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Poole and Smithfield
REVISED **Traffic Impact Analysis**

Knightdale, North Carolina

rameykemp.com

REVISED TRAFFIC IMPACT ANALYSIS

FOR

POOLE AND SMITHFIELD

LOCATED

IN

KNIGHTDALE, NC

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5/23/23

MAY 2023

RKA Project No. 22071

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REVISED TRAFFIC IMPACT ANALYSIS
POOLE AND SMITHFIELD
KNIGHTDALE, NORTH CAROLINA

EXECUTIVE SUMMARY

1. Development Overview

A revised Traffic Impact Analysis (TIA) was conducted for the proposed Poole and Smithfield 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 north of Poole Road and along both sides of Smithfield Road in Knightdale, North Carolina. Access to the site is proposed via two (2) full-movement driveways along Poole Road and via two (2) full movement driveways, three (3) right-in/right-out driveways, and one (1) full movement intersection along Smithfield Road. The previous TIA was updated with revised land uses and densities to reflect the current anticipated build out of the development. The previous TIA report included the following site uses:

- Phase 1: 187 townhomes and 47 single family homes
- Phase 2: 308 single family homes and 85 townhomes in addition to Phase 1
- Full Build Out: 306 apartments, 355 single-family homes, 373 townhomes, and 250,000 s.f. of retail land use

The revised site plan includes similar uses and densities as the previous TIA. The proposed development is anticipated to be completed in 2031. Prior to full build-out, the proposed development is expected to have two interim phases. It should be noted that Phase 1a and Phase 1b are anticipated to be completed in 2025 and Phase 2 is anticipated to be completed in 2028. The following land uses are proposed for each phase of the development:

Phase 1a:

- 47 single-family homes
- 187 townhomes

Phase 1b:

- 150,000 square feet (s.f.) mini warehouse (in addition to Phase 1a)

- 10,000 s.f. fire and rescue station (in addition to Phase 1a)
- 22,000 s.f. general office (in addition to Phase 1a)
- 28,900 s.f. strip retail plaza (in addition to Phase 1a)

Phase 2:

- 293 single-family homes (in addition to Phase 1)
- 85 townhomes (in addition to Phase 1)

Full Build

- A maximum of 340 single-family homes
- A maximum of 393 townhomes
- A maximum of 427 apartments
- A maximum of 150,000 s.f. mini warehouse
- A maximum of 10,000 s.f. fire and rescue station
- A maximum of 40,500 s.f. general office
- A maximum of 90,100 s.f. strip retail plaza

It should be noted that the Town of Knightdale (Town) requires a no-build/build analysis year one (1) year beyond the anticipated build-out year and a future analysis year ten (10) years beyond the anticipated build-out year for the proposed development; therefore, the analysis years considered for this study under full-build conditions are 2032 and 2041. An additional analysis scenario will be included in the study to analyze improvements associated with STIP I-6007. The study analyzes traffic conditions during the weekday AM and PM peak hours for the following scenarios:

- 2022 Existing Traffic Conditions
- 2025+1 No-Build Traffic Conditions
- 2028+1 No-Build Traffic Conditions
- 2031+1 No-Build Traffic Conditions
- 2025+1 Build Traffic Conditions – Phase 1a
- 2025+1 Build Traffic Conditions – Phase 1b
- 2028+1 Build Traffic Conditions – Phase 2
- 2031+1 Build Traffic Conditions – Full Build

- 2031+10 Future Traffic Conditions – Per Town UDO
- 2045 Future Traffic Conditions – (with STIP I-6007 Improvements)

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:

- Poole Road and Smithfield Road
- Smithfield Road and Sandy Run
- Smithfield Road and I-87 (US 64 / US 264) Eastbound Ramps
- Smithfield Road and I-87 (US 64 / US 264) Westbound Ramps
- Smithfield Road and Major Slade Road
- Poole Road and Major Slade Road
- Poole Road and Bethlehem Road

Existing peak hour traffic volumes were determined based on traffic counts conducted at the study intersections listed below, in January, March, and September of 2022 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 for in-person learning:

- Poole Road and Smithfield Road
- Smithfield Road and Sandy Run
- Smithfield Road and I-87 (US 64 / US 264) Eastbound Ramps
- Smithfield Road and I-87 (US 64 / US 264) Westbound Ramps
- Smithfield Road and Major Slade Road
- Poole Road and Major Slade Road
- Poole Road and Bethlehem Road

Weekday AM and PM traffic volumes were balanced between study intersections, where appropriate.

3. Site Trip Generation

Phase 1a of the proposed development is expected to consist of 187 townhomes and 47 single family homes. Phase 1b of the proposed development is expected to consist of 150,000 s.f. of mini-

warehouse land use, 10,000 s.f. of fire and rescue land use, 22,000 s.f. of general office land use, and 28,900 s.f. of strip retail plaza land use. Phase 2 is expected to consist of 293 single family homes and 85 townhomes, in addition to Phase 1b. The proposed development at full build out is expected to add 427 apartments, 121 townhomes, 61,200 s.f. of retail land use, and 18,500 s.f. of general office land use in addition to Phase 1a, Phase 1b, and Phase 2 for a maximum of 427 apartments, 340 single-family homes, 393 townhomes, 150,000 s.f. of mini-warehouse land use, 10,000 s.f. of fire and rescue station land use, 40,500 s.f. of general office land use, and 90,100 s.f. of shopping plaza land use. 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*, 11.1 Edition. Refer to Table E-1-E-4 for a detailed breakdown of the buildout site trip generation for Phase 1a, Phase 1b, Phase 2, and Full Build, respectively.

Table E-1: Trip Generation Summary – Phase 1a

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)	47 units	504	9	28	31	18
Single-Family Attached Housing (215)	187 units	1,374	23	69	64	44
Phase 1a Total		**1,878**	**37**	**92**	**92**	**65**

Table E-2: Trip Generation Summary – Phase 1a +1b

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	AM Peak Hour Trips (vph)		PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Mini-Warehouse (151)	150 k.s.f	218	14	13	14	13
Single-Family Homes (210)	47 units	504	9	28	31	18
Single-Family Attached Housing (215)	187 units	1,374	23	69	64	44
Fire and Rescue Station (575)	10 k.s.f.	50**	1*	4*	1	4
General Office (710)	22 k.s.f.	311	40	6	8	39
Strip Retail Plaza (822)	28.9 k.s.f.	1,449	35	23	83	82
Phase 1b Total Trips		**3,906**	**122**	**143**	**201**	**200**
Internal Capture (5% AM, 4% PM)			*-6*	*-7*	*-8*	*-8*
Total External Trips			**116**	**136**	**193**	**192**
Pass-by Trips (Strip Retail Plaza: 34% PM)			--	--	*-27*	*-27*
Total Primary Trips			**116**	**136**	**166**	**165**

*Due to limited data in the ITE Manual, weekday AM peak hour trips were assumed to be equal to the number of weekday PM peak hour trips.
** Due to limited data in the ITE Manual, weekday daily trips were determined assuming that the weekday PM peak hour accounts for 10% of the daily volume.

Table E-3: Trip Generation Summary – Phase 1 + 2

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	AM Peak Hour Trips (vph)		PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Mini-Warehouse (151)	150 k.s.f	218	14	13	14	13
Single-Family Homes (210)	340 units	3,111	57	170	198	116
Single-Family Attached Housing (215)	272 units	2,022	34	102	94	65
Fire and Rescue Station (575)	10 k.s.f.	50**	1*	4*	1	4
General Office (710)	22 k.s.f.	311	40	6	8	39
Strip Retail Plaza (822)	28.9 k.s.f.	1,449	35	23	83	82
Phase 2 Total Trips		**7,161**	**181**	**318**	**398**	**319**
Internal Capture (4% AM, 4% PM)			*-7*	*-13*	*-16*	*-13*
Total External Trips			**174**	**308**	**382**	**306**
Pass-by Trips (Strip Retail Plaza: 34% PM)			--	--	*-24*	*-24*
Total Primary Trips			**174**	**308**	**355**	**279**

*Due to limited data in the ITE Manual, weekday AM peak hour trips were assumed to be equal to the number of weekday PM peak hour trips.
** Due to limited data in the ITE Manual, weekday daily trips were determined assuming that the weekday PM peak hour accounts for 10% of the daily volume.

Table E-4: Trip Generation Summary – Full Build

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	AM Peak Hour Trips (vph)		PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Mini-Warehouse (151)	150 k.s.f	218	14	13	14	13
Single-Family Homes (210)	340 units	3,111	57	170	198	116
Single-Family Attached Housing (215)	393 units	2,944	50	149	137	95
Multifamily Low-Rise (220)	427 units	2,812	37	118	129	75
Fire and Rescue Station (575)	10 k.s.f.	50**	1*	4*	1	4
General Office (710)	40.5 k.s.f.	529	68	9	13	65
Shopping Plaza (821)	90.1 k.s.f.	6,084	97	59	229	239
Full Build Total Trips		**15,748**	**324**	**522**	**721**	**607**
Internal Capture (3% AM, 3% PM)			*-10*	*-16*	*-22*	*-18*
Total External Trips			**314**	**506**	**699**	**589**
Pass-by Trips (Strip Retail Plaza: 34% PM)			--	--	*-77*	*-77*
Total Primary Trips			**314**	**506**	**622**	**512**

*Due to limited data in the ITE Manual, weekday AM peak hour trips were assumed to be equal to the number of weekday PM peak hour trips.
** Due to limited data in the ITE Manual, weekday daily trips were determined assuming that the weekday PM peak hour accounts for 10% of the daily volume.

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 2026/2029/2032 projected weekday AM and PM peak hour traffic volumes. The following adjacent developments were identified to be considered under future conditions:

- Baker Roofing
- Poole Road Assemblage

5. Capacity Analysis Summary

The analysis considered weekday AM and PM peak hour traffic for 2022 existing, 2026/2029/2032 no-build, 2026/2029/2032 build, and 2041 future traffic conditions. Refer to Section 8 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.

Background Improvements by Adjacent Developments

The following improvements have been committed to by the Baker Roofing HQ development.

Smithfield Road and I-87 (US 64 / 264) Westbound Ramps

- Extend the exclusive southbound right-turn lane to have full storage.
- Restripe the northbound left-through lane to provide an additional left-turn lane.
- Construct a northbound through lane with a minimum of 250 feet of storage and appropriate deceleration and taper length.

The following improvements have been committed to by the Poole Road Assemblage development.

Smithfield Road and Poole Road

- Construct a channelized westbound right-turn lane that operates under yield control with a minimum of 100 feet of storage and appropriate deceleration and taper length.
- Coordinate with NCDOT to develop a signal modification plan for the intersection.

Improvements by NCDOT STIP I-6007

STIP I-6007 is expected to convert the I-87 (US 64 / 264) interchange at Smithfield Road to a diverging diamond interchange.

Improvements by NCDOT STIP HL-0031

STIP HL-0031 is expected to improve the intersection of Poole Road and Smithfield Road by adding exclusive turn lanes on every approach.

Recommended Improvements by Developer

Poole Road and Smithfield Road

- Provide an exclusive southbound right-turn lane with a minimum of 325 feet of storage and appropriate deceleration and taper length. *[Phase 2]*
- Extend the southbound left-turn lane storage to a minimum of 325 feet with appropriate deceleration and taper length. *[Full Build]*
- Extend the northbound left-turn lane storage to a minimum of 425 feet with appropriate deceleration and taper length. *[Full Build]*
- Extend the eastbound left-turn lane storage to a minimum of 425 feet with appropriate deceleration and taper length. *[Full Build]*
- Extend the westbound left-turn lane storage to a minimum of 375 feet with appropriate deceleration and taper length. *[Full Build]*
- Extend the westbound right-turn lane storage to a minimum of 225 feet with appropriate deceleration and taper length. *[Full Build]*

Smithfield Road and Major Slade Road

- Provide an exclusive southbound right-turn lane with a minimum of 100 feet of storage and appropriate deceleration and taper length. *[Phase 2]*

Poole Road and Major Slade Road

- Provide an exclusive northbound right-turn lane with a minimum of 100 feet of storage and appropriate deceleration and taper length. *[Full Build]*

Smithfield Road and Site Access A

The proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to construct a portion of the planned four-lane divided section.

- Construct eastbound approach with one (1) ingress lane and two (2) egress lanes striped as one left-turn lane and one right-turn lane. *[Phase 1a]*
- Provide an exclusive northbound left-turn lane with a minimum of 300 feet of storage and appropriate taper. *[Phase 1b]*
- Provide an exclusive southbound right-turn lane with a minimum of 100 feet of storage and appropriate taper. *[Phase 1b]*
- Monitor intersection for signalization and install traffic signal when warranted. *[Full Build]*

Smithfield Road and Site Access B / Site Access F

The proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to construct a portion of the planned four-lane divided section.

- Construct eastbound approach with one (1) ingress lane and two (2) egress lanes striped as one shared left-through turn lane and one right-turn. *[Phase 2]*
- Provide an exclusive northbound left-turn lane with a minimum of 125 feet of storage and appropriate taper. *[Phase 2]*
- Provide an exclusive southbound right-turn lane with a minimum of 75 feet of storage and appropriate taper. *[Phase 2]*
- Construct westbound approach with one (1) ingress lane and two (1) egress lanes striped as one (1) shared left-thru lane and one (1) right-turn lane. *[Full Build]*
- Provide an exclusive southbound left-turn lane with a minimum of 200 feet of storage and appropriate taper. *[Full Build]*
- Monitor intersection for signalization and install traffic signal when warranted. *[Full Build]*

Poole Road and Site Access C

- Construct southbound approach with one (1) ingress lane and two (2) egress lanes striped as a separate left turn lane and right turn lane. *[Phase 2]*
- Provide an exclusive eastbound left-turn lane with a minimum of 50 feet of storage and appropriate taper. *[Phase 2]*
- Provide stop-control for the southbound approach *[Phase 2]*

Smithfield Road and Site Access D

The proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to construct a portion of the planned four-lane divided section.

- Construct eastbound approach with one (1) ingress lane and two (2) egress lanes striped as a separate left turn lane and right turn lane. *[Phase 1b]*
- Although a northbound left turn lane on Smithfield Road is not warranted based on the turn lane criteria, it is likely that a left turn lane will be required based on the high volume of through traffic.
- Provide stop-control for the eastbound approach. *[Phase 1b]*

Smithfield Road and Site Access E

The proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to construct a portion of the planned four-lane divided section.

- Construct eastbound approach with one (1) ingress lane and one (1) egress lane striped a right-in/right-out. *[Phase 1b]*
- Provide stop-control for the eastbound approach. *[Phase 1b]*

Smithfield Road and Site Access G

The proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to construct a portion of the planned four-lane divided section.

- Construct westbound approach with one (1) ingress lane and one (1) egress lane striped a right-in/right-out. *[Phase 1b]*
- Provide an exclusive northbound right-turn lane with a minimum of 50 feet of storage and appropriate taper. *[Phase 1b]*
- Provide stop-control for the westbound approach. *[Phase 1b]*

Poole Road and Site Access H

- Construct southbound approach with one (1) ingress lane and two (2) egress lanes striped as one left-turn lane and one right-turn lane. *[Phase 1b]*

- Provide an exclusive eastbound left-turn lane with a minimum of 100 feet of storage and appropriate taper. *[Phase 1b]*
- Provide an exclusive westbound right-turn lane with a minimum of 75 feet of storage and appropriate taper. *[Phase 1b]*
- Provide stop-control for the southbound approach *[Phase 1b]*

Smithfield Road and Site Access I

The proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to construct a portion of the planned four-lane divided section.

