Miller Farm

Traffic Impact Analysis

Pineville, North Carolina

July 2021

Prepared for:

DRB Group

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Contact: Jeff Hochanadel, PE, PTOE

5410 Trinity Road, Suite 102 • Raleigh, NC 27607
(919) 866-4511 phone • (919) 859-5663 fax
www.timmons.com

TABLE OF CONTENTS

TABLE OF CONTENTS I
LIST OF TABLES II
LIST OF FIGURES III
APPENDICES III
1 INTRODUCTION 1-1
2 EXISTING INFORMATION 2-1
2.1 STUDY LIMITS 2-1
2.2 EXISTING ROADWAYS 2-1
2.3 EXISTING INTERSECTIONS 2-2
2.4 TRAFFIC VOLUMES 2-4
2.5 CAPACITY ANALYSIS 2-5
3 EXISTING AND BACKGROUND CONDITIONS AND ANALYSIS 3-1
3.1 2021 ANALYSES 3-1
3.2 2025 BACKGROUND TRAFFIC VOLUMES 3-5
3.3 2025 BACKGROUND TRAFFIC ANALYSIS 3-5
4 SITE TRIP GENERATION AND DISTRIBUTION 4-1
4.1 TRIP GENERATION 4-1
4.2 TRIP DISTRIBUTION 4-1
5 BUILD CONDITION AND ANALYSIS 5-1
5.1 2025 BUILD ANALYSIS 5-1
6 CONCLUSIONS AND RECOMMENDATIONS 6-1

LIST OF TABLES

TABLE 2-1: TRAFFIC COUNT INFORMATION 2-4

TABLE 2-2: LEVEL OF SERVICE DEFINITIONS 2-6

TABLE 2-3: SIGNALIZED AND UNSIGNALIZED INTERSECTION LEVEL OF SERVICE CRITERIA 2-7

TABLE 3-1A: INTERSECTION LEVEL OF SERVICE AND DELAY SUMMARY FOR SOUTH CAROLINA STUDY AREA INTERSECTIONS – 2021 TRAFFIC VOLUMES 3-2

TABLE 3-1B: INTERSECTION LEVEL OF SERVICE AND DELAY SUMMARY FOR NORTH CAROLINA STUDY AREA INTERSECTIONS – 2021 TRAFFIC VOLUMES 3-4

TABLE 3-2A: INTERSECTION LEVEL OF SERVICE AND DELAY SUMMARY FOR SOUTH CAROLINA STUDY AREA INTERSECTIONS – 2025 BACKGROUND TRAFFIC VOLUMES 3-6

TABLE 3-2B: INTERSECTION LEVEL OF SERVICE AND DELAY SUMMARY FOR NORTH CAROLINA STUDY AREA INTERSECTIONS – 2025 BACKGROUND TRAFFIC VOLUMES 3-8

TABLE 4-1: TRIP GENERATION SUMMARY 4-1

TABLE 5-1A: INTERSECTION LEVEL OF SERVICE AND DELAY SUMMARY FOR SOUTH CAROLINA STUDY AREA INTERSECTIONS – 2025 BUILD TRAFFIC VOLUMES 5-2

TABLE 5-1B: INTERSECTION LEVEL OF SERVICE AND DELAY SUMMARY FOR NORTH CAROLINA STUDY AREA INTERSECTIONS – 2025 BUILD TRAFFIC VOLUMES ..... 5-5 - 5-6

TABLE 5-2: INTERSECTION LEVEL OF SERVICE AND DELAY SUMMARY – 2025 BUILD + IMPROVEMENTS TRAFFIC VOLUMES 5-7

LIST OF FIGURES

FIGURE 1-1: SITE LOCATION MAP

FIGURE 2-1: PRELIMINARY SITE PLAN

FIGURE 2-2: 2021 EXISTING LANE CONFIGURATION

FIGURE 2-3: 2018 TRAFFIC VOLUMES

FIGURE 2-4: 2020 TRAFFIC VOLUMES

FIGURE 2-5: 2020 ADJUSTED TRAFFIC VOLUMES

FIGURE 2-6: 2021 TRAFFIC VOLUMES

FIGURE 2-7: 2021 ADJUSTED TRAFFIC VOLUMES – REROUTED FOR SCDOT PROJECT

FIGURE 3-1: 2025 AMBIENT TRAFFIC VOLUMES

FIGURE 3-2: APPROVED DEVELOPMENT 2023 TRAFFIC VOLUMES – CAROLINA LOGISTICS PARK

FIGURE 3-2: 2025 BACKGROUND TRAFFIC VOLUMES

FIGURE 4-1: TRIP DISTRIBUTION PERCENTAGES

FIGURE 4-2: TRIP DISTRIBUTION VOLUMES

FIGURE 5-1: 2025 BUILD TRAFFIC VOLUMES

FIGURE 6-1: 2025 PROPOSED LANE CONFIGURATION

APPENDICES

Appendix A – Scoping Information

Appendix B – Traffic Count Data

Appendix C – Approved Developments

Appendix D – SCDOT Public Project Information

Appendix E – Traffic Signal Plans

Appendix F – Synchro Analysis Outputs

Appendix G – NCDOT Nomographs

1 INTRODUCTION

This report presents the findings of the traffic impact analysis for the proposed Miller Farm Development. The proposed development will be located north of NC-51 (Rock Hill – Pineville Road) and east of SR-1126 (Nations Ford Road) in Pineville, NC (see **Figure 1-1**) and will consist of 215 single-family residential units and 145 townhome units. Construction of the development is proposed to occur over two (2) phases: Phase 1 (2023) and Phase 2 (2025). For purposes of this analysis, the development was only evaluated under full build conditions.

Analyses were completed for the following scenarios:

- 2020 Existing traffic volumes;
- 2025 Background traffic volumes (ambient growth + approved surrounding developments); and
- 2025 Build traffic volumes (Background + site trips).

The following steps were taken to determine the potential traffic impacts associated with this project:

1. Data Collection – Due to current COVID-19 restrictions in North Carolina and South Carolina, Timmons Group was unable to collect turning movement counts at all study area intersections. Per the scoping checklist (see **Appendix A**), Timmons Group utilized count data from nearby development TIAs completed prior to 2020 and adjusted the traffic volumes to account for ambient growth. AM and PM peak hour turning movement counts were obtained for the following intersections:

   - SC-51 / S-641 (Flint Hill Road);
   - SC-51 / S-46-48 (Springhill Farm Road) / Business Driveway;
   - SC-51 / S-328 (Andrew L Tucker Road) / Business Driveway;
   - NC-51 (Rock Hill – Pineville Road) / SR-1129 (Downs Road);
   - NC-51 (Main Street) / NC-51 (Pineville – Matthews Road) / SR-4982 (Polk Street);
   - SR-1128 (Westinghouse Boulevard) / Downs Road; and
   - SR-1128 (Westinghouse Boulevard) / SR-1126 (Nations Ford Road).

   At study area intersections where previous count data was unable to be obtained, AM (7:00 – 9:00) and PM (4:00 – 6:00) peak hour turning movement counts were collected in September 2020. These study area intersections include the following:

   - NC-51 (Rock Hill – Pineville Road) / Miller Road; and
   - NC-51 (Rock Hill – Pineville Road) / Marfield Lane.

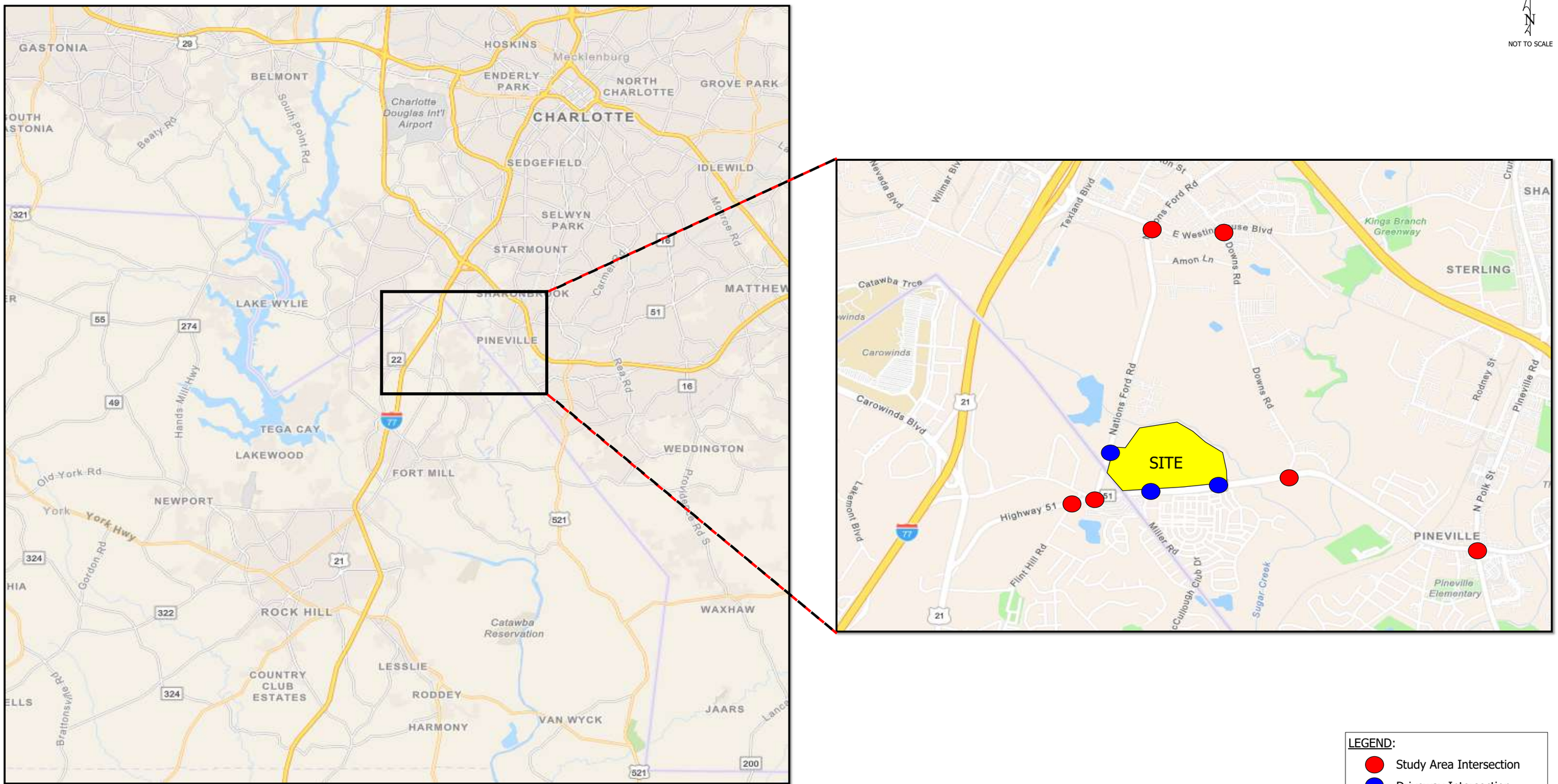
2. Trip Generation/Future Traffic – Traffic generated by the proposed development was estimated using the 10th Edition of the Institute of Transportation Engineers' *Trip Generation Manual*. Trip generation was calculated for the development following the NCDOT standards and practices for trip generation. Projected traffic volumes were calculated using an ambient growth rate of 2% (this percentage was approved by the NCDOT, SCDOT, and York County, SC).

3. Trip Distribution and Projections – The distribution of site-generated trips was based on the distribution of existing area traffic and engineering judgement. It was assumed, for purposes of analysis, that projected trips would follow similar patterns as existing traffic.

4. Traffic Capacity Analysis – Level of service analyses were performed using SYNCHRO Version 10.3 for the following intersections:

    - SC-51 / S-641 (Flint Hill Road);
    - SC-51 / S-46-48 (Springhill Farm Road) / Business Driveway;
    - SC-51 / S-328 (Andrew L Tucker Road) / Business Driveway;
    - NC-51 (Rock Hill – Pineville Road) / Miller Road / Site Driveway 2;
    - NC-51 (Rock Hill – Pineville Road) / Marfield Lane / Site Driveway 1;
    - NC-51 (Rock Hill – Pineville Road) / SR-1129 (Downs Road);
    - NC-51 (Main Street) / NC-51 (Pineville – Matthews Road) / SR-4982 (Polk Street);
    - SR-1128 (Westinghouse Boulevard) / Downs Road;
    - SR-1128 (Westinghouse Boulevard) / SR-1126 (Nations Ford Road); and
    - SR-1126 (Nations Ford Road) / Site Driveway 3.

5. Review of Proposed Improvements – Roadway improvements proposed to accommodate projected site-generated traffic were evaluated.



TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Miller Farm Traffic Impact Analysis

Site Location Map

Figure 1-1

2 EXISTING INFORMATION

The proposed development will be located north of NC-51 (Rock Hill – Pineville Road) and east of SR-1126 (Nations Ford Road) in Pineville, NC as shown on **Figure 1-1**.

2.1 STUDY LIMITS

Access to the proposed site will be provided via three (3) driveway connections: one connection to Nations Ford Road and two connections to NC-51. Site Driveway 1 will connect to the existing three-leg intersection of NC-51 / Marfield Lane. Site Driveway 2 will connect to the existing three-leg intersection of NC-51 / Miller Road. The proposed site driveway connection to Nations Ford Road, Site Driveway 3, will be located approximately 1,100-feet (CL to CL) north of the SC-51 / S-328 (Andrew L Tucker Road) / Business Driveway.

The entrances are shown graphically on **Figure 1-1** and on the preliminary site layout for the residential development on **Figure 2-1** (all figures are located at the end of their respective chapter).

The study limits include the following ten (10) intersections:

- SC-51 / S-641 (Flint Hill Road);
- SC-51 / S-46-48 (Springhill Farm Road) / Business Driveway;
- SC-51 / S-328 (Andrew L Tucker Road) / Business Driveway;
- NC-51 (Rock Hill – Pineville Road) / Miller Road / Site Driveway 2;
- NC-51 (Rock Hill – Pineville Road) / Marfield Lane / Site Driveway 1;
- NC-51 (Rock Hill – Pineville Road) / SR-1129 (Downs Road);
- NC-51 (Main Street) / NC-51 (Pineville – Matthews Road) / SR-4982 (Polk Street);
- SR-1128 (Westinghouse Boulevard) / Downs Road;
- SR-1128 (Westinghouse Boulevard) / SR-1126 (Nations Ford Road); and
- SR-1126 (Nations Ford Road) / Site Driveway 3.

All study area intersections and project assumptions were based on the approved scoping checklist (see **Appendix A**). The scoping checklist was reviewed and approved by the NCDOT, SCDOT, and York County, SC.

2.2 EXISTING ROADWAYS

SC-51 is a two-lane undivided facility within South Carolina that runs approximately east-west. The facility, which is classified as a minor arterial, has a posted speed limit of 45-MPH and provides connection between Fort Mill, SC and Pineville, NC. Per 2019 SCDOT Traffic Count maps, SC-51 carries 14,300 VPD east of Andrew L Tucker Road. East of the North Carolina state border SC-51 becomes NC-51 (Rock Hill – Pineville Road).

S-641 (Flint Hill Road) is a two-lane undivided facility within South Carolina that runs approximately southwest-northeast. The facility, which is classified as a local roadway, has a posted speed limit of 35-MPH and services primarily residential and industrial land uses. No AADT data is currently available for Flint Hill Road.

S-46-48 (Springhill Farm Road) is a two-lane undivided facility within South Carolina that runs approximately east-west. The facility, which is classified as a major collector, has a posted speed limit of 40-MPH and services primarily commercial and industrial land uses. Per 2019 SCDOT Traffic Count maps, Springhill Farm Road carries 10,300 VPD.

S-328 (Andrew L Tucker Road) is a two-lane undivided facility within South Carolina that runs approximately north-south. The facility, which is classified as a local roadway, has an assumed speed limit of 35-MPH and services primarily industrial land uses. Per 2019 SCDOT Traffic Count maps, Andrew L Tucker Road carries 4,200 VPD North of the North Carolina state border Andrew L Tucker Road becomes SR-1126 (Nations Ford Road).

NC-51 (Rock Hill – Pineville Road) / (Main Street) / (Pineville-Matthews Road) is a four-lane facility within North Carolina that runs approximately east-west. West of Downs Road the facility is median divided and has a posted speed limit of 45-MPH. East of Downs Road the facility is undivided and has a varying speed limit of 20-MPH to 35-MPH. NC-51 is classified as a minor arterial and provides connection between Fort Mill, SC and Pineville, NC. Per 2018 NCDOT AADT maps, the facility carries 15,500 VPD east of Andrew L Tucker Road. West of the South Carolina state border NC-51 becomes SC-51.

