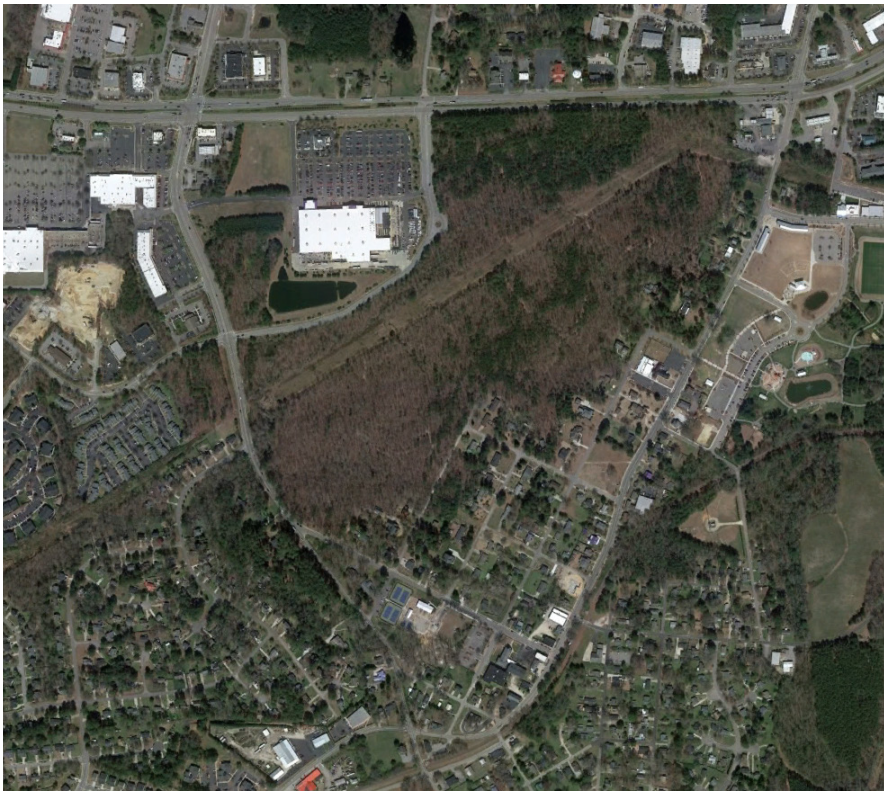
RAMEY KEMP ASSOCIATES

TOGETHER WE ARE LIMITLESS



Suggs

Traffic Impact Analysis

Knightdale, North Carolina

RKA

rameykemp.com

TRAFFIC IMPACT ANALYSIS

FOR

SUGGS

LOCATED

IN

KNIGHTDALE, NC

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December 2022

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RKA Project No. 22335

TRAFFIC IMPACT ANALYSIS
SUGGS
KNIGHTDALE, NORTH CAROLINA

EXECUTIVE SUMMARY

1. Development Overview

A Traffic Impact Analysis (TIA) was conducted for the proposed Suggs development in accordance with the Knightdale (Town) Unified Development Ordinance (UDO) and North Carolina Department of Transportation (NCDOT) capacity analysis guidelines. The proposed development is to be located south of Knightdale Boulevard (US 64 Business) and east of N. Smithfield Road in Knightdale, North Carolina. The proposed development is expected to be a mixed-use development and estimated to be built out in 2034. Site access is proposed via one right in right out intersection along Knightdale Boulevard, one full movement intersection along N. First Avenue, one full movement intersection along McKnight Drive, one full movement site drive along the continuation of Fourth Avenue, one full movement site drive along the continuation of Pine Street, and one full movement site drive along the continuation of Sycamore Street.

The proposed development will be required to widen the site's frontage along Knightdale Boulevard (US 64 Business) to add an additional eastbound through lane per the Comprehensive Transportation Plan. It is recommended in this report to tie in this additional through lane to the adjacent intersections, thus adding a full additional through lane along Knightdale Boulevard (US 64 Business) between its intersections with McKnight Drive and N. First Avenue. This additional through lane will add significant capacity to the through traffic within the study area.

The development is expected to add significant connectivity to the existing roadway network, providing alternative routes to/from Knightdale Boulevard to both Smithfield Road and N. First Street. It is expected that the development will alter the current traffic patterns as drivers will be able to find more efficient routes through the site.

The study analyzes traffic conditions during the weekday AM and PM peak hours for the following scenarios:

- 2022 Existing Traffic Conditions
- 2026+1 No-Build Traffic Conditions
- 2026+1 Build Phase 1 Traffic Conditions
- 2029+1 No-Build Traffic Conditions
- 2029+1 Build Phase 2 Traffic Conditions
- 2034+1 No-Build Traffic Conditions
- 2034+1 Full Build Traffic Conditions
- 2034+10 Full Build Traffic Conditions

2. Existing Traffic Conditions

The study area for the TIA was determined through coordination with the Town and NCDOT and consists of the following existing intersections:

- Mcknight Drive and Knightdale Blvd (US 64 Business)
- N. First Avenue / Old Knight Road and Knightdale Blvd (US 64 Business)
- Smithfield Road and Knightdale Blvd (US 64 Business)
- Mcknight Drive at Lowes Driveway
- Knightdale Station Run and N First Avenue
- Sycamore Street and N. First Avenue
- Pine Street and N. First Avenue
- Fourth Avenue and Main Street
- Main Street and N. First Avenue
- Main Street and Smithfield Road
- Smithfield Road and N. First Avenue
- Carrington Drive and Smithfield Road
- Smithfield Road and 4th Street
- N. First Avenue and Robertson Street
- N. First Avenue and Fayetteville Street

Existing peak hour traffic volumes were determined based on traffic counts conducted at the study intersections listed below, in June of 2022 by RKA and Quality Counts, LLC. during a typical weekday AM (7:00 AM – 9:00 AM) and PM (4:00 PM – 6:00 PM) peak periods while schools were in session:

- Mcknight Drive and Knightdale Blvd (US 64 Business)
- N. First Avenue / Old Knight Road and Knightdale Blvd (US 64 Business)
- Smithfield Road and Knightdale Blvd (US 64 Business)
- Mcknight Drive at Lowes Driveway
- Knightdale Station Run and N First Avenue
- Sycamore Street and N. First Avenue
- Pine Street and N. First Avenue
- Fourth Avenue and Main Street
- Main Street and N. First Avenue
- Main Street and Smithfield Road
- Smithfield Road and N. First Avenue
- Carrington Drive and Smithfield Road

The below intersections were counted in October 2022 by RKA and Quality Counts, LLC. during a typical weekday AM (7:00 AM – 9:00 AM) and PM (4:00 PM – 6:00 PM) peak periods while schools were in session:

- N. First Avenue and Robertson Street
- N. First Avenue and Fayetteville Street

Peak hour traffic volumes at the intersection of Smithfield Road and Fourth Avenue were determined by balancing between adjacent study intersections. Weekday AM and PM traffic volumes were balanced between study intersections, where appropriate.

3. Site Trip Generation

The proposed development is assumed to consist of the uses listed in the tables below. Average weekday daily, AM peak hour, and PM peak hour trips for the proposed development were estimated using methodology contained within the ITE *Trip Generation Manual*, 11th Edition. Table E-1 provides a summary of the Phase 1 trip generation potential for the site. Table E-2

provides a summary of the Phase 2 trip generation potential for the site and Table E-3 provides a summary of the Full Build trip generation potential for the site.

Table E-1: Phase 1 Site Trip Generation

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	AM Peak Hour Trips (vph)		PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Single Family Homes (210)	125 DU	1,239	23	68	77	46
Multifamily Housing – Low-Rise (220)	25 DU	236	7	24	19	12
Total Primary Trips		**1,475**	**30**	**92**	**96**	**58**

Table E-2: Phase 2 Site Trip Generation

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	AM Peak Hour Trips (vph)		PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Single Family Homes (210)	125 DU	1,239	23	68	77	46
Multifamily Housing – Low-Rise (220)	425 DU	2,800	37	118	128	75
Total Primary Trips		**4,039**	**60**	**186**	**205**	**121**

Table E-3: Full Build Site Trip Generation

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	AM Peak Hour Trips (vph)		PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Single Family Homes (210)	125 DU	1,239	23	68	77	46
Multifamily Housing – Low-Rise (220)	425 DU	2,800	37	118	128	75
Hotel (310)	115 Rooms	823	28	22	29	28
Health/Fitness Club (492)	35 KSF	1,240	23	23	71	53
Office Park	110 KSF	1,456	264	33	22	138
Shopping Plaza (821)	70 KSF	6,800	257	237	333	347
Supermarket (850)	65 KSF	5,960	222	206	286	276
High-Turnover Restaurants (932)	20 KSF	2,144	105	86	110	71
Fast-Food Restaurant with Drive-Thru (934)	13 KSF	6,077	296	284	223	206
Bank with Drive-Thru (912)	12 KSF	1,204	69	50	126	126
Gasoline Station with Convenience Market (945)	16 Fueling Positions	4,242	128	129	147	148
Total Trips		**33,985**	**1,452**	**1,256**	**1,552**	**1,514**
Internal Capture (20% AM & 21% PM)			*-291*	*-251*	*-327*	*-319*
Total External Trips			**1,161**	**1,005**	**1,225**	**1,195**
Pass-By Trips			*-201**	*-201**	*-341**	*-341**
Total Primary Trips			**960***	**804***	**884***	**854***

*It should be noted that pass-by trips were limited at 10% of the adjacent street traffic resulting in an increase in primary trips. This is expected to provide conservative results, because it is likely the gas station will operate at the pass-by percentages included above due to the heavy amount of residential development within the vicinity of the site.

4. Future Traffic Conditions

Through coordination with the Town and NCDOT, it was determined that an annual growth rate of 2% would be used to generate 2027, 2030, and 2035 projected weekday AM and PM peak hour traffic volumes. The following adjacent developments were identified to be considered under future conditions:

- Knightdale Station
- Haywood Glen
- Forestville Village

5. Capacity Analysis Summary

The analysis considered weekday AM and PM peak hour traffic for 2022 existing, 2027 no-build, 2027 build, 2030 no-build, 2030 build, 2035 no-build, 2035 build and 2044 build conditions. Refer to Section 7 of the TIA for the capacity analysis summary performed at each study intersection.

6. Recommendations

Based on the findings of this study, specific geometric and traffic control improvements have been identified at study intersections. The improvements are summarized below and are illustrated in Figure E-1.

Improvements to Meet UDO (Not Recommended by Developer)

2035 Full Build

Pine Street and N. First Avenue

- Convert the intersection to a two-way stop-controlled intersection.

Fayetteville Street and N. First Avenue

- Restrict the southbound approach to a right-in/right-out approach.
- Restrict the northbound approach to a left-in/right-in/right-out approach.

Recommended Improvements by Developer

2027 Build Phase 1

Main Street and Smithfield Road

- Construct a southbound left turn lane with 200 feet of storage and appropriate decel and taper.
- Restrict the westbound approach to a left-in/right-in/right-out approach.

Smithfield Road and First Avenue

- Construct a southbound right turn lane with 300 feet of storage and appropriate decel and taper.
- Modify the traffic signal to accommodate the geometric changes.
- Coordinate with NCDOT to develop a signal modification plan to accommodate the geometric changes at the intersection.

Main Street and Access B

- Construct the southbound approach as a full movement access with one ingress lane and one egress lane.

2030 Build Phase 2

First Avenue and Knightdale Station Run / Access C

- Construct the eastbound approach as a full movement access with one ingress lane and one egress lane.

2035 Full Build

Knightdale Boulevard (US 64 Business)

The proposed development will be required to widen the site's frontage along Knightdale Boulevard (US 64 Business) to add an additional eastbound through lane per the Comprehensive Transportation Plan. It is recommended in this report to tie in this additional through lane to the adjacent intersections, thus adding a full additional through lane along Knightdale Boulevard (US 64 Business) between its intersections with McKnight Drive and N. First Avenue. This additional through lane will add significant capacity to the through traffic within the study area.

Knightdale Boulevard (US 64 Business) and McKnight Drive

- Restripe the eastbound right turn lane to include a shared through-right.
- Construct an additional eastbound receiving lane along the eastern approach that extends to Knightdale Boulevard and First Avenue.
- Construct an additional northbound left turn lane with 300 feet of storage and appropriate decel and taper.
- Channelize the right turn movement for the northbound shared through-right.
- Construct an additional westbound left turn lane with 500 feet of storage and appropriate decel and taper.

- Coordinate with the NCDOT to develop a signal modification plan to accommodate the geometric changes at the intersection and to modify the corridor timings along Knightdale Boulevard (US 64 Business).

N. First Avenue / Old Knight Road and Knightdale Boulevard (US 64 Business)

- Restripe the eastbound right turn lane to include a shared through-right and extend storage to full storage.
- Construct an additional eastbound receiving lane along the eastern approach that extends at least 700 feet beyond the intersection.
- Construct a northbound left turn lane with full storage.
- Restripe the northbound through lane to include a shared left-through with full storage.
- *If right-of-way is available*, construct a short, approximately 50-foot, channelized right-turn lane with yield control at the eastbound approach for the shared through-right lane.
- Coordinate with the NCDOT to develop a signal modification plan to accommodate the geometric changes at the intersection and to modify the corridor timings along Knightdale Boulevard (US 64 Business).
- Extend the eastbound left turn lane to include 600 feet of storage and appropriate decel and taper.
- Extend the southbound left turn lane to include 600 feet of storage and appropriate decel and taper.

Smithfield Road and Knightdale Boulevard (US 64 Business)

- Due to geometric changes at adjacent signals, coordinate with the NCDOT to modify the corridor signal timings along Knightdale Boulevard (US 64 Business).

McKnight Drive and Lowes Driveway / Access D

- Construct a roundabout.
- Construct a southbound right turn lane with full storage.
- Construct the westbound approach as a full movement access with one ingress lane and one egress lane.

First Avenue and Knightdale Station Run / Access C

- Convert existing unsignalized intersection to roundabout.
- Construct a southbound right turn lane with 100 feet of storage and appropriate decel and taper.

Fourth Avenue and Main Street

- Construct a southbound left turn lane with 100 feet of storage and appropriate decel and taper.
- Construct an eastbound left turn lane with 100 feet of storage and appropriate decel and taper.
- Construct a westbound left turn lane with 100 feet of storage and appropriate decel and taper.

Main Street and Smithfield Road

- Monitor the intersection for signalization and install a traffic signal when warranted.

Smithfield Road and First Avenue

- Construct an eastbound left turn lane with 100 feet of storage and appropriate decel and taper.
- Construct a westbound left turn lane with 100 feet of storage and appropriate decel and taper.
- Modify the traffic signal to accommodate the geometric changes.
- Coordinate with NCDOT to develop a signal modification plan to accommodate the geometric changes at the intersection.

Smithfield Road and Fourth Avenue

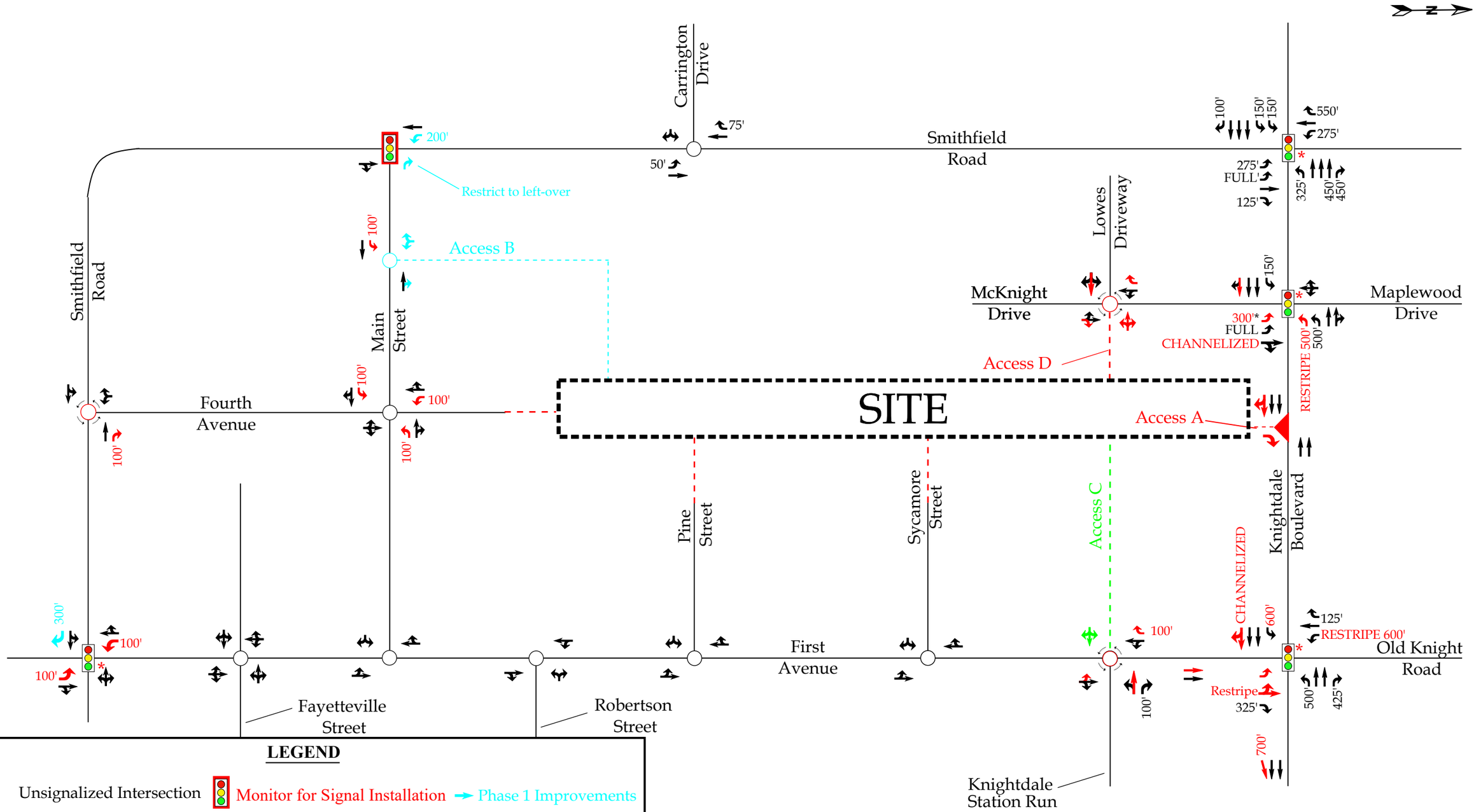
- Convert existing unsignalized intersection to roundabout.
- Construct a northbound left turn lane with 100 feet of storage and appropriate decel and taper.

Knightdale Boulevard (US 64 Business) and Access A

- Construct northbound approach as right-in/right-out intersection with one ingress lane and one egress lane. Design right-in/right-out with large radii/channelization that allows the traffic to easily maneuver to ingress and egress the site
- Construct an additional eastbound shared through-right with full storage.

Main Street and Access B

- Construct an eastbound left turn lane with 100 feet of storage and appropriate decel and taper.



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Suggs
Knightdale, NC

Recommended Lane Configurations

Scale: Not to Scale | Figure E-1

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TRAFFIC IMPACT ANALYSIS
SUGGS
KNIGHTDALE, NORTH CAROLINA

1. INTRODUCTION

The contents of this report present the findings of the Traffic Impact Analysis (TIA) conducted for the proposed Suggs development to be located south of Knightdale Boulevard (US 64 Business) and east of N. Smithfield Road in Knightdale, North Carolina. The purpose of this study is to determine the potential impacts to the surrounding transportation system created by traffic generated by the proposed development, as well as recommend improvements to mitigate the impacts.

The proposed development, anticipated to be completed in 2034, is assumed to consist of the following uses:

- 125 single-family homes
- 425 multifamily housing units
- 115 room hotel
- 35,000 square feet (s.f.) of health/fitness club
- 110,000 s.f. of office park space
- 70,000 s.f. of shopping plaza
- 65,000 s.f. supermarket
- 20,000 s.f. of high-turnover restaurant space
- 13,000 s.f. fast-food restaurant with drive-thru
- 12,000 s.f. bank shop with drive-thru
- 16 fueling position gas station with convenience market

The study analyzes traffic conditions during the weekday AM and PM peak hours for the following scenarios:

- 2022 Existing Traffic Conditions
- 2026+1 No-Build Traffic Conditions
- 2026+1 Build Phase 1 Traffic Conditions

- 2029+1 No-Build Traffic Conditions
- 2029+1 Build Phase 2 Traffic Conditions
- 2034+1 No-Build Traffic Conditions
- 2034+1 Full Build Traffic Conditions
- 2034+10 Full Build Traffic Conditions

1.1. Site Location and Study Area

The development is proposed to be located south of Knightdale Boulevard (US 64 Business) and east of N. Smithfield Road in Knightdale, North Carolina. Refer to Figure 1 for the site location map.

The study area for the TIA was determined through coordination with the North Carolina Department of Transportation (NCDOT) and the Town of Knightdale (Town) and consists of the following existing intersections:

- Mcknight Drive and Knightdale Blvd (US 64 Business)
- N. First Avenue / Old Knight Road and Knightdale Blvd (US 64 Business)
- Smithfield Road and Knightdale Blvd (US 64 Business)
- Mcknight Drive at Lowes Driveway
- Knightdale Station Run and N First Avenue
- Sycamore Street and N. First Avenue
- Pine Street and N. First Avenue
- Fourth Avenue and Main Street
- Main Street and N. First Avenue
- Main Street and Smithfield Road
- Smithfield Road and N. First Avenue
- Carrington Drive and Smithfield Road
- Smithfield Road and 4th Street
- N. First Avenue and Robertson Street
- N. First Avenue and Fayetteville Street

Refer to Appendix A for the approved scoping documentation.

1.2. Proposed Land Use and Site Access

The site is expected to be located south of Knightdale Boulevard (US 64 Business) and east of N. Smithfield Road. The proposed development, anticipated to be completed in 2034, is assumed to consist of the following uses:

- 125 single-family homes
- 425 multifamily housing units
- 115 room hotel
- 35,000 square feet (s.f.) of health/fitness club
- 110,000 s.f. of office park space
- 70,000 s.f. of shopping plaza
- 65,000 s.f. supermarket
- 20,000 s.f. of high-turnover restaurant space
- 13,000 s.f. fast-food restaurant with drive-thru
- 12,000 s.f. bank shop with drive-thru
- 16 fueling position gas station with convenience market

Site access is proposed via one right in right out intersection along Knightdale Boulevard, one full movement intersection along N. First Avenue, one full movement intersection along McKnight Drive, one full movement site drive along the continuation of Fourth Avenue, one full movement site drive along the continuation of Pine Street, and one full movement site drive along the continuation of Sycamore Street. Refer to Figure 2 for a copy of the preliminary site plan.

The proposed development will be required to widen the site's frontage along Knightdale Boulevard (US 64 Business) to add an additional eastbound through lane per the Comprehensive Transportation Plan. It is recommended in this report to tie in this additional through lane to the adjacent intersections, thus adding a full additional through lane along Knightdale Boulevard (US 64 Business) between it's intersections with McKnight Drive and N. First Avenue. This additional through lane will add significant capacity to the through traffic within the study area.

The development is expected to add significant connectivity to the existing roadway network, providing alternative routes to/from Knightdale Boulevard to both Smithfield Road and N. First Street. It is expected that the development will alter the current traffic patterns as drivers will be able to find more efficient routes through the site.

1.3. Adjacent Land Uses

The proposed development is located in an area consisting primarily of commercial development, and residential development.

1.4. Existing Roadways

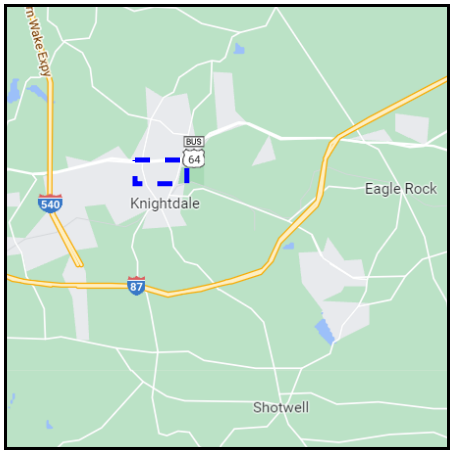
Existing lane configurations (number of traffic lanes on each intersection approach), lane widths, storage capacities, and other intersection and roadway information within the study area are shown in Figure 3. Table 1 provides a summary of this information, as well.

Table 1: Existing Roadway Inventory

Road Name	Route Number	Typical Cross Section	Speed Limit	2019 AADT (vpd)
Knightdale Boulevard	US 64 BUS	4-lane divided	45 mph	24,000
N. First Avenue	SR 2049	2-lane undivided	25 mph	7,500
Smithfield Road	SR 2233	2-lane undivided	35 mph	12,500
McKnight Drive	N/A	2-lane undivided	25 mph	2,400*
Lowes Driveway	N/A	2-lane undivided	Not Posted	1,290*
Old Knight Road	SR 2049	2-lane undivided	45 mph	7,410*

Road Name	Route Number	Typical Cross Section	Speed Limit	2019 AADT (vpd)
Knightdale Station Run	N/A	2-lane undivided	25 mph	2530*
Sycamore Street	N/A	2-lane undivided	25 mph	130*
Pine Street	N/A	2-lane undivided	Not Posted	90*
Main Street	N/A	2-lane undivided	25 mph	4,270*
Fourth Avenue	N/A	2-lane undivided	Not Posted	40*
Carrington Drive	N/A	2-lane undivided	Not Posted	1,540*
Maplewood Drive	N/A	2-lane undivided	25 mph	220*
Robertson Street	SR 2500	2-lane undivided	25 mph	3,100
Fayetteville Street	SR 2513	2-lane undivided	35 mph	1,590

*ADT based on the traffic counts from 2022 and assuming the weekday PM peak hour volume is 10% of the average daily traffic.