- Construct westbound approach with one (1) ingress lane and one (1) egress lane striped a right-in/right-out. *[Full Build]*
- Provide an exclusive northbound right-turn lane with a minimum of 50 feet of storage and appropriate taper. *[Full Build]*
- Provide stop-control for the westbound approach. *[Full Build]*

Improvements Needed to Meet Town's UDO Requirements

Smithfield Road and Sandy Run

- Provide an exclusive eastbound left-turn lane with a minimum of 275 feet of storage and appropriate deceleration and taper length. *[Phase 2]*

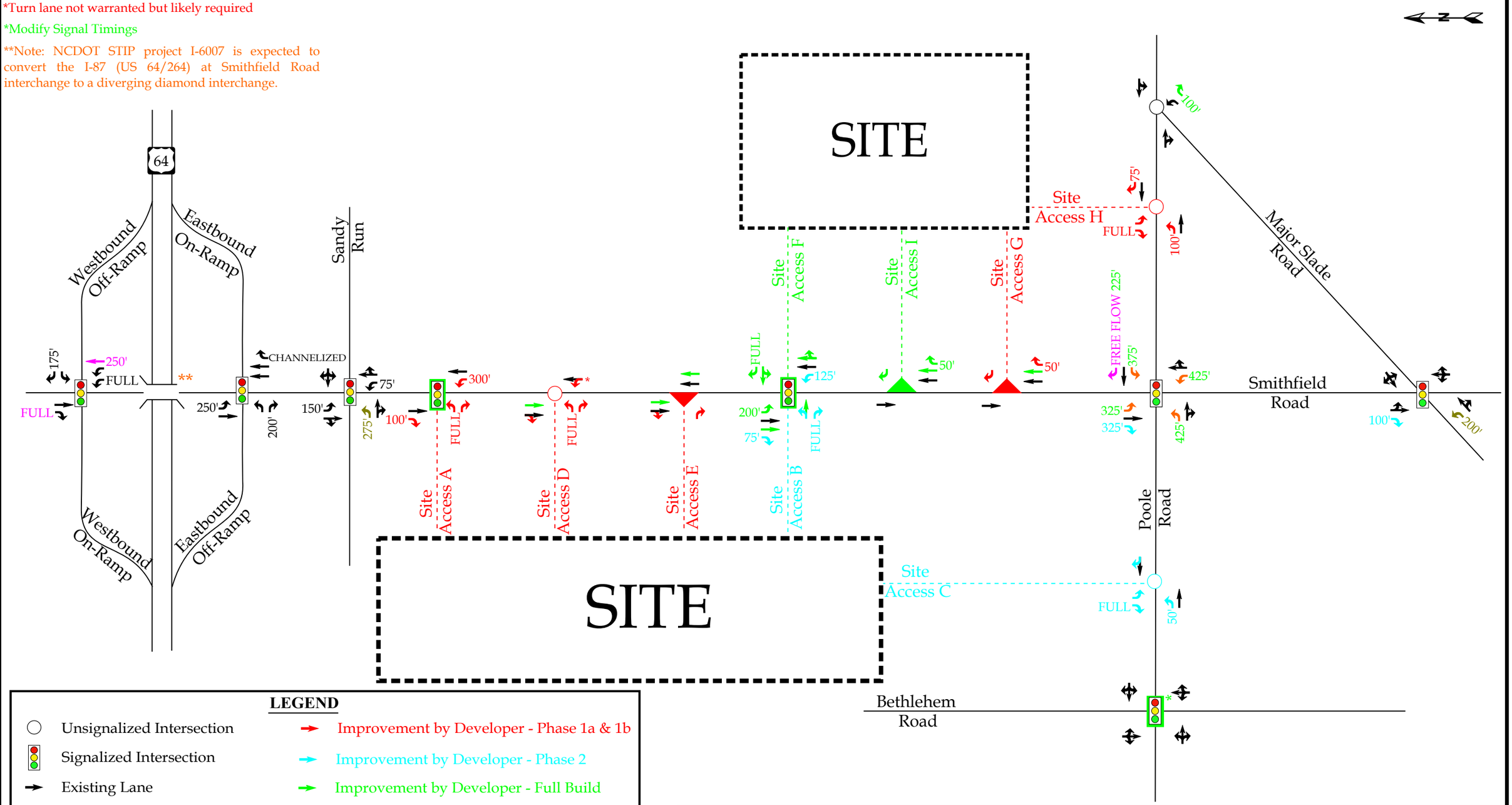
Smithfield Road and Major Slade Road

- Provide an exclusive eastbound left-turn lane with a minimum of 200 feet of storage and appropriate deceleration and taper length. *[Full Build]*

*Turn lane not warranted but likely required

*Modify Signal Timings

**Note: NCDOT STIP project I-6007 is expected to convert the I-87 (US 64/264) at Smithfield Road interchange to a diverging diamond interchange.



LEGEND

- Unsignalized Intersection
- Signalized Intersection
- Existing Lane
- Right-In/Right-Out Intersection
- Improvement by NCDOT STIP
- X' Storage (In Feet)
- Improvement by Developer - Phase 1a & 1b
- Improvement by Developer - Phase 2
- Improvement by Developer - Full Build
- Background Improvement by Adjacent Development
- Improvement to Meet Town's UDO Req
- Monitor for Signalization

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Recommended Lane Configurations

Scale: Not to Scale | Figure E-1

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TECHNICAL APPENDIX

REVISED TRAFFIC IMPACT ANALYSIS
POOLE AND SMITHFIELD
KNIGHTDALE, NORTH CAROLINA

1. INTRODUCTION

The contents of this report present the findings of the revised Traffic Impact Analysis (TIA) conducted for the proposed Poole and Smithfield development to be located north of Poole Road and along both sides of 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 previous TIA was updated with revised land uses and densities to reflect the current anticipated build out of the development. The previous TIA report included the following site uses:

- Phase 1: 187 townhomes and 47 single family homes
- Phase 2: 308 single family homes and 85 townhomes in addition to Phase 1
- Full Build Out: 306 apartments, 355 single-family homes, 373 townhomes, and 250,000 s.f. of retail land use

The revised site plan includes similar uses and densities as the previous TIA. The proposed development is anticipated to be completed in 2031. Prior to full build-out, the proposed development is expected to have two interim phases. It should be noted that Phase 1a and Phase 1b is anticipated to be completed in 2025 and Phase 2 is anticipated to be completed in 2028. The following land uses are proposed for each phase of the development:

Phase 1a:

- 47 single-family homes
- 187 townhomes

Phase 1b:

- 150,000 square feet (s.f.) mini warehouse (in addition to Phase 1a)
- 10,000 s.f. fire and rescue station (in addition to Phase 1a)
- 22,000 s.f. general office (in addition to Phase 1a)

- 28,900 s.f. strip retail plaza (in addition to Phase 1a)

Phase 2:

- 293 single-family homes (in addition to Phase 1)
- 85 townhomes (in addition to Phase 1)

Full Build

- A maximum of 340 single-family homes
- A maximum of 393 townhomes
- A maximum of 427 apartments
- A maximum of 150,000 s.f. mini warehouse
- A maximum of 10,000 s.f. fire and rescue station
- A maximum of 40,500 s.f. general office
- A maximum of 90,100 s.f. strip retail plaza

It should be noted that the Town of Knightdale (Town) requires a no-build/build analysis year one (1) year beyond the anticipated build-out year and a future analysis year ten (10) years beyond the anticipated build-out year for the proposed development; therefore, the analysis years considered for this study under full-build conditions are 2032 and 2041. An additional analysis scenario will be included in the study to analyze improvements associated with STIP I-6007. The study analyzes traffic conditions during the weekday AM and PM peak hours for the following scenarios:

- 2022 Existing Traffic Conditions
- 2025+1 No-Build Traffic Conditions
- 2028+1 No-Build Traffic Conditions
- 2031+1 No-Build Traffic Conditions
- 2025+1 Build Traffic Conditions – Phase 1a
- 2025+1 Build Traffic Conditions – Phase 1b
- 2028+1 Build Traffic Conditions – Phase 2
- 2031+1 Build Traffic Conditions – Full Build
- 2031+10 Future Traffic Conditions – Per Town UDO
- 2045 Future Traffic Conditions – (with STIP I-6007 Improvements)

1.1. Site Location and Study Area

The development is proposed to be located north of Poole Road and along both sides of 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 and consists of the following existing intersections:

- Poole Road and Smithfield Road
- Smithfield Road and Sandy Run
- Smithfield Road and US 64 Eastbound Ramps
- Smithfield Road and US 64 Westbound Ramps
- Smithfield Road and Major Slade Road
- Poole Road and Bethlehem Road
- Poole Road and Major Slade 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 north of Poole Road and along both sides of Smithfield Road in Knightdale, North Carolina. The proposed development, anticipated to be completed in 2031. Prior to full build-out, the proposed development is expected to have two interim phases. It should be noted that Phase 1a and Phase 1b are anticipated to be completed in 2025 and Phase 2 is anticipated to be completed in 2028. The following land uses are proposed for each phase of the development:

Phase 1a:

- 47 single-family homes
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- 10,000 s.f. fire and rescue station (in addition to Phase 1a)
- 22,000 s.f. general office (in addition to Phase 1a)
- 28,900 s.f. strip retail plaza (in addition to Phase 1a)

Phase 2:

- 293 single-family homes (in addition to Phase 1)
- 85 townhomes (in addition to Phase 1)

Full Build

- A maximum of 340 single-family homes
- A maximum of 393 townhomes
- A maximum of 427 apartments
- A maximum of 150,000 s.f. mini warehouse
- A maximum of 10,000 s.f. fire and rescue station
- A maximum of 40,500 s.f. general office
- A maximum of 90,100 s.f. strip retail plaza

Access to the site is proposed via two (2) full-movement driveways along Poole Road and via two (2) full movement driveways, three (3) right-in/right-out driveways, and one (1) full movement intersection along Smithfield Road. 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 undeveloped land and residential development.

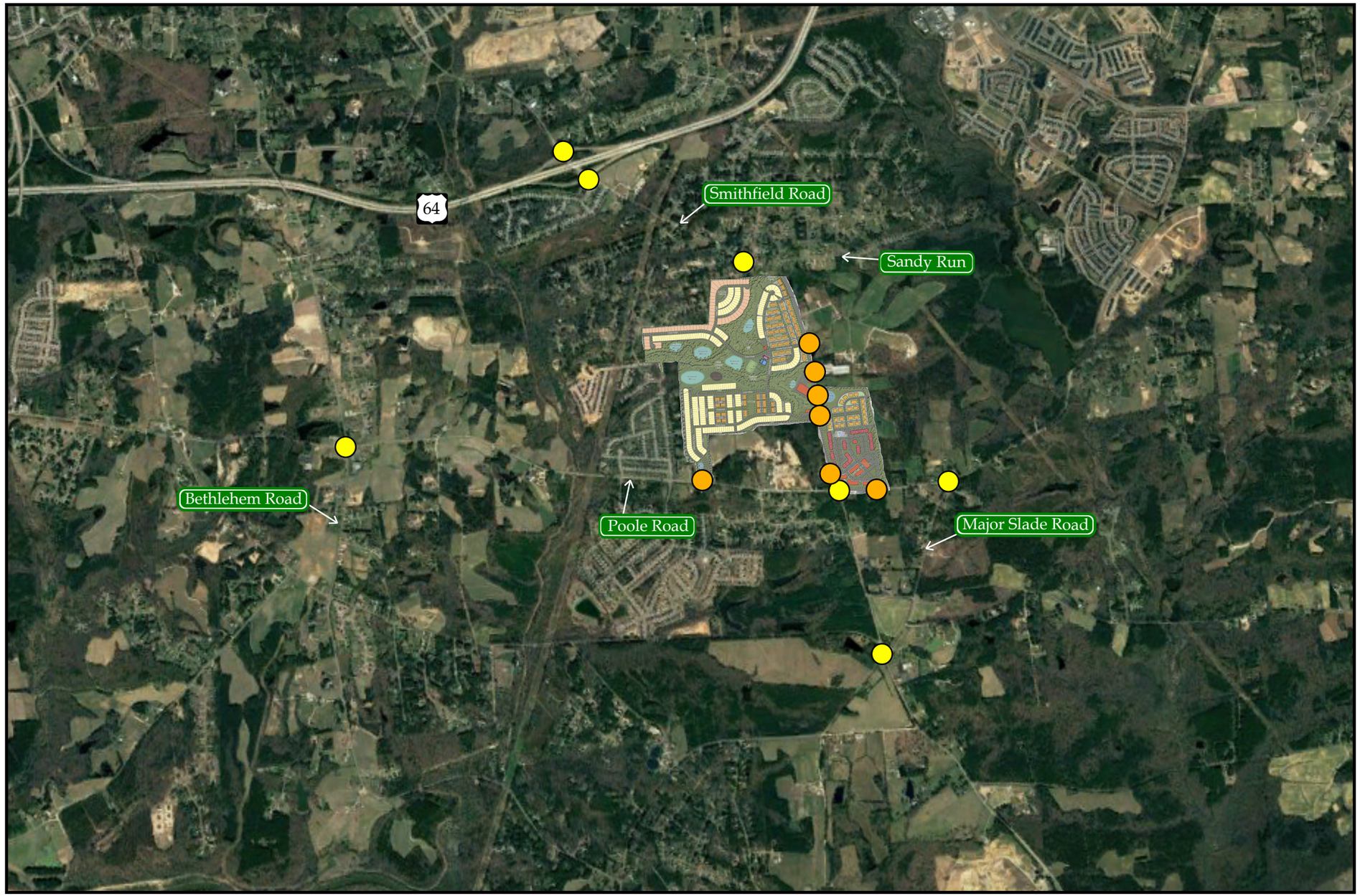
1.4. Existing Roadways

Existing lane configurations (number of traffic lanes on each intersection approach), 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	2021 AADT (vpd)
Poole Road	SR 1007	2-lane undivided	55 mph	3,700
Smithfield Road	SR 2233	2-lane undivided	45 mph	23,500
Sandy Run	SR 2685	2-lane undivided	25 mph	2,800*
I-87 (US 64 / US 264)		6-lane divided	70 mph	70,000
Major Slade Road	SR 2506	2-lane undivided	Not Posted	4,620*
Bethlehem Road	SR 2049	2-lane undivided	45 mph	5,500

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



LEGEND

- Study Intersection
- Proposed Site Access
- Study Area

N

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Poole and Smithfield
Knightdale, NC

Site Location Map

Scale: Not to Scale | Figure 1

Masterplan

Notes

1. See Street Typologies for right of way dimensions & standards.
2. Poole & Smithfield Roads shall both be improved to half the boulevard standard right of way along the Frontage of the Development. Where the Development envompasses both sides of the right of way, the Road shall be improved the full width.
3. Road improvements noted are subject to change per findings of TIA and NCDOT.
4. Commercial layouts shown are illustrative in nature. Exact configuration of buildings and parkings to be determined at site plan.
5. All residential lots shall be mass graded to provide appropriate drainage to stormwater facilities.
6. Amenity Center serving single family lots shall be constructed prior toissuance of 88th certificate of occupancy
7. Amenity Center serving apartments shall be constructed prior to issuance of 1st certificate of occupancy
8. Mix of uses shall be in accordance with UDO 11.1.B.
9. Tree Coverage Calculations:
   Site Area (excluding Poole Rd. & Smithfield Rd.) - 203.70 ac
   Required Tree Cover (19,459' perimeter x 20') - 8.93 ac
   Tree Cover Provided (Neuse River Buffers) - 15.86 ac.
10. Parking Calculations:
    Front Loaded Single Family Lots - 2 spaces/lot
    Rear Loaded Single Family Lots - 2 spaces / lot
    Townhouses - 2.5 spaces/lot (2 spaces on lot & 0.5 spaces in parking lots + marked street parking)
    Apartments - 1 space for studio & 1 bedroom units + 2 spaces for 2 & 3 bedroom units (includes adjacent on-street parking)
    Commercial Center - 4 spaces / 1,000sf of groundfloor commercial + 1 space / 1,000sf of upperfloor office
    Neighborhood Commercial - 3.5 spaces / 1,000 sf of commercial
11. Park & Ride spaces and Transit Shelter shall be provided at Commercial Center in accordance with UDO 7.1.E
12. Electric vehicle parking and charging stations shall be provided in accordance with UDO 7.1.I.2
13. Bicycle parking shall be provided in accordance with UDO 7.1.F
14. Cul-De-Sacs shall only be permitted where trail heads continue the pedestrian circulation, allowing pedestrian connectivity, while limiting impacts to environmentally sensitive areas such as streams and wetlands.
15. Sewer shall be served via proposed gravity outfall to existing poplar creek gravity line. Downstream sewer capacity analysis shall be provided with zoning.
16. Public water shall be installed in all public rights of way including Smithfield Rd. to serve development.
17. Street right of way dedication shall be permitted in the fall zone of the existing cell tower, however no subdivision shall occur in this zone for single family or commercial uses.

