LINCOLN COUNTY PLANNING & INSPECTIONS DEPARTMENT
115 W. MAIN ST., LINCOLNTON, NORTH CAROLINA 28092
704-736-8440 OFFICE 704-736-8434 INSPECTION REQUEST LINE

To: Board of Commissioners
Planning Board

From: Randy Hawkins, Zoning Administrator

Date: June 19, 2020

Re: CUP #424
David Clark Jr., Caroline Clark, Allison Clark and Walter Clark, applicants
Parcel ID# 87374

The following information is for use by the Lincoln County Board of Commissioners and Planning Board at their joint meeting/public hearing on August 3, 2020.

REQUEST

The applicant is requesting a conditional use permit to allow the operation of a charter school for grades K-8 in the B-G (General Business) district. A site plan and a traffic impact analysis have been submitted as part of the application. Under the Unified Development Ordinance, a school is a conditional use in the B-G district.

SITE AREA AND DESCRIPTION

The proposed 5.25-acre site is located at the end of Forney Creek Parkway on the east side of N.C. 16 bypass about 4,600 feet north of Optimist Club Road. It is adjoined by property zoned B-G, I-G (General Industrial) and R-T (Transitional Residential). It is part of Forney Creek Park subdivision, which includes a YMCA and an outpatient surgical center. County water and sewer are available at this location. The subject property is part of an area designated by the Lincoln County Land Use Plan as a Suburban Office Center, suitable for concentrating employment and providing services.

County Of Lincoln, North Carolina

Planning Board

Application No. **CUP #424**

Applicant **David Clark Jr. et al**

Property Location **Forney Creek Parkway**

Zoning District **B-G**

Parcel ID# **87374**

Proposed Use **charter school for grades K-8**

FINDINGS OF FACT

1. The use will not materially endanger the public health or safety if located where proposed and developed according to plan. YES_____ NO_____

   FACTUAL REASONS CITED: _____
   _____
   _____

2. The use meets all required conditions and specifications. YES _____ NO _____

   FACTUAL REASONS CITED: _____
   _____
   _____

3. The use will not substantially injure the value of adjoining or abutting property unless the use is a public necessity. YES _____ NO _____

   FACTUAL REASONS CITED: _____
   _____
   _____

4. The location and character of use, if developed according to the plan as submitted and approved, will be in harmony with the area in which it is to be located and will be in general conformity with the Land Use Plan for the area in question. YES _____ NO _____

   FACTUAL REASONS CITED: _____
   _____
   _____

After having held a Public Hearing on _____ and in light of the Findings of Facts listed herein, the following action was taken by the Lincoln County Planning Board:

_____
_____

In recommending such Conditional Use, the following conditions were recommended by the Lincoln County Planning Board:

_____
_____

Conditional Use Permit Application

Lincoln County Planning and Inspections Department
Zoning Administrator
115 W. Main St., Lincolnton, NC 28092
Phone: (704) 736-8440 Fax: (704) 732-9010

PART I

Applicant Name DAVID CLARK, JR.; CAROLINE L. CLARK; ALLISON T. CLARK; WALTER CLARK

Applicant Address P.O. BOX 9; LINCOLNTON, N.C. 28093

Applicant Phone Number (980) 721-1519 DAVID'S CELL

Property Owner Name SAME AS APPLICANT

Property Owner Address SAME AS APPLICANT

Property Owner Phone Number SAME AS APPLICANT

PART II

Property Location FORNEY CREEK PARK

Property ID (10 digits) 4603096872 Property size +/- 5.26 ACRES

Parcel # (5 digits) 87374 Deed Book(s) 1871 Page(s) 052

PART III

Existing Zoning District B-G

Briefly describe how the property is being used and any existing structures.

UNDEVELOPED. NO EXISTING STRUCTURES

Briefly explain the proposed use and/or structure which would require a Conditional Use Permit.

CONSTRUCTION OF NEW CHARTER SCHOOL

APPLICATION FEE (less than 2 acres $250, 2+ acres $500)
MUST BE RECEIVED BEFORE PROCESSING.

I hereby certify that all knowledge of the information provided for this application and attachments is true and correct to the best of my knowledge.

Applicant's Signature Date 5/4/20

APPLICANTS' PROPOSED FINDINGS OF FACT FOR A CONDITIONAL USE PERMIT

Application No. **CUP #424**

Applicant **David Clark Jr. et al**

Property Location **Forney Creek Parkway**

Zoning District **B-G**

Parcel ID# **87374**

Proposed Use **charter school for grades K-8**

PROPOSED FINDINGS

1. The use will not materially endanger the public health or safety if located where proposed and developed according to plan.

The proposed development will meet all applicable sedimentation control and stormwater guidelines and environmental regulations. The school will be built in compliance with the State Building Code and the proposed use will not materially endanger the public health and safety.

2. The use meets all required conditions and specifications.

A school is a conditional use in the B-G district. The proposed site plan meets all setback, landscaping and parking requirements of the Unified Development Ordinance.

3. The use will not substantially injure the value of adjoining or abutting property unless the use is a public necessity.

This property is located at the end of a one mile long road that serves an outpatient surgical center and a YMCA. It is adjoined by a four-lane, limited-access highway and by undeveloped land owned by the applicant's family, the Catawba Lands Conservancy and the N.C. Department of Transportation. The proposed use will not substantially injure the value of the adjoining properties or other properties in the immediate vicinity.

4. The location and character of use, if developed according to the plan as submitted and approved, will be in harmony with the area in which it is to be located and will be in general conformity with the Land Use Plan for the area in question.

Other nonresidential uses are located in this area. This property is part of an area designated by the Land Use Plan as a Suburban Office Center, suitable for concentrating employment and providing services. The proposed use will provide beneficial and valuable services to surrounding residences, businesses and industries. The proposed use will conform with the Land Use Plan and will be in harmony with area in which it is to be located

Lincoln County, NC

Office of the Tax Administrator, GIS Mapping Division

Lincoln County and its mapping contractors assume no legal responsibility for the information contained on this map. This map is not to be used for land conveyance. The map is based on NC State Plane Coordinate System 1983 NAD.
Date: 7/9/2020 Scale: 1 Inch = 200 Feet

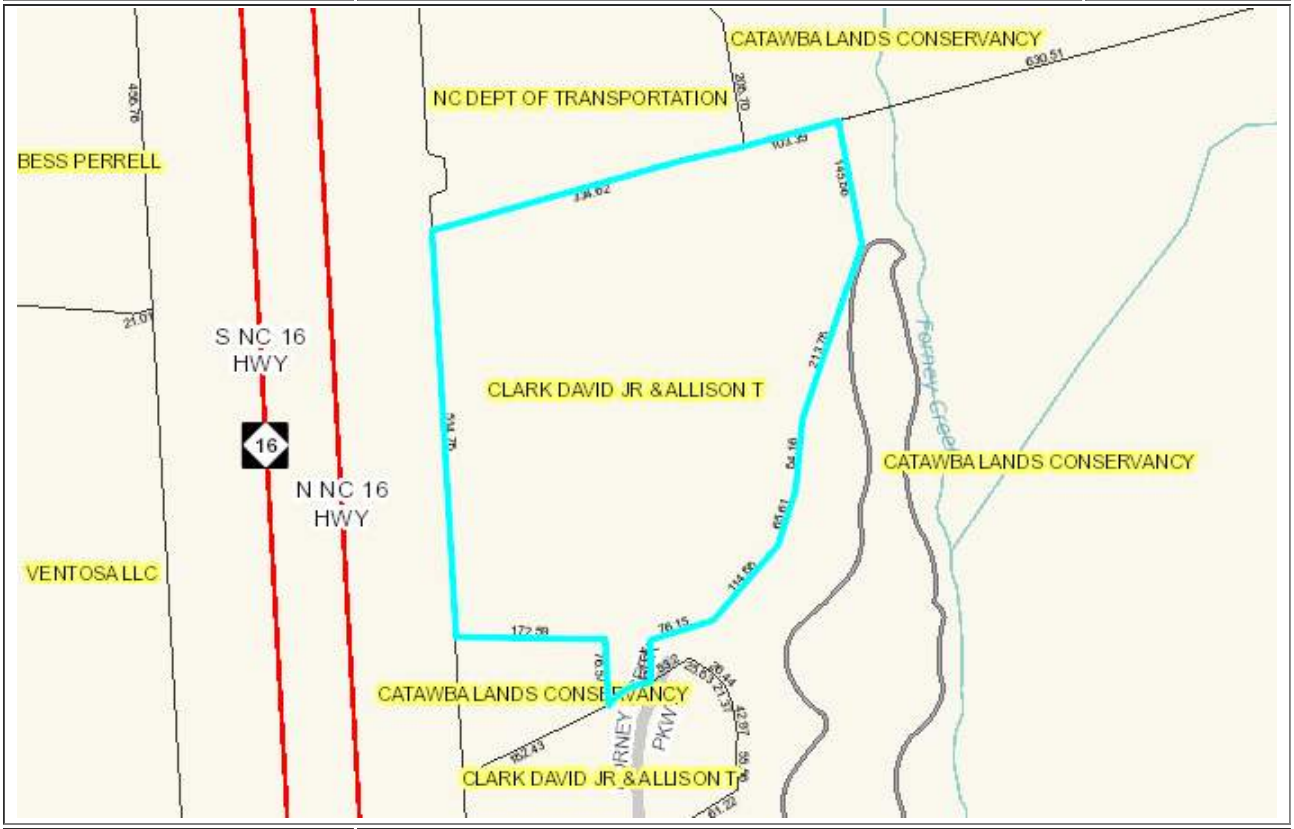


Photo Not Available

Parcel ID	87374	**Owner**	CLARK DAVID JR & ALLISON T CLARK WALTER & MORRISON CAROLI		
Map	4603	**Mailing**	P O BOX 9		
Account	0198526	**Address**	LINCOLNTON, NC 28093		
Deed	1871 52	**Last Transaction Date**	11/09/2006	**Sale Price**	$0
Plat	14 306	**Subdivision**	FORNEY CREEK PARK	**Lot**	D
Land Value	$468,862	**Improvement Value**	$0	**Total Value**	$468,862
Previous Parcel	86933				

-----All values for Tax Year 2020 -----

Description	D FORNEY CREEK PARK			**Deed Acres**	5.251
Address	FORNEY CREEK PKWY			**Tax Acres**	5.257
Township	CATAWBA SPRINGS		**Tax/Fire District**	DENVER	
Main Improvement				**Value**	
Main Sq Feet		**Stories**		**Year Built**	

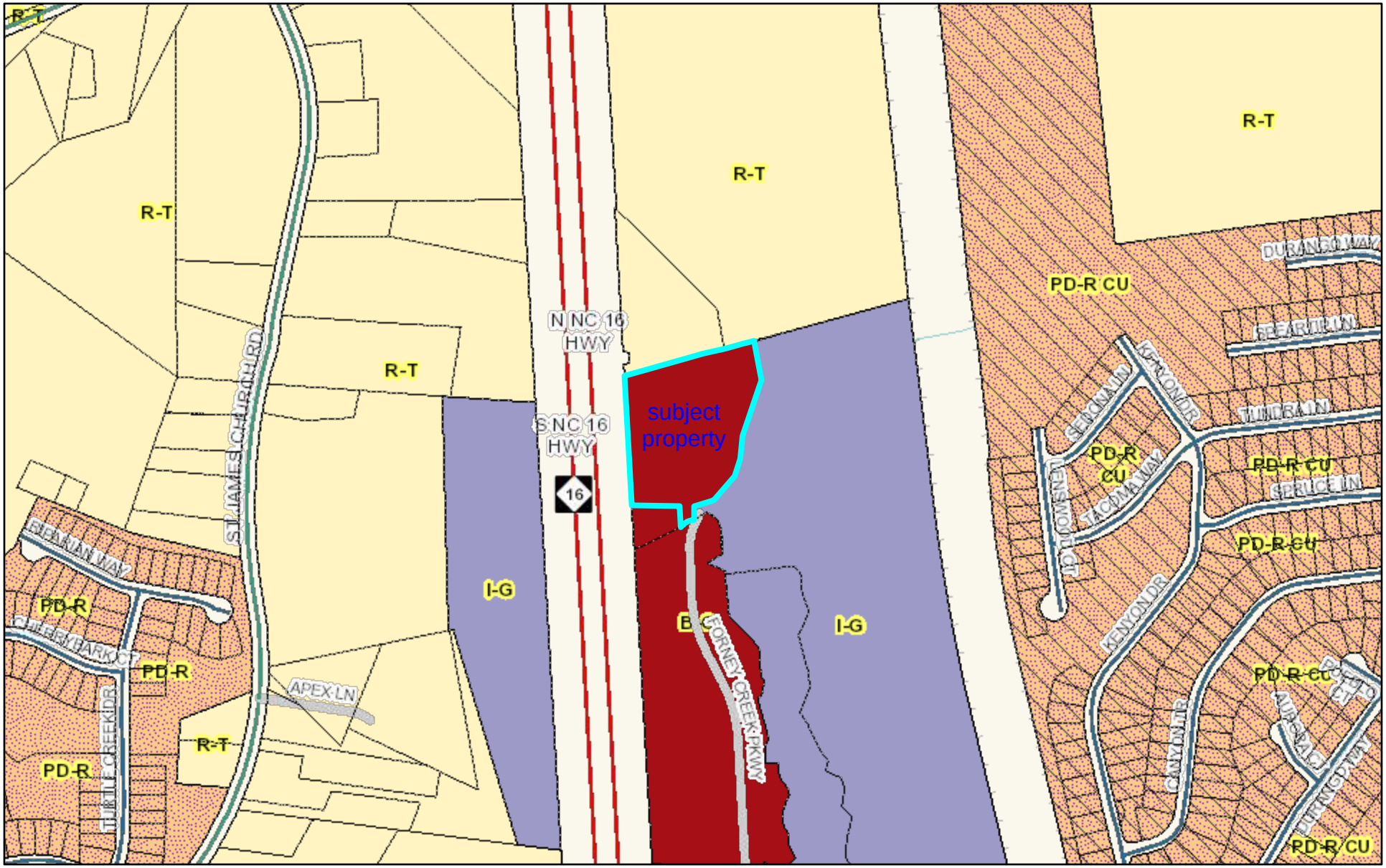
Zoning District	Calc Acres	Voting Precinct	Calc Acres
B-G	5.26	DW28	5.26

Watershed	Sewer District
5.26	5.26

Census County	Tract	Block	
109	071101	2023	5.26

Flood Zone	Description	Panel	
X	NO FLOOD HAZARD	3710460400	0.47
AE	SPECIAL FLOOD HAZARD AREA BASE ELEVATION DETERMINED - 100 YEAR	3710460400	0.09
SHA X		3710460400	0.01
SHA X		3710460300	0.02
AE	SPECIAL FLOOD HAZARD AREA BASE ELEVATION DETERMINED - 100 YEAR	3710460300	0.13
X	NO FLOOD HAZARD	3710460300	4.53