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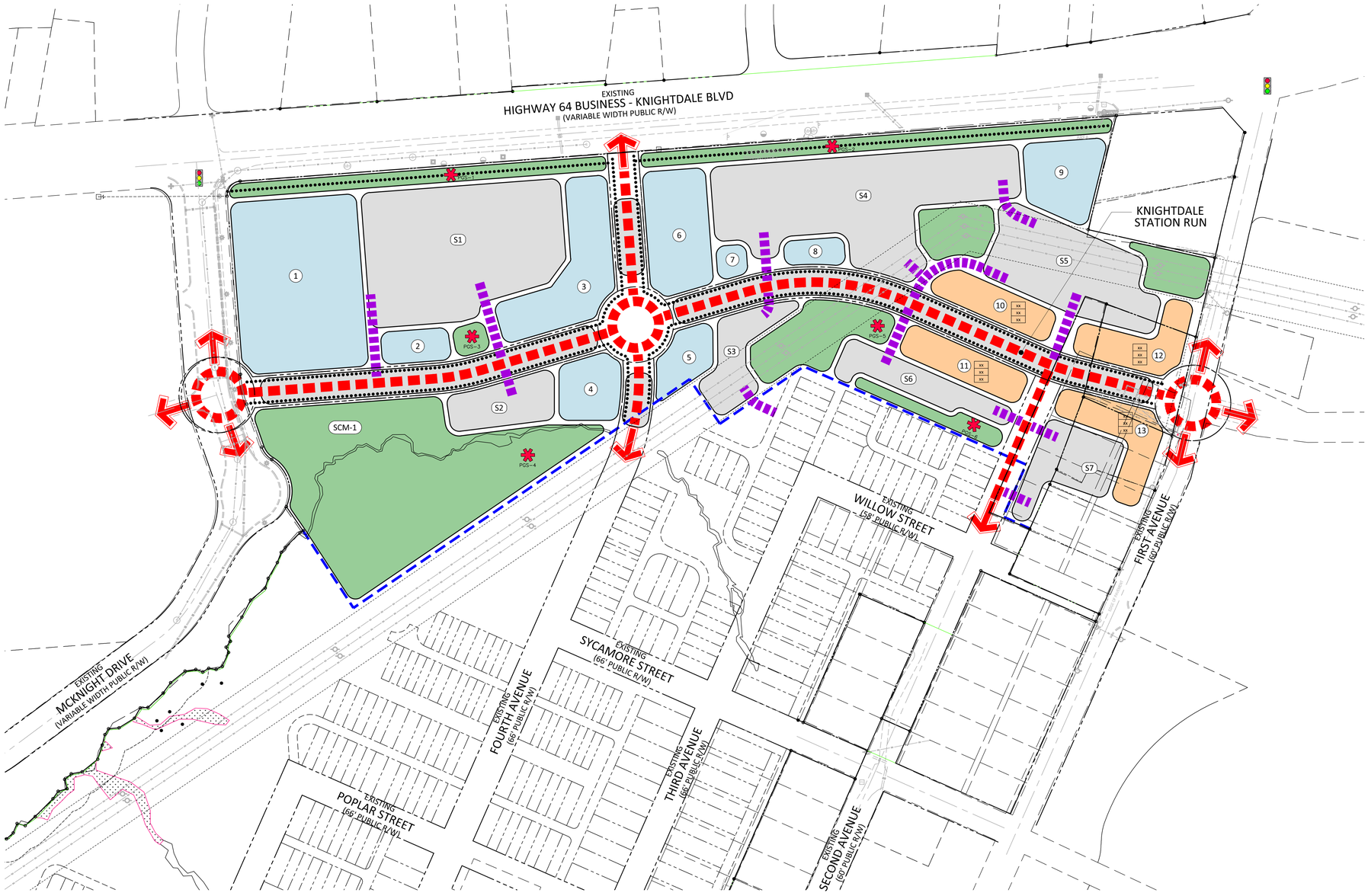
LEGEND

- Proposed Site Location
- Study Intersection
- Study Area

RAMEY KEMP ASSOCIATES	Suggs Knightdale, NC	Site Location Map	
		Scale: Not to Scale	Figure 1



PROPOSED DENSITY LIMITATIONS AND EASTERN CARY GATEWAY MIX OF USES

PROPOSED USES	MINIMUM	% MIX	MAXIMUM	% MIX
OFFICE	700,000 SF	41%	1,200,000 SF	45%
RESIDENTIAL	600,000 SF (600 UNITS)	35%	920,000 SF (920 UNITS)	34%
COMMERCIAL	400,000 SF	24%	575,000 SF	21%
HOTEL	110,000 SF (200 ROOMS)		120,000 SF (450 ROOMS)	

DEVELOPMENT PLANS SHALL BE PROPOSED AND DEVELOPMENT SHALL OCCUR IN ACCORDANCE WITH THE FOLLOWING STANDARDS:

Phase	Minimum Non-Retail	Maximum Retail	Potential Total	Minimum Vertically Integrated
1st	60,000 SF	210,000 SF	270,000 SF	60,000 SF
2nd	100,000 SF	230,000 SF	330,000 SF	100,000 SF
3rd	130,000 SF	250,000 SF	380,000 SF	130,000 SF
4th	340,000 SF	270,000 SF	610,000 SF	175,000 SF
5th	450,000 SF	325,000 SF	775,000 SF	230,000 SF

- NON-RETAIL SPACE SHALL INCLUDE THE FOLLOWING PRINCIPLE USES IDENTIFIED ON THE PDP: OFFICE, RESIDENTIAL, HOSPITALITY, PUBLIC/INSTITUTIONAL AND RESEARCH LABORATORIES;
- RETAIL SPACE SHALL INCLUDE THE PRINCIPLE USES IDENTIFIED ON THE PDP;
- FOR THE ABOVE PURPOSES, A HOTEL SHALL BE CONSIDERED A NON-RETAIL SPACE;
- EXCEPT FOR BUILDINGS 2 AND 11 (BIG BOXES), NO OTHER SINGLE COMMERCIAL TENANT'S GROUND FLOOR FOOTPRINT SHALL BE LARGER THAN 30,000 SF.

VERTICAL INTEGRATION
- THE FOLLOWING DEVELOPMENT CONDITIONS MEET THE DEFINITION OF VERTICAL INTEGRATION:
  - ANY STRUCTURE THAT CONTAINS MORE THAN TWO USES; NON-RETAIL MAY BE LOCATED ABOVE OR BELOW RETAIL USES;
  - A HOTEL CONTAINING ONE OF THE FOLLOWING ELEMENTS:
- A BAR OR RESTAURANT LOCATED ON THE ROOF OR ONE OF THE UPPER FLOORS THAT IS OPEN TO THE PUBLIC AND FACES THE STREET.
- A GROUND FLOOR RESTAURANT THAT HAS A SEPARATE ENTRANCE FROM THE STREET.

STREETSCAPE AND FRONTAGE
- A MINIMUM OF 80% OF THE CARY TOWNE BLVD. FRONTAGE BETWEEN TRINITY ROAD AND SITE DRIVE 'A' SHALL BE FLANKED BY BUILDINGS, LANDSCAPING, HARDSCAPE, OR PLAZA SPACE. A MINIMUM OF 80% OF THE CARY TOWNE BLVD. FRONTAGE BETWEEN TRINITY ROAD AND WALNUT CREEK SHALL BE FLANKED BY BUILDINGS, LANDSCAPING, HARDSCAPE, OR PLAZA SPACE. FOR ANY PORTIONS OF THE RESPECTIVE FRONTAGES THAT MAY NOT BE FLANKED BY THE ABOVE-LISTED FEATURES, IF SUCH AREAS ARE SURFACE PARKING LOTS, THEY SHALL BE SCREENED FROM THE VIEW OF CARY TOWNE BOULEVARD WITH EVERGREEN VEGETATION THAT WILL MATURE AND/OR BE MAINTAINED AT A MINIMUM HEIGHT OF 4 FEET.

COMMUNITY GATHERING AREA
- REQUIRED: 5,000 SF
- PROVIDED: 76,500 SF (1.75 AC)

CGA ID	MIN. SQ. FT.
CGA-1	5,000
CGA-2	10,000
CGA-3	3,500
CGA-4	7,000
CGA-5	7,000

COMMUNITY GATHERING AREA REQUIREMENTS

1. PUBLIC GATHERING SPACE SHALL HAVE DIRECT ACCESS TO A PUBLIC SIDEWALK AND INTERNAL PEDESTRIAN WALKWAY NETWORK AND SHALL PROVIDE AT LEAST THREE (3) OF THE FOLLOWING FEATURES:
   - MOVEABLE TABLES AND CHAIRS
   - FOUNTAIN OR OTHER WATER FEATURE
   - SCULPTURES OR OTHER PUBLIC ART FEATURES
   - BENCHES, SEAT WALLS, OR AMPHITHEATERS
   - RAISED LANDSCAPE PLANTERS
   - SHADE TREES LINING THE GATHERING SPACE
   - PEDESTRIAN SCALE AND CELEBRATORY LIGHTING
   - OTHER FEATURES AS APPROVED BY THE ADMINISTRATOR

SERVICE AREAS
- TRASH AND RECYCLING SHALL BE EITHER COLLECTED AND TRANSFERRED TO A MAIN COMPACTOR/RECYCLING AREA(S) WITHIN THE PROJECT OR CONTAINED IN AN INDIVIDUAL TRASH/RECYCLING AREA(S).
- TRASH, RECYCLING, SERVICE, MECHANICAL EQUIPMENT, TELECOMMUNICATIONS/ MECHANICAL EQUIPMENT, OR OTHER SIMILAR FACILITIES WILL BE SCREENED FROM VIEW OF CARY TOWNE BLVD, TRINITY ROAD, QUINNARD ROAD AND VILLAGE LANE BY BUILDING PLACEMENT, SCREEN WALLS, OR APPROVED VEGETATION. SEE DESIGN GUIDEBOOK FOR EXAMPLES OF SCREENING.

STORMWATER MANAGEMENT
ALL STORMWATER MANAGEMENT DEVICES SHALL BE LOCATED BELOW GRADE. THIS SHALL NOT PRECLUDE THE ABILITY TO PROVIDE LOW IMPACT DEVELOPMENT STORMWATER MEASURES ABOVE GRADE. TEMPORARY STORMWATER MANAGEMENT DEVICES ASSOCIATED WITH PHASED DEVELOPMENT MAY BE LOCATED ABOVE-GROUND.

PARKING
SURFACE
- SURFACE PARKING LOT S1 - SURFACE PARKING LOT S1 MAY BE CONVERTED TO A PARKING STRUCTURE OR A BUILDING AT THE TIME OF DEVELOPMENT PLAN. IF CONVERTED TO A PARKING STRUCTURE, IT MUST BE SCREENED IN ACCORDANCE WITH THE SCREENING REQUIREMENTS OF STRUCTURES D2 AND D5-D8. IF CONVERTED TO A BUILDING, IT MUST COMPLY WITH THE USES AND HEIGHTS OF EITHER BUILDING ENVELOPE 13 OR 16.
- SURFACE PARKING LOT S2 - SURFACE PARKING LOT S2 IN OPTION 2 MAY BE CONVERTED TO A PARKING STRUCTURE OR A BUILDING AT THE TIME OF DEVELOPMENT PLAN. IF CONVERTED TO A PARKING STRUCTURE, IT MUST BE SCREENED IN ACCORDANCE WITH THE SCREENING REQUIREMENTS OF STRUCTURES D2 AND D5-D8. IF CONVERTED TO A BUILDING, IT MUST COMPLY WITH THE USES AND HEIGHTS OF EITHER BUILDING ENVELOPE 8 OR 35.

DECK
- ANY PARKING DECK FRONTING MCKNIGHT DRIVE, KNIGHTDALE BLVD, N FIRST ST, OR KNIGHTDALE STATION RUN WHICH IS NOT WRAPPED WITH COMMERCIAL TENANT SPACE OR ENHANCED WITH PUBLIC ART SHALL BE SCREENING FROM VIEW BY A TYPE 'A' BUFFER, OR AN EQUIVALENT VEGETATIVE SCREEN AS APPROVED BY THE ZONING ADMINISTRATOR. FOR THE PURPOSES OF THIS REQUIREMENT, "FRONTING" SHALL MEAN LOCATED WITHIN 50 FT OF THE RIGHT-OF-WAY. TYPE 'A' BUFFER IS A MINIMUM OF 10 FT WIDE.

GENERAL NOTES

DEVELOPMENT AGREEMENT - NO DEVELOPMENT PLAN MAY BE SUBMITTED PURSUANT TO THIS PDP UNLESS (1) THE DEVELOPMENT IS SUBJECT TO A DEVELOPMENT AGREEMENT, APPROVED BY ORDINANCE AS A LEGISLATIVE DECISION OF THE TOWN COUNCIL PURSUANT TO G.S. 160A-400.22; (2) DEVELOPER IS IN COMPLIANCE WITH THAT DEVELOPMENT AGREEMENT; AND (3) THE PROPOSED DEVELOPMENT IS IN COMPLIANCE WITH THE DEVELOPMENT AGREEMENT.

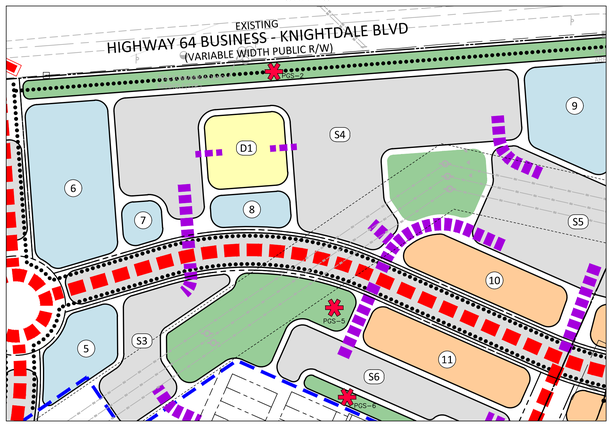
OPTION 1/OPTION 2 (BUILDING 2 AREA) - DEVELOPER MAY CHOOSE TO DEVELOP CONSISTENT WITH EITHER OPTION 1 OR OPTION 2 WITH SUCH DECISION BEING MADE AS PART OF SITE PLAN SUBMITTAL AND REVIEW.

TRANSIT - AT TIME OF SITE PLAN REVIEW FOR EACH PHASE, DEVELOPER AGREES TO ACCOMMODATE A TRANSIT STOP ALONG KNIGHTDALE BLVD AT A LOCATION MUTUALLY AGREEABLE TO THE TOWN AND DEVELOPER.

ATM WITH DRIVE-THROUGH SERVICE - PROJECT MAY CONTAIN AN ATM WITH DRIVE-THROUGH SERVICE ONLY IN THE AREA DESIGNATED BETWEEN DECK D1 AND BUILDING ENVELOPE 4. IN ORDER TO SCREEN DRIVE-THROUGH FROM CARY TOWNE BOULEVARD, A BUILDING MUST BE LOCATED BETWEEN THE ATM AND THE CARY TOWNE BOULEVARD RIGHT-OF-WAY.

PHARMACY DRIVE-THROUGH SERVICE - OPTION 2 PROJECT MAY CONTAIN A PHARMACY WITH DRIVE-THROUGH SERVICE ONLY IN THE AREA DESIGNATED ON THE SOUTHERN ELEVATION OF BUILDING 2. IN ORDER TO SCREEN DRIVE-THROUGH FROM CARY TOWNE BOULEVARD, A BUILDING MUST BE LOCATED BETWEEN THE PHARMACY DRIVE-THROUGH AND THE CARY TOWNE BOULEVARD RIGHT-OF-WAY.

OPTION 2 (PARKING DECK)
SCALE: 1"=100'



PERMITTED USES

COMMERCIAL USES
FINANCIAL INSTITUTION
BANK, WITH DRIVE-THROUGH SERVICE (ONLY IF INTERNAL TO PARKING STRUCTURE)
BANK, WITHOUT DRIVE-THROUGH SERVICE
BANK ATM, WITH DRIVE-THROUGH SERVICE
FOOD AND BEVERAGE SERVICE
NIGHTCLUB/BAR
RESTAURANT
RADIO OR TV BROADCASTING STUDIO
WELLNESS CENTER
RECREATION/ENTERTAINMENT, INDOOR
AMUSEMENT ESTABLISHMENT
NEIGHBORHOOD RECREATION CENTER (INDOOR/OUTDOOR)
COMMERCIAL RECREATIONAL FACILITIES (INDOOR/OUTDOOR)
POOL OR BILLIARD HALL
THEATER
RECREATION/ENTERTAINMENT, OUTDOOR
RETAIL SALES AND SERVICE
ABC STORE
FARM MARKET SEASONAL
POSTAL CENTER, PRIVATE
PERSONAL SERVICE ESTABLISHMENT
RETAIL STORE
SHOPPING CENTER, GENERAL
SHOPPING CENTER, SMALL
TRADE SCHOOL
MOPED SALES/RENTAL
MOTORIZED VEHICLE SALES/RENTAL (NO MORE THAN 5 VEHICLES STORED ON SITE)
MEDICAL OFFICE (EXCEPT FOR JEWEL BOXES - SEE NOTE #3)

OFFICE USES
OFFICE
OFFICE, BUSINESS, OR PROFESSIONAL
RESEARCH LABORATORY
MEDICAL OFFICE USES

RESIDENTIAL USES
MID-RISE MULTI-FAMILY DWELLING
MULTI-FAMILY DWELLING

HOSPITALITY USES
HOTEL OR MOTEL
HOTEL OR MOTEL, EXTENDED STAY

PUBLIC/INSTITUTIONAL USES
NOTE: THESE USES ARE ALLOWED WHEREVER OFFICE OR COMMERCIAL USES ARE PERMITTED
CULTURAL FACILITIES
LIBRARY
MUSEUM
DAY CARE
PARK AND OPEN SPACE
COMMUNITY GARDEN
NEIGHBORHOOD RECREATION CENTER, PUBLIC
OUTDOOR AMPHITHEATER, PUBLIC
PARK, PUBLIC
RELIGIOUS ASSEMBLY
PRE-SCHOOL
TOWN OWNED/OPERATED FACILITY
SCHOOL/COMMUNITY COLLEGE

INDUSTRIAL USES
RESEARCH LABORATORY
CONCEALED (STEALTH) ANTENNAE

ACCESSORY USES
ANY ACCESSORY USE ALLOWED BY SECTION 5.3 OF THE LDO IS PERMITTED IN ACCORDANCE WITH AN ACCESSORY USE PERMIT; HOWEVER, FOOD TRUCKS SHALL BE PERMITTED WITHIN THE DEVELOPMENT WITHOUT REQUIRING AN ACCESSORY USE PERMIT, AS LONG AS ACTIVITY IS CONDUCTED IN COMPLIANCE WITH LDO SECTION 5.3.4(P) AS CURRENTLY WRITTEN OR AS MAY BE AMENDED, AND IS ALSO COMPLIANCE WITH ALL APPLICABLE COUNTY AND/OR STATE REGULATIONS.

TEMPORARY USES AND STRUCTURES
ANY TEMPORARY USE ALLOWED BY SECTION 5.4 OF THE LDO IS PERMITTED IN ACCORDANCE WITH A TEMPORARY USE PERMIT; HOWEVER, TEMPORARY EVENTS PER TABLE 5.4-1 SHALL NOT REQUIRE A TEMPORARY USE PERMIT (ALTHOUGH ALL APPLICABLE BUILDING CODE REQUIREMENTS MUST STILL BE MET).

1. COMMUNITY GATHERING AREAS MAY CONTAIN RETAIL KIOSKS TO HELP ACTIVATE THE PUBLIC SPACES.

2. SMALL-CELL AND/OR MICRO-CELL ANTENNAE MAY BE CONSTRUCTED ON SITE.

BUILDING COMMITTED ELEMENTS KEY

4-10	NUMBER OF STORIES (MIN-MAX)
U	UPPER FLOOR USES
G,O	GROUND FLOOR USES

USES
C - COMMERCIAL
CT - COMMERCIAL-THEATER ONLY
H - HOSPITALITY
O - OFFICE
R - RESIDENTIAL

TABLE A - BUILDING COMMITTED ELEMENTS

BUILDING	GROUND FLOOR PERMITTED USES	UPPER FLOOR PERMITTED USES	VERTICAL INTEGRATION	MIN. HEIGHT - STORIES	MAX. HEIGHT - STORIES
1	COMMERCIAL/OFFICE	OFFICE	OPTIONAL	4	10
2	COMMERCIAL	COMMERCIAL	NO	1	2
3	COMMERCIAL/OFFICE	COMMERCIAL/OFFICE	NO	1	4
4	COMMERCIAL	COMMERCIAL	NO	1	2
5	COMMERCIAL/OFFICE	COMMERCIAL/OFFICE	OPTIONAL	2	4
6	COMMERCIAL/OFFICE	COMMERCIAL/OFFICE	YES	2	4
7	COMMERCIAL	COMMERCIAL	NO	1	2
8	COMMERCIAL/HOSPITALITY/OFFICE	COMMERCIAL/HOSPITALITY/OFFICE/RES	YES	4	12
9	COMMERCIAL/OFFICE/RESIDENTIAL	COMMERCIAL/OFFICE/RESIDENTIAL	OPTIONAL	4 (SEE NOTE #6 BELOW)	6
10	COMMERCIAL	OFFICE/RESIDENTIAL	YES	4	6
11a	COMMERCIAL - THEATER ONLY	COMMERCIAL - THEATER ONLY	NO	1	2
11b	COMMERCIAL	COMMERCIAL/RESIDENTIAL	YES	4	6
12	COMMERCIAL	COMMERCIAL/OFFICE/RESIDENTIAL	YES	4	6
13	COMMERCIAL/RESIDENTIAL	RESIDENTIAL	OPTIONAL	4	6
14	COMMERCIAL/HOSPITALITY/OFFICE/RES	COMMERCIAL/HOSPITALITY/OFFICE/RES	YES	4	12
15	COMMERCIAL/HOSPITALITY/OFFICE/RES	COMMERCIAL/HOSPITALITY/OFFICE/RES	YES	4	12
16	COMMERCIAL/HOSPITALITY/OFFICE	COMMERCIAL/HOSPITALITY/OFFICE	OPTIONAL	5	12
17	COMMERCIAL	COMMERCIAL	NO	1	2
18	COMMERCIAL	COMMERCIAL	NO	1	2
19	COMMERCIAL	COMMERCIAL	NO	1	2
20	COMMERCIAL	COMMERCIAL	NO	1	2
21	COMMERCIAL	COMMERCIAL	NO	1	2
22	COMMERCIAL/HOSPITALITY	COMMERCIAL/HOSPITALITY/OFFICE/RES	YES	3	8
23	COMMERCIAL	COMMERCIAL/OFFICE/RESIDENTIAL	YES	3	8
24	COMMERCIAL/RESIDENTIAL	OFFICE/RESIDENTIAL	OPTIONAL	3	8
25	COMMERCIAL/OFFICE/RESIDENTIAL	OFFICE/RESIDENTIAL	OPTIONAL	4	6
26	COMMERCIAL/OFFICE	OFFICE	OPTIONAL	4	14
27	COMMERCIAL/HOSPITALITY	COMMERCIAL/HOSPITALITY/OFFICE	OPTIONAL	2	5
28	COMMERCIAL/HOSPITALITY/OFFICE	HOSPITALITY/OFFICE	OPTIONAL	4	8
29	COMMERCIAL/HOSPITALITY/OFFICE	HOSPITALITY/OFFICE	OPTIONAL	1	8
30	COMMERCIAL/OFFICE	OFFICE	OPTIONAL	5	8
31	COMMERCIAL	COMMERCIAL	NO	1	2
32	COMMERCIAL	COMMERCIAL	NO	1	2
33	COMMERCIAL/OFFICE	OFFICE	OPTIONAL	5	8
34	COMMERCIAL	COMMERCIAL	NO	1	2
35	COMMERCIAL/HOSPITALITY/OFFICE	COMMERCIAL/HOSPITALITY/OFFICE/RES	YES	4	14
36	COMMERCIAL	COMMERCIAL	NO	1	2

1. VERTICALLY INTEGRATED BUILDINGS WILL CONTAIN A MINIMUM OF 2 USES.
2. SEE PERMITTED USE TABLE BELOW FOR A COMPLETE LIST OF WHICH USES ARE PERMITTED WITHIN THE CATEGORIES SHOWN IN THE BUILDING COMMITTED ELEMENTS TABLE ABOVE.
3. THE MAXIMUM BUILDING HEIGHT (NUMBER OF STORIES) FOR ALL BUILDINGS LISTED IN THE TABLE ABOVE MAY BE CONSTRUCTED AS OF RIGHT.

LEGEND

- CONCEPTUAL BUILDINGS - BUILDING ENVELOPES MAY INCLUDE MULTIPLE BUILDINGS AND MAY SHIFT AT DEVELOPMENT PLAN STAGE AS LONG AS SUBSTANTIALLY SIMILAR.
- VERTICAL INTEGRATION REQUIRED
- CONCEPTUAL PARKING DECKS
- CONCEPTUAL SURFACE PARKING (SEE PARKING NOTES FOR RESTRICTIONS)
- CONCEPTUAL PUBLIC VEHICULAR CIRCULATION
- CONCEPTUAL PRIVATE VEHICULAR CIRCULATION
- GREENWWAY OR STREETSIDE TRAIL
- PROPOSED ZONING BOUNDARY LINE
- CGA–1 — COMMUNITY GATHERING AREAS - LOCATIONS ARE CONCEPTUAL AND MAY SHIFT AT DEVELOPMENT PLAN STAGE AS LONG AS SUBSTANTIALLY SIMILAR
- TRAFFIC LIGHT
- PROJECT SIGNAGE
- PUBLIC ART
- DM — DIMENSIONAL MONUMENT SIGN
- STREAM BUFFER
- FLOODWAY
- 100 YEAR FLOODPLAIN
- WETLANDS

GRAPHIC SCALE
0 50 100 200
1 inch = 100 ft.

