert WBR at Main St to WBTR lane.	Medium-Low	-9%	-4%	High delay on Lavista Rd WB approach at Main St Intersection. Sharp NB u-turn on Chamblee Tucker Rd with heavy volume. Additional travel time for vehicles turning around the Animal Hospital.	Free flow movement on Lavista Rd EBR. Free flow movement on Chamblee Tucker Rd NBT. Free flow movement on Fellowship Rd SBR.
7A	Lynburn Dr One-way to North	-Change the direction of travel on Lynburn Dr to one-way north. -Prohibit NBL turns at Lavista Rd & Main St and shift the traffic to the Lavista Rd & Lynburn Dr. -Provide a full NBL and 200 ft storage for NBT lane on Lynburn Dr.	Low	-29%	10%	Higher delay on School Drvwy due to providing a permissive phase for SBL on a shared SBRTL lane. Ped volume on east leg is high. Potentioal queuing for NB approach on Main St at Lynburn Dr.	Reduces congestion at Main St Intersection.
7B	Lynburn Dr One-way to North with dedicated left turn on Main St	-Change the direction of travel on Lynburn Dr to one-way north. -Prohibit NBL turns at Lavista Rd & Main St and shift the traffic to the Lavista Rd & Lynburn Dr. -Add a NBL lane on Main St to Lynburn Dr. -Provide two full lanes for NBL and NBT lane on Lynburn Dr by removing the two parking spots.	Medium-Low	-11%	12%	Higher delay on School Drvwy due to providing a permissive phase for SBL on a shared SBRTL lane. Ped volume on east leg is high.	Reduces congestion at Main St Intersection.
7C	Lynburn Dr One-way to North with free-flow WBR	-Change the direction of travel on Lynburn Dr to one-way north. -Prohibit NBL turns at Lavista Rd & Main St and shift the traffic to the Lavista Rd & Lynburn Dr. -Provide a full NBL and 200 ft storage for NBT lane on Lynburn Dr. -Add SBR lane on Fellowship Rd -Provide free-flow WBR movement at Lavista Rd & Chamblee Tucker Rd -Remove ped phase at Lavista and Chamblee Tucker Rd -Add NB split phasing on Lynburn Dr at Lavista Rd	Medium-Low	24%	20%	Higher delay on School Drvwy due to providing a permissive phase for SBL on a shared SBRTL lane. Ped volume on east leg is high. Potentioal queuing for NB approach on Main St at Lynburn Dr.	Reduces congestion at Main St Intersection. Provides Free-flow WBR movement on Lavista Rd Removes ped-only phasing at Lavista Rd & Chamblee Tucker Rd
7D	Lynburn Dr One-way to North with Exit-Only School Driveway	-Change the direction of travel on Lynburn Dr to one-way north. -Prohibit NBL turns at Lavista Rd & Main St and shift the traffic to the Lavista Rd & Lynburn Dr. -Add a NBL lane on Main St to Lynburn Dr. -Provide two full lanes for NBL and NBT lane on Lynburn Dr by removing the two parking spots. -Add SBR lane on Fellowship Rd -Provide free-flow WBR movement at Lavista Rd & Chamblee Tucker Rd -Remove ped phase at Lavista and Chamblee Tucker Rd -Add NB split phasing on Lynburn Dr at Lavista Rd -Convert the school driveway to an exit-only access -The entering volume is assumed to be added to the Ball Park Dr. -Restripe School Drvwy to provide SBL and SBTR lanes - Restripe EBL on Lavista Rd & Main St to WBT on Lavitsa Rd & Chamblee Tucker Rd	Medium-Low	-21%	0%	Higher delay for the entering traffic to school since those are rerouted to the Ball Park Dr. Higher delay on Lynburn Dr NB approach due to heavy volume. The queue backs up to the Main st.	Reduces congestion at Main St Intersection. Provides Free-flow WBR movement on Lavista Rd Removes ped phasing at Lavista Rd & Chamblee Tucker Rd Removes the conflict between peds and SBL vehicles
7E	Lynburn Dr One-way to North without SBL at School Driveway	-Change the direction of travel on Lynburn Dr to one-way north. -Prohibit NBL turns at Lavista Rd & Main St and shift the traffic to the Lavista Rd & Lynburn Dr. intersection -Add NBL lane on Main St to Lynburn Dr. -Provide two full lanes for NBL and NBT lane on Lynburn Dr by removing two parking spots. -Add SBR lane on Fellowship Rd -Provide free-flow WBR movement at Lavista Rd & Chamblee Tucker Rd -Remove ped phase at Lavista and Chamblee Tucker Rd -Add NB split phasing on Lynburn Dr at Lavista Rd -Prohibit SBL turns from School Drvwy	Medium-Low	28%	19%	Higher delay for the SBL traffic exiting school since those are rerouted to use the Main St and E Lynburn Dr.	Reduces congestion at Main St Intersection. Provides Free-flow WBR movement on Lavista Rd Removes ped-only phasing at Lavista Rd & Chamblee Tucker Rd Removes the conflict between peds and SBL vehicles
8	Prohibited NBL at Fellowship Rd	-Prohibit NBL movement on Fellowship Rd. The vehicles would go thru, make a u-turn at Chamblee Tucker Rd, and then right turn (SBR) to the Lavista Rd, and then go WBT on Lavista Rd.	Low	-13%	-9%	Higher delay for the SBR traffic on Chamblee Tucker Rd due to increased travel distance.	Increases NBT capacity on Fellowship Rd by removing permissive NBL phase.