Conditional Use Permit #424



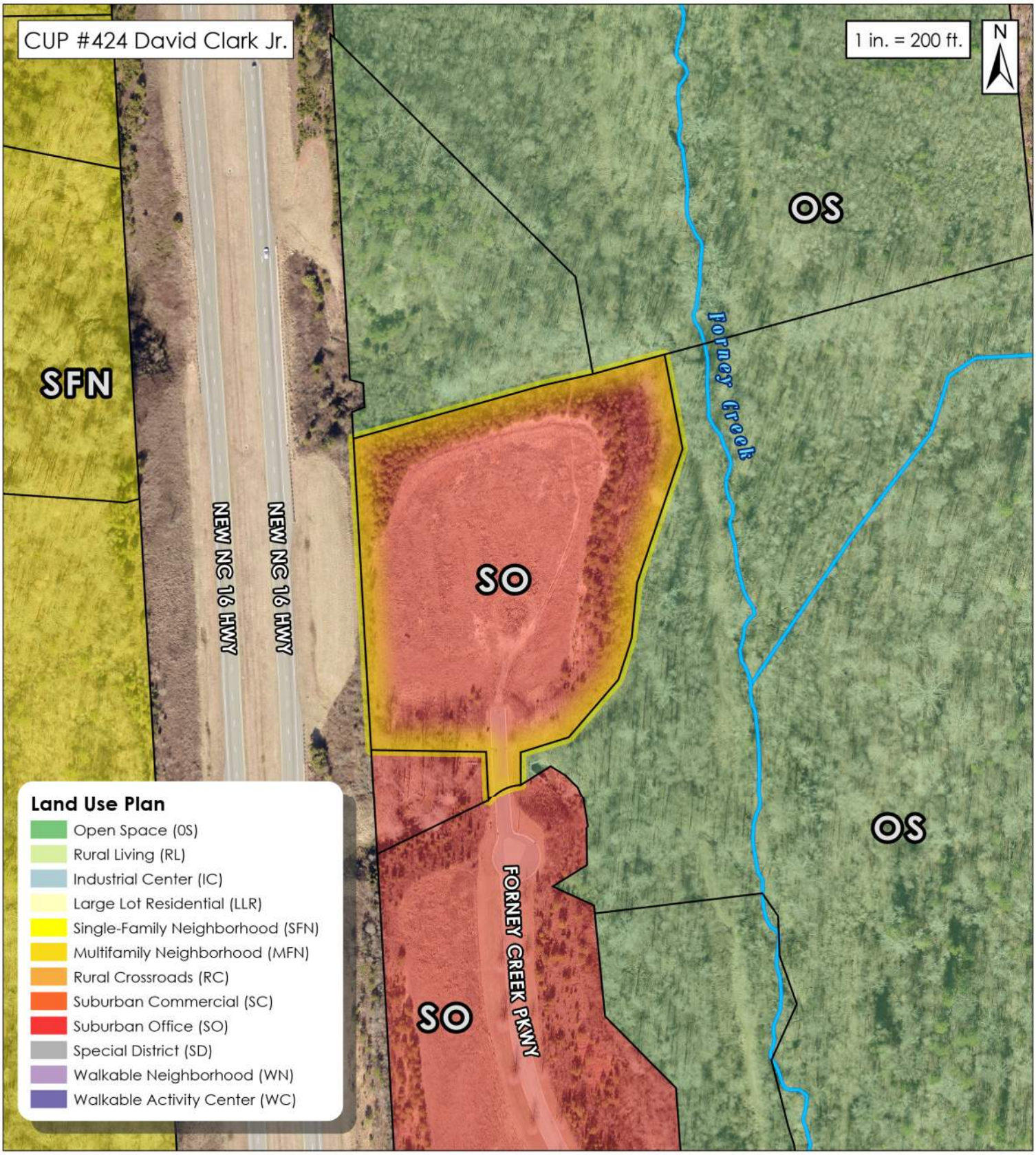
June 8, 2020

1:6,000

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

Esri., Inc., Lincoln County, NC



Lincoln County
Planning & Inspections
115 W. Main St
3rd Floor
Lincolnton, NC 28092

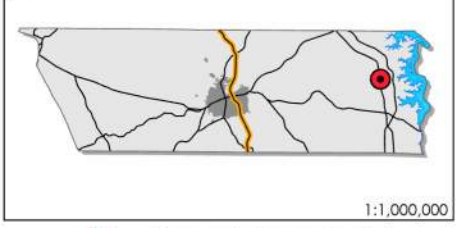
Parcel ID# 84374

- Property Location(s)

See Attached Application for Parcel Information

Property Location(s) Outlined in Yellow.

LOCATION MAP



Property Location(s)

N.C. HWY. 16

10' CLASS 'A' BUFFER

CATAWBA LAND CONSERVANCY DEED 1995-428

PARCEL "C"
PLAT BOOK 14-306
PLATTED ACRES 12.084 AC+-

CANOPY

PICK-UP AREA

FOUNDATION PLANTING AREA

PROP. 1 STORY
SCHOOL BUILDING
±42,200 SF

FFE:

100 PARKING SPACES PROVIDED

PARCEL "D"
PLAT BOOK 14-306
PLATTED ACRES 5.251 AC+-

NC DEPARTMENT OF TRANSPORTATION DEED 1273-09

PROPOSED MONUMENT SIGN

FLAG POLES

FOUNDATION PLANTING AREA

PROPOSED SIDEWALK

PROPOSED 2,000 S.F. TOT LOT

6' HIGH BLACK CHAIN LINK FENCE

BIKE RACK

SOD

ARTIFICIAL GRASS

FORNEY CREEK PARKWAY
(80' PRIVATE R/W)

CATAWBA LAND CONSERVANCY DEED 1995-428

CATAWBA LAND CONSERVANCY DEED 2434-654

0.2% FLOOD LINE

100 YEAR FLOODPLAIN

FLOODWAY

MAXIMUM IMPERVIOUS ALLOWED = 75%
PROPOSED IMPERVIOUS = 73%

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80

No.	REVISIONS	DATE	BY

Kimley»Horn

421 FAYETTEVILLE STREET, SUITE 600, RALEIGH, NC 27601
PHONE: 919-677-2000
WWW.KIMLEY-HORN.COM

KHA PROJECT	012587034
DATE	06/01/2020
SCALE	AS SHOWN
DESIGNED BY	JCB
DRAWN BY	JCB
CHECKED BY	COB

WEST LAKE PREPARATORY ACADEMY

FORNEY CREEK PARKWAY

CATAWBA SPRINGS TOWNSHIP LINCOLN COUNTY NORTH CAROLINA

PRELIMINARY
NOT FOR CONSTRUCTION

PRELIMINARY SITE PLAN

SHEET NUMBER

PSL-1

Traffic Impact Analysis for
West Lake Preparatory Academy
Lincoln County, North Carolina

Prepared for:

David Clark Jr.
Lincolnton, North Carolina

Prepared by:

Kimley-Horn and Associates, Inc.
NC License #F - 0102
200 South Tryon Street, Suite 200
Charlotte, North Carolina 28202
(704) 333-5131

May 2020
012587034

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1.0 Executive Summary

The purpose of this Traffic Impact Analysis (TIA) is to evaluate the vehicular traffic impacts on the surrounding transportation infrastructure as a result of the proposed West Lake Preparatory Academy. The primary objectives of the study are:

- To estimate trip generation and distribution for the proposed development.
- To perform intersection capacity analyses for the identified study area.
- To determine the potential traffic impacts of the proposed development.
- To identify improvements to mitigate the proposed development's traffic impacts.

The proposed West Lake Preparatory Academy is located at the end of Forney Creek Parkway and north of Optimist Club Road in Lincoln, North Carolina. As currently envisioned, the proposed charter school will ultimately consist of 765 students for grades K-8. The owner of the site desires to stagger the start times for grades K-5 and 6-8 for the school. For the purposes of this TIA, a student population of 510 students was analyzed for grades K-5, because that would be the heaviest loading of students in the hour. The teachers for grades K-8 were included in the K-5.

For the purposes of this TIA the anticipated build-out year for the development is 2021. Based on the current site plan, the proposed site will be accessed via one full-movement access point at the end of Forney Creek Parkway.

A TIA Scoping Document was developed and was reviewed and agreed upon by the North Carolina Department of Transportation (NCDOT) and Lincoln County. The original TIA Scoping Document is included in the **Appendix**.

The following AM and PM peak-hour scenarios were analyzed to determine the proposed development's transportation impacts on the surrounding network:

- 2020 Existing Conditions
- 2021 Background Conditions
- 2021 Build Conditions
- 2026 Design Year Conditions (for U-6134)

The 2021 Background and 2021 Build Conditions include NCDOT project R-5712, which is currently proposed to add turn lanes at the intersection of North Triangle Circle/Unity Church Road and NC 16 Business. The current public hearing map for R-5712 is included in the **Appendix**.

NCDOT also has plans to signalize the U-Turn bulbs for Optimist Club Drive at NC 16, these were included in the 2021 background and build conditions.

2026 Design Year Analyses were complete at Optimist Club Road at NC-16 to account for project U-6134, which proposes to convert the intersection to an interchange. At the time of this study, there has not been a selected alternative for U-6134, therefore a diamond interchange was analyzed.

Based on coordination with Lincoln County and NCDOT, this TIA evaluated operations under the AM and PM peak-hours for the following study area intersections:

1. St James Church Road at Optimist Club Road

2. NC 16 at Optimist Club Road
3. Optimist Club Road at Forney Creek Parkway
4. Optimist Club Road at Woods Lane
5. Triangle Circle at Optimist Club Road
6. Triangle Circle/Unity Church Road at NC 16 Business
7. Triangle Circle at NC 16 Business
8. Forney Creek Parkway at Site Driveway

Kimley-Horn was retained to determine the potential traffic impacts of this development (in accordance with the traffic study guidelines in the *NCDOT Policy on Street and Driveway Access to North Carolina Highways* and the *NCDOT Congestion Management Capacity Analysis Guidelines* to identify transportation improvements that may be required to mitigate these impacts. This report presents trip generation, distribution, capacity analyses, and identified transportation improvements required to mitigate anticipated traffic demands produced by the subject development.

Based on information provided by NCDOT the following improvements were recommendations by others considered in the 2021 Background Conditions and 2021 Build Conditions in this traffic impact analysis.

Optimist Club Road at Triangle Circle

- A northbound left-turn lane with 200' of storage
- An eastbound right-turn lane with 350' of storage

Triangle Circle (South) at Triangle Circle

- An eastbound left-turn lane with 50' of storage.

NCDOT Project R-5712 at NC 16 Business at Triangle Circle/Unity Church Road

- Add turn lanes to the intersection and remove the split phasing

NCDOT also has plans to signalize the U-Turn bulbs for Optimist Club Drive at NC 16, these were included in the 2021 background and build conditions.

Based on information provided by NCDOT the following improvements were recommendations by others considered in the 2026 Build Conditions in this traffic impact analysis.

NCDOT Project U-6134 at NC 16 and Optimist Club Road

- Convert the intersection of Optimist Club Road at NC -16 to an interchange. This project would remove the existing U-Turn bulbs along NC-16 for Optimist Club Road. At the time of this study, there has not been a selected alternative for U-6134, therefore a diamond interchange was analyzed. U-6134 is slated for construction in 2026.

Based on the capacity analyses performed at each of the identified study intersections, along with review of the auxiliary turn-lane warrants contained herein, the following improvements have been identified to mitigate the impact of the proposed development on the adjacent street network for 2021 Build Conditions:

St James Church Road at Optimist Club Road

- Construction of a westbound right-turn lane with 100 feet of storage

Optimist Club Road at Forney Creek Parkway

- Prior to the implementation of TIP project U-6134, signalize the intersection and provide for appropriate intersection phasing. It is recommended the eastbound left-turn movement operate with permitted-protected flashing yellow arrow phasing. The southbound right-turn is recommended to operate with permitted-overlap phasing.
- As a part of the implementation of TIP project U-6134, consider implementing an interchange configuration that incorporates the Forney Creek Parkway intersection.

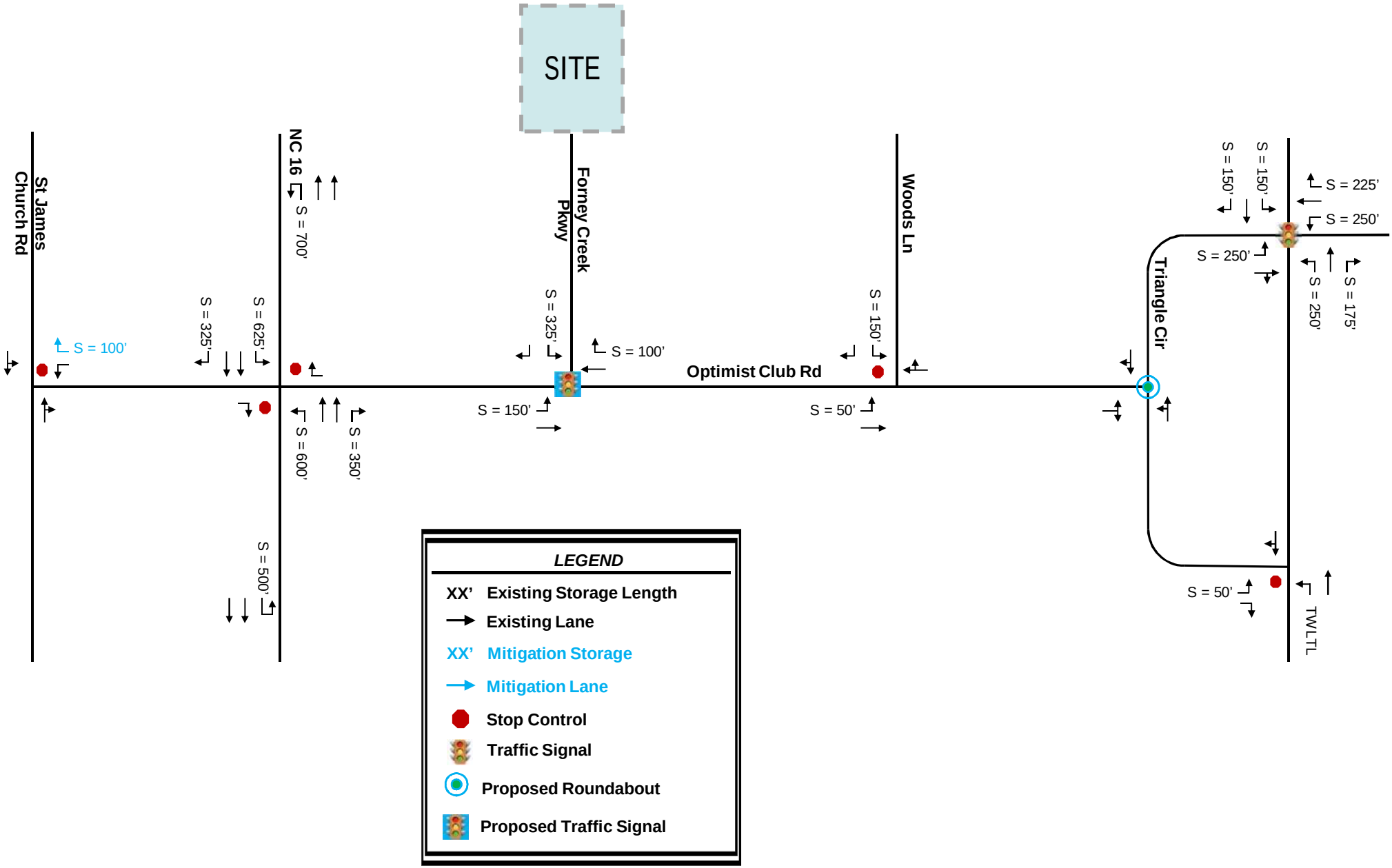
Triangle Circle at Optimist Club Road

- Construction of a single lane roundabout with one entry and one exit per approach.
  - ***This improvement would replace the need for a northbound left-turn lane and eastbound right-right turn lane as shown as an improvement by others in the Rivercross Charter TIA conducted by WSP in 2017.*
  - If right-of-way is not available for a roundabout, consideration for a traffic signal is recommended