Miller Road and Marfield Lane are both two-lane undivided local facilities within North Carolina that serve residential land uses. Miller Road has a posted speed limit of 25-MPH and Marfield Lane has a posted speed limit of 15-MPH. No AADT data is currently available for either facility.

SR-1129 (Downs Road) is a two-lane undivided facility within North Carolina that runs approximately north-south. The facility, which is classified as a local roadway, has a varying posted speed limit of 35-MPH to 45-MPH and services primarily industrial land uses. Per 2016 NCDOT Traffic Count maps, Downs Road carries 5,400 VPD.

SR-4982 (Polk Street) is an undivided facility with a varying cross section of three-lanes to four-lanes within North Carolina that runs approximately north-south. The facility, which is classified as a minor arterial, has a posted speed limit of 35-MPH and provides connection between Pineville, NC and Charlotte, NC. Per 2018 NCDOT AADT maps, the facility carries 18,000 VPD north of NC-51.

SR-1128 (Westinghouse Boulevard) is an undivided facility with a varying cross section of four-lanes to five-lanes within North Carolina that runs approximately east-west. The facility, which is classified as a minor arterial, has a posted speed limit of 45-MPH and provides connection between Pineville, NC and Steele Creek within Charlotte, NC. Per 2018 NCDOT AADT maps, the facility carries 29,000 VPD west of Nations Ford Road.

SR-1126 (Nations Ford Road) is a two-lane undivided facility within North Carolina that runs approximately north-south. The facility, which is classified as a local roadway, has a posted speed limit of 35-MPH and services primarily industrial land uses. Per 2016 NCDOT Traffic Count maps, Nations Ford Road carries 5,900 VPD south of Westinghouse Boulevard.

2.3 EXISTING INTERSECTIONS

Using available aerial imagery and site visits, Timmons Group compiled the existing geometry for the study area intersection. The existing intersection geometry is shown on **Figure 2-2** and used for the existing and future analyses.

SC-51 / Flint Hill Road is a three-phase signalized intersection with permitted left-turn phasing on westbound SC-51 and split phasing on the side streets. The eastbound SC-51 approach consists of a single shared through / right-turn lane. The westbound SC-51 approach consists of a single shared through / left-turn lane. The northbound Flint Hill Road approach consists of a single shared left / right-turn lane. The southbound Flint Hill Road approach is a one-way inbound facility and consists of left-turn lane and a shared through / right-turn lane.

SC-51 / Springhill Farm Road / Business Driveway is an unsignalized intersection with the Springhill Farm Road and Business Driveway approaches encountering the stopped condition. The east and westbound SC-51 and northbound Business Driveway approaches consist of a single shared left / through / right-turn lane. The southbound Springhill Farm Road approach is a one-way inbound facility and consists of one lane.

SC-51 / Andrew L Tucker Road / Business Driveway is an unsignalized intersection with the Andrew L Tucker and Business Driveway approaches encountering the stopped condition. All approaches at this intersection consist of a single shared left / through / right-turn lane.

NC-51 / Miller Road is an unsignalized T-intersection with the Miller Road approach encountering the stopped condition. The northbound Miller Road approach consists of a left-turn lane and a right-turn lane. The eastbound NC-51 approach consists of two through lanes and an exclusive right-turn lane. The westbound NC-51 approach consists of two through lanes and an exclusive left-turn lane. Note that the westbound through lane terminates and merges immediately west of the subject intersection.

NC-51 / Marfield Lane is an unsignalized T-intersection with the Marfield Lane approach encountering the stopped condition. The northbound Marfield Lane approach consists of a left-turn lane and a right-turn lane. The eastbound NC-51 approach consists of two through lanes and an exclusive right-turn lane. The westbound NC-51 approach consists of two through lanes and an exclusive left-turn lane.

NC-51 / Downs Road is a five-phase signalized intersection with protected only left-turn phasing on both NC-51 approaches. The southbound Downs Road consists of a left-turn lane and a right-turn lane. The eastbound NC-51 approach consists of two through lanes and an exclusive left-turn lane. The westbound NC 51 approach consists of an exclusive U-turn lane, two through lanes, and an exclusive right-turn lane.

NC-51 / Polk Street is an eight-phase signalized intersection with protected only left-turn phasing on all approaches. The northbound Polk Street approach consists of two exclusive left-turn lanes and one shared through / right-turn lane. The southbound Polk Street approach consists of an exclusive left-turn lane, one through lane, and an exclusive right-turn lane. The eastbound NC-51 approach consists of an exclusive left-turn lane, one through lane, and a shared through / right-turn lane. The westbound NC-51 approach consists of an exclusive left-turn lane, two through lanes, and an exclusive right-turn lane.

Westinghouse Boulevard / Downs Road is a two-phase signalized intersection with permitted only left-turn phasing on all approaches. The northbound and southbound Downs Road approaches both consist of an exclusive left-turn lane and one shared through / right-turn lane. The eastbound and westbound Westinghouse Boulevard approaches both consist of an exclusive left-turn lane, one through lane, and one shared through / right-turn lane.

Westinghouse Boulevard / Nations Ford Road is a five-phase signalized intersection with protected / permitted left-turn phasing on the eastbound and westbound approaches and permitted only left-turn phasing on the northbound and southbound approaches. The northbound Nations Ford Road approach consist of an exclusive left-turn lane and a shared through / right-turn lane. The southbound Nations Ford Road approach consist of an exclusive left-turn lane, one through lane, and one exclusive right-turn lane. The eastbound and westbound Westinghouse Boulevard approaches both consist of an exclusive left-turn lane, one through lane, and one shared through / right-turn lane.

2.4 TRAFFIC VOLUMES

Due to current COVID-19 government restrictions in North Carolina and South Carolina, Timmons Group utilized previously collected AM and PM peak period turning movement counts (where available) as outlined in the scoping document (see **Appendix A**). AM and PM peak period turning movement counts were collected at study area intersections where previously conducted counts were not available. Following NCDOT guidelines, the AM and PM peak hours are defined as occurring between 7:00 a.m. – 9:00 a.m. and 4:00 p.m. – 6:00 p.m., respectively. Following SCDOT guidelines, the AM and PM peak hours are defined as occurring between 6:30 a.m. – 8:30 a.m. and 4:30 p.m. – 6:30 p.m., respectively. The AM and PM peak hours were dictated for each intersection depending on its geospatial location. The traffic count collection date for each existing study area intersection is detailed below in **Table 2-1**. The complete traffic count data can be found in **Appendix B**.

Table 2-1: Traffic Count Information

Traffic Count Location	Date of Count
Carowinds Boulevard / Foothills Way / I-77 Southbound Off-Ramp	9/25/2018
Carowinds Boulevard / I-77 Southbound On-Ramp	9/25/2018
US-21 / Carowinds Boulevard / I-77 Northbound On-Ramps	9/25/2018
US-21 / I-77 Northbound Off-Ramp / Springhill Farm Road	9/25/2018
US-21 / SC-51	9/25/2018
SC-51 / Flint Hill Road	1/16/2018 & 1/25/2018
SC-51 / Springhill Farm Road / Business Driveway	1/23/2018 & 1/24/2018
SC-51 / Andrew L Tucker Road / Business Driveway	1/23/2018 & 1/24/2018
NC-51 / Miller Road	9/02/2020
NC-51 / Marfield Lane	9/02/2020
NC-51 / Downs Road	3/04/2020
NC-51 / Polk Street	2/22/2018
Westinghouse Boulevard / Downs Road	2/25/2020
Westinghouse Boulevard / Nations Ford Road	2/25/2020

To account for ambient area growth, 2018 traffic volumes (**Figure 2-3**) were grown for 2 years at a 2% growth rate to determine 2020 traffic volumes. This 2% growth rate was agreed upon within the scoping document (see **Appendix A**). The 2020 traffic volumes, both collected and grown, are shown in **Figure 2-4**.

Traffic counts at two study area intersections were collected while COVID-19 restrictions were in place: NC-51 / Miller Road and NC-51 / Marfield Lane. In order to account for these restrictions, collected peak hour data was factored up utilizing the agreed upon methodology (see **Appendix A**). To determine the *"COVID-19 adjustment factor"*, Timmons Group conducted a 48-hour tube count on NC-51 just east of the North Carolina / South Carolina border in September 2020. Traffic counts revealed that NC-51 experienced a daily traffic volume of 14,316 VPD (see **Appendix B**). This resulting traffic volume was then compared to historical AADT data located at the same location (grown to 2020). As noted earlier in the document, per 2018 NCDOT AADT maps, NC-51 carries approximately 15,500 VPD just east of the North Carolina / South Carolina border. Utilizing the agreed upon annual growth rate of 2% (see **Appendix A**), NC-51 would be expected to experience an AADT of approximately 17,500 VPD in 2020 (if COVID-19 restrictions were not in place). This anticipated 2020 AADT volume is approximately 12% greater than the 2020 collected daily traffic volume. To account for this discrepancy, collected traffic volumes at the two aforementioned intersections were grown by 12%. Additionally, the through traffic volumes on NC-51 were balanced at these two intersections based on the collected traffic counts at NC-51 / Downs Road intersection. The 2020 adjusted traffic volumes are shown in **Figure 2-5**. To account

for ambient area growth, 2020 adjusted traffic volumes (**Figure 2-5**) were grown for 1 year at a 2% growth rate to determine the 2021 traffic volumes (**Figure 2-6**).

Note that due to a future SCDOT public project within the study area (described below in **Section 3.2**) traffic volumes were rerouted at the intersections of SC-51 / Flint Hill Road and SC-51 / Andrew Tucker Road / Business Driveway (as appropriate) due to roadway realignment. As this project is scheduled for completion in 2023, the 2021 rerouted traffic volumes are shown in **Figure 2-7** for utilization in ambient growth purposes only.

2.5 CAPACITY ANALYSIS

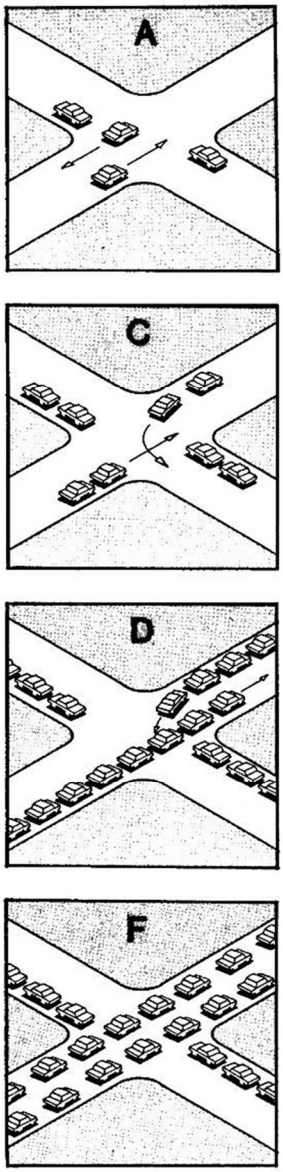
Using field observations, aerial photography, and traffic count data, traffic operations were analyzed during 2021 (existing) and 2025 (without and with the proposed development site trips).

Capacity analysis allows traffic engineers to determine the impacts of traffic on the surrounding roadway network. The Transportation Research Board's (TRB) *Highway Capacity Manual* (HCM) methodologies govern how the capacity analyses are conducted and how the results are interpreted. There are six letter grades of Levels of Service (LOS) from A to F, with LOS A representing the best operating conditions and LOS F the worst operating conditions. At signalized intersections, an overall intersection LOS E is generally considered unacceptable. At unsignalized intersections, a LOS E is generally considered acceptable only if the side street encounters delay. Nevertheless, side streets typically function at a LOS F during peak traffic periods, because the traffic volumes often do not warrant a traffic signal to assist side street traffic. **Table 2-2** shows in detail how each of these levels of service are interpreted.

Table 2-2: Level of Service Definitions

Level of Service	Roadway Segments or Controlled Access Highways	Intersections
A	Free flow, low traffic density.	No vehicle waits longer than one signal indication.
B	Delay is not unreasonable, stable traffic flow.	On a rare occasion motorists wait through more than one signal indication.
C	Stable condition, movements somewhat restricted due to higher volumes, but not objectionable for motorists.	Intermittently drivers wait through more than one signal indication, and occasionally backups may develop behind left turning vehicles, traffic flow still stable and acceptable.
D	Movements more restricted, queues and delays may occur during short peaks, but lower demands occur often enough to permit clearing, thus preventing excessive backups.	Delays at intersections may become extensive with some, especially left-turning vehicles waiting two or more signal indications, but enough cycles with lower demand occur to permit periodic clearance, thus preventing excessive backups.
E	Actual capacity of the roadway invloves delay to all motorists due to congestion.	Very long queues may create lengthly delays, especially for left-turning vehicles.
F	Forced flow with demand volumes greater than capacity resulting in complete congestion. Volumes drop to zero in extreme cases.	Backups from locations downstream restrict or prevent movement of vehicles out of approach creating a storage ares during part or all of an hour.

SOURCE: *"A Policy on Design of Design of Urban Highways and Arterial Streets"* - AASHTO, 1973 based upon material published in *"Highway Capacity Manual"*, National Academy of Sciences, 1965.



For signalized and unsignalized intersections, level of service is defined in terms of **delay**, a measure of driver discomfort, frustration, fuel consumption and lost travel time. **Table 2-3** summarizes the delay associated with each LOS category:

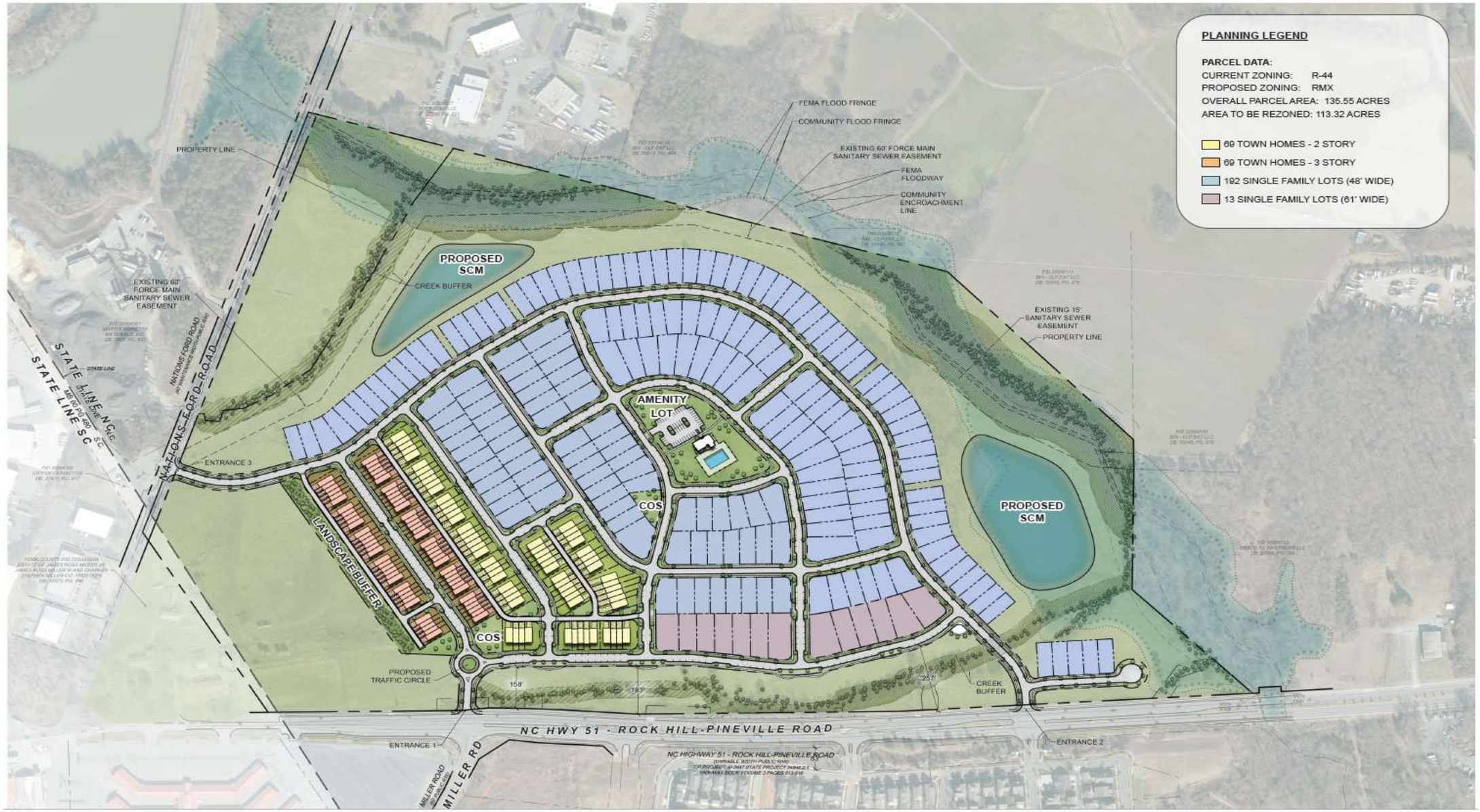
Table 2-3: Signalized and Unsignalized Intersection Level of Service Criteria

Signalized Intersections		Unsignalized Intersections	
Level of Service	Control Delay per Vehicle (sec/veh)	Level of Service	Average Control Delay (sec/veh)
A	≤ 10	A	0 to 10
B	> 10 to ≤ 20	B	> 10 to ≤ 15
C	> 20 to ≤ 35	C	> 15 to ≤ 25
D	> 35 to ≤ 55	D	> 25 to ≤ 35
E	> 55 to ≤ 80	E	> 35 to ≤ 50
F	> 80	F	> 50

Source: Exhibit 16-2 and Exhibit 17-2 from TRB's "Highway Capacity Manual 2000"

Capacity analyses were performed to assess operational conditions. Study area intersections were analyzed using SYNCHRO Version 10.3 based on Highway Capacity Manual (HCM) methodologies with the following assumptions:

- Existing grades;
- 12-foot lane widths;
- No parking activity, bus stops, or pedestrians;
- AM and PM Peak Hour Factors (PHFs) of 0.90;
- Heavy vehicle percentages 2%;
- Minimum turning movement of 4 vehicles per hour (VPH) for all allowed movements;
- Existing signal data found in the provided traffic signal plans (see **Appendix E**); and
- Optimization of signal cycle lengths, splits, and offsets as appropriate.