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

McAdams
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CLIENT

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RALEIGH, NORTH CAROLINA 27615
JACOB ANDERSON
PHONE: 919. 239. 9486

DOWNTOWN NORTH AT KNIGHTDALE STATION
PUD MASTER PLAN
N SMITHFIELD ROAD
KNIGHTDALE, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 051506 ENGINEER PETER E. PROBST

REVISIONS

NO.	DATE

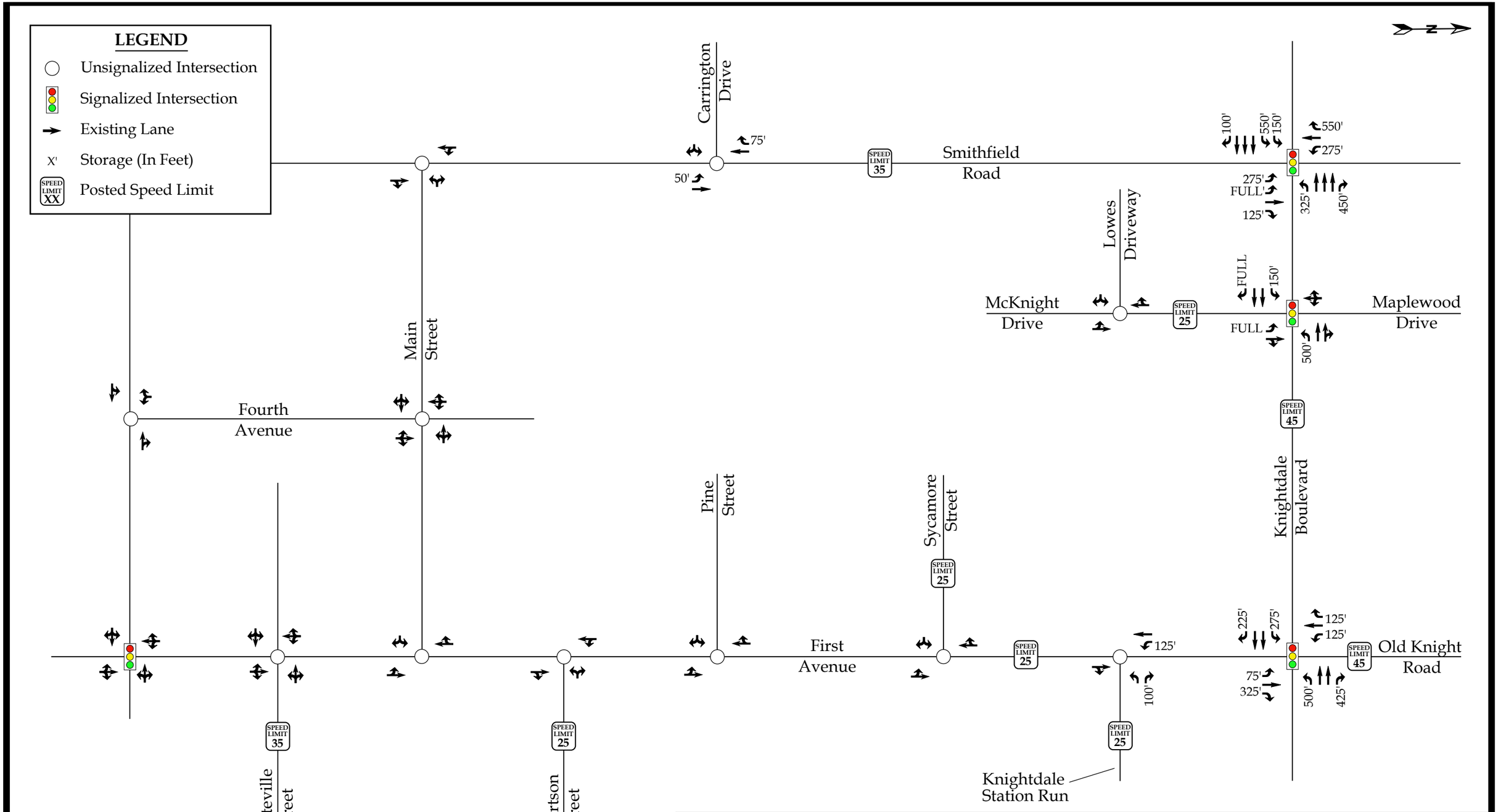
PLAN INFORMATION

PROJECT NO.	AGN-21002
FILENAME	AGN21002-S1
CHECKED BY	TP
DRAWN BY	SMV
SCALE	1"=100'
DATE	09. 13. 2022

SHEET

PUD MASTER PLAN
C2.00

M:\Projects\AGN\AGN21002\04-Production\Planning and LA\Development Plan\Current Drawings\AGN21002-S1.dwg, 9/20/2022 9:28:29 AM, Sean Vandenbrink



RAMEY KEMP ASSOCIATES

Suggs
Knightdale, NC

2022 Existing
Lane Configurations

Scale: Not to Scale | Figure 3

2. 2022 EXISTING PEAK HOUR CONDITIONS

2.1. 2022 Existing Peak Hour Traffic Volumes

Existing peak hour traffic volumes were determined based on traffic counts conducted at the study intersections listed below, in June of 2022 by RKA and Quality Counts, LLC. during a typical weekday AM (7:00 AM – 9:00 AM) and PM (4:00 PM – 6:00 PM) peak periods while schools were in session:

- Mcknight Drive and Knightdale Blvd (US 64 Business)
- N. First Avenue / Old Knight Road and Knightdale Blvd (US 64 Business)
- Smithfield Road and Knightdale Blvd (US 64 Business)
- Mcknight Drive at Lowes Driveway
- Knightdale Station Run and N First Avenue
- Sycamore Street and N. First Avenue
- Pine Street and N. First Avenue
- Fourth Avenue and Main Street
- Main Street and N. First Avenue
- Main Street and Smithfield Road
- Smithfield Road and N. First Avenue
- Carrington Drive and Smithfield Road

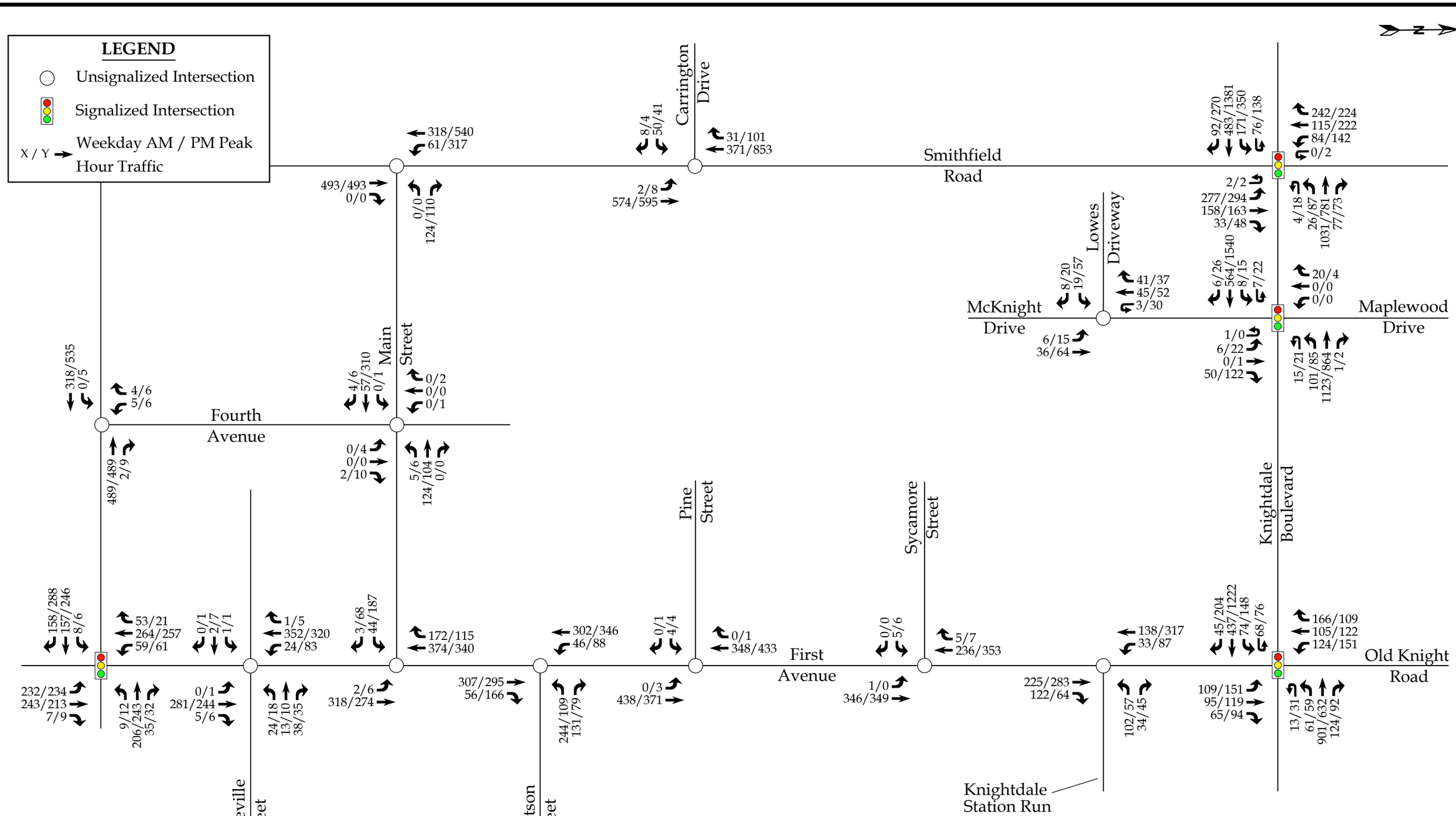
The below intersections were counted in October 2022 by RKA and Quality Counts, LLC. during a typical weekday AM (7:00 AM – 9:00 AM) and PM (4:00 PM – 6:00 PM) peak periods while schools were in session:

- N. First Avenue and Robertson Street
- N. First Avenue and Fayetteville Street

Peak hour traffic volumes at the intersection of Smithfield Road and fourth Avenue were determined by balancing between adjacent study intersections. Weekday AM and PM traffic volumes were balanced between study intersections, where appropriate. Refer to Figure 4 for 2022 existing weekday AM and PM peak hour traffic volumes. A copy of the count data is located in Appendix B of this report.

2.2. Analysis of 2022 Existing Peak Hour Traffic Conditions

The 2022 existing weekday AM and PM peak hour traffic volumes were analyzed to determine the current levels of service at the study intersections under existing roadway conditions. Signal information was obtained from NCDOT and is included in Appendix C. The results of the analysis are presented in Section 7 of this report.



Note: Based on NCDOT Congestion Management guidelines, a volume of 4 vehicles per hour (vph) was analyzed for any movement with less than 4 vph.

RAMEY KEMP ASSOCIATES

Suggs
Knightdale, NC

2022 Existing
Peak Hour Traffic

Scale: Not to Scale | Figure 4

3. 2027 & 2030 & 2035 NO-BUILD PEAK HOUR CONDITIONS

In order to account for growth of traffic and subsequent traffic conditions at a future year, no-build traffic projections are needed. No-build traffic is the component of traffic due to the growth of the community and surrounding area that is anticipated to occur regardless of whether or not the proposed development is constructed. No-build traffic is comprised of existing traffic growth within the study area and additional traffic created as a result of adjacent approved developments.

3.1. Ambient Traffic Growth

Through coordination with the Town and NCDOT, it was determined that an annual growth rate of 2% would be used to generate 2027, 2030, and 2035 projected weekday AM and PM peak hour traffic volumes. Refer to Figure 5A, 5B, and 5C for 2027, 2030, and 2035 projected peak hour traffic, respectively.

3.2. Adjacent Development Traffic

Through coordination with the Town and NCDOT, the following adjacent developments were identified to be included as an approved adjacent development in this study:

- Knightdale Station
- Haywood Glen
- Forestville Village

Table 2, on the following page, provides a summary of the adjacent developments.

Table 2: Adjacent Development Information

Development Name	Location	Build-Out Year	Land Use / Intensity	TIA Performed
Knightdale Station	Along Morning Flyer Way	N/A*	• 432 single family homes	N/A**
Haywood Glen	Along Old Knight Road	2024	• 112 single family homes	October 201 by Timmons Group
Forestville Village	West of Old Knight Road and north of Forestville Road	2025	• 90 single-family homes • 190 townhomes • 40,000 s.f. shopping center	January 2021 by RKA

*Assumed prior to the build-out of the proposed development.
**A trip generation and assignment were performed for each development based on respective land uses since TIAs were not available.

It should be noted that the adjacent developments were approved, during scoping, by the Town and NCDOT. Adjacent development trips are shown in Figure 6. Adjacent development information can be found in Appendix D.

3.3. Future Roadway Improvements

Based on coordination with the NCDOT and the Town, it was determined there were no future roadway improvements to consider with this study.

3.4. 2027 & 2030 & 2035 No-Build Peak Hour Traffic Volumes

The 2027, 2030, and 2035 no-build traffic volumes were determined by projecting the 2022 existing peak hour traffic to the year and adding the adjacent development trips. Refer to Figure 7A, 7B, and 7C for an illustration of the 2027, 2030, and 2035 no-build peak hour traffic volumes at the study intersections.

3.5. Analysis of 2027 & 2030 & 2035 No-Build Peak Hour Traffic Conditions

The 2027, 2030, and 2035 no-build AM and PM peak hour traffic volumes at the study intersections were analyzed with future geometric roadway conditions and traffic control. The analysis results are presented in Section 7 of this report.

LEGEND

- Unsignalized Intersection
- Signalized Intersection
- X / Y → Weekday AM / PM Peak Hour Traffic

N

Smithfield Road

Carrington Drive

Lowes Driveway

McKnight Drive

Maplewood Drive

Fourth Avenue

Main Street

First Avenue

Pine Street

Sycamore Street

Knightdale Boulevard

Old Knight Road

Fayetteville Street

Robertson Street

Knightdale Station Run

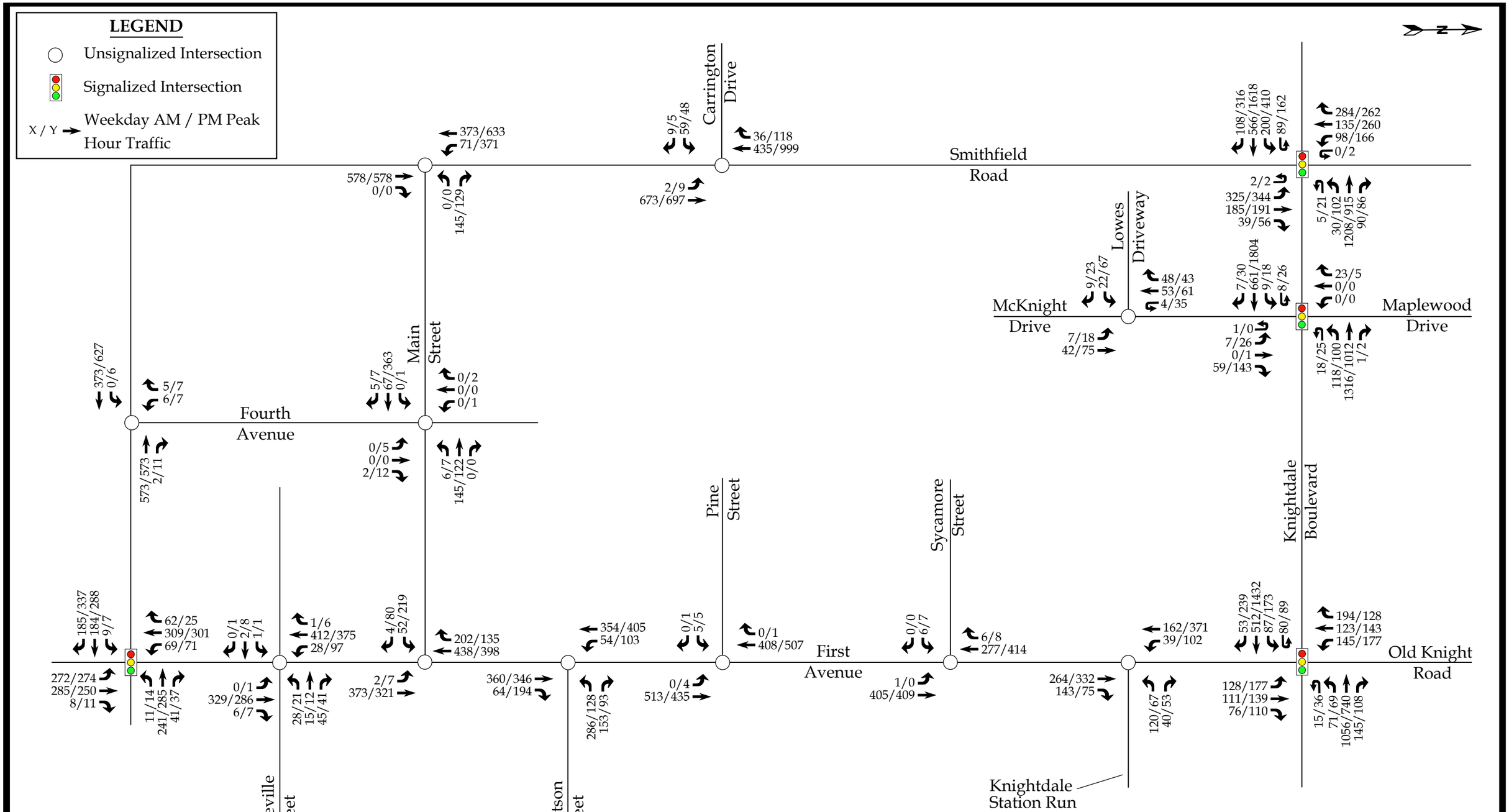
Note: Based on NCDOT Congestion Management guidelines, a volume of 4 vehicles per hour (vph) was analyzed for any movement with less than 4 vph.

RAMEY KEMP ASSOCIATES

Suggs
Knightdale, NC

2027 Projected
Peak Hour Traffic

Scale: Not to Scale | Figure 5A



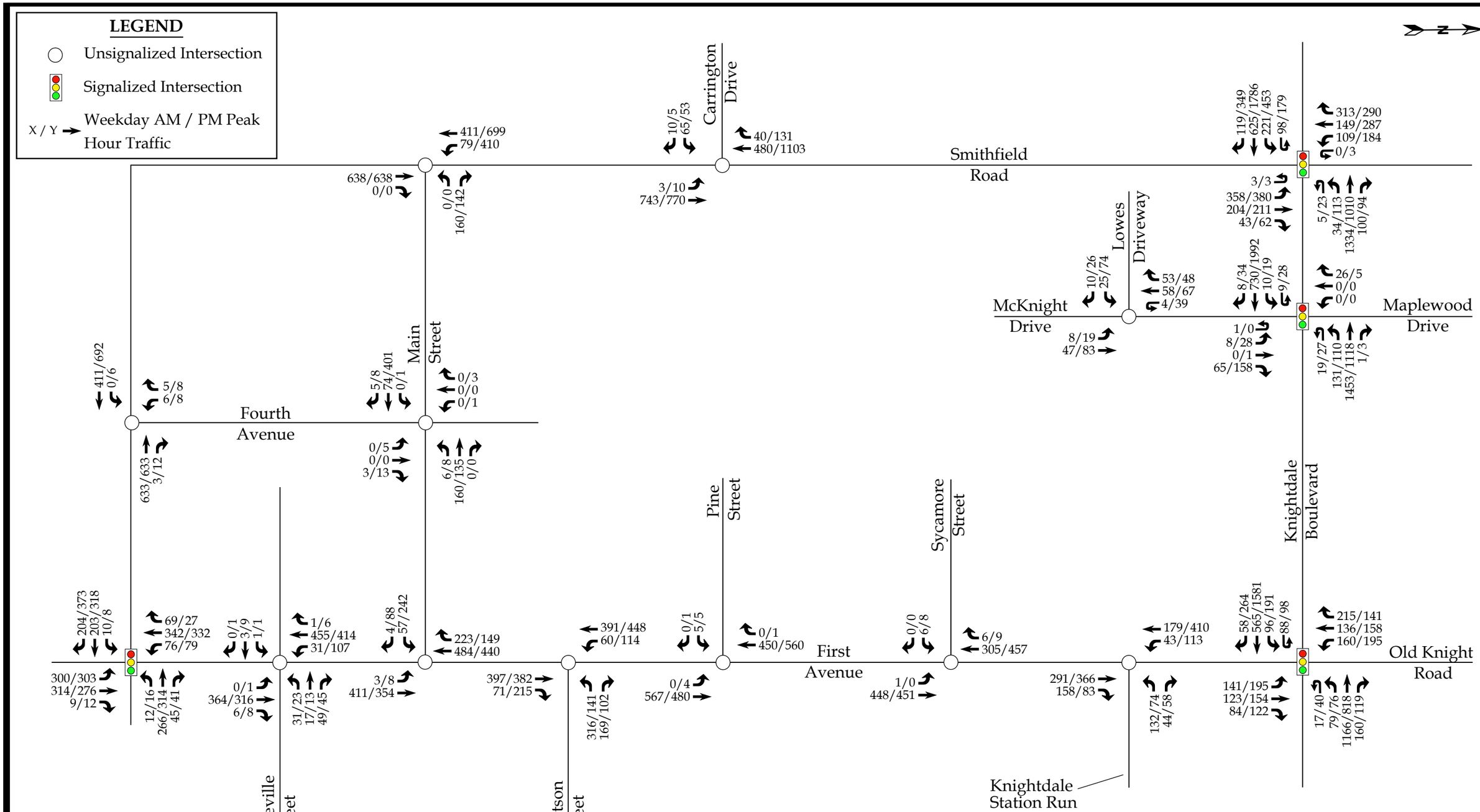
Note: Based on NCDOT Congestion Management guidelines, a volume of 4 vehicles per hour (vph) was analyzed for any movement with less than 4 vph.

RAMEY KEMP ASSOCIATES

Suggs
Knightdale, NC

2030 Projected
Peak Hour Traffic

Scale: Not to Scale | Figure 5B



Note: Based on NCDOT Congestion Management guidelines, a volume of 4 vehicles per hour (vph) was analyzed for any movement with less than 4 vph.

RAMEY KEMP ASSOCIATES

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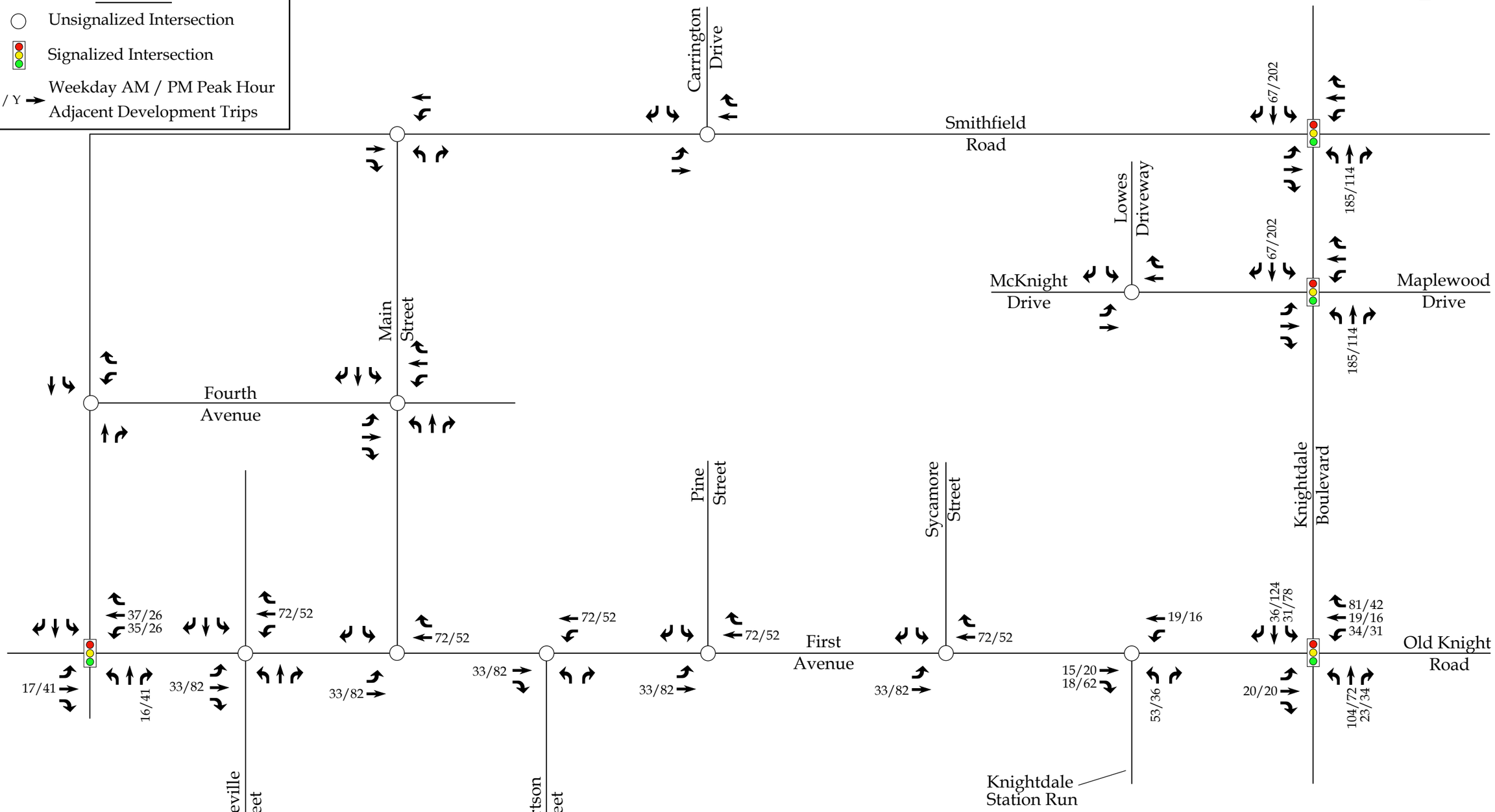
Knightdale, NC

2035 Projected
Peak Hour Traffic

Scale: Not to Scale | Figure 5C

LEGEND

- Unsignalized Intersection
- Signalized Intersection
- X / Y → Weekday AM / PM Peak Hour Adjacent Development Trips



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Knightdale, NC

Peak Hour Adjacent Development Trips

Scale: Not to Scale | Figure 6

LEGEND

- Unsignalized Intersection
- Signalized Intersection
- X / Y → Weekday AM / PM Peak Hour Traffic

N

Smithfield Road
Carrington Drive
Lowes Driveway
McKnight Drive
Maplewood Drive
Main Street
Fourth Avenue
Pine Street
Sycamore Street
Knightdale Boulevard
First Avenue
Old Knight Road
Fayetteville Street
Robertson Street
Knightdale Station Run

Note: Based on NCDOT Congestion Management guidelines, a volume of 4 vehicles per hour (vph) was analyzed for any movement with less than 4 vph.

