

April 2022



# CREEKVIEW CROSSING RESIDENTIAL

## Traffic Impact Analysis

LOCATED IN KNIGHTDALE, NC

Prepared for:

Ellis Developments Group  
6801 Falls of Neuse Road, #108  
Raleigh, North Carolina 27615

Prepared by:

Exult Engineering, PC  
P.O. Box 99277  
Raleigh, NC 27624



This document entitled Creekview Crossing Residential Traffic Impact Analysis was prepared by Exult Engineering, PC for the account of Ellis Developments Group. The material in it reflects Exult Engineering's best judgement in light of the information available to them at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Exult Engineering, PC accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Creekview Crossing Residential Traffic Impact Analysis

Prepared by: *Lisa Lundeen* (sign)

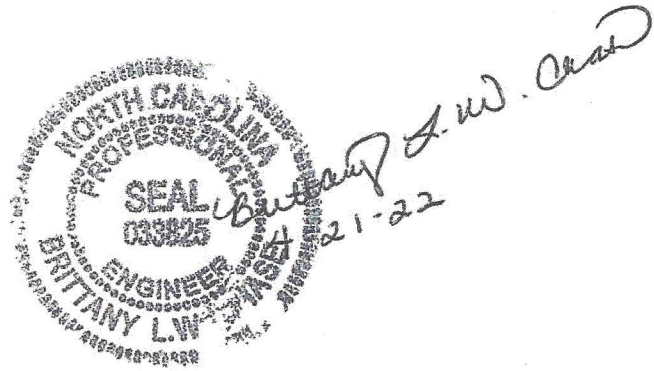
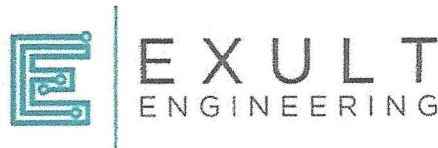
Date: 4-21-2022

Lisa Lundeen, PE

Reviewed by: *Brittany Chase* (sign)

Date: 4-21-22

Brittany Chase, PE



**TABLE OF CONTENTS**

EXECUTIVE SUMMARY ..... 5

INTRODUCTION ..... 7

EXISTING CONDITIONS ..... 10

FUTURE CONDITIONS ..... 14

PROPOSED SITE ..... 17

CAPACITY ANALYSIS ..... 22

Widewaters Parkway at Laurens Way ..... 25

Widewaters Parkway at Flatrock Park Drive ..... 27

Widewaters Parkway at Knightdale Boulevard ..... 28

Laurens Way at Lynnwood Road ..... 30

Lynwood Road at Hodge Road ..... 31

Carrington Drive at Smithfield Road ..... 33

Crosstie Street at Bethlehem Road/First Avenue ..... 35

RECOMMENDATIONS ..... 36

APPENDIX ..... 38

**LIST OF FIGURES**

Figure 1: Vicinity Map ..... 8

Figure 2: Site Plan..... 9

Figure 3: Existing Lane Geometry ..... 12

Figure 4: Existing 2022 AM and PM Peak Hour Traffic Volumes ..... 13

Figure 5: 2026 AM Peak Hour No-Build Traffic..... 15

Figure 6: 2026 PM Peak Hour No-Build Traffic ..... 16

Figure 7: Site Traffic Distribution and Assignment ..... 19

Figure 8: 2026 AM Peak Hour Buildout Traffic ..... 20

Figure 9: 2026 PM Peak Hour Buildout Traffic..... 21

Figure 10: Recommended Lane Geometry ..... 37

**LIST OF TABLES**

Table 1: Trip Generation ..... 17

Table 2: Highway Capacity Manual (LOS and Delay) ..... 22

Table 3: Level-of-Service: Widewaters Parkway at Laurens Way (Unsignalized) ..... 25

Table 4: Level-of-Service: Widewaters Parkway at Flatrock Park Drive (Roundabout)..... 27

Table 5: Level-of-Service: Widewaters Parkway at Knightdale Boulevard (US 64 Business) (Signalized) .. 29

Table 6: Level-of-Service: Laurens Way at Lynnwood Road (Unsignalized) ..... 30

Table 7: Level-of-Service: Lynwood Road at Hodge Road (Unsignalized)..... 32

Table 8: Level-of-Service: Carrington Drive at Smithfield Road (Unsignalized)..... 34

Table 9: Level-of-Service: Crosstie Street at Bethlehem Road/First Avenue (Unsignalized)..... 35

## EXECUTIVE SUMMARY

The proposed 89.5-acre site is located south of Laurens Way, west of St. Johns Street in Knightdale, North Carolina. The property is currently zoned as Rural Transition. The proposed development consists of 151 single family residential units, 68 residential townhome units, and 72 multifamily apartment units. The proposed site is to be developed within four years by the year 2026 and does require rezoning. The proposed development will be accessed by cross-connectivity to Widewaters Parkway and Southampton Drive. The purpose of this Traffic Impact Analysis (TIA) is to analyze the potential traffic impacts of the proposed development on the surrounding roadway network and to identify any roadway improvements necessary to mitigate the impact of the project traffic.

A TIA Scoping MOU was prepared and submitted to the Town of Knightdale and the North Carolina Department of Transportation (NCDOT). The Scoping MOU and subsequent correspondence regarding the scope of the TIA is included in the Appendix of this report. The *NCDOT Congestion Management Capacity Analysis Guidelines* were referenced to perform this traffic study.

As determined by the Town of Knightdale and NCDOT, the study area includes:

1. Widewaters Parkway at Laurens Way
2. Widewaters Parkway at Flatrock Park Drive (roundabout)
3. Widewaters Parkway at Knightdale Boulevard
4. Laurens Way at Lynnwood Road
5. Lynnwood Road at Hodge Road
6. Smithfield Road at Carrington Drive
7. First Avenue/Bethlehem Road at Crosstie Street

The proposed development is expected to generate 2,242 daily trips, 160 AM peak hour trips (42 entering, 118 exiting), and 213 PM peak hour trips (132 entering, 81 exiting).

Based on coordination with the Town, a 3% annual growth rate was applied to the existing traffic volumes to determine 2026 no-build traffic volumes. Approved developments are developments in the area of the proposed site that have been approved but not yet constructed. The traffic from these approved developments is expected to contribute to the no-build traffic volumes projected for the study intersections. According to the Town and NCDOT, there are no approved developments to consider in the future year analysis.

To determine the traffic impacts of the proposed development, capacity analyses were performed at the study intersections under the following scenarios:

- Existing (2022) Traffic Conditions
- No-Build (2026) Traffic Conditions
- Buildout (2026) Traffic Conditions
- Buildout (2026) Traffic Conditions with Recommended Improvements

NCDOT and the Town have indicated there are no roadway improvements committed to by others to include in the future analysis for the study intersections.

Due to existing pedestrian safety concerns, the following pedestrian improvements are recommended to be constructed **by others**:

Widewaters Parkway at Laurens Way:

- Re-stripe the crosswalk on the north leg of Widewaters Parkway, preferably to a 10-foot wide high-visibility crosswalk.
- Relocate the existing stop bars on the east and west leg approaches of Laurens Way such that the minimum distance between the stop bar and crosswalk is four (4) feet.

Based on the capacity analysis presented herein, the following roadway improvements are recommended to be completed **by the developer** to accommodate buildout site traffic volumes:

Hodge Road at Lynnwood Road:

- Construct a northbound right-turn lane on Hodge Road to provide 50 feet of full-width storage and appropriate taper.

Carrington Drive at Smithfield Road:

- Stripe the existing eastbound approach of Carrington Drive to provide an exclusive left-turn lane and an exclusive right-turn lane.

The following roadway improvements are required to be constructed **by the developer** within the proposed site:

- Construct the extension of Widewaters Parkway to provide a Future Town-Maintained Collector Street in accordance with the Town's *Street Network Plan*.
- Construct the extension of Southampton Drive to provide a Future Town-Maintained Collector Street in accordance with the Town's *Street Network Plan*.

## INTRODUCTION

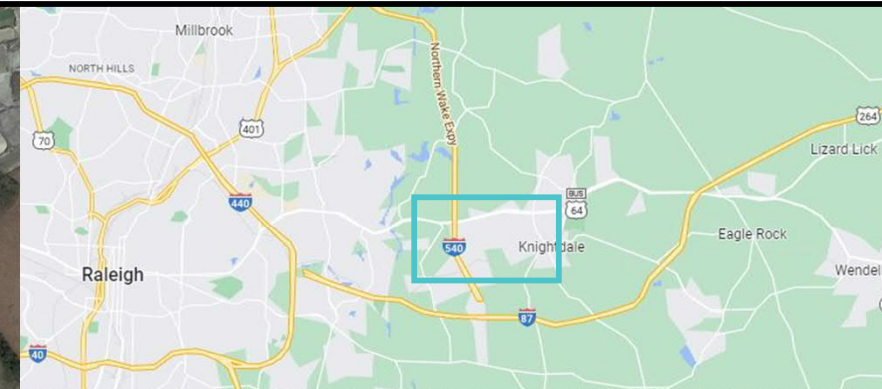
The proposed 89.5-acre site is located south of Laurens Way, west of St. Johns Street in Knightdale, North Carolina, as shown on Figure 1. The property is currently zoned as Rural Transition. The proposed development consists of 151 single family residential units, 68 residential townhome units, and 72 multifamily apartment units. The property does require rezoning to accommodate the proposed site. As shown on Figure 2, the proposed development will be accessed by cross-connectivity to Widewaters Parkway and Southampton Drive. The proposed site is to be developed within four years by the year 2026

The purpose of this TIA is to analyze the potential traffic impacts of the proposed development on the surrounding roadway network and to identify any roadway improvements necessary to mitigate the impact of the project traffic. This study includes the analysis of the following traffic scenarios:

- Existing (2022) Traffic Conditions
- No-Build (2026) Traffic Conditions
- Buildout (2026) Traffic Conditions
- Buildout (2026) Traffic Conditions with Recommended Improvements

Based on coordination with the Town, a 3% annual growth rate was applied to the existing traffic volumes to determine 2026 no-build traffic volumes. Approved developments are developments in the area of the proposed site that have been approved but not yet constructed. The traffic from these approved developments is expected to contribute to the no-build traffic volumes projected for the study intersections. According to the Town and NCDOT, there are no approved developments to consider in the future year analysis.