MILLER FARM

CONDITIONAL SITE PLAN - JULY 14, 2021

SCALE 1" = 150'

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Miller Farm Traffic Impact Analysis

Preliminary Site Plan

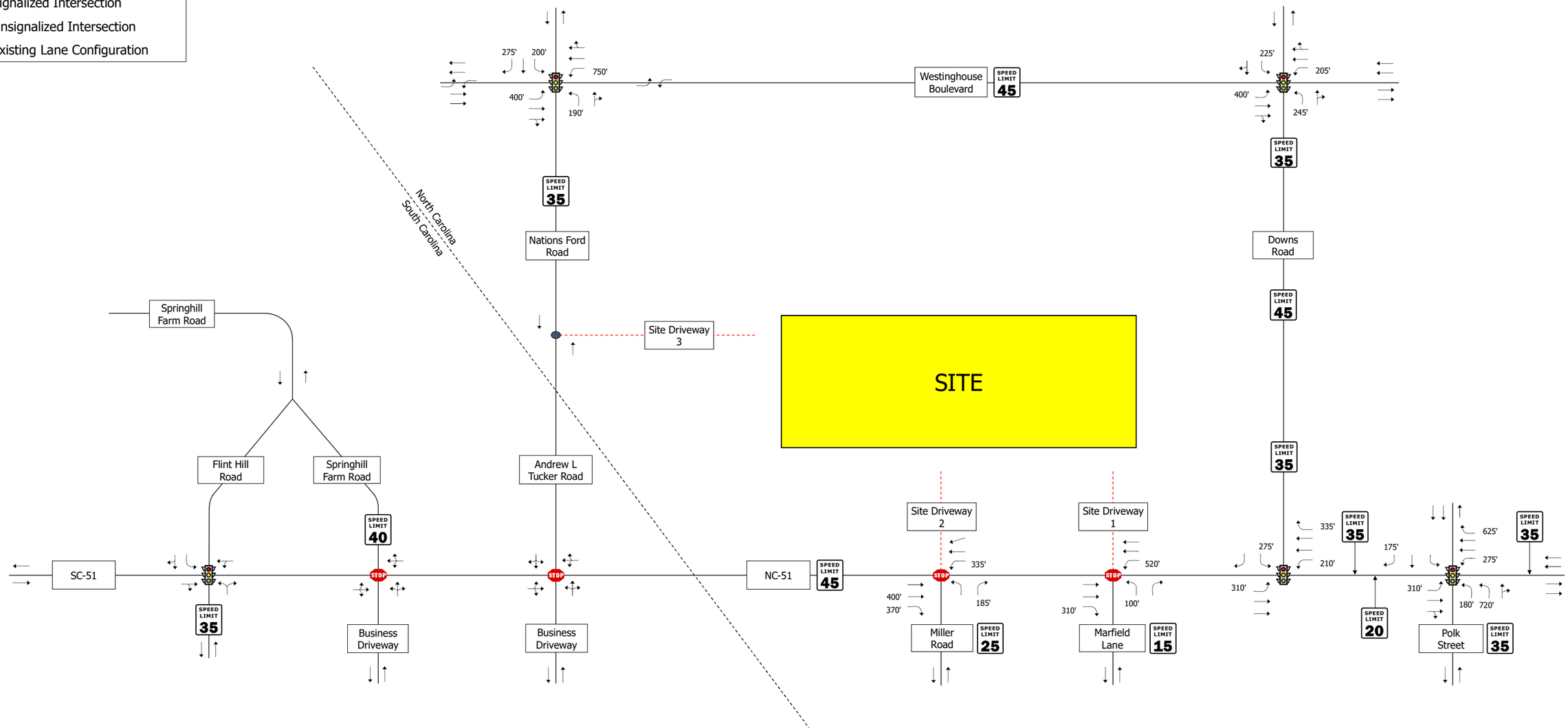
Figure 2-1

LEGEND:

- Existing Road
- Proposed Road
- Signalized Intersection
- Unsignalized Intersection
- Existing Lane Configuration

N

NOT TO SCALE



TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Miller Farm Traffic Impact Analysis

2021 Existing Lane Configuration

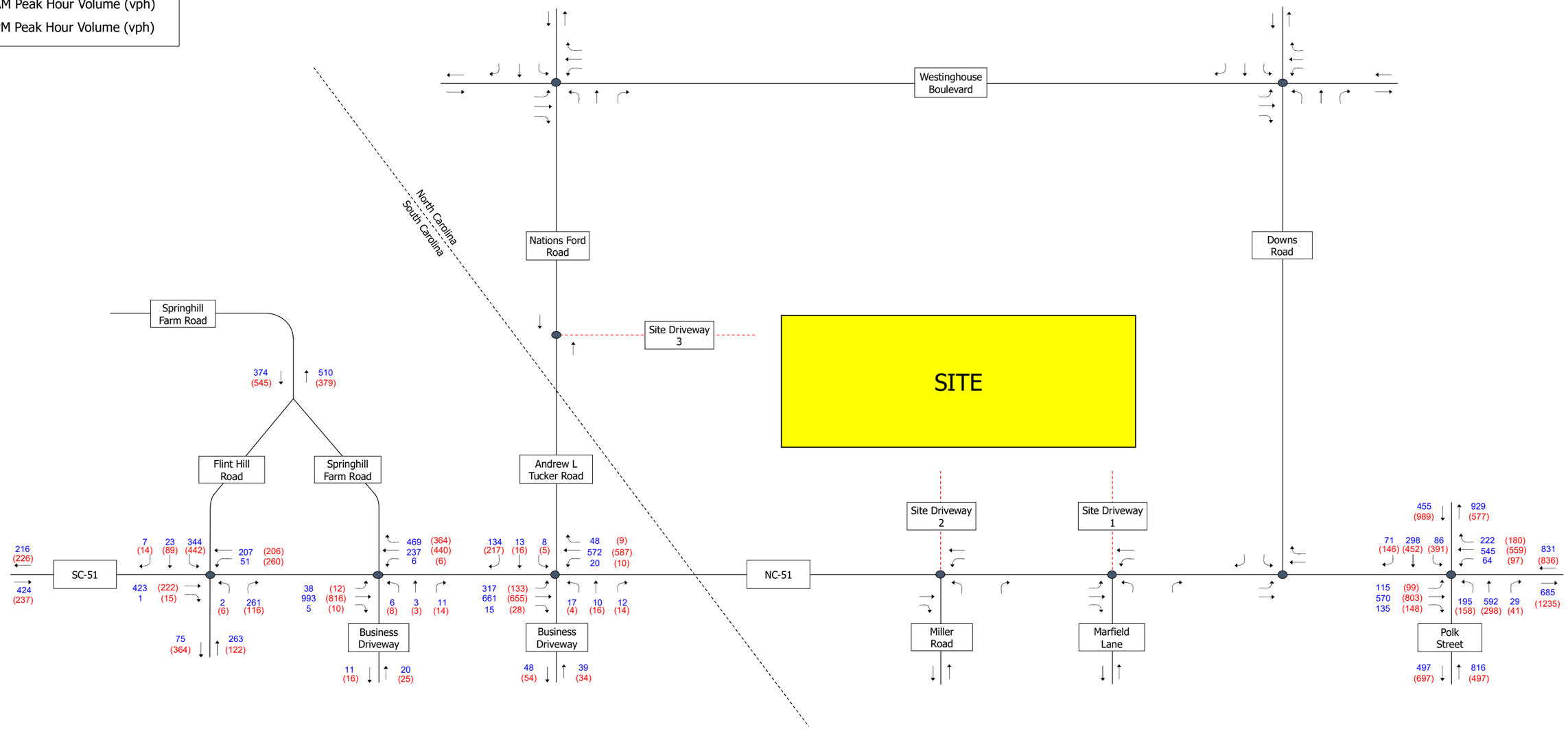
Figure 2-2

LEGEND:

- Existing Road
- Proposed Road
- XX AM Peak Hour Volume (vph)
- (XX) PM Peak Hour Volume (vph)

N

NOT TO SCALE



TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Miller Farm Traffic Impact Analysis

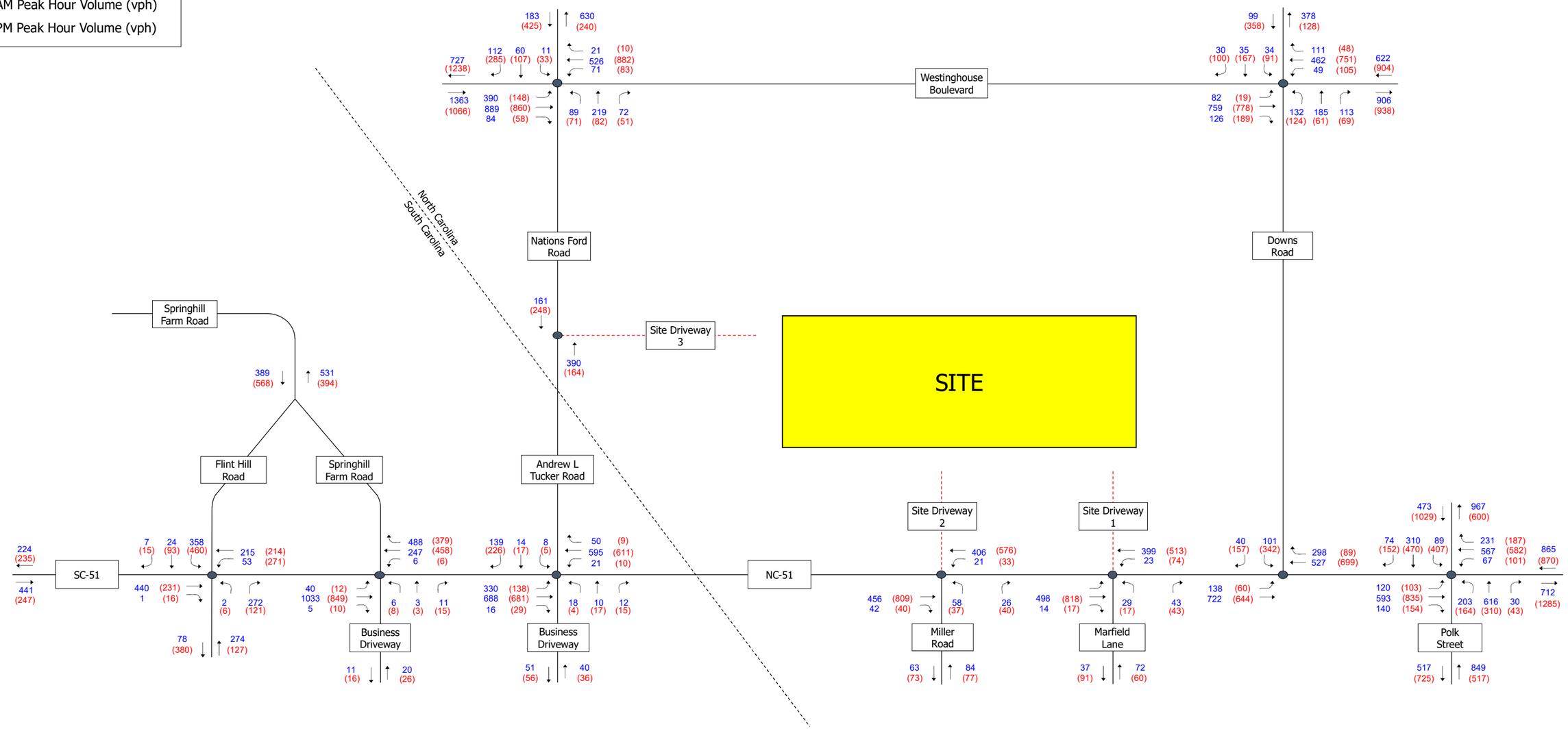
2018 Traffic Volumes

Figure 2-3

LEGEND:

- Existing Road
- Proposed Road
- XX AM Peak Hour Volume (vph)
- (XX) PM Peak Hour Volume (vph)

NOT TO SCALE



TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Miller Farm Traffic Impact Analysis

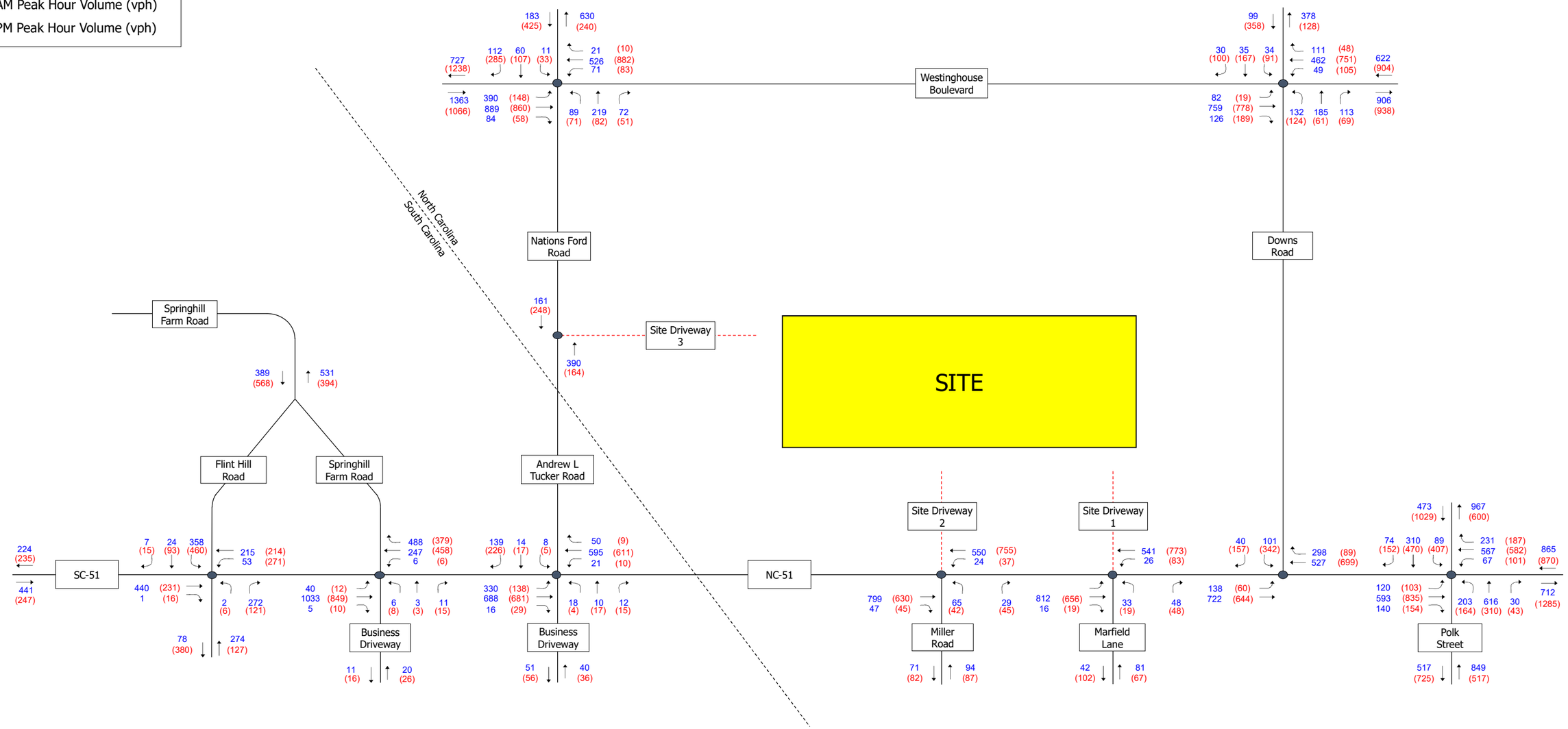
2020 Traffic Volumes

Figure 2-4

LEGEND:

- Existing Road
- Proposed Road
- XX AM Peak Hour Volume (vph)
- (XX) PM Peak Hour Volume (vph)

NOT TO SCALE



TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Miller Farm Traffic Impact Analysis

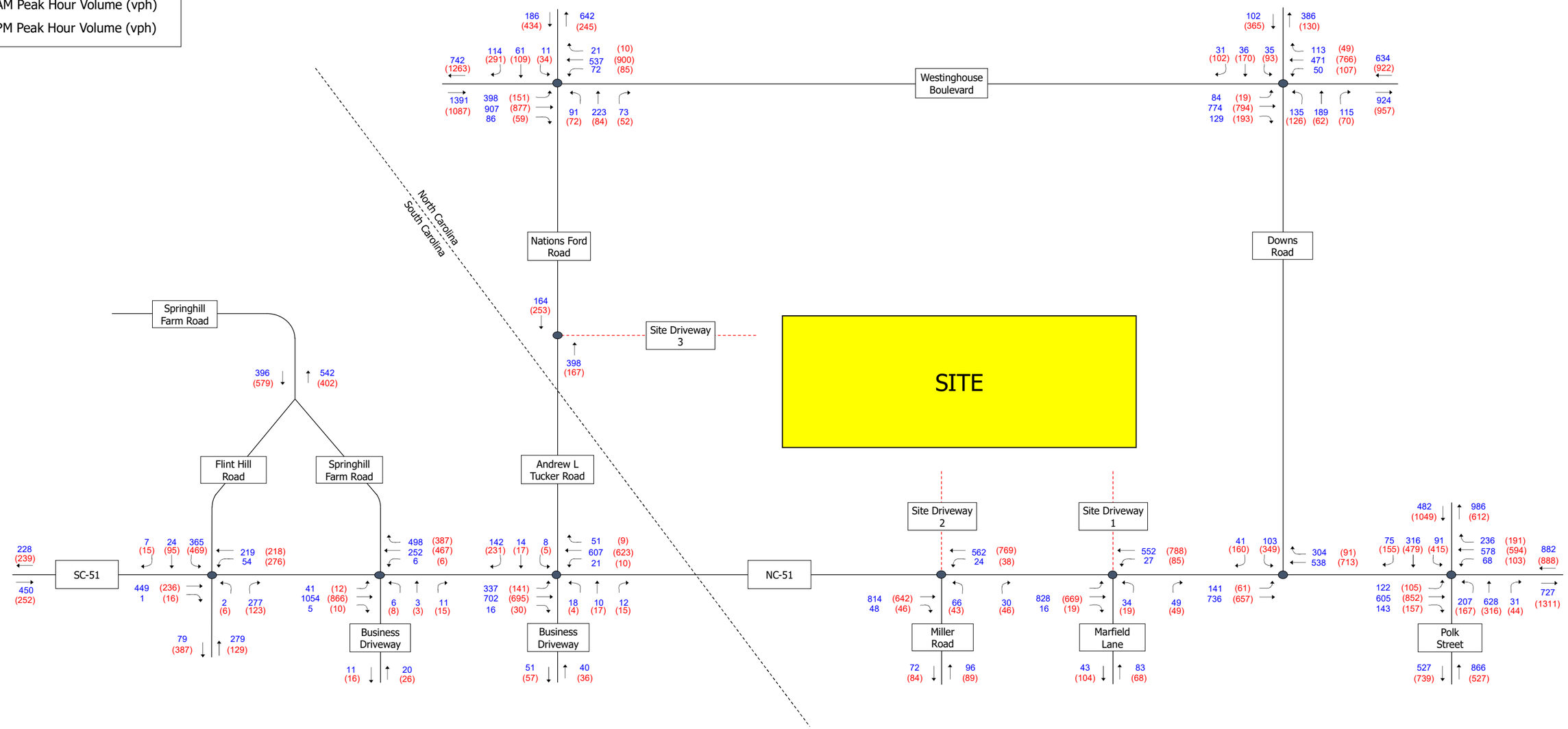
2020 Adjusted Traffic Volumes

Figure 2-5

LEGEND:

- Existing Road
- Proposed Road
- XX AM Peak Hour Volume (vph)
- (XX) PM Peak Hour Volume (vph)

NOT TO SCALE



TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Miller Farm Traffic Impact Analysis

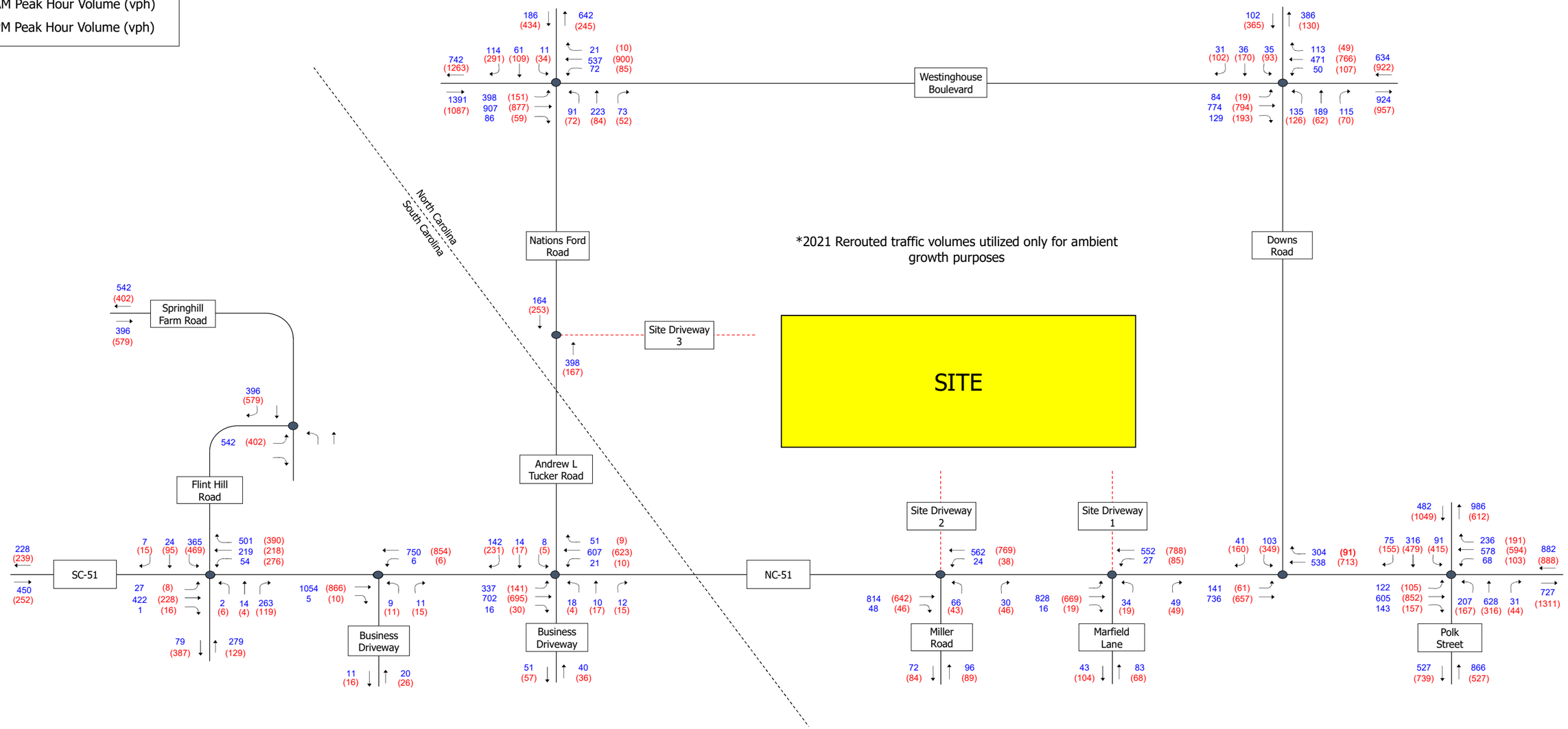
2021 Traffic Volumes

Figure 2-6

LEGEND:

- Existing Road
- Proposed Road
- XX AM Peak Hour Volume (vph)
- (XX) PM Peak Hour Volume (vph)

NOT TO SCALE



Miller Farm Traffic Impact Analysis

2021 Adjusted Traffic Volumes - Rerouted for SCDOT Project

Figure 2-7

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

3 EXISTING AND BACKGROUND CONDITIONS AND ANALYSIS

3.1 2021 ANALYSES

Tables 3-1a and 3-1b summarize the 2021 Existing intersection LOS and delay based on the geometry shown on **Figure 2-2** and the 2021 traffic volumes shown on **Figure 2-6**. The corresponding SYNCHRO outputs are included in **Appendix F**.

South Carolina Study Area Intersections:

The signalized intersection of SC-51 / Flint Hill Road is currently operating at a LOS D and a LOS E during the 2021 Existing AM and PM peak hours, respectively. The westbound, northbound, and southbound approaches are currently operating unacceptably during at least one peak hour. The eastbound approach is currently operating at a LOS C or better during both peak hours.

The northbound approach at the unsignalized intersection of SC-51 / Springhill Farm Road / Business Driveway is currently operating at a LOS E and a LOS D during the 2021 Existing AM and PM peak hours, respectively. All other approaches are currently operating at a LOS A during both peak hours.

The northbound and southbound approaches at the unsignalized intersection of SC-51 / Andrew L Tucker Road / Business Driveway are currently operating at a LOS F during both 2021 Existing AM and PM peak hours. All other approaches are currently operating at a LOS A during both peak hours.

Table 3-1a: Intersection Level of Service and Delay Summary for South Carolina Study Area Intersections – 2021 Traffic Volumes

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Delay [1] (sec/veh)	LOS [1]	*95th Percentile Queue Length	Sim Traffic Max Queue Length (ft)	Delay [1] (sec/veh)	LOS [1]	*95th Percentile Queue Length	Sim Traffic Max Queue Length (ft)
5: Flint Hill Road & SC-51	EB Thru/Right		33.3	C	364	2233	17.6	B	160	214
	EB Approach		33.3	C	--	--	17.6	B	--	--
	WB Left/Thru		51.9	D	#306	295	***89.5***	***F***	#549	420
	WB Approach		51.9	D	--	--	***89.5***	***F***	--	--
	NB Left/Thru/Right		***65.1***	***E***	#330	1002	***72.2***	***E***	#181	117
	NB Approach		***65.1***	***E***	--	--	***72.2***	***E***	--	--
	SB Left		***57.5***	***E***	#392	334	***96.4***	***F***	#526	308
	SB Thru/Right		24.5	C	38	329	25.4	C	97	284
	SB Approach		54.9	D	--	--	***82.8***	***F***	--	--
	Overall		49.4	D	--	--	***72.9***	***E***	--	--
6: Business Driveway/Springhill Farm Road & SC-51	EB Left/Thru/Right		0.4	A	0.2	428	0.1	A	0.1	387
	EB Approach		0.4	A	--	--	0.1	A	--	--
	WB Left/Thru/Right		0.1	A	0	35	0.1	A	0	126
	WB Approach		0.1	A	--	--	0.1	A	--	--
	NB Left/Thru/Right		***40.6***	***E***	0.7	116	31.4	D	0.6	117
	NB Approach		***40.6***	***E***	--	--	31.4	D	--	--
7: Business Driveway/Andrew L Tucker Road & SC-51	EB Left/Thru/Right		3.9	A	2.2	124	1.6	A	0.6	127
	EB Approach		3.9	A	--	--	1.6	A	--	--
	WB Left/Thru/Right		0.3	A	0.1	248	0.1	A	0	1038
	WB Approach		0.3	A	--	--	0.1	A	--	--
	NB Left/Thru/Right		*+*	***F***	***ERROR***	802	***206.5***	***F***	3.4	289
	NB Approach		*+*	***F***	--	--	***206.5***	***F***	--	--
	SB Left/Thru/Right		*+*	***F***	***ERROR***	1032	***142.5***	***F***	12.6	1037
	SB Approach		*+*	***F***	--	--	***142.5***	***F***	--	--

[1] *Overall intersection LOS and delay reported for signalized intersections and roundabouts only.*

\+ Delay greater than 9999.99 seconds cannot be calculated by SYNCHRO

* - 95th percentile queues for unsignalized intersections reported in number of vehicles.

SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

North Carolina Study Area Intersections:

The eastbound approach at the unsignalized intersection of NC-51 / Miller Road is currently operating at a LOS E and a LOS C during the 2021 Existing AM and PM peak hours, respectively. All other approaches are currently operating at a LOS A during both peak hours.

All approaches at the unsignalized intersection of NC-51 / Marfield Lane are currently operating at a LOS C or better during the 2021 Existing AM and PM peak hours.

The signalized intersection of NC-51 / Downs Road is currently operating at a LOS B during both 2021 Existing AM and PM peak hours. All approaches are currently operating at a LOS C or better during both peak hours.

The signalized intersection of NC-51 / Polk Street is currently operating at a LOS D and a LOS E during the 2021 Existing AM and PM peak hours, respectively. The eastbound, northbound, and southbound approaches are all operating unacceptably during at least one peak hour. The westbound approach is operating at a LOS D during both peak hours.

The signalized intersection of Westinghouse Boulevard / Downs Road is currently operating at a LOS B during both 2021 Existing AM and PM peak hours. All approaches are currently operating at a LOS C or better during both peak hours.

The signalized intersection of Westinghouse Boulevard / Nations Ford Road is currently operating at a LOS C during both 2021 Existing AM and PM peak hours. The northbound approach is currently operating at a LOS D and a LOS E during the AM and PM peak hours, respectively. All other approaches are currently operating at a LOS D or better during both peak hours.