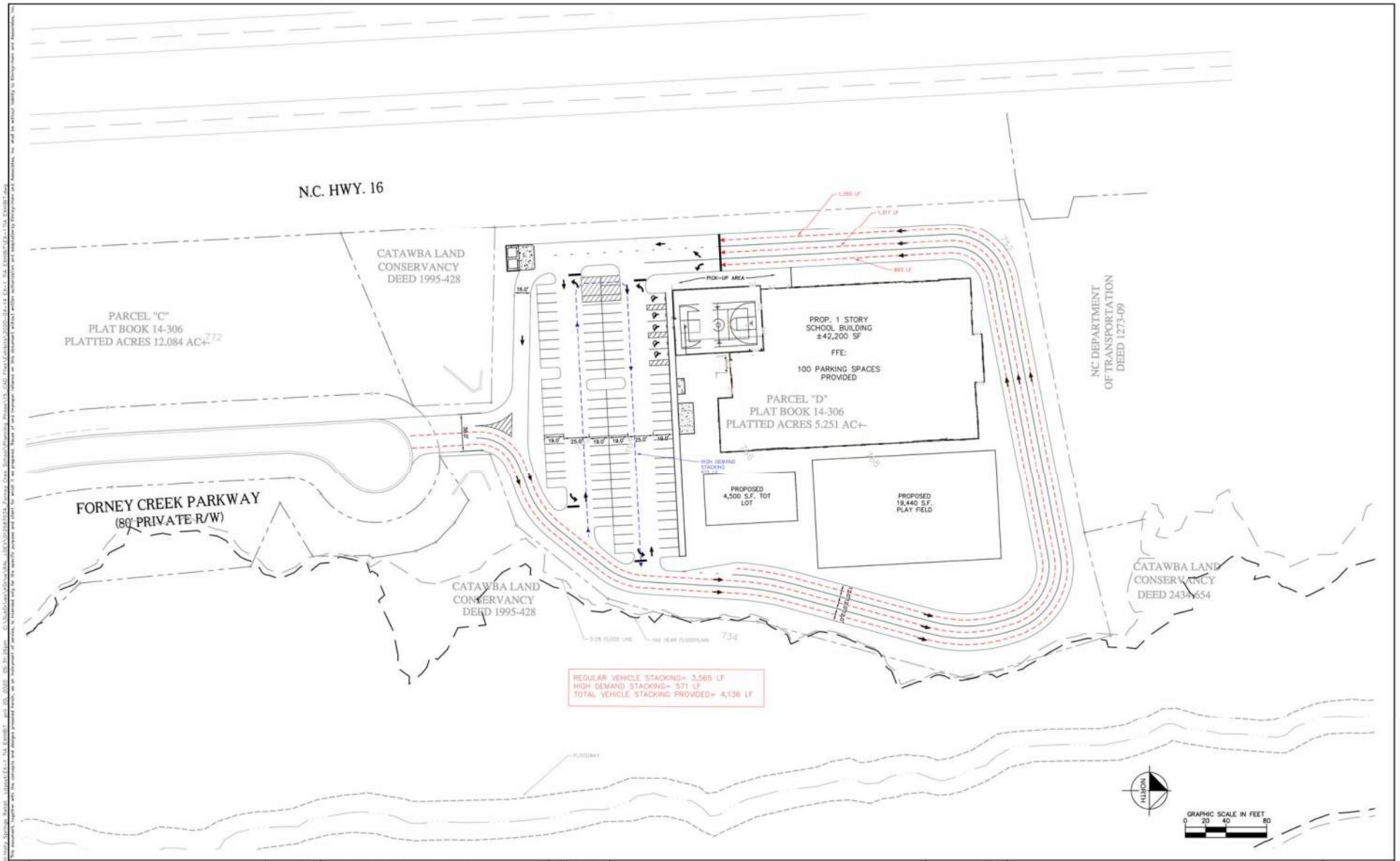
The mitigation improvements identified within the study area are shown in **Figure 1.1**. The improvements shown on this figure are subject to approval by NCDOT and Lincoln County. All additions and attachments to the State and County roadway system shall be properly permitted, designed and constructed in conformance to standards maintained by the agencies.

Per NCDOT MSTA guidelines the total onsite queuing should accommodate 4,241 feet for the high demand volume for grades K-8 for 765 students. Please note the high demand is for 765 students (full enrollment) and not 510 students (staggered start) in the situation that there is an event for the entire school.

The site operational plan, which shows the desired school drop-off, pick-up, high demand queues, total onsite queuing, operation restrictions, and proposed improvements for the offsite roadways is shown in Figure 1.2.



Kimley»Horn	West Lake Preparatory Academy Traffic Impact Analysis	Identified Mitigation Improvements	Figure 1.1


N.C. HWY. 16
CATAWBA LAND CONSERVANCY DEED 1995-428
PARCEL "C"
PLAT BOOK 14-306
PLATTED ACRES 12.084 AC+-
PICK-UP AREA
PROP. 1 STORY SCHOOL BUILDING ±42,200 SF
FFE:
100 PARKING SPACES PROVIDED
PARCEL "D"
PLAT BOOK 14-306
PLATTED ACRES 5.251 AC+-
NC DEPARTMENT OF TRANSPORTATION DEED 1273-09
PROPOSED 4,500 S.F. TOT LOT
PROPOSED 19,440 S.F. PLAY FIELD
FORNEY CREEK PARKWAY
(80' PRIVATE R/W)
CATAWBA LAND CONSERVANCY DEED 1995-428
CATAWBA LAND CONSERVANCY DEED 2434-654
REGULAR VEHICLE STACKING= 3,565 LF
HIGH DEMAND STACKING= 571 LF
TOTAL VEHICLE STACKING PROVIDED= 4,136 LF
NORTH
GRAPHIC SCALE IN FEET
0 20 40 80
Kimley»Horn
© 2020 KIMLEY-HORN AND ASSOCIATES, INC.
421 FAYETTEVILLE STREET, SUITE 600, RALEIGH, NC 27601
PHONE: 919-677-2000
WWW.KIMLEY-HORN.COM
KHA PROJECT 012587034
DATE 04/20/2020
SCALE AS SHOWN
DESIGNED BY JCB
DRAWN BY JCB
CHECKED BY COB
WEST LAKE PREPARATORY ACADEMY
FORNEY CREEK PARKWAY
CATAWBA SPRINGS TOWNSHIP LINCOLN COUNTY NORTH CAROLINA
PRELIMINARY NOT FOR CONSTRUCTION
TIA EXHIBIT
SHEET NUMBER EX-1
No. REVISIONS DATE BY

2.0 Introduction

The proposed West Lake Preparatory Academy is located at the end of Forney Creek Parkway and north of Optimist Club Road in Lincoln, North Carolina. As currently envisioned, the proposed charter school will ultimately consist of 765 students for grades K-8. The owner of the site desires to stagger the start times for grades K-5 and 6-8 for the school. For the purposes of this TIA, a student population of 510 students was analyzed for grades K-5, because that would be the heaviest loading of students in the hour. The teachers for grades K-8 were included in the K-5.

For the purposes of this TIA the anticipated build-out year for the development is 2021. Based on the current site plan, the proposed site will be accessed via one full-movement access point at the end of Forney Creek Parkway.

A TIA Scoping Document was developed and was reviewed and agreed upon by the North Carolina Department of Transportation (NCDOT) and Lincoln County. The original TIA Scoping Document is included in the **Appendix**.

Kimley-Horn was retained to determine the potential traffic impacts of this development (in accordance with the traffic study guidelines in the *NCDOT Policy on Street and Driveway Access to North Carolina Highways* and the *NCDOT Congestion Management Capacity Analysis Guidelines* to identify transportation improvements that may be required to mitigate these impacts. This report presents trip generation, distribution, capacity analyses, and identified transportation improvements required to mitigate anticipated traffic demands produced by the subject development. The specific TIA scope and methodologies are based on the NCDOT TIA Need Screening and NCDOT TIA Scoping Checklist signed on 4/22/2020 by NCDOT Division 12, District 3.

3.0 Existing Traffic Conditions

Existing traffic conditions were coordinated with Lincoln County and NCDOT staff and collected through a desktop review and turning-movement counts to establish the existing conditions baseline analysis.

3.1 STUDY AREA

Based on coordination with the County and NCDOT, the study area for this TIA includes the following existing intersections:

1. St James Church Road at Optimist Club Road
2. NC 16 at Optimist Club Road
3. Optimist Club Road at Forney Creek Parkway*
4. Optimist Club Road at Woods Lane
5. Triangle Circle at Optimist Club Road
6. Triangle Circle/Unity Church Road at NC 16 Business
7. Triangle Circle at NC 16 Business
8. Forney Creek Parkway at Site Driveway

Figure 3.1 shows the site location, **Figure 3.2** shows the study area for the development and **Figure 3.3** shows the site plan, and **Figure 3.4** shows the existing roadway laneage.

The primary roadways in the vicinity of the site are NC 16 and NC 16 Business.

NC 16 is a four-lane, divided principal arterial with a posted speed limit of 60 miles per hour (mph) throughout the study area. Based on 2018 NCDOT annual average daily traffic (AADT) volume maps, NC 16 carries an AADT of 33,000 vehicles per day (vpd) north of Optimist Club Road and 33,000 vpd south of Optimist Club Road. As part of State Transportation Improvement Program (STIP) project U-6134, NC 16 at Optimist Club Road is planned to become a standard diamond interchange.

NC 16 Business is a two-lane, undivided minor arterial throughout the study area. Based on 2017 NCDOT AADT volume maps, NC 16 Business carries and AADT of 18,000 vpd north of Triangle Circle/Unity Church Road and 21,000 vpd south of Triangle Circle. NC 16 Business has a posted speed limit of 45 mph in the study area.

Optimist Club Road, St James Church Road, Forney Creek Parkway, Woods Lane, and TrTriangle Circle are all classified as local roadways.

3.2 EXISTING TRAFFIC VOLUME DEVELOPMENT

AM (7:00-9:00 AM) and PM (4:00-6:00 PM) intersection turning-movement, heavy-vehicle, pedestrian and bicycle counts were collected by Quality Counts, LLC on Thursday, May 16, 2019, at the following intersections:

- St James Church Road at Optimist Club Road
- NC 16 at Optimist Club Road
- Optimist Club Road at Woods Lane
- Triangle Circle at Optimist Club Road
- Triangle Circle/Unity Church Road at NC 16 Business
- Triangle Circle at NC 16 Business

Due to the COVID-19 pandemic, no new traffic counts could be collected. With approval from NCDOT these counts were grown using a growth rate (4%) calculated from historical AADT volumes near the development location. It was also approved to use the PM peak hour (4:00-6:00 PM) as opposed to a typical school peak hour (2:00-4:00 PM) as the PM peak hour was calculated to have 16% more volume than the school peak hour therefore being more conservative.

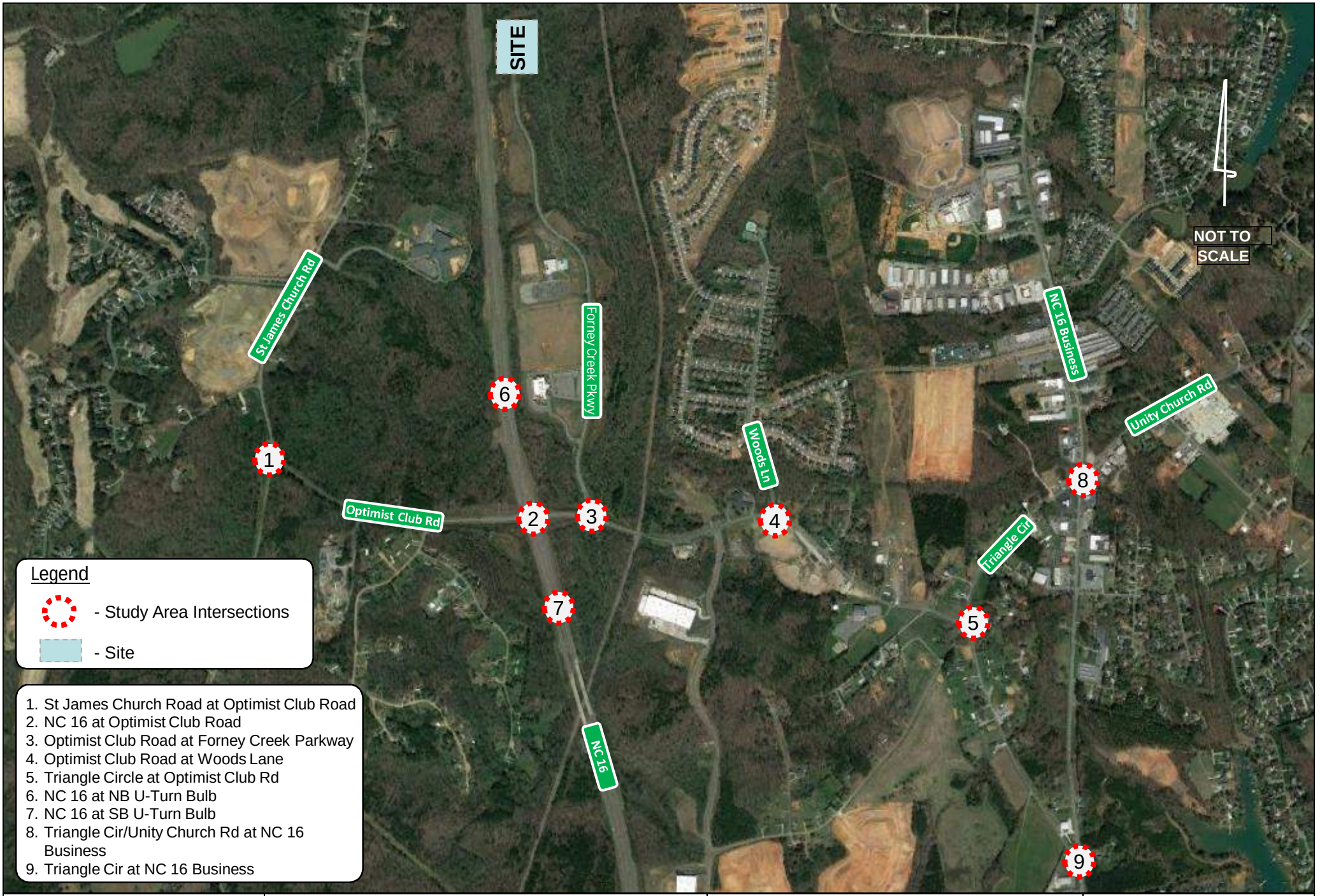
2017 AM (7:00-9:00 AM) and PM (2:00-4:00 PM) intersection turning-movement were used from the *Draft Forney Creek Charter School TIA* (Progressive Design Group, July 2017) at the intersection of Optimist Club Road and Forney Creek Parkway. These counts were grown by 4% per year for three years to equate to 2020 counts. The school dismissal counts were then grown by an additional 16% to equate to PM peak hour counts

Volume balancing was performed along Optimist Club Road from St James Church Road to Triangle Circle to account for the different count dates and count growth methodology.