# Creekview Crossing Residential TIA

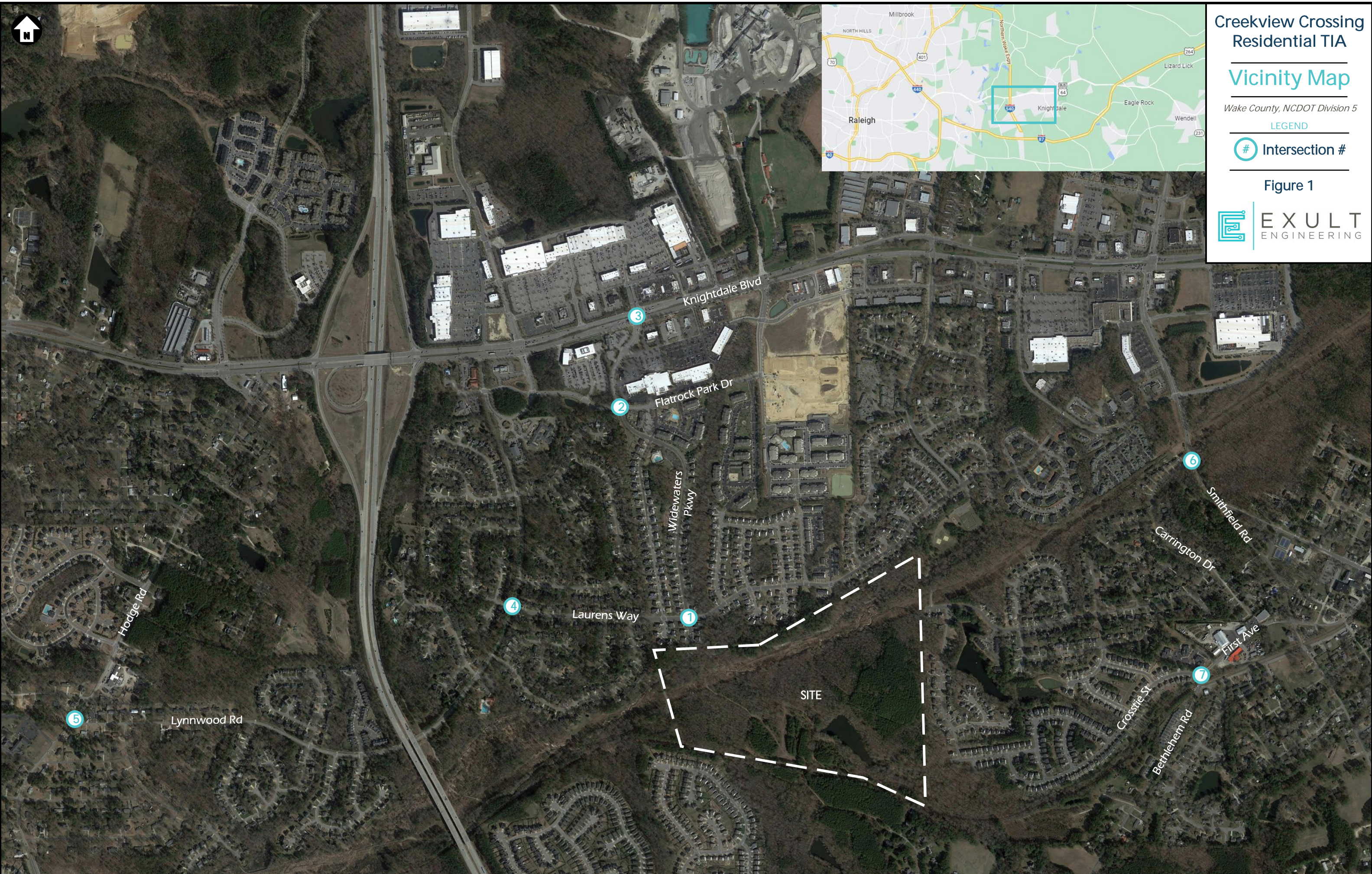
## Vicinity Map

Wake County, NCDOT Division 5

LEGEND

# Intersection #

Figure 1





Proposed Site Plan




Prepared by Strong Rock

Wake County, NCDOT Division 5

Figure 2



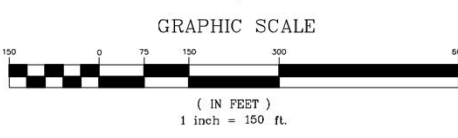
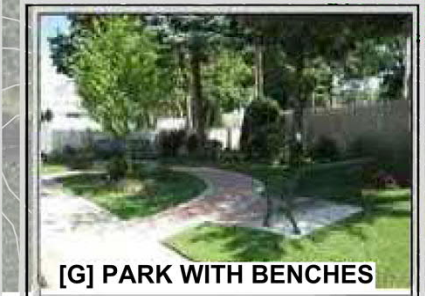
**LEGEND:**

-  OPEN SPACE
-  POND
-  ROAD



**PRELIMINARY SKETCH "D"**

3 STORY TOWNHOMES	20' x 100' LOTS	21 UNITS (7%)
TOWNHOMES	20' x 100' LOTS	47 UNITS (16%)
SINGLE FAMILY	30' x 110' LOTS	78 UNITS (27%)
SINGLE FAMILY	60' x 120' LOTS	52 UNITS (18%)
SINGLE FAMILY	70' x 120' LOTS	21 UNITS (7%)
BUILDING	135' x 70' LOTS	72 UNITS (25%)
		<b>291 UNITS</b>





## EXISTING CONDITIONS

The proposed 89.5-acre site is located south of Laurens Way, west of St. Johns Street in Knightdale, North Carolina. The property is currently zoned as Rural Transition. Per the Town and NCDOT, the study area for the proposed development includes the following intersections:

1. Widewaters Parkway at Laurens Way
2. Widewaters Parkway at Flatrock Park Drive (roundabout)
3. Widewaters Parkway at Knightdale Boulevard
4. Laurens Way at Lynnwood Road
5. Lynnwood Road at Hodge Road
6. Smithfield Road at Carrington Drive
7. First Avenue/Bethlehem Road at Crosstie Street

A site visit was performed on Wednesday, March 16, 2022 to observe existing field conditions, such as lane geometry, posted speed limits, and traffic operations. Figure 3 shows the Existing Lane Geometry at the above existing study intersections.

Peak-hour turning movement traffic counts were performed at the existing study intersections during the AM (7:00 – 9:00) and PM (4:00 – 6:00) peak periods on Tuesday, March 15, 2022 and on Wednesday, March 30, 2022. Traffic count data is included in the Appendix of this report. Any traffic count imbalances between study intersections were justified due to the number of access points and land uses located between study intersections. Figure 4 shows the 2022 AM and PM Peak Hour Existing Traffic Volumes for the study intersections.

Widewaters Parkway is currently a 2-lane undivided roadway with a posted speed limit of 25 miles per hour (mph) in the project vicinity. Widewaters Parkway is classified as an Existing Town-Maintained Collector on the Town of Knightdale's *Street Network Plan* and a Main Street on the Town's *Functional Classification Plan*. Assuming the PM peak hour traffic volume accounts for approximately 10% of the daily traffic volume, Widewaters Parkway has an estimated 2022 ADT volume of 2,550 vehicles per day.

Laurens Way is currently a 2-lane undivided roadway with a posted speed limit of 25 miles per hour (mph) in the project vicinity. Laurens Way is classified as an Existing Town-Maintained Collector on the Town of Knightdale's *Street Network Plan* and a Main Street on the Town's *Functional Classification Plan*. Assuming the PM peak hour traffic volume accounts for approximately 10% of the daily traffic volume, Laurens Way has an estimated 2022 ADT volume of 1,920 vehicles per day.

Flatrock Park Drive is currently a 2-lane undivided roadway with a posted speed limit of 25 miles per hour (mph) in the project vicinity. Flatrock Park Drive is classified as an Existing Town-Maintained Collector on Town of Knightdale's *Street Network Plan* and a Main Street on the Town's *Functional Classification Plan*. Assuming the PM peak hour traffic volume accounts for approximately 10% of the daily traffic volume, Flatrock Park Drive has an estimated 2022 ADT volume of 1,960-3,880 vehicles per day.

Knightdale Boulevard (U.S. 64 Business) is currently a 6-lane roadway with a posted speed limit of 45 miles per hour (mph) in the project vicinity. Knightdale Boulevard is classified as an Existing State-Maintained Arterial on Town of Knightdale's *Street Network Plan* and a Six-Lane Boulevard on the Town's *Functional Classification Plan*. Knightdale Boulevard has a 2019 average annual daily traffic (AADT) volume of 38,500 vehicles per day on the *NCDOT Interactive Traffic Volume Map*.



Lynnwood Road is currently a 2-lane undivided roadway with a posted speed limit of 25 miles per hour (mph) in the project vicinity. Lynnwood Road is classified as an Existing Town-Maintained Collector on Town of Knightdale's *Street Network Plan* and an Avenue on the Town's *Functional Classification Plan*. Assuming the PM peak hour traffic volume accounts for approximately 10% of the daily traffic volume, Lynnwood Road has an estimated 2022 ADT volume of 2,520 vehicles per day.

Hodge Road is currently a 2-lane undivided roadway with a posted speed limit of 45 miles per hour (mph) in the project vicinity. Hodge Road is classified as an Existing State-Maintained Arterial on Town of Knightdale's *Street Network Plan*. Hodge Road is designated as a Boulevard south of Lynnwood Road and an Avenue north of Lynnwood Road on the Town's *Functional Classification Plan*. Hodge Road has a 2020 average annual daily traffic (AADT) volume of 8,000 vehicles per day on the *NCDOT Interactive Traffic Volume Map*.

Smithfield Road is currently a 2-lane undivided roadway with a posted speed limit of 35 miles per hour (mph) in the project vicinity. Smithfield Road is classified as an Existing State-Maintained Arterial on Town of Knightdale's *Street Network Plan*. Smithfield Road is classified as an Urban Avenue north of Carrington Drive and a Main Street south of Carrington Drive on the Town's *Functional Classification Plan*. Smithfield Road has a 2019 average annual daily traffic (AADT) volume of 12,500 vehicles per day on the *NCDOT Interactive Traffic Volume Map*.

Carrington Drive is currently a 2-lane undivided roadway with a posted speed limit of 25 miles per hour (mph) in the project vicinity. Carrington Drive is classified as a local road on the *NCDOT Functional Class Map*. Assuming the PM peak hour traffic volume accounts for approximately 10% of the daily traffic volume, Carrington Drive has an estimated 2022 ADT volume of 1,570 vehicles per day.








Crosstie Street is currently a 2-lane undivided roadway with a posted speed limit of 25 miles per hour (mph) in the project vicinity. Crosstie Street is classified as a local road on the *NCDOT Functional Class Map* and a Main Street on the Town's *Functional Classification Plan*. Assuming the PM peak hour traffic volume accounts for approximately 10% of the daily traffic volume, Crosstie Street has an estimated 2022 ADT volume of 1,210 vehicles per day.