RAMEY KEMP ASSOCIATES

Suggs
Knightdale, NC

2027 No-Build
Peak Hour Traffic

Scale: Not to Scale | Figure 7A

LEGEND

- Unsignalized Intersection
- Signalized Intersection
- X / Y → Weekday AM / PM Peak Hour Traffic

N

Carrington Drive
9/5
59/48
36/118
435/999
2/9
673/697

Smithfield Road
373/633
71/371
578/578
0/0
0/0
145/129
108/316
633/1820
200/410
89/162
284/262
135/260
98/166
0/2
2/2
325/344
185/191
39/56
5/21
30/102
1393/1029
90/86

Lowes Driveway
9/23
22/67
48/43
53/61
4/35
7/18
42/75

McKnight Drive
7/30
728/2006
9/18
8/26
23/5
0/0
0/0
1/0
7/26
0/1
59/143
18/25
118/100
1501/1126
1/2

Maplewood Drive

Main Street
373/627
0/6
5/7
6/7
5/7
67/363
0/1
0/2
0/0
0/1
573/573
2/11
0/5
0/0
2/12
6/7
145/122
0/0

Fourth Avenue

Pine Street
Sycamore Street
Knightdale Boulevard

185/337
184/288
9/7
62/25
346/327
104/97
0/1
2/8
1/1
1/6
484/427
28/97
4/80
52/219
202/135
510/450
426/457
54/103
0/1
5/5
0/1
480/559
0/0
6/7
6/8
349/466
181/387
39/102
53/239
548/1556
118/251
80/89
275/170
142/159
179/208

First Avenue
Old Knight Road

272/274
302/291
8/11
11/14
241/285
57/78
0/1
362/368
6/7
28/21
15/12
45/41
2/7
406/403
393/428
64/194
286/128
153/93
0/4
546/517
1/0
438/491
279/352
161/137
173/103
40/53
128/177
131/159
76/110
15/36
71/69
1160/812
168/142

Fayetteville Street
Robertson Street
Knightdale Station Run

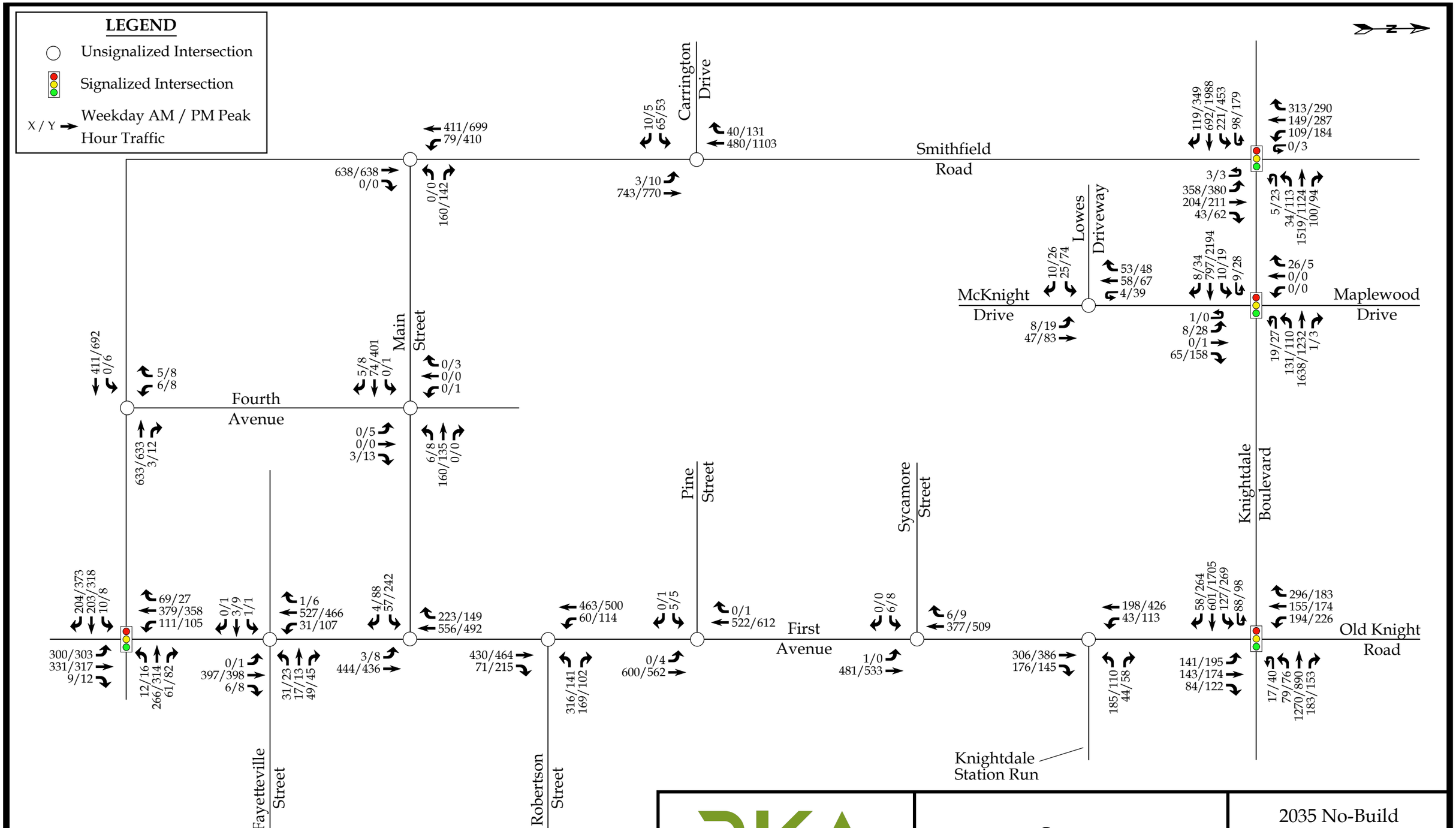
Note: Based on NCDOT Congestion Management guidelines, a volume of 4 vehicles per hour (vph) was analyzed for any movement with less than 4 vph.

RAMEY KEMP ASSOCIATES

Suggs
Knightdale, NC

2030 No-Build
Peak Hour Traffic

Scale: Not to Scale | Figure 7B



Note: Based on NCDOT Congestion Management guidelines, a volume of 4 vehicles per hour (vph) was analyzed for any movement with less than 4 vph.

RAMEY KEMP ASSOCIATES

Suggs
Knightdale, NC

2035 No-Build
Peak Hour Traffic

Scale: Not to Scale | Figure 7C

4. SITE TRIP GENERATION AND DISTRIBUTION

4.1. Trip Generation

The proposed development is assumed to consist of the uses listed in the tables below. Average weekday daily, AM peak hour, and PM peak hour trips for the proposed development were estimated using methodology contained within the ITE *Trip Generation Manual*, 11th Edition. Refer to Table 3 for the Phase 1 land uses, Table 4 for the Phase 2 land uses, and Table 5 for the full build land uses. It should be noted that densities from previous phases are included in each phase.

Table 3: Phase 1 Trip Generation Summary

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	AM Peak Hour Trips (vph)		PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Single Family Homes (210)	125 DU	1,239	23	68	77	46
Multifamily Housing – Low-Rise (220)	25 DU	236	7	24	19	12
Total Primary Trips		**1,475**	**30**	**92**	**96**	**58**

It is estimated that the proposed development will generate approximately 1,475 trips on the roadway network during a typical 24-hour weekday period. Of the daily traffic volume, it is anticipated that 122 trips (30 entering and 92 exiting) will occur during the weekday AM peak hour and 154 (96 entering and 58 exiting) will occur during the weekday PM peak hour.

Table 4: Phase 2 Trip Generation Summary

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	AM Peak Hour Trips (vph)		PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Single Family Homes (210)	125 DU	1,239	23	68	77	46
Multifamily Housing – Low-Rise (220)	425 DU	2,800	37	118	128	75
Total Primary Trips		**4,039**	**60**	**186**	**205**	**121**

It is estimated that the proposed development will generate approximately 1,475 trips on the roadway network during a typical 24-hour weekday period. Of the daily traffic volume, it is anticipated that 122 trips (30 entering and 92 exiting) will occur during the weekday AM peak hour and 154 (96 entering and 58 exiting) will occur during the weekday PM peak hour.

Table 5: Full Build Trip Generation Summary

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	AM Peak Hour Trips (vph)		PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Single Family Homes (210)	125 DU	1,239	23	68	77	46
Multifamily Housing – Low-Rise (220)	425 DU	2,800	37	118	128	75
Hotel (310)	115 Rooms	823	28	22	29	28
Health/Fitness Club (492)	35 KSF	1,240	23	23	71	53
Office Park	110 KSF	1,456	264	33	22	138
Shopping Plaza (821)	70 KSF	6,800	257	237	333	347
Supermarket (850)	65 KSF	5,960	222	206	286	276
High-Turnover Restaurants (932)	20 KSF	2,144	105	86	110	71
Fast-Food Restaurant with Drive-Thru (934)	13 KSF	6,077	296	284	223	206
Bank with Drive-Thru (912)	12 KSF	1,204	69	50	126	126
Gasoline Station with Convenience Market (945)	16 Fueling Positions	4,242	128	129	147	148
Total Trips		**33,985**	**1,452**	**1,256**	**1,552**	**1,514**
Internal Capture (20% AM & 21% PM)			*-291*	*-251*	*-327*	*-319*
Total External Trips			**1,161**	**1,005**	**1,225**	**1,195**
Pass-By Trips			*-201**	*-201**	*-341**	*-341**
Total Primary Trips			**960***	**804***	**884***	**854***

*It should be noted that pass-by trips were limited at 10% of the adjacent street traffic resulting in an increase in primary trips. This is expected to provide conservative results, because it is likely the gas station will operate at the pass-by percentages included above due to the heavy amount of residential development within the vicinity of the site.

It is estimated that the proposed development will generate approximately 33,985 trips on the roadway network during a typical 24-hour weekday period. Of the daily traffic volume, it is anticipated that 2,708 trips (1,452 entering and 1,256 exiting) will occur during the weekday AM peak hour and 3,066 (1,552 entering and 1,514 exiting) will occur during the weekday PM peak hour.

Internal capture of trips between the office, residential, and retail uses was considered in this study. Internal capture is the consideration for trips that will be made within the site between different land uses, so the vehicle technically never leaves the internal site but can still be considered as a trip to that specific land use. Internal capture typically only considers trips between residential, office, and retail/restaurant land uses. Based on NCHRP Report 684 methodology, a weekday AM peak hour internal capture of 20% and a weekday PM peak hour internal capture rate of 21% was applied to the total trips. The internal capture reductions are expected to account for approximately 542 (291 entering and 251 exiting) trips during the weekday AM peak hour and 646 (327 entering and 319 exiting) trips during the weekday PM peak hour.

Pass-by trips were also taken into consideration in this study. Pass-by trips are made by the traffic already using the adjacent roadway, entering the site as an intermediate stop on their way to another destination. Pass-by percentages are applied to site trips after adjustments for internal capture. Pass-by trips were capped at 10% of the total approach traffic per NCDOT Congestion management guidelines. Pass-by trips are expected to account for approximately 402 trips (201 entering and 201 exiting) during the weekday AM peak hour and approximately 682 trips (341 entering and 341 exiting) during the weekday PM peak hour. It should be noted that the pass-by trips were balanced, as it is likely that these trips would enter and exit in the same hour.

The total primary site trips are the calculated site trips after the reduction for internal capture and pass-by trips. Primary site trips are expected to generate approximately 1,765 trips (960 entering and 804 exiting) during the weekday AM peak hour and 1,738 trips (884 entering and 854 exiting) during the weekday PM peak hour.

4.2. Site Trip Distribution and Assignment

Trip distribution percentages used in assigning site traffic for this development were estimated based on a combination of existing traffic patterns, population centers adjacent to the study area, and engineering judgment.

It is estimated that site trips will be regionally distributed as follows:

Residential Trip Distribution

- 35% to/from the west via Knightdale Boulevard
- 15% to/from the north via Smithfield Road
- 10% to/from the north via Old Knight Road
- 15% to/from the east via Knightdale Boulevard
- 2% to/from the east via Knightdale Station Run
- 3% to/from the east via Robertson Street
- 10% to/from the east via Smithfield Road
- 10% to/from the south via First Avenue

It is estimated that site trips will be regionally distributed as follows under full build conditions:

Commercial Trip Distribution

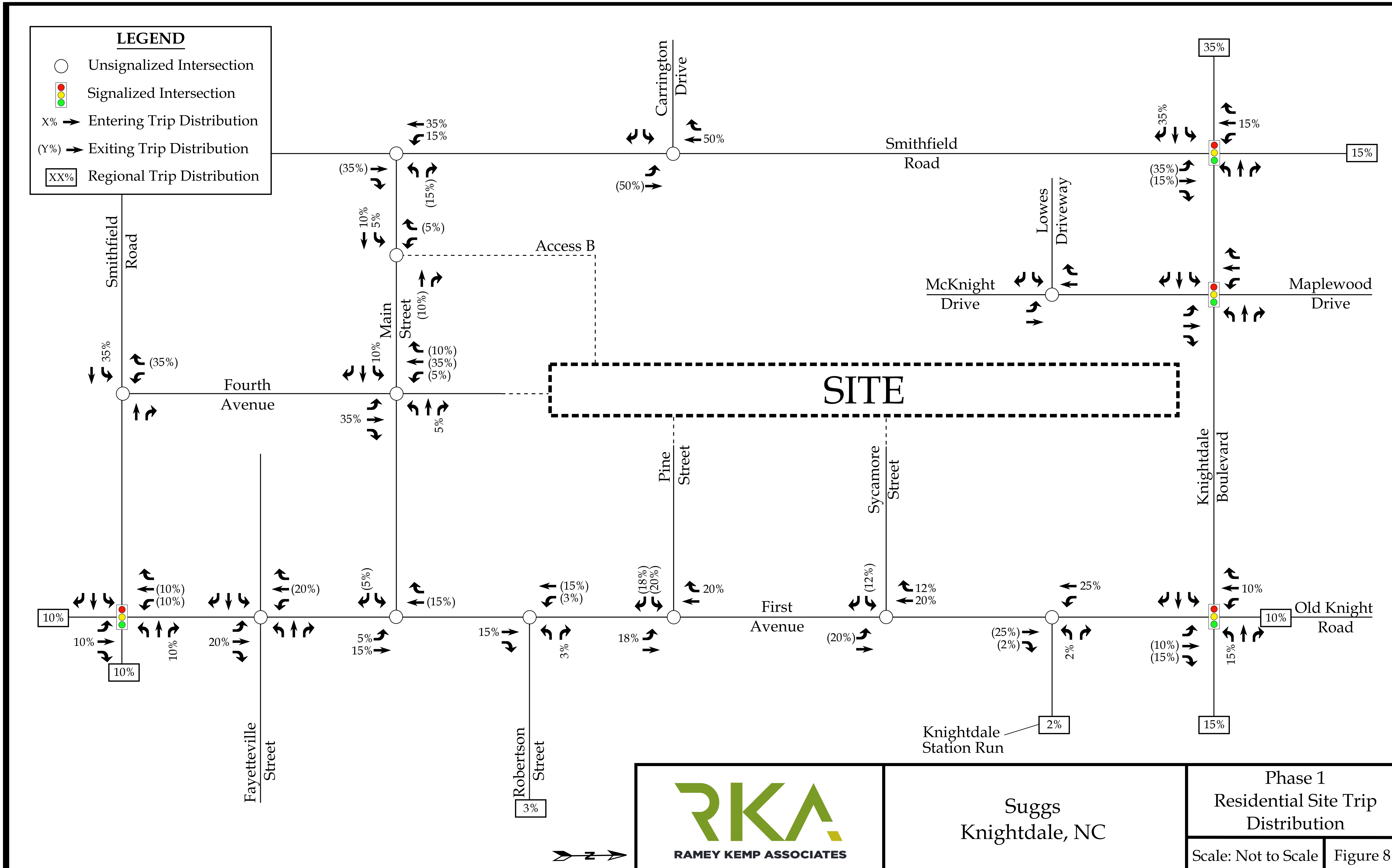
- 25% to/from the west via Knightdale Boulevard
- 15% to/from the north via Smithfield Road
- 10% to/from the north via Old Knight Road
- 15% to/from the east via Knightdale Boulevard
- 5% to/from the east via Knightdale Station Run
- 3% to/from the east via Robertson Street
- 2% to/from the east via Robertson Street
- 15% to/from the east via Smithfield Road
- 10% to/from the south via First Avenue

The Phase 1 residential site trip distribution is shown in Figure 8 and the Phase 1 site trip assignment is shown in Figure 9. The Phase 2 residential site trip distribution is shown in

Figure 10 and the Phase 2 site trip assignment is shown in Figure 11. The Full Build residential site trip distribution is shown in Figure 12A and the Full Build commercial site trip distribution is shown in Figure 12B. Refer to Figure 13A for the Full Build residential site trip assignment and Figure 13B for the commercial site trip assignment.

The pass-by site trips were distributed based on existing traffic patterns with consideration given to the proposed driveway access and site layout. Refer to Figure 14 for the pass-by site trip distribution. Pass-by site trips are shown in Figure 15. Pass-by trips were only associated with the Full Build scenario.

The total Full Build site trips were determined by adding the primary site trips and the pass-by site trips. Refer to Figure 16 for the total peak hour site trips at the study intersections.



LEGEND
Unsignalized Intersection
Signalized Intersection
X% Entering Trip Distribution
(Y%) Exiting Trip Distribution
XX% Regional Trip Distribution
SITE
Smithfield Road
Carrington Drive
Main Street
Access B
Fourth Avenue
Lowes Driveway
McKnight Drive
Maplewood Drive
Knightdale Boulevard
Pine Street
Sycamore Street
First Avenue
Old Knight Road
Fayetteville Street
Robertson Street
Knightdale Station Run
35%
15%
10%
3%
2%
RAMEY KEMP ASSOCIATES
Suggs
Knightdale, NC
Phase 1
Residential Site Trip Distribution
Scale: Not to Scale
Figure 8

LEGEND

- Unsignalized Intersection
- Signalized Intersection
- X / Y → Weekday AM / PM Peak Hour Site Trips

N

Carrington Drive

Smithfield Road

Access B

Lowes Driveway

McKnight Drive

Maplewood Drive

Main Street

Fourth Avenue

SITE

Pine Street

Sycamore Street

Knightdale Boulevard

First Avenue

Old Knight Road

Fayetteville Street

Robertson Street

Knightdale Station Run

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Suggs
Knightdale, NC

Phase 1
Residential Site Trip Assignment

Scale: Not to Scale | Figure 9

LEGEND

- Unsignalized Intersection
- Signalized Intersection
- X% → Entering Trip Distribution
- (Y%) → Exiting Trip Distribution
- XX% Regional Trip Distribution

SITE

Smithfield Road

Fourth Avenue

Main Street

Access B

Carrington Drive

Smithfield Road

Lowes Driveway

McKnight Drive

Maplewood Drive

Pine Street

Sycamore Street

Access C

Knightdale Boulevard

First Avenue

Fayetteville Street

Robertson Street

Knightdale Station Run

Old Knight Road

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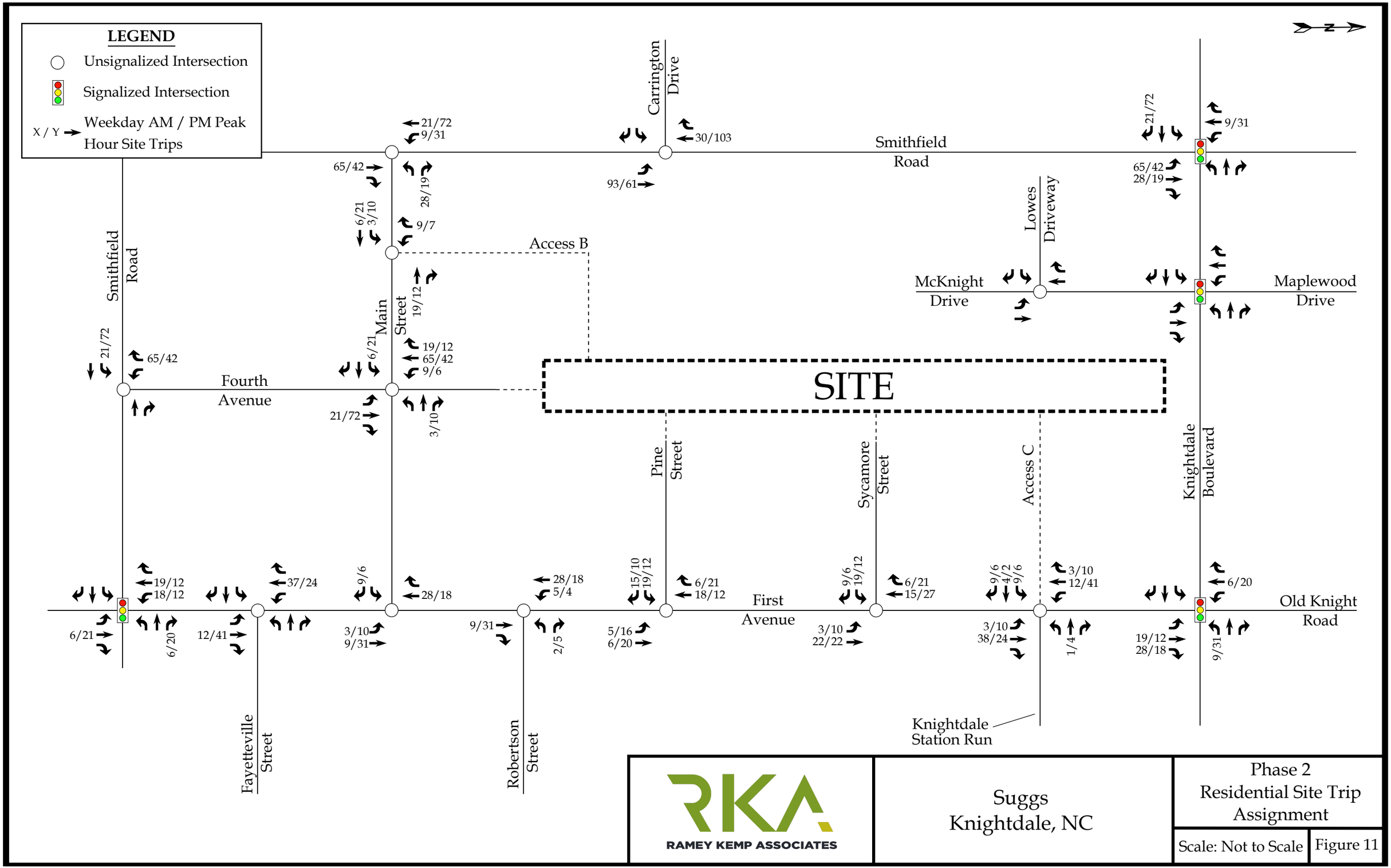
Knightdale, NC

Phase 2
Residential Site Trip Distribution

Scale: Not to Scale | Figure 10



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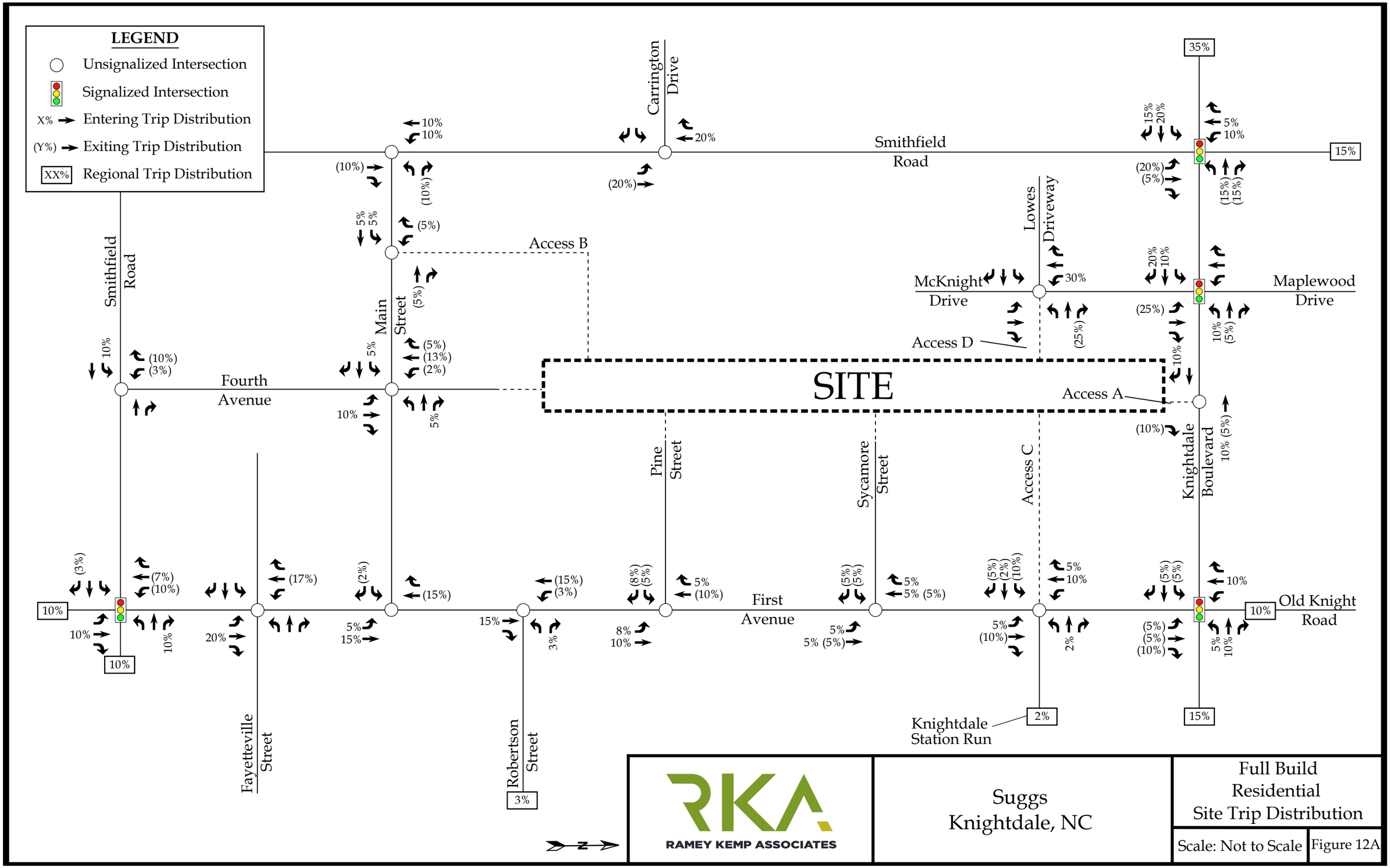
Phase 2
Residential Site Trip Assignment