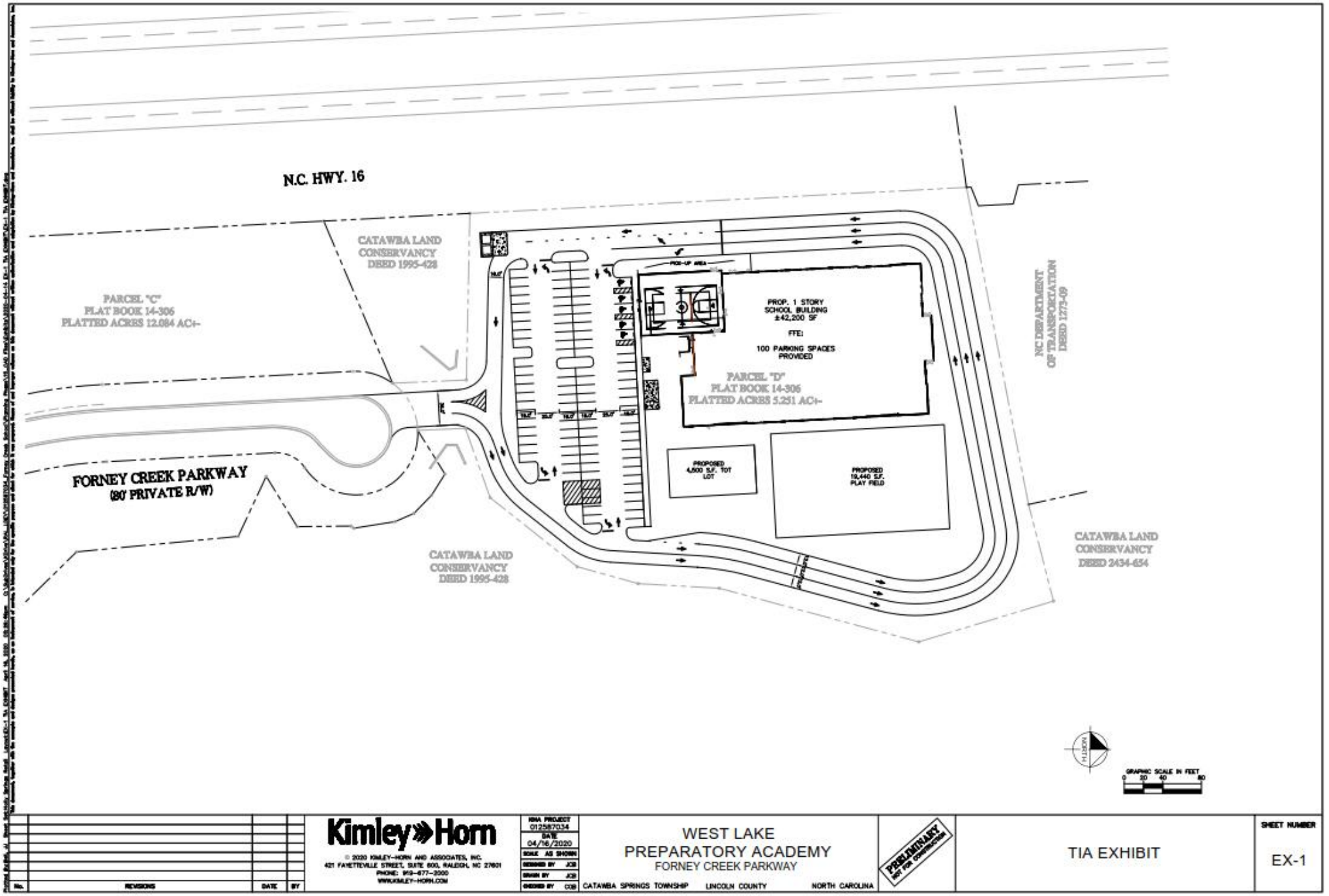
Peak-hour intersection turning-movement count data is provided in the **Appendix**.

Figure 3.5A illustrates the AM and PM peak hour counted volumes and **Figure 3.5B** illustrates the 2020 existing AM and PM peak-hour grown traffic volumes.

Kimley»Horn	**West Lake Preparatory Academy Traffic Impact Analysis**	**Site Location**	**Figure 3.1**



Kimley»Horn	**West Lake Preparatory Academy Traffic Impact Analysis**	**Study Area**	**Figure 3.2**


N.C. HWY. 16
CATAWBA LAND CONSERVANCY DEED 1995-428
PARCEL "C" PLAT BOOK 14-306 PLATTED ACRES 12.084 AC+-
PROP. 1 STORY SCHOOL BUILDING ±42,200 SF
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PARCEL "D" PLAT BOOK 14-306 PLATTED ACRES 5.251 AC+-
PROPOSED 4,500 S.F. TOT LOT
PROPOSED 19,440 S.F. PLAY FIELD
NC DEPARTMENT OF TRANSPORTATION DEED 1273-69
FORNEY CREEK PARKWAY (80' PRIVATE R/W)
CATAWBA LAND CONSERVANCY DEED 1995-428
CATAWBA LAND CONSERVANCY DEED 2434-654
GRAPHIC SCALE IN FEET
0 20 40 80
Kimley»Horn
© 2020 KIMLEY-HORN AND ASSOCIATES, INC.
421 FAYETTEVILLE STREET, SUITE 600, RALEIGH, NC 27601
PHONE: 919-677-2000
WWW.KIMLEY-HORN.COM
KHA PROJECT 012587034
DATE 04/16/2020
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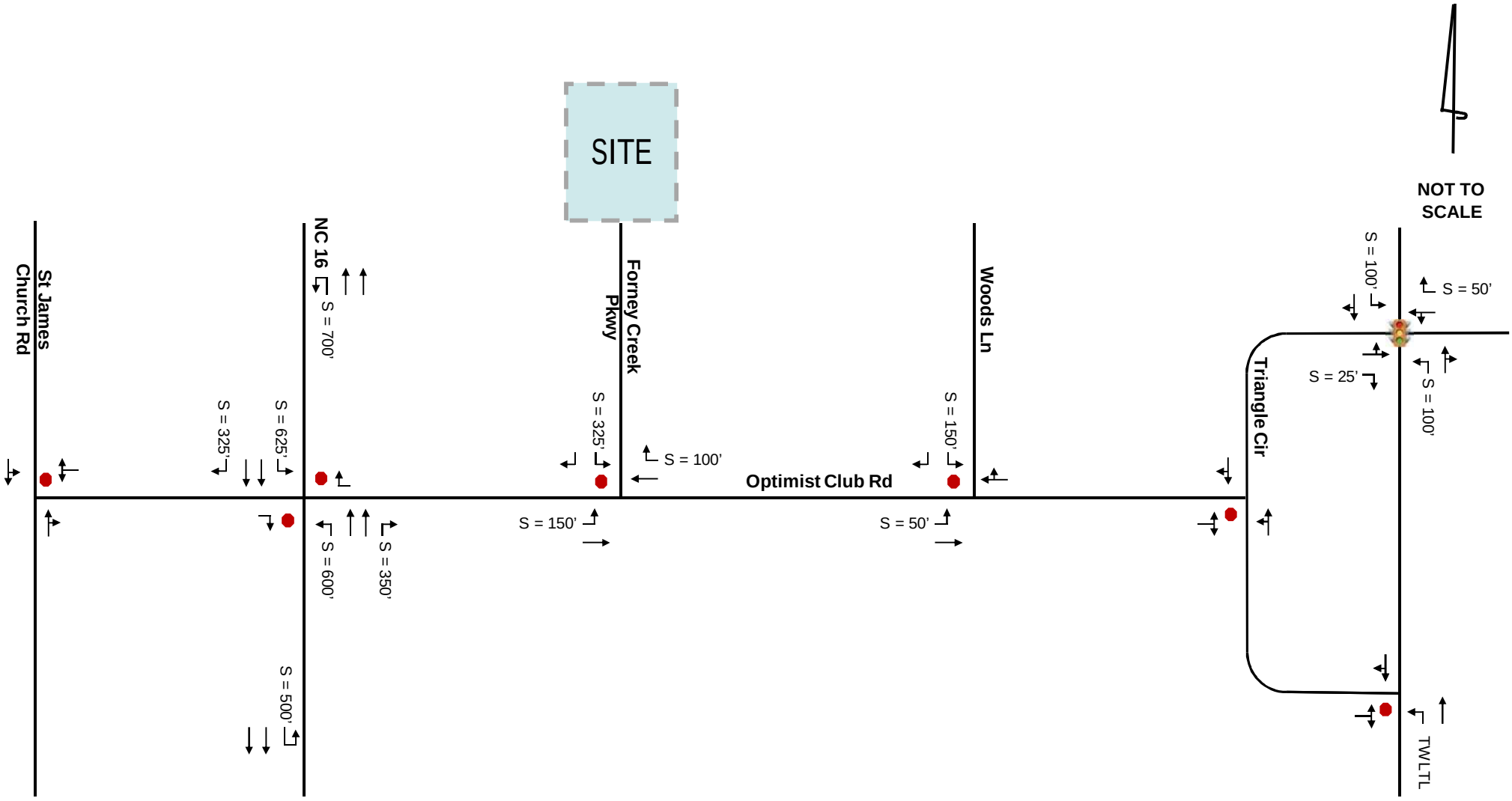
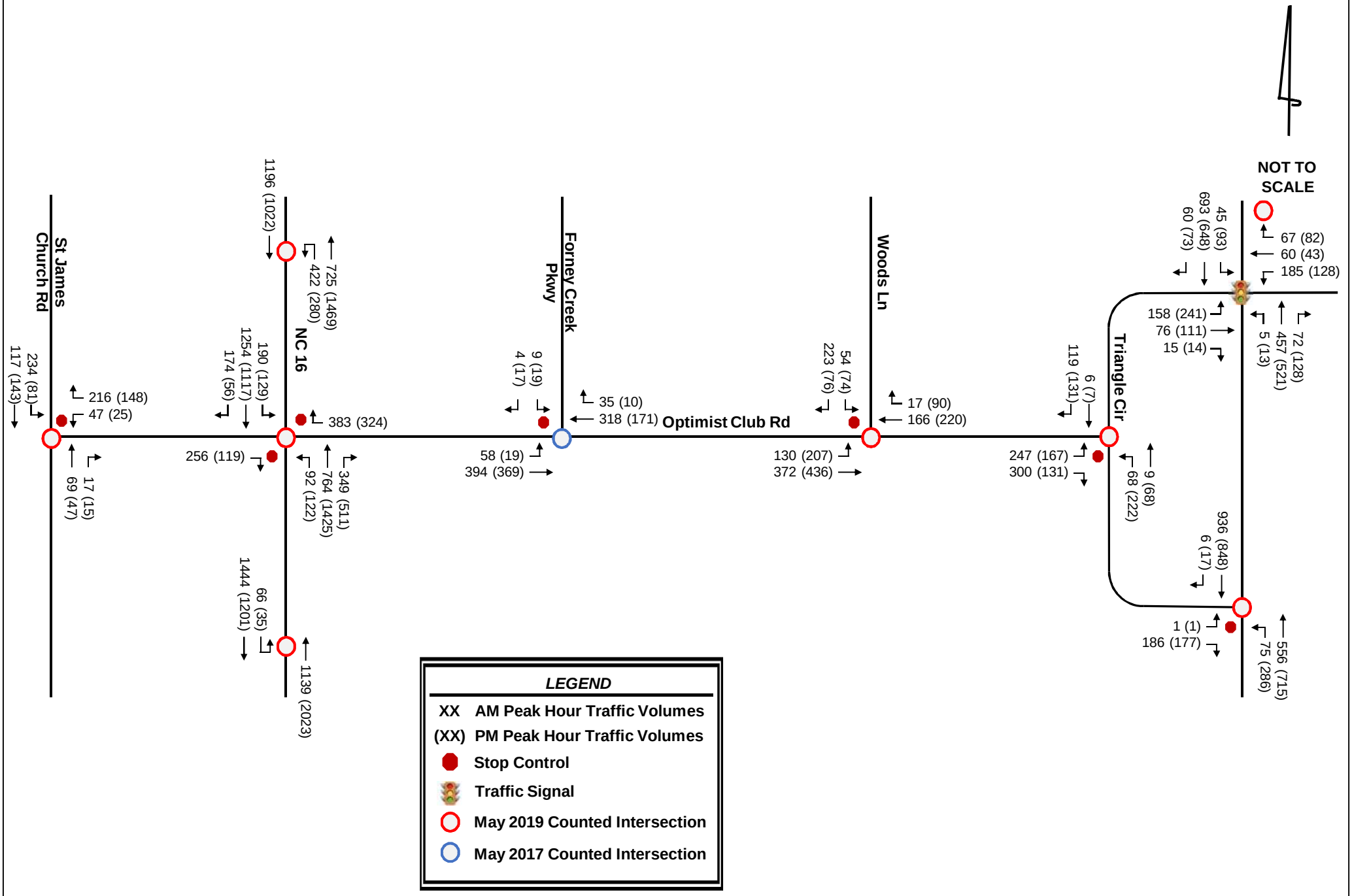
No. REVISIONS DATE BY



Kimley»Horn	West Lake Preparatory Academy Traffic Impact Analysis	Existing Roadway Laneage	Figure 3.4



Kimley»Horn	West Lake Preparatory Academy Traffic Impact Analysis	Counted Peak Hour Traffic Volumes	Figure 3.5A

LEGEND	
XX	AM Peak Hour Traffic Volumes
(XX)	PM Peak Hour Traffic Volumes
	Stop Control
	Traffic Signal

Kimley»Horn	West Lake Preparatory Academy Traffic Impact Analysis	Existing 2020 Peak Hour Traffic Volumes	Figure 3.5B

4.0 Background Traffic Volume Development

Projected background (non-project) traffic is defined as the expected growth or change in traffic volumes on the surrounding roadway network between the year the existing counts were collected (2020) and the expected build-out year (2021), absent the opening of the proposed project.

4.1 HISTORICAL BACKGROUND GROWTH TRAFFIC

Historical background growth is the increase in existing traffic volumes due to usage increases and non-specific growth throughout the area, and accounts for growth that is independent of specific off-site developments or planned transportation projects. Historical background growth traffic is calculated using an annual growth rate, which is applied to the existing traffic volumes up to the future horizon years.

For this analysis, an annual growth rate of 4% was applied to the 2020 existing peak-hour traffic volumes to calculate base 2021 background traffic volumes for study area intersections.

4.2 APPROVED DEVELOPMENTS

The Rivercross/Wildbrook development was considered for this TIA. The development consisted of 315 Single Family Homes, 133 Townhomes, and 200 Apartments. The volumes for this approved development were gathered from the *Rivercross Charter TIA* conducted by WSP in 2017, the original figure from this report can be found in the approved developments section of the **Appendix**. The volumes that were distributed at intersections shared with this TIA were entered in as such. Intersections not included in WSP's distribution of the approved development volumes were given volumes based on their existing volume splits. The approved development volume can be found in **Figure 4.1**.

Figure 3 from the *Rivercross Charter TIA* conducted by WSP in 2017 was used to develop the approved development mitigation to be used in this study. From the figure (attached in the **Appendix**), the following background improvements were included:

Optimist Club Road at Triangle Circle

- A northbound left-turn lane with 200' of storage
- An eastbound right-turn lane with 350' of storage

Triangle Circle (South) at Triangle Circle

- An eastbound left-turn lane with 50' of storage.