First Avenue/Bethlehem Road is currently a 2-lane undivided roadway with a posted speed limit of 45 miles per hour (mph) in the project vicinity. First Avenue/Bethlehem Road is classified as an Existing State-Maintained Arterial on Town of Knightdale's *Street Network Plan* and an Avenue on the Town's *Functional Classification Plan*. First Avenue/Bethlehem Road has a 2019 average annual daily traffic (AADT) volume of 9,100 vehicles per day on the *NCDOT Interactive Traffic Volume Map*.

# Creekview Crossing Residential TIA

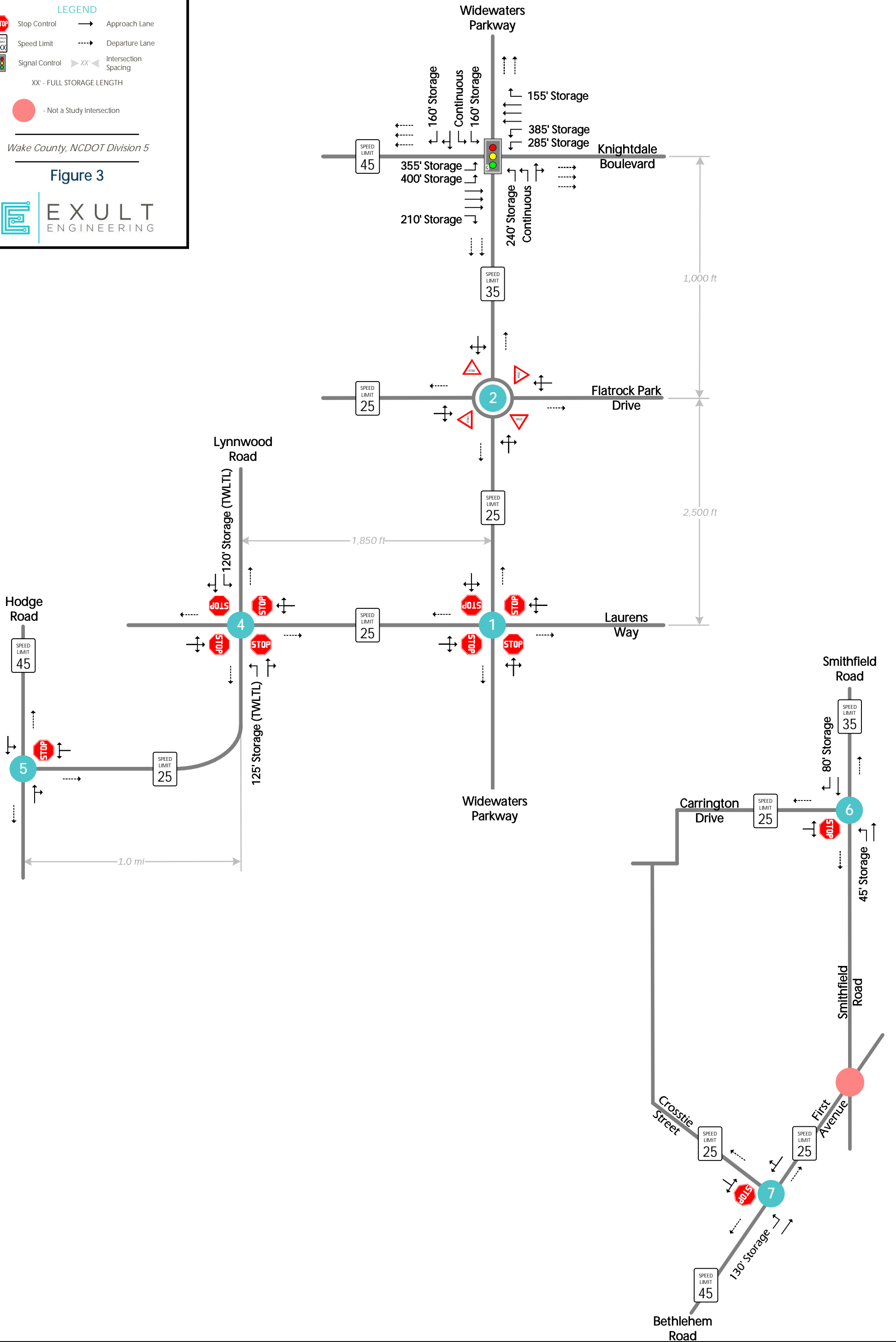
## Existing Lane Geometry

### LEGEND

-  Stop Control       Approach Lane
-  Speed Limit       Departure Lane
-  Signal Control       Intersection Spacing
- XX' - FULL STORAGE LENGTH
-  - Not a Study Intersection

Wake County, NCDOT Division 5

Figure 3





# Creekview Crossing Residential TIA

## Existing 2022 AM and PM Traffic Volumes



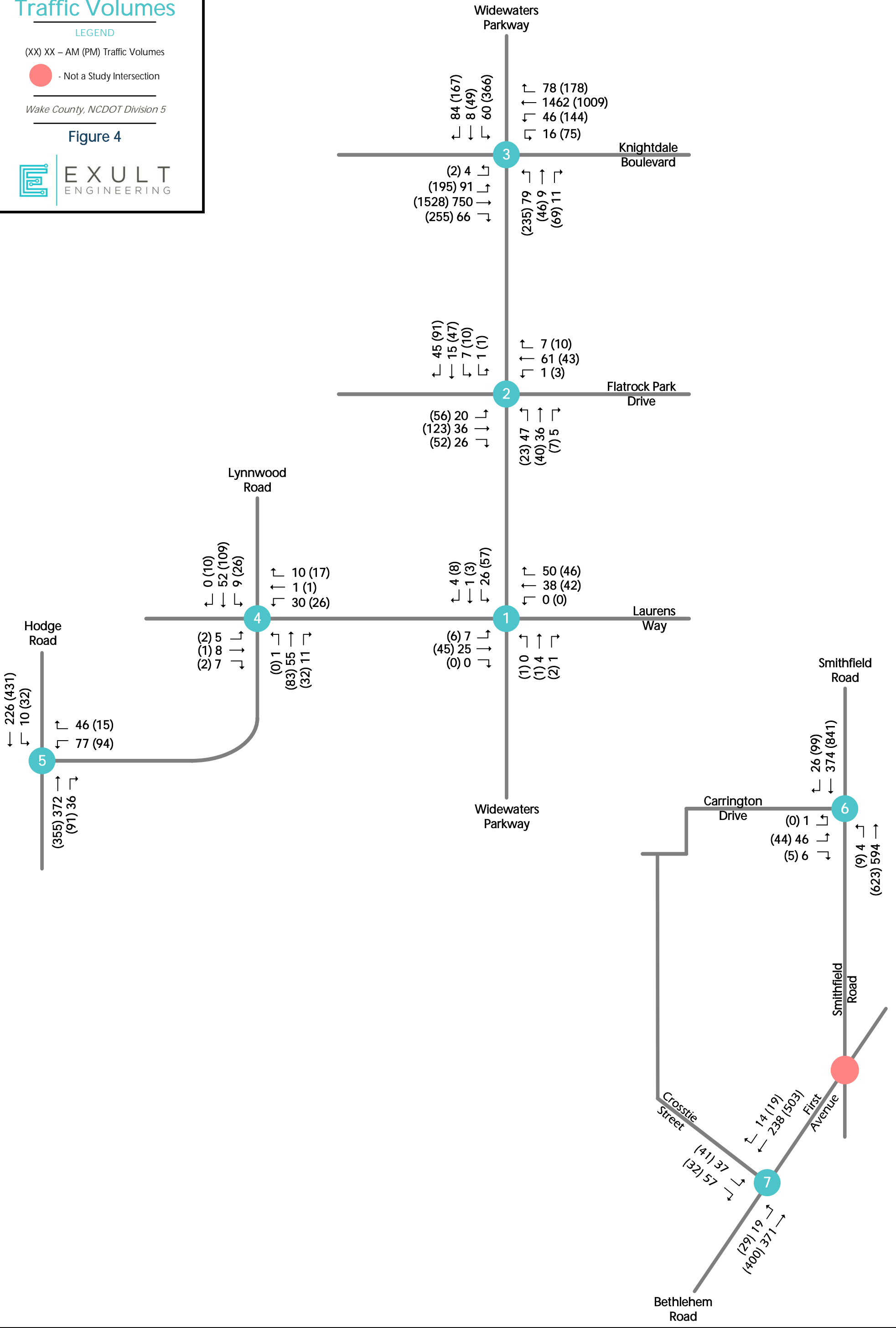
### LEGEND

(XX) XX – AM (PM) Traffic Volumes

● - Not a Study Intersection

Wake County, NCDOT Division 5

Figure 4



## FUTURE CONDITIONS

The proposed site is to be developed within four years by the year 2026. The projected 2026 no-build traffic volumes consist of existing 2022 traffic volumes plus no-build growth. As required by the Town, an annual 3% growth rate was applied to determine 2026 no-build traffic volumes.

Approved developments are developments in the area of the proposed site that have been approved but not yet constructed. The traffic from these approved developments is expected to contribute to the no-build traffic volumes projected for the study intersections. According to the Town and NCDOT, there are no approved developments to consider in the future year analysis.

The projected no-build traffic volumes at the study intersections are shown in Figure 5 (2026 AM Peak Hour No-Build Traffic Volumes) and Figure 6 (2026 PM Peak Hour No-Build Traffic Volumes). Traffic volume calculations are also included in the Appendix of this report.

According to NCDOT and the Town, there are no roadway improvements committed to by others to include in the future year analysis.