TABLE 8.2 CONTINUED

Alt No.	Name	Description	Cost of Improvement	% of Network Delay Improvement for Design Year		Issues	Potential Improvement
				AM	PM		
9A	Additional NBL on Fellowship Rd	-Add NBL lane on Fellowship Rd by widening to the east -Add a SBR lane on Fellowship Rd by widening to the west -Restripe SB approach on Chamblee Tucker Rd, to provide dual SBL and SBTR lanes	Medium-Low	-15%	5%	High cost of widening and relocating the signal pole the Lavista Rd at Fellowship Rd intersection.	Increases NB approach capacity on Fellowship Rd
9B	Additional NBL on Fellowship Rd & Lynburn Dr One-way to North	-Add NBL lane on Fellowship Rd by widening to the east -Add SBR lane on Fellowship Rd by widening to the west -Change the direction of travel on Lynburn Dr to one-way north. -Prohibit NBL turns at Lavista Rd & Main St and shift the traffic to the Lavista Rd & Lynburn Dr. -Provide a full NBL and 200 ft storage for NBLT lane on Lynburn Dr. -Provide free-flow WBR to Chamblee Tucker Rd -Remove ped phase at Lavista and Chamblee Tucker Rd -Add NB split phasing on Lynburn Dr at Lavista Rd	Medium	36%	21%	High cost of removing/relocating the utility pole on south-east corner of the Lavista Rd at Fellowship Rd intersection. Higher delay on School Drvwy due to providing a permissive phase for SBL on a shared SBRTL lane. Ped volume on east leg is high. Potentioal queuing for NB approach on Main St at Lynburn Dr.	Reduces congestion at Main St Intersection. Provides Free-flow WBR movement on Lavista Rd Removes ped-only phasing at Lavista Rd & Chamblee Tucker Rd
9C	Additional NBL on Fellowship Rd & Entrance Only School Driveway & Lynburn Dr One-way to North	-Add NBL lane on Fellowship Rd by widening to the east -Add SBR lane on Fellowship Rd by widening to the west -Change the direction of travel on Lynburn Dr to one-way north. -Prohibit NBL turns at Lavista Rd & Main St and shift the traffic to the Lavista Rd & Lynburn Dr. -Provide a full NBL and 200 ft storage for NBLT lane on Lynburn Dr. -Provide free-flow WBR to Chamblee Tucker Rd -Remove ped phase at Lavista and Chamblee Tucker Rd -Add NB split phasing on Lynburn Dr at Lavista Rd -Convert the school driveway to an entrance-only access.	Medium	27%	16%	High cost of removing/relocating the utility pole on south-east corner of the Lavista Rd at Fellowship Rd intersection. Potentioal queuing for NB approach on Main St at Lynburn Dr. Higher delay for the exiting traffic since they are rerouted to the Ball Park Dr.	Reduces congestion at Main St Intersection. Provides Free-flow WBR movement on Lavista Rd Removes ped phasing at Lavista Rd & Chamblee Tucker Rd Reduced delay at school driveway by removing one signal phase.
10A	One way Pair & Entrance Only School Driveway	- Convert Chamblee Tucker Rd to a one-way road to the north and Fellowship Rd to a one-way road to the south. - Remove WBL to Fellowship Rd movement. - Restripe the EB approach to provide EBL, EBLT, and EBTR lanes. - Provide SBR, dual SBT, and dual SBL lanes on Fellowship Rd by widening to the west. - Restripe the NB approach to have dual NBR lanes and remove NBL at Fellowship Rd. -Prohibit EBL to the school driveway - Add a right-in access for school buses on east side of the Chamblee Tucker Rd -Shared WB thru/R on Lavista Rd to Chamblee Tucker Rd -Convert the school driveway to an entrance-only access.	Medium-Low	-183%	-41%	NBL vehicles which make an EBL turn and then NBU, create a long queue which causes gridlock. The ideal is to avoid vehicles making two left turn/u-turn consecutively. High delay on Lavista EB approach due to heavy EBL volume. Additional delay imposed to the vehicles entering the school. Additional travel time for vehicles turning around the Animal Hospital.	Free flow movement on Chamblee Tucker Rd NB approach. Removes EBL phasing from the Main St signal Shorter ped phase time by replacing the EBL with a 12 ft concrete median and provide two-stage ped crossing Provides additional access point for school buses
10B	One way Pair with added EBL and NBL lanes & Entrance Only School Driveway	- Convert Chamblee Tucker Rd to a one-way road to the north and Fellowship Rd to a one-way road to the south. - Remove WBL to Fellowship Rd movement. - Provide SBR, dual SBT, and dual SBL lanes on Fellowship Rd by widening to the west. - Widen NB approach to have a single NBL and dual NBR lanes -Prohibit EBL to the school driveway - Add a right-in access for school buses on east side of the Chamblee Tucker Rd - Widen the EB approach to provide dual EBL, EBT, and EBTR lanes. -Convert the school driveway to an entrance-only access.	Medium-High	-5%	24%	High cost of removing/relocating the utility pole on south-east corner of the Lavista Rd at Fellowship Rd intersection. Additional delay imposed to the vehicles entering the school. Additional travel time for vehicles turning around the Animal Hospital.	Free flow movement on Chamblee Tucker Rd NB approach. Removes EBL phasing from the Main St signal Shorter ped phase time by replacing the EBL with a 12 ft concrete median and provide two-stage ped crossing Provides additional access point for school buses Reduced delay at school driveway by removing one signal phase.
11A	One way Pair with added EBL lane & Lynburn Dr One-way to North	- Convert Chamblee Tucker Rd to a one-way road to the north and Fellowship Rd to a one-way road to the south. - Remove WBL to Fellowship Rd movement. - Provide SBR, dual SBT, and dual SBL lanes on Fellowship Rd by widening to the west. - Restripe the NB approach to have dual NBR lanes and remove NBL at Fellowship Rd . -Prohibit EBL to the school driveway -Widen the EB approach to provide dual EBL, EBT, and EBTR lanes. -Change the direction of travel on Lynburn Dr to one-way north. -Prohibit NBL turns at Lavista Rd & Main St and shift the traffic to the Lavista Rd & Lynburn Dr. -Provide a full NBL and 200 ft storage for NBT lane on Lynburn Dr.	Medium-High	-74%	-49%	SBL on Fellowship Rd cannot get into the EBT lanes due to the queue back up on Lavista Rd. High cost of removing/relocating the utility pole on south-east corner of the Lavista Rd at Fellowship Rd intersection. Additional delay imposed to the vehicles entering the school. Additional travel time for vehicles turning around the Animal Hospital.	Removed EBL and NBL phasings from the Main St signal Shorter ped phase time by replacing the EBL with a 12 ft concrete median and provide two-stage ped crossing
11B	One way Pair with added EBL and NBL lanes & Lynburn Dr One-way to North	- Convert Chamblee Tucker Rd to a one-way road to the north and Fellowship Rd to a one-way road to the south. - Remove WBL to Fellowship Rd movement. - Provide SBR, dual SBT, and dual SBL lanes on Fellowship Rd by widening to the west. - Widen NB approach to have a single NBL and dual NBR lanes. -Prohibit EBL to the school driveway -Widen the EB approach to provide dual EBL, EBT, and EBTR lanes. -Change the direction of travel on Lynburn Dr to one-way north. -Prohibit NBL turns at Lavista Rd & Main St and shift the traffic to the Lavista Rd & Lynburn Dr. -Provide a full NBL and 200 ft storage for NBT lane on Lynburn Dr.	Medium-High	-51%	-51%	High cost of removing/relocating the utility pole on south-east corner of the Lavista Rd at Fellowship Rd intersection. Additional delay imposed to the vehicles entering the school. Additional travel time for vehicles turning around the Animal Hospital.	Removed EBL and NBL phasings from the Main St signal Shorter ped phase time by replacing the EBL with a 12 ft concrete median and provide two-stage ped crossing