Table 3-1b: Intersection Level of Service and Delay Summary for North Carolina Study Area Intersections – 2021 Traffic Volumes

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Delay [1] (sec/veh)	LOS [1]	*95th Percentile Queue Length	Sim Traffic Max Queue Length (ft)	Delay [1] (sec/veh)	LOS [1]	*95th Percentile Queue Length	Sim Traffic Max Queue Length (ft)
9: Miller Road & NC-51	EB Thru		0.0	A	0	0	0.0	A	0	0
	EB Right	370	0.0	A	0	2	0.0	A	0	2
	EB Approach		0.0	A	--	--	0.0	A	--	--
	WB Left	335	10.2	B	0.1	50	9.5	A	0.2	54
	WB Thru		0.0	A	0	41	0.0	A	0	126
	WB Approach		0.4	A	--	--	0.4	A	--	--
	NB Left		*48.0*	*E*	2.2	100	*36.3*	*E*	1.2	117
	NB Right	185	11.9	B	0.2	53	11.1	B	0.3	56
	NB Approach		*36.7*	*E*	--	--	23.3	C	--	--
10: Marfield Lane & NC-51	EB Thru		0.0	A	0	0	0.0	A	0	2
	EB Right	310	0.0	A	0	0	0.0	A	0	0
	EB Approach		0.0	A	--	--	0.0	A	--	--
	WB Left	520	10.2	B	0.1	44	9.8	A	0.4	83
	WB Thru		0.0	A	0	0	0.0	A	0	0
	WB Approach		0.5	A	--	--	1.0	A	--	--
	NB Left	100	*36.9*	*E*	0.9	60	*40.2*	*E*	0.6	42
	NB Right		12.3	B	0.3	58	11.3	B	0.3	51
	NB Approach		22.4	C	--	--	19.4	C	--	--
11: NC-51 & Downs Road	EB Left	310	23.0	C	103	112	35.0	D	77	90
	EB Thru		7.0	A	161	102	13.1	B	222	144
	EB Approach		9.6	A	--	--	14.9	B	--	--
	WB U-Turn	210	23.5	C	9	26	35.0	C	13	34
	WB Thru		15.7	B	140	148	23.6	C	264	245
	WB Right	335	0.3	A	0	94	0.1	A	0	0
	WB Approach		10.2	B	--	--	21.0	C	--	--
	SB Left	275	23.7	C	82	121	30.5	C	282	251
	SB Right		8.2	A	24	68	10.7	B	87	133
	SB Approach		19.3	B	--	--	24.2	C	--	--
	Overall		10.6	B	--	--	19.7	B	--	--
12: Polk Street & NC-51	EB Left	310	*79.1*	*E*	#207	183	*67.8*	*E*	150	384
	EB Thru/Right		50.8	D	#444	333	*74.0*	*E*	#622	637
	EB Approach		54.7	D	--	--	*73.4*	*E*	--	--
	WB Left	275	*71.2*	*E*	#120	129	*106.7*	*F*	#199	184
	WB Thru		50.5	D	313	266	41.5	D	308	348
	WB Right	625	33.2	C	237	245	14.1	B	126	170
	WB Approach		47.5	D	--	--	43.2	D	--	--
	NB Dual Lefts	450	*58.7*	*E*	132	407	*71.7*	*E*	#125	478
	NB Thru/Right		*57.9*	*E*	#800	714	*123.3*	*F*	#549	862
	NB Approach		*58.1*	*E*	--	--	*106.9*	*F*	--	--
	SB Left		*86.0*	*F*	#173	148	*113.2*	*F*	#608	749
	SB Thru		30.3	C	296	305	43.6	D	507	524
	SB Right	175	14.6	B	58	203	16.6	B	111	275
	SB Approach		38.4	D	--	--	*67.2*	*E*	--	--
	Overall		51.1	D	--	--	*69.0*	*E*	--	--
13: Downs Road & Westinghouse Boulevard	EB Left	400	8.5	A	m71	84	4.2	A	m8	38
	EB Thru/Right		8.7	A	274	249	5.4	A	145	265
	EB Approach		8.7	A	--	--	5.4	A	--	--
	WB Left	205	12.3	B	35	80	20.0	C	#96	144
	WB Thru/Right		9.1	A	108	117	8.3	A	127	155
	WB Approach		9.4	A	--	--	9.6	A	--	--
	NB Left	245	19.2	B	80	143	42.3	D	#122	165
	NB Thru/Right		24.8	C	166	272	20.4	C	85	137
	NB Approach		23.1	C	--	--	31.1	C	--	--
	SB Left	225	16.5	B	29	63	21.2	C	66	96
	SB Thru/Right		15.1	B	42	101	28.6	C	170	229
	SB Approach		15.6	B	--	--	26.7	C	--	--
	Overall		12.1	B	--	--	12.6	B	--	--
14: Nations Ford Road & Westinghouse Boulevard	EB Left	400	15.2	B	256	264	5.9	A	54	129
	EB Thru/Right		18.1	B	394	306	11.2	B	275	228
	EB Approach		17.3	B	--	--	10.5	B	--	--
	WB Left	750	9.2	A	34	85	3.8	A	m20	85
	WB Thru/Right		29.2	C	244	232	11.6	B	290	317
	WB Approach		26.9	C	--	--	10.9	B	--	--
	NB Left	190	39.3	D	107	165	*61.4*	*E*	107	117
	NB Thru/Right		*56.4*	*E*	317	270	*60.2*	*E*	175	188
	NB Approach		52.4	D	--	--	*60.6*	*E*	--	--
	SB Left	200	35.3	D	23	39	52.3	D	60	103
	SB Thru		35.1	D	74	97	53.5	D	142	177
	SB Right	275	13.2	B	64	120	48.0	D	292	276
	SB Approach		21.7	C	--	--	49.7	D	--	--
	Overall		25.2	C	--	--	20.7	C	--	--

[1] *Overall intersection LOS and delay reported for signalized intersections and roundabouts only.*

+ Delay greater than 9999.99 seconds cannot be calculated by SYNCHRO

* - 95th percentile queues for unsignalized intersections reported in number of vehicles.

SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

3.2 2025 BACKGROUND TRAFFIC VOLUMES

The 2025 ambient traffic volumes, shown on **Figure 3-1**, were calculated by applying a 2% growth rate to the 2021 traffic volumes for four years.

Per discussions with NCDOT and SCDOT (see **Appendix A**), there is currently one approved development in the project study area that will be partially or fully built-out by 2025. This development, Carolina Logistics Park, is to be located between Nations Ford Road and Downs Road in Pineville, NC. Per the TIA (prepared by Ramey Kemp and Associates in July 2020) the development is to be constructed over two phases with completion of phase 1 occurring in 2023 and phase 2 in 2026. Phase 1 is to comprise of a 2,500,000 SF industrial warehouse and phase 2 is to construct an additional 1,000,000 SF industrial warehouse. Trip distribution for the development was assumed to follow the same pattern as outlined within the TIA (see **Appendix C**). For study area intersections not included in the Carolina Logistics Park TIA, trip distribution was based on existing area traffic. Per the TIA, there are no off-site improvements at any of the study area intersections. The projected and distributed trips from the approved development are shown in in **Figure 3-2**.

The approved development trips shown in **Figure 3-2** were added to the 2025 ambient traffic volumes (shown on **Figure 3-1**) to determine the 2025 Background traffic volumes (shown on **Figures 3-3**).

Currently, there is one public project scheduled for completion within the project study area: a South Carolina Pennies for Progress project improving US-21 and SC-51 (see **Appendix D**). This project has an assumed build-out year of 2023 and will therefore be included in all future year analyses. Project improvements include: widening of US-21, realignment of the US-21 / SC-51 intersection, widening of SC-51, realignment of the SC-51 / Flint Hill Road intersection, and severance of the Springhill Farm Road approach at the existing intersection of SC-51 / Springhill Farm Road / Business Driveway. The project begins at SC-460 (Springfield Parkway) in York County, South Carolina, and ends northwards prior to the intersection of US-21 / I-77 Northbound Off-Ramp / Springhill Farm Road and eastwards at the North Carolina / South Carolina border (see **Appendix D**).

3.3 2025 BACKGROUND TRAFFIC ANALYSIS

Tables 3-2a and **3-2b** summarize the 2025 Background intersection LOS and delay based on the future lane geometry and the 2025 Background traffic volumes shown on **Figure 3-3**. The corresponding SYNCHRO outputs are included in **Appendix F**.

South Carolina Study Area Intersections:

The signalized intersection of SC-51 / Flint Hill Road is projected to operate at a LOS C during both 2025 Background AM and PM peak hours. All approaches are projected to operate at a LOS D or better during both peak hours.

The northbound approach at the unsignalized intersection of SC-51 / Business Driveway is projected to operate at a LOS E and a LOS D during the 2025 Background AM and PM peak hours, respectively. All other approaches are projected to operate at a LOS A during both peak hours.

The northbound and southbound approaches at the unsignalized intersection of SC-51 / Andrew L Tucker Road / Business Driveway are projected to operate at a LOS F during both 2025 Background AM and PM peak hours. All other approaches are projected to operate at a LOS A during both peak hours.

Table 3-2a: Intersection Level of Service and Delay Summary for South Carolina Study Area Intersections – 2025 Background Traffic Volumes

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Delay [1] (sec/veh)	LOS [1]	*95th Percentile Queue Length	Sim Traffic Max Queue Length (ft)	Delay [1] (sec/veh)	LOS [1]	*95th Percentile Queue Length	Sim Traffic Max Queue Length (ft)
5: Flint Hill Road & SC-51	EB Left	200	27.1	C	37	71	14.3	B	12	30
	EB Thru/Right		31.8	C	187	217	16.2	B	77	117
	EB Approach		31.6	C	--	--	16.2	B	--	--
	WB Left	200	40.9	D	74	113	41.0	D	258	261
	WB Thru		27.1	C	97	116	16.0	B	71	164
	WB Right	350	15.7	B	336	307	6.6	A	145	196
	WB Approach		20.7	C	--	--	19.2	B	--	--
	NB Left	150	22.8	C	10	25	33.3	C	17	27
	NB Thru/Right		38.4	D	268	265	41.3	D	#146	154
	NB Approach		38.2	D	--	--	40.9	D	--	--
	SB Dual Lefts	250	26.1	C	167	205	31.9	C	220	206
	SB Thru/Right		23.1	C	40	81	28.0	C	115	124
	SB Approach		25.9	C	--	--	31.2	C	--	--
	Overall		26.9	C	--	--	24.0	C	--	--
6: Business Driveway & SC-51	EB Thru/Right		0.0	A	0	235	0.0	A	0	33
	EB Approach		0.0	A	--	--	0.0	A	--	--
	WB Left/Thru		0.3	A	0	54	0.2	A	0	73
	WB Approach		0.3	A	--	--	0.2	A	--	--
	NB Left/Right		*41.0*	*E*	0.7	69	31.4	D	0.7	53
	NB Approach		*41.0*	*E*	--	--	31.4	D	--	--
7: Business Driveway/Andrew L Tucker Road & SC-51	EB Left	150	14.5	B	3.3	116	10.6	B	0.9	104
	EB Thru/Right		0.0	A	0	2	0.0	A	0	8
	EB Approach		4.8	A	--	--	1.9	A	--	--
	WB Left/Thru		0.6	A	0.1	68	0.2	A	0	70
	WB Thru/Right		0.6	A	0	58	0.2	A	0	23
	WB Approach		0.6	A	--	--	0.2	A	--	--
	NB Left/Thru/Right		+	*F*	*ERROR*	360	*183.4*	*F*	3.3	66
	NB Approach		+	*F*	--	--	*183.4*	*F*	--	--
	SB Left/Thru/Right		+	*F*	*ERROR*	961	*143.7*	*F*	14.8	303
	SB Approach		+	*F*	--	--	*143.7*	*F*	--	--

[1] *Overall intersection LOS and delay reported for signalized intersections and roundabouts only.*

\+ Delay greater than 9999.99 seconds cannot be calculated by SYNCHRO

* - 95th percentile queues for unsignalized intersections reported in number of vehicles.

SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

North Carolina Study Area Intersections:

The northbound approach at the unsignalized intersection of NC-51 / Miller Road is projected to operate at a LOS F and a LOS D during the 2025 Background AM and PM peak hours, respectively. All other approaches are projected to operate at a LOS A during both peak hours.

All approaches at the unsignalized intersection of NC-51 / Marfield Lane are projected to operate at a LOS D or better during the 2025 Background AM and PM peak hours.

The signalized intersection of NC-51 / Downs Road is projected to operate at a LOS B and a LOS C during the 2025 Background AM and PM peak hours, respectively. All approaches are projected to operate at a LOS C or better during both peak hours.

The signalized intersection of NC-51 / Polk Street is projected to operate at a LOS E and a LOS F during the 2025 Background AM and PM peak hours, respectively. The eastbound, northbound, and southbound

approaches are projected to operate unacceptably during at least one peak hour. The westbound approach is projected to operate at a LOS D during both peak hours.

The signalized intersection of Westinghouse Boulevard / Downs Road is projected to operate at a LOS B during both 2025 Background AM and PM peak hours. All approaches are projected to operate at a LOS D or better during both peak hours.

The signalized intersection of Westinghouse Boulevard / Nations Ford Road is projected to operate at a LOS D and a LOS C during the 2025 Background AM and PM peak hours, respectively. The northbound approach is projected to operate at a LOS E during both AM and PM peak hours. All other approaches are projected to operate at a LOS D or better during both peak hours.

Table 3-2b: Intersection Level of Service and Delay Summary for North Carolina Study Area Intersections – 2025 Background Traffic Volumes

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Delay [1] (sec/veh)	LOS [1]	*95th Percentile Queue Length	Sim Traffic Max Queue Length (ft)	Delay [1] (sec/veh)	LOS [1]	*95th Percentile Queue Length	Sim Traffic Max Queue Length (ft)
9: Miller Road & NC-51	EB Thru		0.0	A	0	0	0.0	A	0	0
	EB Right	370	0.0	A	0	12	0.0	A	0	4
	EB Approach		0.0	A	--	--	0.0	A	--	--
	WB Left	335	10.8	B	0.1	54	9.8	A	0.2	61
	WB Thru		0.0	A	0	0	0.0	A	0	0
	WB Approach		0.4	A	--	--	0.5	A	--	--
	NB Left		*73.6*	*F*	3.3	144	*48.1*	*E*	1.6	78
	NB Right	185	12.5	B	0.2	50	11.5	B	0.3	66
	NB Approach		*54.6*	*F*	--	--	29.2	D	--	--
10: Marfield Lane & NC-51	EB Thru		0.0	A	0	0	0.0	A	0	0
	EB Right	310	0.0	A	0	2	0.0	A	0	6
	EB Approach		0.0	A	--	--	0.0	A	--	--
	WB Left	520	10.7	B	0.2	50	10.2	B	0.4	77
	WB Thru		0.0	A	0	0	0.0	A	0	0
	WB Approach		0.5	A	--	--	1.0	A	--	--
	NB Left	100	*48.8*	*E*	1.3	72	*52.9*	*F*	0.9	51
	NB Right		13.0	B	0.4	68	11.7	B	0.3	55
	NB Approach		27.7	D	--	--	23.4	C	--	--
11: NC-51 & Downs Road	EB Left	310	24.7	C	129	140	41.1	D	100	104
	EB Thru		7.2	A	185	135	15.0	B	270	180
	EB Approach		10.3	B	--	--	17.4	B	--	--
	WB U-Turn	210	26.2	C	10	30	40.2	D	13	27
	WB Thru		17.3	B	168	183	26.8	C	321	242
	WB Right	335	0.4	A	0	164	0.1	A	0	0
	WB Approach		11.1	B	--	--	23.6	C	--	--
	SB Left	275	25.9	C	98	138	33.1	C	349	309
	SB Right		8.5	A	29	71	11.7	B	115	220
	SB Approach		20.6	C	--	--	26.1	C	--	--
	Overall		11.5	B	--	--	22.1	C	--	--
12: Polk Street & NC-51	EB Left	310	*90.7*	*F*	#233	319	*81.5*	*F*	#199	410
	EB Thru/Right		*78.6*	*E*	#521	523	*105.9*	*F*	#714	1066
	EB Approach		*80.3*	*F*	--	--	*103.5*	*F*	--	--
	WB Left	275	*77.4*	*E*	#133	135	*121.3*	*F*	#219	252
	WB Thru		*56.8*	*E*	#375	318	42.0	D	332	396
	WB Right	625	35.4	D	263	238	13.6	B	131	165
	WB Approach		52.7	D	--	--	45.0	D	--	--
	NB Dual Lefts	450	*60.5*	*E*	143	550	*77.5*	*E*	#141	550
	NB Thru/Right		*71.7*	*E*	#893	950	*154.0*	*F*	#608	1007
	NB Approach		*69.0*	*E*	--	--	*129.6*	*F*	--	--
	SB Left		*99.6*	*F*	#191	185	*143.3*	*F*	#674	932
	SB Thru		31.7	C	324	310	48.7	D	#604	826
	SB Right	175	14.8	B	66	190	17.6	B	127	275
	SB Approach		41.7	D	--	--	*81.4*	*F*	--	--
	Overall		*63.3*	*E*	--	--	*86.4*	*F*	--	--
13: Downs Road & Westinghouse Boulevard	EB Left	400	7.6	A	m41	108	5.8	A	m7	46
	EB Thru/Right		9.5	A	198	265	11.6	B	139	289
	EB Approach		9.3	A	--	--	11.5	B	--	--
	WB Left	205	17.9	B	57	101	53.0	D	#135	156
	WB Thru/Right		8.9	A	108	131	9.7	A	148	153
	WB Approach		9.9	A	--	--	15.0	B	--	--
	NB Left	245	21.7	C	100	152	*65.4*	*E*	#174	261
	NB Thru/Right		29.0	C	198	257	20.0	B	100	211
	NB Approach		26.6	C	--	--	43.4	D	--	--
	SB Left	225	19.3	B	34	66	20.6	C	71	103
	SB Thru/Right		16.0	B	48	94	26.5	C	179	252
	SB Approach		17.1	B	--	--	25.0	C	--	--
	Overall		13.4	B	--	--	18.4	B	--	--
14: Nations Ford Road & Westinghouse Boulevard	EB Left	400	53.5	D	462	398	47.6	D	207	212
	EB Thru/Right		23.0	C	483	372	17.6	B	398	318
	EB Approach		31.3	C	--	--	21.6	C	--	--
	WB Left	750	*66.2*	*E*	124	140	*61.5*	*E*	m128	167
	WB Thru/Right		33.8	C	272	321	23.2	C	452	448
	WB Approach		37.5	D	--	--	26.3	C	--	--
	NB Left	190	42.6	D	143	288	*74.1*	*E*	175	221
	NB Thru/Right		*62.7*	*E*	366	411	50.3	D	172	231
	NB Approach		*57.3*	*E*	--	--	*61.7*	*E*	--	--
	SB Left	200	38.8	D	26	46	44.1	D	58	82
	SB Thru		36.2	D	83	101	46.3	D	141	158
	SB Right	275	10.7	B	64	100	29.8	C	280	249
	SB Approach		20.7	C	--	--	35.1	D	--	--
	Overall		35.9	D	--	--	29.0	C	--	--

[1] *Overall intersection LOS and delay reported for signalized intersections and roundabouts only.*

\+ Delay greater than 9999.99 seconds cannot be calculated by SYNCHRO

* - 95th percentile queues for unsignalized intersections reported in number of vehicles.

