



Old Milburnie Residential
Traffic Impact Analysis
Knightdale, North Carolina

TRAFFIC IMPACT ANALYSIS

FOR

OLD MILBURNIE RESIDENTIAL

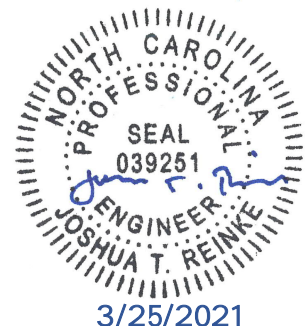
LOCATED

IN

KNIGHTDALE, NORTH CAROLINA

Prepared For:
JPM South Development
7208 Falls of Neuse Road, Suite 101
Raleigh, NC 27615

Prepared By:
Ramey Kemp & Associates, Inc.
5808 Faringdon Place, Suite 100
Raleigh, NC 27609
License #C-0910



March 2021

RKA Project No. 21037

Prepared By: MLS

Reviewed By: JTR

TRAFFIC IMPACT ANALYSIS
OLD MILBURNIE RESIDENTIAL
KNIGHTDALE, NORTH CAROLINA

EXECUTIVE SUMMARY

1. Development Overview

A Traffic Impact Analysis (TIA) was conducted for the proposed Old Milburnie Residential 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 east of Old Milburnie Road and south of Buffaloe Road in Knightdale, North Carolina. An original TIA was performed by RKA in August of 2018. This study includes updates based on the new site plan and build-out year.

The original TIA assumed a total of 300 single-family homes. The proposed development, anticipated to be completed in 2025, is now expected to consist of 177 single-family homes and 93 townhomes. Per the Town of Knightdale (Town) Unified Development Ordinance (UDO), future analysis should include the build year + 1 year, as well as a future (build year + 10 years) scenario. The study analyzes traffic conditions during the weekday AM and PM peak hours for the following scenarios:

- Existing (2021) Traffic Conditions
- No-Build (2026) Traffic Conditions
- Build (2026) Traffic Conditions
- Future (2035) Traffic Conditions
- Build (2026) Traffic Conditions with Improvements

Site access will be provided via the following access points:

- One (1) full movement intersection along Old Milburnie Road
- One (1) full movement intersection along Old Lewis Farm Road
- One (1) full movement access along Old Crews Road

A fourth access may be provided by tying into the existing Brilliant Drive. While a portion of the site trips may utilize this access along Brilliant Drive, the residential development along Brilliant Drive (Brighton Knoll) may also utilize the additional interconnectivity to the south to enter/exit the Brighton Knoll subdivision. Additionally, Brilliant Drive is not anticipated to be a main access for the proposed Old Milburnie Residential development; therefore, all site trips will be routed through the other access points to provide conservative results at the main site driveways. Brilliant Drive was not studied as a part of this TIA due to the negligible traffic that would be expected to be added to this roadway.

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:

- Buffaloe Road and I-540 Southbound Ramps
- Buffaloe Road and I-540 Northbound Ramps
- Old Milburnie Road and Buffaloe Road
- Old Milburnie Road and Old Lewis Farm Road
- Old Milburnie Road and Forestville Road

Existing peak hour traffic volumes were determined based on traffic counts conducted at the study intersections listed above, in June of 2018 by RKA during a typical weekday AM (7:00 AM – 9:00 AM) and PM (4:00 PM – 6:00 PM) peak periods. Per coordination with the Town staff, 2018 traffic counts were grown by an annually compounded growth rate of 3% to 2021 to develop the existing traffic volumes. Through volumes were balanced along Buffaloe Road between the I-540 northbound and southbound ramps; however, imbalances between the remaining study area intersections were reasonable and, therefore, were unchanged.

3. Site Trip Generation

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, 10th Edition. Table E-1 on the following page provides a summary of the trip generation potential for the site.

Table E-1: Site Trip Generation

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	Weekday AM Peak Hour Trips (vph)		Weekday PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Single-Family Detached Housing (210)	177 dwellings	1,760	32	98	111	65
Multifamily Housing (Low-Rise) (220)	93 dwellings	670	10	35	35	20
Total		2,430	42	133	146	85

4. Future Traffic Conditions

Through coordination with the Town and NCDOT, it was determined that an annual growth rate of 3% would be used to generate projected (2026) weekday AM and PM peak hour traffic volumes. The following adjacent developments were identified to be considered under future conditions:

- Blue Run Lane
- Buffalo Shoals
- East Wake Middle School Expansion
- Saluda Tract
- Forestville-Needham Townhomes
- Town of Knightdale Soccer Park

It should be noted that including trips from the above adjacent developments on top of an annually compounded growth rate is anticipated to provide conservative results in this area, as local development growth is the most impactful for more rural areas. Additionally, there is expected to be interaction between some of the adjacent developments and the proposed development based on the different land uses; however, no reduction in adjacent development trips was proposed to provide a conservative estimation of future traffic volumes. It should also be noted that an MOU has not yet been provided for the Saluda Tract development. Based on coordination with the Client, the Saluda Tract development is anticipated to be constructed after Old Milburnie Residential; therefore, including the trips by this development in future volumes is anticipated to provide conservative results.

5. Capacity Analysis Summary

The analysis considered weekday AM and PM peak hour traffic for existing (2021), no-build (2026), build (2026), and future (2035) conditions. Refer to Section 7 of the report 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.

Recommended Improvements by Developer

Buffaloe Road and I-540 Southbound Ramps

- Provide signal timing adjustments along the Buffaloe Road corridor.

Buffaloe Road and I-540 Northbound Ramps

- Provide signal timing adjustments along the Buffaloe Road corridor.

Buffaloe Road and Old Milburnie Road

- Provide an exclusive southbound right-turn lane with a minimum of 150 feet of storage and appropriate deceleration and taper length.
- Provide signal modifications to accommodate the exclusive southbound right-turn lane.

Old Milburnie Road and Site Drive 1

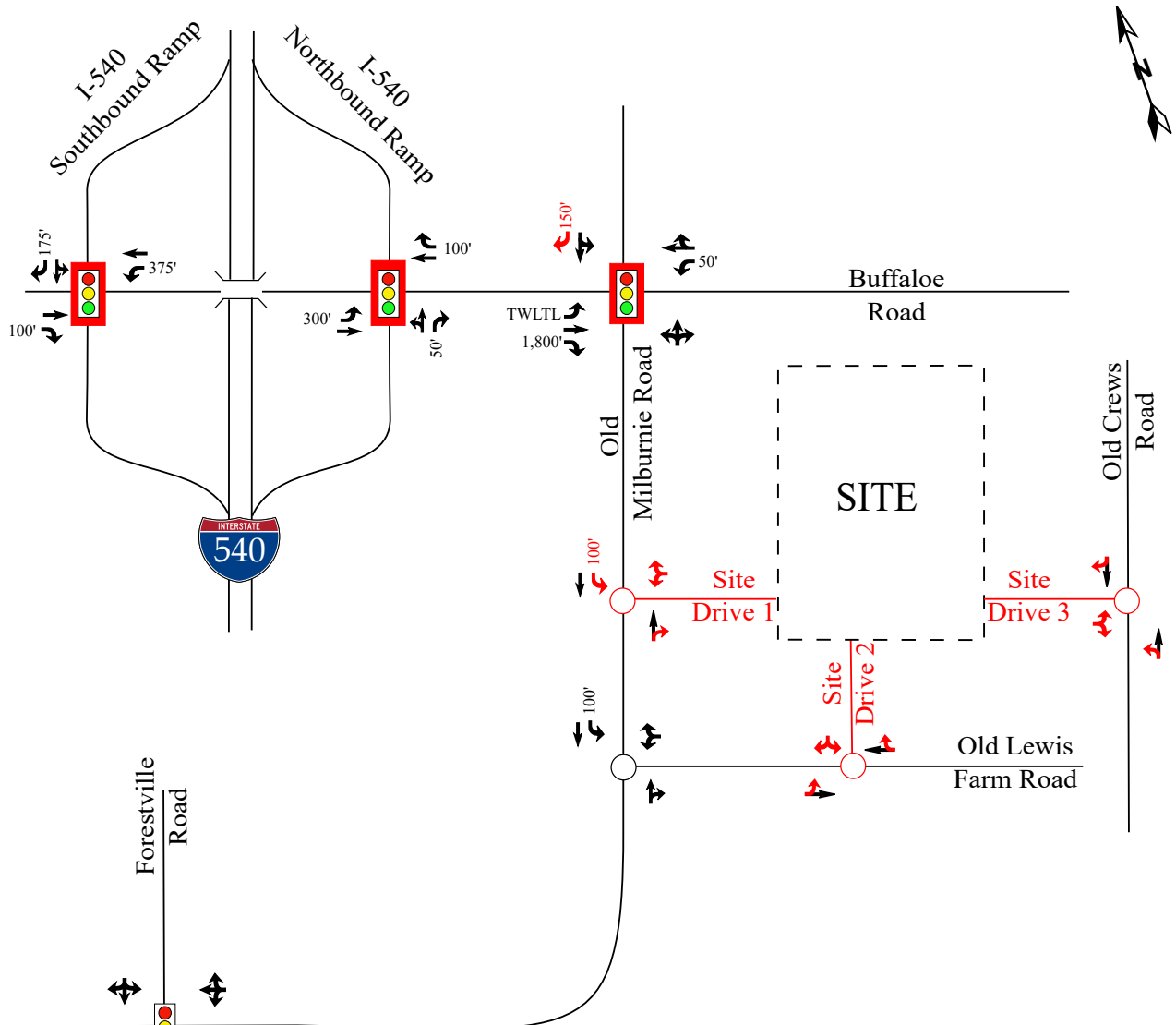
- Construct the westbound approach with one ingress lane and one egress lane.
- Provide an exclusive southbound left-turn lane with a minimum of 100 feet of storage and appropriate deceleration and taper length.
- Provide stop control for the westbound approach.

Old Lewis Farm Road and Site Drive 2

- Construct the southbound approach with one ingress lane and one egress lane.
- Provide stop control for the southbound approach.

Old Crews Road and Site Drive 3

- Construct the eastbound approach with one ingress lane and one egress lane.
- Provide stop control for the eastbound approach.