7.2 STAGE 2 PREFERRED ALTERNATIVE EVALUATION

Three preferred alternatives were selected for further analysis. Planning level conceptual layouts were developed for each alternative and are briefly summarized below. The layouts are presented in **Appendix E**.

Design Alternative 1 - Reverse Lynburn Dr

This improvement proposes to reverse the direction of travel on Lynburn Drive from one-way southbound to one-way northbound. The Lynburn Drive approach at Lavista Road would include a full length through/left turn lane and an exclusive left turn lane with 245 feet of storage. The existing traffic signal at Lavista Road and Chamblee Tucker Road would be converted to split phasing on the side street approaches. A raised concrete island would be installed to channelize the westbound right turn lane on Lavista Road. The need for pedestrian crossings at this location should be evaluated further. Existing pedestrian counts at this location are low and there are nearby crossings that would still be convenient for pedestrians.

The existing split-phasing at the intersection of Lavista Road and Main Street would be converted to a standard four-phase signal by shifting the dual left turn movements to Lynburn Drive. The signal timing would be reoptimized to provide additional green time to the Lavista Road approaches. In addition, removing the left turn movements from the Main Street approach would eliminate some potential conflict points at the intersection.

A northbound left turn lane would be installed on Main Street at Lynburn Drive. The existing parallel parking spaces on the northbound approach of Main Street would be eliminated to accommodate the left turn lane. The intersection would remain unsignalized.

The existing on-street parking spaces on Lynburn Drive would be removed; however, additional parking spaces could be installed along Main Street between Lynburn Drive and Lavista Road.

The proposed improvements would require GDOT signal permit revisions at both the Lavista Road intersections (Lavista Road at Lynburn Drive and Lavista Road at Main Street).

Design Alternative 2 - Turn lane on Fellowship Road

This improvement would install an exclusive left turn lane with 200 feet of storage on the northbound approach of Fellowship Road at Lavista Road. The existing, shared left turn/through lane would be converted to a through only lane. The northbound left turn lane would not warrant protected phasing and would, therefore, be served by permissive only phasing.

Installation of an additional lane on Fellowship Road would require widening the northbound approach; however, the conceptual layout indicates that the additional capacity could be achieved without impacting the large utility pole existing on the southeast corner of the study intersection. The design would potentially require replacing up to two mast arms. A GDOT signal permit revision would be required.

Design Alternative 3 - Combined Alternative

This alternative includes all the above-mentioned modifications from alternatives 1 and 2. The proposed improvements could be implemented simultaneously or in stages depending on available funding sources.

Capacity analysis was performed for the three preferred alternatives. Table 7.3 shows the operational improvements in terms of Network delay for each of the selected alternatives. No Build results are included for comparison.

Reversing Lynburn Drive is expected to provide considerable improvements versus the No Build conditions in both the Opening and Design Years. Installing a turn lane on Fellowship Road would be expected to provide greater benefits during the evening peak hour in both the Future Years. Combining the two alternatives would provide the greatest benefits to the study area in both Future Years.

TABLE 7.3 – NETWORK DELAY RESULTS FOR THE PREFERRED ALTERNATIVES

Network Delay (sec/veh)	AM Peak Hour		PM Peak Hour	
	2025 Opening Year	2045 Design Year	2025 Opening Year	2045 Design Year
No Build	60.5	114.9	116.9	277.5
Build (Reverse Lynburn Drive)	40.9	85.6	97.1	238.2
% Improvement	**32%**	**26%**	**17%**	**14%**
Build (Turn lanes on Fellowship Road)	59.4	95.0	114.8	264.5
% Improvement	**2%**	**17%**	**2%**	**5%**
Build (Combined Alternative)	38.5	71.8	93.7	229.6
% Improvement	**54%**	**50%**	**24%**	**20%**

8. FUTURE BUILD TRAFFIC

The three preferred alternatives were evaluated for the Opening Year 2025 and Design Year 2045 conditions.

8.1 INTERSECTION CAPACITY ANALYSIS

Capacity analysis was performed for the morning (AM) and evening (PM) peak hours in the Build conditions. *Synchro* and *SimTraffic* reports are included in **Appendix D**. The results of the analysis for the preferred alternatives are listed in Table 8.1 through Table 8.3.

8.1.1 DESIGN ALTERNATIVE 1: REVERSE LYNBURN DR

The analysis results indicate that the intersections will experience the following changes in the overall delay and LOS under Build Conditions:

Intersection 1 – SR 236/Lavista Road and Fellowship Road

The intersection delay and LOS would remain the same in the Build condition as it was in the No-Build condition, for the Opening Year AM peak hour and Design Year both peak hours. However, the LOS D for No-Build condition during the Opening Year PM peak hour will get worse (LOS F) in the Build condition.