Use Distribution

Use Type	Area in Ac.	Percent Development
Single Family Dwelling	41.46	48.1%
Townhouse Dwelling	22.69	26.4%
Multifamily Dwelling	9.12	10.6%
Mixed Use	6.93	8.0%
Commercial/Office	5.90	6.9%

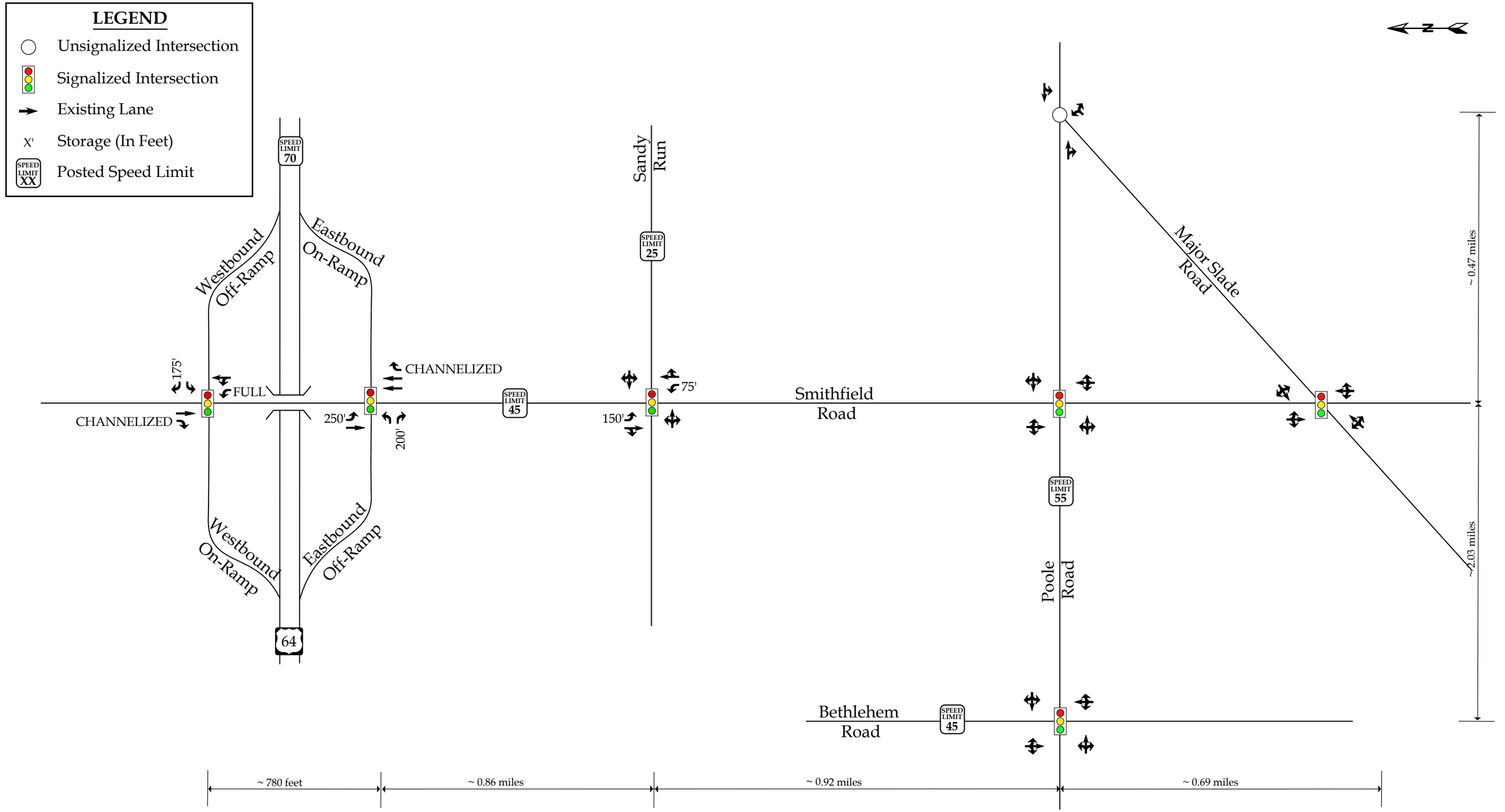
Unit Legend

- Front Loaded Single Family Lot (80)
- Rear Loaded Single Family Lot (260)
- Townhomes (366)
- Apartments (356)
- Commercial
- Vertically Mixed Use

1" = 250'-0"

0 125 250 500 1,000

N



RAMEY KEMP ASSOCIATES

Poole and Smithfield
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

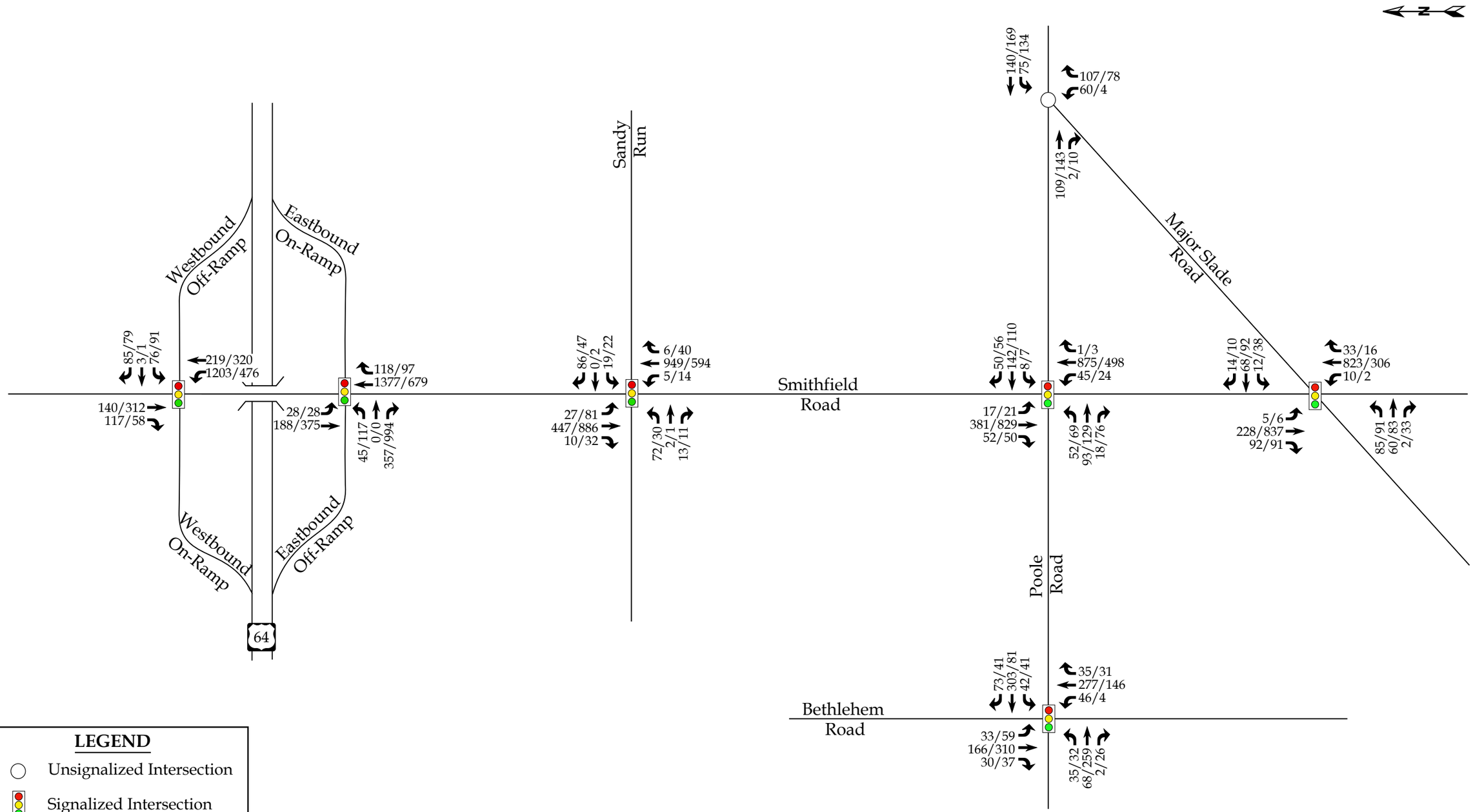
Existing peak hour traffic volumes were determined based on traffic counts conducted at the study intersections listed below, in January, March, and September of 2022 during a typical weekday AM (7:00 AM – 9:00 AM) and PM (4:00 PM – 6:00 PM) peak periods while schools were in session for in-person learning:

- Poole Road and Smithfield Road
- Smithfield Road and Sandy Run
- Smithfield Road and I-87 (US 64 / US 264) Eastbound Ramps
- Smithfield Road and I-87 (US 64 / US 264) Westbound Ramps
- Smithfield Road and Major Slade Road
- Poole Road and Major Slade Road
- Poole Road and Bethlehem Road

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 8 of this report.



LEGEND

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

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

Poole and Smithfield
Knightdale, NC

2022 Existing
Peak Hour Traffic

Scale: Not to Scale | Figure 4

3. 2026/2029/2032 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 3% would be used to generate 2026/2029/2032 projected weekday AM and PM peak hour traffic volumes. Refer to Figure 5a, 5b, and 5c for 2026/2029/2032 projected peak hour traffic volumes, 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:

- Baker Roofing
- Poole Road Assemblage

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
Baker Roofing	Northwest quadrant of the US 64-264 at Smithfield Road interchange	2026	220,000 Warehouse 145,000 Specialty Trade 16 f.p. gas station 22,000 general retail 20,000 general office 4,000 s.f. FF w/ DT 200-room hotel	March 2022 by KHA
Poole Road Assemblage	Northeast quadrant at the intersection of Poole Road and Smithfield Road	2026	246 single family homes	October 2022 by RKA

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 that the roadway improvements associated with the State Transportation Improvement Program (STIP) projects I-6007 and HL-0031 are to be considered in this study. STIP I-6007 is expected to convert the US 264 interchange at Smithfield Road to a diverging diamond interchange, while STIP HL-0031 is expected to improve the intersection of Poole Road and Smithfield Road by adding exclusive left-turn lanes at the intersection. Future roadway improvements associated with STIP I-6007 project will be analyzed under 2045 future traffic conditions, as the project is not currently funded for construction. Additionally, future roadway improvements associated with the adjacent developments will be analyzed under future conditions.

Per the Comprehensive Transportation Plan (CTP), Smithfield Road is expected to be widened to a four-lane divided section. The proposed development is expected to provide approximately 0.6 miles of widening along their frontage on either side of Smithfield Road prior to the full build-out of the development. Based on coordination with the Town and

NCDOT, the four-lane divided section was analyzed under future conditions (2032, Full Build).

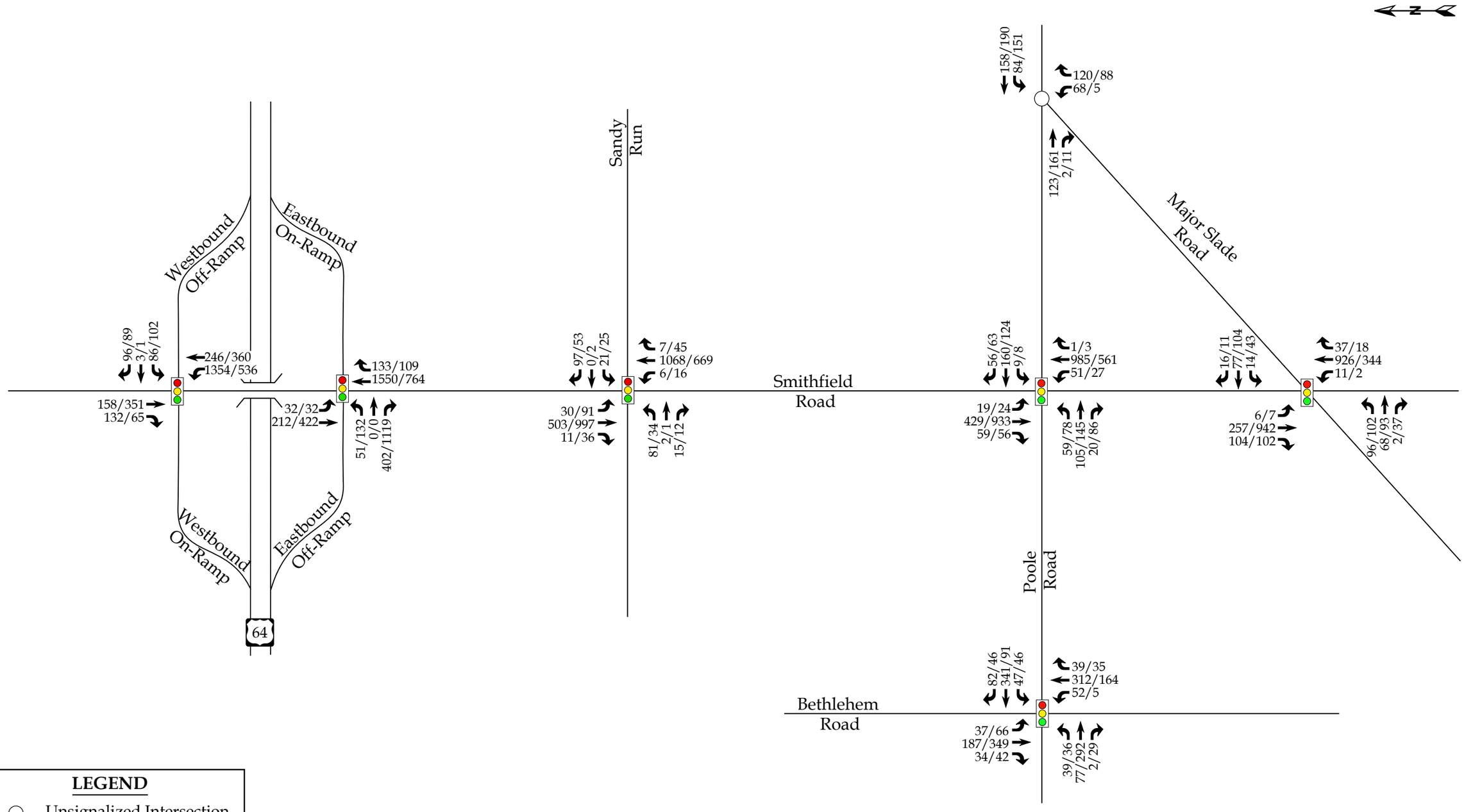
The STIP I-6007 plans can be found in Appendix E.

3.4. 2026/2029/2032 No-Build Peak Hour Traffic Volumes

The 2026/2029/2032 no-build traffic volumes were determined by projecting the 2022 existing peak hour traffic to the build year and adding the adjacent development trips. Refer to Figure 7a, 7b, and 7c for an illustration of the 2026/2029/2032 no-build peak hour traffic volumes at the study intersections, respectively.

3.5. Analysis of 2026/2029/2032 No-Build Peak Hour Traffic Conditions

The 2026/2029/2032 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 8 of this report.



LEGEND

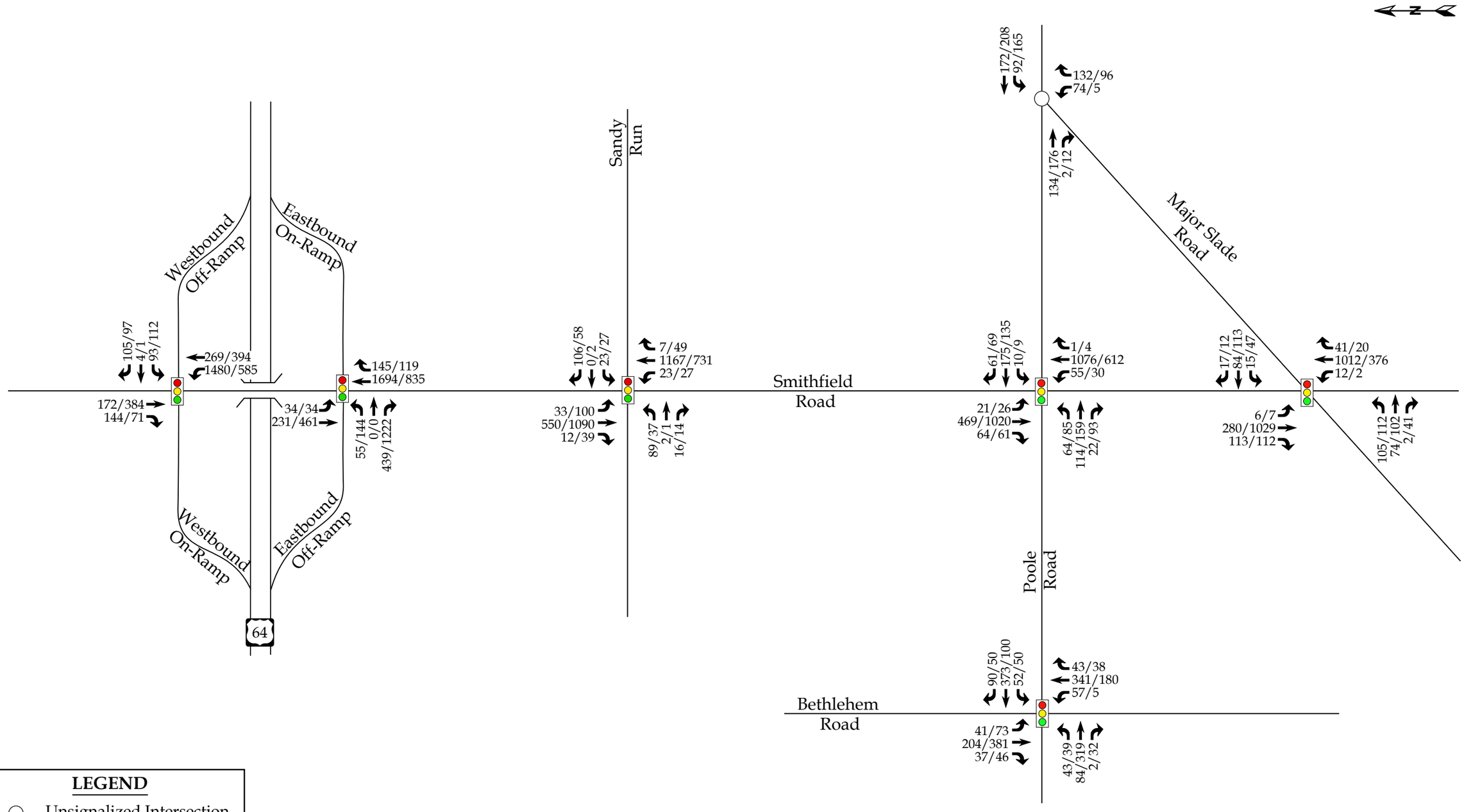
- Unsignalized Intersection
- Signalized Intersection
- X / Y → Weekday AM / PM Peak Hour Traffic