4.3 PLANNED TRANSPORTATION PROJECTS

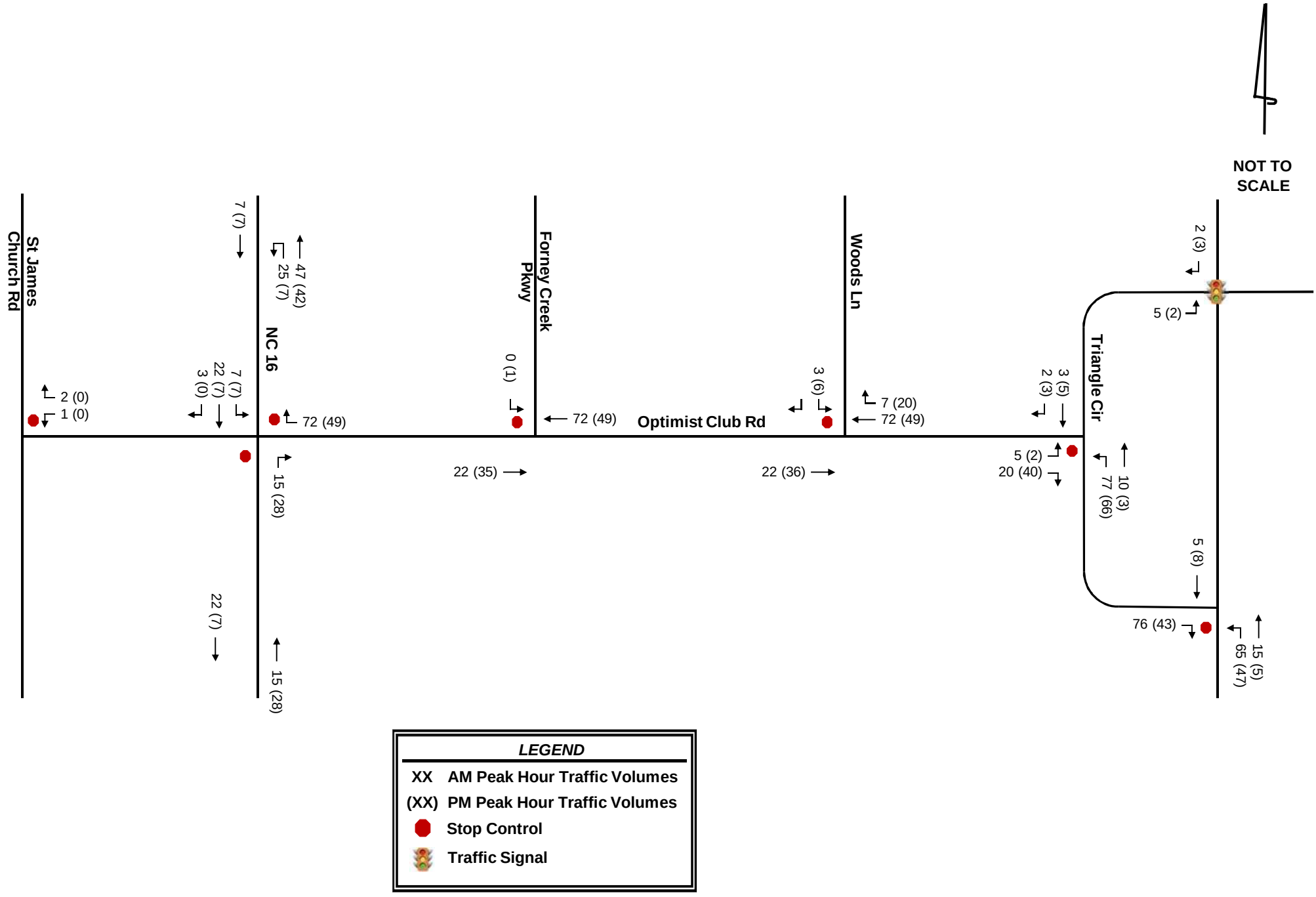
Within the study area, NCDOT project R-5712, which is currently proposed to add turn lanes at the intersection. This improvement is planned to be completed in 2021.

NCDOT also has plans to signalize the U-Turn bulbs for Optimist Club Drive at NC 16, these were included in the 2021 background and build conditions.

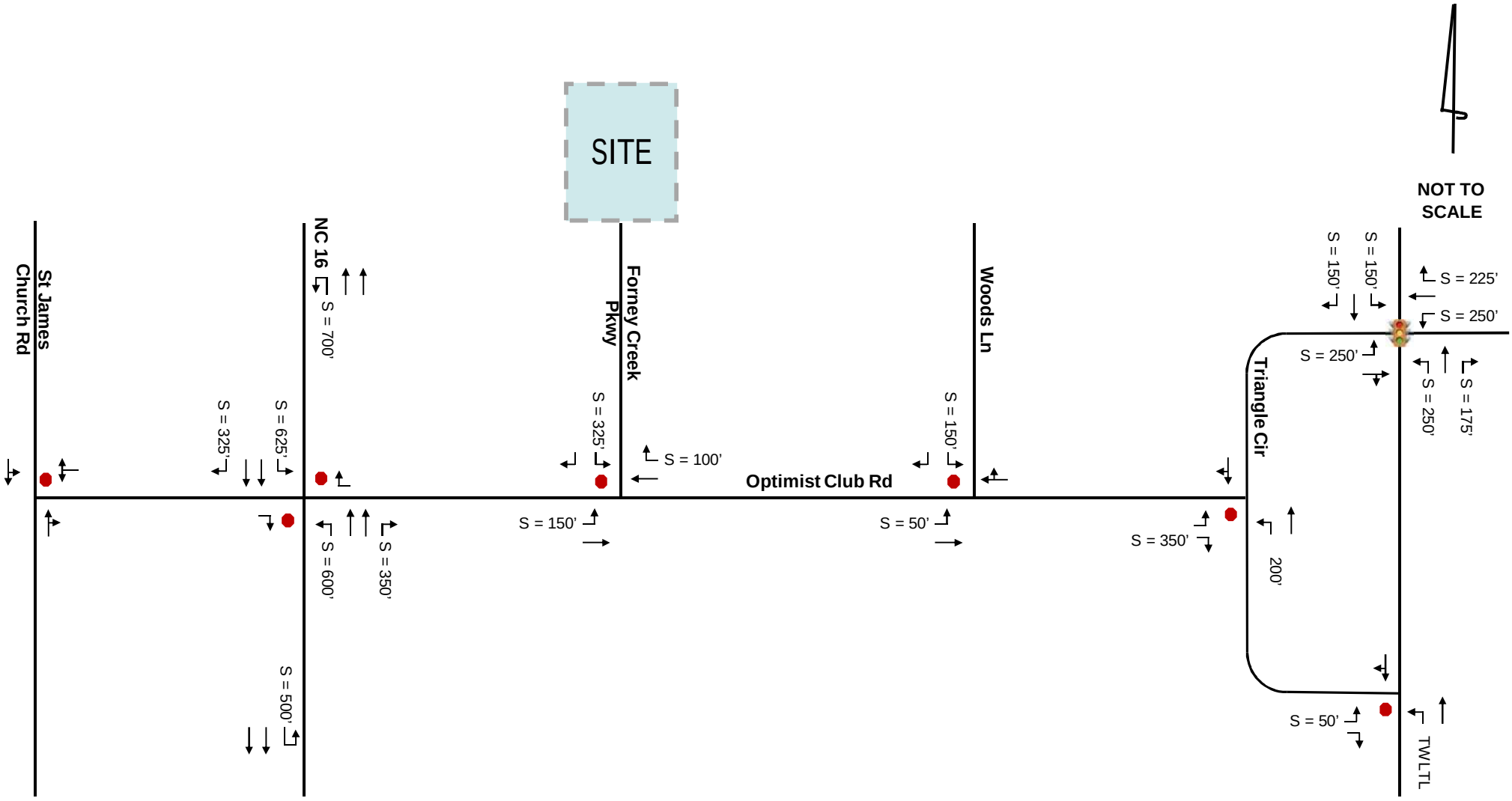
NCDOT project U-6134, which proposes to convert the intersection of Optimist Club Road at NC -16 to an interchange. This project would remove the existing U-Turn bulbs along NC-16 for Optimist

Club Road. At the time of this study, there has not been a selected alternative for U-6134, therefore a diamond interchange was analyzed. U-6134 is slated for construction in 2026.

Figure 4.2 shows the background roadway laneage. **Figure 4.3** shows the 2021 background AM and PM peak-hour traffic volumes, which include the historical growth traffic.



Kimley»Horn	West Lake Preparatory Academy Traffic Impact Analysis	Approved Development Volumes	Figure 4.1



Kimley»Horn	West Lake Preparatory Academy Traffic Impact Analysis	2021 Background Roadway Laneage	Figure 4.2

Kimley»Horn	West Lake Preparatory Academy Traffic Impact Analysis	Background 2021 Peak Hour Traffic Volumes	Figure 4.3

5.0 Site Traffic Volume Development

Site traffic developed for this TIA is defined as the vehicle trips expected to be generated and added to the study area by construction of the proposed development, and the distribution and assignment of that traffic throughout the surrounding network.

5.1 SITE ACCESS

Based on the current site plan, the proposed site will be accessed via one full-movement access point at the end of Forney Creek Parkway.

5.2 TRAFFIC GENERATION

The proposed West Lake Preparatory Academy is located at the end of Forney Creek Parkway and north of Optimist Club Road in Lincoln, North Carolina. As currently envisioned, the proposed charter school will ultimately consist of 765 students for grades K-8. The owner of the site desires to stagger the start times for grades K-5 and 6-8 for the school. For the purposes of this TIA, a student population of 510 students was analyzed for grades K-5, because that would be the heaviest loading of students in the hour. The teachers for grades K-8 were included in the K-5.

Table 5.1A summarizes the projected MSTA trip generation for the full 765 students of the proposed charter school. Table 5.1A should be used to show the high demand queue length.

Table 5.1B summarizes the projected MSTA trip generation for the staggered start for grades K-5, for 510 students.

Table 5.1A – 765 Students MSTA Trip Generation for High Demand Length

School Name: Lincoln County Charter School

Type: **Urban Charter** Version: 102816

MSTA School Queue Input

Grade Level	Student Population	Number of Buses	Staff Members	Student Drivers	PM Total Vehicles	PM Peak Vehicles	Average Queue Length	Total AM Trips	Total PM Trips	High Demand Length
										30%
K - 10	765		106		300	147	3262	962	706	4241
11th										
12th										
Sum >>	765		106		300	147	3262	962	706	4241
										979

Calculations

Grade K-10

Direction	AM Trips Generated: Parents	Buses	Staff	Trips	PM Trips Generated: Parents	Buses	Staff	Trips
IN	428		106	534	300			300
OUT	428			428	300		106	406
		AM K-10 Trips		962		PM K-10 Trips		706

Direction	AM Trips Generated: Parents	Buses	Staff		Trips	PM Trips Generated: Parents	Buses	Staff		Trips
IN										
OUT										
			AM 11th Trips					PM 11th Trips		

Direction	AM Trips Generated: Parents	Buses	Staff		Trips	PM Trips Generated: Parents	Buses	Staff		Trips
IN										
OUT										
			AM 12th Trips					PM 12th Trips		

All AM TRIPS	In	534	All PM TRIPS	In	300
	Out	428		Out	406
	Total	962		Total	706

ADT
1668
1668

Table 5.1B – 510 Student Staggered Start Analysis

School Name: Lincoln County Charter School Staggred

Type: **Urban Charter** Version: 102816

MSTA School Queue Input

Grade Level	Student Population	Number of Buses	Staff Members	Student Drivers	PM Total Vehicles	PM Peak Vehicles	Average Queue Length	Total AM Trips	Total PM Trips	High Demand Length
										30%
K - 10	510		106		200	98	2175	677	506	2827
11th										
12th										
Sum >>	510		106		200	98	2175	677	506	2827
										652

Calculations

Grade K-10

Direction	AM Trips Generated: Parents	Buses	Staff	Trips	PM Trips Generated: Parents	Buses	Staff	Trips
IN	285		106	391	200			200
OUT	285			285	200		106	306
		AM K-10 Trips		677		PM K-10 Trips		506

Direction	AM Trips Generated: Parents	Buses	Staff		Trips	PM Trips Generated: Parents	Buses	Staff		Trips
IN										
OUT										
			AM 11th Trips					PM 11th Trips		

Direction	AM Trips Generated: Parents	Buses	Staff		Trips	PM Trips Generated: Parents	Buses	Staff		Trips
IN										
OUT										
			AM 12th Trips					PM 12th Trips		