Intersection 2 – SR 236/Lavista Road and Chamblee Tucker Road/Lynburn Drive

During the Opening Year AM and PM peaks, the intersection LOS will deteriorate from LOS A and B in the No-Build condition AM and PM peak hours, respectively, to LOS B and LOS C in the Build condition. During the Design Year AM and PM peaks, the intersection LOS will deteriorate from LOS A and D in the No-Build condition AM and PM peak hours, respectively, to LOS B and LOS F in the Build condition.

Intersection 3 – Chamblee Tucker Road and Fellowship Road

The intersection delay and LOS would remain the same in the Build condition as it was in the No-Build condition, for both Opening Year and Design Year peak hours.

Intersection 4 – SR 236/Lavista Road and Main Street

During the Opening Year AM and PM peaks, the intersection delay and LOS will improve from LOS D in the No-Build condition to LOS A or LOS C in the Build condition. During the Design Year AM and PM peaks, the intersection delay and LOS will improve from LOS F in the No-Build condition to LOS D or LOS E in the Build condition.

TABLE 8.1 – FUTURE YEARS BUILD INTERSECTION DELAY AND LOS RESULTS- REVERSE LYNBURN DRIVE ALTERNATIVE

No.	Intersecting Street	Approach	2025 Opening Year				2045 Design Year			
			AM Peak		PM Peak		AM Peak		PM Peak	
			Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
1	SR 236/Lavista Rd & Fellowship Rd	*EB*	17.5	B	32.5	C	23.7	C	165.2	F
		WB	15.3	B	23.1	C	45.1	D	33.0	C
		NB	124.8	F	85.3	F	464.0	F	264.6	F
		SB	33.9	C	109.0	F	45.6	D	291.3	F
		Overall	***42.4***	***D***	***55.3***	***E***	***130.0***	***F***	***179.3***	***F***
2	SR 236/Lavista Rd & Chamblee Tucker Rd/Lynburn Dr	*EB*	4.8	A	8.6	A	7.8	A	194.6	F
		WB	2.7	A	14.4	B	6.3	A	21.8	C
		NB	53.1	D	52.9	D	48.5	D	47.9	D
		SB	69.2	E	59.0	E	78.8	E	86.5	F
		Overall	***14.8***	***B***	***26.0***	***C***	***18.3***	***B***	***110.7***	***F***
3	Chamblee Tucker Rd & Fellowship Rd	*WB*	16.2	B	24.4	C	16.8	B	24.8	C
		NB	8.5	A	11.0	B	9.9	A	6.2	A
		SB	6.7	A	31.1	C	7.3	A	85.6	F
		Overall	***9.6***	***A***	***25.9***	***C***	***10.5***	***B***	***61.5***	***E***
4	SR 236/Lavista Rd & Main St	*EB*	8.1	A	5.3	A	11.0	B	84.6	F
		WB	22.7	C	5.7	A	58.0	E	9.8	A
		NB	34.9	C	50.6	D	35.9	D	47.7	D
		SB	37.5	D	55.7	E	43.5	D	59.9	E
		Overall	***20.4***	***C***	***8.8***	***A***	***42.2***	***D***	***63.1***	***E***

8.1.2 DESIGN ALTERNATIVE 2: TURN LANE ON FELLOWSHIP ROAD

Results of the Build conditions Synchro analysis indicate that the intersections will experience the following changes in the overall delay and LOS under Build Conditions:

Intersection 1 – SR 236/Lavista Road and Fellowship Road
During the PM peak hour (both Design Year and Opening Year) the intersection LOS would remain the same in the Build condition as it was in the No-Build condition. During the AM peak hour, the LOS will improve from LOS D and LOS F in the Opening Year and Design Year, respectively, to LOS C and LOS D in the Build condition.

Intersection 2 – SR 236/Lavista Road and Chamblee Tucker Road/Lynburn Drive
The intersection delay and LOS would remain the same in the Build condition as it was in the No-Build condition, for both Opening Year and Design Year peak hours.

Intersection 3 – Chamblee Tucker Road and Fellowship Road
The intersection delay and LOS would remain the same in the Build condition as it was in the No-Build condition, for both Opening Year and Design Year peak hours.

Intersection 4 – SR 236/Lavista Road and Main Street
The intersection delay and LOS would remain the same in the Build condition as it was in the No-Build condition, for both Opening Year and Design Year peak hours.

During the Opening Year AM and PM peaks, the intersection delay and LOS will improve from LOS D in the No-Build condition to LOS A or LOS C in the Build condition. During the Design Year AM and PM peaks, the intersection delay and LOS will improve from LOS F in the No-Build condition to LOS D or LOS E in the Build condition.

TABLE 8.2 – FUTURE YEARS BUILD INTERSECTION DELAY AND LOS RESULTS- NB LEFT TURN LANE ON FELLOWSHIP ROAD ALTERNATIVE

No.	Intersecting Street	Approach	2025 Opening Year				2045 Design Year			
			AM Peak		PM Peak		AM Peak		PM Peak	
			Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
1	SR 236/Lavista Rd & Fellowship Rd	*EB*	14.2	B	32.5	C	23.7	C	165.2	F
		WB	4.1	A	16.2	B	38.7	D	26.5	C
		NB	51.9	D	230.5	F	85.7	F	315.2	F
		SB	39.6	D	109.0	F	45.6	D	291.3	F
		Overall	***22.8***	***C***	***49.3***	***D***	***46.8***	***D***	***183.7***	***F***
2	SR 236/Lavista Rd & Chamblee Tucker Rd/Lynburn Dr	*EB*	1.6	A	3.9	A	1.9	A	4.7	A
		WB	2.9	A	7.4	A	5.1	A	8.2	A
		NB	---	---	---	---	---	---	---	---
		SB	63.0	E	45.0	D	63.0	E	158.9	F
		Overall	***7.9***	***A***	***14.6***	***B***	***9.5***	***A***	***41.4***	***D***
3	Chamblee Tucker Rd & Fellowship Rd	*WB*	16.2	B	24.4	C	16.8	B	24.8	C
		NB	8.8	A	13.8	B	11.2	B	8.2	A
		SB	6.7	A	31.1	C	7.3	A	85.6	F
		Overall	***9.7***	***A***	***26.5***	***C***	***11.0***	***B***	***62.0***	***E***
4	SR 236/Lavista Rd & Main St	*EB*	16.8	B	52.0	D	19.6	B	286.8	F
		WB	39.4	D	16.7	B	177.6	F	22.1	C
		NB	44.3	D	48.4	D	51.8	D	57.0	E
		SB	73.0	E	54.3	D	150.7	F	60.0	E
		Overall	***37.3***	***D***	***42.9***	***D***	***118.4***	***F***	***181.3***	***F***