RAMEY KEMP ASSOCIATES

Poole and Smithfield
Knightdale, NC

2026 Projected
Peak Hour Traffic

Scale: Not to Scale | Figure 5a



LEGEND

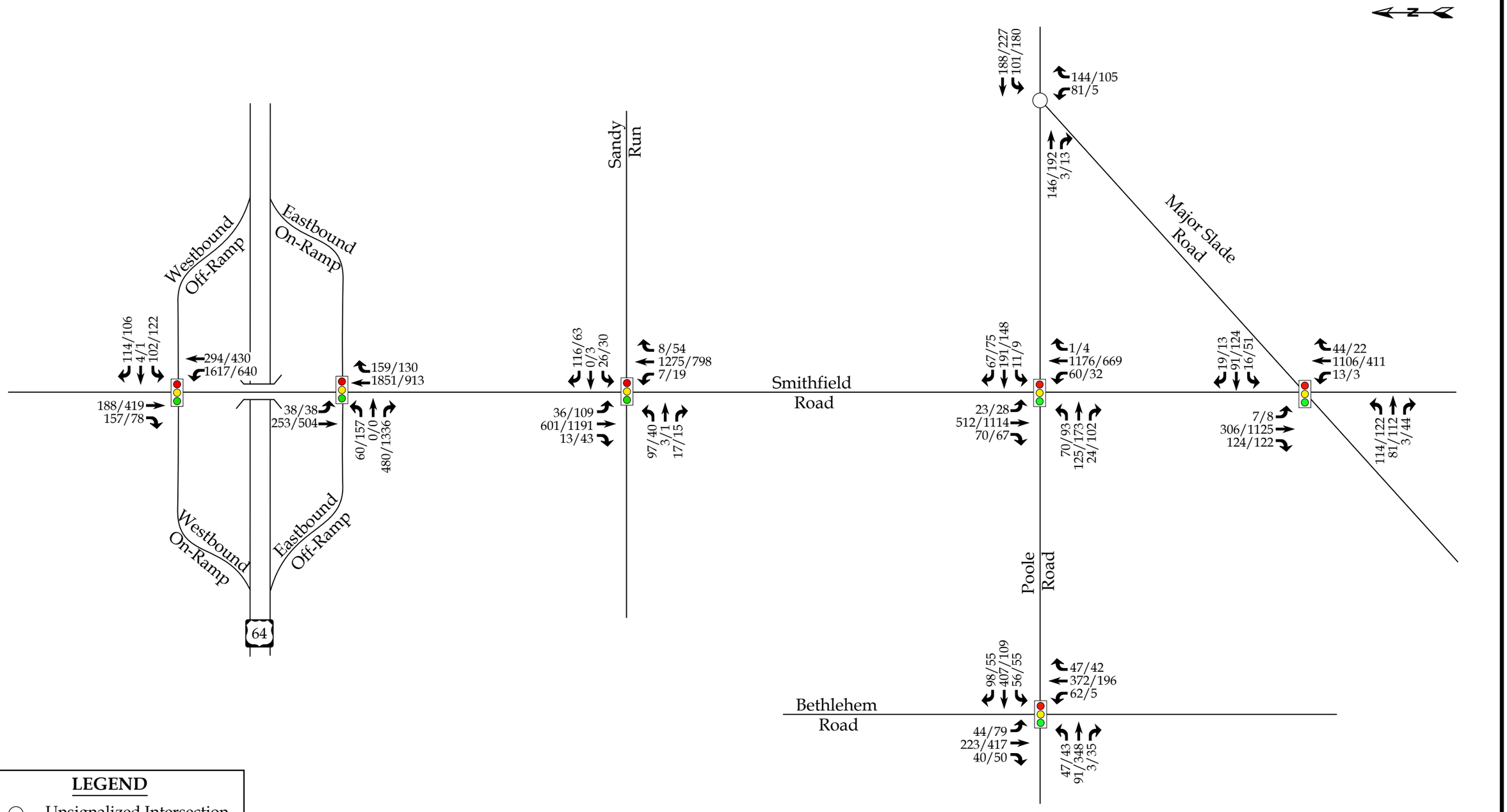
- ◯ Unsignalized Intersection
- Signalized Intersection
- X / Y → Weekday AM / PM Peak Hour Traffic

RAMEY KEMP ASSOCIATES

Poole and Smithfield
Knightdale, NC

2029 Projected
Peak Hour Traffic

Scale: Not to Scale | Figure 5b



LEGEND

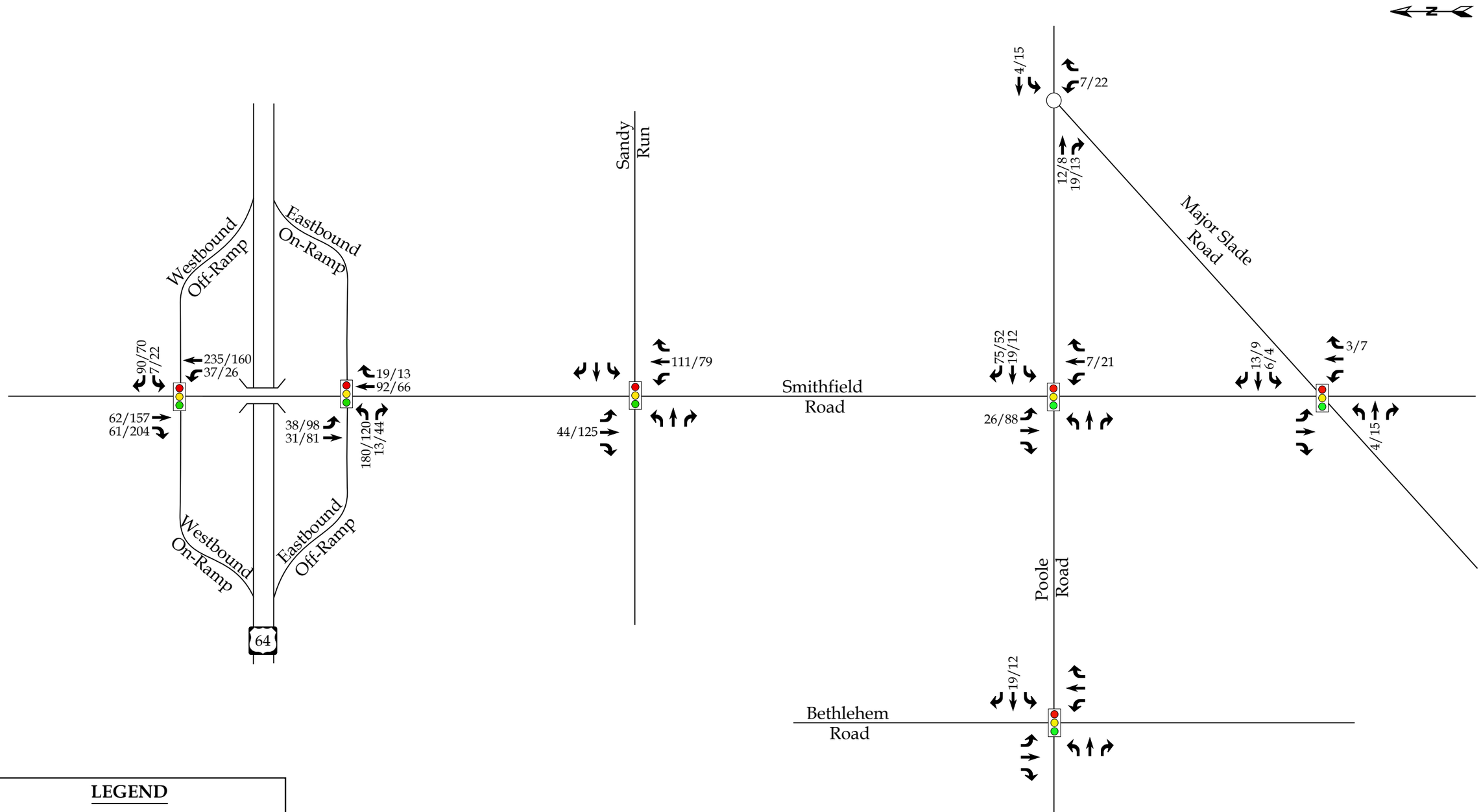
- ◯ Unsignalized Intersection
- Signalized Intersection
- X / Y → Weekday AM / PM Peak Hour Traffic

RKA
RAMEY KEMP ASSOCIATES

Poole and Smithfield
Knightdale, NC

2032 Projected
Peak Hour Traffic

Scale: Not to Scale | Figure 5c



LEGEND

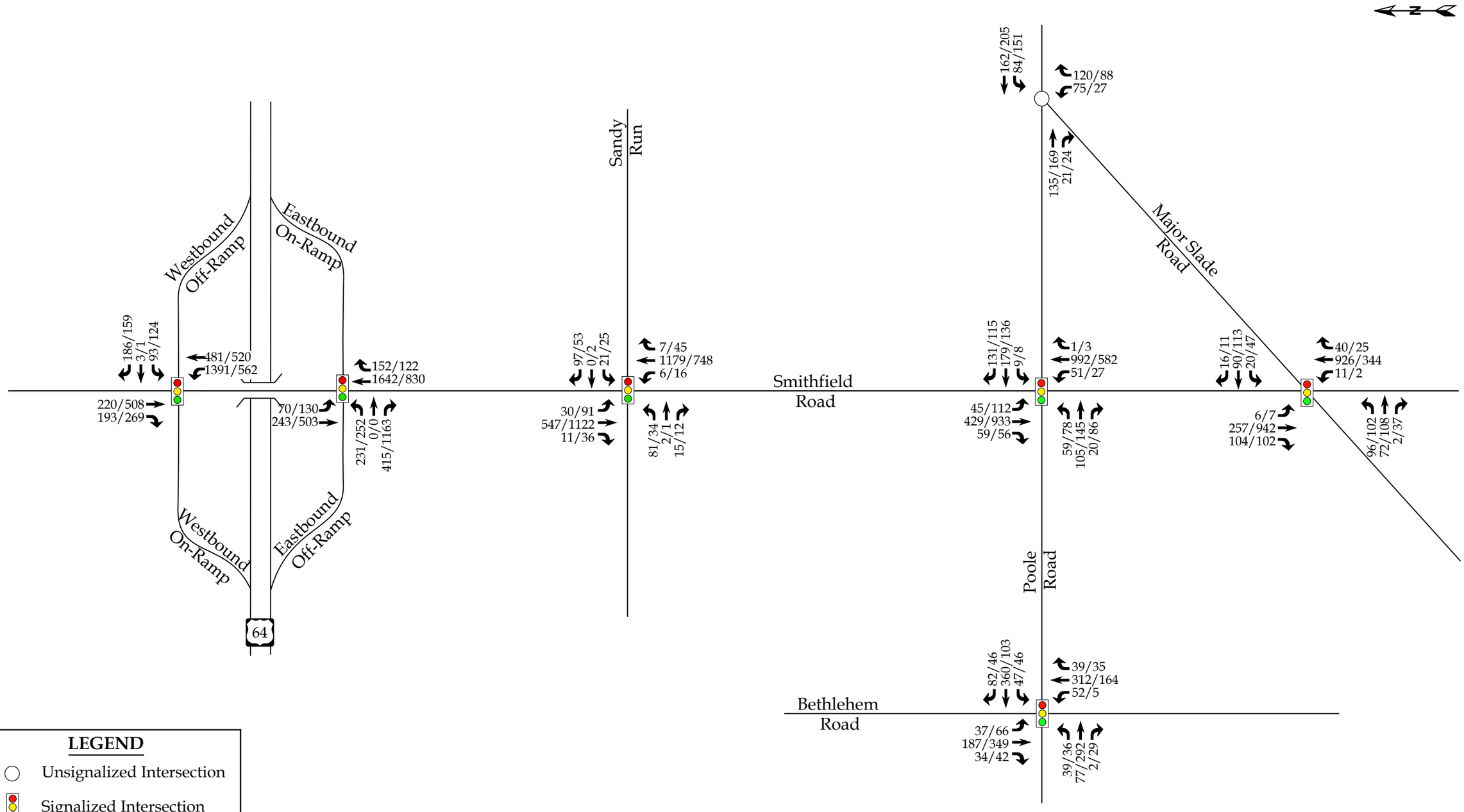
- Unsignalized Intersection
- Signalized Intersection
- X / Y → Weekday AM / PM Peak Hour Adjacent Development Trips

RAMEY KEMP ASSOCIATES

Poole and Smithfield
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

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.

RKA
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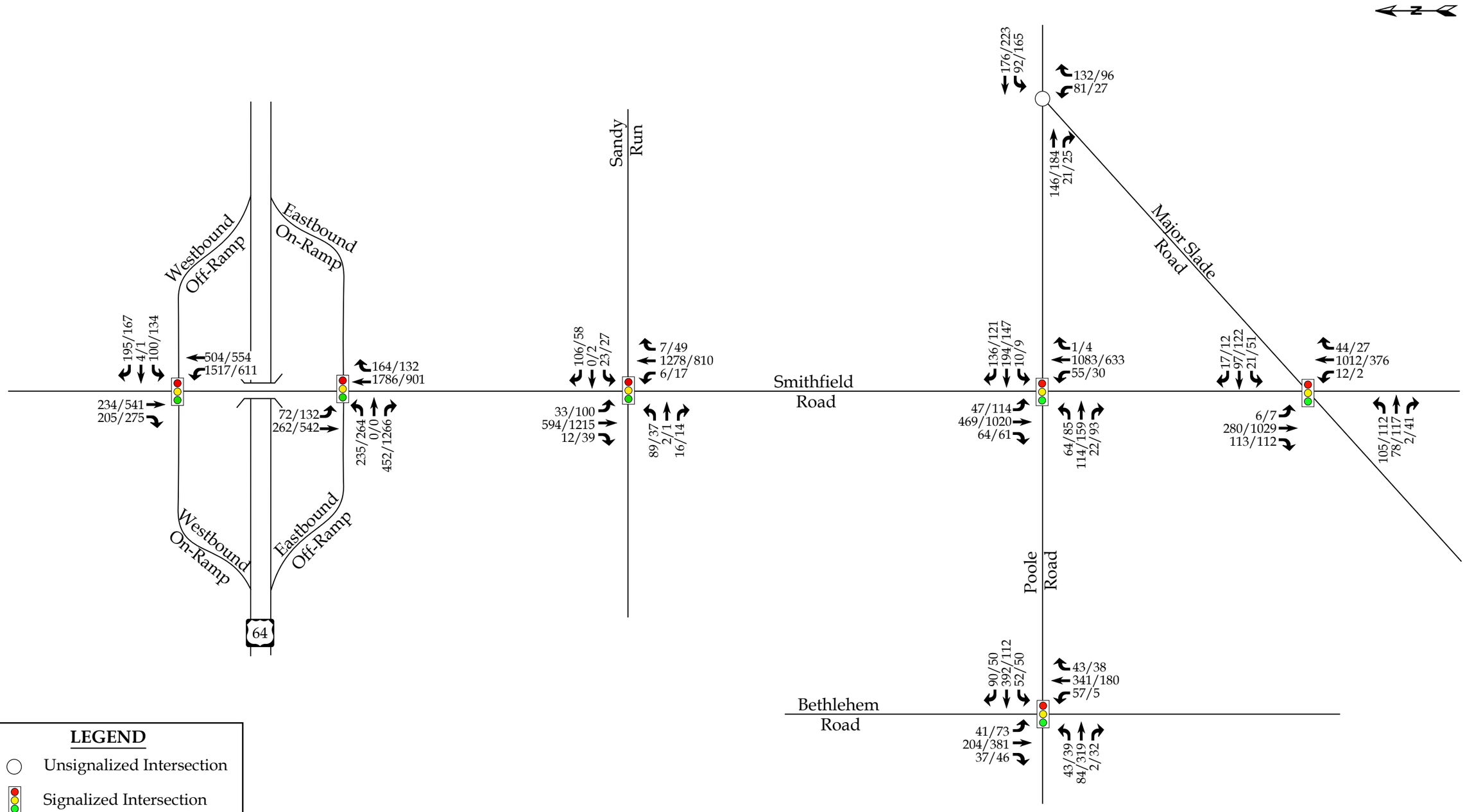
Poole and Smithfield
Knightdale, NC