Scale: Not to Scale | Figure 11


LEGEND
Unsignalized Intersection
Signalized Intersection
X% Entering Trip Distribution
(Y%) Exiting Trip Distribution
XX% Regional Trip Distribution
Carrington Drive
Smithfield Road
Lowes Driveway
McKnight Drive
Maplewood Drive
Access B
Access D
Access A
SITE
Main Street
Fourth Avenue
Pine Street
Sycamore Street
Access C
Knightdale Boulevard
First Avenue
Old Knight Road
Fayetteville Street
Robertson Street
Knightdale Station Run
35%
15%
10%
2%
3%
RAMEY KEMP ASSOCIATES
Suggs
Knightdale, NC
Full Build
Residential
Site Trip Distribution
Scale: Not to Scale
Figure 12A

LEGEND

- Unsignalized Intersection
- Signalized Intersection
- Right-In/Right-Out Intersection
- X% → Entering Trip Distribution
- (Y%) → Exiting Trip Distribution
- XX% Regional Trip Distribution

N

SITE

Smithfield Road

Carrington Drive

Smithfield Road

Lowes Driveway

McKnight Drive

Maplewood Drive

Access B

Access D

Access A

Main Street

Fourth Avenue

Pine Street

Sycamore Street

Access C

Knightdale Boulevard

First Avenue

Old Knight Road

Fayetteville Street

Robertson Street

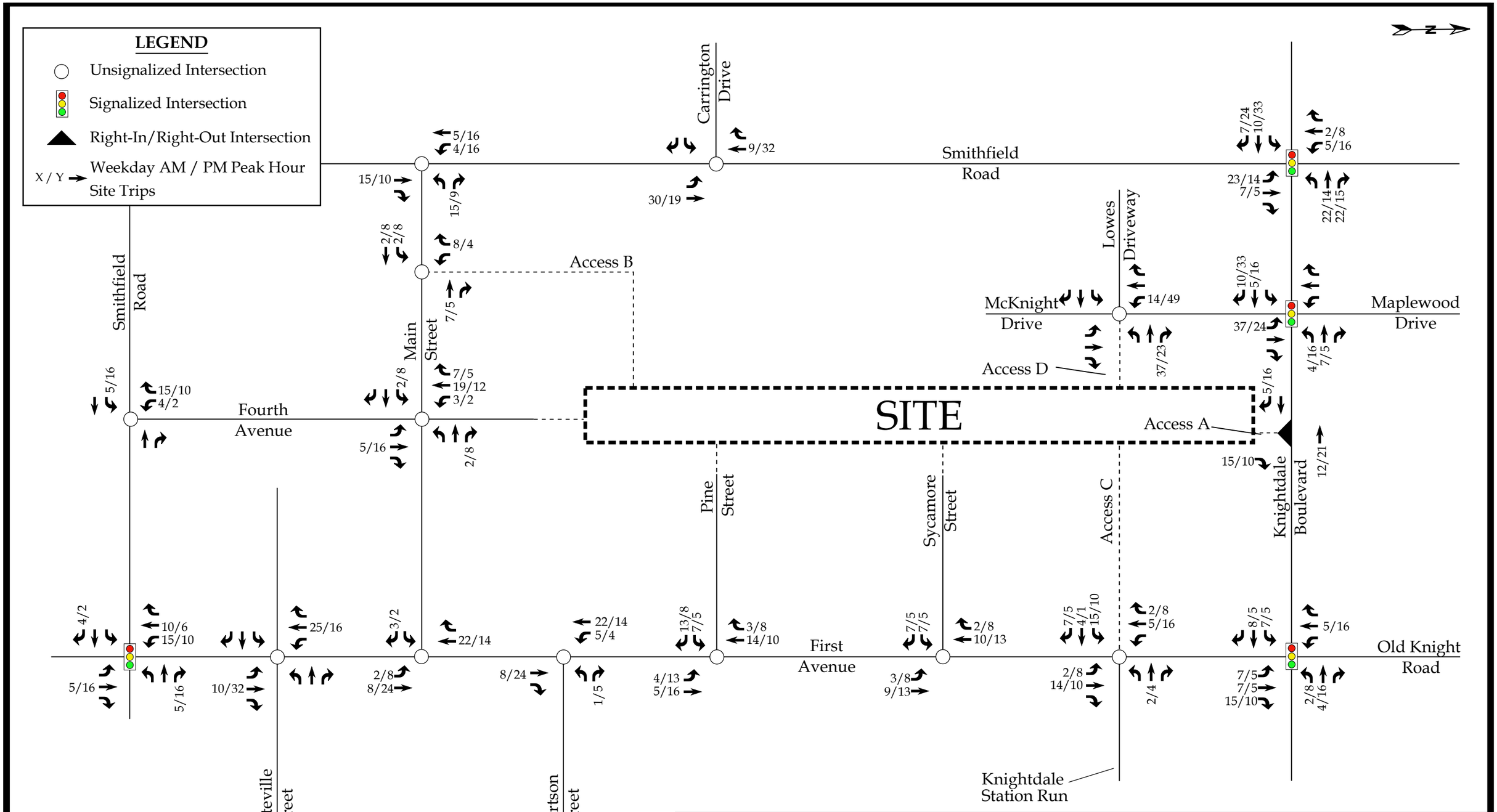
Knightdale Station Run

RAMEY KEMP ASSOCIATES

Suggs
Knightdale, NC

Full Build
Commercial
Site Trip Distribution

Scale: Not to Scale | Figure 12B



RAMEY KEMP ASSOCIATES

Suggs
Knightdale, NC

Full Build
Residential Site Trip
Assignment

Scale: Not to Scale | Figure 13A

LEGEND

- Unsignalized Intersection
- Signalized Intersection
- Right-In/Right-Out Intersection
- X / Y → Weekday AM / PM Peak Hour Site Trips

N

SITE

Smithfield Road

Carrington Drive

Lowes Driveway

McKnight Drive

Maplewood Drive

Access A

Access B

Access D

Main Street

Fourth Avenue

Pine Street

Sycamore Street

Access C

Knightdale Boulevard

First Avenue

Old Knight Road

Fayetteville Street

Robertson Street

Knightdale Station Run

25/10
6/17
6/17
25/10
12/5
52/19
13/5
25/10
3/9
3/8
12/35
6/17
52/19
25/10
77/29
12/35
25/10
6/17
25/10
6/17
10/26
52/19
16/43
4/11
77/29
5/2
9/26
31/27
4/9
6/17
3/9
3/8
13/5
13/5
39/14
6/17
1/3
13/5
5/2
4/11
5/2
13/5
3/9
3/9
3/9
2/5
13/5
8/3
21/8
5/14
21/8
5/14
5/14
4/9
12/35
21/8
38/14
14/4
6/17
3/9
3/9
25/10
13/5
25/10

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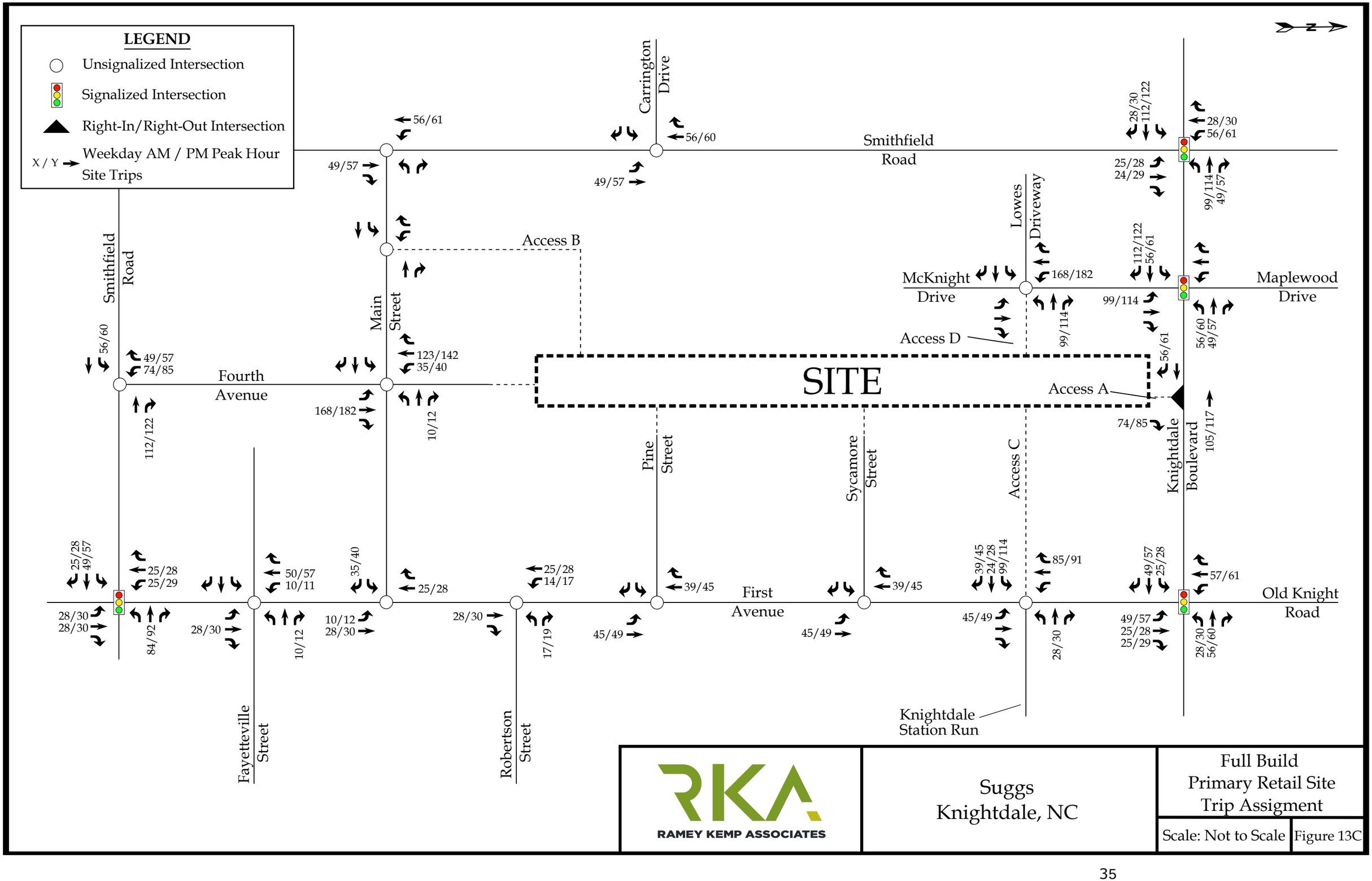
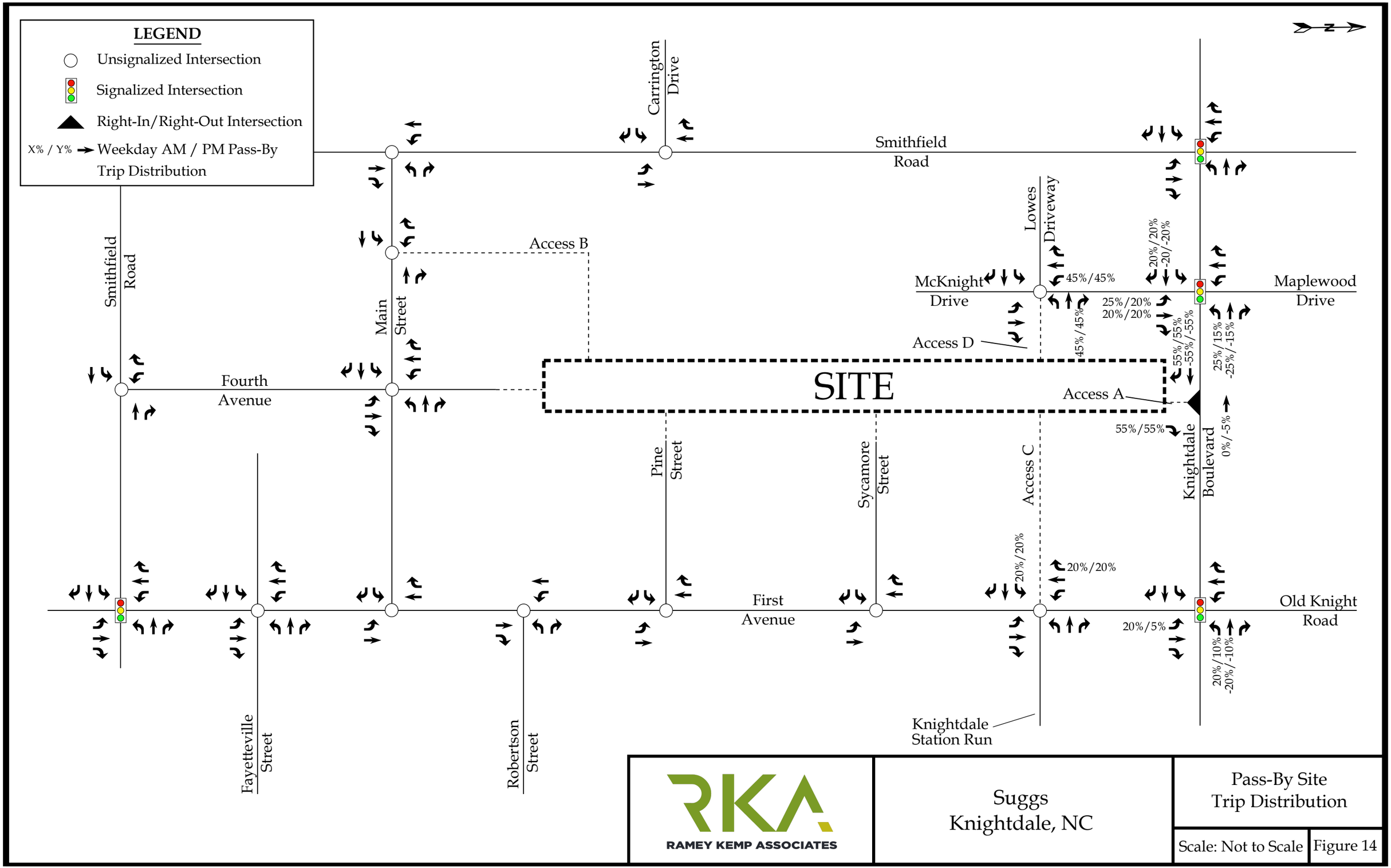
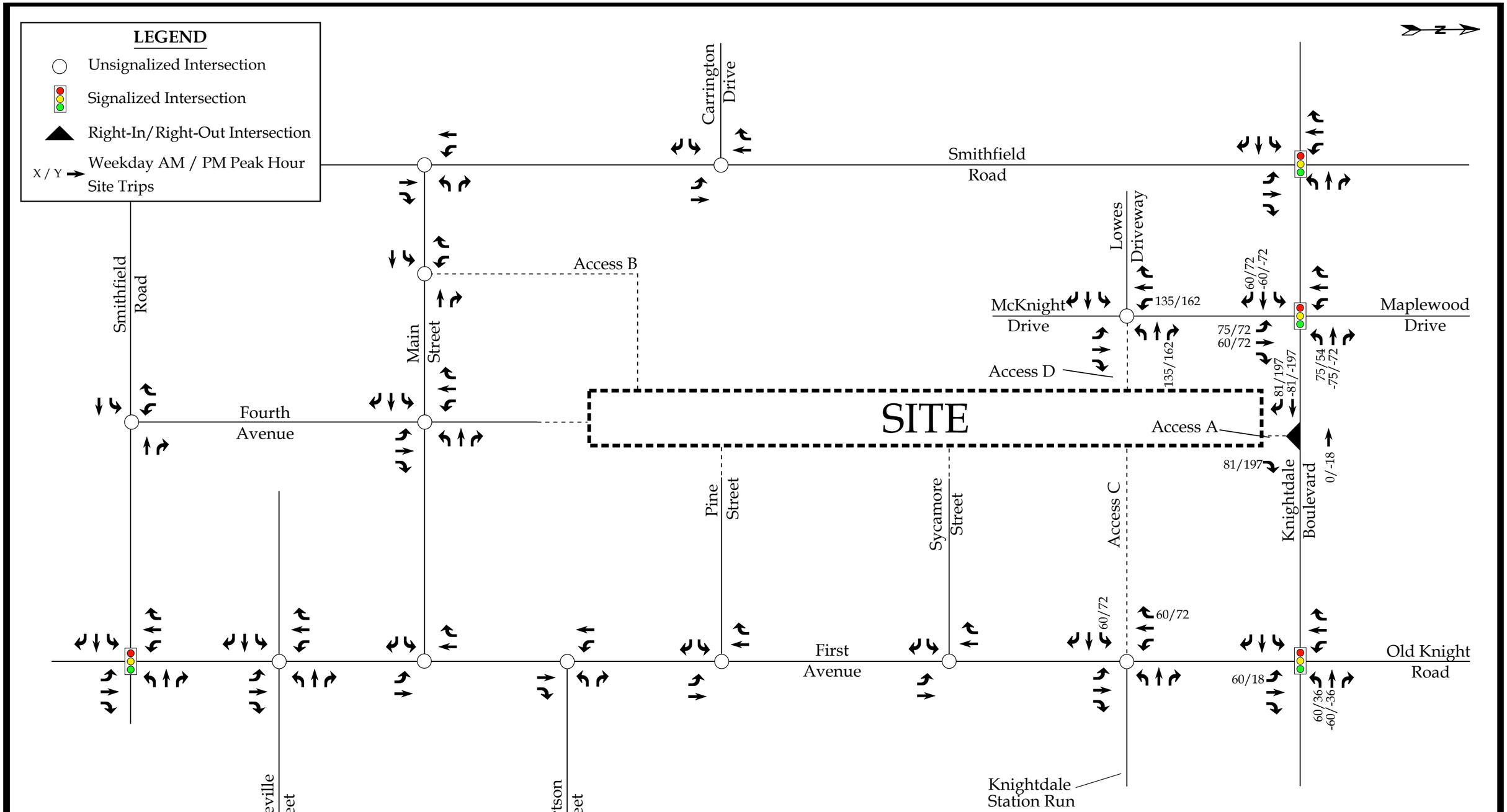
Knightdale, NC

Full Build
Office Site Trip
Assigment

Scale: Not to Scale | Figure 13B


LEGEND
Unsignalized Intersection
Signalized Intersection
Right-In/Right-Out Intersection
X / Y
Weekday AM / PM Peak Hour Site Trips
N
Smithfield Road
Carrington Drive
56/61
49/57
56/60
49/57
28/30
112/122
28/30
56/61
25/28
24/29
99/114
49/57
Lowes Driveway
McKnight Drive
168/182
112/122
56/61
Maplewood Drive
99/114
56/60
49/57
Access B
Smithfield Road
56/60
49/57
74/85
Main Street
123/142
35/40
SITE
Access D
99/114
56/61
Access A
Fourth Avenue
168/182
10/12
74/85
Knightdale Boulevard
105/117
112/122
Pine Street
Sycamore Street
Access C
25/28
49/57
25/28
25/29
35/40
25/28
25/28
14/17
39/45
39/45
39/45
24/28
99/114
85/91
49/57
25/28
57/61
Old Knight Road
28/30
28/30
84/92
50/57
10/11
10/12
28/30
10/12
28/30
17/19
45/49
45/49
45/49
28/30
49/57
25/28
25/29
28/30
56/60
First Avenue
Fayetteville Street
Robertson Street
Knightdale Station Run
RKA
RAMEY KEMP ASSOCIATES
Suggs
Knightdale, NC
Full Build
Primary Retail Site
Trip Assigment
Scale: Not to Scale
Figure 13C


LEGEND
Unsignalized Intersection
Signalized Intersection
Right-In/Right-Out Intersection
X% / Y% → Weekday AM / PM Pass-By Trip Distribution
N
Carrington Drive
Smithfield Road
Lowes Driveway
20%/20%
-20%/-20%
McKnight Drive
45%/45%
Maplewood Drive
25%/20%
20%/20%
Access B
Smithfield Road
Main Street
Access D
45%/45%
55%/55%
-55%/-55%
25%/15%
-25%/-15%
SITE
Access A
Fourth Avenue
55%/55%
Knightdale Boulevard
0%/-5%
Pine Street
Sycamore Street
Access C
20%/20%
20%/20%
First Avenue
20%/5%
Old Knight Road
20%/10%
-20%/-10%
Fayetteville Street
Robertson Street
Knightdale Station Run
RKA
RAMEY KEMP ASSOCIATES
Suggs
Knightdale, NC
Pass-By Site
Trip Distribution
Scale: Not to Scale
Figure 14



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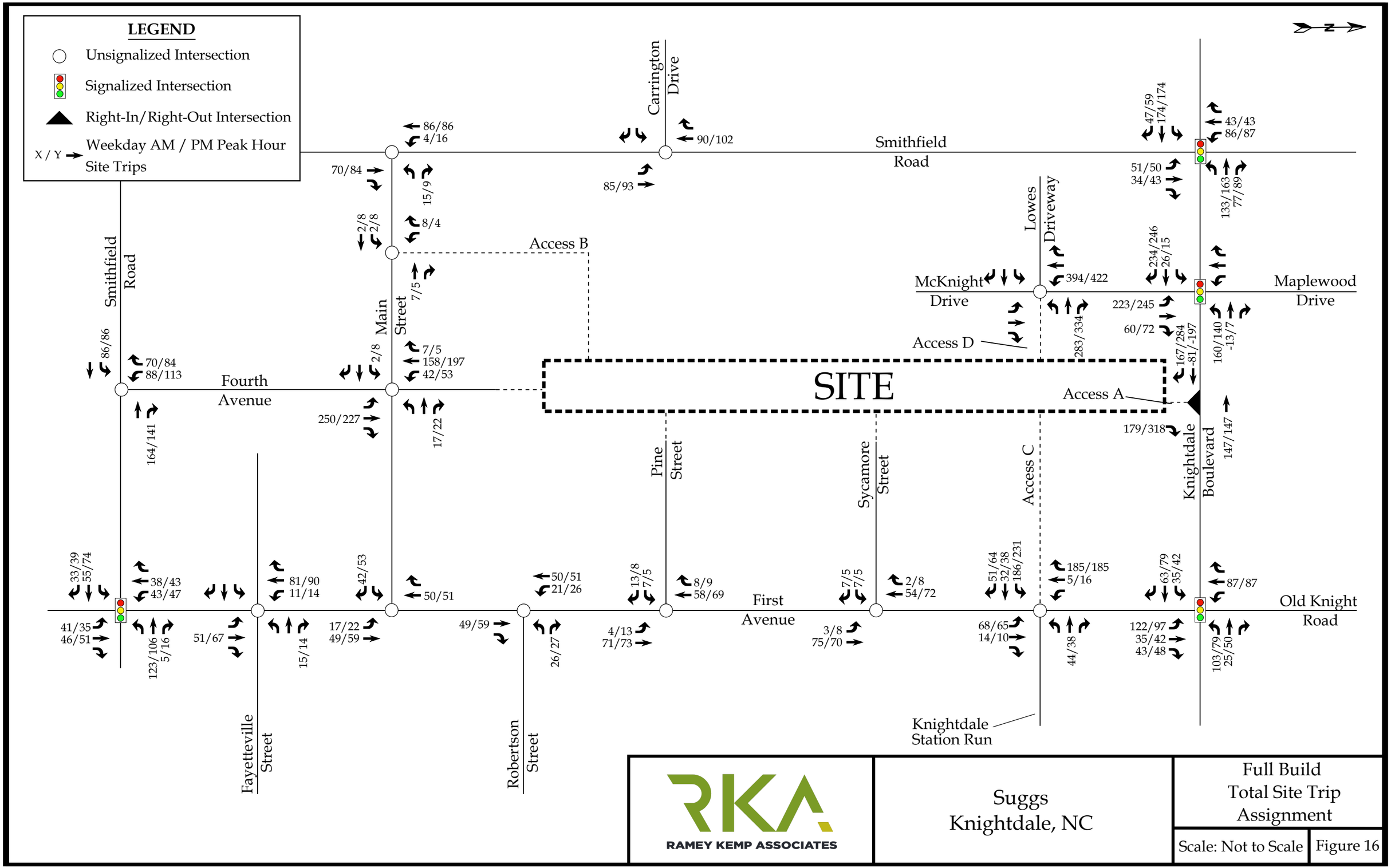
Knightdale, NC

Pass-By Site
Trip Assignment

Scale: Not to Scale | Figure 15


LEGEND
Unsignalized Intersection
Signalized Intersection
Right-In/Right-Out Intersection
X / Y
Weekday AM / PM Peak Hour Site Trips
N
Carrington Drive
86/86
4/16
90/102
85/93
Smithfield Road
47/59
174/174
43/43
86/87
51/50
34/43
133/163
77/89
70/84
15/9
2/8
2/8
8/4
Access B
Lowes Driveway
234/246
26/15
McKnight Drive
394/422
Maplewood Drive
7/5
Smithfield Road
86/86
Main Street
2/8
7/5
158/197
42/53
223/245
60/72
283/334
Access D
167/284
-81/-197
160/140
-13/7
70/84
88/113
Fourth Avenue
SITE
Access A
164/141
250/227
17/22
179/318
147/147
Knightdale Boulevard
Pine Street
Sycamore Street
Access C
33/39
55/74
38/43
43/47
81/90
11/14
42/53
50/51
50/51
21/26
13/8
7/5
8/9
58/69
First Avenue
7/5
7/5
2/8
54/72
51/64
32/38
186/231
185/185
5/16
63/79
35/42
87/87
Old Knight Road
41/35
46/51
123/106
5/16
51/67
15/14
17/22
49/59
49/59
26/27
4/13
71/73
3/8
75/70
68/65
14/10
44/38
122/97
35/42
43/48
103/79
25/50
Fayetteville Street
Robertson Street
Knightdale Station Run
RKA
RAMEY KEMP ASSOCIATES
Suggs
Knightdale, NC
Full Build
Total Site Trip
Assignment
Scale: Not to Scale
Figure 16

5. 2027 & 2030 & 2035 & 2044 BUILD TRAFFIC CONDITIONS

5.1. 2027 & 2030 & 2035 & 2044 Build Peak Hour Traffic Volumes

To estimate traffic conditions with the site fully built-out, the total site trips were added to the 2027, 2030, and 2035 no-build traffic volumes to determine the 2027, 2030, and 2035 build traffic volumes. Refer to Figure 17A, 17B, and 17C for an illustration of the 2027, 2030, and 2035 build peak hour traffic volumes with the proposed site fully developed. The 2044 build traffic volumes were developed using the same methodology as the 2035 build traffic volumes; however, background volumes were grown to the year 2044 rather than 2035. Refer to Figure 17D for an illustration of the 2044 build peak hour traffic volumes.