8.1.3 DESIGN ALTERNATIVE 3: COMBINED

The results indicate that in the Opening Year, the studied intersections operate at an acceptable LOS D or better; However, some of the individual approaches exhibit LOS E or F, including:

- Southbound Fellowship Road approach at Lavista Road (PM peak hour)
- Southbound Chamblee Tucker Rd approach at Lavista Road (both peak hours)
- Southbound School Driveway approach at Lavista Road (PM peak hour)

In the Opening Year, all the study intersections would operate adequately during both peak hours. During the Design Year, the operation of Lavista Road and Fellowship Road intersection as well as Lavista Road and Chamblee Tucker Road intersection exhibit unacceptable operations (LOS F) in the evening peak hour. The intersections of Fellowship Road and Chamblee Tucker Road as well as Lavista Road and Main Street will operate at capacity (LOS E) in the evening peak hour.

Results of the Build conditions Synchro analysis indicate that the intersections will experience the following changes in the overall delay and LOS under Build Conditions:

Intersection 1 – SR 236/Lavista Road and Fellowship Road
During the PM peak hour (both Design Year and Opening Year) the intersection LOS would remain the same in the Build condition as it was in the No-Build condition. During the AM peak hour, the LOS will improve from LOS D and LOS F in the Opening Year and Design Year, respectively, to LOS C and LOS D in the Build condition.

Intersection 2 – SR 236/Lavista Road and Chamblee Tucker Road/Lynburn Drive
During the Opening Year AM and PM peaks, the intersection LOS will deteriorate from LOS A and B in the No-Build condition AM and PM peak hours, respectively, to LOS B and LOS C in the Build condition. During the Design Year AM and PM peaks, the intersection LOS will deteriorate from LOS A and D in the No-Build condition AM and PM peak hours, respectively, to LOS B and LOS F in the Build condition.

Intersection 3 – Chamblee Tucker Road and Fellowship Road
The intersection delay and LOS would remain the same in the Build condition as it was in the No-Build condition, for both Opening Year and Design Year peak hours.

Intersection 4 – SR 236/Lavista Road and Main Street
During the Opening Year AM and PM peaks, the intersection delay and LOS will improve from LOS D in the No-Build condition to LOS A or LOS C in the Build condition. During the Design Year AM and PM peaks, the intersection delay and LOS will improve from LOS F in the No-Build condition to LOS D or LOS E in the Build condition

TABLE 8.3 - INTERSECTION DELAY AND LOS RESULTS- COMBINED BUILD ALTERNATIVE

No.	Intersecting Street	Approach	2025 Opening Year				2045 Design Year			
			AM Peak		PM Peak		AM Peak		PM Peak	
			Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
1	SR 236/Lavista Rd & Fellowship Rd	*EB*	14.2	B	32.5	C	23.7	C	165.2	F
		WB	11.2	B	23.1	C	45.1	D	33.0	C
		NB	51.9	D	45.6	D	85.7	F	60.8	E
		SB	39.6	D	109.0	F	45.6	D	291.3	F
		Overall	***25.6***	***C***	***50.8***	***D***	***49.3***	***D***	***156.0***	***F***
2	SR 236/Lavista Rd & Chamblee Tucker Rd/Lynburn Dr	*EB*	5.2	A	8.9	A	8.0	A	194.8	F
		WB	2.7	A	14.4	B	6.3	A	21.8	C
		NB	53.1	D	52.9	D	48.5	D	47.9	D
		SB	69.2	E	59.0	E	78.8	E	86.5	F
		Overall	***14.9***	***B***	***26.1***	***C***	***18.3***	***B***	***110.8***	***F***
3	Chamblee Tucker Rd & Fellowship Rd	*WB*	16.2	B	24.4	C	16.8	B	24.8	C
		NB	8.8	A	13.8	B	11.2	B	8.2	A
		SB	6.7	A	31.1	C	7.3	A	85.6	F
		Overall	***9.7***	***A***	***26.5***	***C***	***11.0***	***B***	***62.0***	***E***
4	SR 236/Lavista Rd & Main St	*EB*	8.2	A	5.3	A	11.0	B	84.6	F
		WB	22.7	C	5.7	A	58.0	E	9.8	A
		NB	34.9	C	50.6	D	35.9	D	47.7	D
		SB	37.5	D	55.7	E	43.5	D	59.9	E
		Overall	***20.4***	***C***	***8.8***	***A***	***42.2***	***D***	***63.1***	***E***

8.2 QUEUEING ANALYSIS

Back of Queue analysis was performed for each preferred alternative. SimTraffic analysis reports are included in **Appendix D**.

8.2.1 DESIGN ALTERNATIVE 1: REVERSE LYNBURN DR

The expected queue lengths for Design Alternative 1 condition are shown in Table 8.4 for Opening Year 2025 and Design Year 2045. The highlighted queue lengths in Table 8.4 are the movements where the reported queue length value exceeds the storage length available for that turning movement. The results differed from future No Build conditions as follows:

Intersection 1 – SR 236/Lavista Road and Fellowship Road

The BOQ lengths reduced or increased by less than a vehicle length (25 ft) for all the movements and during all peak hours except for:

- The eastbound left-turn lane: The queue length reduced by 46 ft during the Opening Year PM peak hour, however BOQ still extends beyond the available storage in lengths and extends to the two-way left-turn lane (TWLTL).
- The eastbound through and right-turn lanes: The queue length would be reduced significantly by about 400 ft during the Opening Year PM peak hour. During the Design Year PM peak hour, this queue increased by about 35 ft.
- The northbound through, left-turn and right-turn lanes: The queue length increased by 120 ft during the Opening Year PM peak hour, and by 40 ft during the Design Year PM peak hour.