2026 No-Build
Peak Hour Traffic

Scale: Not to Scale | Figure 7a



LEGEND

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

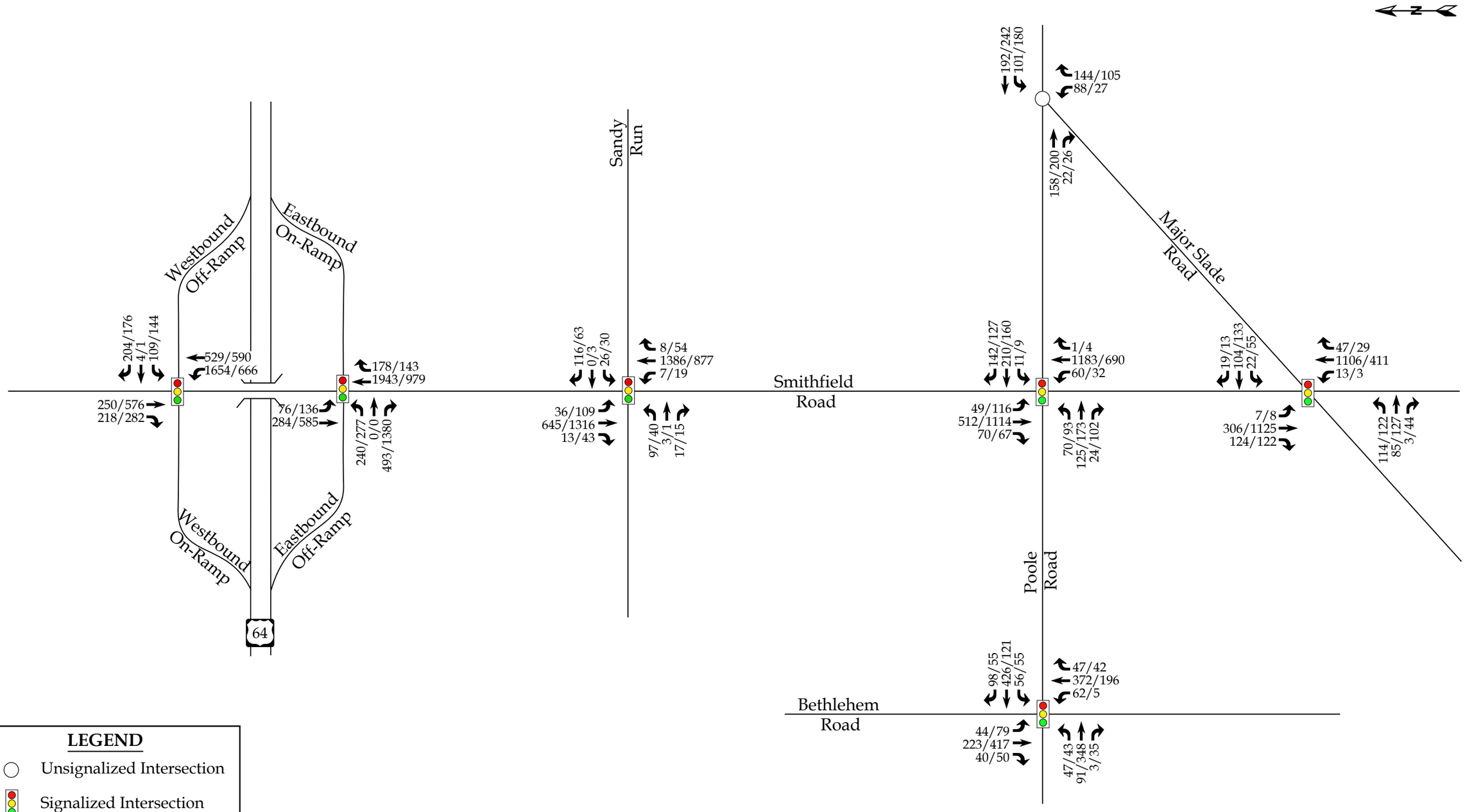
Note: Based on NCDOT Congestion Management guidelines, a volume of 4 vehicles per hour (vph) was analyzed for any movement with less than 4 vph.

RAMEY KEMP ASSOCIATES

Poole and Smithfield
Knightdale, NC

2029 No-Build
Peak Hour Traffic

Scale: Not to Scale | Figure 7b



LEGEND

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

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

Poole and Smithfield
Knightdale, NC

2032 No-Build
Peak Hour Traffic

Scale: Not to Scale | Figure 7c

4. SITE TRIP GENERATION AND DISTRIBUTION

4.1. Trip Generation

Phase 1a of the proposed development is expected to consist of 187 townhomes and 47 single family homes. Phase 1b of the proposed development is expected to consist of 150,000 s.f. of mini-warehouse land use, 10,000 s.f. of fire and rescue land use, 22,000 s.f. of general office land use, and 28,900 s.f. of strip retail plaza land use. Phase 2 is expected to consist of 293 single family homes and 85 townhomes, in addition to Phase 1b. The proposed development at full build out is expected to add 427 apartments, 121 townhomes, 61,200 s.f. of retail land use, and 18,500 s.f. of general office land use in addition to Phase 1a, Phase 1b, and Phase 2 for a maximum of 427 apartments, 340 single-family homes, 393 townhomes, 150,000 s.f. of mini-warehouse land use, 10,000 s.f. of fire and rescue station land use, 40,500 s.f. of general office land use, and 90,100 s.f. of shopping plaza land use. 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*, 11.1 Edition. Refer to Table 3-5 for a detailed breakdown of the buildout site trip generation for Phase 1a, Phase 1b, Phase 2, and Full Build, respectively.

Table 3: Trip Generation Summary – Phase 1a

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)	47 units	504	9	28	31	18
Single-Family Attached Housing (215)	187 units	1,374	23	69	64	44
Phase 1a Total		**1,878**	**37**	**92**	**92**	**65**

Table 4: Trip Generation Summary – Phase 1a + 1b

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	AM Peak Hour Trips (vph)		PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Mini-Warehouse (151)	150 k.s.f	218	14	13	14	13
Single-Family Homes (210)	47 units	504	9	28	31	18
Single-Family Attached Housing (215)	187 units	1,374	23	69	64	44
Fire and Rescue Station (575)	10 k.s.f.	50**	1*	4*	1	4
General Office (710)	22 k.s.f.	311	40	6	8	39
Strip Retail Plaza (822)	28.9 k.s.f.	1,449	35	23	83	82
Phase 1b Total Trips		**3,906**	**122**	**143**	**201**	**200**
Internal Capture (5% AM, 4% PM)			*-6*	*-7*	*-8*	*-8*
Total External Trips			**116**	**136**	**193**	**192**
Pass-by Trips (Strip Retail Plaza: 34% PM)			--	--	*-27*	*-27*
Total Primary Trips			**116**	**136**	**166**	**165**

*Due to limited data in the ITE Manual, weekday AM peak hour trips were assumed to be equal to the number of weekday PM peak hour trips.
** Due to limited data in the ITE Manual, weekday daily trips were determined assuming that the weekday PM peak hour accounts for 10% of the daily volume.

Table 5: Trip Generation Summary – Phase 1 + 2

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	AM Peak Hour Trips (vph)		PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Mini-Warehouse (151)	150 k.s.f	218	14	13	14	13
Single-Family Homes (210)	340 units	3,111	57	170	198	116
Single-Family Attached Housing (215)	272 units	2,022	34	102	94	65
Fire and Rescue Station (575)	10 k.s.f.	50**	1*	4*	1	4
General Office (710)	22 k.s.f.	311	40	6	8	39
Strip Retail Plaza (822)	28.9 k.s.f.	1,449	35	23	83	82
Phase 2 Total Trips		**7,161**	**181**	**318**	**398**	**319**
Internal Capture (4% AM, 4% PM)			*-7*	*-13*	*-16*	*-13*
Total External Trips			**174**	**308**	**382**	**306**
Pass-by Trips (Strip Retail Plaza: 34% PM)			--	--	*-24*	*-24*
Total Primary Trips			**174**	**308**	**355**	**279**

*Due to limited data in the ITE Manual, weekday AM peak hour trips were assumed to be equal to the number of weekday PM peak hour trips.
** Due to limited data in the ITE Manual, weekday daily trips were determined assuming that the weekday PM peak hour accounts for 10% of the daily volume.

Table 6: Trip Generation Summary – Full Build

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	AM Peak Hour Trips (vph)		PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Mini-Warehouse (151)	150 k.s.f	218	14	13	14	13
Single-Family Homes (210)	340 units	3,111	57	170	198	116
Single-Family Attached Housing (215)	393 units	2,944	50	149	137	95
Multifamily Low-Rise (220)	427 units	2,812	37	118	129	75
Fire and Rescue Station (575)	10 k.s.f.	50**	1*	4*	1	4
General Office (710)	40.5 k.s.f.	529	68	9	13	65
Shopping Plaza (821)	90.1 k.s.f.	6,084	97	59	229	239
Full Build Total Trips		**15,748**	**324**	**522**	**721**	**607**
Internal Capture (3% AM, 3% PM)			*-10*	*-16*	*-22*	*-18*
Total External Trips			**314**	**506**	**699**	**589**
Pass-by Trips (Strip Retail Plaza: 34% PM)			--	--	*-77*	*-77*
Total Primary Trips			**314**	**506**	**622**	**512**

*Due to limited data in the ITE Manual, weekday AM peak hour trips were assumed to be equal to the number of weekday PM peak hour trips.
** Due to limited data in the ITE Manual, weekday daily trips were determined assuming that the weekday PM peak hour accounts for 10% of the daily volume.

It is estimated that the proposed development will generate approximately 15,748 total site trips on the roadway network during a typical 24-hour weekday period. Of the daily traffic volume, it is anticipated that 846 trips (324 entering and 522 exiting) would occur during the weekday AM peak hour and 1,328 trips (721 entering and 607 exiting) would occur during the weekday PM peak hour.

Internal capture of trips between the retail and residential uses are 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 considered trips

between residential, office, and retail/restaurant land uses. Based on NCHRP Report 684 methodology, a weekday AM peak hour internal capture rate of 3% and a weekday PM peak hour internal capture rate of 3% were applied to the total trips under build conditions. The internal capture reductions are expected to account for approximately 26 trips (10 entering and 16 exiting) trips during the weekday AM peak hour and 40 trips (22 entering and 18 exiting) during the weekday PM peak hour. It should be noted that the internal capture percentage varied throughout the different phases of the project based on the land uses and the sizes of each land use. At completion of Phase 2, an internal capture of 4% in the AM and PM peak hours was applied to the total trips.

Pass-by trips are 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 trips are expected to account for approximately 154 trips (77 entering and 77 exiting) during the weekday PM peak hour under build conditions.

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 be 820 trips (314 entering and 506 exiting) during the weekday PM peak hour and 1,134 trips (622 entering and 512 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 the residential and retail site trips will be regionally distributed the same as in the previous TIA as follows:

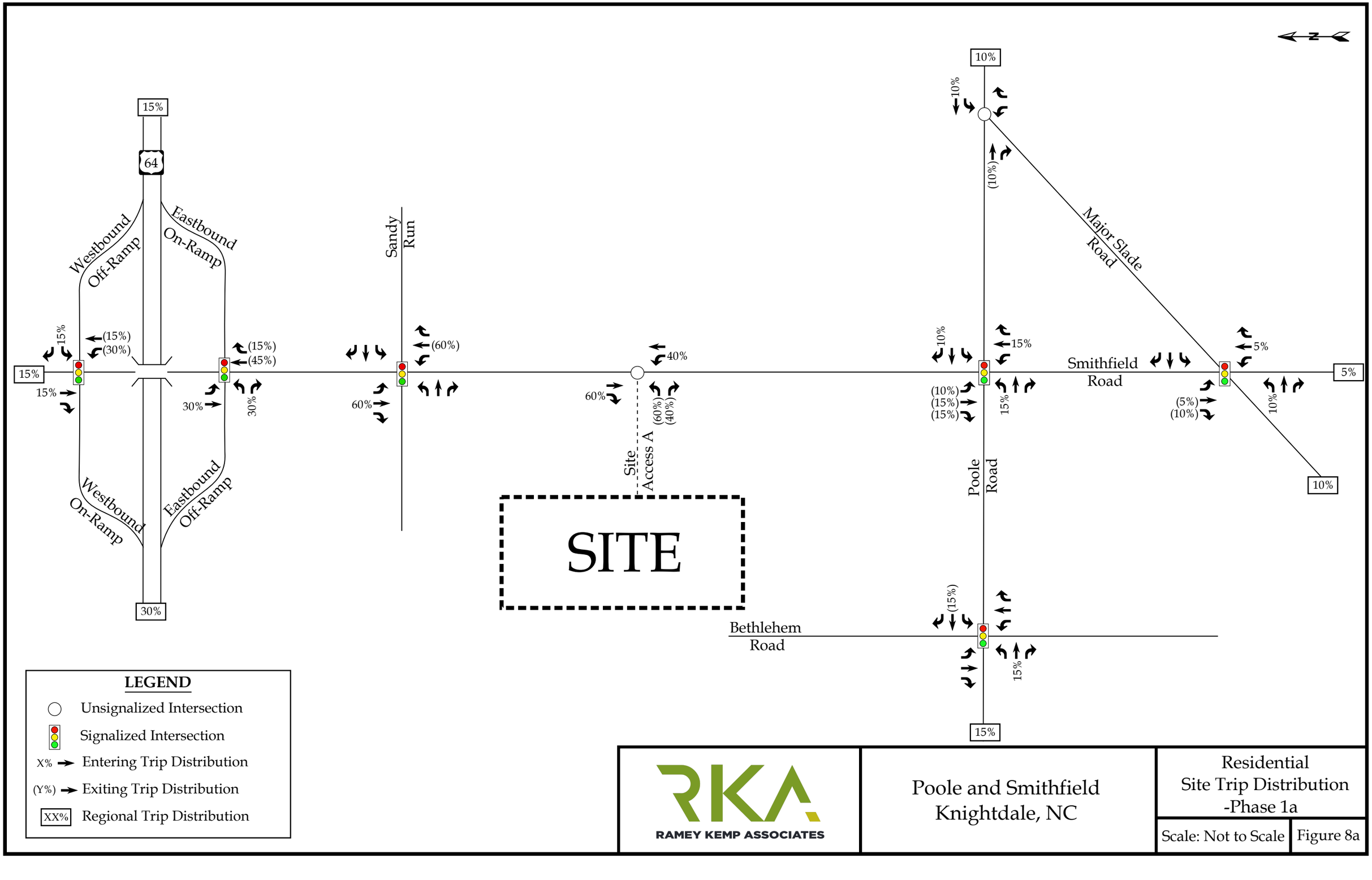
- 15% to/from the east via US 64
- 30% to/from the west via US 64
- 15% to/from the north via Smithfield Road
- 5% to/from the south via Smithfield Road
- 15% to/from the west via Poole Road
- 10% to/from the east via Poole Road

- 10% to/from the south via Major Slade Road

Refer to Figures 8a, 8b, 8c, and 8d for the residential site trip distribution for Phase 1a, Phase 1b, Phase 2, and Full Build, respectively. Figure 9a, 9b, and 9c illustrate the retail site trip distribution under Phase 1b, Phase 2, and Full Build, respectively. Refer to Figures 10a, 10b, 10c, and 10d for the residential site trip assignment for Phase 1b, Phase 2, and Full Build, respectively. Figures 11a, 11b, and 11c illustrate the retail site trip assignment for Phase 1b, Phase 2, and Full Build, respectively.

The pass-by site trips were distributed under all three phases based on existing traffic patterns with consideration given to the proposed driveway access and site layout. Refer to Figures 12a, 12b, and 12c for the pass-by site trip distribution for Phase 1b, Phase 2, and Full Build. Phase 1b, Phase 2, and Full Build pass-by site trips are shown in Figures 13a, 13b, and 13c, respectively.

The total site trips were determined by adding the primary site trips and the pass-by site trips. Refer to Figures 14a, 14b, and 14c for the total peak hour site trips at the study intersections for Phase 1b, Phase 2, and Full Build, respectively.