LEGEND

- Unsignalized Intersection
- ⏏ Signalized Intersection
- ⏏ (with red border) Signal Modifications by Developer
- ➡ Existing Lane
- ➡ (with red border) Improvement by Developer
- X' Storage (In Feet)



Old Milburnie Road
Residential PUD
Knightdale, NC

Recommended
Lane Configurations

Scale: Not to Scale	Figure E-1
---------------------	------------

TABLE OF CONTENTS

- 1. INTRODUCTION 1
 - 1.1. Site Location and Study Area 1
 - 1.2. Proposed Land Use and Site Access 2
 - 1.3. Adjacent Land Uses..... 3
 - 1.4. Existing Roadways 3
- 2. EXISTING (2021) PEAK HOUR CONDITIONS 7
 - 2.1. Existing (2021) Peak Hour Traffic..... 7
 - 2.2. Analysis of Existing (2021) Peak Hour Traffic..... 7
- 3. NO-BUILD (2026) PEAK HOUR CONDITIONS 9
 - 3.1. Ambient Traffic Growth..... 9
 - 3.2. Adjacent Development Traffic..... 9
 - 3.3. Future Roadway Improvements 11
 - 3.4. No-Build (2026) Peak Hour Traffic Volumes..... 11
 - 3.5. Analysis of No-Build (2026) Peak Hour Traffic Conditions..... 11
- 4. SITE TRIP GENERATION AND DISTRIBUTION..... 15
 - 4.1. Trip Generation..... 15
 - 4.2. Site Trip Distribution and Assignment..... 15
- 5. BUILD (2026) TRAFFIC CONDITIONS..... 19
 - 5.1. Build (2026) Peak Hour Traffic Volumes 19
 - 5.2. Analysis of Build (2026) Peak Hour Traffic 19
- 6. FUTURE (2035) TRAFFIC CONDITIONS 21
 - 6.1. Future (2035) Peak Hour Traffic Volumes..... 21
 - 6.2. Analysis of Future (2035) Peak Hour Traffic 21
- 7. TRAFFIC ANALYSIS PROCEDURE 23
 - 7.1. Adjustments to Analysis Guidelines..... 23
- 8. CAPACITY ANALYSIS 24
 - 8.1. Buffalo Road and I-540 Southbound Ramps 24
 - 8.2. Buffalo Road and I-540 Northbound Ramps 26
 - 8.3. Buffalo Road and Old Milburnie Road 28
 - 8.4. Old Milburnie Road and Old Lewis Farm Road..... 30

8.5. Forestville Road and Old Milburnie Road..... 32

8.6. Old Milburnie Road and Site Drive 1..... 33

8.7. Old Lewis Farm Road and Site Drive 2..... 34

8.8. Old Crews Road and Site Drive 3..... 35

9. CONCLUSIONS..... 37

10. RECOMMENDATIONS 40

LIST OF FIGURES

Figure 1 – Site Location Map 4

Figure 2 – Preliminary Site Plan..... 5

Figure 3 – Existing Lane Configurations 6

Figure 4 – Existing (2021) Peak Hour Traffic..... 8

Figure 5 – Projected (2026) Peak Hour Traffic.....12

Figure 6 – Adjacent Development Trips.....13

Figure 7 – No-Build (2026) Peak Hour Traffic.....14

Figure 8 – Site Trip Distribution.....17

Figure 9 – Site Trip Assignment.....18

Figure 10 – Build (2026) Peak Hour Traffic20

Figure 11 – Future (2035) Peak Hour Traffic22

Figure 12 – Recommended Lane Configurations.....41

LIST OF TABLES

Table 1: Existing Roadway Inventory..... 3

Table 2: Adjacent Development Information..... 10

Table 3: Trip Generation Summary..... 15

Table 4: Highway Capacity Manual – Levels-of-Service and Delay 23

Table 5: Analysis Summary of Buffalo Road and I-540 Southbound Ramps..... 24

Table 6: Analysis Summary of Buffalo Road and I-540 Northbound Ramps 26

Table 7: Analysis Summary of Buffalo Road and Old Milburnie Road 28

Table 8: Analysis Summary of Old Milburnie Road and Old Lewis Farm Road..... 30

Table 9: Analysis Summary of Forestville Road and Old Milburnie Road..... 32

Table 10: Analysis Summary of Old Milburnie Road and Site Drive 1..... 33

Table 11: Analysis Summary of Old Lewis Farm Road and Site Drive 2..... 34
Table 12: Analysis Summary of Old Crews Road and Site Drive 3..... 35

TECHNICAL APPENDIX

Appendix A: Scoping Documentation
Appendix B: Traffic Counts
Appendix C: Signal Plans
Appendix D: Adjacent Development Information
Appendix E: Capacity Calculations – Buffaloe Road and I-540 Southbound Ramps
Appendix F: Capacity Calculations – Buffaloe Road and I-540 Northbound Ramps
Appendix G: Capacity Calculations – Old Milburnie Road and Buffaloe Road
Appendix H: Capacity Calculations – Old Milburnie Road and Old Lewis Farm Road
Appendix I: Capacity Calculations – Old Milburnie Road and Forestville Road
Appendix J: Capacity Calculations – Old Milburnie Road and Site Drive 1
Appendix K: Capacity Calculations – Old Lewis Farm Road and Site Drive 2
Appendix L: Capacity Calculations – Old Crews Road and Site Drive 3

TRAFFIC IMPACT ANALYSIS
OLD MILBURNIE RESIDENTIAL
KNIGHTDALE, NORTH CAROLINA

1. INTRODUCTION

The contents of this report present the findings of the Traffic Impact Analysis (TIA) conducted for the proposed Old Milburnie Residential development to be located east of Old Milburnie Road and south of Buffaloe Road in Knightdale, North Carolina. An original TIA was performed by RKA in August of 2018. This study includes updates based on the new site plan and build-out year. 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 original TIA assumed a total of 300 single-family homes. The proposed development, anticipated to be completed in 2025, is now expected to consist of the following uses:

- 177 single-family homes
- 93 townhomes

Per the Town of Knightdale (Town) Unified Development Ordinance (UDO), future analysis should include the build year + 1 year, as well as a future (build year + 10 years) scenario. The study analyzes traffic conditions during the weekday AM and PM peak hours for the following scenarios:

- Existing (2021) Traffic Conditions
- No-Build (2026) Traffic Conditions
- Build (2026) Traffic Conditions
- Future (2035) Traffic Conditions
- Build (2026) Traffic Conditions with Improvements

1.1. Site Location and Study Area

The development is proposed to be located east of Old Milburnie Road and south of Buffaloe 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 and consists of the following existing intersections:

- Buffaloe Road and I-540 Southbound Ramps
- Buffaloe Road and I-540 Northbound Ramps
- Old Milburnie Road and Buffaloe Road
- Old Milburnie Road and Old Lewis Farm Road
- Old Milburnie Road and Forestville Road

Refer to Appendix A for the approved scoping documentation.

1.2. Proposed Land Use and Site Access

The site is expected to be located east of Old Milburnie Road and south of Buffaloe Road. The proposed development, anticipated to be completed in 2025, is assumed to consist of the following uses:

- 177 single-family homes
- 93 townhomes

Site access will be provided via the following access points:

- One (1) full movement intersection along Old Milburnie Road
- One (1) full movement intersection along Old Lewis Farm Road
- One (1) full movement access along Old Crews Road

A fourth access may be provided by tying into the existing Brilliant Drive. While a portion of the site trips may utilize this access along Brilliant Drive, the residential development along Brilliant Drive (Brighton Knoll) may also utilize the additional interconnectivity to the south to enter/exit the Brighton Knoll subdivision. Additionally, Brilliant Drive is not anticipated to be a main access for the proposed Old Milburnie Residential development; therefore, all site trips will be routed through the other access points to provide conservative results at the main site driveways. Brilliant Drive was not studied as a part of this TIA due to the negligible traffic that would be expected to be added to this roadway. This methodology was reviewed and approved by the Town and NCDOT as part of the Memorandum of Understanding

(MOU). Refer to Appendix A for a copy of the approved MOU. Refer to Figure 2 for a copy of the preliminary site plan.

1.3. Adjacent Land Uses

The proposed development is located in an area consisting primarily of residential development. East Wake Middle School is located to the south of the development along Old Milburnie Road.

1.4. Existing Roadways

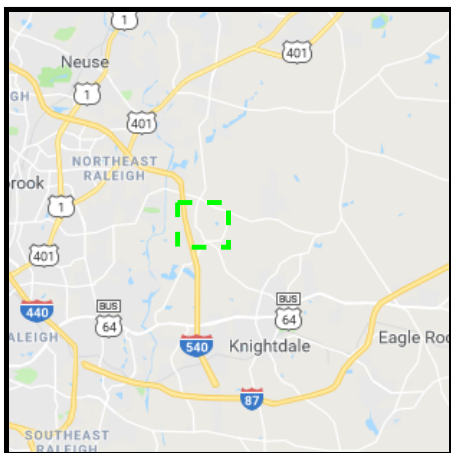
Existing lane configurations (number of traffic lanes on each intersection approach), speed limits, storage capacities, and other intersection and roadway information within the study area are shown in Figure 3. Table 1 provides a summary of this information, as well.

Table 1: Existing Roadway Inventory

Road Name	Route Number	Typical Cross Section	Speed Limit	Maintained By	2019 AADT (vpd)
Buffaloe Road	SR 2215	2-lane undivided	45 mph	NCDOT	10,000
I-540	I-540	6-lane divided	70 mph	NCDOT	72,500
Old Milburnie Road	SR 2217	2-lane undivided	45 mph	NCDOT	3,100
Old Lewis Farm Road	N/A	2-lane undivided	25 mph (assumed)	Town	400**
Forestville Road	SR 2049	2-lane undivided	45 mph	NCDOT	3,800
Old Crews Road	SR 2228	2-lane undivided	45 mph (assumed)	NCDOT	1,700*

*ADT from 2015

**ADT based on the traffic counts from 2018, grown to 2021, and assuming the weekday PM peak hour volume is 10% of the average daily traffic.



LEGEND

- - - Proposed Site Location
- Study Intersection
- - - Study Area

Moving forward.