# Creekview Crossing Residential TIA

## 2026 AM Peak Hour No-Build Traffic



### LEGEND

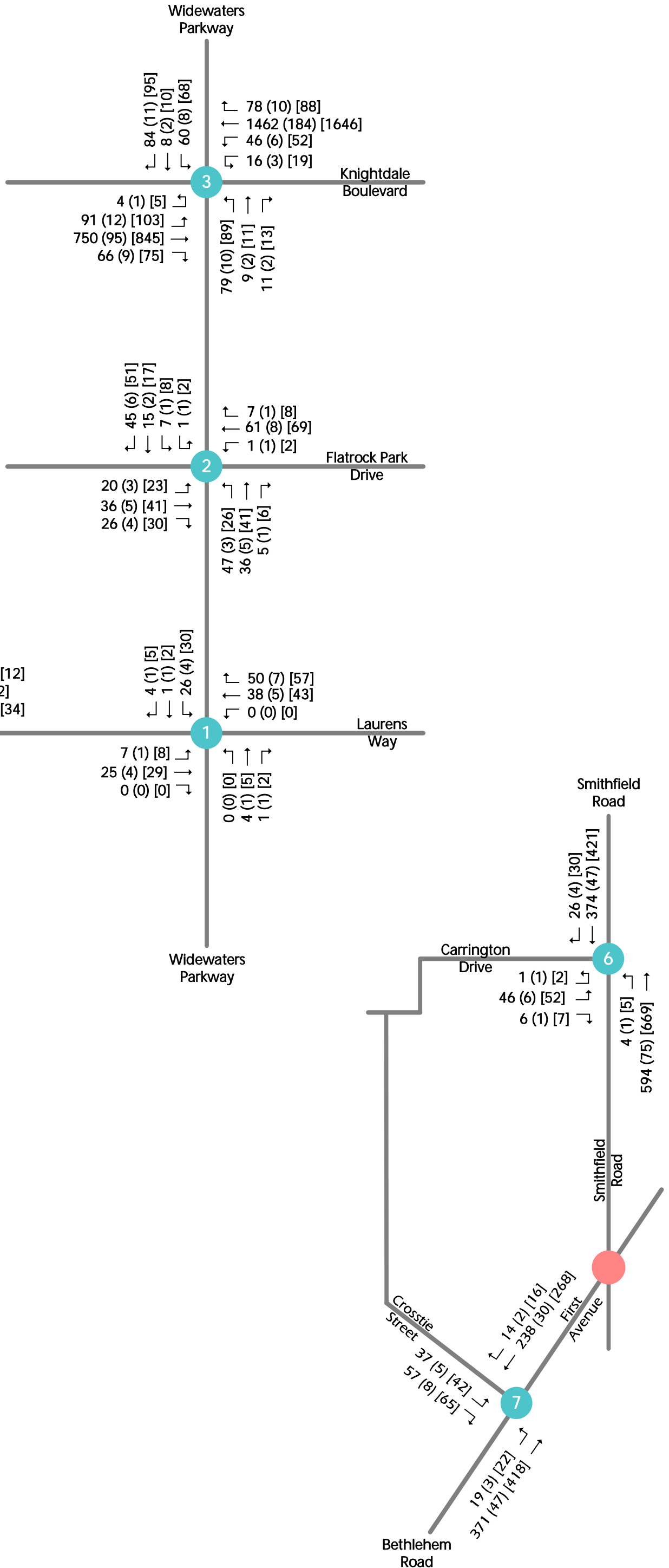
XX – Existing Traffic  
 (XX) – 2026 No-Build Traffic Due to Growth Rate  
 [XX] – 2026 Total No-Build Traffic

XX + (XX) = [XX]

- Not a Study Intersection

Wake County, NCDOT Division 5

Figure 5




# Creekview Crossing Residential TIA

## 2026 PM Peak Hour No-Build Traffic

### LEGEND

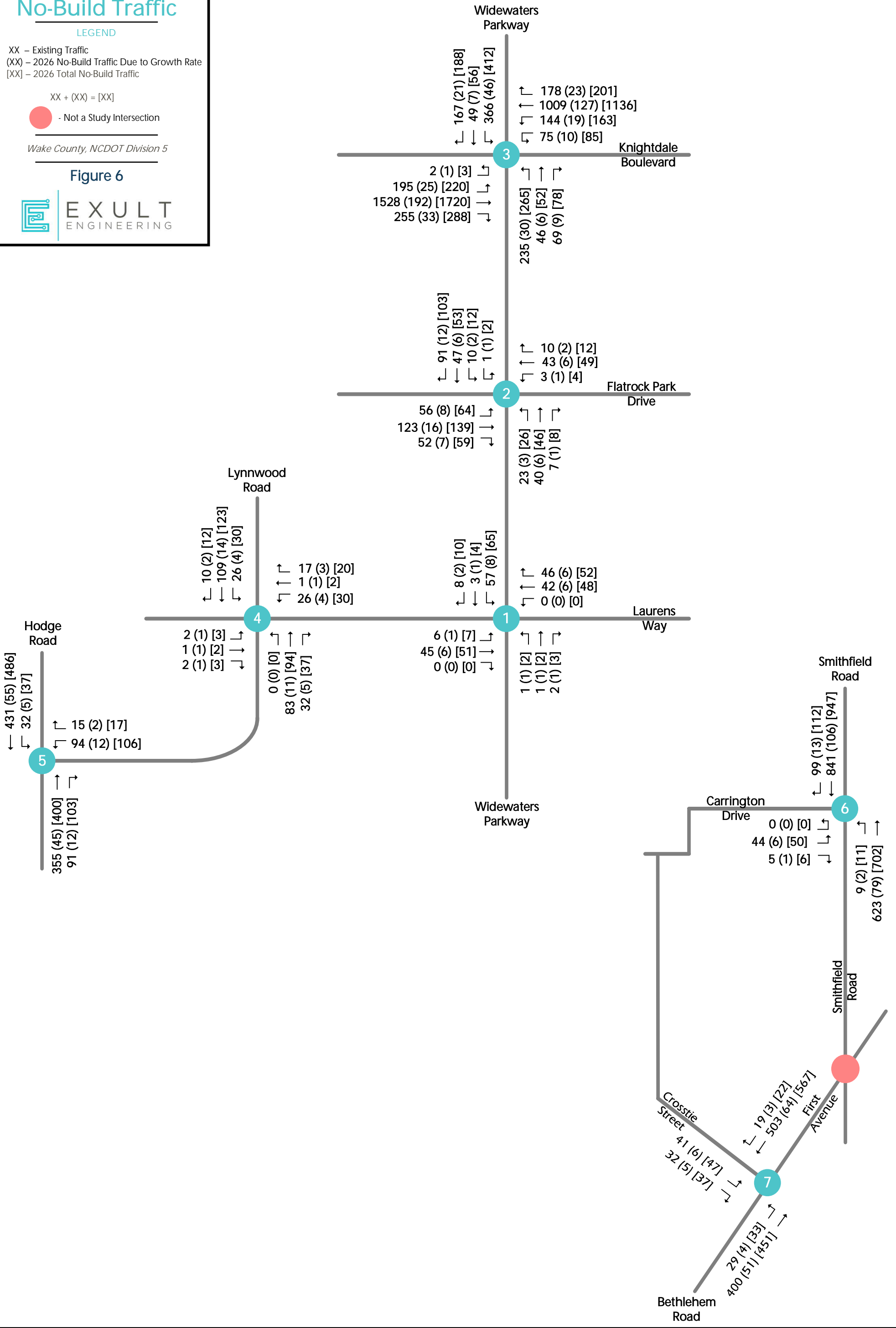
XX – Existing Traffic  
 (XX) – 2026 No-Build Traffic Due to Growth Rate  
 [XX] – 2026 Total No-Build Traffic

XX + (XX) = [XX]

 - Not a Study Intersection

Wake County, NCDOT Division 5

Figure 6



## PROPOSED SITE

The proposed 89.5-acre site is located south of Laurens Way, west of St. Johns Street in Knightdale, North Carolina. The property is currently zoned as Rural Transition. The proposed development consists of 151 single family residential units, 68 residential townhome units, and 72 multifamily apartment units. The proposed site is to be developed within four years by the year 2026 and does require rezoning. The proposed development will be accessed by cross-connectivity to Widewaters Parkway and Southampton Drive.

Table 1 shows the projected trip generation for the proposed development. The trip generation was based on rates published in the most recent edition of the Institute of Transportation Engineer’s *Trip Generation Manual* (11<sup>th</sup> Edition). The NCDOT Congestion Management Rates vs. Equations spreadsheet was used for guidance. The proposed development is expected to generate 2,242 daily trips, 160 AM peak hour trips (42 entering, 118 exiting), and 213 PM peak hour trips (132 entering, 81 exiting).

**Table 1: Trip Generation**

Land Use			Daily	AM Peak Hour			PM Peak Hour		
				Total	Enter	Exit	Total	Enter	Exit
210: Single Family Detached Housing	151	d.u.	1,476	109	28	81	147	93	54
215: Single Family Attached Housing	68	d.u.	468	30	9	21	37	21	16
221: Multifamily Housing (Mid-Rise)	72	d.u.	298	21	5	16	29	18	11
<b>Total</b>			<b>2,242</b>	<b>160</b>	<b>42</b>	<b>118</b>	<b>213</b>	<b>132</b>	<b>81</b>

References: *Trip Generation Manual*, 11<sup>th</sup> Edition, Institute of Transportation Engineers, September 2021

Based on the existing traffic patterns and surrounding opportunities to access retail and office developments, the proposed trip distribution for the site is as follows:

- 25% to/from the west on Knightdale Boulevard
- 12% to/from the east on Knightdale Boulevard
- 5% to/from the north on Widewaters Parkway
- 10% to/from the west on Flatrock Park Drive
- 2% to/from the east on Flatrock Park Drive
- 3% to/from the east on Laurens Way
- 5% to/from the north on Lynnwood Road
- 10% to/from the north on Hodge Road
- 10% to/from the south on Hodge Road
- 3% to/from the north on Smithfield Road
- 5% to/from the south on Smithfield Road
- 2% to/from the east on First Avenue
- 8% to/from the west on Bethlehem Road

The trip generation methodology and site distributions were previously approved by the Town. Figure 7 shows the Site Traffic Distribution and Assignment at each of the study intersections. The trip assignment



was applied to the trips generated for the proposed development to determine the projected AM and PM peak hour site traffic. The projected AM and PM peak hour site traffic volumes were added to the 2026 no-build traffic volumes to determine the buildout traffic volumes at the study intersections. The projected buildout traffic volumes at the study intersections are shown in Figure 8 (2026 AM Peak Hour Buildout Traffic Volumes) and Figure 9 (2026 PM Peak Hour Buildout Traffic Volumes).

In accordance with the Town's *Street Network Plan*, the proposed site plan incorporates the future extensions of Widewaters Parkway and Southampton Drive through the development. While this interconnectivity will allow for new travel patterns, background traffic volumes were not reassigned throughout the roadway network. Given the surrounding land uses and opportunities to access major thoroughfares, the potential future directional shift in background traffic volumes is expected to counterbalance the impact of the opposing directional shift in traffic.