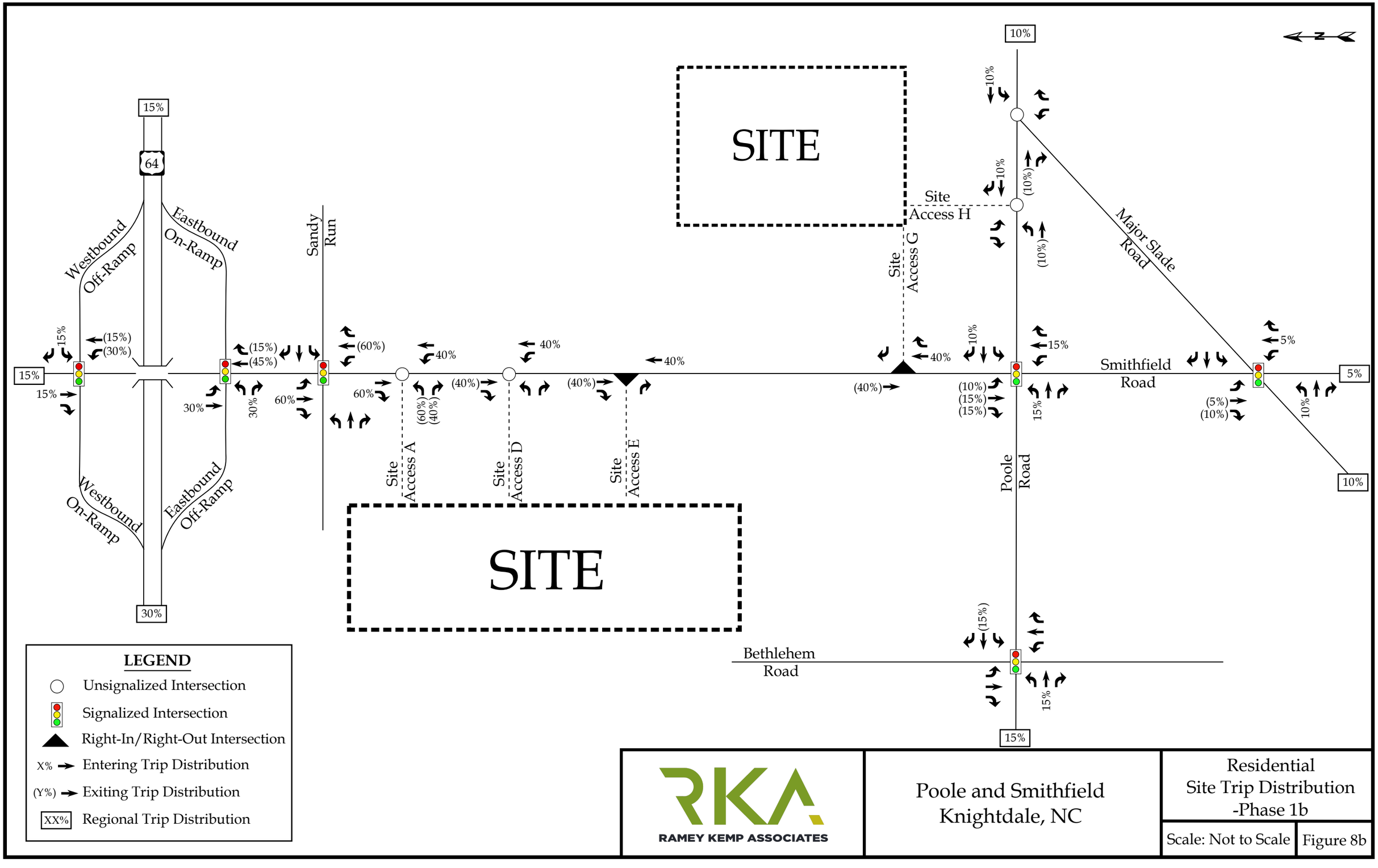


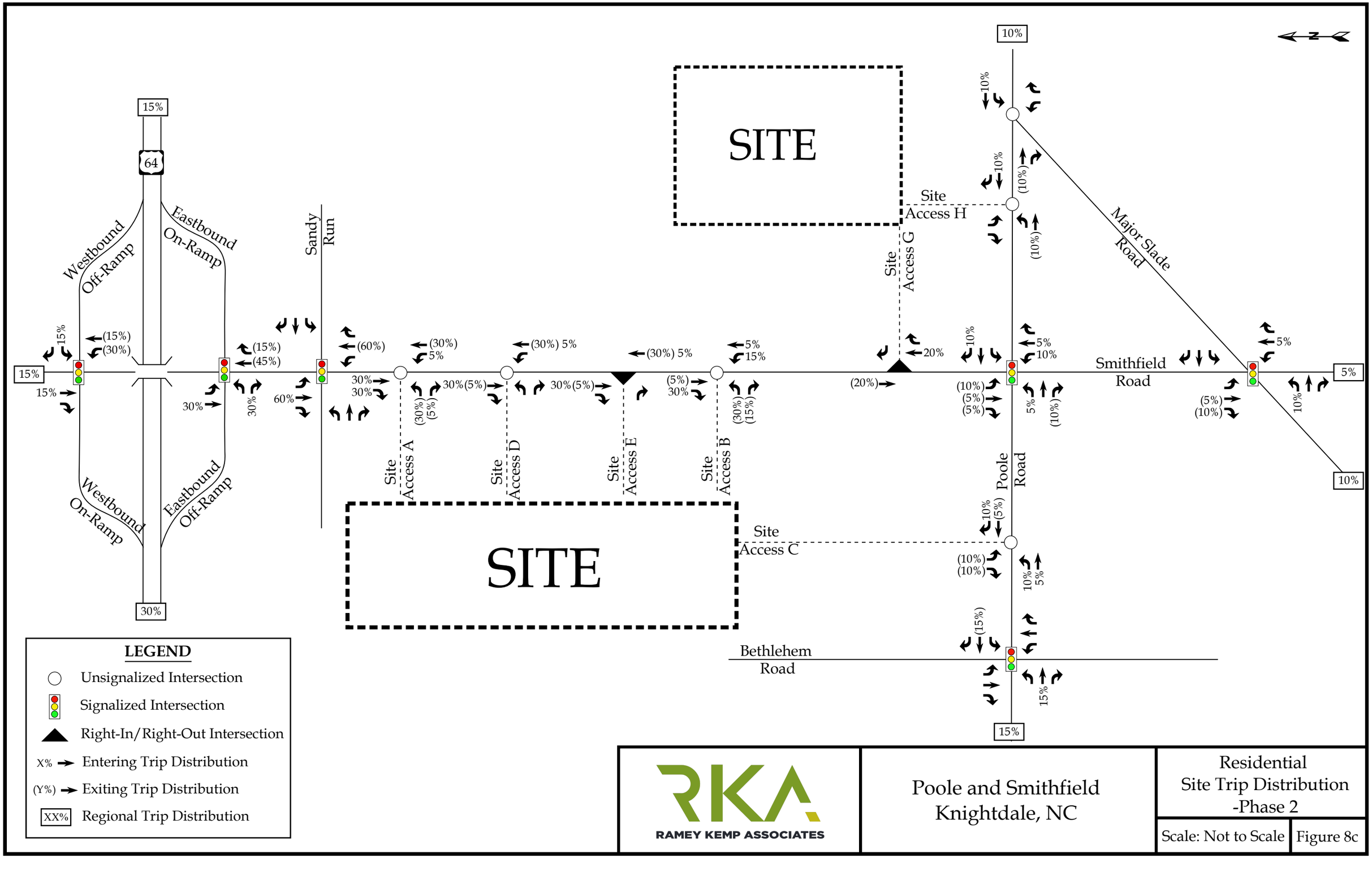
RAMEY KEMP ASSOCIATES

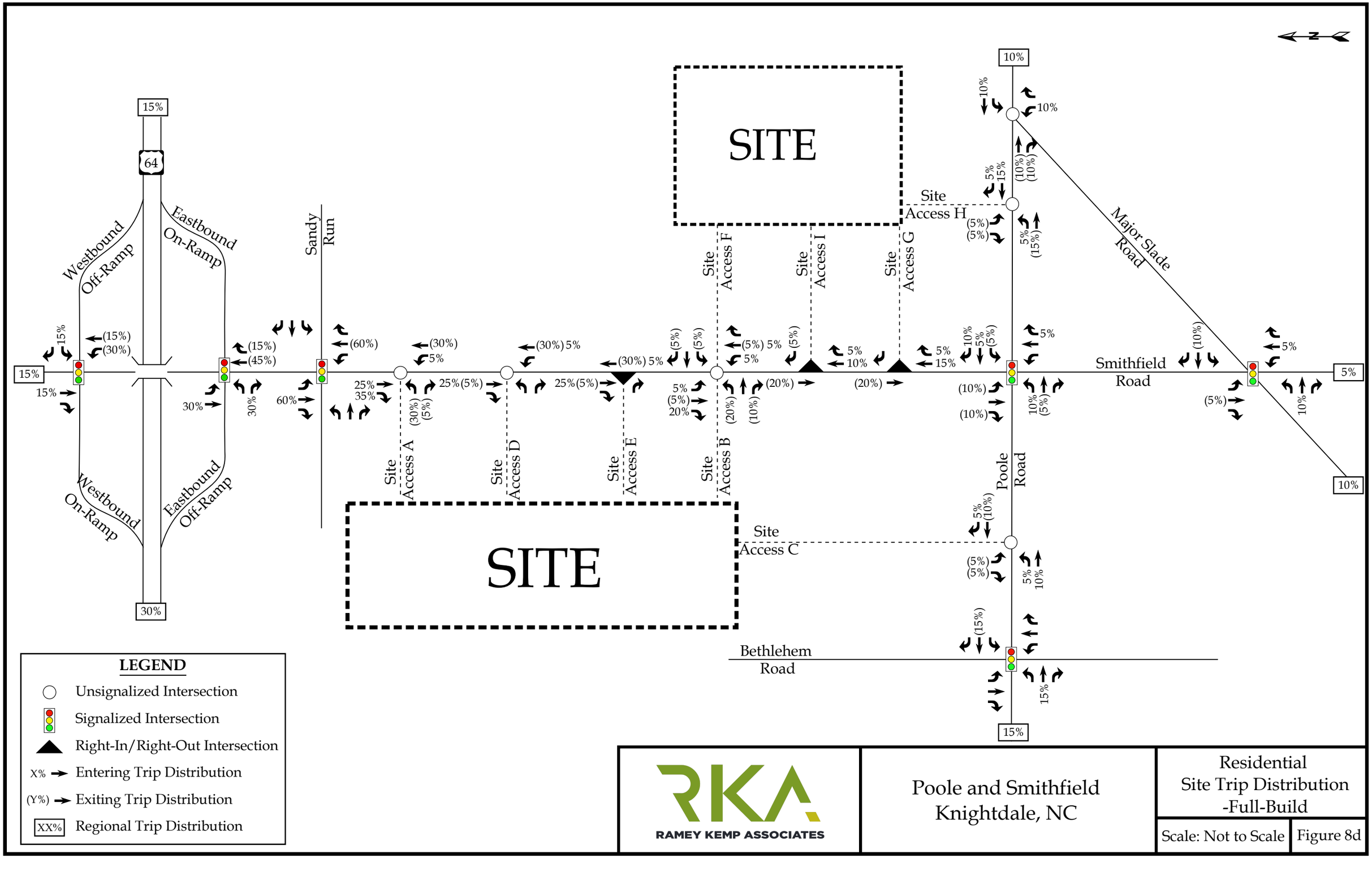
Poole and Smithfield
Knightdale, NC

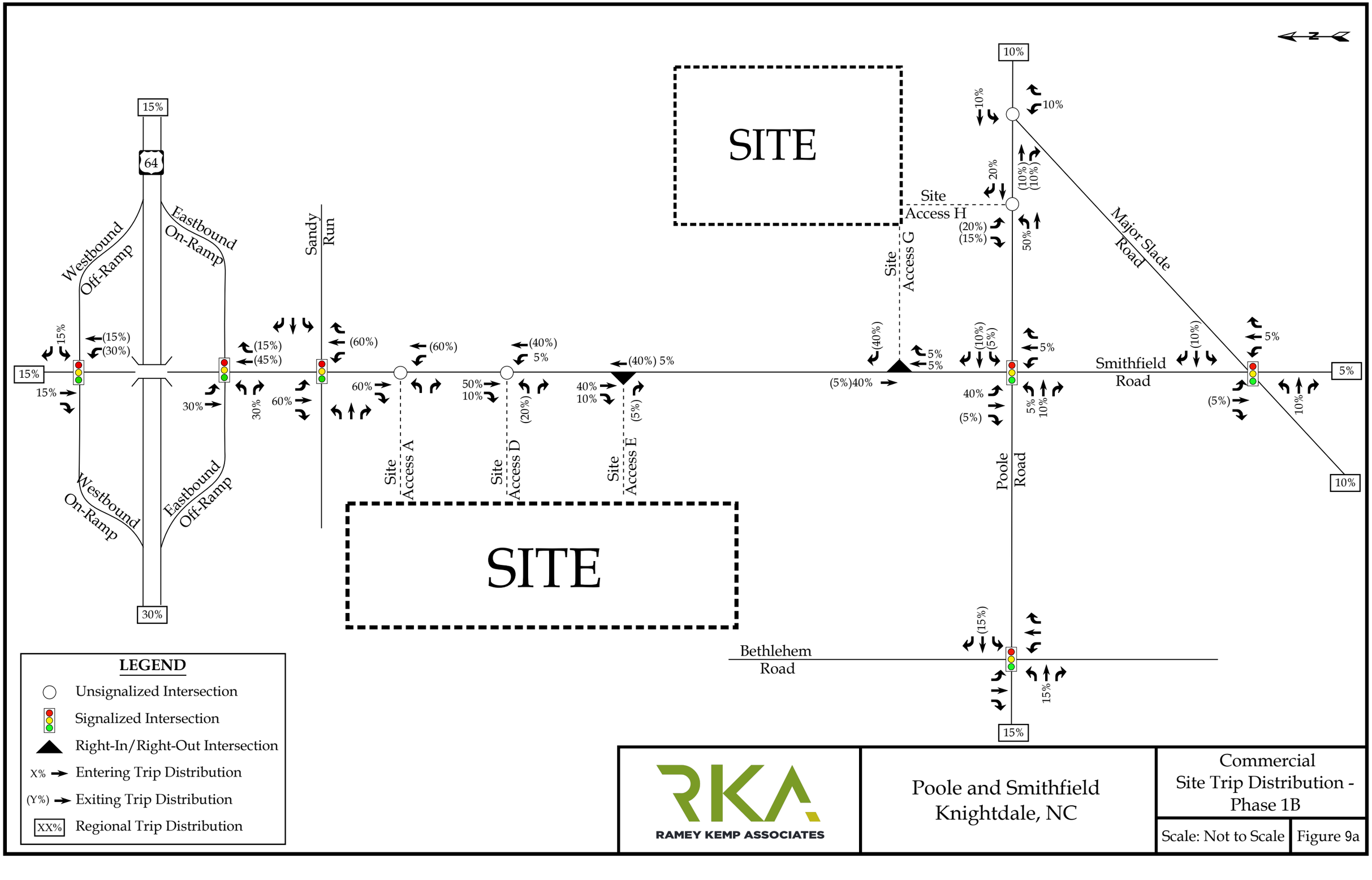
Residential
Site Trip Distribution
-Phase 1a

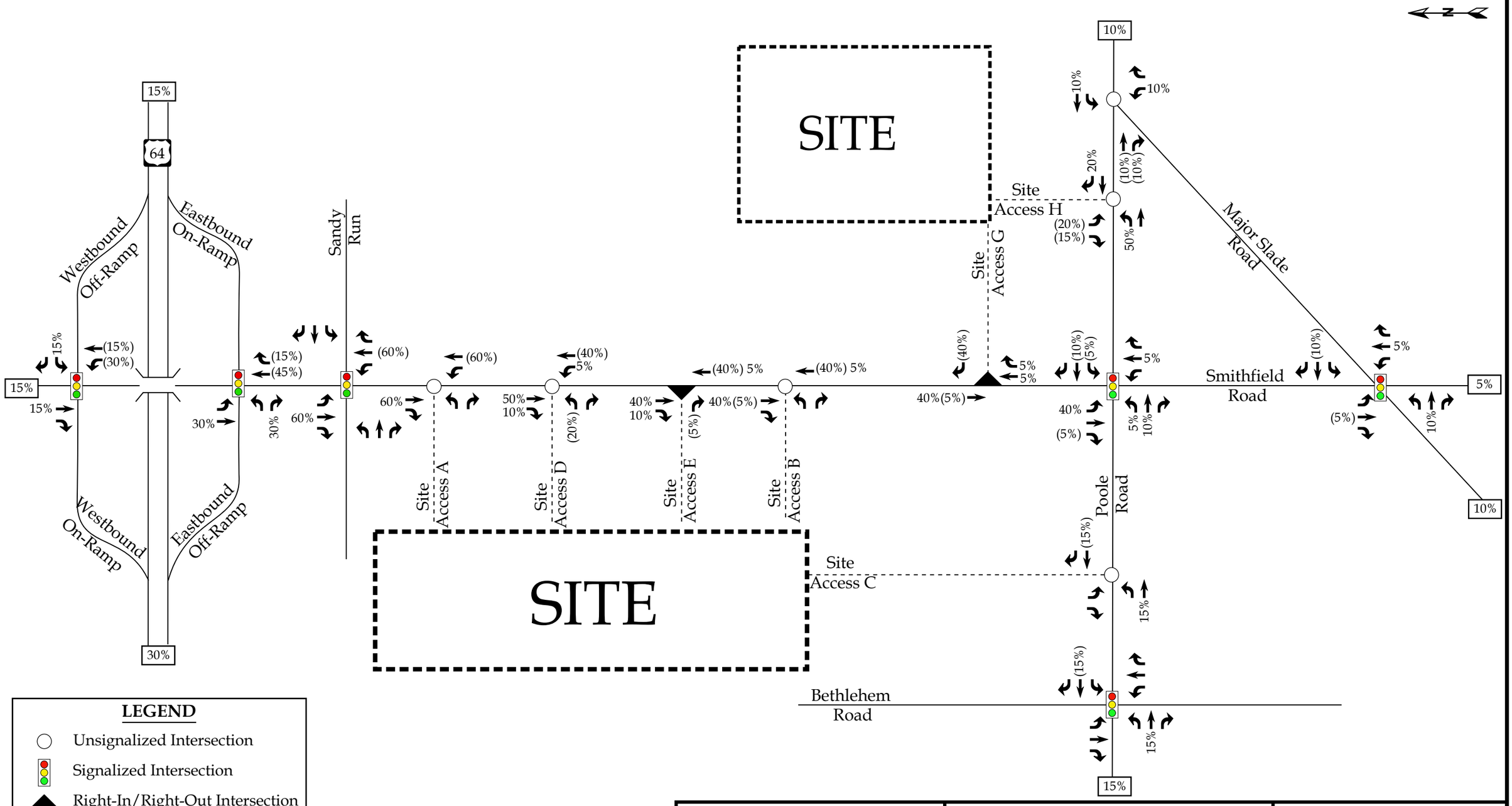
Scale: Not to Scale | Figure 8a


SITE
SITE
64
15%
30%
10%
Westbound Off-Ramp
Eastbound On-Ramp
Westbound On-Ramp
Eastbound Off-Ramp
Sandy Run
Site Access A
Site Access D
Site Access E
Site Access G
Site Access H
Major Slade Road
Smithfield Road
Poole Road
Bethlehem Road
LEGEND
Unsignalized Intersection
Signalized Intersection
Right-In/Right-Out Intersection
X% Entering Trip Distribution
(Y%) Exiting Trip Distribution
XX% Regional Trip Distribution
RAMEY KEMP ASSOCIATES
Poole and Smithfield
Knightdale, NC
Residential
Site Trip Distribution
-Phase 1b
Scale: Not to Scale
Figure 8b