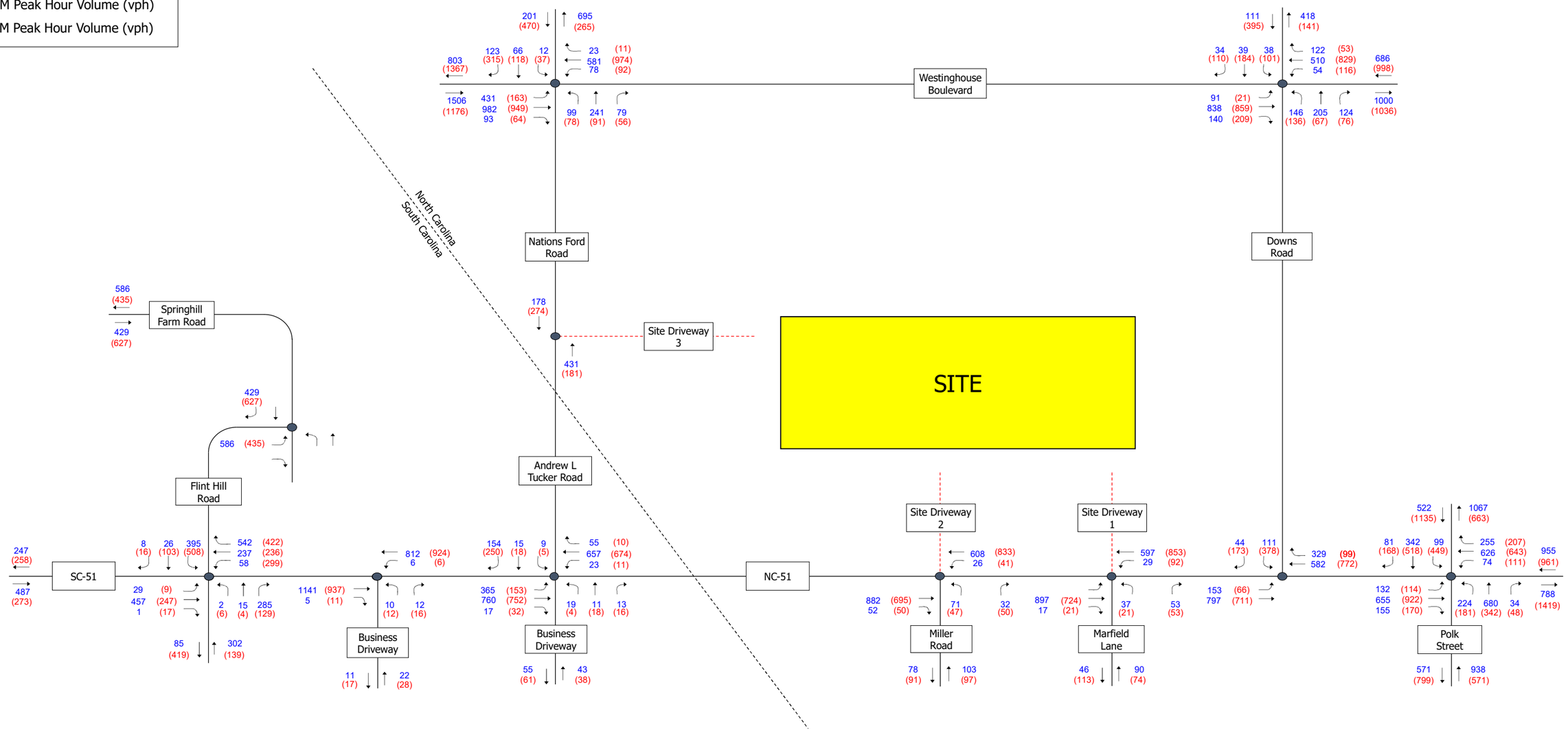
SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

LEGEND:

- Existing Road
- Proposed Road
- XX AM Peak Hour Volume (vph)
- (XX) PM Peak Hour Volume (vph)

N

NOT TO SCALE



TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Miller Farm Traffic Impact Analysis

2025 Ambient Traffic Volumes

Figure 3-1

LEGEND:

- Existing Road
- Proposed Road
- XX AM Peak Hour Volume (vph)
- (XX) PM Peak Hour Volume (vph)

NOT TO SCALE

Westinghouse Boulevard

Nations Ford Road

Downs Road

North Carolina
South Carolina

Springhill Farm Road

Site Driveway 3

SITE

Flint Hill Road

Andrew L Tucker Road

SC-51

NC-51

Business Driveway

Business Driveway

Site Driveway 2

Site Driveway 1

Miller Road

Marfield Lane

Polk Street

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Miller Farm Traffic Impact Analysis

Approved Development 2023 Traffic Volumes - Carolina Logistics Park

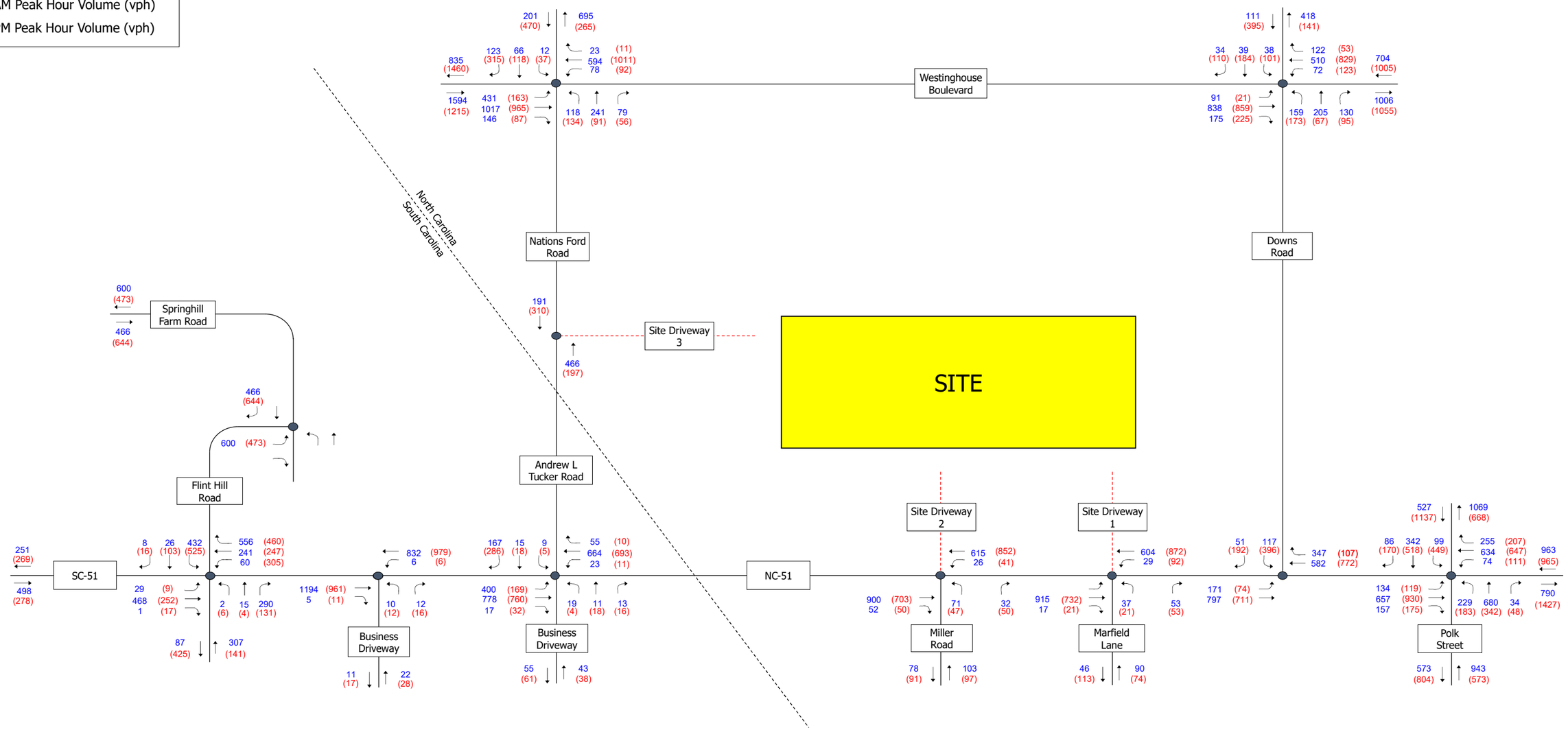
Figure 3-2

LEGEND:

- Existing Road
- Proposed Road
- XX AM Peak Hour Volume (vph)
- (XX) PM Peak Hour Volume (vph)

N

NOT TO SCALE



TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Miller Farm Traffic Impact Analysis

2025 Background Traffic Volumes

Figure 3-3

4 SITE TRIP GENERATION AND DISTRIBUTION

Site trips for the development were estimated based on the proposed land uses supplied by the developer and subsequently distributed onto the surrounding roadway network.

4.1 TRIP GENERATION

The site-generated trips shown in **Table 4-1** are based on trip generation information provided in the 10th Edition of the Institute of Transportation Engineer's (ITE's) *Trip Generation Manual* and the anticipated size of the residential development. The trip generation was calculated using the proposed number of residential units as the independent variable and the provided equation (per NCDOT standards).

Table 4-1: Trip Generation Summary

ITE Land Use Code	Independent Variable	AM Peak Hour			PM Peak Hour			Daily Traffic
		In	Out	Total	In	Out	Total	
210 – Single Family Detached Housing	215 DU	39	118	157	133	79	212	2,103
220 – Multifamily Housing (Low Rise)	145 DU	16	52	68	52	30	82	1,055
Total:		55	170	225	185	109	294	3,158

SOURCE: Institute of Transportation Engineers' *Trip Generation Manual* 10th Edition (2017)

AM peak hour trips totaled 55 incoming and 170 outgoing where PM peak hour trips totaled 185 incoming and 109 outgoing. Average daily traffic (ADT) volumes generated by the development totaled 3,158 VPD.

4.2 TRIP DISTRIBUTION

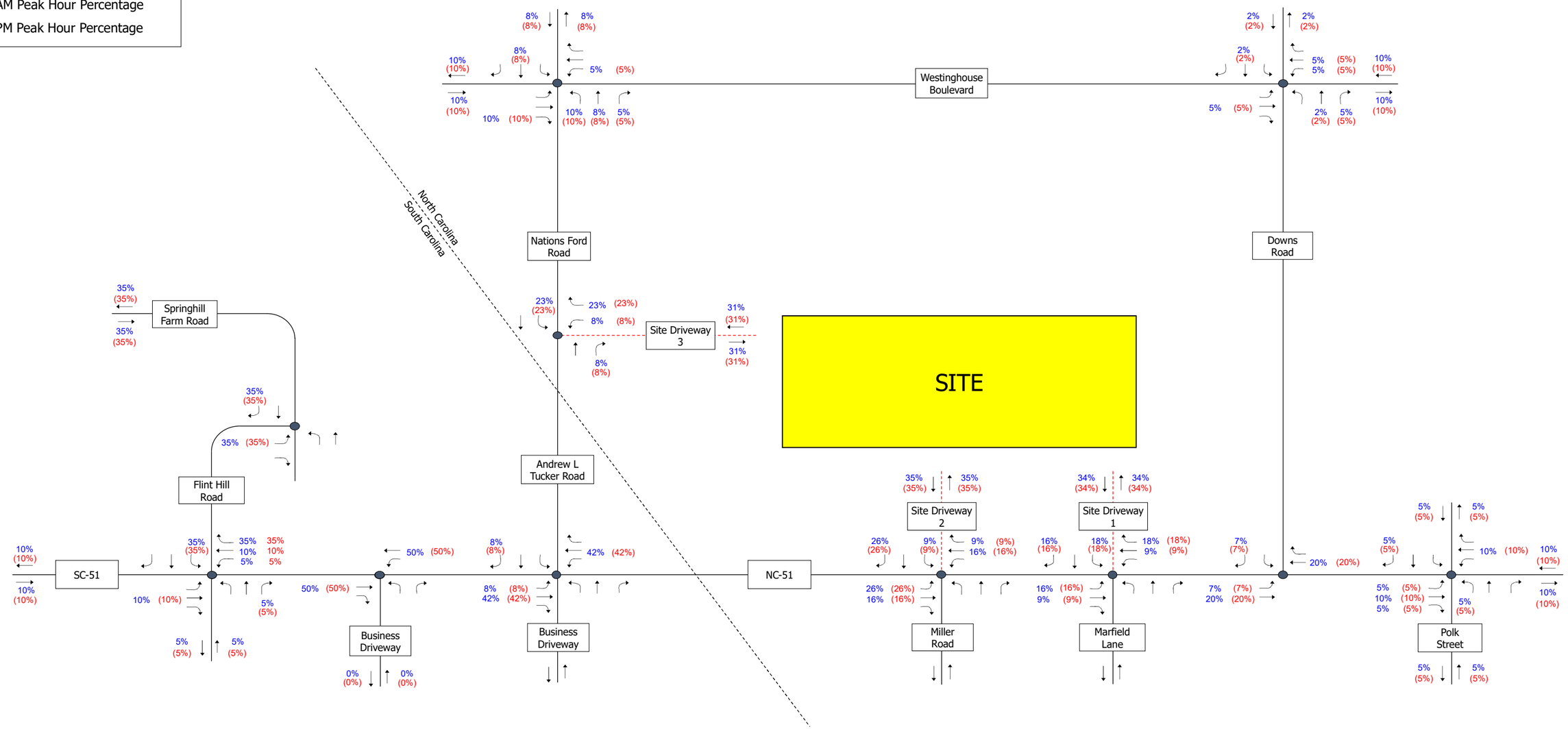
The directional traffic patterns, or trip distribution, of the site-generated traffic was determined using the existing AM and PM peak hour traffic characteristics and engineering judgement. It was assumed, for purposes of this study, that all site traffic would enter and exit the study area in a similar manner as the existing traffic. Area trip distribution is based on the traffic counts utilized by Timmons Group. Total trips into and out of the study area using SC-51, Flint Hill Road, Springhill Farm Road, Nations Ford Road, Westinghouse Boulevard, Downs Road, NC-51, and Polk Street form the basis for the percentage distribution. Distribution percentages into and out of the study area were calculated using existing traffic volumes entering and exiting the study area. The percentages were routed, via shortest path, to and from the proposed development. The distribution percentages were then applied to the generated trips to predict routes and project traffic volumes for the 2025 Build scenario. **Figure 4-1** shows the distribution percentages and **Figure 4-2** shows the trip distribution volumes for the proposed development.