Old Milburnie Road
Residential PUD
Knightdale, NC

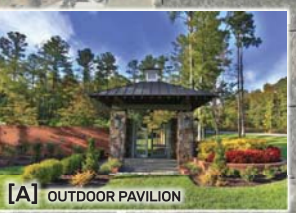
Site Location Map

Scale: Not to Scale

Figure 1



[A] OUTDOOR PAVILION



[A] OUTDOOR PAVILION



[A] FIRE PITS, SEATING, HAMMOCKS



[A] PEDESTRIAN COURTYARDS



[B] RECREATION ZONES



[B] RECREATION ZONES



[C] PLAYGROUNDS



[C] WALKING TRAILS



OLD MILBURNIE RESIDENTIAL PUD CONCEPTUAL MASTER PLAN



[C] PLAY LAWNS



[D] ENTRY MONUMENTATION



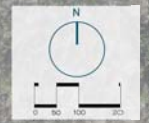
[D] ENTRY MONUMENTATION

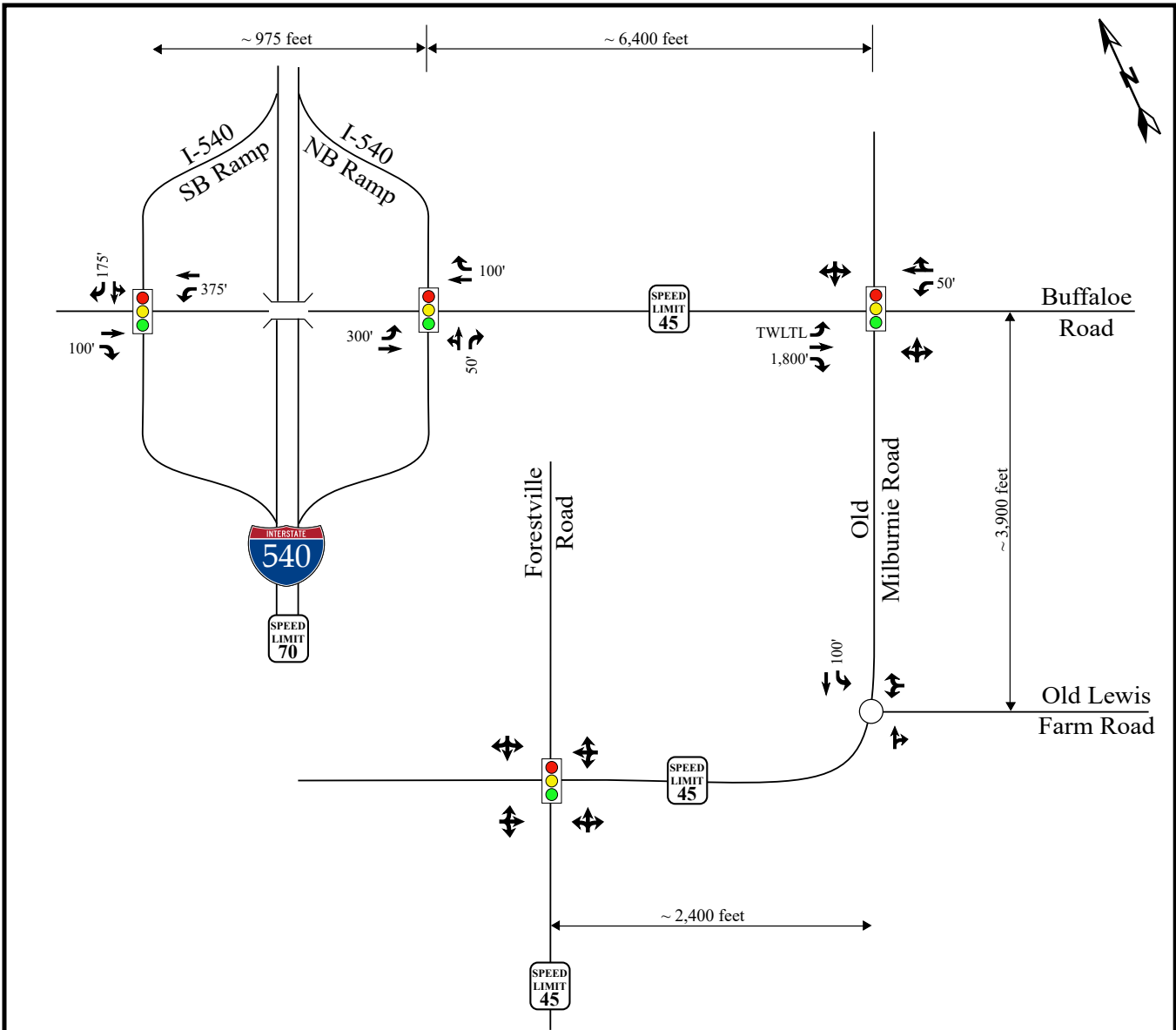


[D] ENTRY MONUMENTATION



[D] ENTRY MONUMENTATION





LEGEND

- Unsignalized Intersection
- ⓧ Storage (In Feet)
- 🚦 Signalized Intersection
- 🚦 Posted Speed Limit
- ➔ Existing Lane

Moving forward.



Old Milburnie Road
Residential PUD
Knightdale, NC

Existing
Lane Configurations

Scale: Not to Scale

Figure 3

2. EXISTING (2021) PEAK HOUR CONDITIONS

2.1. Existing (2021) Peak Hour Traffic

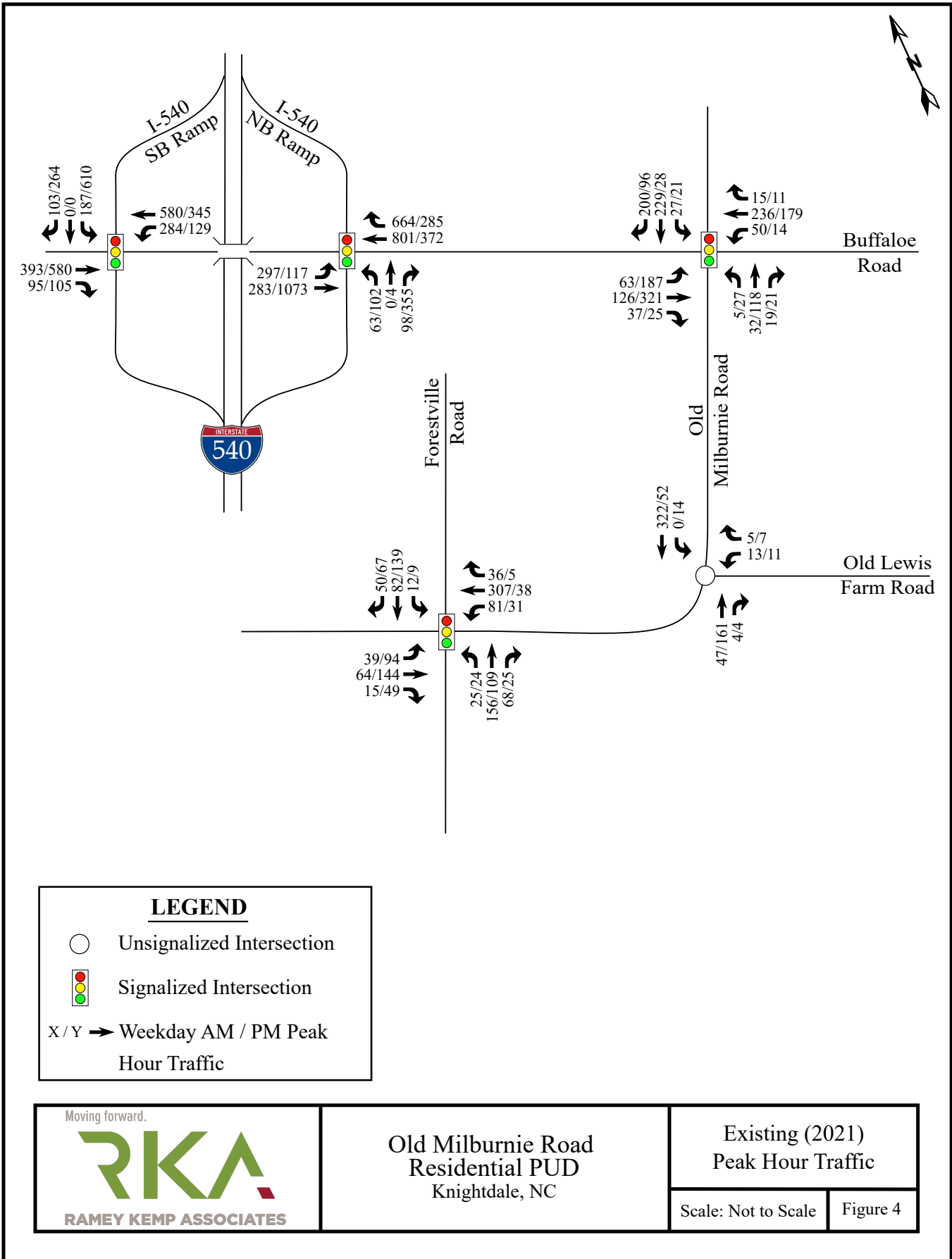
Existing peak hour traffic volumes were determined based on traffic counts conducted at the study intersections listed below, in June of 2018 during a typical weekday AM (7:00 AM – 9:00 AM) and PM (4:00 PM – 6:00 PM) peak periods:

- Buffalo Road and Southbound I-540 Ramps
- Buffalo Road and Northbound I-540 Ramps
- Old Milburnie Road and Buffalo Road
- Old Milburnie Road and Old Lewis Farm Road
- Old Milburnie Road and Forestville Road

Per coordination with the Town staff, 2018 traffic counts were grown by an annually compounded growth rate of 3% to 2021 to develop the existing traffic volumes. Through volumes were balanced along Buffalo Road between the I-540 northbound and southbound ramps; however, imbalances between the remaining study area intersections were reasonable and, therefore, were unchanged. This methodology was reviewed and approved as part of the MOU. Refer to Appendix A for a copy of the approved MOU. Refer to Figure 4 for existing (2021) 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 Existing (2021) Peak Hour Traffic

The existing (2021) 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.



3. NO-BUILD (2026) 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 3% would be used to generate projected (2026) weekday AM and PM peak hour traffic volumes. Refer to Figure 5 for projected (2026) peak hour traffic.

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:

- Blue Run Lane
- Buffaloe Shoals
- East Wake Middle School Expansion
- Saluda Tract
- Forestville-Needham Townhomes
- Town of Knightdale Soccer Park

Table 2, on the following page, provides a summary of the adjacent developments. Additional adjacent development information can be found in Appendix D.

Table 2: Adjacent Development Information

Development Name	Location	Build-Out Year	Land Use / Intensity	TIA Performed
Blue Run Lane	West of Blue Run Lane	2026	207 Townhomes	January of 2020 by RKA
Buffaloe Shoals	Southwest quadrant at the intersection of Buffaloe Road and Forestville Road	2023	414 apartment units	January of 2021 by RKA
East Wake Middle School Expansion	Southeast quadrant at the intersection of Old Milburnie Road and Old Lewis Farm Road	N/A**	Expand from a current enrollment of 1,163 students to a maximum of 1,450 students	September 2016 by AMT
Saluda Tract***	South of Buffaloe Road and east of Old Crews Road	2026*	514 townhomes, 405 age-restricted single-family homes, and 394 single-family homes	N/A <i>Trips generated and applied to roadway network</i>
Forestville-Needham Townhomes	Northwestern quadrant of the intersection of Forestville Road and Needham Road	2024	284 Townhomes	August of 2020 by Timmons Group
Town of Knightdale Soccer Park	Northwest quadrant at the intersection of Forestville Road and Smithfield Road / Horton Road	N/A**	10 soccer fields	N/A <i>Trips generated and applied to roadway network</i>

* Based on coordination with the Client, the Saluda Tract development is anticipated to be constructed after Old Milburnie Residential; therefore, including the trips by this development in future volumes is anticipated to provide conservative results.

** Anticipated prior to the build-out of Old Milburnie Residential.

***An MOU has not been provided for this development. The TIA for this development is anticipated to include Old Milburnie Residential.

It should be noted that including trips from the above adjacent developments on top of an annually compounded growth rate is anticipated to provide conservative results in this area, as local development growth is the most impactful for more rural areas. Additionally, there is

expected to be interaction between some of the adjacent developments and the proposed development based on the different land uses; however, no reduction in adjacent development trips was proposed to provide a conservative estimation of future traffic volumes. 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. Refer to Appendix A for a copy of the approved MOU.