SITE
SITE
15%
64
Westbound Off-Ramp
Eastbound On-Ramp
Westbound On-Ramp
Eastbound Off-Ramp
30%
Sandy Run
Site Access A
Site Access D
Site Access E
Site Access B
Site Access G
Site Access H
Site Access C
Major Slade Road
Smithfield Road
Poole Road
Bethlehem Road
10%
5%
15%
LEGEND
Unsignalized Intersection
Signalized Intersection
Right-In/Right-Out Intersection
X% Entering Trip Distribution
(Y%) Exiting Trip Distribution
XX% Regional Trip Distribution
RAMEY KEMP ASSOCIATES
Poole and Smithfield
Knightdale, NC
Residential
Site Trip Distribution
-Phase 2
Scale: Not to Scale
Figure 8c


SITE
SITE
64
Westbound Off-Ramp
Eastbound On-Ramp
Westbound On-Ramp
Eastbound Off-Ramp
Sandy Run
Site Access A
Site Access D
Site Access E
Site Access B
Site Access F
Site Access I
Site Access G
Site Access H
Site Access C
Major Slade Road
Smithfield Road
Poole Road
Bethlehem Road
15%
30%
10%
5%
LEGEND
Unsignalized Intersection
Signalized Intersection
Right-In/Right-Out Intersection
X% Entering Trip Distribution
(Y%) Exiting Trip Distribution
XX% Regional Trip Distribution
RAMEY KEMP ASSOCIATES
Poole and Smithfield
Knightdale, NC
Residential
Site Trip Distribution
-Full-Build
Scale: Not to Scale
Figure 8d


SITE
SITE
64
15%
30%
Westbound Off-Ramp
Eastbound On-Ramp
Westbound On-Ramp
Eastbound Off-Ramp
Sandy Run
Site Access A
Site Access D
Site Access E
Site Access G
Site Access H
Major Slade Road
Smithfield Road
Poole Road
Bethlehem Road
10%
5%
15%
LEGEND
Unsignalized Intersection
Signalized Intersection
Right-In/Right-Out Intersection
X% Entering Trip Distribution
(Y%) Exiting Trip Distribution
XX% Regional Trip Distribution
RAMEY KEMP ASSOCIATES
Poole and Smithfield
Knightdale, NC
Commercial
Site Trip Distribution - Phase 1B
Scale: Not to Scale
Figure 9a

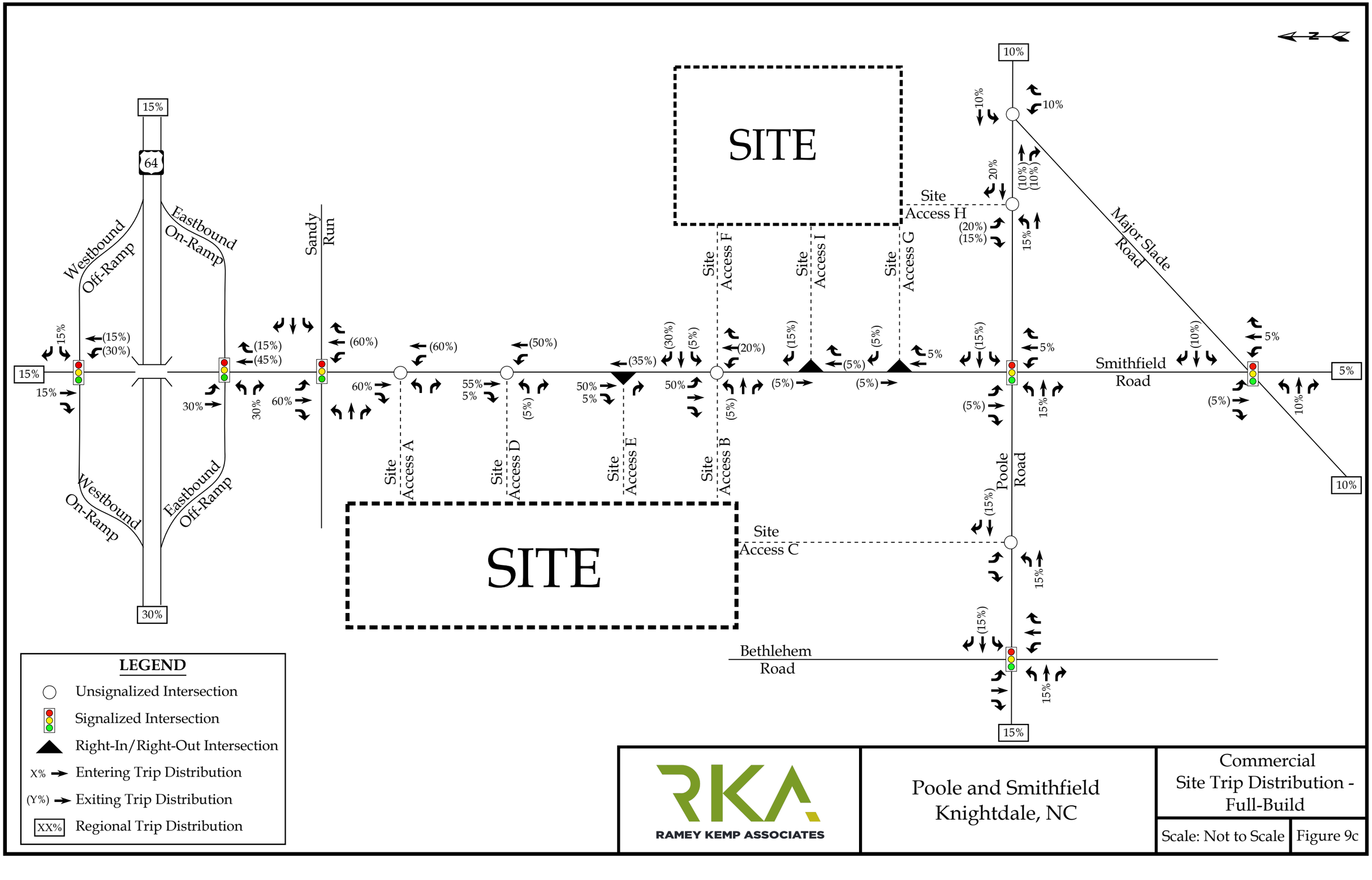


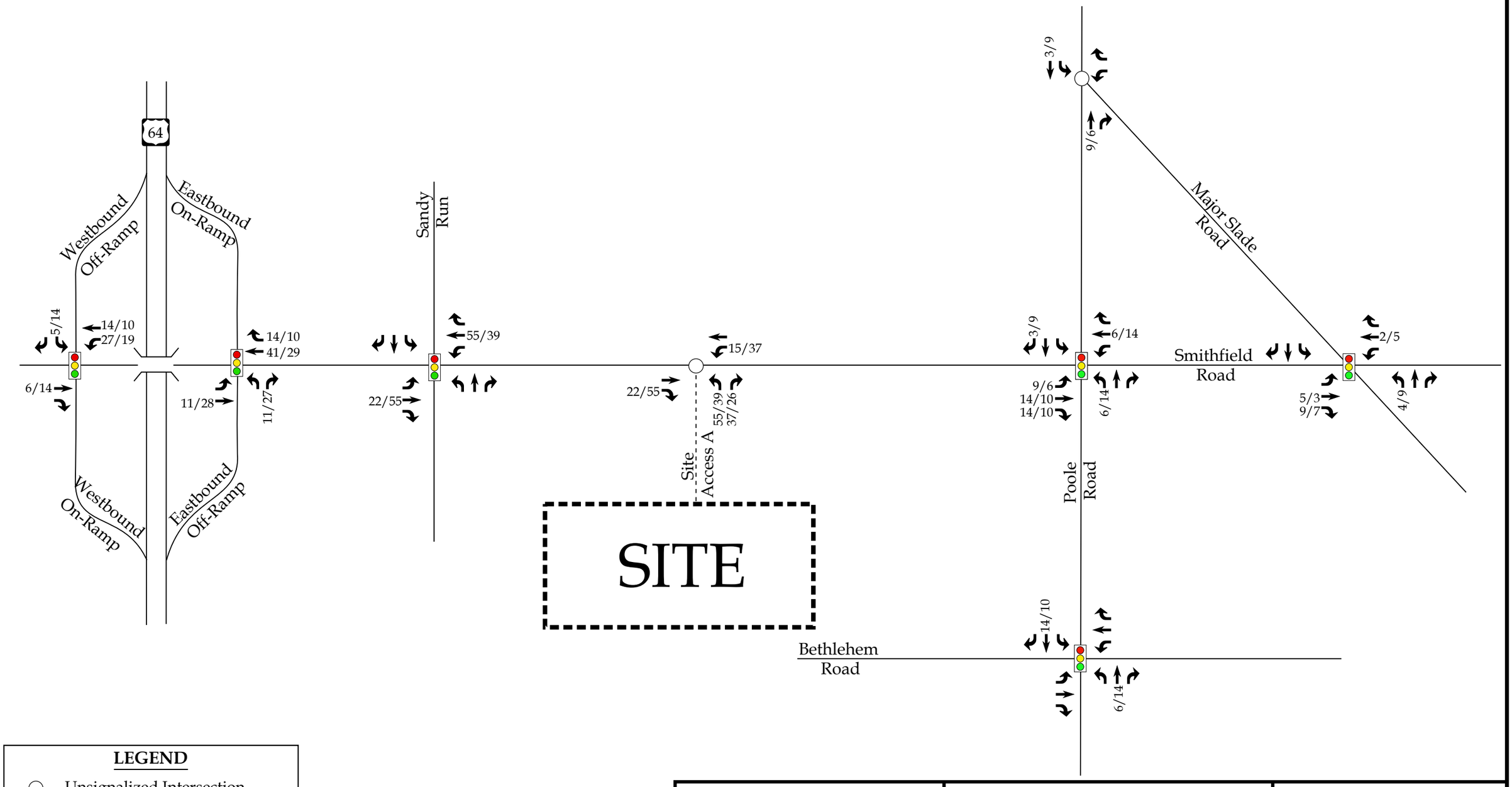
RAMEY KEMP ASSOCIATES

Poole and Smithfield
Knightdale, NC

Commercial
Site Trip Distribution - Phase 2

Scale: Not to Scale | Figure 9b


SITE
SITE
64
15%
30%
Westbound Off-Ramp
Eastbound On-Ramp
Westbound On-Ramp
Eastbound Off-Ramp
Sandy Run
Site Access A
Site Access D
Site Access E
Site Access B
Site Access F
Site Access I
Site Access G
Site Access H
Site Access C
Major Slade Road
Smithfield Road
Poole Road
Bethlehem Road
10%
5%
15%
LEGEND
Unsignalized Intersection
Signalized Intersection
Right-In/Right-Out Intersection
X% Entering Trip Distribution
(Y%) Exiting Trip Distribution
XX% Regional Trip Distribution
RAMEY KEMP ASSOCIATES
Poole and Smithfield
Knightdale, NC
Commercial
Site Trip Distribution -
Full-Build
Scale: Not to Scale
Figure 9c



LEGEND

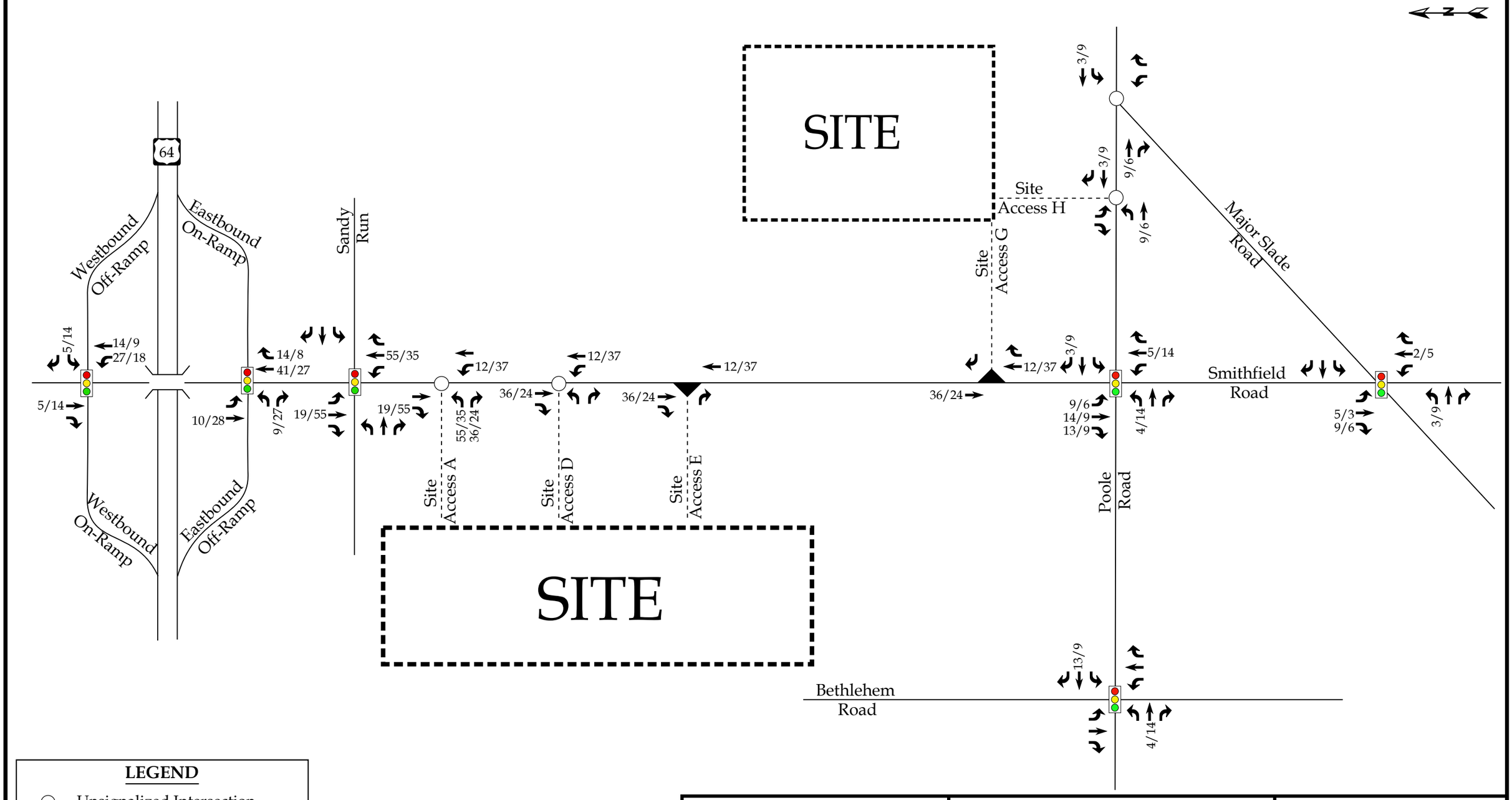
- ○ Unsignalized Intersection
- Signalized Intersection
- X / Y → Weekday AM / PM Peak Hour Site Trips