All AM TRIPS	In	391	All PM TRIPS	In	200
	Out	285		Out	306
	Total	677		Total	506

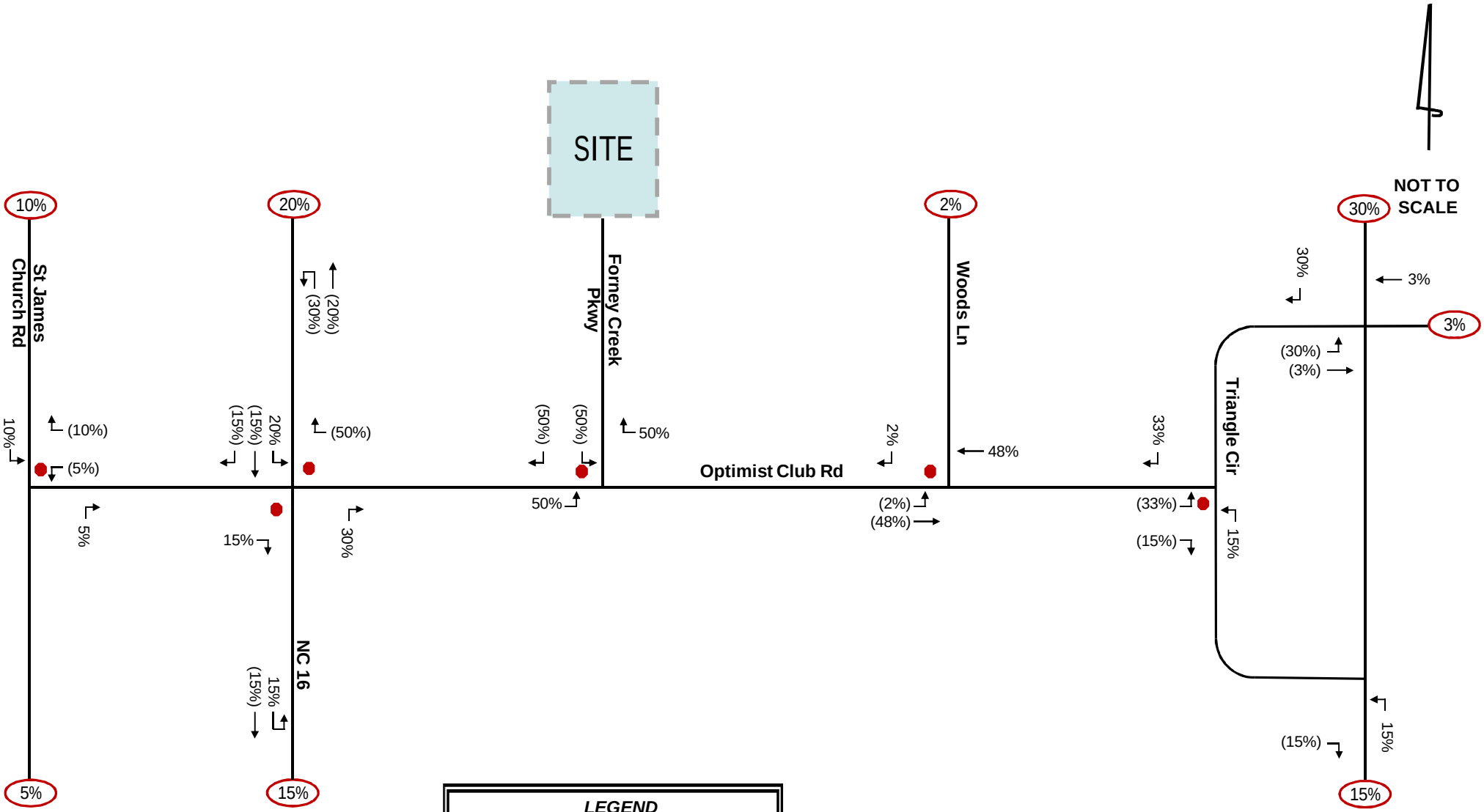
ADT
1183
1183

5.3 SITE TRAFFIC DISTRIBUTION AND ASSIGNMENT

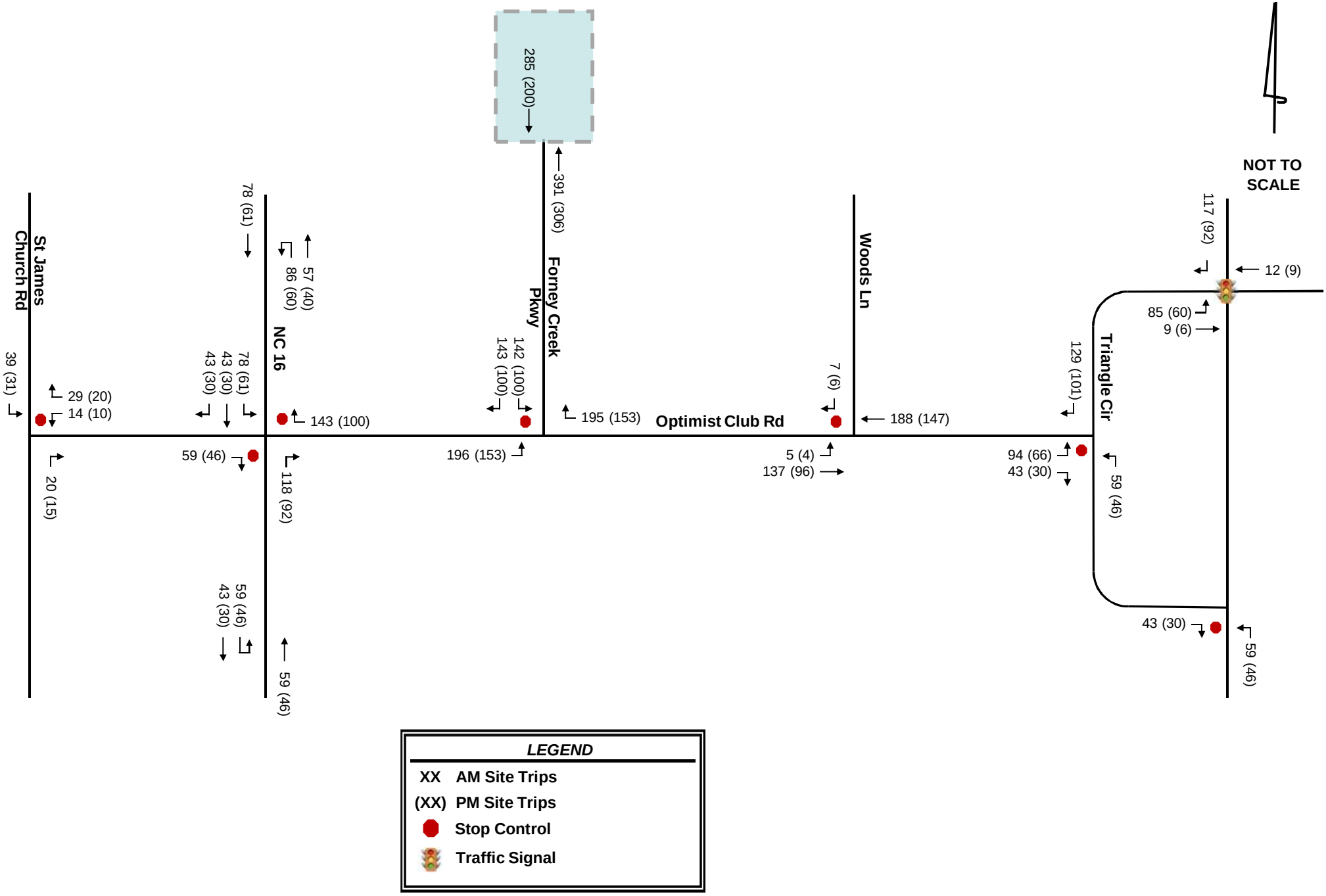
The proposed development's net new external trips were assigned to the surrounding network based on existing peak-hour turning movements, surrounding land uses, population densities in the area, and the proposed site layout. The overall site traffic distribution and assignment are shown in **Figure 5.1.**

5.4 BUILD TRAFFIC VOLUMES

The build traffic volumes include the assignment of the projected site traffic generation added to the appropriate background traffic volumes. **Figures 5.2** shows the distributed site trips and **Figure 5.3** shows the projected 2021 build traffic volumes for the AM and PM peak hours. **Figure 5.4** shows the STIP project U-6134 2026 distributed volumes. Intersection volume development worksheets for all intersections within the study network are provided in the **Appendix**.

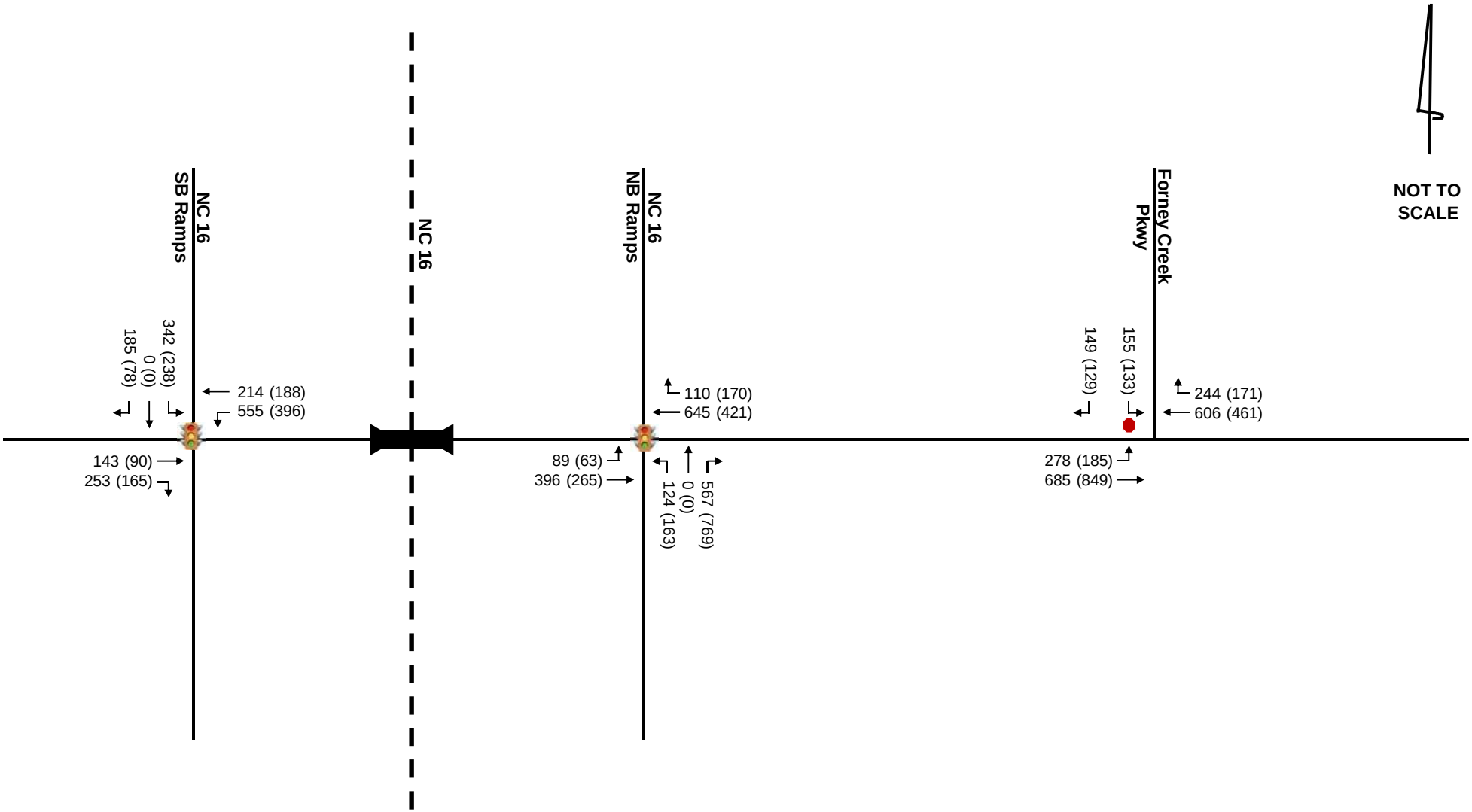


Kimley»Horn	West Lake Preparatory Academy Traffic Impact Analysis	Site Traffic Distribution and Assignment	Figure 5.1



Kimley»Horn	West Lake Preparatory Academy Traffic Impact Analysis	Site Trips	Figure 5.2

Kimley»Horn	West Lake Preparatory Academy Traffic Impact Analysis	Future 2021 Peak Hour Traffic Volumes	Figure 5.3



LEGEND	
XX	AM Peak Hour Traffic Volumes
(XX)	PM Peak Hour Traffic Volumes
	Stop Control
	Traffic Signal

Kimley»Horn	West Lake Preparatory Academy Traffic Impact Analysis	2026 Build Volumes for U-6134	Figure 5.4

6.0 Capacity Analysis

Based on the requirements set forth in accordance with the traffic study guidelines in the *NCDOT Policy on Street and Driveway Access to North Carolina Highways and NCDOT Congestion Management Capacity Analysis Guidelines*, capacity analyses were performed at the study area intersections for each of the following AM and PM peak-hour scenarios:

- 2020 Existing Conditions
- 2021 Background Conditions
- 2021 Build Conditions
- 2026 Design Year Conditions (for R-5706)

Capacity analyses were performed for the AM and PM peak hours using the Synchro Version 10 software to determine the operating characteristics at the signalized and stop-controlled intersections of the adjacent street network and to evaluate the impacts of the proposed development. Capacity is defined as the maximum number of vehicles that can pass over a particular road segment, or through a particular intersection, within a specified period of time under prevailing operational, geometric and controlling conditions within a set time duration. This software program uses methodologies contained in the *Highway Capacity Manual* (HCM) to determine the operating characteristics of an intersection.

The *Highway Capacity Manual* (HCM) defines LOS as a "quantitative stratification of a performance measure or measures representing quality of service", and is used to "translate complex numerical performance results into a simple A-F system representative of travelers' perceptions of the quality of service provided by a facility or service". The HCM defines six levels of service, LOS A through LOS F, with A having the best operating conditions from the traveler's perspective and F having the worst. However, it must be understood that "the LOS letter result hides much of the complexity of facility performance", and that "the appropriate LOS for a given system element in the community is a decision for local policy makers". According to the HCM, "for cost, environmental impact, and other reasons, roadways are typically designed not to provide LOS A conditions during peak periods but instead to provide some lower LOS that balances individual travers' desires against society's desires and financial resources. Nevertheless, during low-volume periods of the day, a system element may operate at LOS A."

LOS for a two-way stop-controlled (TWSC) intersection is determined by the control delay at the side-street approaches, typically during the highest volume periods of the day, the AM and PM peak periods. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. With respect to field measurements, control delay is defined as the total elapsed time from the time a vehicle stops at the end of the queue to the time the vehicle departs from the stop line. It is typical for stop sign-controlled side streets and driveways intersecting major streets to experience long delays during peak hours, particularly for left-turn movements. The majority of the traffic moving through the intersection on the major street experiences little or no delay.

LOS for signalized intersections is reported for the intersection as a whole, and typically during the highest volume periods of the day, the AM and PM peak periods. One or more movements at an intersection may experience a low level-of-service, while the intersection as a whole may operate acceptably.

Table 6.0-A and **6.0-B** list the LOS control delay thresholds published in the HCM for unsignalized and signalized intersections, respectively, as well as the unsignalized operational descriptions assumed herein.

Table 6.0-A Vehicular LOS Control Delay Thresholds for Unsignalized Intersections		
Level-of-Service	**Average Control Delay per Vehicle [sec/veh]**	
A	≤ 10	Short Delays
B	> 10 – 15	
C	> 15 – 25	
D	> 25 – 35	Moderate Delays
E	> 35 – 50	
F	> 50	Long Delays

Table 6.0-B Vehicular LOS Control Delay Thresholds for Signalized Intersections	
Level-of-Service	**Average Control Delay per Vehicle [sec/veh]**
A	≤ 10
B	> 10 – 20
C	> 20 – 35
D	> 35 – 55
E	> 55 – 80
F	> 80

Existing signal timing plans were provided by NCDOT and are included in the **Appendix**. These plans were used in existing conditions analyses; cycle lengths, offsets, and splits were optimized for both peak hours. The Congestion Management minimum cycle length based on the phasing of the signalized intersections was also utilized. A lost time of 5 seconds and no right turn on red (RTOR) were utilized in all future scenarios as well.

Observed peak hour factors (PHFs) were used in existing conditions analysis. A 0.9 PHF was used for all future year background volumes during the AM and PM peak hours. During the build conditions a 0.5 PHF was used for all school movements. A weighted PHF for background volumes and school traffic volumes was used in the build analysis.

Capacity analysis reports generated by Synchro Version 10 software are included in the **Appendix**. SimTraffic results are also shown in the **Appendix.**

Per NCDOT Congestion Management guidelines, the following considerations were made in this analysis:

- Right-turn on red (RTOR) operations were not allowed in this analysis.
- Permitted-protected left-turn movements were modeled as protected-only in future years.
- Lost time adjust was added to the yellow and red times provided in the signal plans to maintain a total lost time of 5 seconds for each movement for future year analysis.

6.1 ST JAMES CHURCH ROAD AT OPTIMIST CLUB ROAD

Table 6.1 summarizes the LOS, control delay, and 95th percentile queue lengths at the unsignalized intersection of St James Church Road at Optimist Club Road for the analyzed peak hour conditions.

Table 6.1 - St James Church Rd & Optimist Club Rd				
Condition	Measure	WB	NB	SB
		WBLR	NBTR	SBTL
AM Peak Hour				
2020 Existing	LOS (Delay)	D (28.7)	A (0.0)	A (6.2)
	Synchro 95th Q	157'	0'	24'
2021 Background	LOS (Delay)	C (15.2)	A (0.0)	A (5.9)
	Synchro 95th Q	66'	0'	18'
2021 Build	LOS (Delay)	D (25.2)	A (0.0)	A (6.5)
	Synchro 95th Q	140'	0'	24'
2021 Build Improved	LOS (Delay)	B (14.8)	A (0.0)	A (6.5)
	Synchro 95th Q	43'	0'	24'
PM Peak Hour				
2020 Existing	LOS (Delay)	B (10.7)	A (0.0)	A (5.1)
	Synchro 95th Q	24'	0'	10'
2021 Background	LOS (Delay)	B (10.6)	A (0.0)	A (5.2)
	Synchro 95th Q	25'	0'	10'
2021 Build	LOS (Delay)	B (12.1)	A (0.0)	A (5.9)
	Synchro 95th Q	38'	0'	13'
2021 Build Improved	LOS (Delay)	B (10.8)	A (0.0)	A (5.9)
	Synchro 95th Q	21'	0'	13'

As shown in **Table 6.1**, the westbound stop-controlled approach is expected to operate with moderate delays during the AM peak hour and short delays during the PM peak for the 2020 existing and 2021 background conditions. Upon build-out of the site in 2021, the westbound stop-controlled delay is anticipated to operate with moderate delays during the AM peak hour but retain short delays during the PM peak hour.

To mitigate the anticipated impact of the site traffic at this intersection a construction of a westbound right-turn lane with 100 feet of storage and an appropriate taper is recommended.

With this improvement in place, the westbound stop-controlled approach is expected to improve to a LOS B in the AM peak hour and remain at a LOS B in the PM peak hour for the 2021 build condition. The recommended storage length for the turn lane is based on NCDOT turn lane minimums.

6.2 NC 16 AT OPTIMIST CLUB ROAD

Table 6.2A summarizes the LOS, control delay, and 95th percentile queue lengths at the unsignalized intersection of NC 16 at Optimist Club Road for the analyzed peak hour conditions. For the 2026 build condition this intersection will be converted to an interchange under STIP project U-6134.