# Creekview Crossing Residential TIA

## Site Traffic Distribution & Assignment

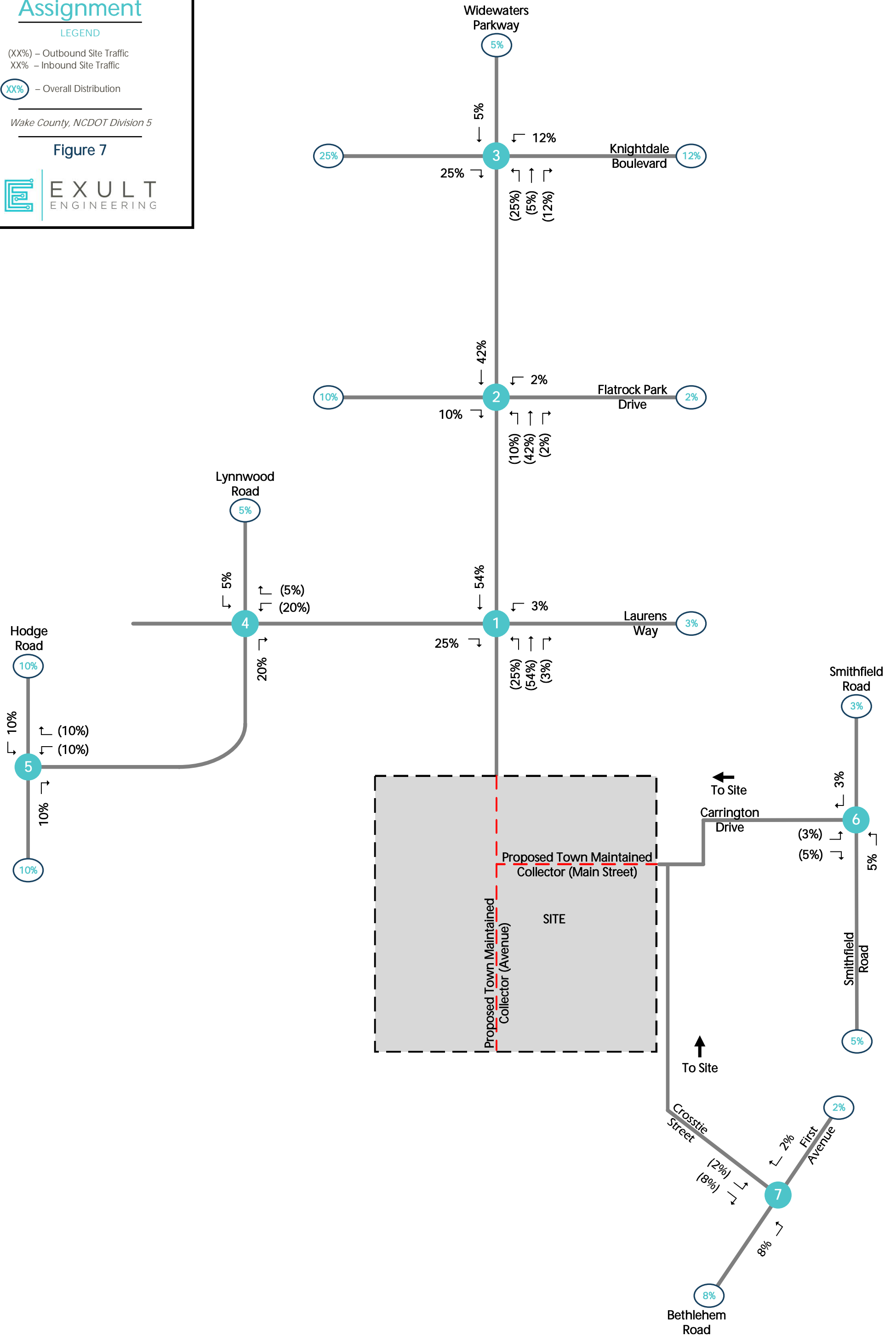
### LEGEND

(XX%) – Outbound Site Traffic  
 XX% – Inbound Site Traffic

(XX%) – Overall Distribution

Wake County, NCDOT Division 5

Figure 7




# Creekview Crossing Residential TIA

## 2026 AM Peak Hour Buildout Traffic

### LEGEND

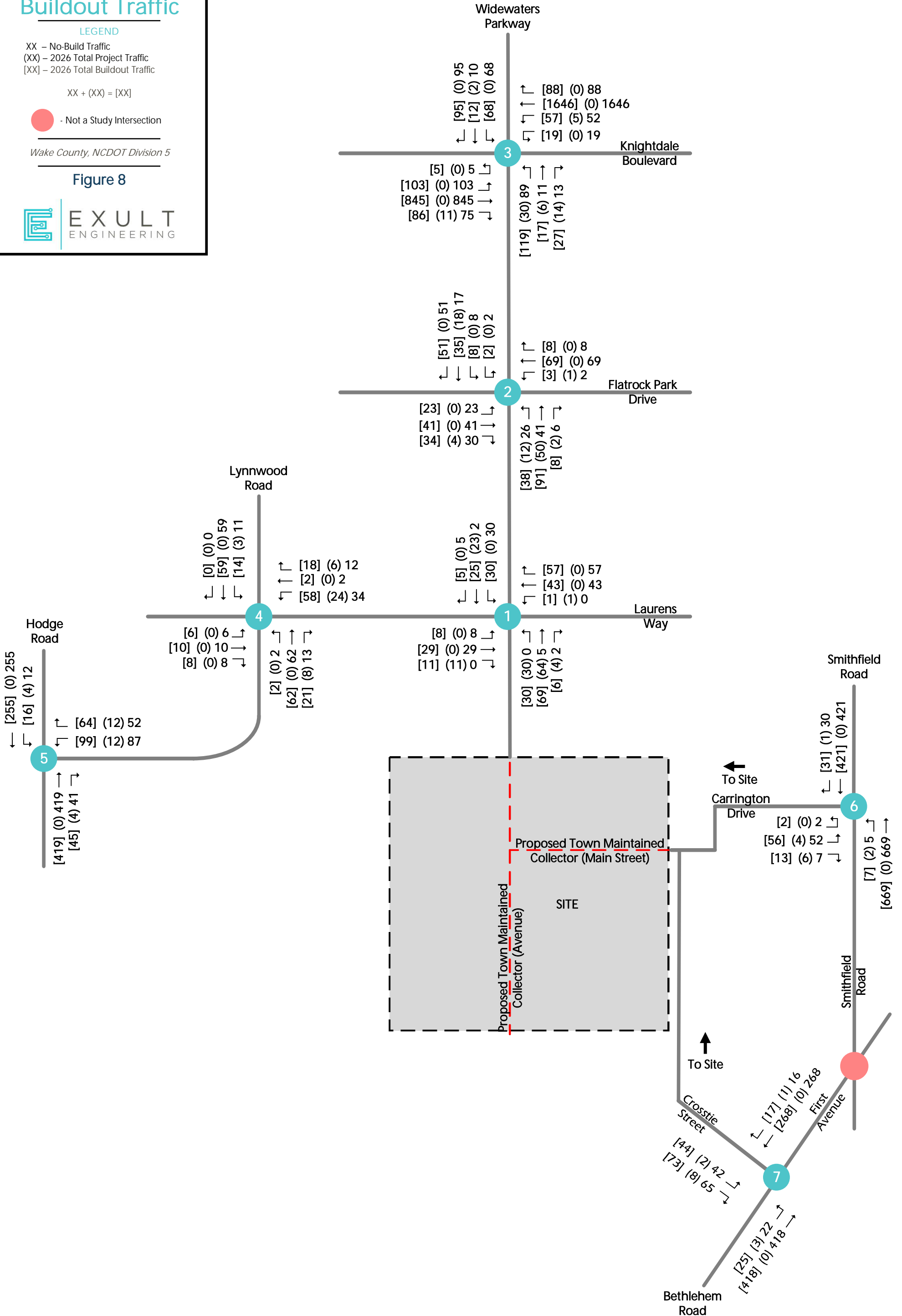
XX – No-Build Traffic  
 (XX) – 2026 Total Project Traffic  
 [XX] – 2026 Total Buildout Traffic

XX + (XX) = [XX]

 - Not a Study Intersection

Wake County, NCDOT Division 5

Figure 8






# Creekview Crossing Residential TIA

## 2026 PM Peak Hour Buildout Traffic

### LEGEND

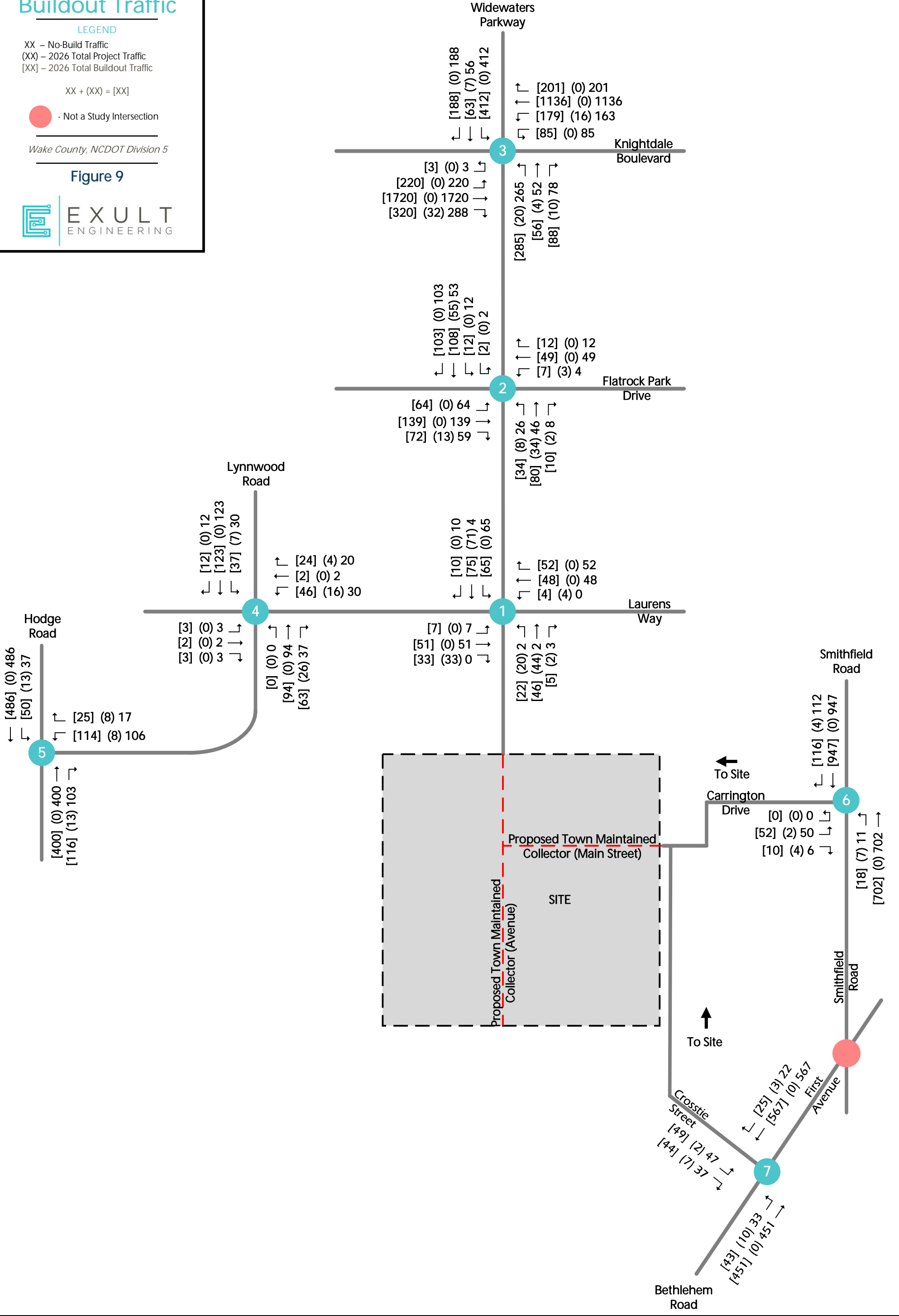
XX – No-Build Traffic  
 (XX) – 2026 Total Project Traffic  
 [XX] – 2026 Total Buildout Traffic

XX + (XX) = [XX]

 - Not a Study Intersection

Wake County, NCDOT Division 5

Figure 9



## CAPACITY ANALYSIS

The intersections identified within the study area were analyzed under 2022 existing, 2026 no-build, and 2026 buildout conditions to identify the potential traffic impact of the proposed development on the roadway network. Necessary roadway improvements to mitigate the anticipated impact of the proposed site traffic were recommended based on the level-of-service (LOS) analysis results.