5.2. Analysis of 2027 & 2030 & 2035 & 2044 Build Peak Hour Traffic Conditions

Study intersections were analyzed with the 2027, 2030, 2035, and 2044 build traffic volumes using the same methodology previously discussed for existing and no-build traffic conditions. Intersections were analyzed with improvements necessary to accommodate future traffic volumes. The results of the capacity analysis for each intersection are presented in Section 7 of this report.

LEGEND

- Unsignalized Intersection
- Signalized Intersection
- X / Y → Weekday AM / PM Peak Hour Traffic

N

SITE

Smithfield Road

Fourth Avenue

Main Street

Access B

Carrington Drive

Smithfield Road

Lowes Driveway

McKnight Drive

Maplewood Drive

Pine Street

Sycamore Street

Knightdale Boulevard

First Avenue

Old Knight Road

Fayetteville Street

Robertson Street

Knightdale Station Run

Note: Based on NCDOT Congestion Management guidelines, a volume of 4 vehicles per hour (vph) was analyzed for any movement with less than 4 vph.

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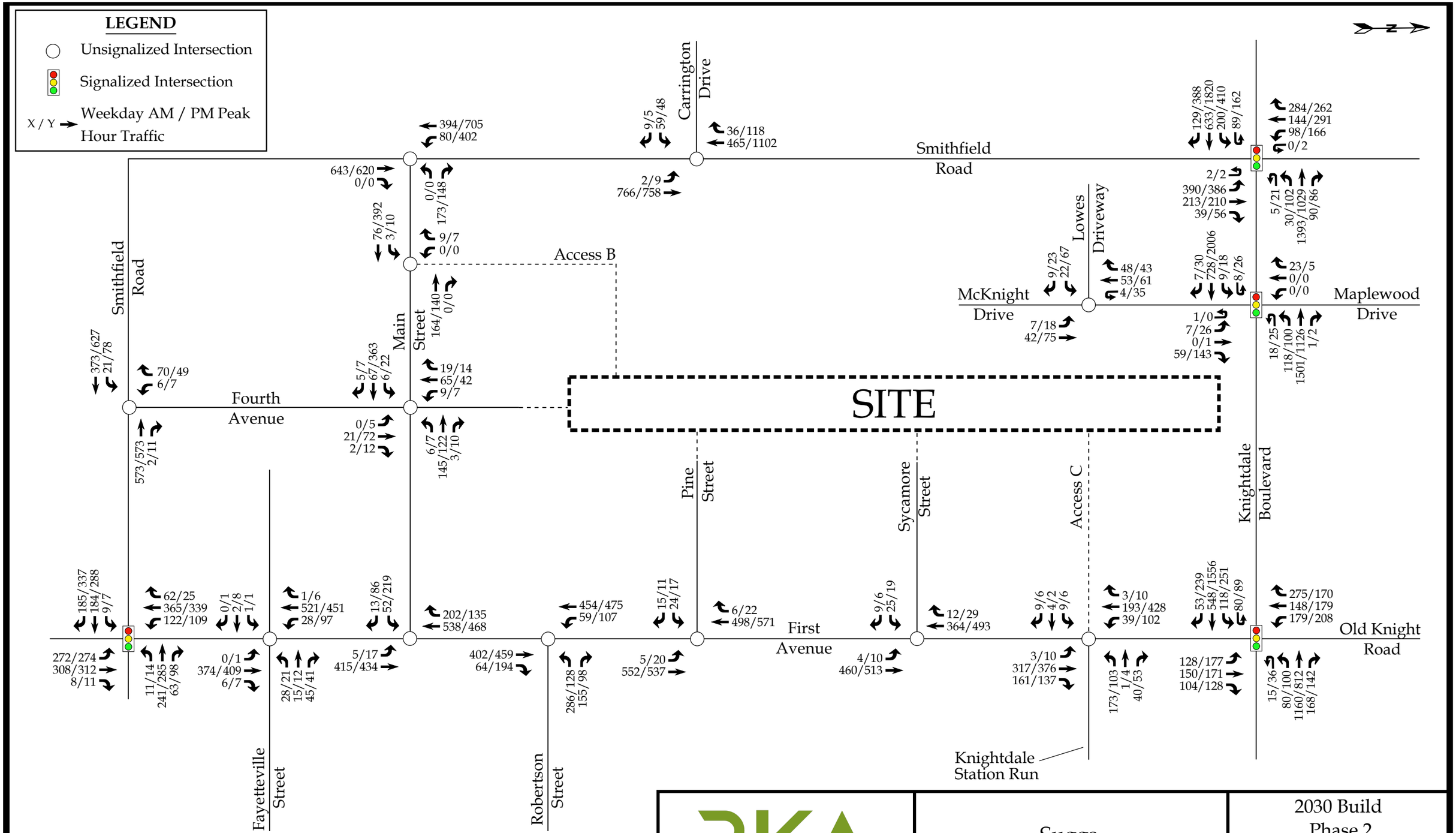
Suggs
Knightdale, NC

2027 Build
Phase 1
Peak Hour Traffic

Scale: Not to Scale | Figure 17A



Note: Based on NCDOT Congestion Management guidelines, a volume of 4 vehicles per hour (vph) was analyzed for any movement with less than 4 vph.

RAMEY KEMP ASSOCIATES

Suggs
Knightdale, NC

2030 Build
Phase 2
Peak Hour Traffic

Scale: Not to Scale | Figure 17B

LEGEND

- Unsignalized Intersection
- Signalized Intersection
- X / Y → Weekday AM / PM Peak Hour Traffic

N

SITE

Smithfield Road

Fourth Avenue

Main Street

Access B

Carrington Drive

Smithfield Road

Lowes Driveway

McKnight Drive

Access D

Maplewood Drive

Access A

Knightdale Boulevard

Access C

Knightdale Station Run

Pine Street

Sycamore Street

First Avenue

Old Knight Road

Fayetteville Street

Robertson Street

Note: Based on NCDOT Congestion Management guidelines, a volume of 4 vehicles per hour (vph) was analyzed for any movement with less than 4 vph.

RAMEY KEMP ASSOCIATES

Suggs
Knightdale, NC

2035 Full Build
Peak Hour Traffic

Scale: Not to Scale | Figure 17C

6. TRAFFIC ANALYSIS PROCEDURE

Study intersections were analyzed using the methodology outlined in the *Highway Capacity Manual* (HCM), 6th Edition published by the Transportation Research Board. Capacity and level of service are the design criteria for this traffic study. A computer software package, Synchro (Version 10.3), was used to complete the analyses for the study area intersections. Please note that the unsignalized capacity analysis does not provide an overall level of service for an intersection; only delay for an approach with a conflicting movement.

The HCM defines capacity as "the maximum hourly rate at which persons or vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under prevailing roadway, traffic, and control conditions." Level of service (LOS) is a term used to represent different driving conditions, and is defined as a "qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers." Level of service varies from Level "A" representing free flow, to Level "F" where breakdown conditions are evident. Refer to Table 4 for HCM levels of service and related average control delay per vehicle for both signalized and unsignalized intersections. Control delay as defined by the HCM includes "initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay". An average control delay of 50 seconds at a signalized intersection results in LOS "D" operation at the intersection.

Table 4: Highway Capacity Manual – Levels-of-Service and Delay

UNSIGNALIZED INTERSECTION		SIGNALIZED INTERSECTION	
LEVEL OF SERVICE	AVERAGE CONTROL DELAY PER VEHICLE (SECONDS)	LEVEL OF SERVICE	AVERAGE CONTROL DELAY PER VEHICLE (SECONDS)
A	0-10	A	0-10
B	10-15	B	10-20
C	15-25	C	20-35
D	25-35	D	35-55
E	35-50	E	55-80
F	>50	F	>80

6.1. Adjustments to Analysis Guidelines

Capacity analysis at all study intersections was completed according to the NCDOT Congestion Management Guidelines.

7. CAPACITY ANALYSIS

7.1. McKnight Drive and Knightdale Boulevard (US 64 Business)

The existing signalized intersection of McKnight Drive and Knightdale Boulevard (US 64 Business) was analyzed under 2022 existing, 2027 no-build, 2027 build, 2030 no-build, 2030 build, 2035 no-build, 2035 build and 2044 build traffic conditions with lane configurations and traffic control shown in Table 5. Refer to Table 5 for a summary of the analysis results. Refer to Appendix E for the Synchro capacity analysis reports.

Table 5: Analysis Summary of McKnight Drive and Knightdale Boulevard (US 64 Business)

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2022 Existing	EB WB NB SB	1 LT, 2 TH, 1 RT 1 LT, 1 TH, 1 TH-RT 1 LT, 1 TH-RT 1 LT-TH-RT	A A E E	B (10)	B C E E	C (22)
2027 No-Build	EB WB NB SB	1 LT, 2 TH, 1 RT 1 LT, 1 TH, 1 TH-RT 1 LT, 1 TH-RT 1 LT-TH-RT	B A E E	B (13)	C C E E	C (33)
2027 Build	EB WB NB SB	1 LT, 2 TH, 1 RT 1 LT, 1 TH, 1 TH-RT 1 LT, 1 TH-RT 1 LT-TH-RT	B A E E	B (13)	C C E E	C (32)
2030 No-Build	EB WB NB SB	1 LT, 2 TH, 1 RT 1 LT, 1 TH, 1 TH-RT 1 LT, 1 TH-RT 1 LT-TH-RT	C A D E	B (16)	C C E E	D (36)
2030 Build	EB WB NB SB	1 LT, 2 TH, 1 RT 1 LT, 1 TH, 1 TH-RT 1 LT, 1 TH-RT 1 LT-TH-RT	C A D E	B (16)	C C E E	D (36)
2035 No-Build	EB WB NB SB	1 LT, 2 TH, 1 RT 1 LT, 1 TH, 1 TH-RT 1 LT, 1 TH-RT 1 LT-TH-RT	C A D E	B (16)	E D E E	D (53)
2035 Build	EB WB NB SB	1 LT, 2 TH, 1 RT 1 LT, 1 TH, 1 TH-RT 1 LT, 1 TH-RT 1 LT-TH-RT	D B E E	C (25)	F D F E	F (92)
2035 Build **with Improvements**	EB WB NB SB	1 LT, 2 TH, **1 TH**-RT **2 LT**, 1 TH, 1 TH-RT **2 LT**, 1 TH-RT 1 LT-TH-RT	B A D E	B (17)	A B E E	B (18)
2044 Build	EB WB NB SB	1 LT, 2 TH, **1 TH**-RT **2 LT**, 1 TH, 1 TH-RT **2 LT**, 1 TH-RT 1 LT-TH-RT	C A D E	B (18)	C B E E	C (30)

Improvements to lane configurations are shown in bold.

Capacity analysis of 2022 existing, 2027 no-build, 2027 build, 2030 no-build, and 2030 build traffic conditions indicates the overall intersection is expected to operate at LOS D or better. Both major street approaches are expected to operate at LOS C or better during both the weekday AM and PM peak hours.

Under 2035 no-build traffic conditions, the overall intersection is expected to operate at LOS D or better. Under 2035 build traffic conditions, significant increases in delay and queue length are expected. The eastbound approach and the overall intersection are expected to operate at LOS F during the PM peak hour. Under 2035 build conditions, McKnight Drive will serve as a primary commercial driveway for the proposed site. Significant traffic is anticipated to be added to the northbound approach as well as along the primary road (Knightdale Boulevard).

In order to accommodate the additional site traffic, turn lanes along the northbound and westbound approaches were considered. Additional pavement is available along the westbound approach for an additional left turn lane. This pavement was previously painted as an additional turn lane but has since been removed. It is recommended that the westbound approach be restriped to include an additional westbound left turn lane. Additional turn lanes on the northbound approach include dual northbound left turn lanes as well as channelization of the northbound through-right lane. Signal timings were optimized along Knightdale Boulevard under 2035 build with improvements conditions.

Under 2044 build conditions, site traffic is expected to only account for approximately 15% of the total volume for the intersection during either the weekday AM or PM peak hour. Additionally, under the 2044 build conditions, a majority of the impacts are caused by the background growth expected in the 10 years after the site is built. The overall intersection is expected to operate at overall LOS C or better with the identified improvements. Due to the minimal impact by the proposed site, no additional improvements by the developer are recommended under 2044 build conditions.

7.2. N. First Avenue / Old Knight Road and Knightdale Boulevard (US 64 Business)

The existing signalized intersection of N. First Avenue / Old Knight Road and Knightdale Boulevard (US 64 Business) was analyzed under 2022 existing, 2027 no-build, 2027 build, 2030 no-build, 2030 build, 2035 no-build, 2035 build and 2044 build traffic conditions with existing lane configurations and traffic control. Refer to Table 6 for a summary of the analysis results. Refer to Appendix F for the Synchro capacity analysis reports.

Table 6: Analysis Summary of N. First Avenue / Old Knight Road and Knightdale Boulevard (US 64 Business)

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2022 Existing	EB WB NB SB	1 LT, 2 TH, 1 RT 1 LT, 2 TH, 1 RT 1 LT, 1 TH, 1 RT 1 LT, 1 TH, 1 RT	C C D E	C (32)	B C E E	C (32)
2027 No-Build	EB WB NB SB	1 LT, 2 TH, 1 RT 1 LT, 2 TH, 1 RT 1 LT, 1 TH, 1 RT 1 LT, 1 TH, 1 RT	C C D D	D (36)	C D D E	D (35)
2027 Build	EB WB NB SB	1 LT, 2 TH, 1 RT 1 LT, 2 TH, 1 RT 1 LT, 1 TH, 1 RT 1 LT, 1 TH, 1 RT	C C D D	D (36)	C D D E	D (36)
2030 No-Build	EB WB NB SB	1 LT, 2 TH, 1 RT 1 LT, 2 TH, 1 RT 1 LT, 1 TH, 1 RT 1 LT, 1 TH, 1 RT	C C D D	D (37)	C D D E	D (37)
2030 Build	EB WB NB SB	1 LT, 2 TH, 1 RT 1 LT, 2 TH, 1 RT 1 LT, 1 TH, 1 RT 1 LT, 1 TH, 1 RT	C C D E	D (37)	C D D E	D (40)
2035 No-Build	EB WB NB SB	1 LT, 2 TH, 1 RT 1 LT, 2 TH, 1 RT 1 LT, 1 TH, 1 RT 1 LT, 1 TH, 1 RT	C D D E	D (40)	D D D E	D (49)
2035 Build	EB WB NB SB	1 LT, 2 TH, 1 RT 1 LT, 2 TH, 1 RT 1 LT, 1 TH, 1 RT 1 LT, 1 TH, 1 RT	D E F D	E (61)	F D F D	F (115)
2035 Build **with Improvements**	EB WB NB SB	*1 LT, **3 TH**, 1 RT** 1 LT, 2 TH, 1 RT 1 LT, **1 LT**-TH, 1 RT *1 LT, 1 TH, 1 RT	C D E E	D (51)	C E E E	D (53)
2044 Build	EB WB NB SB	1 LT, 2 TH, **1 TH**-RT 1 LT, 2 TH, 1 RT 1 LT, **1 LT**-TH, 1 RT 1 LT, 1 TH, 1 RT	D F F F	E (79)	E F F F	F (91)

Improvements to lane configurations are shown in bold.
*Left turn storage extended
**Short channelized right-turn for the shared through-right lane.

Capacity analysis of 2022 existing, 2027 no-build, 2027 build, 2030 no-build, and 2030 build traffic conditions indicates each approach operates at LOS D or better. The southbound approach is expected to operate at LOS E under 2030 build traffic conditions. The overall intersection is expected to operate at LOS D or better under all 2027 and 2030 build conditions. The overall intersection is expected to degrade to LOS E during the 2035 build weekday AM peak hour and LOS F during the 2035 build weekday PM peak hour.

The proposed development will be required to widen the site's frontage along Knightdale Boulevard (US 64 Business) to add an additional eastbound through lane per the Comprehensive Transportation Plan. It is recommended in this report to tie in this additional through lane to the adjacent intersections, thus adding a full additional through lane along Knightdale Boulevard (US 64 Business) between it's intersections with McKnight Drive and N. First Avenue. This additional through lane will add significant capacity to the through traffic within the study area. It is recommended that the existing eastbound right-turn lane at the intersection of Knightdale Boulevard (US 64 Business) and N. First Avenue is restriped to a shared through/right-turn so that the additional through lane can be tied into the intersection. It is also recommended that this additional through lane is extended beyond the intersection as a receiving lane and is tapered back into two through lanes at least 700 feet beyond the signalized intersection. If right-of-way is available at the eastbound approach, it is also recommended that a short (approximately 50-foot) channelized right-turn lane is provided to allow right-turning vehicles to more efficiently get out of shared through/right-turn lane.

Additional turn lanes were considered along the northbound approach. Significant geometric and right-of-way constraints were observed with businesses on either side of the northbound approach; therefore, it is not likely feasible that significant additional pavement could be constructed to the northbound approach. It is recommended that the northbound through lane be restriped to a shared left/through lane and that it is extended to the adjacent intersection of First Avenue and Knightdale Station Run. The existing eastbound left-turn lane and the southbound approach were both observed to experience significant queuing. It is recommended that the eastbound left-turn lane storage is extended to at least 600 feet of

storage and the southbound approach is restriped to extend the southbound left-turn storage to maximize the available pavement without disrupting the existing businesses.

Converting the intersection to split phasing was considered but was found to increase queues along the northbound and eastbound approaches. Due to the significant changes to the geometry and traffic patterns expected by the development, all the signals along Knightdale Boulevard (US 64 Business) were optimized and re-coordinated with each other.

Under 2044 build conditions, site traffic is expected to only account for approximately 10% of the total volume for the intersection during either the weekday AM or PM peak hour. Additionally, under the 2044 build conditions, a majority of the impacts are caused by the background growth expected in the 10 years after the site is built. Due to the minimal impact by the proposed site, no additional improvements by the developer are recommended under 2044 build conditions.

7.3. Smithfield Road and Knightdale Boulevard (US 64 Business)

The existing signalized intersection of Smithfield Road and Knightdale Boulevard (US 64 Business) was analyzed under 2022 existing, 2027 no-build, 2027 build, 2030 no-build, 2030 build, 2035 no-build, 2035 build and 2044 build traffic conditions with the lane configurations and traffic control shown in Table 7. Refer to Table 7 for a summary of the analysis results. Refer to Appendix G for the Synchro capacity analysis reports.

Table 7: Analysis Summary of Smithfield Road and Knightdale Boulevard (US 64 Business)

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2022 Existing	EB WB NB SB	2 LT, 3 TH, 1 RT 1 LT, 3 TH, 1 RT 2 LT, 1 TH, 1 RT 1 LT, 1 TH, 1 RT	D C E D	D (41)	D E E E	D (50)
2027 No-Build	EB WB NB SB	2 LT, 3 TH, 1 RT 1 LT, 3 TH, 1 RT 2 LT, 1 TH, 1 RT 1 LT, 1 TH, 1 RT	D C E E	D (43)	D E E E	E (55)
2027 Build	EB WB NB SB	2 LT, 3 TH, 1 RT 1 LT, 3 TH, 1 RT 2 LT, 1 TH, 1 RT 1 LT, 1 TH, 1 RT	D C E E	D (44)	D E E F	E (57)
2030 No-Build	EB WB NB SB	2 LT, 3 TH, 1 RT 1 LT, 3 TH, 1 RT 2 LT, 1 TH, 1 RT 1 LT, 1 TH, 1 RT	D C E E	D (45)	D E E F	E (58)
2030 Build	EB WB NB SB	2 LT, 3 TH, 1 RT 1 LT, 3 TH, 1 RT 2 LT, 1 TH, 1 RT 1 LT, 1 TH, 1 RT	D C F E	D (48)	D E E F	E (63)
2035 No-Build	EB WB NB SB	2 LT, 3 TH, 1 RT 1 LT, 3 TH, 1 RT 2 LT, 1 TH, 1 RT 1 LT, 1 TH, 1 RT	D C E F	D (51)	D E E F	E (68)
2035 Build	EB WB NB SB	2 LT, 3 TH, 1 RT 1 LT, 3 TH, 1 RT 2 LT, 1 TH, 1 RT 1 LT, 1 TH, 1 RT	D D F F	E (57)	E E F F	F (85)
2035 Build with Improvements	EB WB NB SB	2 LT, 3 TH, 1 RT 1 LT, 3 TH, 1 RT 2 LT, 1 TH, 1 RT 1 LT, 1 TH, 1 RT	C C E E	D (40)	E C F F	E (65)
2044 Build	EB WB NB SB	2 LT, 3 TH, 1 RT 1 LT, 3 TH, 1 RT 2 LT, 1 TH, 1 RT 1 LT, 1 TH, 1 RT	D D F F	D (54)	F D F F	F (108)

Capacity analysis of 2022 existing, 2027 no-build, 2027 build, 2030 no-build, 2030 build, 2035 no-build traffic conditions indicate the overall intersection is expected to operate at LOS D or better during the AM peak hour and LOS E or better during the PM peak hour. The overall intersection is expected to degrade from LOS E to LOS F when comparing the 2035 no-build and 2035 build PM conditions.

Geometric improvements were considered at the proposed intersection; however, the intersection currently has left and right-turn lanes at each approach, with limited right-of way to accommodate additional pavement. Dual left-turn lanes were considered at the westbound approach, as that improvement could be feasible; however, the volumes do not support the need for dual left-turn lanes and the site is not expected to contribute a significant amount of traffic to that approach. Overall, dual westbound left-turn lanes would not improve the operations of the intersection significantly. Due to the significant changes to the geometry and traffic patterns expected by the development, all the signals along Knightdale Boulevard (US 64 Business) were optimized and re-coordinated with each other. With these signal timing improvements, under full build 2035 traffic conditions, the intersection is expected to operate at an overall LOS D during the weekday AM peak hour and an overall LOS E during the weekday PM peak hour. It should be noted that these levels of service and delay are less than the 2035 no-build traffic conditions. It is recommended that the Knightdale Boulevard (US 64 Business) corridor signal timings are modified to accommodate for the geometric and traffic pattern changes associated with the proposed site.

Under 2044 build conditions, site traffic is expected to only account for approximately 11% of the total volume for the intersection during either the weekday AM or PM peak hour. Additionally, under the 2044 build conditions, a majority of the impacts are caused by the background growth expected in the 10 years after the site is built. Due to the minimal impact by the proposed site, no additional improvements by the developer are recommended under 2044 build conditions.

7.4. McKnight Drive at Lowes Driveway / Access D

The existing unsignalized intersection of McKnight Drive at Lowes Driveway / Access D was analyzed under 2022 existing, 2027 no-build, 2027 build, 2030 no-build, 2030 build, and 2035 no-build traffic conditions with existing lane configurations and traffic control. The expected roundabout intersection was analyzed under 2035 build and 2044 build traffic conditions with the lane configurations and traffic control shown in Table 8. Refer to Table 8 for a summary of the analysis results. Refer to Appendix H for the Synchro and SIDRA capacity analysis reports.

Table 8: Analysis Summary of McKnight Drive at Lowes Driveway / Access D

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2022 Existing	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	A[2] A[1] --	N/A	A[2] A[1] --	N/A
2027 No-Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	A[2] A[1] --	N/A	B[2] A[1] --	N/A
2027 Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	A[2] A[1] --	N/A	B[2] A[1] --	N/A
2030 No-Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	A[2] A[1] --	N/A	B[2] A[1] --	N/A
2030 Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	A[2] A[1] --	N/A	B[2] A[1] --	N/A
2035 No-Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	A[2] A[1] --	N/A	B[2] A[1] --	N/A
2035 Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	E[2] B[2] A[1] F[1]	N/A	F[2] B[2] A[1] F[1]	N/A
2035 Build **with Improvements**	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH, 1 RT	A A A A	A (5)	A A A A	A (6)
2044 Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH, 1 RT	A A A A	A (6)	A A A A	A (7)

Improvements to lane configurations are shown in bold.

1. Level of service for major-street left-turn movement.
2. Level of service for minor-street approach.

Under 2022 existing, 2027 no-build, 2027 build, 2030 no-build, 2030 build traffic conditions, the major street left turn movement and minor street approaches are expected to operate at LOS B or better during both the AM and PM weekday peak hours for all scenarios. The

southbound approach is expected to operate at LOS F under 2035 build conditions during both the AM and PM weekday peak hours.

The roundabout just south of the McKnight Drive and Lowe's Drive intersection is expected to be relocated to the study intersection. The study intersection was analyzed as a roundabout with lane geometrics shown in Table 8. With these improvements implemented, minimal delays and queues are expected on all approaches. It is recommended that the roundabout be installed with the above geometrics.

Under 2044 build conditions, the intersection is expected to operate at LOS A during both peak hours. All approaches are expected to operate at LOS A. Based on the SimTraffic simulation, no significant queues are expected.