Table 6.2A - NC-16 & Optimist Club Rd					
Condition	Measure	EB	WB	NB	SB
		EBR	WBR	NBL	SBL
AM Peak Hour					
2020 Existing	LOS (Delay)	F (51.2)	E (38.7)	F (324.4)	F (354.6)
	Synchro 95th Q	209'	242'	241'	462'
2021 Background	LOS (Delay)	F (52.1)	F (67.1)	F (287.8)	F (347.7)
	Synchro 95th Q	195'	368'	207'	410'
2021 Build	LOS (Delay)	F (161.6)	F (247.3)	F (479.3)	F (*)
	Synchro 95th Q	449'	1016'	252'	*
2026 Build	LOS (Delay)	SEE TABLES 6.2D AND 6.2E			
	Synchro 95th Q				
PM Peak Hour					
2020 Existing	LOS (Delay)	C (19.6)	F (128.4)	F (176.2)	F (*)
	Synchro 95th Q	56'	368'	250'	*
2021 Background	LOS (Delay)	C (22.5)	F (282.8)	F (170.7)	F (*)
	Synchro 95th Q	64'	655'	209'	*
2021 Build	LOS (Delay)	D (34.0)	F (522.4)	F (239.2)	F (*)
	Synchro 95th Q	130'	1138'	242'	*
2026 Build	LOS (Delay)	SEE TABLES 6.2D AND 6.2E			
	Synchro 95th Q				
*Approach delays and queues are over capacity					

As shown in the table above, the stop-controlled eastbound approach is anticipated to operate with long delays during the AM peak hour and short to moderate delays during the PM peak hour. The westbound stop-controlled approach is anticipated to operate with long delays for AM and PM peak hours.

The northbound and southbound left-turns were modeled under stop control, even though there is not control for these movements today. Both of these movements are anticipated to operate over capacity in existing through build conditions. The STIP project U-6134, which proposes to convert this intersection to an interchange, is expected to significantly improve the turning movement delays. The results of the 2026 interchange analysis are show in **Table 6.2D and 6.2E**

Although there are significant delays on the eastbound and westbound approaches during school dismissal times, no mitigations are recommended as a STIP project is already planned in the near future to improve the intersection.

The intersection of NC 16 and Optimist Club Road also includes two U-Turn bulbs on NC 16. **Table 6.2B** and **Table 6.2C** summarize the results at these U-Turn bulbs.

Table 6.2B - NC 16 NB U-Turn Bulb at Optimist Club Road				
Condition	Measure	NB NBU	SB SBT	Intersection
AM Peak Hour				
2020 Existing	LOS (Delay)	F (168.0)	-	-
	Synchro 95th Q	516'	-	
2021 Background	LOS (Delay)	D (38.7)	B (18.2)	C (23.5)
	Synchro 95th Q	#335'	307'	
2021 Build	LOS (Delay)	E (68.8)	C (23.1)	D (35.8)
	Synchro 95th Q	#419	#394	
2026 Build	LOS (Delay)	U-turn bulbs eliminated as part of STIP Project U-6134		
	Synchro 95th Q			
PM Peak Hour				
2020 Existing	LOS (Delay)	E (35.7)	-	-
	Synchro 95th Q	163'	-	
2021 Background	LOS (Delay)	C (23.7)	B (12.1)	B (14.5)
	Synchro 95th Q	#186'	207'	
2021 Build	LOS (Delay)	C (30.6)	B (13.1)	B (17.1)
	Synchro 95th Q	#262'	224'	
2026 Build	LOS (Delay)	U-turn bulbs eliminated as part of STIP Project U-6134		
	Synchro 95th Q			

The northbound U-Turn currently operates with long delays during the AM peak hour and moderate delays during the PM peak hour.

NCDOT currently has plans to signalize this U-Turn bulb, thus the 2021 conditions reflect the U-Turn bulb as signalized. The northbound U-Turn bulb is anticipated to operate at LOS D and LOE during the AM and PM peak hours during the background conditions once signalized, respectively. During build conditions the AM peak hour is anticipated to drop from LOS D to LOS E, while the PM peak hour is anticipated to continue to operate at LOS C. No improvements are recommended at this intersection to mitigate the impact of the proposed school.

Table 6.2C - NC 16 SB U-Turn Bulb at Optimist Club Road				
Condition	Measure	NB NBT	SB SBU	Intersection
AM Peak Hour				
2020 Existing	LOS (Delay)	-	C (17.1)	-
	Synchro 95th Q	-	23'	
2021 Background	LOS (Delay)	A (4.8)	C (24.0)	A (5.8)
	Synchro 95th Q	58'	169'	
2021 Build	LOS (Delay)	A (7.2)	C (23.9)	A (8.7)
	Synchro 95th Q	95'	182'	
2026 Build	LOS (Delay)	U-turn bulbs eliminated as part of STIP Project U-6134		
	Synchro 95th Q			
PM Peak Hour				
2020 Existing	LOS (Delay)	-	D (31.1)	-
	Synchro 95th Q	-	25'	
2021 Background	LOS (Delay)	A (8.7)	C (26.2)	A (9.0)
	Synchro 95th Q	#651'	36'	
2021 Build	LOS (Delay)	B (19.7)	C (29.1)	C (20.0)
	Synchro 95th Q	#668'	67'	
2026 Build	LOS (Delay)	U-turn bulbs eliminated as part of STIP Project U-6134		
	Synchro 95th Q			

The southbound U-Turn currently operates with short delays during the AM peak hour and moderate delays during the PM peak hour.

NCDOT currently has plans to signalize this U-Turn bulb, thus the 2021 conditions reflect the U-Turn bulb as signalized. The southbound U-Turn bulb is anticipated to operate at LOS A during the AM and PM peak hours during the background conditions once signalized. During build conditions the AM peak hour is anticipated to remain at LOS A, while the PM peak hour is anticipated to drop from LOS A to LOS C. No improvements are recommended at this intersection to mitigate the impact of the proposed school.

Table 6.2D and **Table 6.2E** show the results of STIP project U-6134, Optimist Club Road at NC 16 interchange. At the time of this traffic impact analysis, a preferred alternative has not been selected for this interchange, therefore it was modeled as a standard diamond interchange for the purposes of this TIA.

Table 6.2D - NC-16 NB Ramps & Optimist Club Rd								
Condition	Measure	EB		WB		NB		Intersection
		EBL	EBT	WBT	WBR	NBLT	NBR	
AM Peak Hour								
2026 Build	LOS (Delay)	A (4.9)		A (5.2)		E (60.7)		B (10.2)
	Synchro 95th Q	m43'	145'	307'	45'	163'	0'	
	SimTraffic 95th Q	300'	522'	135'	35'	581'	432'	
PM Peak Hour								
2026 Build	LOS (Delay)	A (5.3)		A (5.3)		E (57.5)		B (13.7)
	Synchro 95th Q	36'	122'	208'	81'	209'	0'	
	SimTraffic 95th Q	67'	154'	111'	55'	223'	0'	

As shown in Table 6.2D, the intersection of NC 16 Northbound Ramps at Optimist Club Road is anticipated to operate at LOS B during the AM and PM peak hours as a standard diamond interchange.

Table 6.2E - NC-16 SB Ramps & Optimist Club Rd								
Condition	Measure	EB		WB		SB		Intersection
		EBT	EBR	WBL	WBT	SBL	SBT	
AM Peak Hour								
2026 Build	LOS (Delay)	C (28.3)		D (36.2)		D (49.5)		D (38.5)
	Synchro 95th Q	167'	#311'	288'	113'	350'	187'	
	SimTraffic 95th Q	225'	264'	218'	120'	444'	534'	
PM Peak Hour								
2026 Build	LOS (Delay)	B (16.9)		D (46.5)		E (64.4)		D (44.9)
	Synchro 95th Q	98'	173'	252'	105'	313'	114'	
	SimTraffic 95th Q	101'	169'	200'	96'	325'	179'	

As shown in Table 6.2E, the intersection of NC 16 Northbound Ramps at Optimist Club Road is anticipated to operate at LOS D during the AM and PM peak hours as a standard diamond interchange.

6.3 OPTIMIST CLUB ROAD AT FORNEY CREEK PARKWAY

Table 6.3 summarizes the LOS, control delay, and 95th percentile queue lengths at the unsignalized intersection of Optimist Club Road at Forney Creek Parkway for the analyzed peak hour conditions.

Table 6.3 - Optimist Club Rd & Forney Creek Pkwy							
Condition	Measure	EB		WB		SB	
		EBL	EBT	WBT	WBR	SBL	SBR
AM Peak Hour							
2020 Existing	LOS (Delay)	A (1.0)		A (0.0)		C (20.0)	
	Synchro 95th Q	5'	0'	0'	0'	5'	1'
2021 Background	LOS (Delay)	A (1.0)		A (0.0)		C (23.9)	
	Synchro 95th Q	6'	0'	0'	0'	6'	1'
2021 Build	LOS (Delay)	A (7.5)		A (0.0)		F (*)	
	Synchro 95th Q	111'	0'	0'	0'	*	84'
2026 Build	LOS (Delay)	A (9.4)		A (0.0)		F (*)	
	Synchro 95th Q	159'	0'	0'	0'	*	144'
PM Peak Hour							
2020 Existing	LOS (Delay)	A (0.3)		A (0.0)		C (17.4)	
	Synchro 95th Q	2'	0'	0'	0'	11'	3'
2021 Background	LOS (Delay)	A (0.3)		A (0.0)		C (20.4)	
	Synchro 95th Q	2'	0'	0'	0'	15'	3'
2021 Build	LOS (Delay)	A (3.4)		A (0.0)		F (*)	
	Synchro 95th Q	43'	0'	0'	0'	*	38'
2026 Build	LOS (Delay)	A (3.3)		A (0.0)		F (*)	
	Synchro 95th Q	51'	0'	0'	0'	*	55'
*Approach delays and queues are over capacity							

As shown in the table above, under 2020 existing and 2021 background conditions, all approaches are expected to operate with short delays for the AM and PM peak hours.

Under 2021 build and 2026 build conditions, the southbound approach is expected to operate with over capacity. Exclusive turn lanes already exist for this unsignalized intersection.

As a supplemental analysis, peak hour signal warrants were analyzed at this intersection. The results of the signalization of this intersection is below in **Table 6.3 Supplemental Signal**

Table 6.3 Supplemental Signal - Optimist Club Rd & Forney Creek Pkwy								
Condition	Measure	EB		WB		SB		Intersection
		EBL	EBT	WBT	WBR	SBL	SBR	
AM Peak Hour								
2021 Build	LOS (Delay)	B (15.6)		C (27.7)		C (34.4)		C (24.2)
	Synchro 95th Q	88'	225'	404'	154'	128'	78'	
PM Peak Hour								
2021 Build	LOS (Delay)	B (10.1)		B (19.0)		C (29.7)		B (16.7)
	Synchro 95th Q	58'	349'	276'	105'	108'	70'	

If a traffic signal was constructed at this location, it is expected to operate at LOS C during the AM peak hour and LOS B during the PM peak hour. However, this intersection is located approximately 500' from the intersection of NC 16 at Optimist Club Road, which is too close for signalization when STIP project U-6134 is constructed. Additionally, this intersection would only likely meet signal warrants for two hours of the day of the required 8-hours.

An additional supplemental analysis was performed to determine if a single lane roundabout would serve as a intersection control measure to improve delays and queues at this intersection. The results of the roundabout at this intersection is shown below in **Table 6.3 Supplemental Roundabout**

Table 6.3 Supplemental Roundabout - Optimist Club Rd & Forney Creek Pkwy					
Condition	Measure	EB	WB	SB	Intersection
		EBLT	WBTR	SBLR	
AM Peak Hour					
2021 Build	LOS (Delay)	F (67.4)	F (88.6)	C (19.1)	F (64.7)
	Synchro 95th Q	1736'	1659'	231'	V/C = 1.12
PM Peak Hour					
2021 Build	LOS (Delay)	F (51.9)	C (18.3)	B (10.7)	D (33.1)
	Synchro 95th Q	1736'	367'	91'	V/C = 1.02

If a single-lane roundabout was constructed at this location, it is expected to operate at LOS F during the AM peak hour and LOS D during the PM peak hour, with long eastbound queues during both peak hours. Additionally, the volume to capacity ratios are above 0.85, in the 2021 horizon year. With failing levels of service, long queues, and high volume to capacity ratios, a roundabout is not recommended at this intersection.

For the two intersection mitigation options considered in this evaluation (signal and roundabout), the signalized option provides better operational performance in both the 2021 and 2026 horizon years as compared to the single lane roundabout. However, the signalized option is unlikely to meet eight-hour signal warrants to justify the signal. Furthermore, not providing some level of traffic control at this location is not an option.

With this understanding, it is recommended that a traffic signal be constructed at this intersection to mitigate the anticipated traffic impacts associated with the proposed development. Furthermore, it is encouraged that if possible an interchange configuration that incorporates the Forney Creek Parkway intersection be considered as a part of the U-6314 project.

6.4 OPTIMIST CLUB ROAD AT WOODS LANE

Table 6.4 summarizes the LOS, control delay and 95th percentile queue lengths at the unsignalized intersection of Optimist Club Road at Woods Lane for the analyzed peak hour conditions.

Table 6.4 - Optimist Club Rd & Woods Ln						
Condition	Measure	EB		WB	SB	
		EBL	EBT	WBTR	SBL	SBR
AM Peak Hour						
2020 Existing	LOS (Delay)	A (2.2)		A (0.0)	B (14.8)	
	Synchro 95th Q	12'	0'	0'	24'	67'
2021 Background	LOS (Delay)	A (2.0)		A (0.0)	B (14.3)	
	Synchro 95th Q	11'	0'	0'	17'	54'
2021 Build	LOS (Delay)	A (1.8)		A (0.0)	D (26.4)	
	Synchro 95th Q	16'	0'	0'	27'	125'
2021 Build Improved	LOS (Delay)	A (1.8)		A (0.0)	D (25.6)	
	Synchro 95th Q	16'	0'	0'	27'	120'
PM Peak Hour						
2020 Existing	LOS (Delay)	A (3.2)		A (0.0)	C (19.7)	
	Synchro 95th Q	23'	0'	0'	41'	12'
2021 Background	LOS (Delay)	A (2.9)		A (0.0)	C (20.9)	
	Synchro 95th Q	23'	0'	0'	46'	13'
2021 Build	LOS (Delay)	A (2.9)		A (0.0)	D (30.4)	
	Synchro 95th Q	31'	0'	0'	69'	21'
2021 Build Improved	LOS (Delay)	A (2.9)		A (0.0)	D (29.4)	
	Synchro 95th Q	31'	0'	0'	68'	19'

As shown in the table above, under existing and background conditions, the stop-controlled southbound approach is anticipated to operate with short delays during the AM peak hour and moderate delays during the PM peak hour.

With the addition of site traffic, the stop-controlled southbound approach is expected to operate with moderate delays during the AM and PM peak hours. An eastbound left-turn lane and separate southbound left-turn lanes are already present at this intersection. A westbound right-turn was analyzed to determine if the southbound delays would be significantly reduced, but the delay only decreased by 0.8 seconds and 1.0 second for the AM and PM peak hour respectively.

It is typical for stop sign-controlled side streets and driveways intersecting major streets to experience long delays during peak hours, particularly for left-turn movements. Therefore, no improvements are recommended to mitigate the impact of the proposed school.

6.5 TRIANGLE CIRCLE AT OPTIMIST CLUB ROAD

Table 6.5 summarizes the LOS, control delay and 95th percentile queue lengths at the unsignalized intersection of Triangle Circle at Optimist Club Road for the analyzed peak hour conditions.