The proposed site is to be developed within five years by the year 2026. This study includes the analysis of the following traffic scenarios:

- Existing (2022) Traffic Conditions
- No-build (2026) Traffic Conditions
- Buildout (2026) Traffic Conditions
- Buildout (2026) Traffic Conditions with Recommended Improvements

LOS is a qualitative measurement of traffic operations that is a measure of delay time. The Transportation Research Board's *Highway Capacity Manual* (HCM) defines six levels of service for intersections with LOS "A" representing the best operating condition and LOS "F" representing the worst. The following table summarizes the criteria for signalized intersections and stop-controlled intersections.

**Table 2: Highway Capacity Manual (LOS and Delay)**

Signalized Intersection		Stop-Controlled Intersection	
Level-of-Service (LOS)	Average Control Delay (Seconds per Vehicles)	Level-of-Service (LOS)	Average Control Delay (Seconds per Vehicle)
A	$\leq 10.0$	A	$\leq 10.0$
B	$> 10.0$ and $\leq 20.0$	B	$> 10.0$ and $\leq 15.0$
C	$> 20.0$ and $\leq 35.0$	C	$> 15.0$ and $\leq 25.0$
D	$> 35.0$ and $\leq 55.0$	D	$> 25.0$ and $\leq 35.0$
E	$> 55.0$ and $\leq 80.0$	E	$> 35.0$ and $\leq 50.0$
F	$> 80.0$	F	$> 50.0$

Version 10.3 of Synchro Professional software was used to determine the LOS, delay, and expected queue length at the signalized and unsignalized intersections. SimTraffic was also used to determine the maximum queue length experienced at the study intersections. This software is based on the analysis procedures defined in the HCM. For unsignalized intersections, Synchro reports were created using the HCM 6<sup>th</sup> Edition option for unsignalized intersections. Queue lengths for the turn lanes are shown in the summary tables. Detailed Synchro and SimTraffic reports are included in the Appendix of this report.

LOS for a two-way stop-controlled (TWSC) intersection is determined by the control delay and is defined for the minor approaches. Control delay includes initial deceleration delay, queue move-up time, stopped



delay, and final acceleration delay. With respect to field measurements, this summation of control delay is defined as the total time elapsed from the time a vehicle stops at the end of the queue to the time the vehicle departs from the stop line. Capacity analysis results between LOS A and LOS C for the minor street stop-controlled approaches are assumed to represent short delays. Results between LOS D and LOS E for the minor street stop-controlled approaches are assumed to represent moderate delays, and LOS F for the minor street stop-controlled approaches is assumed to represent long delays. It is typical for minor street stop-controlled approaches and driveways intersecting major streets to experience long delays during peak hours, particularly for left-turn movements. However, the majority of the traffic moving through the intersection experiences little or no delay on the major street approaches.

### Capacity Analysis Inputs

The *NCDOT Congestion Management Capacity Analysis Guidelines* were referenced to perform this traffic study. The following inputs were used for all intersections:

- Peak Hour Factor (PHF) was based on existing count data by intersection for existing scenarios. For no-build and buildout scenarios, a PHF of 0.90 was used.
- Heavy vehicle (HV%) percentages were based on existing count data by intersection for existing scenarios. To remain conservative, the heavy vehicle percentage was set to 2% for no-build and buildout scenarios.
- Right-turns on red were not permitted in any scenario, unless otherwise justified in the intersection summary section.
- For allowable movements where zero (0) volumes are projected, a value of four (4) was used in the Synchro capacity analysis model.

For unsignalized intersections, queue length for HCM from Synchro is given in terms of number of vehicles. To convert to queue length in feet, an estimated 25'/vehicle was applied.

As recommended in the *NCDOT Congestion Management Capacity Analysis Guidelines*, SIDRA 9 software was utilized for the roundabout analysis. Three Measurements of Effectiveness (MOEs) are typically used to estimate the performance of a roundabout design: degree of saturation, delay, and queue length. Each measure provides a distinct perspective on roundabout's operation under specific traffic and geometric conditions.

- *Degree of saturation* is the ratio of the demand at the roundabout entry to the capacity of the entry and provides a direct assessment of the sufficiency of a given design. The degree of saturation for an entry lane should be less than 0.85 for satisfactory operation. When the degree of saturation exceeds this range, the operation of the roundabout can deteriorate rapidly, particularly over short periods of time. With deterioration in operation, queues form and delay begins to increase exponentially.
- *Delay* is a standard parameter identified in the Highway Capacity Manual (HCM) used to measure the performance of an intersection. The HCM identifies delay attributable to the control device. This control delay is the time that a driver spends queuing and then waiting for an acceptable gap in the circulating flow while at the front of the queue. For roundabouts, this delay represents the time for a single vehicle on any approach spends yielding to traffic before entering the circulating roadway. This is not indicative of the cumulative delay experienced by vehicles on an approach waiting to advance to the roundabout yield point.

- *Queue Length* is a key factor when assessing the adequacy of the geometric design of the roundabout approaches. Queue length provides a means for comparing roundabout performance with other intersection control types (i.e. stop control, traffic signal) and can be greatly affected by the degree of saturation of an approach. Queue length is typically shown in feet or vehicles lengths. A standard passenger car has a queue length of 25 feet, which represents the distance between the front bumpers of two stacked vehicles.

The following subsections summarize the LOS and queue length results for the capacity analysis under 2022 existing, 2026 no-build, and 2026 buildout traffic scenarios as well as recommended improvements for each study intersection.

Widewaters Parkway at Laurens Way

Widewaters Parkway at Laurens Way is currently an unsignalized intersection. All approaches operate under stop control.

The capacity analysis results for the intersection are summarized in Table 3 below. The intersection of Widewaters Parkway at Laurens Way currently operates with short delays for all approaches during the AM and PM peak hours.

The intersection is expected to continue to operate with short delays for all approaches under no-build and buildout conditions during the AM and PM peak hours. As shown in Table 3, the addition of traffic from the proposed development is expected to have minimal impact on the operation of the intersection of Widewaters Parkway at Laurens Way.

Therefore, no roadway improvements are recommended to accommodate project traffic at the intersection.



**Westbound Approach of Widewaters Parkway at Laurens Way**

**Table 3: Level-of-Service: Widewaters Parkway at Laurens Way (Unsignalized)**

Condition	AM Peak		PM Peak	
	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length (feet)	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length (feet)
2022 Existing	EB – A (7.3) WB – A (7.2) NB – A (7.3) SB – A (7.5)	No Turn Lanes	EB – A (7.5) WB – A (7.4) NB – A (7.1) SB – A (7.8)	No Turn Lanes
2026 No-Build	EB – A (7.4) WB – A (7.3) NB – A (7.3) SB – A (7.6)	No Turn Lanes	EB – A (7.6) WB – A (7.5) NB – A (7.3) SB – A (7.9)	No Turn Lanes
2026 Buildout	EB – A (7.7) WB – A (7.7) NB – A (8.1) SB – A (7.9)	No Turn Lanes	EB – A (8.1) WB – A (8.1) NB – A (8.2) SB – A (8.8)	No Turn Lanes



### Pedestrian Enhancements

Per conversations with the Town, pedestrian safety enhancements at this intersection are of particular importance to Town Council. Pedestrian count data was collected during the AM and PM peak hours. The maximum number of pedestrians observed in a one-hour time period at this intersection was 17 pedestrians. The north leg of Widewaters Parkway experienced the highest pedestrian volume crossing demand.

During the site visit at this intersection, it was noted that the existing crosswalk on the north leg of Widewaters Parkway is faded and not visible. The stop bars located on the east and west legs of Laurens Way are placed approximately two (2) feet from the crosswalks at the nearest points. The minimum separation distance for stop bars from crosswalks recommended by NCDOT is four (4) feet. Additional photos of the pedestrian accommodations at the intersection are included in the Appendix.

To enhance pedestrian safety at this intersection, the following improvements are recommended to be completed by others:

- Re-stripe the crosswalk on the north leg of Widewaters Parkway, preferably to a 10-foot wide high-visibility crosswalk.
- Relocate the existing stop bars on the east and west leg approaches of Laurens Way such that the minimum distance between the stop bar and crosswalk is four (4) feet.



**Pedestrian Crossing on North Leg of Widewaters Parkway at Laurens Way**

Widewaters Parkway at Flatrock Park Drive

Widewaters Parkway at Flatrock Park Drive is currently a roundabout intersection. Each approach operates under yield control.

The capacity analysis results for the intersection are summarized in Table 4 below. The intersection of Widewaters Parkway at Flatrock Park Drive currently operates with short delays for all approaches during the AM and PM peak hours. The intersection is expected to continue to operate with short delays for all approaches under no-build and buildout conditions during the AM and PM peak hours. As shown in Table 4, the addition of traffic from the proposed development is expected to



**Westbound Approach of Widewaters Parkway at Flatrock Park Drive**

have minimal impact on the operation of the intersection of Widewaters Parkway at Flatrock Park Drive. Therefore, no roadway improvements are recommended to accommodate project traffic at the intersection.