Intersection 2 – SR 236/Lavista Road and Chamblee Tucker Road/Lynburn Drive

The BOQ lengths reduced or increased by less than a vehicle length (25 ft) for all the movements and during all peak hours except for:

- The eastbound thru lane: The queue length would be reduced by 34 ft and increased by 43 ft during the Opening Year PM peak hour and Design Year AM peak hour, respectively.
- The westbound thru and right turn lanes: The queue length would be reduced in all peak hours.

Intersection 3 – Chamblee Tucker Rd and Fellowship Road

The BOQ lengths reduced or increased by less than a vehicle length (25 ft) for all the movements and during all peak hours except for:

- The westbound right turn lane: The queue length would be reduced by 53 ft during the Opening Year AM peak hour.

Intersection 4 – SR 236/Lavista Road and Chamblee Tucker and Main Street

The BOQ lengths reduced or increased by less than a vehicle length (25 ft) for all the movements and during all peak hours except for:

- The eastbound thru lanes: The queue length would be reduced significantly during all peak hours by 80-126 ft.
- The westbound thru, left, and right-turn lanes: The queue length would be reduced significantly during all peak hours up to 219 ft.

- The northbound thru and right-turn lanes: The queue length would be reduced significantly.

TABLE 8.4 – BACK OF THE QUEUE RESULTS- REVERSE LYNBURN DRIVE BUILD ALTERNATIVE

Int #	Intersection	Control	Movement	Storage Bay Length (ft)	Build Queue Length (ft)			
					Opening Year 2025		Design Year 2045	
					AM Peak	PM Peak	AM Peak	PM Peak
1	SR 236/Lavista Rd & Fellowship Rd	Signal	EBL	250	88	357	144	415
			EBT	---	126	531	168	1930
			EBT+R	---	128	516	186	1919
			WBL	215	35	72	52	90
			WBT	205	188	162	257	223
			NBT+L	---	362	442	685	666
			NBT+R	---	320	405	698	660
			SBT	245	184	252	230	243
			SBT+R	245	218	246	231	242
2	SR 236/Lavista Rd & Chamblee Tucker Rd/Lynburn Dr	Signal	EBT	215	39	245	101	282
			WBT	215	94	143	345	230
			WBR	215	20	0	27	0
			NBL	225	164	159	217	257
			NBT+L	320	187	198	254	294
			SBL	230	139	253	175	248
			SBT+R+L	230	153	246	182	243
3	Chamblee Tucker Rd & Fellowship Rd	Signal	WBR	230	173	143	243	175
			NBT	175	88	241	108	236
			SBL	---	110	188	149	180
			SBT+L	---	106	191	168	183
4	SR 236/Lavista Rd & Main St	Signal	EBL	215	87	50	126	53
			EBT	215	81	302	83	315
			EBT+R	215	96	310	104	324
			WBL	180	69	77	144	104
			WBT	---	351	120	847	161
			WBR	100	114	16	184	35
			NBT	200	125	41	174	74
			NBR	130	61	56	91	88
			SBT+R+L	---	127	88	135	118

8.2.2 DESIGN ALTERNATIVE 2: TURN LANE ON FELLOWSHIP ROAD

The expected queue lengths for Design Alternative 2 condition is shown in Table 8.5 for the Opening Year 2025 and Design Year 2045. The results differed from future No Build conditions as follows:

Intersection 1 – SR 236/Lavista Road and Fellowship Road

The BOQ lengths reduced or increased by less than a vehicle length (25 ft) for all the movements and during all peak hours except for:

- The eastbound thru lanes: The queue length will increase by 200 ft during the Opening Year PM peak hour and 30 ft during the Design Year AM peak hour. Similar to the No-Build condition, BOQ still extends beyond the available storage in lengths and extends to the two-way left-turn lane (TWLTL).
- The westbound left-turn lane: The queue length will increase by 26 ft during the Opening Year PM peak hour while still can be accommodated by the available storage.
- The northbound thu, left-turn and right-turn lanes: The queue length would be reduced significantly during all peak hours by 85 ft to 372 ft.

Intersection 2 – SR 236/Lavista Road and Chamblee Tucker Road/Lynburn Drive

The BOQ lengths reduced or increased by less than a vehicle length (25 ft) for all the movements and during all peak hours except for:

- The westbound right turn lane: The queue length would be reduced by 56 ft during the Design Year PM peak hour.

Intersection 3 – Chamblee Tucker Rd and Fellowship Road

The BOQ lengths reduced or increased by less than a vehicle length (25 ft) for all the movements and during all peak hours.

Intersection 4 – SR 236/Lavista Road and Chamblee Tucker and Main Street

The BOQ lengths reduced or increased by less than a vehicle length (25 ft) for all the movements and during all peak hours except for:

- The eastbound left-turn lane: The queue length will increase by 33 ft during the Design Year PM peak hour while it still can be accommodated by the available storage.
- The westbound left-turn lane: The queue length will increase by 27 ft during the Opening Year PM peak hour and reduce by 37 ft during the Design Year AM peak hour. In both cases the BOQ still can be accommodated by the available storage.
- The westbound thru lane: The queue length would be reduced by 46 ft during the Design Year AM peak hour.
- The westbound right-turn lane: The queue length will increase by 28 ft during the Design Year PM peak hour but still can be accommodated by the available storage.