Table 6.5 - Triangle Cir & Optimist Club Rd				
Condition	Measure	EB	NB	SB
		EBLR	NBTL	SBTR
AM Peak Hour				
2020 Existing	LOS (Delay)	C (24.9)	A (6.4)	A (0.0)
	Synchro 95th Q	197'	5'	0'
2021 Background	LOS (Delay)	C (18.3)	A (7.1)	A (0.0)
	Synchro 95th Q	121'	10'	0'
2021 Build	LOS (Delay)	F (440.3)	A (8.4)	A (0.0)
	Synchro 95th Q	1305'	23'	0'
2021 Build Improved (Roundabout)	LOS (Delay)	A (9.3)	A (8.6)	A (7.7)
	Synchro 95th Q	142'	45'	54'
PM Peak Hour				
2020 Existing	LOS (Delay)	F (246.5)	A (6.6)	A (0.0)
	Synchro 95th Q	761'	18'	0'
2021 Background	LOS (Delay)	F (426.2)	A (6.7)	A (0.0)
	Synchro 95th Q	1099'	24'	0'
2021 Build	LOS (Delay)	F (*)	A (7.8)	A (0.0)
	Synchro 95th Q	*	38'	0'
2021 Build Improved (Roundabout)	LOS (Delay)	B (10.2)	C (16.0)	A (8.7)
	Synchro 95th Q	159'	163'	52'
*Approach delays and queues are over capacity				

As shown in the table above, under 2020 existing and 2021 background conditions, the eastbound stop-controlled approach is anticipated to operate with short delays in the AM peak hour. In the PM peak hour, the eastbound approach is anticipated to operate with long delays.

With the addition of site traffic, the LOS of the eastbound approach is expected to operate with long delays in the AM peak hour and continue to operate with long delays the PM peak hour.

The background and build analysis considered an eastbound right-turn lane and northbound left-turn as an improvement by others in *Rivercross Charter TIA* conducted by WSP in 2017. Even with these improvements in place, the eastbound approach is anticipated to operate with long delays.

Instead of constructing the turn lanes suggested from the Rivercross/Wildbrook development, a roundabout should be considered at this intersection. The roundabout analyzed at this intersection was a single lane roundabout with one entry and exit lane per approach. The proposed roundabout improved the LOS and delay of the eastbound approach from a LOS F to a LOS A in the AM peak hour. In the PM peak hour, the roundabout improved the eastbound approach from a LOS F to a LOS B.

If the right-of-way is not available to construct a roundabout at this intersection, consideration for a traffic signal is recommended. A supplemental analysis shown in the table below, depicts the anticipated level of service if this intersection was signalized. The signalized scenario considers the turn lanes suggested as improvements for the Rivercross/Wildbrook development.

Table 6.5 Supplemental - Triangle Cir & Optimist Club Rd							
Condition	Measure	EB		NB		SB	Intersection
		EBL	EBR	NBL	NBT	SBTR	
AM Peak Hour							
2021 Build	LOS (Delay)	C (21.2)		C (26.6)		B (14.8)	C (20.6)
	Synchro 95th Q	#224'	144'	115'	12'	149'	
PM Peak Hour							
2021 Build	LOS (Delay)	C (31.4)		D (36.5)		B (12.0)	C (29.0)
	Synchro 95th Q	#310'	142'	#259'	34'	129'	

As shown in the supplemental table, the intersection is anticipated to operate at LOS C during the AM and PM build peak hour conditions under signalized operations.

6.6 NC 16 BUSINESS AT TRIANGLE CIRCLE/UNITY CHURCH ROAD

Table 6.6 summarizes the LOS, control delay and 95th percentile queue lengths at the signalized intersection of NC 16 Business at Triangle Circle/Unity Church Road for the analyzed peak hour conditions. STIP project R-5712 adds changes the geometry and phasing of the intersection starting in the 2021 background condition.

Table 6.6 - NC-16 Business & Triangle Cir/Unity Church Rd														
Condition	Measure	EB			WB			NB			SB			Intersection
		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
AM Peak Hour														
2020 Existing	LOS (Delay)	F (135.4)			F (93.2)			E (75.5)			E (79.1)			F (89.1)
	Synchro 95th Q	-	#296'	32'	-	275'	99'	12'	#702'	-	43'	#1060'	-	
2021 Background	LOS (Delay)	D (38.2)			D (38.0)			B (10.9)			B (15.8)			C (21.2)
	Synchro 95th Q	195'	97'	-	124'	33'	39'	1'	151'	18'	11'	300'	17'	
2021 Build	LOS (Delay)	D (44.8)			C (29.7)			B (17.5)			C (24.3)			C (27.1)
	Synchro 95th Q	276'	99'	-	199'	72'	74'	10'	409'	64'	48'	#859'	135'	
PM Peak Hour														
2020 Existing	LOS (Delay)	F (115.1)			E (63.3)			F (101.5)			E (63.6)			F (84.6)
	Synchro 95th Q	-	m#578'	m0'	-	179'	3'	27'	#886	-	#89'	#932'	-	
2021 Background	LOS (Delay)	D (48.0)			C (32.3)			B (15.7)			C (20.5)			C (25.6)
	Synchro 95th Q	336'	148'	-	158'	56'	93'	19'	447'	95'	93'	674'	61'	
2021 Build	LOS (Delay)	E (59.5)			C (29.9)			B (19.2)			C (24.5)			C (30.8)
	Synchro 95th Q	#462'	151'	-	158'	64'	93'	19'	447'	95'	99'	674'	112'	

As shown in the table above, under existing conditions, the overall intersection LOS for existing conditions is a LOS F for both the AM and PM peak hour.

With the geometry change of STIP project R-5712, all approaches and the overall intersection are anticipated at LOS D or better. With the addition of the site traffic, all approaches are anticipated to continue to operate at LOS D or better with the exception of the eastbound approach during the PM peak hour. However, the overall intersection LOS is expected to remain at LOS C for build conditions. No mitigation is recommended at this intersection.

6.7 NC 16 BUSINESS AT TRIANGLE CIRCLE

Table 6.7 summarizes the LOS, control delay and 95th percentile queue lengths at the unsignalized intersection of NC 16 Business at Triangle Circle.

Table 6.8 - Triangle Cir & NC 16 Business					
Condition	Measure	EB	NB		SB
		EBLR	NBL	NBT	SBTR
AM Peak Hour					
2020 Existing	LOS (Delay)	F (81.1)	A (1.5)		A (0.0)
	Synchro 95th Q	218'	12'	0'	0'
2021 Background	LOS (Delay)	F (147.5)	A (2.5)		A (0.0)
	Synchro 95th Q	342'	26'	0'	0'
2021 Build	LOS (Delay)	F (248.7)	A (4.1)		A (0.0)
	Synchro 95th Q	518'	50'	0'	0'
PM Peak Hour					
2020 Existing	LOS (Delay)	D (34.6)	A (4.3)		A (0.0)
	Synchro 95th Q	104'	63'	0'	0'
2021 Background	LOS (Delay)	F (62.7)	A (5.2)		A (0.0)
	Synchro 95th Q	190'	86'	0'	0'
2021 Build	LOS (Delay)	F (97.1)	A (7.2)		A (0.0)
	Synchro 95th Q	276'	128'	0'	0'

The table above shows that the eastbound approach is anticipated to operate at a LOS F for all conditions in the AM peak hour and all conditions except the existing PM peak hour.

It is typical for stop sign-controlled side streets intersecting major streets to experience long delays during peak hours. The background and build analysis considered an eastbound left-turn lane as an improvement by others in *Rivercross Charter TIA* conducted by WSP in 2017. Even with this improvement in place, the eastbound approach is anticipated to operate with long delays.

The southbound right-turn volumes, do not warrant a right-turn lane. Therefore, no improvements are recommended to mitigate the impact of the proposed school.

6.8 FORNEY CREEK PARKWAY AT SITE DRIVEWAY

Table 6.8A summarizes the LOS, control delay and 95th percentile queue lengths at the proposed unsignalized intersection of Forney Creek Parkway at Site Driveway.

Table 6.9A - Forney Creek Pkwy & Site Driveway*			
Condition	Measure	NB NBT	SB SBT
AM Peak Hour			
2021 Build	LOS (Delay)	E (49.9)	C (20.6)
	Synchro 95th Q	-	-
	SimTraffic 95th Q	165'	99'
2026 Build	LOS (Delay)	E (49.9)	C (20.6)
	Synchro 95th Q	-	-
	SimTraffic Max Q	202'	119'
PM Peak Hour			
2021 Build	LOS (Delay)	C (18.6)	B (12.1)
	Synchro 95th Q	-	-
	SimTraffic 95th Q	107'	91'
2026 Build	LOS (Delay)	C (18.6)	B (12.1)
	Synchro 95th Q	-	-
	SimTraffic Max Q	124'	92'
*Stop-controlled approach assumed due to the presence of crosswalk(s)			

The egress and ingress movements at this intersection are proposed to be free-flow. However, to determine the anticipated LOS at this intersection, to accommodate pedestrians, the northbound and southbound approaches were modeled as stop control. Table 6.9A shows the northbound approach is anticipated to operate with moderate delays and the southbound approach is anticipated to operate with short delays. It should be noted that it, is unlikely the northbound and southbound movements will operate under stop control.

Additionally, an internal signal was coded to represent the student drop-off and loading zone. Figure 6.8B summarizes the anticipated cumulative queuing anticipated due to the loading zone. The queues are not anticipated to spill back beyond the available storage during staggered start conditions.

Table 6.9B - Pick-up/Drop-off Zone Queueing Summary*		
Condition	Measure	SB SBT
AM Peak Hour		
2021 Build	SimTraffic 95th Q	560'
2026 Build	SimTraffic Max Q	1277'
PM Peak Hour		
2021 Build	SimTraffic 95th Q	255'
2026 Build	SimTraffic Max Q	333'
*Based on 20-second pick-up/drop-off delay		

7.0 Mitigation Improvements

Based on information provided by NCDOT the following improvements were recommendations by others considered in the 2021 Background Conditions and 2021 Build Conditions in this traffic impact analysis.

Optimist Club Road at Triangle Circle

- A northbound left-turn lane with 200' of storage
- An eastbound right-turn lane with 350' of storage

Triangle Circle (South) at Triangle Circle

- An eastbound left-turn lane with 50' of storage.

NCDOT Project R-5712 at NC 16 Business at Triangle Circle/Unity Church Road

- Add turn lanes to the intersection and remove the split phasing

NCDOT also has plans to signalize the U-Turn bulbs for Optimist Club Drive at NC 16, these were included in the 2021 background and build conditions.

Based on information provided by NCDOT the following improvements were recommendations by others considered in the 2026 Build Conditions in this traffic impact analysis.

NCDOT Project U-6134 at NC 16 and Optimist Club Road

- Convert the intersection of Optimist Club Road at NC -16 to an interchange. This project would remove the existing U-Turn bulbs along NC-16 for Optimist Club Road. At the time of this study, there has not been a selected alternative for U-6134, therefore a diamond interchange was analyzed. U-6134 is slated for construction in 2026.

Based on the capacity analyses performed at each of the identified study intersections, along with review of the auxiliary turn-lane warrants contained herein, the following improvements have been identified to mitigate the impact of the proposed development on the adjacent street network for 2021 Build Conditions:

St James Church Road at Optimist Club Road

- Construction of a westbound right-turn lane with 100 feet of storage

Optimist Club Road at Forney Creek Parkway

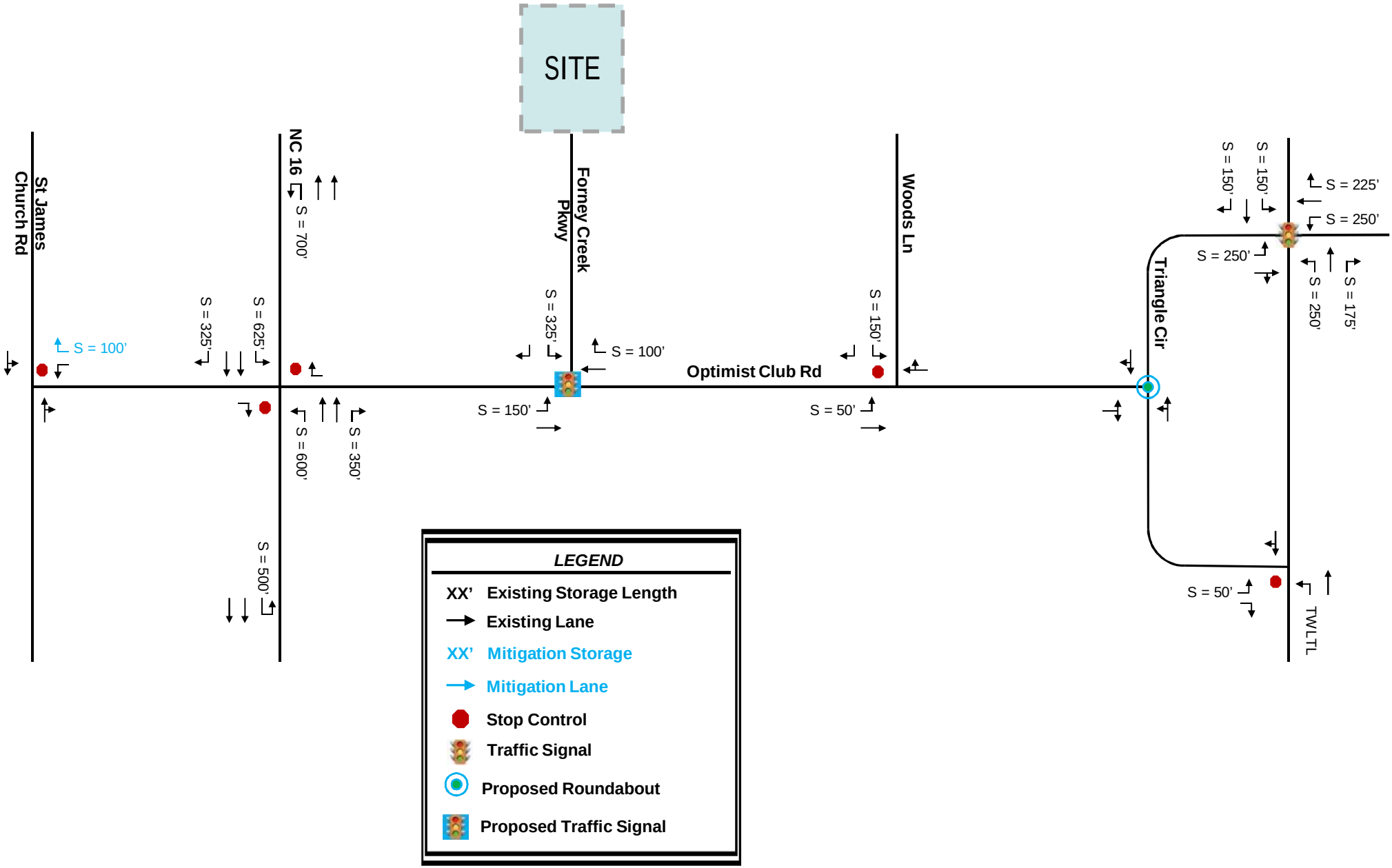
- Prior to the implementation of TIP project U-6134, signalize the intersection and provide for appropriate intersection phasing. It is recommended the eastbound left-turn movement operate with permitted-protected flashing yellow arrow phasing. The southbound right-turn is recommended to operate with permitted-overlap phasing.
- As a part of the implementation of TIP project U-6134, consider implementing an interchange configuration that incorporates the Forney Creek Parkway intersection.

Triangle Circle at Optimist Club Road

- Construction of a single lane roundabout with one entry and one exit per approach.

- ***This improvement would replace the need for a northbound left-turn lane and eastbound right-right turn lane as shown as an improvement by others in the Rivercross Charter TIA conducted by WSP in 2017.*
- If right-of-way is not available for a roundabout, consideration for a traffic signal is recommended

The mitigation improvements identified within the study area are shown in **Figure 7.1**. The improvements shown on this figure are subject to approval by NCDOT and Lincoln County. All additions and attachments to the State and County roadway system shall be properly permitted, designed and constructed in conformance to standards maintained by the agencies.



Kimley»Horn	West Lake Preparatory Academy Traffic Impact Analysis	Identified Mitigation Improvements	Figure 7.1