**Table 4: Level-of-Service: Widewaters Parkway at Flatrock Park Drive (Roundabout)**

Condition	AM Peak			PM Peak		
	LOS, Delay (sec/veh)	v/c	Turn Lane SIDRA 95% Queue Length (feet)	LOS, Delay (sec/veh)	v/c	Turn Lane SIDRA 95% Queue Length (feet)
2021 Existing	Overall – A (3.4) EB – A (3.3) WB – A (3.5) NB – A (3.5) SB – A (3.5)	Overall – 0.075 EB – 0.067 WB – 0.061 NB – 0.075 SB – 0.061	EB – 7.4' WB – 6.6' NB – 8.3' SB – 6.6'	Overall – A (4.3) EB – A (4.7) WB – A (3.5) NB – A (4.0) SB – A (4.0)	Overall – 0.211 EB – 0.211 WB – 0.055 NB – 0.074 SB – 0.137	EB – 27' WB – 5.9' NB – 8' SB – 16.2'
2026 No-Build	Overall – A (3.6) EB – A (3.4) WB – A (3.7) NB – A (3.6) SB – A (3.7)	Overall – 0.089 EB – 0.080 WB – 0.074 NB – 0.089 SB – 0.074	EB – 9' WB – 8.1' NB – 10' SB – 8.1'	Overall – A (4.5) EB – A (4.9) WB – A (3.6) NB – A (4.2) SB – A (4.2)	Overall – 0.234 EB – 0.234 WB – 0.063 NB – 0.084 SB – 0.152	EB – 30.6' WB – 6.7' NB – 9.1' SB – 18.2'
2026 Buildout	Overall – A (3.9) EB – A (3.5) WB – A (4.0) NB – A (4.1) SB – A (3.9)	Overall – 0.147 EB – 0.085 WB – 0.081 NB – 0.147 SB – 0.092	EB – 9.6' WB – 8.8' NB – 17.5' SB – 10.2'	Overall – A (4.9) EB – A (5.5) WB – A (3.9) NB – A (4.6) SB – A (4.7)	Overall – 0.262 EB – 0.262 WB – 0.069 NB – 0.131 SB – 0.205	EB – 34.4' WB – 7.4' NB – 14.6' SB – 25.8'

### Widewaters Parkway at Knightdale Boulevard (U.S. 64 Business)

Widewaters Parkway at Knightdale Boulevard (U.S. 64 Business) is currently a signalized intersection. Existing signal plans and timing charts obtained from NCDOT were used for the 2022 analysis scenarios (minimum initial, maximum green, yellow and red time). The signal plan is included in the Appendix of this report. For future no-build and buildout scenarios, the following input values were used in accordance with NCDOT Congestion Management guidelines:



**Northbound Approach of Widewaters Parkway at  
Knightdale Boulevard (U.S. 64 Business)**

- Cycle lengths for future scenarios remained consistent with existing cycle lengths as long as minimum recommendations were met. Splits were optimized for future year scenarios.
- Left-turn treatment for exclusive left-turn lanes was set to protected only.
- For future year scenarios, minimum initial for the major street through movements was set to 12 seconds, minimum initial for major street left-turns and minor street was set to 7 seconds, lost time was set to 5 seconds, yellow time was set to 5 seconds, and red time was set to 2 seconds in future scenarios.
- Default values for vehicle extension and minimum gap were used.
- The southbound right-turn overlap was not able to be modeled in Synchro due to the conflicting protected eastbound u-turn movement. Therefore, right-turns on red were permitted for the southbound approach only under all analysis scenarios.

It is important to note that in order to most appropriately model how the intersection operates today, pedestrian phases were not included in the peak hour capacity analysis scenarios due to the minimal amount of pedestrians observed at the intersection.

Table 5 summarizes the capacity analysis results for the signalized intersection of Widewaters Parkway at Knightdale Boulevard (U.S. 64 Business) under 2022 existing, 2026 no-build, and 2026 buildout scenarios. As shown in Table 5 below, the intersection of Widewaters Parkway at Knightdale Boulevard (U.S. 64 Business) currently operates at LOS C during the AM peak hour and LOS D during the PM peak hours. The intersection is expected to continue to operate at LOS C during the AM peak hour and LOS D during the PM peak hour under the 2026 no-build and buildout conditions. The site traffic has minimal impact on the operation at the intersection of Widewaters Parkway at Knightdale Boulevard (U.S. 64 Business) and the intersection is projected to operate at an acceptable LOS.

According to the Town's *Unified Development Ordinance*, mitigation should be considered if the addition of site traffic degrades the projected level-of-service at the intersection. According to the guidelines published in NCDOT's *Policy on Street and Driveway Access to North Carolina Highways* (July 2003), mitigation improvements should be identified if the total average delay at the intersection or individual approaches increases by 25% or more with the addition of the proposed development site trips. The LOS



is not expected to be impacted with the development of the proposed site and the total average delay at the intersection and individual approaches under buildout conditions increases by less than 25% when compared to no-build conditions. Therefore, no roadway improvements are recommended to accommodate project traffic at the intersection.

**Table 5: Level-of-Service: Widewaters Parkway at Knightdale Boulevard (US 64 Business) (Signalized)**

Condition	AM Peak		PM Peak	
	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length (feet)	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length (feet)
2022 Existing	Overall – B (18.1) EB – B (15.7) WB – B (16.5) NB – D (53.5) SB – C (26.8)	EBU/L – 63’/107’ EBR – 32’/67’ WBU/L – 46’/88’ WBR – 20’/149’ NBL – 55’/118’ SBL – 45’/122’ SBR – -’/46’	Overall – D (35.8) EB – C (31.5) WB – C (29.3) NB – E (59.6) SB – D (52.1)	EBU/L – 129’/190’ EBR – 77’/ 147’ WBU/L – 141’/163’ WBR – 55’/127’ NBL – 151’/196’ SBL – 230’/285’ SBR – 26’/220’
2026 No-Build	Overall – C (20.1) EB – B (16.5) WB – B (19.3) NB – D (53.2) SB – C (27.7)	EBU/L – 74’/127’ EBR – 38’/73’ WBU/L – 54’/87’ WBR – 24’/68’ NBL – 64’/119’ SBL – 53’/106’ SBR – -’/94’	Overall – D (40.0) EB – D (36.4) WB – C (33.1) NB – E (62.7) SB – E (55.1)	EBU/L – 159’/195’ EBR – 107’/273’ WBU/L – 179’/192’ WBR – 62’/208’ NBL – 180’/211’ SBL – 270’/284’ SBR – 54’/211’
2026 Buildout	Overall – C (21.0) EB – B (16.5) WB – B (19.7) NB – D (54.5) SB – C (29.1)	EBU/L – 74’/119’ EBR – 40’/95’ WBU/L – 57’/84’ WBR – 24’/69’ NBL – 80’/115’ SBL – 53’/93’ SBR – -’/58’	Overall – D (40.9) EB – D (37.2) WB – C (33.6) NB – E (65.0) SB – E (55.7)	EBU/L – 159’/183’ EBR – 122’/353’ WBU/L – 186’/242’ WBR – 62’/201’ NBL – 194’/217’ SBL – 270’/286’ SBR – 57’/212’

Laurens Way at Lynnwood Road

Laurens Way at Lynnwood Road is currently an unsignalized intersection. Each approach operates under stop control.

The capacity analysis results for the intersection are summarized in Table 6 below. The intersection of Laurens Way at Lynnwood Road currently operates with short delays for all approaches during the AM and PM peak hours. The intersection is expected to continue to operate with short delays for all approaches under no-build and buildout conditions during the AM and PM peak hours. As shown in Table 6, the addition



**Southbound Approach of Laurens Way at Lynnwood Road**

of traffic from the proposed development is expected to have minimal impact on the operation of the intersection of Laurens Way at Lynnwood Road. Therefore, no roadway improvements are recommended to accommodate project traffic at the intersection.

**Table 6: Level-of-Service: Laurens Way at Lynnwood Road (Unsignalized)**

Condition	AM Peak		PM Peak	
	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length (feet)	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length (feet)
2022 Existing	EB – A (7.3) WB – A (7.6) NBL – A (8.0) NBT/R – A (7.9) SBL – A (8.1) SBT/R – A (7.9)	NBL – 0’/10’ SBL – 0’/31’	EB – A (7.5) WB – A (7.8) NBL – A (8.0) NBT/R – A (8.1) SBL – A (8.2) SBT/R – A (8.3)	NBL – 0’/27’ SBL – 3’/39’
2026 No-Build	EB – A (7.4) WB – A (7.7) NBL – A (8.0) NBT/R – A (7.9) SBL – A (8.1) SBT/R – A (7.9)	NBL – 0’/27’ SBL – 3’/31’	EB – A (7.7) WB – A (8.0) NBL – A (8.1) NBT/R – A (8.4) SBL – A (8.3) SBT/R – A (8.6)	NBL – 0’/27’ SBL – 5’/55’
2026 Buildout	EB – A (7.5) WB – A (7.9) NBL – A (8.1) NBT/R – A (8.0) SBL – A (8.2) SBT/R – A (8.0)	NBL – 0’/22’ SBL – 3’/40’	EB – A (7.8) WB – A (8.3) NBL – A (8.2) NBT/R – A (8.7) SBL – A (8.5) SBT/R – A (8.8)	NBL – 0’/26’ SBL – 5’/44’

Lynnwood Road at Hodge Road

Lynnwood Road at Hodge Road is currently an unsignalized intersection. The westbound minor street approach (Lynnwood Road) operates under stop control, and the northbound and southbound major street approaches (Hodge Road) are free-flow.

The capacity analysis results for the intersection are summarized in Table 7 below. The intersection of Lynnwood Road at Hodge Road currently operates with short delays during the AM peak hour and moderate delays during the PM peak hour for the minor street approach (Lynnwood Road).



**Westbound Approach of Lynnwood Road at Hodge Road**

The intersection is expected to continue to operate with short delays during the

AM peak hour and moderate delays during the PM peak hour for the minor street approach under no-build conditions. The intersection is expected to continue to operate with short delays for the minor street approach during the AM peak hour under buildout conditions. The intersection is expected to operate with long delays during the PM peak hour under buildout conditions. It is typical for stop-controlled approaches to experience long delays during peak hours while the major street free-flow approaches experience little to no delay.

According to the guidelines published in NCDOT's *Policy on Street and Driveway Access to North Carolina Highways* (July 2003), mitigation improvements should be identified if the total average delay at the intersection or individual approaches increases by 25% or more with the addition of the proposed development site trips. The projected delay for the westbound minor street approach under buildout conditions increases by 25% when compared to no-build conditions.

The following improvement is recommended by the developer to mitigate the impact of the proposed development:

- Construct a northbound right-turn lane on Hodge Road to provide 50 feet of full-width storage and appropriate taper.