3.3. Future Roadway Improvements

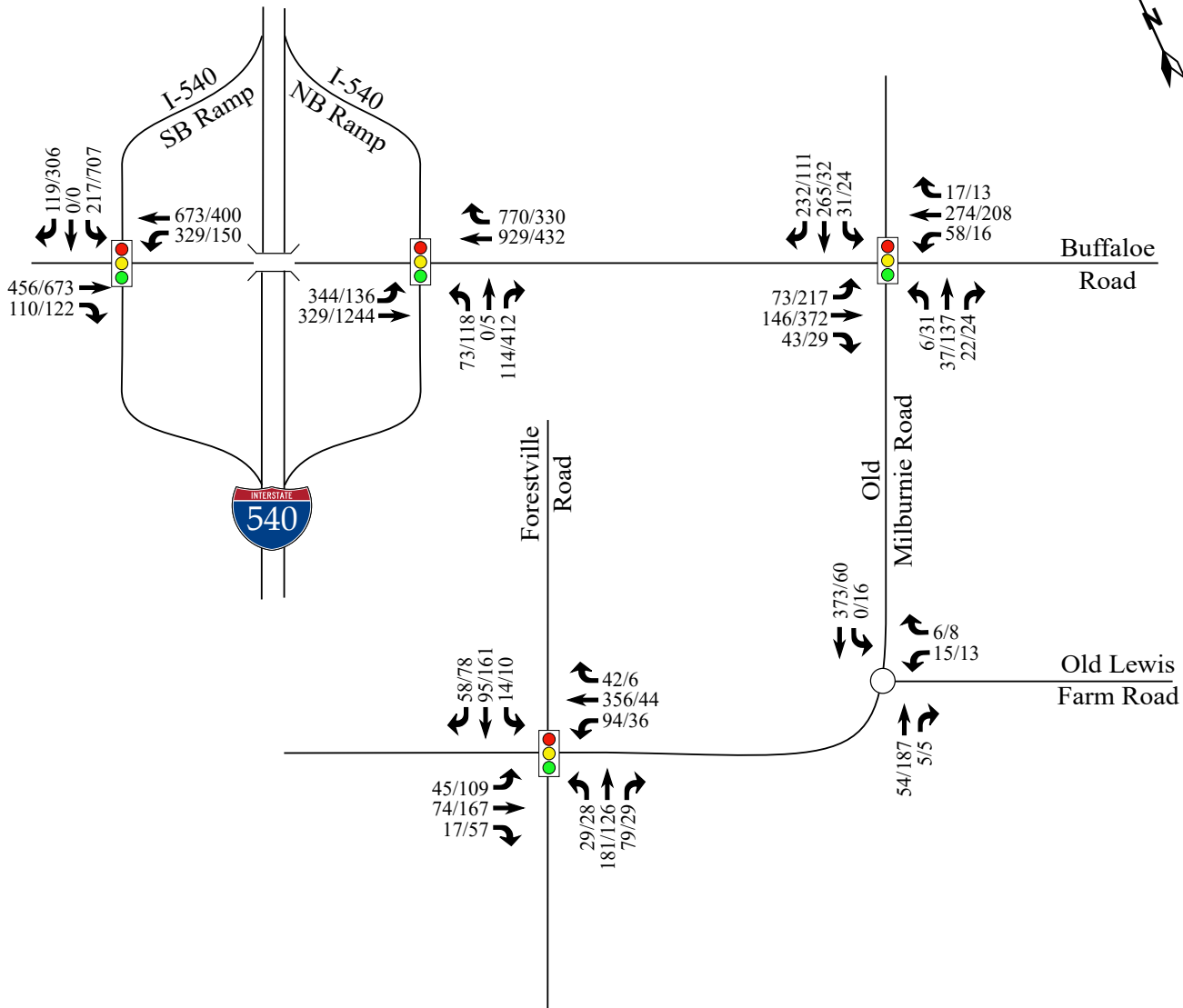
Based on coordination with the NCDOT and the Town, it was determined there were no future roadway improvements to consider with this study.

3.4. No-Build (2026) Peak Hour Traffic Volumes

The no-build (2026) traffic volumes were determined by projecting the existing (2021) peak hour traffic to the year 2026 and adding the adjacent development trips. Refer to Figure 7 for an illustration of the no-build (2026) peak hour traffic volumes at the study intersections.

3.5. Analysis of No-Build (2026) Peak Hour Traffic Conditions

The no-build (2026) 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

Moving forward.

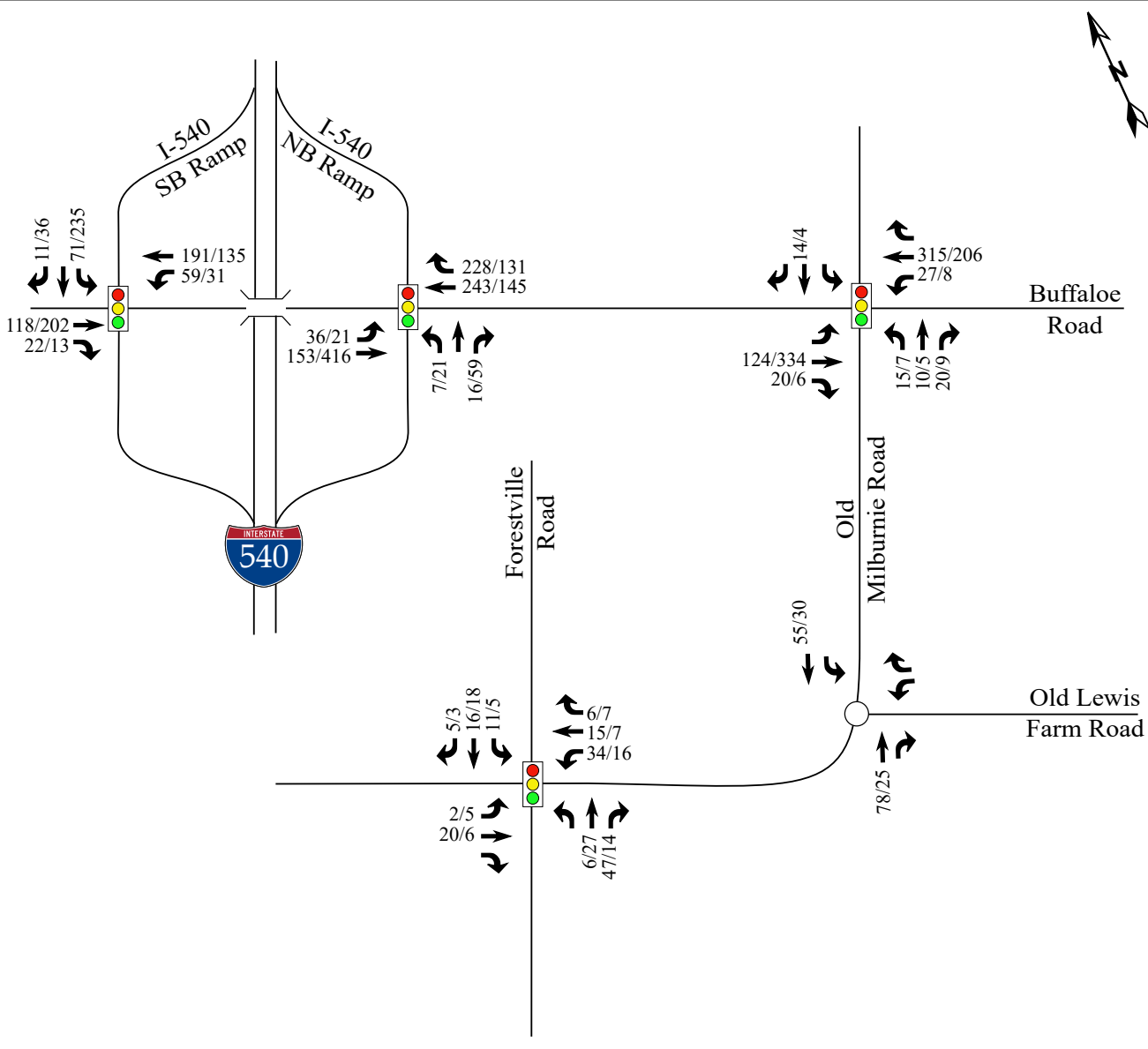
RKA

RAMEY KEMP ASSOCIATES

Old Milburnie Road
Residential PUD
Knightdale, NC

Projected (2026)
Peak Hour Traffic

Scale: Not to Scale	Figure 5
---------------------	----------



LEGEND

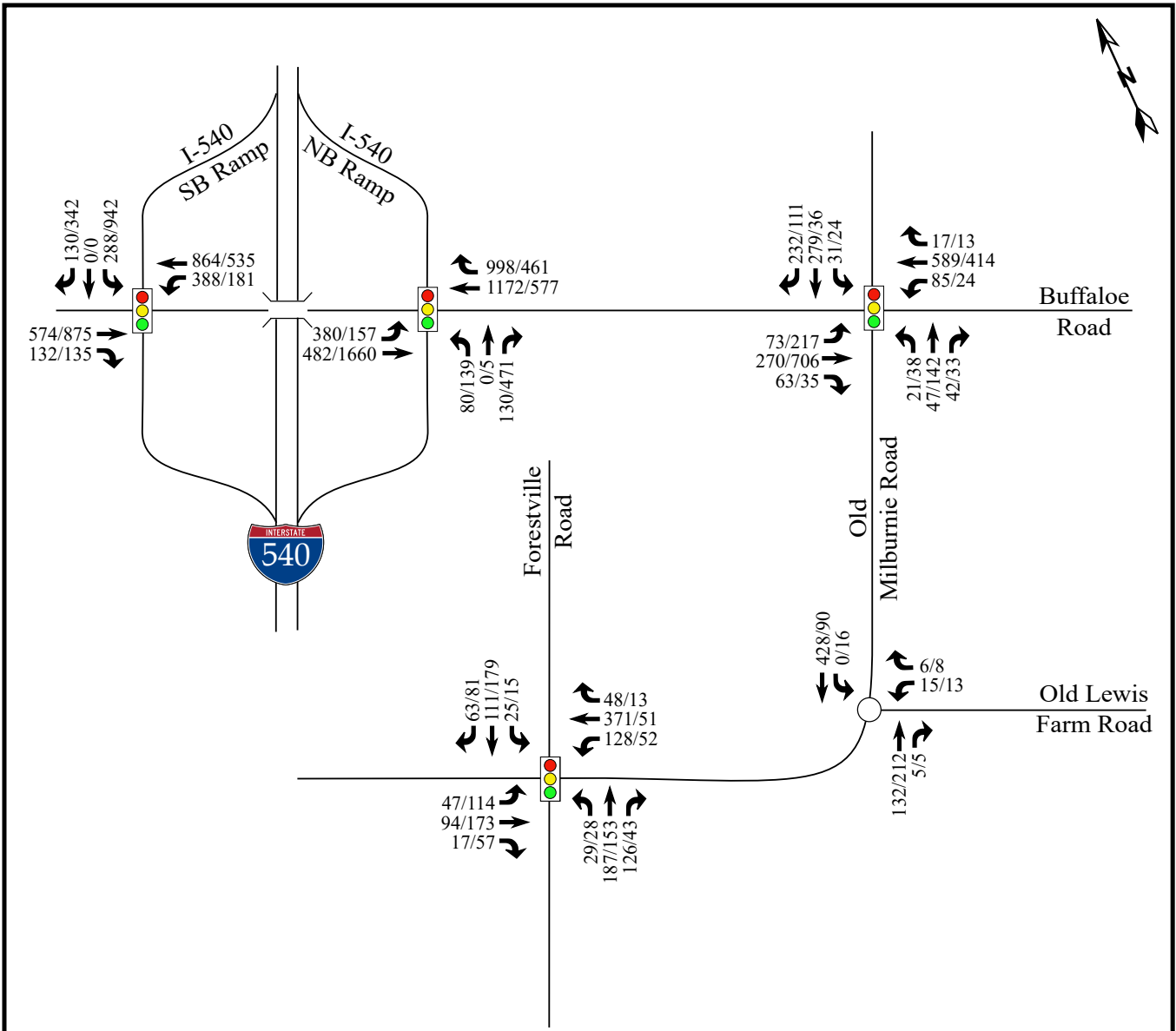
- Unsignalized Intersection
- 🚦 Signalized Intersection

X/Y → Weekday AM / PM Peak Hour
Adjacent Development Trips



Old Milburnie Road
Residential PUD
Knightdale, NC

Adjacent Development
Trips
Scale: Not to Scale Figure 6



LEGEND

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

Moving forward.