7.5. Knightdale Station Run / Site Drive and N. First Avenue

The existing unsignalized intersection of Knightdale Station Run / Site Drive and N. First Avenue was analyzed under 2022 existing, 2027 no-build, 2027 build, 2030 no-build, 2030 build, and 2035 no-build traffic conditions with existing lane configurations and traffic control. The expected roundabout intersection was analyzed under 2035 build and 2044 build traffic conditions with the lane configurations and traffic control shown in Table 9. Refer to Table 9 for a summary of the analysis results. Refer to Appendix I for the Synchro and SIDRA capacity analysis reports.

Table 9: Analysis Summary of Knightdale Station Run / Site Drive and N. First Avenue

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2022 Existing	WB NB SB	1 LT, 1 RT 1 TH-RT 1 LT-TH	B[2] -- A[1]	N/A	C[2] -- A[1]	N/A
2027 No-Build	WB NB SB	1 LT, 1 RT 1 TH-RT 1 LT-TH	C[2] -- A[1]	N/A	D[2] -- A[1]	N/A
2027 Build	WB NB SB	1 LT, 1 RT 1 TH-RT 1 LT-TH	C[2] -- A[1]	N/A	D[2] -- A[1]	N/A
2030 No-Build	WB NB SB	1 LT, 1 RT 1 TH-RT 1 LT-TH	C[2] -- A[1]	N/A	D[2] -- A[1]	N/A
2030 Build	**EB** WB NB SB	**1 LT-TH-RT** 1 LT, **1 TH**-RT 1 **LT**-TH-RT 1 LT, 1 TH-**RT**	C[2] D[2] A[1] A[1]	N/A	D[2] F[2] A[1] A[1]	N/A
2035 No-Build	WB NB SB	1 LT, 1 RT 1 TH-RT 1 LT-TH	C[2] -- A[1]	N/A	E[2] -- A[1]	N/A
2035 Build	**EB** WB NB SB	**1 LT-TH-RT** 1 LT, **1 TH**-RT 1 **LT**-TH-RT 1 LT, 1 TH-**RT**	F[2] F[2] A[1] A[1]	N/A	F[2] F[2] A[1] A[1]	N/A
2035 Build **with Improvements**	**EB** WB NB SB	**1 LT-TH-RT** 1 LT-**TH**, 1 RT 1 LT-TH-RT 1 LT-TH, **1 RT**	A A A A	A (7)	A A A A	A (9)
2044 Build	**EB** WB NB SB	**1 LT-TH-RT** 1 LT-**TH**, 1 RT 1 LT-TH-RT 1 LT-TH, **1 RT**	A A A A	A (7)	B A B B	B (11)

Improvements to lane configurations are shown in bold.

1. Level of service for major-street left-turn movement.
2. Level of service for minor-street approach.

Capacity analysis of 2022 existing, 2027 no-build, 2027 build, 2030 no-build, 2030 build traffic conditions indicate the minor street approach of the intersection is expected to operate at LOS D or better during the weekday AM and PM peak hours. Under 2030 build PM conditions,

the westbound approach is expected to operate at LOS F. It is not uncommon for the minor street of an unsignalized intersection to experience high delays.

Significant delays and queues are expected on the eastbound and westbound approach under 2035 build AM and PM peak hour. A roundabout was considered at the study intersection. With a roundabout in place, each approach is expected to operate at LOS A, minimal delays are expected.

Under 2044 build conditions, the intersection is expected to operate at LOS B or better during both peak hours. All approaches are expected to operate at LOS B or better. Based on the SimTraffic simulation, no significant queues are expected.

7.6. Sycamore Street and N. First Avenue

The existing unsignalized intersection of Sycamore Street and N. First Avenue was analyzed under 2022 existing, 2027 no-build, 2027 build, 2030 no-build, 2030 build, 2035 no-build, 2035 build and 2044 build traffic conditions with the lane configurations and traffic control shown in Table 10. Refer to Table 10 for a summary of the analysis results. Refer to Appendix J for the Synchro capacity analysis reports.

Table 10: Analysis Summary of Sycamore Street and N. First Avenue

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2022 Existing	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	B[2] A[1] --	N/A	B[2] A[1] --	N/A
2027 No-Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	B[2] A[1] --	N/A	C[2] A[1] --	N/A
2027 Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	C[2] A[1] --	N/A	C[2] A[1] --	N/A
2030 No-Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	B[2] A[1] --	N/A	C[2] A[1] --	N/A
2030 Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	C[2] A[1] --	N/A	C[2] A[1] --	N/A
2035 No-Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	C[2] A[1] --	N/A	C[2] A[1] --	N/A
2035 Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	C[2] A[1] --	N/A	D[2] A[1] --	N/A
2044 Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	C[2] A[1] --	N/A	D[2] A[1] --	N/A

1. Level of service for major-street left-turn movement.
2. Level of service for minor-street approach.

The minor street approach and major-street left turn is expected to operate at LOS D or better under all scenarios during both peak hours. Based on the SimTraffic simulation, minimal queues are expected. No improvements by the development are recommended.

7.7. Pine Street and N. First Avenue

The existing all-way stop intersection of Pine Street and N. First Avenue was analyzed under 2022 existing, 2027 no-build, 2027 build, 2030 no-build, 2030 build, 2035 no-build, 2035 build and 2044 build traffic conditions with lane configurations and traffic control shown in Table 11. Refer to Table 11 for a summary of the analysis results. Refer to Appendix K for the Synchro capacity analysis reports.

Table 11: Analysis Summary Pine Street and N. First Avenue

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2022 Existing	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	A B B	B (13)	A B B	B (13)
2027 No-Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	A C C	C (17)	A C C	C (19)
2027 Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	A C C	C (18)	A C C	C (20)
2030 No-Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	A C C	C (19)	A C C	C (21)
2030 Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	A C C	C (22)	A D D	D (27)
2035 No-Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	A D C	C (24)	A C D	D (28)
2035 Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	B F D	E (41)	B E F	F (53)
2035 Build – **To Meet UDO**	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	C[2] A[1] --	N/A	D[2] A[1] --	N/A
2044 Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	D[2] A[1] --	N/A	E[2] A[1] --	N/A

1. Level of service for major-street left-turn movement.
2. Level of service for minor-street approach.

Capacity analysis of 2022 existing, 2027 no-build, 2027 build, 2030 no-build, 2030 build traffic conditions indicate the overall intersection is expected to operate at LOS D or better. Each approach is expected to operate at LOS D or better. Under 2035 build conditions, the overall intersection is expected to operate at LOS E during the AM peak hour and F during the PM peak hour.

Turn lanes were considered at the intersection. Turn lanes along First Avenue would eliminate both on street parking and bike lanes. Additionally, each side of the intersection is surrounded by homes, businesses, and a cemetery. A traffic signal was also considered but is not expected to meet warrants throughout the day due to being in a residential area. These areas tend to experience heavy peak hours but do not have consistent traffic throughout the day. It should also be noted that the proposed site is expected to add connectivity to the area. This would allow drivers experiencing delays to find alternative routes from poorly performing intersections. Due to the limitations of the intersection, and additional expected connectivity, no improvements by the development are recommended.

Under 2044 build conditions, site traffic is expected to only account for approximately 11% of the total volume for the intersection during either the weekday AM or PM peak hour. Additionally, under the 2044 build conditions, a majority of the impacts are caused by the background growth expected in the 10 years after the site is built. Due to the minimal impact of the proposed site, no additional improvements by the developer are recommended under 2044 build conditions.

Per the Town's UDO, improvements to meet LOS D or back to existing conditions should be identified. Both turn lanes and changes to the current traffic control were considered. Turn lanes along First Avenue would eliminate both the current on-street parking and bike lanes. Additionally, the right-of-way along each side of the intersection is surrounded by homes, businesses, and a cemetery. The intersection is currently an all-way stop intersection; however, the volumes along the minor-street are relatively low. It is likely that the all-way stop traffic control was put in place as a type of traffic calming considering the adjacent properties and bike lanes. The intersection was analyzed as a two-way stop-controlled

intersection, with stop-control only on the eastbound Pine Street approach. As a two-way stop control, the N. First Street through traffic no longer experiences delay and the minor-street and major-street left-turn movements are expected to operate at LOS D or better during both the weekday AM and PM peak hours. From a traffic capacity standpoint, it is recommended that the intersection be converted to a two-way stop-controlled intersection. If the intent of the original all-way stop-controlled intersection is traffic calming, the delays and queuing experienced at the intersection as an all-way stop controlled intersection are not excessive and not uncommon for unsignalized intersections and would be acceptable for the purposes of slowing traffic down.

A traffic signal was also considered but is not expected to meet warrants throughout the day due to being in a residential area. These areas tend to experience heavy peak hours but do not have consistent traffic throughout the day. It should also be noted that the proposed site is expected to add connectivity to the area. This would allow drivers experiencing delays to find alternative routes from poorly performing intersections. Due to the geometric limitations of the intersection, it is recommended that the intersection is converted to a two-way stop control intersection.

7.8. Fourth Avenue and Main Street

The existing unsignalized intersection of Fourth Avenue and Main Street was analyzed under 2022 existing, 2027 no-build, 2027 build, 2030 no-build, 2030 build, 2035 no-build, 2035 build and 2044 build traffic conditions with lane configurations and traffic control shown in Table 12. Refer to Table 12 for a summary of the analysis results. Refer to Appendix L for the Synchro capacity analysis reports.

Table 12: Analysis Summary of Fourth Avenue and Main Street

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2022 Existing	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A[1] A[1] A[2] A[2]	N/A	A[1] A[1] B[2] B[2]	N/A
2027 No-Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A[1] A[1] A[2] B[2]	N/A	A[1] A[1] B[2] B[2]	N/A
2027 Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A[1] A[1] B[2] B[2]	N/A	A[1] A[1] B[2] B[2]	N/A
2030 No-Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A[1] A[1] B[2] B[2]	N/A	A[1] A[1] B[2] B[2]	N/A
2030 Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A[1] A[1] B[2] B[2]	N/A	A[1] A[1] C[2] B[2]	N/A
2035 No-Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A[1] A[1] B[2] B[2]	N/A	A[1] A[1] B[2] B[2]	N/A
2035 Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A[1] A[1] C[2] C[2]	N/A	A[1] A[1] E[2] F[2]	N/A
2035 Build **with Improvements**	EB WB NB SB	**1 LT**, 1 TH-RT **1 LT**, 1 TH-RT 1 LT-TH-RT **1 LT**, 1 TH-RT	A[1] A[1] C[2] B[2]	N/A	A[1] A[1] E[2] D[2]	N/A
2044 Build	EB WB NB SB	**1 LT**, 1 TH-RT **1 LT**, 1 TH-RT 1 LT-TH-RT 1 LT-TH-RT	A[1] A[1] C[2] C[2]	N/A	A[1] A[1] F[2] F[2]	N/A

Improvements to lane configurations are shown in bold.

1. Level of service for major-street left-turn movement.
2. Level of service for minor-street approach.

Capacity analysis of 2022 existing, 2027 no-build, 2027 build, 2030 no-build, and 2030 build traffic conditions indicate the minor-street approaches are expected to operate at LOS C or better during the weekday AM and PM peak hours. The major street left turn movement is expected to operate at LOS A during both AM and PM peak hour during all scenarios. Under 2035 build and 2044 conditions, minor street approaches are expected to operate at LOS E or F.

In order to meet the Town's UDO, left turn lanes were considered on the northbound and southbound approaches. Due to the connectivity expected to be provided by the proposed site, Main Street would not need to be utilized for cut-through traffic as often as it is under existing conditions. This is expected to reduce the amount of through volume and allow additional gaps for side street traffic. With this rerouting taken into consideration, the southbound approach is expected to experience delay impacts. It is recommended that a southbound left turn lane be installed.

Per the Town's UDO, improvements to meet LOS D or back to existing conditions should be identified. Based on the current roadway network and traffic patterns, Main Street is most likely operating as a cut-through roadway to connect Smithfield and N First. Avenue. It is most likely that the vehicles performing this cut-through originate from eastbound Knightdale Boulevard (US 64 Business) and destined for Robertson Street. The proposed development is expected to provide additional connectivity to the area that would provide multiple alternative routes for vehicles to travel without utilizing Main Street as a cut-through, should they experience delays along Main Street. Analysis was provided in Appendix V to demonstrate the operations of the network if a portion of the existing traffic rerouted through the interconnectivity provided by the site rather than Main Street. With the reduced through traffic along Main Street, levels of service and queuing at the intersection are expected to be significantly improved.

A two-way-left-turn lane is recommended along Main Street between Fourth Avenue and Smithfield Road. Additionally, a southbound left-turn lane at Fourth Avenue and Main Street is recommended under full build traffic conditions.

7.9. Main Street and N. First Avenue

The existing unsignalized intersection of Main Street and N. First Avenue was analyzed under 2022 existing, 2027 no-build, 2027 build, 2030 no-build, 2030 build, 2035 no-build, 2035 build and 2044 build traffic conditions with existing lane configurations and traffic control. Refer to Table 13 for a summary of the analysis results. Refer to Appendix M for the Synchro capacity analysis reports.

Table 13: Analysis Summary of Main Street and N. First Avenue

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2022 Existing	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	C[2] A[1] --	N/A	D[2] A[1] --	N/A
2027 No-Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	C[2] A[1] --	N/A	F[2] A[1] --	N/A
2027 Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	C[2] A[1] --	N/A	F[2] A[1] --	N/A
2030 No-Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	D[2] A[1] --	N/A	F[2] A[1] --	N/A
2030 Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	D[2] A[1] --	N/A	F[2] A[1] --	N/A
2035 No-Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	D[2] A[1] --	N/A	F[2] A[1] --	N/A
2035 Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	E[2] B[1] --	N/A	F[2] A[1] --	N/A
2035 Build - Rerouting	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	E[2] B[1] --	N/A	F[2] A[1] --	N/A
2044 Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	F[2] B[1] --	N/A	F[2] A[1] --	N/A

1. Level of service for major-street left-turn movement.
2. Level of service for minor-street approach.

Capacity analysis of the intersection traffic conditions indicates the intersection of the minor street is expected to operate at LOS F during the PM peak hour under all scenarios. The minor street is expected to operate at LOS E under the 2035 build AM peak hour and LOS D or better during all other AM scenarios. The major street left turn lane is expected to operate at LOS A under all scenarios. The eastbound approach is expected to experience significant queues.

Turn lanes were considered at the intersection. Turn lanes along First Avenue or Main Street would eliminate on street parking. It should also be noted that the proposed site is expected to add connectivity to the area. This would allow drivers experiencing delays to find alternative routes from poorly performing intersections. This connectivity is expected to reduce queues and lower delay along the eastbound approach due to drivers finding alternative routes rather than waiting in long queues. Due to the limitations of the intersection, and additional expected connectivity, no improvements by the development are recommended.

Under 2044 build conditions, site traffic is expected to only account for approximately 10% of the total volume for the intersection during either the weekday AM or PM peak hour. Additionally, under the 2044 build conditions, a majority of the impacts are caused by the background growth expected in the 10 years after the site is built. Due to the minimal impact by the proposed site, no additional improvements by the developer are recommended under 2044 build conditions.

Per the Town's UDO, improvements to meet LOS D or back to existing conditions should be identified. Based on the current roadway network and traffic patterns, Main Street is most likely operating as a cut-through roadway to connect Smithfield and N First. Avenue. It is most likely that the vehicles performing this cut-through originate from eastbound Knightdale Boulevard (US 64 Business) and destined for Robertson Street. The proposed development is expected to provide additional connectivity to the area that would provide multiple alternative routes for vehicles to travel without utilizing Main Street as a cut-through, should they experience delays along Main Street. Analysis was provided in Appendix V to demonstrate the operations of the network if a portion of the existing traffic rerouted through the interconnectivity provided by the site rather than Main Street. With the reduced through traffic along Main Street, levels of service and queuing at the intersection are expected to be significantly improved.

7.10. Main Street and Smithfield Road

The existing unsignalized intersection of Main Street and Smithfield Road was analyzed under 2022 existing, 2027 no-build, 2027 build, 2030 no-build, 2030 build, 2035 no-build, 2035 build and 2044 build traffic conditions with existing lane configurations and traffic control. Refer to Table 14 for a summary of the analysis results. Refer to Appendix N for the Synchro capacity analysis reports.

Table 14: Analysis Summary of Main Street and Smithfield Road

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2022 Existing	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	B[2] -- A[1]	N/A	C[2] -- B[1]	N/A
2027 No-Build	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	C[2] -- A[1]	N/A	D[2] -- B[1]	N/A
2027 Build	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	C[2] -- A[1]	N/A	E[2] -- B[1]	N/A
2027 Build **with Improvements**	WB NB SB	**1 RT** 1 TH-RT **1 LT**, 1 TH	C[2] -- A[1]	N/A	C[2] -- B[1]	N/A
2030 No-Build	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	C[2] -- A[1]	N/A	E[2] -- B[1]	N/A
2030 Build	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	C[2] -- A[1]	N/A	F[2] -- B[1]	N/A
2030 Build **with Improvements**	WB NB SB	**1 RT** 1 TH-RT **1 LT**, 1 TH	C[2] -- A[1]	N/A	D[2] -- B[1]	N/A
2035 No-Build	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	C[2] -- A[1]	N/A	F[2] -- B[1]	N/A
2035 Build	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	D[2] -- A[1]	N/A	C[2] -- C[1]	N/A
2035 Build **with Improvements**	WB NB SB	**1 RT** 1 TH-RT **1 LT**, 1 TH	C A A	A (8)	C B A	B (10)
2044 Build	WB NB SB	**1 RT** 1 TH-RT **1 LT**, 1 TH	D B A	B (12)	C C B	B (19)

Improvements to lane configurations are shown in bold.

1. Level of service for major-street left-turn movement.
2. Level of service for minor-street approach.

Capacity analysis of 2022 existing, 2027 no-build, 2027 build, 2030 no-build, 2030 build, 2035 no-build, 2035 build and 2044 build traffic conditions indicates the major street left turn

movement is expected to operate at LOS C or better under all scenarios. The minor street approach is expected to see significant delays during the PM peak hour of all future scenarios.

When counts were performed, no vehicles were observed making the westbound left turning movement. Based on NCDOT guidelines, volumes of 4 were utilized for each peak hour. These volumes attempting to turn left on the major roadway were a significant factor for the high delays observed. In order to prevent this movement from causing delays in the future, the westbound approach was restricted to a right turn only during all improvement scenarios. This is expected to significantly reduce delays and queues.

Based on the current roadway network and traffic patterns, Main Street is most likely operating as a cut-through roadway to connect Smithfield and N First. Avenue. It is most likely that the vehicles performing this cut-through originate from eastbound Knightdale Boulevard (US 64 Business) and destined for Robertson Street. The proposed development is expected to provide additional connectivity to the area that would provide multiple alternative routes for vehicles to travel without utilizing Main Street as a cut-through, should they experience delays along Main Street. Analysis was provided in Appendix V to demonstrate the operations of the network if a portion of the existing traffic rerouted through the interconnectivity provided by the site rather than Main Street. With the reduced through traffic along Main Street, levels of service and queuing at the intersection are expected to be significantly improved. A southbound left turn lane was considered in order to remove left turning traffic from the major street through movement. This turn lane is expected to reduce queues along the southbound approach; however, significant delays and queues are still expected. Under 2035 build with improvement conditions, the intersection was analyzed with signalization to reduce queuing to meet the UDO. It should be noted that drivers are expected to reroute due to the expected connectivity by the proposed site. This would result in drivers rerouting from this intersection in order to avoid high delays and long queues, most of which would be drivers originally utilizing the southbound left turn. It is recommended that the development install an exclusive southbound left turn lane and restrict the intersection to a left-over intersection. The intersection should also be monitored for signalization once the site is fully built out and new traffic patterns have been established.

Under 2044 build conditions, site traffic is expected to only account for approximately 10% of the total volume for the intersection during either the weekday AM or PM peak hour. Additionally, under the 2044 build conditions, a majority of the impacts are caused by the background growth expected in the 10 years after the site is built. Due to the minimal impact by the proposed site, no additional improvements by the developer are recommended under 2044 build conditions.

It was observed that the westbound approach is expected to significantly improve in LOS and delay when comparing the 2035 no-build and 2035 build conditions, despite the addition of site traffic under 2035 build conditions. It was concluded that this is likely due to limitations of the Synchro software determining that the westbound right turning movement has additional capacity under no-build conditions. All site traffic on this approach is expected to perform this movement, which if additional capacity were available, would reduce the delay per vehicle as more vehicles are expected to clear the intersection.

7.11. Smithfield Road and N. First Avenue

The existing signalized intersection of Smithfield Road and N. First Avenue was analyzed under 2022 existing, 2027 no-build, 2027 build, 2030 no-build, 2030 build, 2035 no-build, 2035 build and 2044 build traffic conditions with existing lane configurations and traffic control. Refer to Table 15 for a summary of the analysis results. Refer to Appendix O for the Synchro capacity analysis reports.

Table 15: Analysis Summary of Smithfield Road and N. First Avenue

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2022 Existing	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	C B C C	C (23)	D B C D	C (33)
2027 No-Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	D B C D	C (32)	E B C F	E (59)
2027 Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	D B C D	C (33)	E B C F	E (63)
2027 Build **with Improvements**	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH, **1 RT**	D B C C	C (27)	E B C C	C (34)
2030 No-Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	E B C D	D (42)	F B C F	E (77)
2030 Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	F C C D	D (46)	F B C F	F (81)
2030 Build **with Improvements**	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH, **1 RT**	E B C C	D (36)	E B D C	D (39)
2035 No-Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	F C C D	E (69)	F B D F	F (113)
2035 Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	F E D E	F (127)	F D F F	F (182)
2035 Build **with Improvements**	EB WB NB SB	**1 LT**, 1 TH-RT **1 LT**, 1 TH-RT 1 LT-TH-RT 1 LT-TH, **1 RT**	D D E C	D (50)	E E E C	D (51)

Table 15: Analysis Summary of Smithfield Road and N. First Avenue Continued

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2044 Build	EB	**1 LT**, 1 TH-RT	E	E (70)	F	F (82)
	WB	**1 LT**, 1 TH-RT	F		F	
	NB	1 LT-TH-RT	F		F	
	SB	1 LT-TH, **1 RT**	C		C	

Improvements to lane configurations are shown in bold.

Capacity analysis of 2022 existing, 2027 no-build, 2027 build, 2030 no-build, and 2030 build traffic conditions indicates the overall intersection is expected to operate at LOS E or F during the PM peak hour. Significant queues are expected along the southbound approach. A southbound right turn lane alleviates queues and lowers delay for the overall intersection. It should be noted that, based on coordination with the Town and NCDOT, there are plans to improve the study intersection that included a southbound right turn lane as well as exclusive left turn lanes along the eastbound and westbound approaches; however, these improvements are not currently funded.

Under 2035 no-build and 2035 build conditions, the southbound, eastbound, and westbound approaches are expected to experience high delays and queues. With the implementation of the improvements discussed above, the intersection is expected to operate at an overall LOS D. It is recommended that the development install an exclusive southbound right turn lane as well as exclusive left turn lanes on the eastbound and westbound approaches under full build. Signal modifications are recommended to accommodate the geometric changes.

Under 2044 build conditions, the intersection is expected to operate at an overall LOS E or F during the weekday AM and PM peak hours. The heavy overall delays under 2044 build conditions are anticipated to be primarily due to the background growth expected in the next 10 years and is not anticipated to be due to the traffic from the proposed development. Due

to the constraints of the intersection, corridor level improvements would be required in order to meet the Town UDO under these conditions.

7.12. Carrington Drive and Smithfield Road

The existing unsignalized intersection of Carrington Drive and Smithfield Road was analyzed under 2022 existing, 2027 no-build, 2027 build, 2030 no-build, 2030 build, 2035 no-build, 2035 build and 2044 build traffic conditions with existing lane configurations and traffic control. Refer to Table 16 for a summary of the analysis results. Refer to Appendix P for the Synchro capacity analysis reports.

Table 16: Analysis Summary of Carrington Drive and Smithfield Road

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2022 Existing	EB NB SB	1 LT-RT 1 LT, 1 TH 1 TH, 1 RT	C[2] A[1] --	N/A	F[2] B[1] --	N/A
2027 No-Build	EB NB SB	1 LT-RT 1 LT, 1 TH 1 TH, 1 RT	D[2] A[1] --	N/A	F[2] B[1] --	N/A
2027 Build	EB NB SB	1 LT-RT 1 LT, 1 TH 1 TH, 1 RT	D[2] A[1] --	N/A	F[2] B[1] --	N/A
2030 No-Build	EB NB SB	1 LT-RT 1 LT, 1 TH 1 TH, 1 RT	D[2] A[1] --	N/A	F[2] B[1] --	N/A
2030 Build	EB NB SB	1 LT-RT 1 LT, 1 TH 1 TH, 1 RT	E[2] A[1] --	N/A	F[2] B[1] --	N/A
2035 No-Build	EB NB SB	1 LT-RT 1 LT, 1 TH 1 TH, 1 RT	E[2] A[1] --	N/A	F[2] B[1] --	N/A
2035 Build	EB NB SB	1 LT-RT 1 LT, 1 TH 1 TH, 1 RT	F[2] A[1] --	N/A	F[2] B[1] --	N/A
2044 Build	EB NB SB	1 LT-RT 1 LT, 1 TH 1 TH, 1 RT	F[2] A[1] --	N/A	F[2] C[1] --	N/A

1. Level of service for major-street left-turn movement.
2. Level of service for minor-street approach.

Capacity analysis of Capacity analysis of 2022 existing, 2027 no-build, 2027 build, 2030 no-build, 2030 build, 2035 no-build, 2035 build, and 2044 build traffic conditions indicates the major street left turn movement is expected to operate at LOS B or better. The minor street is expected to operate at LOS D during the AM peak hour under 2022 existing conditions to 2030 no-build conditions. The minor street is expected to operate at LOS F during all future scenarios in the PM peak hour.

The proposed site is only expected to add through traffic to the study intersection which would not be mitigated by the addition of any turn lanes along the primary roadway.

Additionally, the major street has exclusive turn lanes on both approaches; therefore, no additional improvements may be added to the intersection. A traffic signal was also considered but is not expected to meet warrants throughout the day due to being in a residential area. These areas tend to experience heavy peak hours but do not have consistent traffic throughout the day that would be needed in order for a signal to be warranted. It should be noted that high delays are not uncommon on a minor street of an unsignalized intersection. No improvements by the development are recommended.