LEGEND:

- Existing Road
- Proposed Road
- XX AM Peak Hour Percentage
- (XX) PM Peak Hour Percentage

N

NOT TO SCALE



TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Miller Farm Traffic Impact Analysis

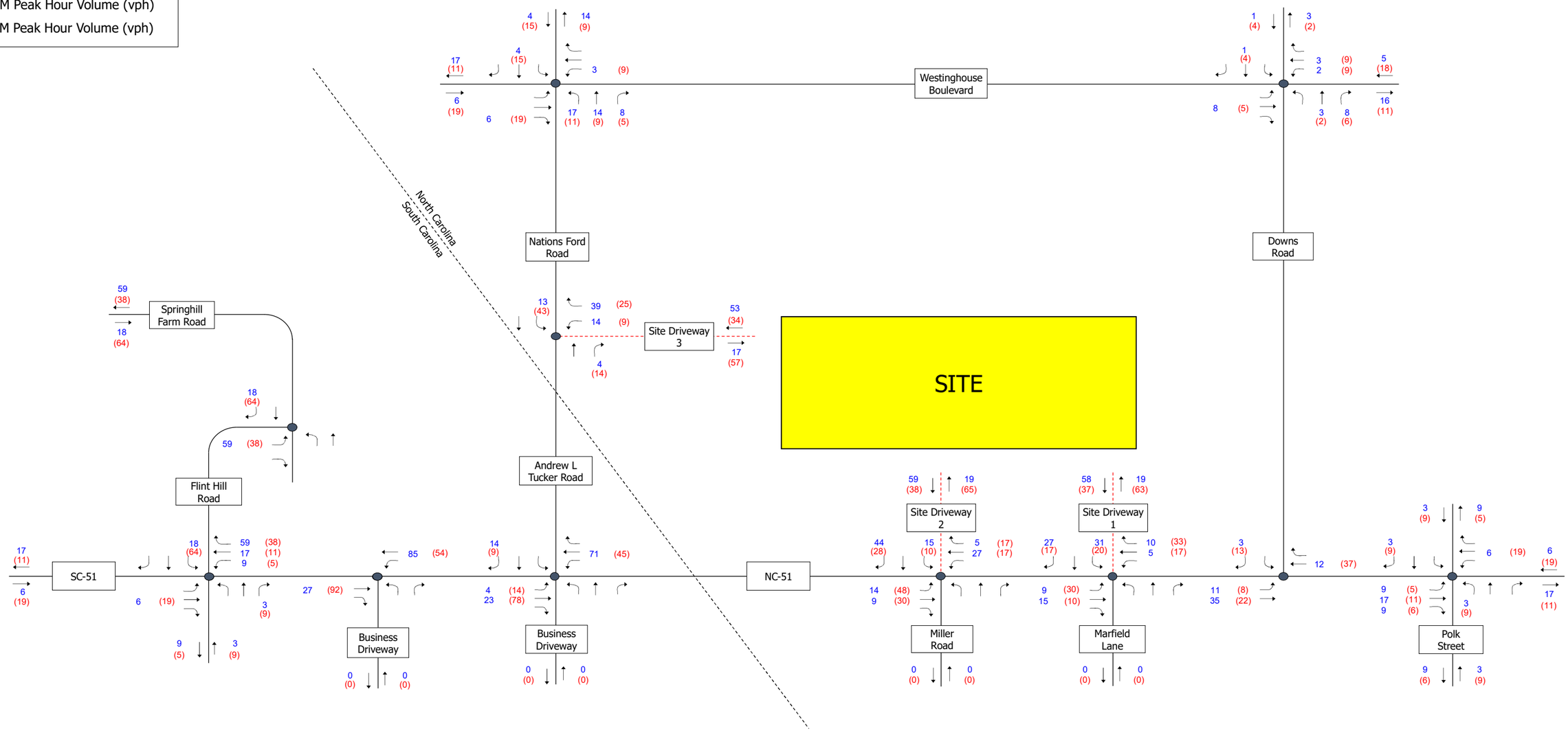
Trip Distribution Percentages

Figure 4-1

LEGEND:

- Existing Road
- Proposed Road
- XX AM Peak Hour Volume (vph)
- (XX) PM Peak Hour Volume (vph)

NOT TO SCALE



TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Miller Farm Traffic Impact Analysis

Trip Distribution Volumes

Figure 4-2

5 BUILD CONDITION AND ANALYSIS

To complete the Build analyses (including the proposed development), the estimated site trips were added to the Background traffic volumes. The projected total volumes, along with the future intersection geometry and optimized existing signal timings, were used to complete the capacity analyses.

The 2025 Background traffic volumes (**Figure 3-1**) were added to the projected site trips from the residential development (**Figure 4-1**) to generate the 2025 Build traffic volumes (background + site) shown on **Figure 5-1**.

To summarize, the 2025 Build traffic volumes shown on **Figure 5-1** contain the following:

- 2021 traffic volumes grown by an ambient growth rate of 2% per year for four years;
- Traffic volumes from the study area approved development; and
- Site trips generated by the subject development.

5.1 2025 BUILD ANALYSIS

Tables 5-1a and **5-1b** summarize the 2025 Build intersection LOS and delay based on the future lane geometry and the 2025 Build traffic volumes shown on **Figure 5-1**. The corresponding SYNCHRO outputs are included in **Appendix F**.

South Carolina Study Area Intersections:

The signalized intersection of SC-51 / Flint Hill Road is projected to operate at a LOS C during both 2025 Build AM and PM peak hours. All approaches are projected to operate at a LOS D or better during both peak hours. Because the intersection is anticipated to operate acceptably overall, no improvements are recommended due to the construction of the proposed development.

The northbound approach at the unsignalized intersection of SC-51 / Business Driveway is projected to operate at a LOS E during the 2025 Build AM and PM peak hours. All other approaches are projected to operate at a LOS A during both peak hours. It should be noted that the northbound approach is projected to operate unacceptably during the 2025 Background AM peak hour condition without construction of the proposed development. Additionally, the northbound approach is a business driveway with minimal traffic during both peak hours with volume to capacity ratios not projected to exceed 0.21 and projected queue lengths of less than three vehicles. No improvements are recommended at this intersection due to the construction of the proposed development.

The northbound and southbound approaches at the unsignalized intersection of SC-51 / Andrew L Tucker Road / Business Driveway are projected to operate at a LOS F during the 2025 Build AM and PM peak hours. All other approaches are projected to operate at a LOS A during both peak hours. To assist with mitigation of the excessive queuing and delay present on the northbound and southbound intersection approaches, it is recommended that the development pay a fee-in-lieu (proportionate to the development's impact) for intersection signalization due to construction of the proposed development. Based on the 2025 Background and 2025 Build scenarios, the proposed development is projected to increase the subject intersection traffic volumes by a maximum of 7.3% (maximum occurs during the PM peak hour).

Table 5-1a: Intersection Level of Service and Delay Summary for South Carolina Study Area Intersections – 2025 Build Traffic Volumes

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Delay [1] (sec/veh)	LOS [1]	*95th Percentile Queue Length	Sim Traffic Max Queue Length (ft)	Delay [1] (sec/veh)	LOS [1]	*95th Percentile Queue Length	Sim Traffic Max Queue Length (ft)
5: Flint Hill Road & SC-51	EB Left	200	27.4	C	37	70	13.7	B	12	39
	EB Thru/Right		32.9	C	190	243	16.1	B	80	129
	EB Approach		32.6	C	--	--	16.0	B	--	--
	WB Left	200	48.8	D	#86	116	43.1	D	261	278
	WB Thru		27.9	C	103	120	15.8	B	72	129
	WB Right	350	17.5	B	388	329	6.7	A	154	193
	WB Approach		22.7	C	--	--	19.5	B	--	--
	NB Left	150	23.8	C	10	22	34.2	C	17	25
	NB Thru/Right		40.5	D	#302	296	45.1	D	#178	164
	NB Approach		40.3	D	--	--	44.7	D	--	--
	SB Dual Lefts	250	25.9	C	172	183	34.4	C	#273	238
	SB Thru/Right		22.8	C	40	47	28.0	C	115	137
	SB Approach		25.7	C	--	--	33.3	C	--	--
	Overall		28.0	C	--	--	25.1	C	--	--
6: Business Driveway & SC-51	EB Thru/Right		0.0	A	0	345	0.0	A	0	43
	EB Approach		0.0	A	--	--	0.0	A	--	--
	WB Left/Thru		0.3	A	0	46	0.3	A	0	62
	WB Approach		0.3	A	--	--	0.3	A	--	--
	NB Left/Right		*45.9*	*E*	0.8	72	*37.9*	*E*	0.8	65
	NB Approach		*45.9*	*E*	--	--	*37.9*	*E*	--	--
7: Business Driveway/Andrew L Tucker Road & SC-51	EB Left	150	16.2	C	3.9	116	11.1	B	1	105
	EB Thru/Right		0.0	A	0	9	0.0	A	0	12
	EB Approach		5.3	A	--	--	1.9	A	--	--
	WB Left/Thru		0.6	A	0.1	68	0.3	A	0.1	76
	WB Thru/Right		0.6	A	0	55	0.3	A	0	23
	WB Approach		0.6	A	--	--	0.3	A	--	--
	NB Left/Thru/Right		*+*	*F*	*ERROR*	564	*359.8*	*F*	4.3	73
	NB Approach		*+*	*F*	--	--	*359.8*	*F*	--	--
	SB Left/Thru/Right		*+*	*F*	*ERROR*	893	*266.5*	*F*	20.4	514
	SB Approach		*+*	*F*	--	--	*266.5*	*F*	--	--

[1] *Overall intersection LOS and delay reported for signalized intersections and roundabouts only.*

\+ Delay greater than 9999.99 seconds cannot be calculated by SYNCHRO

* - 95th percentile queues for unsignalized intersections reported in number of vehicles.

SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

North Carolina Study Area Intersections:

The northbound and southbound approaches at the unsignalized intersection of NC-51 / Miller Road / Site Driveway 2 are projected to operate unacceptably during at least one of the 2025 Build AM and PM peak hours. All other approaches are projected to operate at a LOS A during both peak hours. Per the NCDOT Policy on Street and Driveway Access to North Carolina Highways Manual:

"Generally left and right turn lanes and tapers shall be considered when:

- *In accordance with G.S. 136-18(29), the average daily traffic meets or exceeds 4,000 vehicles per day on any secondary route (the average daily traffic should include both the existing traffic plus traffic generated by the proposed development)"*

With AADTs along NC-51 exceeding 4,000 VPD, an eastbound left-turn lane is recommended at Site Driveway 2. Per the nomograph (provided in the Driveway Manual – see **Appendix G**), and projected

2025 Build traffic volumes, a 100-foot eastbound left-turn lane (with appropriate taper) is recommended (see **Figure 6-1**). As shown in **Table 5-2**, following the construction of this improvement, the northbound and southbound approaches are projected to continue to operate unacceptably during at least one peak hour. Despite the fact that these approaches are projected to operate unacceptably, no additional improvements are recommended at this intersection due to the construction of the proposed development. Outside of signalization, no feasible amount of geometric improvements will result in an acceptable level of service for the failing minor street approaches. Based on projected volumes and peaking characteristics of developments in the area, traffic signal warrants will likely not be met for the MUTCD's 4-hour and 8-hour volume warrants (which the NCDOT typically requires for signalization). Additionally, proposed and existing turn lane storage is projected to adequately contain all 95th percentile and SimTraffic queue lengths.

The northbound and southbound approaches at the unsignalized intersection of NC-51 / Marfield Lane / Site Driveway 1 are projected to operate unacceptably during both 2025 Build AM and PM peak hours. All other approaches are projected to operate at a LOS A during both peak hours. Per the nomograph (provided in the Driveway Manual – see **Appendix G**), and projected 2025 Build traffic volumes, a 100-foot eastbound left-turn lane (with appropriate taper) is recommended (see **Figure 6-1**). As shown in **Table 5-2**, following the construction of this improvement, the northbound and southbound approaches are projected to continue to operate unacceptably during at least one peak hour. Despite the fact that these approaches are projected to operate unacceptably, no additional improvements are recommended at this intersection due to the construction of the proposed development. Outside of signalization, no feasible amount of geometric improvements will result in an acceptable level of service for the failing minor street approaches. Based on projected volumes and peaking characteristics of developments in the area, traffic signal warrants will likely not be met for the MUTCD's 4-hour and 8-hour volume warrants (which the NCDOT typically requires for signalization). Additionally, proposed and existing turn lane storage is projected to adequately contain all 95th percentile and SimTraffic queue lengths and projected volume / capacity ratios are not expected to exceed 0.69 during either peak.

The signalized intersection of NC-51 / Downs Road is projected to operate at a LOS B and a LOS C during the 2025 Build AM and PM peak hours, respectively. All approaches are projected to operate at a LOS C or better during both peak hours. Because the intersection is anticipated to operate acceptably overall, no improvements are recommended due to the construction of the proposed development. Additionally, the percent difference between the 2025 Background and 2025 Build intersection delays are less than 25%, which does not trigger requirement for improvement recommendations per NCDOT's Driveway Manual.

The signalized intersection of NC-51 / Polk Street is projected to operate at a LOS E and a LOS F during the 2025 Build AM and PM peak hours, respectively. The eastbound, northbound, and southbound approaches are projected to operate unacceptably during at least one peak hour. The westbound approach is projected to operate at a LOS D during both peak hours. Despite the fact that the intersection is anticipated to operate unacceptably, no improvements are recommended due to the construction of the proposed development. The percent difference between the 2025 Background and 2025 Build intersection delays are less than 25%, which does not trigger requirement for improvement recommendations per NCDOT's Driveway Manual.

The signalized intersection of Westinghouse Boulevard / Downs Road is projected to operate at a LOS B and a LOS C during the 2025 Build AM and PM peak hours, respectively. All approaches are projected to operate at a LOS D or better during both peak hours. Because the intersection is anticipated to operate acceptably overall, no improvements are recommended due to the construction of the proposed development. Additionally, the percent difference between the 2025 Background and 2025 Build intersection delays are less than 25%, which does not trigger requirement for improvement recommendations per NCDOT's Driveway Manual.

The signalized intersection of Westinghouse Boulevard / Nations Ford Road is projected to operate at a LOS D and a LOS C during both 2025 Build AM and PM peak hours, respectively. The northbound approach is projected to operate at a LOS E during both peak hours. All other approaches are projected to operate at a LOS D or better during both peak hours. Because the intersection is anticipated to operate acceptably overall, no improvements are recommended due to the construction of the proposed development. Additionally, the percent difference between the 2025 Background and 2025 Build intersection delays are less than 25%, which does not trigger requirement for improvement recommendations per NCDOT's Driveway Manual.

All approaches at the unsignalized intersection of Nations Ford Road / Site Driveway 3 are projected to operate at a LOS B or better during the 2025 Build AM and PM peak hours. Per the nomograph (provided in the Driveway Manual – see **Appendix G**), and projected 2025 Build traffic volumes, a 100-foot eastbound left-turn lane (with appropriate taper) is recommended (see **Figure 6-1**). As shown in **Table 5-2**, following the construction of this improvement, all approaches are projected to continue to operate acceptably during both peak hours. It should be noted that the excessive queuing shown occurring at this intersection in **Table 5-2** is due to queue spillback from the intersection of SC-51 / Andrew L Tucker Road / Business Driveway.

Table 5-1b: Intersection Level of Service and Delay Summary for North Carolina Study Area Intersections – 2025 Build Traffic Volumes

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Delay [1] (sec/veh)	LOS [1]	*95th Percentile Queue Length	Sim Traffic Max Queue Length (ft)	Delay [1] (sec/veh)	LOS [1]	*95th Percentile Queue Length	Sim Traffic Max Queue Length (ft)
9: Miller Road/Site Driveway 2 & NC-51	EB Left/Thru		0.3	A	0.1	52	1.2	A	0.2	88
	EB Right	370	0.0	A	0	4	0.0	A	0	8
	EB Approach		0.3	A	--	--	1.2	A	--	--
	WB Left	335	10.8	B	0.1	50	10.0	B	0.2	51
	WB Thru/Right		0.0	A	0	0	0.0	A	0	20
	WB Approach		0.4	A	--	--	0.4	A	--	--
	NB Left/Thru		*248.5*	*F*	6.3	166	*205.9*	*F*	4.3	100
	NB Right	185	12.6	B	0.2	50	11.7	B	0.3	61
	NB Approach		*178.0*	*F*	--	--	*109.8*	*F*	--	--
	SB Left/Thru/Right		28.8	D	1.3	70	*50.0*	*F*	1.5	68
	SB Approach		28.8	D	--	--	*50.0*	*F*	--	--
10: Marfield Lane/Site Driveway 1 & NC-51	EB Left/Thru		0.2	A	0	50	0.9	A	0.2	84
	EB Right	310	0.0	A	0	2	0.0	A	0	2
	EB Approach		0.2	A	--	--	0.9	A	--	--
	WB Left	520	10.8	B	0.2	41	10.3	B	0.4	72
	WB Thru/Right		0.0	A	0	5	0.0	A	0	2
	WB Approach		0.5	A	--	--	0.9	A	--	--
	NB Left/Thru	100	*104.4*	*F*	2.6	83	*144.3*	*F*	2.1	81
	NB Right		13.1	B	0.4	64	11.8	B	0.3	61
	NB Approach		*52.9*	*F*	--	--	*54.3*	*F*	--	--
	SB Left/Thru/Right		*48.4*	*E*	2.1	87	*133.8*	*F*	3	83
	SB Approach		*48.4*	*E*	--	--	*133.8*	*F*	--	--
11: NC-51 & Downs Road	EB Left	310	24.9	C	136	162	43.2	D	112	129
	EB Thru		7.3	A	196	117	15.0	B	282	170
	EB Approach		10.4	B	--	--	17.9	B	--	--
	WB U-Turn	210	26.8	C	10	27	41.8	D	14	33
	WB Thru		17.8	B	176	180	27.3	C	342	259
	WB Right	335	0.4	A	0	190	0.1	A	0	0
	WB Approach		11.4	B	--	--	24.2	C	--	--
	SB Left	275	26.4	C	99	139	34.6	C	360	316
	SB Right		8.5	A	29	73	12.5	B	129	214
	SB Approach		20.7	C	--	--	27.1	C	--	--
	Overall		11.7	B	--	--	22.7	C	--	--
12: Polk Street & NC-51	EB Left	310	*88.2*	*F*	#242	382	*77.7*	*E*	#200	410
	EB Thru/Right		*77.8*	*E*	#533	576	*112.7*	*F*	#731	1194
	EB Approach		*79.3*	*E*	--	--	*109.2*	*F*	--	--
	WB Left	275	*77.4*	*E*	#133	152	*121.3*	*F*	#219	206
	WB Thru		*57.1*	*E*	#381	345	44.0	D	347	349
	WB Right	625	35.3	D	263	248	14.1	B	134	165
	WB Approach		52.9	D	--	--	46.4	D	--	--
	NB Dual Lefts	450	*58.8*	*E*	143	550	*71.0*	*E*	#139	550
	NB Thru/Right		*78.2*	*E*	#905	985	*154.0*	*F*	#608	1017
	NB Approach		*73.4*	*E*	--	--	*126.6*	*F*	--	--
	SB Left		*99.6*	*F*	#191	173	*143.3*	*F*	#674	1085
	SB Thru		33.4	C	334	309	51.6	D	#617	1032
	SB Right	175	15.3	B	69	198	17.8	B	133	275
	SB Approach		42.7	D	--	--	*82.3*	*F*	--	--
	Overall		*64.6*	*E*	--	--	*88.4*	*F*	--	--
13: Downs Road & Westinghouse Boulevard	EB Left	400	7.9	A	m40	108	5.8	A	m8	41
	EB Thru/Right		9.5	A	204	270	10.9	B	164	291
	EB Approach		9.4	A	--	--	10.8	B	--	--
	WB Left	205	19.2	B	#61	102	*62.0*	*E*	#146	194
	WB Thru/Right		9.1	A	109	125	9.6	A	151	181
	WB Approach		10.1	B	--	--	16.3	B	--	--
	NB Left	245	21.4	C	100	184	*74.2*	*E*	#176	261
	NB Thru/Right		30.0	C	#213	294	20.5	C	104	211
	NB Approach		27.3	C	--	--	47.6	D	--	--
	SB Left	225	19.6	B	34	66	21.0	C	71	111
	SB Thru/Right		15.9	B	48	94	27.4	C	#186	232
	SB Approach		17.1	B	--	--	25.8	C	--	--
	Overall		13.7	B	--	--	19.2	B	--	--