RKA
RAMEY KEMP ASSOCIATES

Old Milburnie Road
Residential PUD
Knightdale, NC

No-Build (2026)
Peak Hour Traffic

Scale: Not to Scale Figure 7

Moving forward.

4. SITE TRIP GENERATION AND DISTRIBUTION

4.1. Trip Generation

The proposed development is assumed to consist of 177 single-family homes and 93 multi-family (low-rise) units. 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*, 10th Edition. Table 3 provides a summary of the trip generation potential for the site.

Table 3: Trip Generation Summary

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	Weekday AM Peak Hour Trips (vph)		Weekday PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Single-Family Detached Housing (210)	177 dwellings	1,760	32	98	111	65
Multifamily Housing (Low-Rise) (220)	93 dwellings	670	10	35	35	20
Total		2,430	42	133	146	85

It is estimated that the proposed development will generate approximately 2,430 total site trips on the roadway network during a typical 24-hour weekday period. Of the daily traffic volume, it is anticipated that 175 trips (42 entering and 133 exiting) will occur during the weekday AM peak hour and 231 trips (146 entering and 85 exiting) will occur 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.

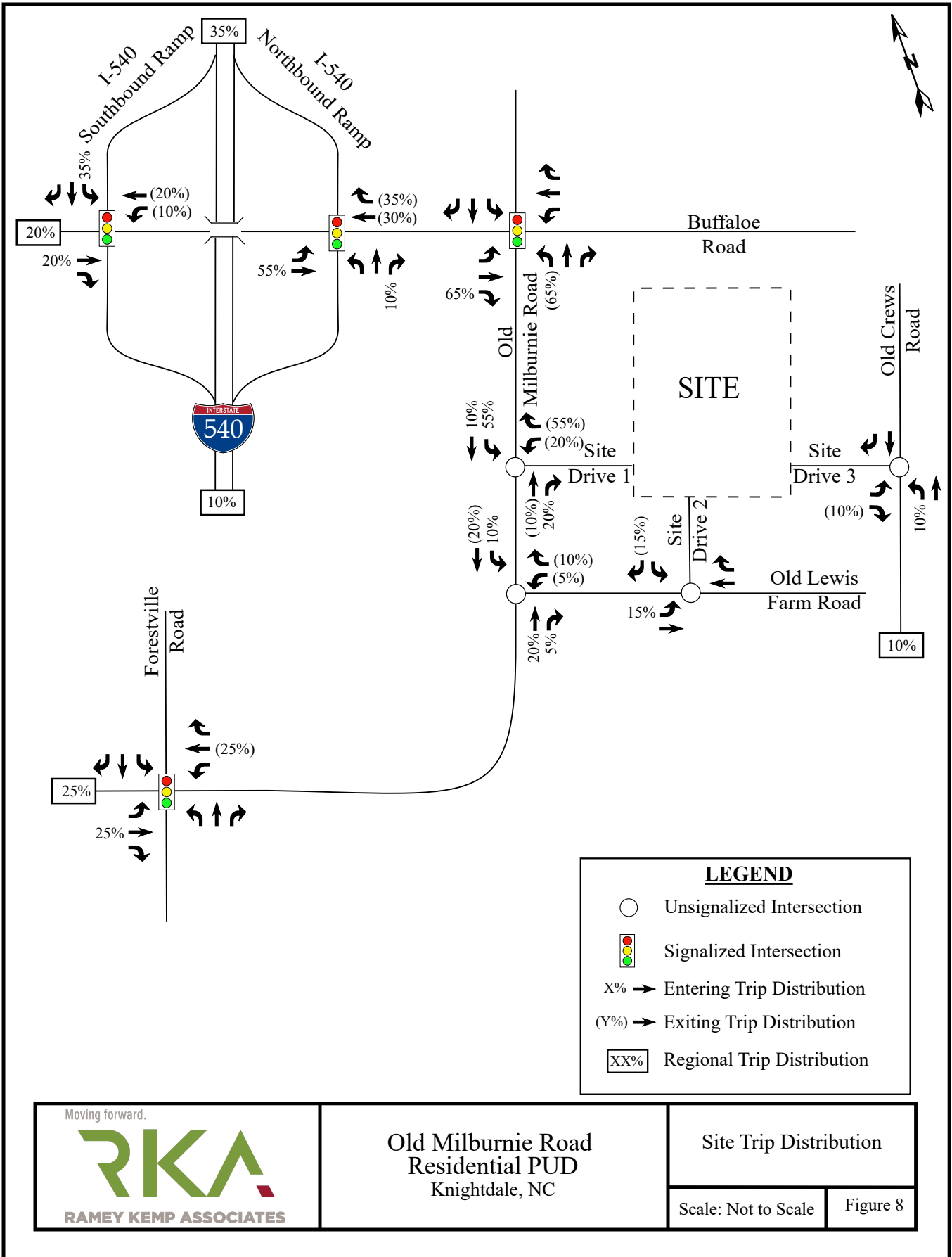
It is estimated that the site trips will be regionally distributed as follows:

- 35% to/from the north via I-540
- 25% to/from the west via Old Milburnie Road
- 20% to/from the west via Buffaloe Road

Moving forward.

- 10% to/from the south via I-540
- 10% to/from the south via Old Crews Road

It should be noted that the above distributions are consistent with the previously approved TIA for Old Milburnie Residential. These distributions were additionally reviewed and approved as part of the MOU. Refer to Appendix A for a copy of the approved MOU. The site trip distribution is shown in Figure 8. Refer to Figure 9 for the site trip assignment.



Moving forward.

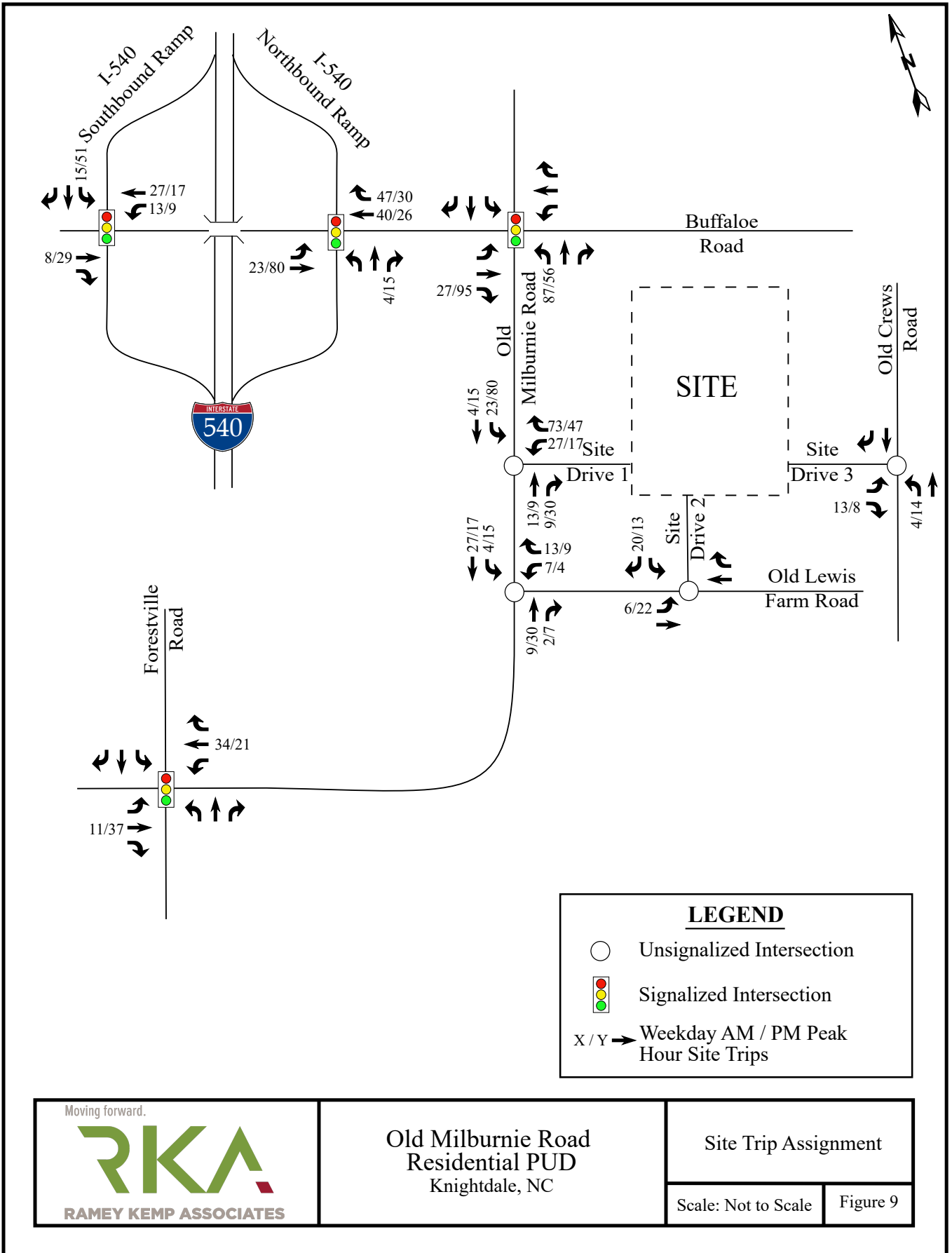


Old Milburnie Road Residential PUD
Knightdale, NC

Site Trip Distribution

Scale: Not to Scale

Figure 8



Moving forward.