However, it is important to note that there are existing conditions that may prohibit the construction of the recommended northbound right-turn lane. In particular, there are existing utilities (pole and boxes) located on the southeast quadrant of the intersection and cross pipes under each roadway that would need to be extended. Based on our preliminary review, an easement would need to be obtained from the adjacent property owner to relocate the utilities an appropriate distance from the widened roadway. In addition, temporary or permanent drainage easements may be required for the pipe extensions. Due to the right-of-way constraints, the improvement may not be feasible for the intersection. If the adjacent



property owner does not agree to the easements and the improvement is not constructed, the intersection will still operate with reasonable delay and queuing.

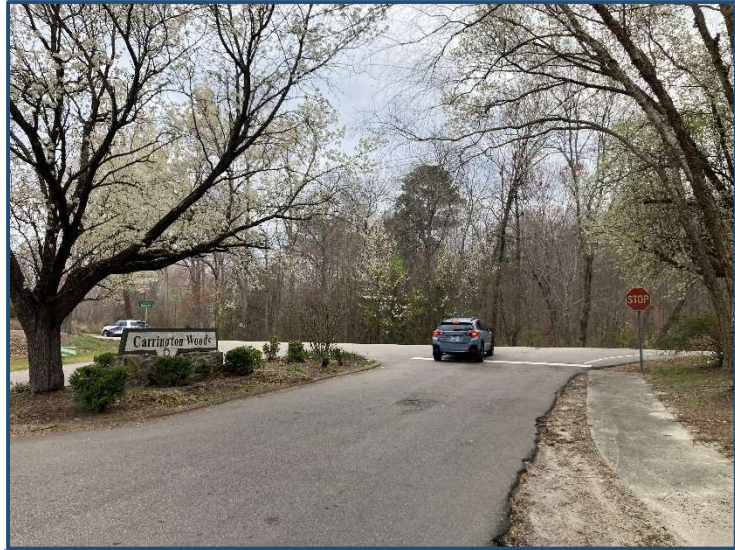
**Table 7: Level-of-Service: Lynwood Road at Hodge Road (Unsignalized)**

Condition	AM Peak		PM Peak	
	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length (feet)	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length (feet)
2022 Existing	WB – C (17.3) SBL – A (8.4)	No Turn Lanes	WB – D (27.2) SBL – A (8.5)	No Turn Lanes
2026 No-Build	WB – C (18.9) SBL – A (8.5)	No Turn Lanes	WB – E (39.9) SBL – A (8.7)	No Turn Lanes
2026 Buildout	WB – C (20.7) SBL – A (8.5)	No Turn Lanes	WB – F (50.0) SBL – A (8.8)	No Turn Lanes
2026 Buildout with Improvements	WB – C (19.9) SBL – A (8.5)	NBR – -’/’	WB – E (41.5) SBL – A (8.8)	NBR – -’/12’

### Carrington Drive at Smithfield Road

Carrington Drive at Smithfield Road is currently an unsignalized intersection. The eastbound minor street approach (Carrington Drive) operates under stop control, and the northbound and southbound main street approaches (Smithfield Road) are free-flow.

The capacity analysis results for the intersection are summarized in Table 8 below. The intersection of Carrington Drive at Smithfield Road currently operates with short delays during the AM peak hour and moderate delays during the PM peak hour for the minor street approach (Carrington Drive).



**Eastbound Approach of Carrington Drive at Smithfield**

The intersection is expected to operate with moderate delays for the minor street approach during the AM peak hour under no-build and buildout conditions. The intersection is expected to operate with long delays for the minor street approach during the PM peak hour under no-build and buildout conditions. While the intersection is expected to experience long delays for the eastbound minor street approach of Carrington Drive under future conditions, it is typical for stop-controlled approaches to experience long delays during peak hours while the major street free-flow approaches experience little to no delay.

The addition of traffic from the proposed development is expected to have minimal impact on the operation of the intersection of Carrington Drive at Smithfield Road. According to the guidelines published in NCDOT's *Policy on Street and Driveway Access to North Carolina Highways* (July 2003), mitigation improvements should be identified if the total average delay at the intersection or individual approaches increases by 25% or more with the addition of the proposed development site trips. The LOS is not expected to be impacted with the development of the proposed site and the total average delay at the intersection and individual approaches under buildout conditions increases by less than 25% when compared to no-build conditions.

Based on the Federal Highway Administration *Manual on Uniform Traffic Control Devices* (2009), the projected buildout peak hour traffic volumes do not meet the Peak Hour Signal Warrant for considering the installation of a traffic signal to improve operation. The existing turn lanes on the northbound and southbound approaches of Smithfield Road and wide egress lane for the eastbound approach of Carrington Drive provide increased capacity at the intersection.

In order to best utilize the available pavement on the eastbound approach, the following roadway improvement is recommended to accommodate project traffic at the intersection:

- Stripe the existing eastbound approach of Carrington Drive to provide an exclusive left-turn lane and an exclusive right-turn lane.

**Table 8: Level-of-Service: Carrington Drive at Smithfield Road (Unsignalized)**

Condition	AM Peak		PM Peak	
	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length (feet)	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length (feet)
2022 Existing	EB – C (21.9) NBL – A (8.2)	NBL – 0’/18’	EB – E (49.3) NBL – B (10.2)	NBL – 0’/31’ SBR – -’/4’
2026 No-Build	EB – D (29.1) NBL – A (8.4)	NBL – 0’/25’	EB – F (116.9) NBL – B (11.2)	NBL – 3’/31’ SBR – -’/9’
2026 Buildout	EB – D (29.4) NBL – A (8.4)	NBL – 0’/25’	EB – F (132.8) NBL – B (11.3)	NBL – 3’/31’ SBR – -’/18’
2026 Buildout with Improvements	EB – D (28.0) NBL – A (8.4)	EBL – 33’/77’ EBR – 3’/39’ NBL – 0’/18’	EB – F (117.7) NBL – B (11.3)	EBL – 93’/184’ EBR – 3’/107’ NBL – 3’/35’ SBR – -’/18’

It is important to note that traffic currently utilizing the intersection of Carrington Drive and Smithfield Road may instead travel to the north and west via the interconnectivity provided through the proposed site and therefore decrease the delay experienced at this intersection. As shown in the analysis results for the study intersections to the north and west, there is available capacity to accommodate this potential shift in traffic.

Based on the *Guidelines for NCDOT Project-Level Traffic Forecasting Procedures* (June 2002), the capacity for a two-lane suburban roadway is approximately 10,500 - 12,500 vehicles per day (vpd). Assuming the PM peak hour traffic accounts for approximately 10% of the daily traffic volumes, the total demand for Carrington Drive under 2026 project buildout conditions is 1,960 vpd, which is well below the capacity of the roadway. The existing traffic controls (i.e., stop-controlled intersections) in place within the subdivision are expected to support the proposed development site traffic volumes.



Crosstie Street at Bethlehem Road/First Avenue

Crosstie Street at Bethlehem Road/First Avenue is currently an unsignalized intersection. The eastbound minor street approach (Crosstie Street) operates under stop control, and the northbound and southbound major street approaches (Bethlehem Road/First Avenue) are free-flow.

The capacity analysis results for the intersection are summarized in Table 9 below. The intersection of Crosstie Street at Bethlehem Road/First Avenue currently operates with short delays for the minor street approach (Crosstie Street) during both the AM and PM peak hours. The intersection is expected to continue to operate with short delays for the minor street approach during the AM peak hour under no-build and buildout conditions. The intersection is expected to operate with moderate delays for the minor street approach during the PM peak hour under no-build and buildout conditions. It is typical for stop-controlled approaches to experience moderate or long delays during peak hours while the major street free-flow approaches experience little to no delay.



**Eastbound Approach of Crosstie Street at Bethlehem Road/First Avenue Road**

As shown in Table 9, the addition of traffic from the proposed development is expected to have minimal impact on the operation of the intersection of Crosstie Street at Bethlehem Road/First Avenue. According to the guidelines published in NCDOT’s *Policy on Street and Driveway Access to North Carolina Highways* (July 2003), mitigation improvements should be identified if the total average delay at the intersection or individual approaches increases by 25% or more with the addition of the proposed development site trips. The LOS is not expected to be impacted with the development of the proposed site and the total average delay at the intersection and individual approaches under buildout conditions increases by less than 25% when compared to no-build conditions. Therefore, no roadway improvements are recommended to accommodate project traffic at the intersection.

**Table 9: Level-of-Service: Crosstie Street at Bethlehem Road/First Avenue (Unsignalized)**

Condition	AM Peak		PM Peak	
	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length (feet)	LOS and Delay (sec/veh)	Turn Lane Synchro 95% Queue Length/SimTraffic Max Queue Length (feet)
2022 Existing	EB – B (12.8) NBL – A (7.8)	NBL – 0’/34’	EB – C (18.6) NBL – A (8.6)	NBL – 3’/34’
2026 No-Build	EB – B (14.4) NBL – A (8.0)	NBL – 3’/30’	EB – D (26.4) NBL – A (9.0)	NBL – 3’/39’
2026 Buildout	EB – B (14.6) NBL – A (8.0)	NBL – 3’/48’	EB – D (28.0) NBL – A (9.1)	NBL – 5’/42’

## RECOMMENDATIONS

The recommended lane geometry is shown on Figure 10.

Due to existing pedestrian safety concerns, the following pedestrian improvements are recommended to be constructed **by others**:

### Widewaters Parkway at Laurens Way:

- Re-stripe the crosswalk on the north leg of Widewaters Parkway, preferably to a 10-foot wide high-visibility crosswalk.
- Relocate the existing stop bars on the east and west leg approaches of Laurens Way such that the minimum distance between the stop bar and crosswalk is four (4) feet.

Based on the capacity analysis presented herein, the following roadway improvements are recommended to be completed **by the developer** to accommodate buildout site traffic volumes:

### Hodge Road at Lynnwood Road:

- Construct a northbound right-turn lane on Hodge Road to provide 50 feet of full-width storage and appropriate taper.

### Carrington Drive at Smithfield Road:

- Stripe the existing eastbound approach of Carrington Drive to provide an exclusive left-turn lane and an exclusive right-turn lane.

The following roadway improvements are required to be constructed **by the developer** within the proposed site:

- Construct the extension of Widewaters Parkway to provide a Future Town-Maintained Collector Street in accordance with the Town's *Street Network Plan*.
- Construct the extension of Southampton Drive to provide a Future Town-Maintained Collector Street in accordance with the Town's *Street Network Plan*.

# Creekview Crossing Residential TIA

## Recommended Lane Geometry



- LEGEND**
- Stop Control
  - Existing Approach Lane
  - Departure Lane
  - Speed Limit
  - Recommended Improvements by Developer
  - Existing Signal
  - Recommended Pedestrian Improvements by Others

XX' - FULL STORAGE LENGTH

XX' - FULL STORAGE LENGTH

- Not a Study Intersection

Wake County, NCDOT Division 5

Figure 10