Table 5-1b: Intersection Level of Service and Delay Summary for North Carolina Study Area Intersections – 2025 Build Traffic Volumes (Continued)

14: Nations Ford Road & Westinghouse Boulevard	EB Left	400	54.8	D	#469	398	48.5	D	207	227
	EB Thru/Right		24.9	C	506	383	19.8	B	434	322
	EB Approach		33.0	C	--	--	23.6	C	--	--
	WB Left	750	***67.3***	***E***	129	143	***60.4***	***E***	m135	158
	WB Thru/Right		35.1	D	274	325	23.0	C	m375	434
	WB Approach		38.9	D	--	--	26.4	C	--	--
	NB Left	190	42.1	D	158	289	***78.2***	***E***	191	225
	NB Thru/Right		***61.0***	***E***	386	430	49.1	D	186	228
	NB Approach		***55.6***	***E***	--	--	***62.9***	***E***	--	--
	SB Left	200	37.3	D	26	47	42.6	D	58	81
	SB Thru		34.7	C	86	102	45.4	D	155	196
	SB Right	275	10.1	B	62	100	28.7	C	276	262
	SB Approach		20.1	C	--	--	34.4	C	--	--
	Overall		37.1	D	--	--	30.1	C	--	--
15: Andrew L Tucker Road/Nations Ford Road & Site Driveway 3	WB Left/Right		13.3	B	0.4	497	11.0	B	0.2	55
	WB Approach		13.3	B	--	--	11.0	B	--	--
	NB Thru/Right		0.0	A	0	0	0.0	A	0	0
	NB Approach		0.0	A	--	--	0.0	A	--	--
	SB Left/Thru		0.5	A	0	1370	1.0	A	0.1	81
	SB Approach		0.5	A	--	--	1.0	A	--	--

[1] *Overall intersection LOS and delay reported for signalized intersections and roundabouts only.*

\+ Delay greater than 9999.99 seconds cannot be calculated by SYNCHRO

* - 95th percentile queues for unsignalized intersections reported in number of vehicles.

SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

Table 5-2: Intersection Level of Service and Delay Summary – 2025 Build + Improvements Traffic Volumes

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Delay [1] (sec/veh)	LOS [1]	*95th Percentile Queue Length	Sim Traffic Max Queue Length (ft)	Delay [1] (sec/veh)	LOS [1]	*95th Percentile Queue Length	Sim Traffic Max Queue Length (ft)
9: Miller Road/Site Driveway 2 & NC-51	EB Left	100	9.2	A	0.1	24	10.6	B	0.2	49
	EB Thru		0.0	A	0	0	0.0	A	0	0
	EB Right	370	0.0	A	0	2	0.0	A	0	15
	EB Approach		0.1	A	--	--	0.6	A	--	--
	WB Left	335	10.8	B	0.1	41	10.0	B	0.2	65
	WB Thru/Right		0.0	A	0	4	0.0	A	0	7
	WB Approach		0.4	A	--	--	0.4	A	--	--
	NB Left/Thru		*234.9*	*F*	6.1	144	*181.7*	*F*	4.1	105
	NB Right	185	12.6	B	0.2	44	11.7	B	0.3	65
	NB Approach		*168.4*	*F*	--	--	*97.5*	*F*	--	--
	SB Left/Thru/Right		28.2	D	1.3	74	*45.6*	*E*	1.4	86
	SB Approach		28.2	D	--	--	*45.6*	*E*	--	--
10: Marfield Lane/Site Driveway 1 & NC-51	EB Left	100	9.0	A	0	24	10.6	B	0.2	42
	EB Thru		0.0	A	0	2	0.0	A	0	0
	EB Right	310	0.0	A	0	2	0.0	A	0	4
	EB Approach		0.1	A	--	--	0.4	A	--	--
	WB Left	520	10.8	B	0.2	41	10.3	B	0.4	78
	WB Thru/Right		0.0	A	0	0	0.0	A	0	6
	WB Approach		0.5	A	--	--	0.9	A	--	--
	NB Left/Thru		*102.1*	*F*	2.6	74	*135.6*	*F*	2.1	61
	NB Right		13.1	B	0.4	60	11.8	B	0.3	52
	NB Approach		*51.9*	*F*	--	--	*51.5*	*F*	--	--
	SB Left/Thru/Right		*47.9*	*E*	2.1	82	*123.6*	*F*	2.9	69
	SB Approach		*47.9*	*E*	--	--	*123.6*	*F*	--	--
15: Andrew L Tucker Road/Nations Ford Road & Site Driveway 3	WB Left/Right		13.3	B	0.4	529	10.9	B	0.2	60
	WB Approach		13.3	B	--	--	10.9	B	--	--
	NB Thru/Right		0.0	A	0	0	0.0	A	0	0
	NB Approach		0.0	A	--	--	0.0	A	--	--
	SB Left	100	8.5	A	0	185	7.8	A	0.1	65
	SB Thru		0.0	A	0	1469	0.0	A	0	34
	SB Approach		0.5	A	--	--	1.0	A	--	--

[1] *Overall intersection LOS and delay reported for signalized intersections and roundabouts only.*

\+ Delay greater than 9999.99 seconds cannot be calculated by SYNCHRO

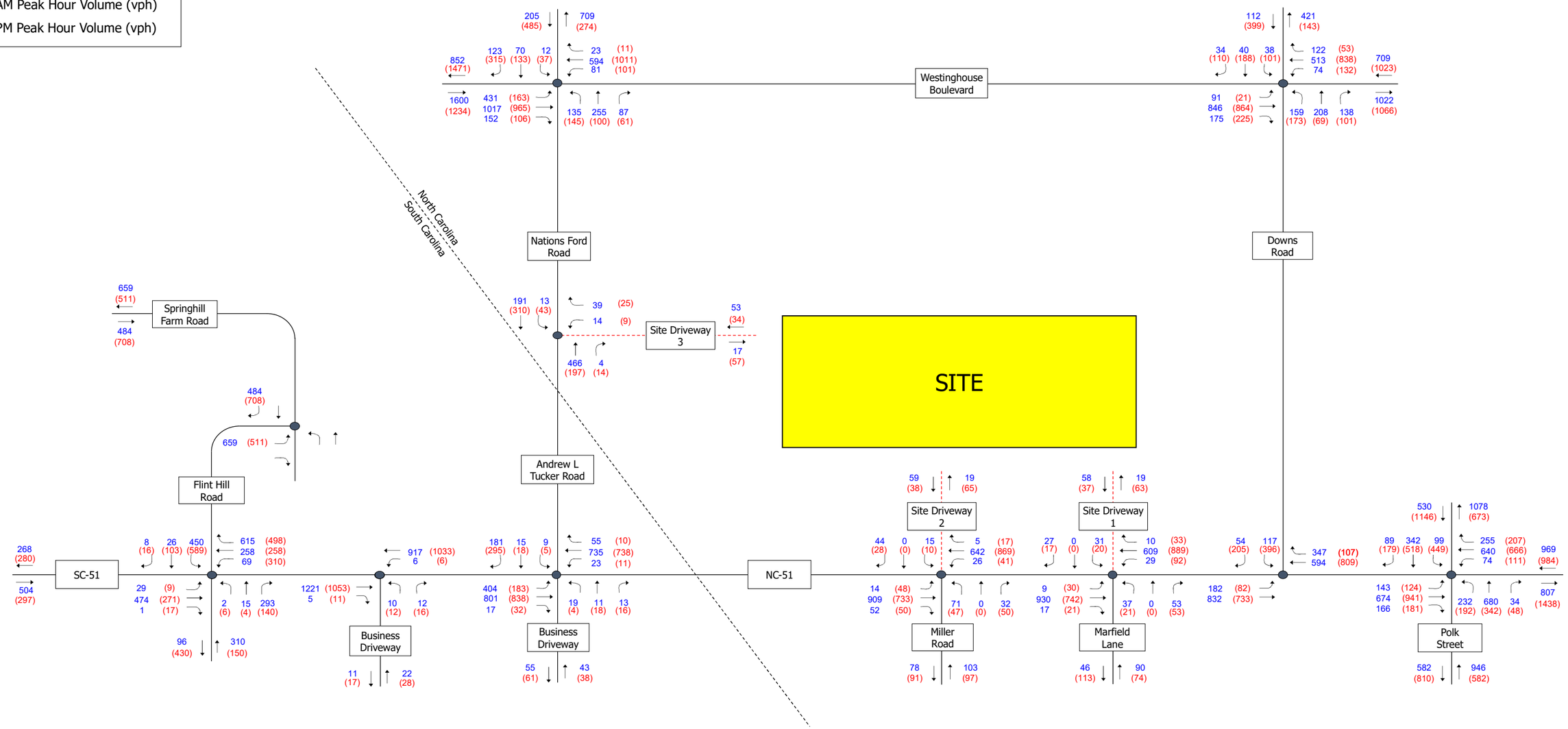
* - 95th percentile queues for unsignalized intersections reported in number of vehicles.

SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

LEGEND:

- Existing Road
- Proposed Road
- XX AM Peak Hour Volume (vph)
- (XX) PM Peak Hour Volume (vph)

NOT TO SCALE



TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Miller Farm Traffic Impact Analysis

2025 Build Traffic Volumes

Figure 5-1

6 CONCLUSIONS AND RECOMMENDATIONS

Capacity analyses were performed for the following scenarios:

- 2021 Existing traffic volumes;
- 2025 Background traffic volumes (ambient growth + approved surrounding developments); and
- 2025 Build traffic volumes (Background + site trips).

In closing, the following improvements (see **Figure 6-1**) are recommended in conjunction with the construction of the proposed development:

South Carolina Study Area Intersections:

- SC-51 / Andrew L Tucker Road / Business Driveway
  - Fee-in-lieu (proportionate to the development's impact) for intersection signalization

North Carolina Study Area Intersections:

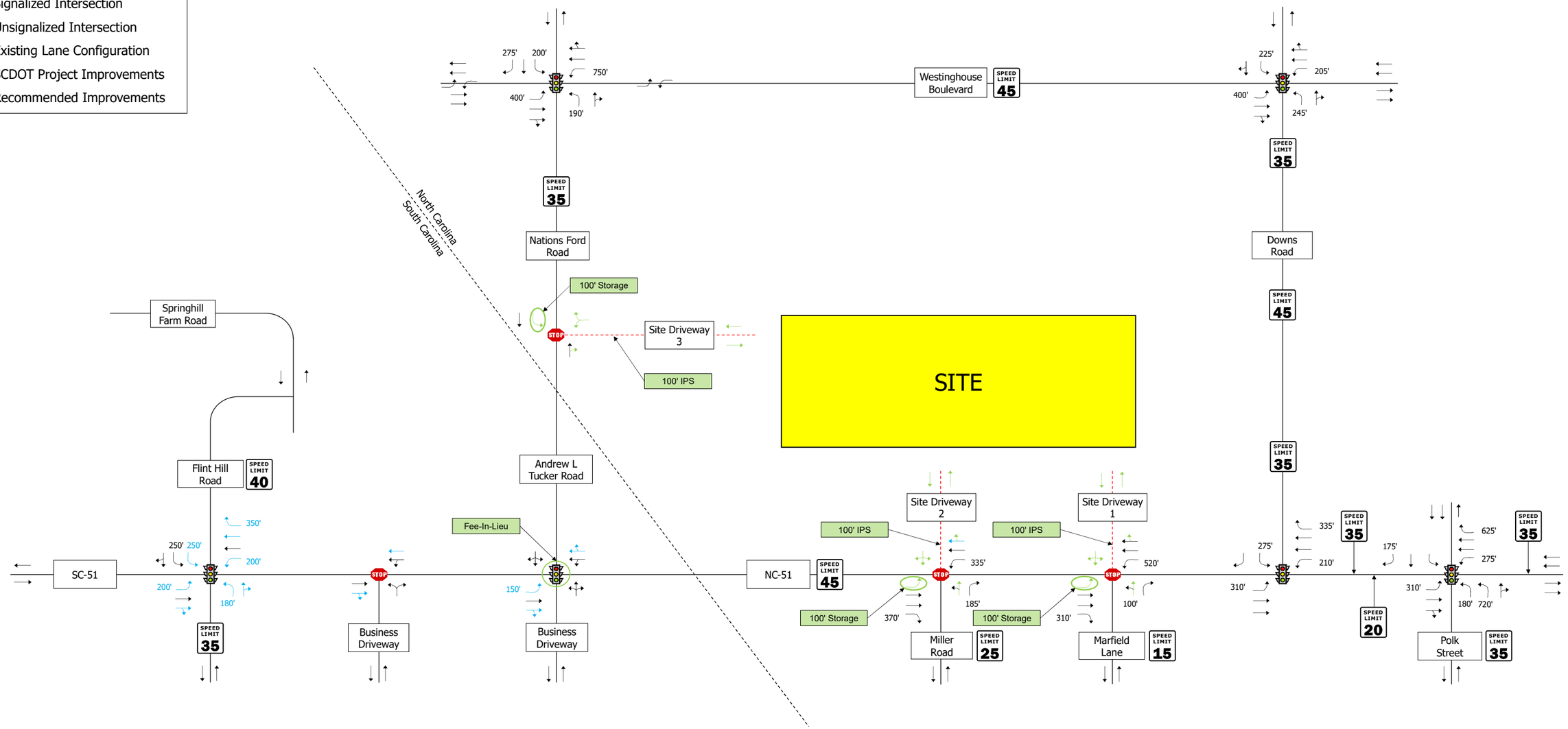
- NC-51 / Miller Road / Site Driveway 2
  - Construction of a 100-foot eastbound left-turn lane (with appropriate taper)
  - 100-Foot internally protected storage (IPS)
- NC-51 / Marfield Lane / Site Driveway 1
  - Construction of a 100-foot eastbound left-turn lane (with appropriate taper)
  - 100-Foot IPS
- Nations Ford Road / Site Driveway 3
  - Construction of a 100-foot southbound left-turn lane (with appropriate taper)
  - 100-Foot IPS

LEGEND:

- Existing Road
- Proposed Road
- Signalized Intersection
- Unsignalized Intersection
- Existing Lane Configuration
- SCDOT Project Improvements
- Recommended Improvements

N

NOT TO SCALE



TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Miller Farm Traffic Impact Analysis

2025 Proposed Lane Configuration

Figure 6-1