Old Milburnie Road
Residential PUD
Knightdale, NC

Site Trip Assignment

Scale: Not to Scale

Figure 9

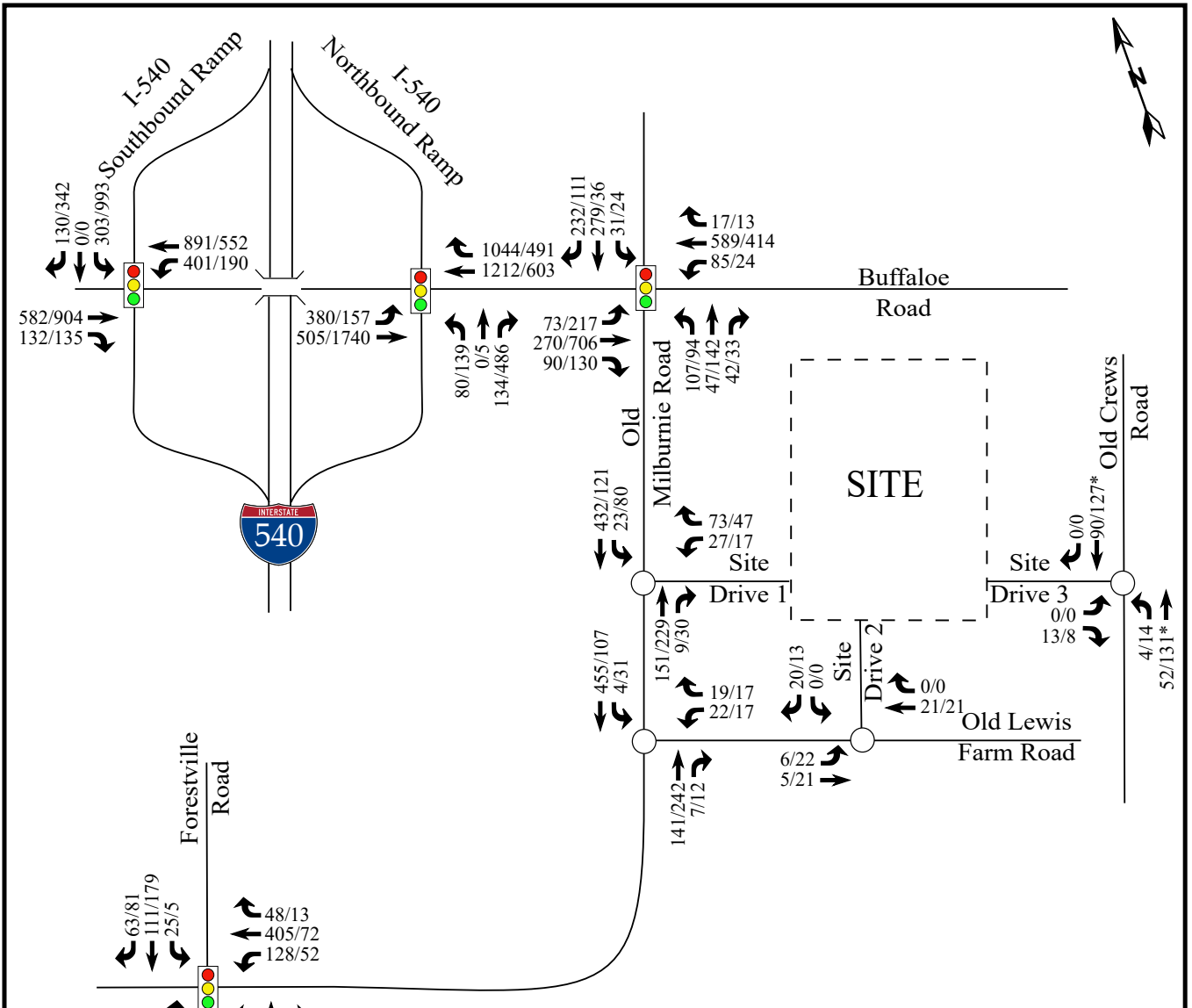
5. BUILD (2026) TRAFFIC CONDITIONS

5.1. Build (2026) Peak Hour Traffic Volumes

To estimate traffic conditions with the site fully built-out, the total site trips were added to the no-build (2026) traffic volumes to determine the build (2026) traffic volumes. Refer to Figure 10 for an illustration of the build (2026) peak hour traffic volumes with the proposed site fully developed.



5.2. Analysis of Build (2026) Peak Hour Traffic

Study intersections were analyzed with the build (2026) 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.



*Through volumes were estimated based on count data from the Saluda Tract adjacent development.

LEGEND

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

Moving forward.



RAMEY KEMP ASSOCIATES

Old Milburnie Road
Residential PUD
Knightdale, NC

Build (2026)
Peak Hour Traffic

Scale: Not to Scale Figure 10

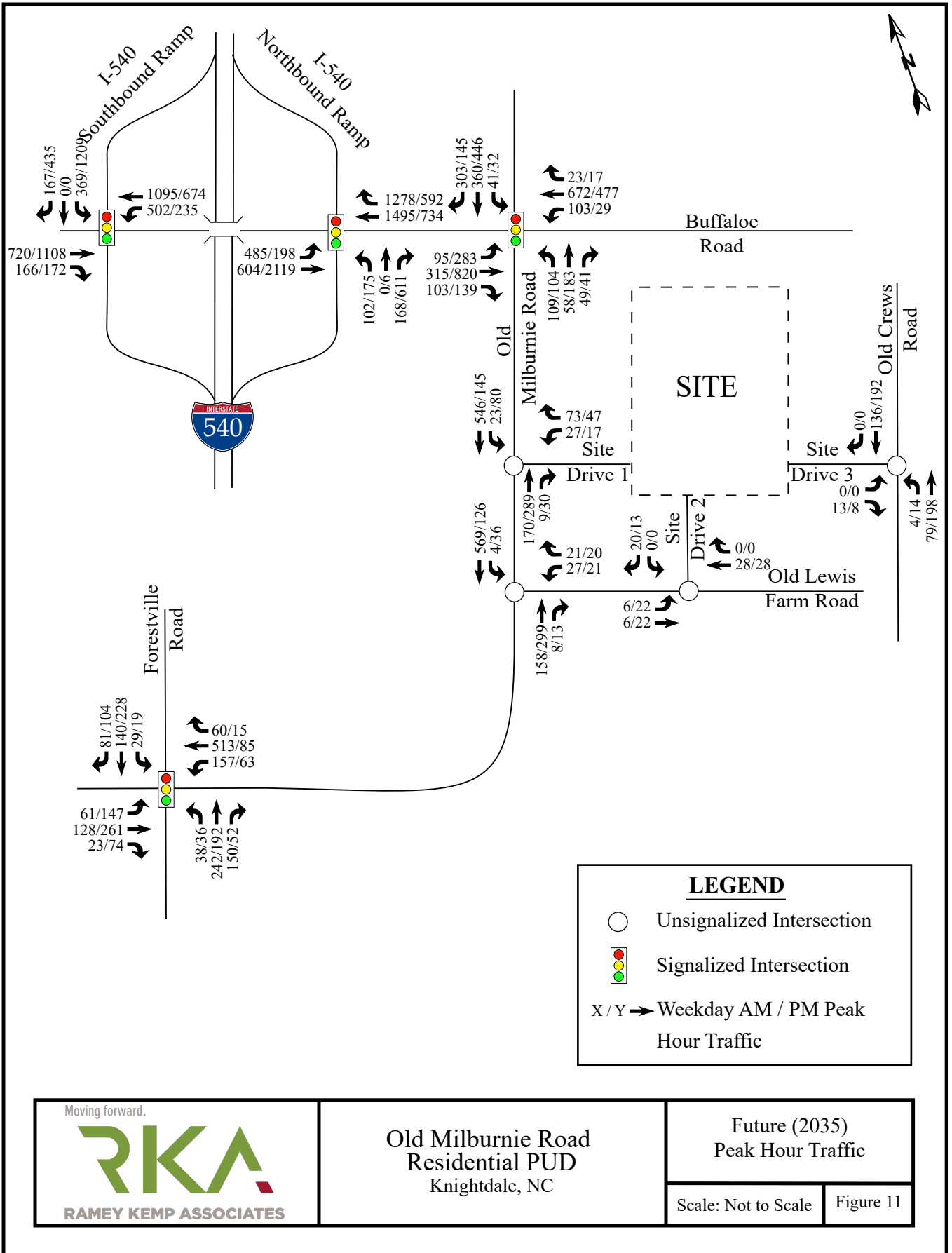
6. FUTURE (2035) TRAFFIC CONDITIONS

6.1. Future (2035) Peak Hour Traffic Volumes

Future traffic conditions were determined by projecting the existing (2021) traffic volumes to the year 2035 and adding the adjacent development and total site trips. Refer to Figure 11 for an illustration of the future (2034) peak hour traffic volumes with the site fully developed.

6.2. Analysis of Future (2035) Peak Hour Traffic

Study intersections were analyzed with the future (2035) 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.



Moving forward.

7. 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 all of 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

7.1. Adjustments to Analysis Guidelines

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

Moving forward.

8. CAPACITY ANALYSIS

8.1. Buffalo Road and I-540 Southbound Ramps

The existing signalized intersection of Buffalo Road and I-540 Southbound Ramps was analyzed under existing (2021), no-build (2026), build (2026), and future (2035) 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 Buffalo Road and I-540 Southbound Ramps

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)
Existing (2021) Conditions	EB	1 TH, 1 RT	B	C (21)	D	D (41)
	WB	1 LT, 1 TH	B		C	
	--*	--	--		--	
	SB	1 LT-TH, 1 RT	D		D	
No-Build (2026) Conditions	EB	1 TH, 1 RT	C	C (32)	F	F (152)
	WB	1 LT, 1 TH	C		D	
	--*	--	--		--	
	SB	1 LT-TH, 1 RT	D		F	
Build (2026) Conditions	EB	1 TH, 1 RT	D	C (35)	F	F (170)
	WB	1 LT, 1 TH	C		D	
	--*	--	--		--	
	SB	1 LT-TH, 1 RT	D		F	
Build (2026) Conditions – Modified Signal Coordination**	EB	1 TH, 1 RT	C	C (27)	F	F (157)
	WB	1 LT, 1 TH	B		F	
	--*	--	--		--	
	SB	1 LT-TH, 1 RT	E		F	
Future (2035) Conditions	EB	1 TH, 1 RT	D	F (92)	F	F (262)
	WB	1 LT, 1 TH	F		E	
	--*	--	--		--	
	SB	1 LT-TH, 1 RT	E		F	

*The southern leg of this intersection exists as a southbound on-ramp.

**Due to heavy queuing along the Buffalo Road corridor, coordinated signal timing adjustments and intersection offset adjustments were considered at the Buffalo Road and I-540 ramps intersections. Improvements to the intersection are shown in bold.

Capacity analysis of existing (2021), no-build (2026), and build (2026) traffic conditions indicates the intersection of Buffalo Road and I-540 Southbound Ramps is expected to

operate at an overall LOS C during the weekday AM peak hour. During the weekday PM peak hour, the intersection currently operates at an overall LOS D under existing (2020) and is expected to operate at an overall LOS F under no-build (2023) and build (2023) conditions. Under future (2035) conditions, the intersection is expected to continue to operate at an overall LOS F during the weekday AM and PM peak hours. The heavy overall delays under future (2035) conditions are anticipated to be due to the background growth expected in the next 14 years and is not anticipated to be due to the traffic from the proposed development.

It should be noted that adjacent development trips are anticipated to amount to approximately 21% of the overall no-build (2026) traffic volumes at this intersection (in addition to the 3% annually compounded growth rate) and the proposed development is anticipated to amount to approximately 3% of the overall no-build (2026) traffic volumes at this intersection. Based on SimTraffic queuing results, heavy queuing is anticipated on the southbound approach of the I-540 Southbound Ramps under no-build (2026) and build (2026) conditions.

Because the intersection is anticipated to degrade by an overall level-of-service existing (2021) and no-build (2023) conditions during the weekday PM peak hour and due to the heavy queuing results, improvements were considered at the study intersection. Exclusive turn lanes exist on all approaches. Additional geometric improvements would be expected to require bridge widening on the eastern leg of the intersection; therefore, signal modifications were considered. With signal coordination adjustments along the Buffaloe Road corridor, the study intersection is anticipated to improve by 8 overall seconds of delay during the weekday AM peak hour and 18 overall seconds of delay during the weekday PM peak hour and queuing on the I-540 Southbound Ramps is anticipated to be contained within the existing storages, without spilling back onto I-540. It should be noted that with signal timing adjustments, the intersection is expected to operate with similar overall delay than no-build (2026) conditions during the weekday AM and PM peak hours.

It is recommended that signal coordination adjustments be provided along the Buffaloe Road corridor within the study area.

Moving forward.