Based on the current roadway network and traffic patterns, Main Street is most likely operating as a cut-through roadway to connect Smithfield and N First. Avenue. It is most likely that the vehicles performing this cut-through originate from eastbound Knightdale Boulevard (US 64 Business) and destined for Robertson Street. The proposed development is expected to provide additional connectivity to the area that would provide multiple alternative routes for vehicles to travel without utilizing Main Street as a cut-through, should they experience delays along Main Street. Analysis was provided in Appendix V to demonstrate the operations of the network if a portion of the existing traffic rerouted through the interconnectivity provided by the site rather than Main Street. With the reduced through traffic along Main Street, levels of service and queuing at the intersection are expected to be significantly improved.

7.13. Smithfield Road and Fourth Avenue

The existing unsignalized intersection of Smithfield and Fourth Avenue was analyzed under 2022 existing, 2027 no-build, 2027 build, 2030 no-build, 2030 build, 2035 no-build, 2035 build and 2044 build traffic conditions with existing lane configurations and traffic control. Refer to Table 17 for a summary of the analysis results. Refer to Appendix Q for the Synchro and S capacity analysis reports.

Table 17: Analysis Summary of Smithfield Road and Fourth Avenue

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2022 Existing	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	B[2] -- A[1]	N/A	C[2] -- A[1]	N/A
2027 No-Build	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	C[2] -- A[1]	N/A	C[2] -- A[1]	N/A
2027 Build	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	B[2] -- A[1]	N/A	C[2] -- A[1]	N/A
2030 No-Build	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	C[2] -- A[1]	N/A	C[2] -- A[1]	N/A
2030 Build	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	C[2] -- A[1]	N/A	C[2] -- A[1]	N/A
2035 No-Build	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	C[2] -- A[1]	N/A	C[2] -- A[1]	N/A
2035 Build	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	F[2] -- B[1]	N/A	F[2] -- B[1]	N/A
2035 Build **with Improvements**	WB NB SB	1 LT-RT 1 TH, **1 RT** 1 LT-TH	A A A	A (8)	B A B	B (11)
2044 Build	WB NB SB	1 LT-RT 1 TH, **1 RT** 1 LT-TH	B A A	A (10)	B A C	C (15)

Improvements to lane configurations are shown in bold.

1. Level of service for major-street left-turn movement.
2. Level of service for minor-street approach.

Capacity analysis of 2022 existing, 2027 no-build, 2027 build, 2030 no-build, and 2030 build traffic conditions indicates the major street left turn lane is expected to operate at LOS A. The minor street approach is expected to operate at LOS C or better. Queues are expected to develop on the southbound approach due to spillback from an adjacent intersection. The queues are expected to be alleviated after improvements are implemented.

Based on the current roadway network and traffic patterns, Main Street is most likely operating as a cut-through roadway to connect Smithfield and N First. Avenue. It is most likely that the vehicles performing this cut-through are originating from eastbound Knightdale Boulevard (US 64 Business) and destined for Robertson Street. The proposed development is expected to provide additional connectivity to the area that would provide multiple alternative routes for vehicles to travel without utilizing Main Street as a cut-through, should they experience delays along Main Street. Analysis was provided in Appendix V to demonstrate the operations of the network if a portion of the existing traffic rerouted through the interconnectivity provided by the site rather than Main Street. With the reduced through traffic along Main Street, levels of service and queuing at the intersection are expected to be significantly improved.

Under 2035 build conditions, the westbound approach is expected to experience high delays and queues. Turn lanes were considered along the northbound and southbound approaches in order to alleviate queues but further mitigation is required. The intersection was analyzed as a roundabout with the lane geometrics shown in Table 17. This included an exclusive northbound right turn lane. The roundabout, and all approaches, are expected to function at LOS B or better. Based on the SimTraffic simulations, minimal queues are expected. It should be noted that the roundabout is expected to function at acceptable levels of service under 2044 build conditions. It is recommended that the development convert the intersection to a roundabout.

7.14. Robertson Street and N. First Avenue

The existing unsignalized intersection of Robertson Street and N. First Avenue was analyzed under 2022 existing, 2027 no-build, 2027 build, 2030 no-build, 2030 build, 2035 no-build, 2035 build and 2044 build traffic conditions with existing lane configurations and traffic control. Refer to Table 18 for a summary of the analysis results. Refer to Appendix R for the Synchro capacity analysis reports.

Table 18: Analysis Summary of Robertson Street and N. First Avenue

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2022 Existing	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	F[2] -- A[1]	N/A	D[2] -- A[1]	N/A
2027 No-Build	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	F[2] -- A[1]	N/A	F[2] -- A[1]	N/A
2027 Build	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	F[2] -- A[1]	N/A	F[2] -- A[1]	N/A
2030 No-Build	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	F[2] -- A[1]	N/A	F[2] -- A[1]	N/A
2030 Build	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	F[2] -- A[1]	N/A	F[2] -- A[1]	N/A
2035 No-Build	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	F[2] -- A[1]	N/A	F[2] -- A[1]	N/A
2035 Build	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	F[2] -- A[1]	N/A	F[2] -- B[1]	N/A
2044 Build	WB NB SB	1 LT-RT 1 TH-RT 1 LT-TH	F[2] -- A[1]	N/A	F[2] -- B[1]	N/A

1. Level of service for major-street left-turn movement.
2. Level of service for minor-street approach.

Capacity analysis of the intersection traffic conditions indicates the intersection of the minor street is expected to operate at LOS F during the AM and PM peak hour under all scenarios. The major street left turn lane is expected to operate at LOS B or better under all scenarios.

Turn lanes were considered at the intersection. Turn lanes along First Avenue would eliminate on-street parking. A traffic signal was also considered but is not expected to meet warrants throughout the day due to being in a residential area. These areas tend to experience heavy peak hours but do not have consistent traffic throughout the day. Based on the current roadway network and traffic patterns, Main Street is most likely operating as a cut-through roadway to connect Smithfield and N First. Avenue. It is most likely that the vehicles performing this cut-through originate from eastbound Knightdale Boulevard (US 64 Business) and destined for Robertson Street. The proposed development is expected to provide additional connectivity to the area that would provide multiple alternative routes for vehicles to travel without utilizing Main Street as a cut-through, should they experience delays along Main Street. Analysis was provided in Appendix V to demonstrate the operations of the network if a portion of the existing traffic rerouted through the interconnectivity provided by the site rather than Main Street. With the reduced through traffic along Main Street, levels of service and queuing at the intersection are expected to be significantly improved.

Under 2044 build conditions, site traffic is expected to only account for approximately 8% of the total volume for the intersection during either the weekday AM or PM peak hour. Additionally, under the 2044 build conditions, a majority of the impacts are caused by the background growth expected in the 10 years after the site is built. Due to the minimal impact by the proposed site, no additional improvements by the developer are recommended under 2044 build conditions.

7.15. Fayetteville Street and N. First Avenue

The existing unsignalized intersection of Robertson Street and N. First Avenue was analyzed under 2022 existing, 2027 no-build, 2027 build, 2030 no-build, 2030 build, 2035 no-build, 2035 build and 2044 build traffic conditions with existing lane configurations and traffic control. Refer to Table 19 for a summary of the analysis results. Refer to Appendix S for the Synchro capacity analysis reports.

Table 19: Analysis Summary of Fayetteville Street and N. First Avenue

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2022 Existing	EB	1 LT-TH-RT	C[2]	N/A	C[2]	N/A
	WB	1 LT-TH-RT	C[2]		C[2]	
	NB	1 LT-TH-RT	A[1]		A[1]	
	SB	1 LT-TH-RT	A[1]		A[1]	
2027 No-Build	EB	1 LT-TH-RT	C[2]	N/A	C[2]	N/A
	WB	1 LT-TH-RT	C[2]		C[2]	
	NB	1 LT-TH-RT	A[1]		A[1]	
	SB	1 LT-TH-RT	A[1]		A[1]	
2027 Build	EB	1 LT-TH-RT	C[2]	N/A	C[2]	N/A
	WB	1 LT-TH-RT	C[2]		C[2]	
	NB	1 LT-TH-RT	A[1]		A[1]	
	SB	1 LT-TH-RT	A[1]		A[1]	
2030 No-Build	EB	1 LT-TH-RT	C[2]	N/A	C[2]	N/A
	WB	1 LT-TH-RT	C[2]		C[2]	
	NB	1 LT-TH-RT	A[1]		A[1]	
	SB	1 LT-TH-RT	A[1]		A[1]	
2030 Build	EB	1 LT-TH-RT	C[2]	N/A	D[2]	N/A
	WB	1 LT-TH-RT	C[2]		D[2]	
	NB	1 LT-TH-RT	A[1]		A[1]	
	SB	1 LT-TH-RT	A[1]		A[1]	
2035 No-Build	EB	1 LT-TH-RT	C[2]	N/A	D[2]	N/A
	WB	1 LT-TH-RT	D[2]		D[2]	
	NB	1 LT-TH-RT	A[1]		A[1]	
	SB	1 LT-TH-RT	A[1]		A[1]	
2035 Build	EB	1 LT-TH-RT	D[2]	N/A	E[2]	N/A
	WB	1 LT-TH-RT	D[2]		E[2]	
	NB	1 LT-TH-RT	A[1]		A[1]	
	SB	1 LT-TH-RT	A[1]		A[1]	
2035 Build – To Meet UDO	EB	**1 RT**	B[2]	N/A	B[2]	N/A
	WB	**1 RT**	B[2]		B[2]	
	NB	1 TH-RT	--		--	
	SB	1 LT-TH-RT	A[1]		A[1]	
2044 Build	EB	1 LT-TH-RT	E[2]	N/A	F[2]	N/A
	WB	1 LT-TH-RT	F[2]		F[2]	
	NB	1 LT-TH-RT	A[1]		A[1]	
	SB	1 LT-TH-RT	A[1]		A[1]	

1. Level of service for major-street left-turn movement.
2. Level of service for minor-street approach.

Capacity analysis of the intersection traffic conditions indicates the intersection of the minor street is expected to operate at LOS D or better during the AM peak hour and LOS D or better during the PM peak hour under all scenarios, excluding the 2035 build PM scenario.

Per the Town's UDO, improvements to meet LOS D or back to existing conditions should be identified. Turn lanes were considered on each of the minor street approaches; however, turn lanes are not expected to mitigate impacts by the proposed site. Maple Street and Fayetteville Street are currently offset by approximately 50 feet, in a manner that could cause left-turning conflicts. Restriction of the intersection was considered as mitigation. Under build 2035 to meet the UDO traffic conditions, the Maple Street approach was restricted to a right-in/right-out approach and the Fayetteville Street approach was restricted to a left-in/right-in/right-out approach. With these restrictions the minor street approaches and major street left turn lane are expected to operate at LOS B or better during both the weekday AM and PM peak hours.

The expected connectivity of the site would allow trips to reroute and thus would be minimally impacted by the restricted access. Due to the common levels of service and delay for unsignalized intersections, the added connectivity of the site, and the established businesses along Fayetteville Street, no improvements by the developer are recommended.

7.16. Knightdale Boulevard (US 64 Business) and Access A

The future unsignalized right-in/right-out intersection of Knightdale Boulevard and Access A was analyzed under 2035 build and 2044 traffic conditions with existing lane configurations and traffic control. Refer to Table 20 for a summary of the analysis results. Refer to Appendix T for the Synchro capacity analysis reports.

Table 20: Analysis Summary of Knightdale Boulevard (US 64 Business) and Access A

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2035 Build	EB WB **NB**	1 TH, **1 TH-RT** 2 TH **1 RT**	-- -- C[1]	N/A	-- -- F[1]	N/A
2035 Build **with Improvements**	EB WB **NB**	2 TH, **1 TH-RT** 2 TH **1 RT**	-- -- C[1]	N/A	-- -- F[1]	N/A
2044 Build	EB WB **NB**	2 TH, **1 TH-RT** 2 TH **1 RT**	-- -- D[1]	N/A	-- -- F[1]	N/A

Improvements to lane configurations are shown in bold.
1. Level of service for minor-street approach.

Capacity analysis of the intersection traffic conditions indicates the intersection of the minor street is expected to operate at LOS C during the AM peak hour and LOS F during the PM peak hour under all scenarios. It should be noted that it is not uncommon for a minor street approach to experience high delays at an unsignalized intersection.

- The proposed development will be required to widen the site's frontage along Knightdale Boulevard (US 64 Business) to add an additional eastbound through lane per the Comprehensive Transportation Plan. It is recommended in this report to tie in this additional through lane to the adjacent intersections, thus adding a full additional through lane along Knightdale Boulevard (US 64 Business) between its intersections with McKnight Drive and N. First Avenue. This additional through lane will add significant capacity to the through

traffic within the study area. Significant queues are expected along the northbound approach under 2035 build conditions. Under 2035 build with improvement conditions, the northbound approach was channelized. With the channelization in place, and the additional improvements along Knightdale Boulevard, queues were expected to significantly improve. This is likely due to the channelization functioning more closely to what would be expected in the field as well as additional gaps along the major road being provided by improved conditions at the adjacent signals. It is recommended that the right-in/right-out be designed with large radii /channelization that allows the traffic to easily maneuver to ingress and egress the site.

7.17. Main Street and Access B

The future unsignalized intersection of Main Street and Access B was analyzed under 2027 build, 2030 build, 2035 build, and 2044 build traffic conditions with lane configurations and traffic control. Refer to Table 21 for a summary of the analysis results. Refer to Appendix U for the Synchro capacity analysis reports.

Table 21: Analysis Summary of Main Street and Access B

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2027 Build	EB WB **SB**	1 **LT**-TH 1 TH-**RT** **1 LT-RT**	A[1] -- A[2]	N/A	A[1] -- B[2]	N/A
2030 Build	EB WB **SB**	1 **LT**-TH 1 TH-**RT** **1 LT-RT**	A[1] -- A[2]	N/A	A[1] -- B[2]	N/A
2035 Build	EB WB **SB**	1 **LT**-TH 1 TH-**RT** **1 LT-RT**	A[1] -- A[2]	N/A	A[1] -- B[2]	N/A
2035 Build **with Improvements**	EB WB **SB**	**1 LT**, 1 TH 1 TH-**RT** **1 LT-RT**	A[1] -- A[2]	N/A	A[1] -- B[2]	N/A
2044 Build	EB WB **SB**	**1 LT**, 1 TH 1 TH-**RT** **1 LT-RT**	A[1] -- A[2]	N/A	A[1] -- B[2]	N/A

Improvements to lane configurations are shown in bold.
1. Level of service for major-street left-turn movement.
2. Level of service for minor-street approach.

Capacity analysis of the intersection traffic conditions indicates the intersection of the minor street is expected to operate at LOS B or better during the AM peak hour and PM peak hour under all scenarios. No significant queues are expected. It should be noted that under 2035 build conditions, a two way left turn lane is recommended along Main Street, which would provide a left turn lane along the eastbound approach.

8. CONCLUSIONS

This Traffic Impact Analysis was conducted to determine the potential traffic impacts of the proposed Suggs development to be located south of Knightdale Boulevard (US 64 Business) and east of N. Smithfield Road in Knightdale, North Carolina. The proposed development is expected to be a mixed-use development and be built out in 2034. Site access is proposed via one right in right out intersection along Knightdale Boulevard, one full movement intersection along N. First Avenue, one full movement intersection along McKnight Drive, one full movement site drive along the continuation of Fourth Avenue, one full movement site drive along the continuation of Pine Street, and one full movement site drive along the continuation of Sycamore Street.

The proposed development will be required to widen the site's frontage along Knightdale Boulevard (US 64 Business) to add an additional eastbound through lane per the Comprehensive Transportation Plan. It is recommended in this report to tie in this additional through lane to the adjacent intersections, thus adding a full additional through lane along Knightdale Boulevard (US 64 Business) between its intersections with McKnight Drive and N. First Avenue. This additional through lane will add significant capacity to the through traffic within the study area.

The study analyzes traffic conditions during the weekday AM and PM peak hours for the following scenarios:

- 2022 Existing Traffic Conditions
- 2026+1 No-Build Traffic Conditions
- 2026+1 Build Phase 1 Traffic Conditions
- 2029+1 No-Build Traffic Conditions
- 2029+1 Build Phase 2 Traffic Conditions
- 2034+1 No-Build Traffic Conditions
- 2034+1 Full Build Traffic Conditions
- 2034+10 Full Build Traffic Conditions

Trip Generation

The total primary site trips are the calculated site trips after the reduction for internal capture and pass-by trips. Primary site trips are expected to generate approximately 1,765 trips (960 entering and 804 exiting) during the weekday AM peak hour and 1,738 trips (884 entering and 854 exiting) during the weekday PM peak hour.

Adjustments to Analysis Guidelines

Capacity analysis at all study intersections was completed according to NCDOT Congestion Management Guidelines. Refer to section 6.1 of this report for a detailed description of any adjustments to these guidelines made throughout the analysis.

Intersection Capacity Analysis Summary

All the study area intersections (including the proposed site driveways) are expected to operate at acceptable levels-of-service under existing and future year conditions with the improvements identified in this report. Refer to Section 7 of this report for a detailed description for each intersection.

9. RECOMMENDATIONS

Based on the findings of this study, specific geometric improvements have been identified and are recommended to accommodate future traffic conditions. See a more detailed description of the recommended improvements below. Refer to Figure 18 for an illustration of the recommended lane configuration for the proposed development.

Improvements to Meet UDO (Not Recommended by Developer)

2035 Full Build

Pine Street and N. First Avenue

- Convert the intersection to a two-way stop-controlled intersection.

Fayetteville Street and N. First Avenue

- Restrict the southbound approach to a right-in/right-out approach.
- Restrict the northbound approach to a left-in/right-in/right-out approach.

Recommended Improvements by Developer

2027 Build Phase 1

Main Street and Smithfield Road

- Construct a southbound left turn lane with 200 feet of storage and appropriate decel and taper.
- Restrict the westbound approach to a left-in/right-in/right-out approach.

Smithfield Road and First Avenue

- Construct a southbound right turn lane with 300 feet of storage and appropriate decel and taper.
- Modify the traffic signal to accommodate the geometric changes.
- Coordinate with NCDOT to develop a signal modification plan to accommodate the geometric changes at the intersection.

Main Street and Access B

- Construct the southbound approach as a full movement access with one ingress lane and one egress lane.

2030 Build Phase 2

First Avenue and Knightdale Station Run / Access C

- Construct the eastbound approach as a full movement access with one ingress lane and one egress lane.

2035 Full Build

Knightdale Boulevard (US 64 Business)

The proposed development will be required to widen the site's frontage along Knightdale Boulevard (US 64 Business) to add an additional eastbound through lane per the Comprehensive Transportation Plan. It is recommended in this report to tie in this additional through lane to the adjacent intersections, thus adding a full additional through lane along Knightdale Boulevard (US 64 Business) between its intersections with McKnight Drive and N. First Avenue. This additional through lane will add significant capacity to the through traffic within the study area.

Knightdale Boulevard (US 64 Business) and McKnight Drive

- Restripe the eastbound right turn lane to include a shared through-right.
- Construct an additional eastbound receiving lane along the eastern approach that extends to Knightdale Boulevard and First Avenue.
- Construct an additional northbound left turn lane with 300 feet of storage and appropriate decel and taper.
- Channelize the right turn movement for the northbound shared through-right.
- Construct an additional westbound left turn lane with 500 feet of storage and appropriate decel and taper.
- Coordinate with the NCDOT to develop a signal modification plan to accommodate the geometric changes at the intersection and to modify the corridor timings along Knightdale Boulevard (US 64 Business).

N. First Avenue / Old Knight Road and Knightdale Boulevard (US 64 Business)

- Restripe the eastbound right turn lane to include a shared through-right and extend storage to full storage.
- Construct an additional eastbound receiving lane along the eastern approach that extends at least 700 feet beyond the intersection.
- Construct a northbound left turn lane with full storage.
- Restripe the northbound through lane to include a shared left-through with full storage.
- *If right-of-way is available*, construct a short, approximately 50-foot, channelized right-turn lane with yield control at the eastbound approach for the shared through-right lane.
- Coordinate with the NCDOT to develop a signal modification plan to accommodate the geometric changes at the intersection and to modify the corridor timings along Knightdale Boulevard (US 64 Business).
- Extend the eastbound left turn lane to include 600 feet of storage and appropriate decel and taper.
- Extend the southbound left turn lane to include 600 feet of storage and appropriate decel and taper.

Smithfield Road and Knightdale Boulevard (US 64 Business)

- Due to geometric changes at adjacent signals, coordinate with the NCDOT to modify the corridor signal timings along Knightdale Boulevard (US 64 Business).

McKnight Drive and Lowes Driveway / Access D

- Construct a roundabout.
- Construct a southbound right turn lane with full storage.
- Construct the westbound approach as a full movement access with one ingress lane and one egress lane.

First Avenue and Knightdale Station Run / Access C

- Convert existing unsignalized intersection to roundabout.
- Construct a southbound right turn lane with 100 feet of storage and appropriate decel and taper.

Fourth Avenue and Main Street

- Construct a southbound left turn lane with 100 feet of storage and appropriate decel and taper.
- Construct an eastbound left turn lane with 100 feet of storage and appropriate decel and taper.
- Construct a westbound left turn lane with 100 feet of storage and appropriate decel and taper.

Main Street and Smithfield Road

- Monitor the intersection for signalization and install a traffic signal when warranted.

Smithfield Road and First Avenue

- Construct an eastbound left turn lane with 100 feet of storage and appropriate decel and taper.
- Construct a westbound left turn lane with 100 feet of storage and appropriate decel and taper.
- Modify the traffic signal to accommodate the geometric changes.
- Coordinate with NCDOT to develop a signal modification plan to accommodate the geometric changes at the intersection.

Smithfield Road and Fourth Avenue

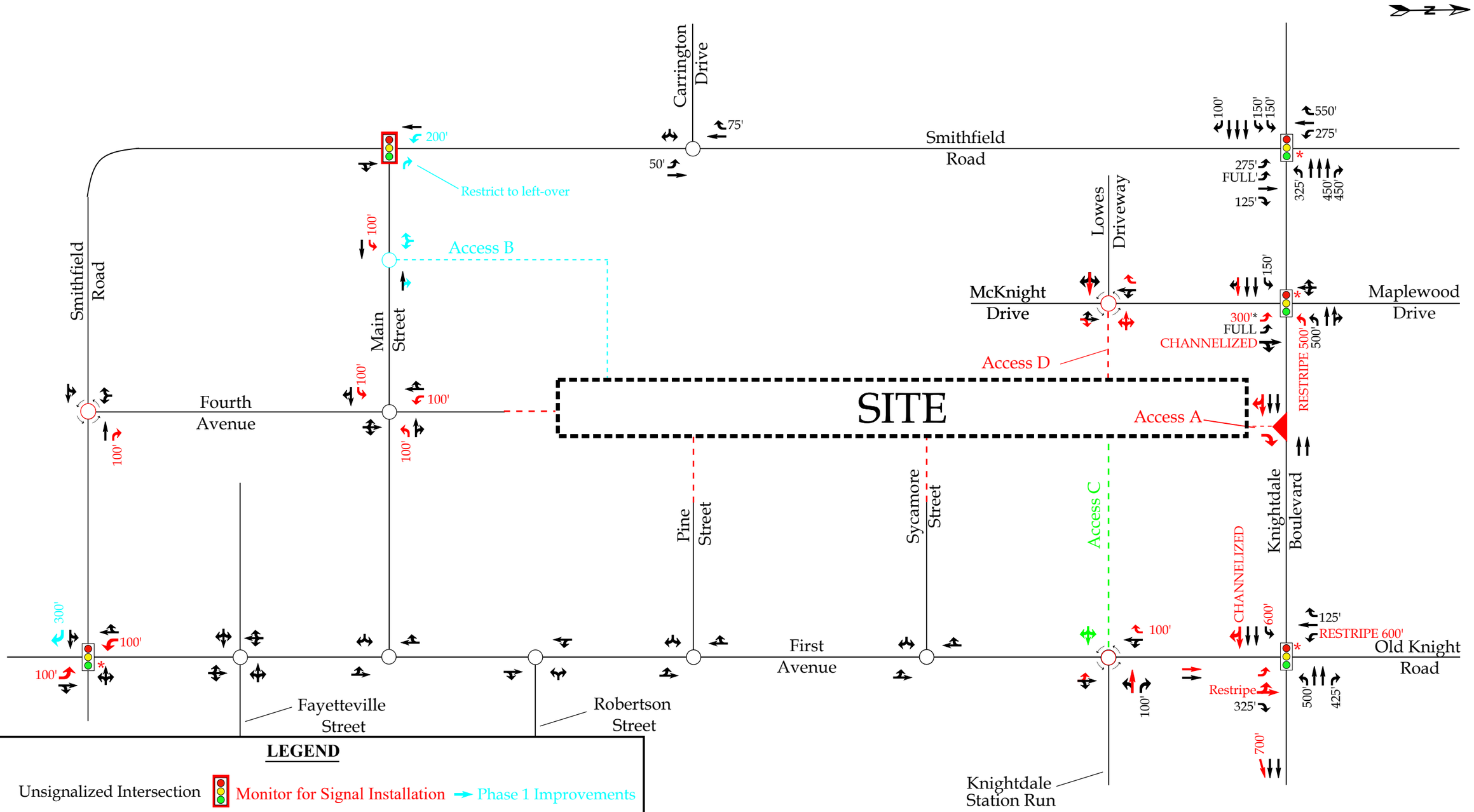
- Convert existing unsignalized intersection to roundabout.
- Construct a northbound left turn lane with 100 feet of storage and appropriate decel and taper.

Knightdale Boulevard (US 64 Business) and Access A

- Construct northbound approach as right-in/right-out intersection with one ingress lane and one egress lane. Design right-in/right-out with large radii/channelization that allows the traffic to easily maneuver to ingress and egress the site
- Construct an additional eastbound shared through-right with full storage.

Main Street and Access B

- Construct an eastbound left turn lane with 100 feet of storage and appropriate decel and taper.



RAMEY KEMP ASSOCIATES

Suggs
Knightdale, NC

Recommended Lane Configurations

Scale: Not to Scale | Figure 18