TABLE 8.5 – BACK OF THE QUEUE RESULTS- NB LEFT TURN LANE ON FELLOWSHIP ROAD BUILD ALTERNATIVE

Int #	Intersection	Control	Movement	Storage Bay Length (ft)	Opening Year 2025		Design Year 2045	
					AM Peak	PM Peak	AM Peak	PM Peak
1	SR 236/Lavista Rd & Fellowship Rd	Signal	EBL	250	86	379	143	422
			EBT	---	114	1144	181	1861
			EBT+R	---	116	1145	195	1869
			WBL	215	46	111	53	96
			WBT	205	260	176	252	220
			NBL	200	100	95	250	184
			NBT	---	258	206	414	277
			NBT+R	---	231	166	373	248
			SBT	245	182	243	231	245
			SBT+R	245	214	253	237	252
2	SR 236/Lavista Rd & Chamblee Tucker Rd/Lynburn Dr	Signal	EBT	215	24	279	52	289
			EBT+R	215	24	279	47	285
			WBT	215	258	209	375	261
			WBR	215	55	97	118	79
			SBL	230	137	266	161	261
			SBT+R+L	230	154	262	181	255
3	Chamblee Tucker Rd & Fellowship Rd	Signal	WBR	230	219	139	259	182
			NBT	175	74	230	105	247
			SBL	---	118	183	135	183
			SBT+L	---	122	181	168	186
4	SR 236/Lavista Rd & Main St	Signal	EBL	215	95	28	135	91
			EBT	215	173	403	212	406
			EBT+R	215	187	404	217	413
			WBL	180	89	111	122	137
			WBT	---	589	201	805	282
			WBR	100	122	50	190	89
			NBL	130	255	243	257	246
			NBT+R	130	233	206	236	252
			SBT+R+L	---	126	119	115	132

8.2.3 DESIGN ALTERNATIVE 3: COMBINED

The expected queue lengths for Design Alternative 3 condition is shown in Table 8.6 for Opening Year 2025 and Design Year 2045. The results differed from future No Build conditions as follows:

Intersection 1 – SR 236/Lavista Road and Fellowship Road

The BOQ lengths reduced or increased by less than a vehicle length (25 ft) for all the movements and during all peak hours except for:

- The eastbound left-turn lane: The queue length would be reduced by 38 ft during the Opening Year PM peak hour. However, similar to the No-Build condition, BOQ still extends beyond the available storage in lengths and extends to the two-way left-turn lane (TWLTL).
- The eastbound through and right-turn lanes: The queue length would be reduced significantly by about 275 ft during the Opening Year PM peak hour and by 50 ft during the Design Year PM peak hour. During the Design Year AM peak hour, this queue increased by about 27 ft.
- The westbound through lanes: The queue length would be reduced by about 66 ft during the Opening Year AM peak hour. The queue will no longer back up to the upstream intersection.
- The northbound through, left-turn and right-turn lanes: The queue length would be reduced significantly during all peak hours by 80 ft to 360 ft.

Intersection 2 – SR 236/Lavista Road and Chamblee Tucker Road/Lynburn Drive

The BOQ lengths reduced or increased by less than a vehicle length (25 ft) for all the movements and during all peak hours except for:

- The eastbound thru lane: The queue length would be reduced by 38 ft and increased by 72 ft during the Opening Year PM peak hour and Design Year AM peak hour, respectively.
- The westbound thru and right turn lanes: The queue length would be reduced significantly up to 163 ft.

Intersection 3 – Chamblee Tucker Rd and Fellowship Road

The BOQ lengths reduced or increased by less than a vehicle length (25 ft) for all the movements and during all peak hours except for:

- The westbound right turn lane: The queue length would be reduced by 53 ft and 40 ft during the Opening Year AM peak hour and Design Year AM peak hour, respectively.

Intersection 4 – SR 236/Lavista Road and Chamblee Tucker Road and Main Street

The BOQ lengths reduced or increased by less than a vehicle length (25 ft) for all the movements and during all peak hours except for:

- The eastbound thru lanes: The queue length would be reduced significantly during all peak hours by 80-141 ft.
- The westbound thru lanes: The queue length would be reduced significantly during all peak hours by 23 ft to 229 ft.
- The westbound right-turn lane: The queue length would be reduced by 38 ft during the Design Year PM peak hour.

- The northbound thru and right-turn lanes: The queue length would be reduced significantly during all peak hours by 86 ft to 201 ft.

In Summary, the improvements have been observed at many locations in terms of queue length. At the locations where the BOQ would be increased, it would either be (a) shorter than one vehicle length; (b) similar to the no-build condition, backed up to the upstream intersection, or (c) accommodated with the available storage.

TABLE 8.6 – BACK OF THE QUEUE RESULTS- COMBINED BUILD ALTERNATIVE

Int #	Intersection	Control	Movement	Storage Bay Length (ft)	Build Queue Length (ft)			
					Opening Year 2025		Design Year 2045	
					AM Peak	PM Peak	AM Peak	PM Peak
1	SR 236/Lavista Rd & Fellowship Rd	Signal	EBL	250	86	365	146	412
			EBT	---	125	663	176	1843
			EBT+R	---	129	660	192	1839
			WBL	215	35	75	54	101
			WBT	205	178	177	252	222
			NBL	300	97	100	259	241
			NBT	---	256	204	408	288
			NBT+R	---	236	166	367	257
			SBT	245	179	241	239	238
			SBT+R	245	211	240	232	243
2	SR 236/Lavista Rd & Chamblee Tucker Rd/Lynburn Dr	Signal	EBT	215	52	241	130	278
			WBT	215	93	159	335	248
			WBR	215	6	0	36	0
			NBL	245	174	178	238	243
			NBT+L	320	202	206	280	282
			SBL	230	138	242	190	245
			SBT+R+L	230	146	242	186	242
3	Chamblee Tucker Rd & Fellowship Rd	Signal	WBR	230	173	144	225	182
			NBT	175	79	210	103	234
			SBL	---	117	176	141	189
			SBT+L	---	115	189	175	177
4	SR 236/Lavista Rd & Main St	Signal	EBL	215	90	21	133	27
			EBT	215	81	277	68	316
			EBT+R	215	106	297	98	313
			WBL	180	101	81	150	114
			WBT	---	341	121	828	177
			WBR	100	119	14	197	23
			NBT	200	127	48	153	78
			NBR	140	39	60	62	82
			SBT+R+L	---	127	94	128	120

8.3 BENEFIT-COST ANALYSIS

Benefit-Cost (B/C) analysis is a systematic process for identifying, quantifying, and comparing expected benefits and costs of design alternatives. B/C analysis was conducted for the proposed

projects to evaluate their cost effectiveness. A GDOT B/C Ratio Spreadsheet was used for this purpose. An analysis period of 20-years was used to evaluate the life cycle benefits. The determination of operational benefit for each improvement alternative was based on the methodology of calculating the reduction in travel delay provided by the proposed improvements. This methodology converts the vehicle (auto and truck) delay into monetary value, assuming 250 workdays per year and hourly values for travel time savings as $13.75 per hour and $72.65 per hour for auto and trucks, respectively.