8.2. Buffalo Road and I-540 Northbound Ramps

The existing signalized intersection of Buffalo Road and I-540 Northbound Ramps was analyzed under existing (2021), no-build (2026), build (2026), and future (2035) 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 Buffalo Road and I-540 Northbound Ramps

ANALYSIS SCENARIO	A P P R O A C H	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
Existing (2021) Conditions	EB WB NB --*	1 LT, 1 TH 1 TH, 1 RT 1 LT-TH, 1 RT --	B C E --	C (28)	B B F --	E (56)
No-Build (2026) Conditions	EB WB NB --*	1 LT, 1 TH 1 TH, 1 RT 1 LT-TH, 1 RT --	C F E --	F (154)	F B F --	F (152)
Build (2026) Conditions	EB WB NB --*	1 LT, 1 TH 1 TH, 1 RT 1 LT-TH, 1 RT --	C F E --	F (170)	F B F --	F (169)
Build (2026) Conditions – Modified Signal Coordination**	EB WB NB --*	1 LT, 1 TH 1 TH, 1 RT 1 LT-TH, 1 RT --	E F F --	F (94)	F B F --	F (155)
Future (2035) Conditions	EB WB NB --*	1 LT, 1 TH 1 TH, 1 RT 1 LT-TH, 1 RT --	E F E --	F (277)	F B F --	F (268)

*The northern leg of this intersection exists as a northbound on-ramp.

**Due to heavy queuing along the Buffalo Road corridor, coordinated signal timing adjustments and intersection offset adjustments were considered at the Buffalo Road and I-540 ramps intersections. Improvements to the intersection are shown in bold.

Capacity analysis of existing (2021) traffic conditions indicates the intersection of Buffalo Road and I-540 Northbound Ramps currently operates at an overall LOS C during the weekday AM peak hour and LOS E during the weekday PM peak hour. Under no-build

(2026) and build (2026) conditions, the intersection is expected to operate at an overall LOS F during the weekday AM and PM peak hours. Under future (2035) conditions, the intersection is expected to continue to operate at an overall LOS F during the weekday AM and PM peak hours. The heavy overall delays under future (2035) conditions are anticipated to be due to the background growth expected in the next 14 years and is not anticipated to be due to the traffic from the proposed development.

It should be noted that adjacent development trips are anticipated to amount to approximately 22% of the overall no-build (2026) traffic volumes at this intersection (in addition to the 3% annually compounded growth rate) and the proposed development is anticipated to amount to less than 4% of the overall no-build (2026) traffic volumes at this intersection. Based on SimTraffic queuing results, heavy queuing is anticipated on I-540 Northbound Ramps during the weekday PM peak hour.

Due to the heavy queuing results, improvements were considered at the study intersection. Exclusive turn lanes exist on all approaches. Additional geometric improvements would be expected to require bridge widening on the western leg of the intersection; therefore, signal modifications were considered. With signal coordination adjustments along the Buffalo Road corridor, the study intersection is anticipated to improve by 76 overall seconds of delay during the weekday AM peak hour and 14 overall seconds of delay during the weekday PM peak hour. With signal timing adjustments, heavy queuing was still shown on the northbound approach of I-540 Northbound Ramps under SimTraffic simulations during the weekday PM peak hour. It is anticipated that the intersection currently operates with vehicles turning right on red. There is not current signage to indicate that this movement is not allowable. Right-turn on-red was analyzed under build (2026) conditions to better represent field conditions. With right-turn on-red, queuing on the I-540 Northbound Ramps is anticipated to be contained within the existing storages, without spilling back onto I-540.

It is recommended that signal coordination adjustments be provided along the Buffalo Road corridor within the study area.

Moving forward.

8.3. Buffalo Road and Old Milburnie Road

The existing signalized intersection of Bufflaoe Road and Old Milburnie Road was analyzed under existing (2021), no-build (2026), build (2026), and future (2035) 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 Buffalo Road and Old Milburnie 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)
Existing (2021) Conditions	EB	1 LT, 1 TH, 1 RT	B	C (22)	A	B (15)
	WB	1 LT, 1 TH-RT	C		B	
	NB	1 LT-TH-RT	B		C	
	SB	1 LT-TH-RT	C		C	
No-Build (2026) Conditions	EB	1 LT, 1 TH, 1 RT	B	E (67)	B	C (23)
	WB	1 LT, 1 TH-RT	C		B	
	NB	1 LT-TH-RT	D		D	
	SB	1 LT-TH-RT	F		D	
Build (2026) Conditions	EB	1 LT, 1 TH, 1 RT	B	F (116)	B	C (27)
	WB	1 LT, 1 TH-RT	C		B	
	NB	1 LT-TH-RT	F		E	
	SB	1 LT-TH-RT	F		D	
Build (2026) Conditions – Improved	EB	1 LT, 1 TH, 1 RT	B	C (31)	B	C (22)
	WB	1 LT, 1 TH-RT	C		C	
	NB	1 LT-TH-RT	E		D	
	SB	1 LT-TH, 1 RT	C		B	
Future (2035) Conditions	EB	1 LT, 1 TH, 1 RT	B	F (246)	B	D (55)
	WB	1 LT, 1 TH-RT	C		B	
	NB	1 LT-TH-RT	F		F	
	SB	1 LT-TH-RT	F		E	

Improvements to the intersection are shown in bold.

Capacity analysis of existing (2021) traffic conditions indicates the intersection of Buffalo Road and Old Milburnie Road currently operates at an overall LOS C during the weekday AM peak hour and LOS B during the weekday PM peak hour. Under no-build (2026) traffic

Moving forward.

conditions, the intersection is expected to operate at an overall LOS E during the weekday AM peak hour and LOS C during the weekday PM peak hour. Under build (2026) traffic conditions, the intersection is expected to operate at an overall LOS F during the weekday AM peak hour and LOS C during the weekday PM peak hour. Under future (2035) conditions, the intersection is expected to operate at an overall LOS F during the weekday AM peak hour and LOS D during the weekday PM peak hour. The poor level-of-service under future (2035) conditions is anticipated due to the background growth expected in the next 14 years and is not anticipated to be due to the traffic from the proposed development.

Under build (2026) with improvement scenarios, an exclusive southbound right-turn lane with permitted/overlap phasing was considered. With this improvement, the intersection is expected to operate at an overall LOS C during the weekday AM and PM peak hours.

Moving forward.

8.4. Old Milburnie Road and Old Lewis Farm Road

The existing unsignalized intersection of Old Milburnie Road and Old Lewis Farm Road was analyzed under existing (2021), no-build (2026), build (2026), and future (2035) 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 capacity analysis reports.

Table 8: Analysis Summary of Old Milburnie Road and Old Lewis Farm Road

ANALYSIS SCENARIO	A P P R O A C H	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
Existing (2021) Conditions	WB NB SB	1 LT-RT 1 TH-RT 1 LT, 1 TH	B ² -- A ¹	N/A	A ² -- A ¹	N/A
No-Build (2026) Conditions	WB NB SB	1 LT-RT 1 TH-RT 1 LT, 1 TH	B ² -- A ¹	N/A	B ² -- A ¹	N/A
Build (2026) Conditions	WB NB SB	1 LT-RT 1 TH-RT 1 LT, 1 TH	B ² -- A ¹	N/A	B ² -- A ¹	N/A
Future (2035) Conditions	WB NB SB	1 LT-RT 1 TH-RT 1 LT, 1 TH	B ² -- A ¹	N/A	B ² -- A ¹	N/A

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

Under existing (2021), no-build (2026), build (2026), and future (2035) conditions, the major-street left-turn movement at the intersection of Old Milburnie Road and Old Lewis Farm Road is expected to operate at LOS A during the weekday AM and PM peak hours. The minor-street approach is expected to operate at LOS B or better during the weekday AM and PM peak hours.

Moving forward.

Based on SimTraffic simulations, the existing southbound left-turn lane is anticipated to accommodate future southbound left-turning volumes during the weekday AM and PM peak hours.

Moving forward.

8.5. Forestville Road and Old Milburnie Road

The existing signalized intersection of Forestville Road and Old Milburnie Road was analyzed under existing (2021), no-build (2026), build (2026), and future (2035) traffic conditions with existing lane configurations and traffic control. Refer to Table 9 for a summary of the analysis results. Refer to Appendix I for the Synchro capacity analysis reports.

Table 9: Analysis Summary of Forestville Road and Old Milburnie Road

ANALYSIS SCENARIO	A P P R O A C H	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
Existing (2021) Conditions	EB	1 LT-TH-RT	A	B (15)	B	B (12)
	WB	1 LT-TH-RT	B		A	
	NB	1 LT-TH-RT	B		B	
	SB	1 LT-TH-RT	B		B	
No-Build (2026) Conditions	EB	1 LT-TH-RT	B	C (23)	B	B (14)
	WB	1 LT-TH-RT	C		B	
	NB	1 LT-TH-RT	C		B	
	SB	1 LT-TH-RT	B		B	
Build (2026) Conditions	EB	1 LT-TH-RT	B	C (24)	B	B (15)
	WB	1 LT-TH-RT	C		B	
	NB	1 LT-TH-RT	C		B	
	SB	1 LT-TH-RT	C		B	
Future (2035) Conditions	EB	1 LT-TH-RT	B	D (35)	C	C (21)
	WB	1 LT-TH-RT	D		B	
	NB	1 LT-TH-RT	D		C	
	SB	1 LT-TH-RT	C		C	

Capacity analysis of existing (2021), no-build (2026), and build (2026) traffic conditions indicates the intersection of Forestville Road and Old Milburnie Road is expected to operate at LOS C or better during the weekday AM and PM peak hours. Under future (2035) conditions, the intersection is expected to operate at an overall LOS D during the weekday AM peak hour and overall LOS C during the weekday PM peak hour.

Moving forward.

8.6. Old Milburnie Road and Site Drive 1

The proposed intersection of Old Milburnie Road and Site Drive 1 was analyzed under build (2026) and future (2035) 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 Old Milburnie Road and Site Drive 1

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)
Build (2026) Conditions	WB NB SB	1 LT-RT 1 TH-RT 1 LT, 1 TH	B ² -- A ¹	N/A	B ² -- A ¹	N/A
Future (2035) Conditions	WB NB SB	1 LT-RT 1 TH-RT 1 LT, 1 TH	B ² -- A ¹	N/A	B ² -- A ¹	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 build (2026) and future (2035) traffic conditions indicates the minor-street approach at the proposed intersection of Old Milburnie Road and Site Drive 1 is expected to operate at LOS B during the weekday AM and PM peak hours. The major-street left-turn movement is expected to operate at LOS A.

Left and right-turn lanes were considered based on the NCDOT *Policy on Street and Driveway Access to North Carolina Highways* and an exclusive southbound left-turn lane was recommended. This is consistent with other developments in the area along Old Milburnie Road.

Moving forward.

8.7. Old Lewis Farm Road and Site Drive 2

The proposed unsignalized intersection of Old Lewis Farm Road and Site Drive 2 was analyzed under build (2026) and future (2035) 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 of Old Lewis Farm Road and Site Drive 2

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)
Build (2026) Conditions	EB WB SB	1 LT-TH 1 TH-RT 1 LT-RT	A ¹ -- A ²	N/A	A ¹ -- A ²	N/A
Future (2035) Conditions	EB WB SB	1 LT-TH 1 TH-RT 1 LT-RT	A ¹ -- A ²	N/A	A ¹ -- A 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 build (2026) and future (2035) traffic conditions indicates the minor-street approach and major-street left-turn movement at the proposed intersection of Old Lewis Farm Road and Site Drive 2 are expected to operate at LOS A during the weekday AM and PM peak hours.

Left and right-turn lanes were considered based on the NCDOT *Policy on Street and Driveway Access to North Carolina Highway*, but are not recommended based on the low weekday AM and PM peak hour turning movement volumes and relatively low amount of development along Old Lewis Farm Road.

Moving forward.

8.8. Old Crews Road and Site Drive 3

The proposed unsignalized intersection of Old Crews Road and Site Drive 3 was analyzed under build (2026) and future (2035) traffic conditions with lane configurations and traffic control shown in Table 12. Through movement volumes along Old Crews Road were estimated based on the Saluda Tract adjacent development. Refer to Table 12 for a summary of the analysis results. Refer to Appendix L for the Synchro capacity analysis reports. Additionally included in Appendix L is the Old Crews Road traffic volumes based on Saluda Tract.

Table 12: Analysis Summary of Old Crews Road and Site Drive 3

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)
Build (2026) Conditions	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	A ² A ¹ --	N/A	A ² A ¹ --	N/A
Future (2035) Conditions	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	A ² A ¹ --	N/A	B ² A ¹ --	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 build (2026) traffic conditions indicates the minor-street approach and major-street left-turn movement at the proposed intersection of Old Lewis Farm Road and Site Drive 3 are expected to operate at LOS A during the weekday AM and PM peak hours. Under future (2035) traffic conditions, the major-street left-turn movement is expected to continue to operate at LOS A during the weekday AM and PM peak hours and the minor-street approach is expected to operate at LOS B or better during the weekday AM and PM peak hours.

Moving forward.

Left and right-turn lanes were considered based on the NCDOT *Policy on Street and Driveway Access to North Carolina Highway*, but are not recommended based on the low weekday AM and PM peak hour turning movement volumes.

9. CONCLUSIONS

This Traffic Impact Analysis was conducted to determine the potential traffic impacts of the proposed Old Milburnie Residential development, located east of Old Milburnie Road and south of Buffaloe Road in Knightdale, North Carolina. The proposed development is expected to be a residential development and be built out in 2025. Site access will be provided via the following access points:

- One (1) full movement intersection along Old Milburnie Road
- One (1) full movement intersection along Old Lewis Farm Road
- One (1) full movement access along Old Crews Road

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

- Existing (2021) Traffic Conditions
- No-Build (2026) Traffic Conditions
- Build (2026) Traffic Conditions
- Future (2035) Traffic Conditions

Trip Generation

It is estimated that the proposed development will generate approximately 2,430 total site trips on the roadway network during a typical 24-hour weekday period. Of the daily traffic volume, it is anticipated that 175 trips (42 entering and 133 exiting) will occur during the weekday AM peak hour and 231 trips (146 entering and 85 exiting) will occur 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 exception of the intersections listed below. A summary of the study area intersections that are expected to need improvements are as follows:

Buffaloe Road and I-540 Southbound Ramps

During the weekday PM peak hour, the intersection is expected to operate at an overall LOS F under no-build (2023) and build (2023) conditions. It should be noted that adjacent development trips are anticipated to amount to approximately 21% of the overall no-build (2026) traffic volumes at this intersection (in addition to the 3% annually compounded growth rate) and the proposed development is anticipated to amount to approximately 3% of the overall no-build (2026) traffic volumes at this intersection. Based on SimTraffic queuing results, heavy queuing is anticipated on the southbound approach of the I-540 Southbound Ramps under no-build (2026) and build (2026) conditions.

Because the intersection is anticipated to degrade by an overall level-of-service existing (2021) and no-build (2023) conditions during the weekday PM peak hour and due to the heavy queuing results, improvements were considered at the study intersection. Exclusive turn lanes exist on all approaches. Additional geometric improvements would be expected to require bridge widening on the eastern leg of the intersection; therefore, signal modifications were considered. With signal coordination adjustments along the Buffaloe Road corridor, queuing on the I-540 Southbound Ramps is anticipated to be contained within the existing storages, without spilling back onto I-540. It should be noted that with signal timing adjustments, the intersection is expected to operate with similar overall delay as no-build (2026) conditions during the weekday AM and PM peak hours. It is recommended that signal coordination adjustments be provided along the Buffaloe Road corridor within the study area.

Buffaloe Road and I-540 Northbound Ramps

Under no-build (2026) and build (2026) conditions, the intersection is expected to operate at an overall LOD F. It should be noted that adjacent development trips are anticipated to amount to approximately 22% of the overall future traffic volumes at this intersection (in addition to the 3% annually compounded growth rate) and the proposed development is anticipated to amount to less than 4% of the overall future traffic volumes at this intersection. Based on SimTraffic queuing results, heavy queuing is anticipated on I-540 Northbound Ramps during the weekday PM peak hour.

Due to the heavy queuing results, improvements were considered at the study intersection. Exclusive turn lanes exist on all approaches. Additional geometric improvements would be expected to require bridge widening on the western leg of the intersection; therefore, signal modifications were considered. With signal coordination adjustments along the Buffaloe Road corridor, the study intersection is anticipated to improve significantly. With signal timing adjustments, heavy queuing was still shown on the northbound approach of I-540 Northbound Ramps under SimTraffic simulations during the weekday PM peak hour. It is anticipated that the intersection currently operates with vehicles turning right on red. There is not current signage to indicate that this movement is not allowable. Right-turn on-red was analyzed under build (2026) conditions to better represent field conditions. With right-turn on-red, queuing on the I-540 Northbound Ramps is anticipated to be contained within the existing storages, without spilling back onto I-540. It is recommended that signal coordination adjustments be provided along the Buffaloe Road corridor within the study area.

Buffaloe Road and Old Milburnie Road

Under build (2026) traffic conditions, the intersection is expected to operate at an overall LOS F during the weekday AM peak hour and LOS C during the weekday PM peak hour. An exclusive southbound right-turn lane with permitted/overlap phasing was considered. With this improvement, the intersection is expected to operate at an overall LOS C during the weekday AM and PM peak hours.

10. 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 12 for an illustration of the recommended lane configuration for the proposed development.

Recommended Improvements by Developer

Buffaloe Road and I-540 Southbound Ramps

- Provide signal timing adjustments along the Buffaloe Road corridor.

Buffaloe Road and I-540 Northbound Ramps

- Provide signal timing adjustments along the Buffaloe Road corridor.

Buffaloe Road and Old Milburnie Road

- Provide an exclusive southbound right-turn lane with a minimum of 150 feet of storage and appropriate deceleration and taper length.
- Provide signal modifications to accommodate the exclusive southbound right-turn lane.

Old Milburnie Road and Site Drive 1

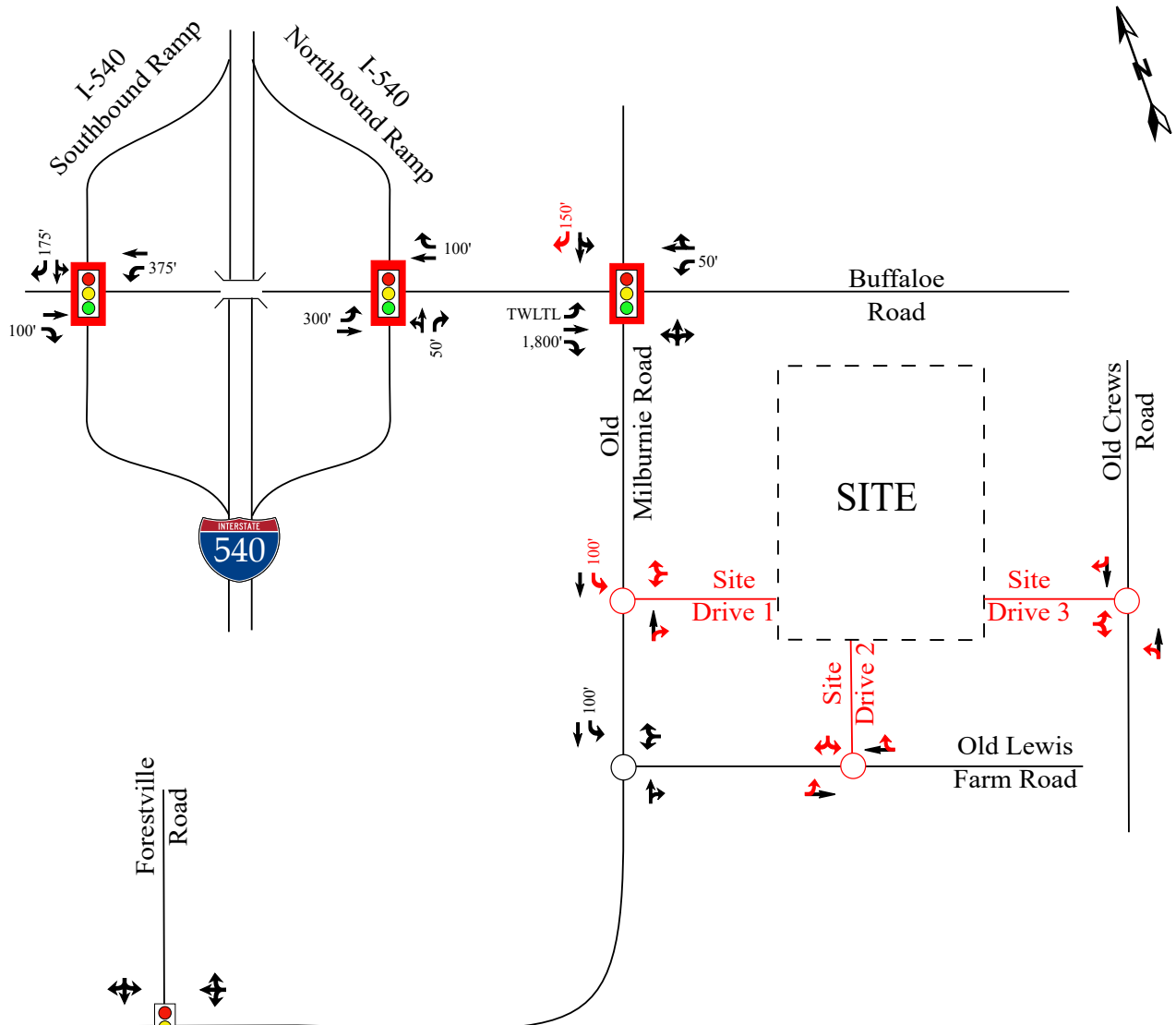
- Construct the westbound approach with one ingress lane and one egress lane.
- Provide an exclusive southbound left-turn lane with a minimum of 100 feet of storage and appropriate deceleration and taper length.
- Provide stop control for the westbound approach.

Old Lewis Farm Road and Site Drive 2

- Construct the southbound approach with one ingress lane and one egress lane.
- Provide stop control for the southbound approach.

Old Crews Road and Site Drive 3

- Construct the eastbound approach with one ingress lane and one egress lane.
- Provide stop control for the eastbound approach.



LEGEND

- Unsignalized Intersection
- 🚦 Signalized Intersection
- 🚦 (Red Box) Signal Modifications by Developer
- ➡ Existing Lane
- ➡ (Red) Improvement by Developer
- X' Storage (In Feet)



Old Milburnie Road
Residential PUD
Knightdale, NC

Recommended
Lane Configurations

Scale: Not to Scale	Figure 12
---------------------	-----------