The network delay for each design alternative was compared to the No-Build condition operations for the Opening Year (2025) and the Design Year (2045). Cost estimates were determined using a separate Cost Estimate worksheet. B/C ratio calculations are provided in **Appendix F**. Cost estimates are included in **Appendix G**.

The 2045 cost estimate for each alternative as summarized in Table 8.7 was used in the calculation of B/C ratios. The relative comparison of BC ratios shows that Alternative 1 is more efficient than Alternative 2 or 3; however, Alternative 2 has the lower construction cost.

TABLE 8.7 – PREFERED ALTERNATIVE B/C COMPARISON

Alternative	Cost	Design Life Benefits	B/C Ratio
Build (Reverse Lynburn Drive)	$ 1,037,396	$ 12,815,630	12.4
Build (Turn lanes on Fellowship Road)	$ 785,626	$ 4,662,386	5.9
Build (Combined Alternative)	$ 1,854,223	$ 16,072,774	8.7

9. CONCLUSIONS

As requested by the City of Tucker request, a traffic study was performed to evaluate the congestion and safety concerns created by heavy traffic within the Tucker Triangle and one more adjacent intersection (Lavista Rd and Main St) within the study area. The operational issues intended to be addressed by this study include existing and future projected congestion within the study area.

The average annual growth of 1.6 percent was calculated and applied to the existing traffic volume to project the future years traffic volume for the studied intersections. The capacity analysis results indicate that in the Existing Year and No Build conditions Opening Year, the studied intersections operate at an acceptable LOS D or better; however, some of the individual approaches exhibit LOS E or F.

During the No Build conditions Design Year, the operation at the intersections of Lavista Road and Fellowship Road and at Lavista Road and Main Street exhibits unacceptance level (LOS F) in both peak hours. The intersections of Fellowship Road and Chamblee Tucker Rd will also operate below capacity (LOS E) in the evening peak hour. The intersection of Lavista Road at Chamblee Tucker Rd would be expected to continue to operate at an acceptable level (LOS D or better).

The BOQ results indicated that the queue on Lavista Road, between Main Street to Fellowship Road, is observed mainly in westbound direction during the morning peak hour in eastbound direction during evening peak hour. At Main Street intersection, the northbound left, through and right turn queue length is also longer than the existing storage length which means the queue spills back to the Lynburn Drive intersection. The intersection of Chamblee Tucker Road and Fellowship Road also exhibit queues backing up to the Lavista Road on both approaches.

A total of 24 unconventional designs and access refinement alternatives were evaluated in terms of operation and cost. The issues, constraints and potential improvements were identified and then three alternatives with the highest improvement and reasonable costs were selected as "preferred alternatives" to analysis in more details.

The Alternative 1, Reverse Lynburn Drive, provides a simple four-phase traffic signal operations at the Main Street and Lavista Road intersection by eliminating the left-turn movement at the Main Street and accommodating it on the Lynburn Drive northbound approach. This alternative reduces delay, number of conflict points and traffic signal phases at the Lavista Road and Main Street Intersection and increases throughput on the Lavista Road. With alternative 1, the queue of the northbound traffic on Main Street is removed as the heavy left turn movements are shifted to the Lynburn Drive. But due to this shift, an additional signal split phase will be required for the intersection of Lavista Road at Lynburn Drive. This intersection currently has a pedestrian-only phase which will be replaced by the split phasing for the northbound. Alternative 1 also included a modification of the Lavista Road westbound right-turn lane to a free-flow right-turn lane. Since this right turn lane carries a high volume of traffic, providing a free-flow movement will improve the intersection delay.

The Alternative 2, Install Turn Lane on Fellowship Road, proposes to install an exclusive left turn lane with a 200 ft storage on the Fellowship Road northbound approach and convert the shared northbound through-left turn lane to a through lane only. A left turn phase was not warranted and thus the left turn type, would remain as permissive-only phasing. The advantage of the Alternative 2 is that it removes the shared use of left turns and thru movements from the inside lane on Fellowship Road northbound approach. Since the left turn is currently permissive only,

the delay imposed to the through traffic, when a left turn vehicle has stopped at the signal, will be removed.

A combination of Alternative 1 and Alternative 2 was chosen as the preferred alternative. With the Alternative 3, Combined Improvements, the intersection delay and LOS will improve at the intersection of Lavista Road and Fellowship Road and also at the intersection of Lavista Road and Main Street. the intersection of Lavista Road and Chamblee Tucker Road would continue to operate at an acceptable LOS C or better during the Opening Year AM and PM peak hours and during the Design Year AM peak hour. However, the intersection will operate below capacity (LOS F) during the Design Year PM peak hour. At the intersection of Fellowship Road and Chamblee Tucker Road, delay and LOS would remain the same in the Build condition as it was in the No-Build condition.

With Alternative 3, the improvements have been observed at many locations in terms of queue length. At the locations where the BOQ would be increased, it would either be (a) shorter than one vehicle length; (b) similar to the no-build condition, backed up to the upstream intersection, or (c) accommodated with the available storage.

The network delay for each design alternative was compared to the No-Build condition operations for the Opening Year (2025) and the Design Year (2045). It was found that with the Combined Alternative 3, a 20-24% delay improvement would be observed during the PM peak hours and a 50-54% improvement would be expected during the AM peak hours.

A benefit-to-cost (B/C) ratio anlaysis has also shown that the B/C for the three alternatives would be 12.4, 5.9, and 8.7, respectively. The relative comparison of B/C ratios shows that Alternative 1 is more efficient than Alternative 2 or 3; however, Alternative 2 has the lower construction cost. Improvement projects should be prioritized at a regional level. The following factors should be considered while evaluating the proposed improvement alternatives to be advanced further for funding and construction:

- B/C Ratio: Typically, projects with B/C ratios greater than or equal to 1.00 indicate cost effectiveness of the improvements;
- Safety Improvements and their Benefits;
- Geometric Improvements;
- No anticipated ROW Impacts: Projects that require additional right-of-way are typically costly, and are not preferred.

References

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