RAMEY KEMP ASSOCIATES

Poole and Smithfield
Knightdale, NC

Residential
Site Trip Assignment
-Phase 1a

Scale: Not to Scale | Figure 10a



LEGEND

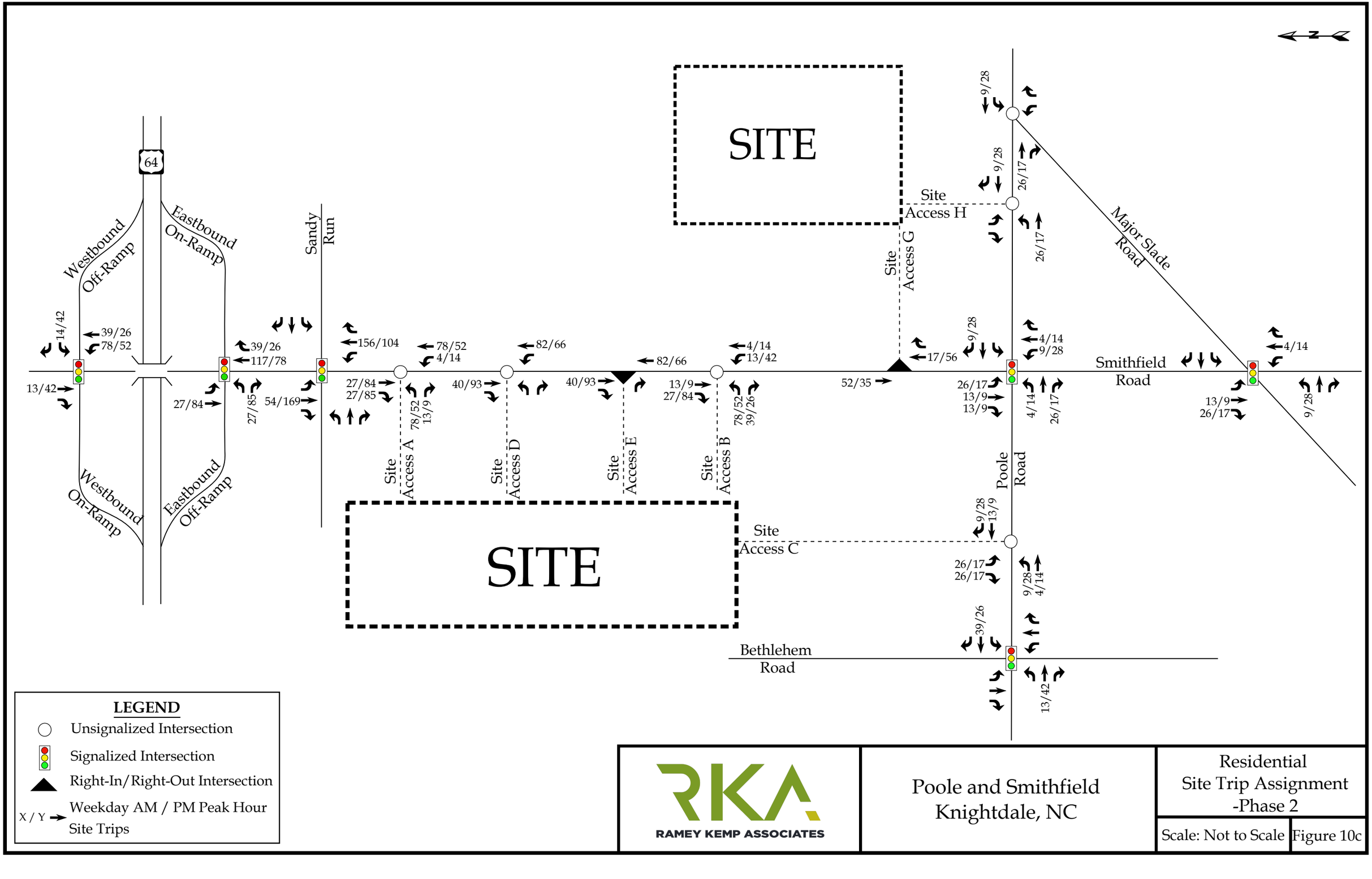
- Unsignalized Intersection
- Signalized Intersection
- X / Y → Weekday AM / PM Peak Hour Site Trips

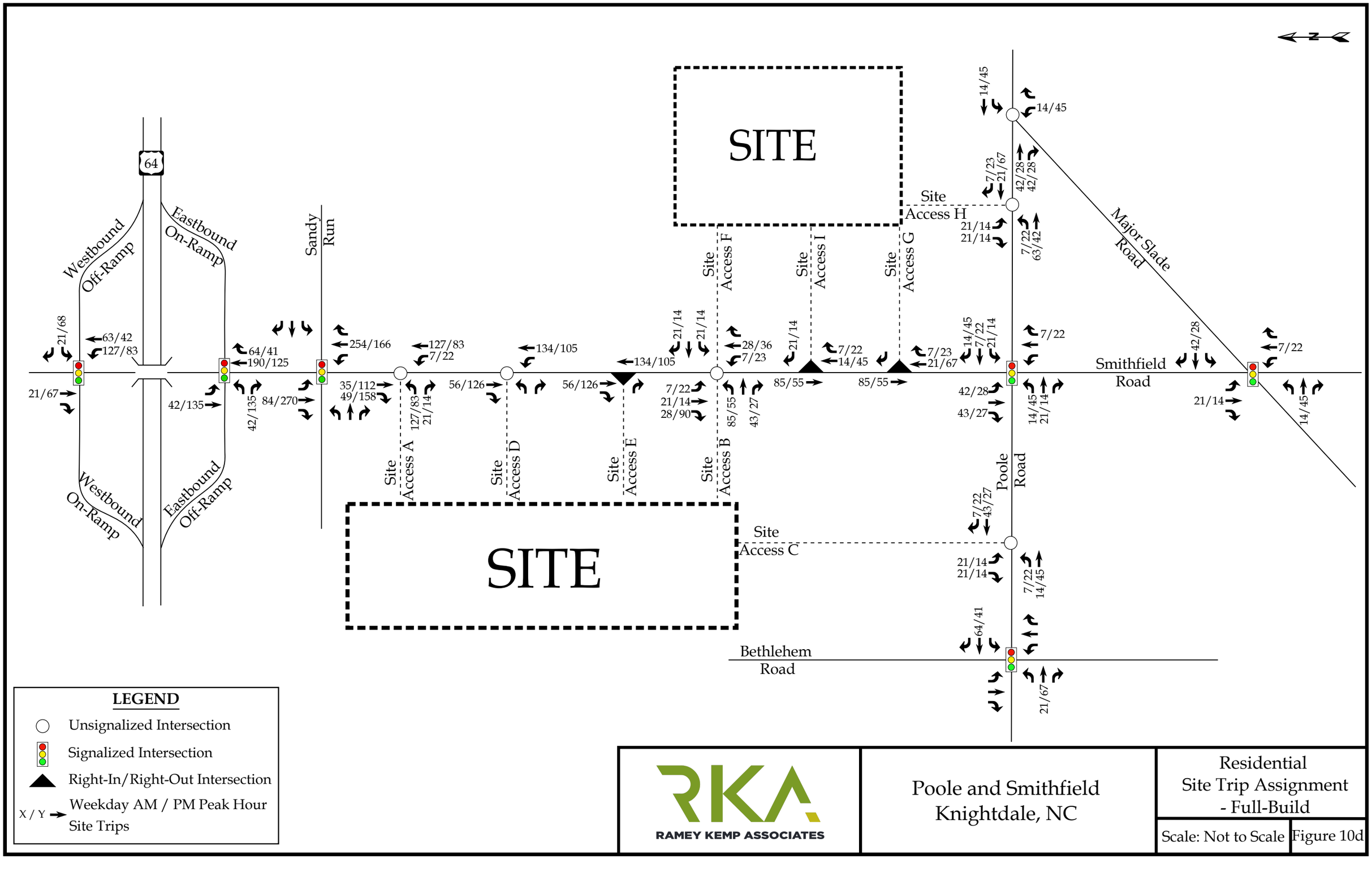
RAMEY KEMP ASSOCIATES

Poole and Smithfield
Knightdale, NC

Residential
Site Trip Assignment
-Phase 1b

Scale: Not to Scale | Figure 10b


SITE
SITE
64
Westbound Off-Ramp
Eastbound On-Ramp
Westbound On-Ramp
Eastbound Off-Ramp
Sandy Run
Site Access A
Site Access D
Site Access E
Site Access B
Site Access G
Site Access H
Site Access C
Major Slade Road
Smithfield Road
Poole Road
Bethlehem Road
14/42
13/42
39/26
78/52
27/84
27/85
39/26
117/78
54/169
156/104
27/84
27/85
78/52
4/14
78/52
13/9
82/66
40/93
82/66
40/93
82/66
4/14
13/42
13/9
27/84
78/52
39/26
52/35
17/56
9/28
9/28
9/28
26/17
26/17
9/28
4/14
9/28
26/17
13/9
13/9
4/14
26/17
13/9
26/17
4/14
9/28
9/28
13/9
26/17
26/17
9/28
4/14
39/26
13/42
LEGEND
Unsignalized Intersection
Signalized Intersection
Right-In/Right-Out Intersection
X / Y
Weekday AM / PM Peak Hour Site Trips
RAMEY KEMP ASSOCIATES
Poole and Smithfield
Knightdale, NC
Residential
Site Trip Assignment
-Phase 2
Scale: Not to Scale
Figure 10c



LEGEND

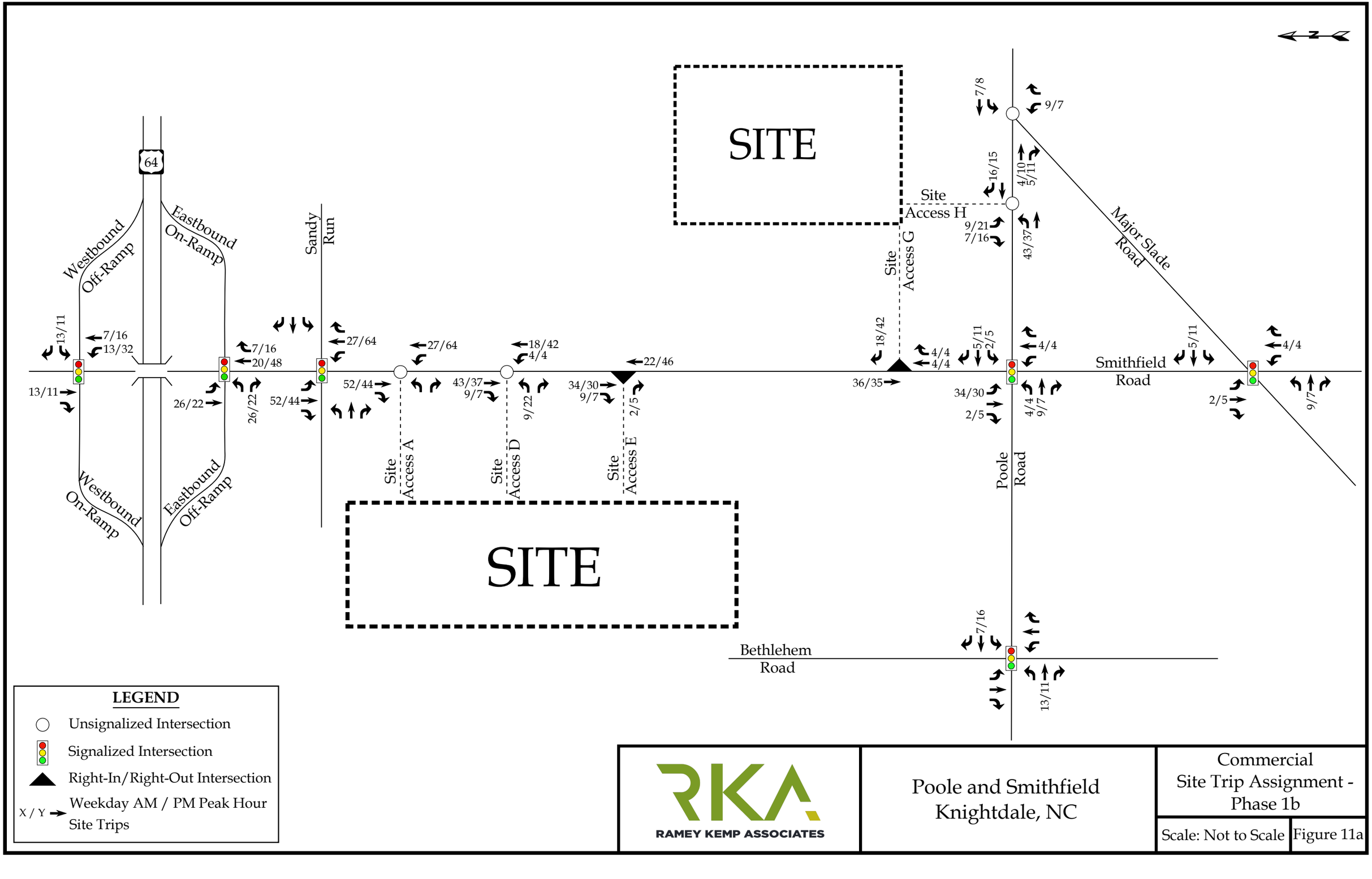
- Unsignalized Intersection
- Signalized Intersection
- Right-In/Right-Out Intersection
- X / Y → Weekday AM / PM Peak Hour Site Trips

RAMEY KEMP ASSOCIATES

Poole and Smithfield
Knightdale, NC

Residential
Site Trip Assignment
- Full-Build

Scale: Not to Scale | Figure 10d

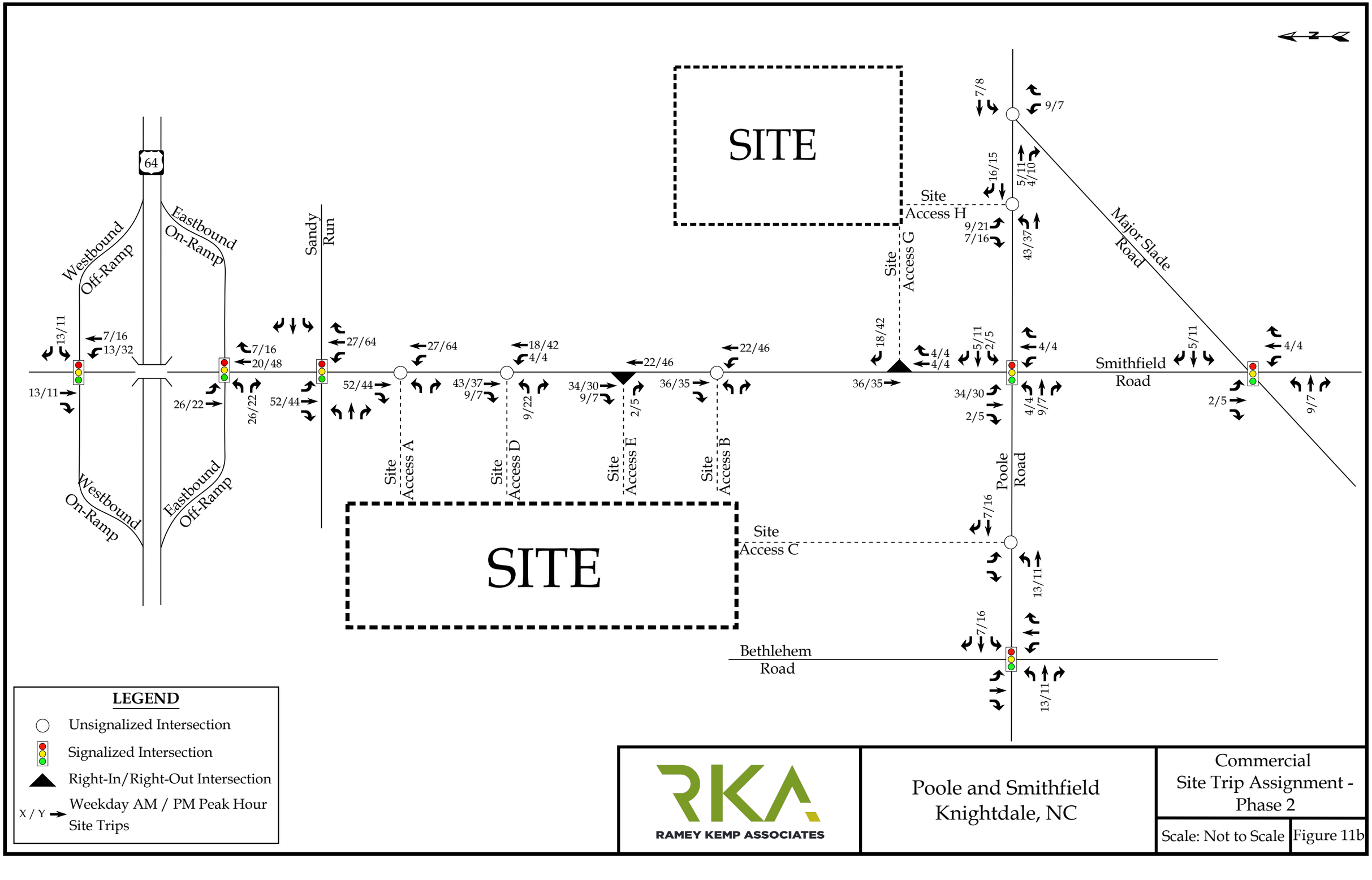


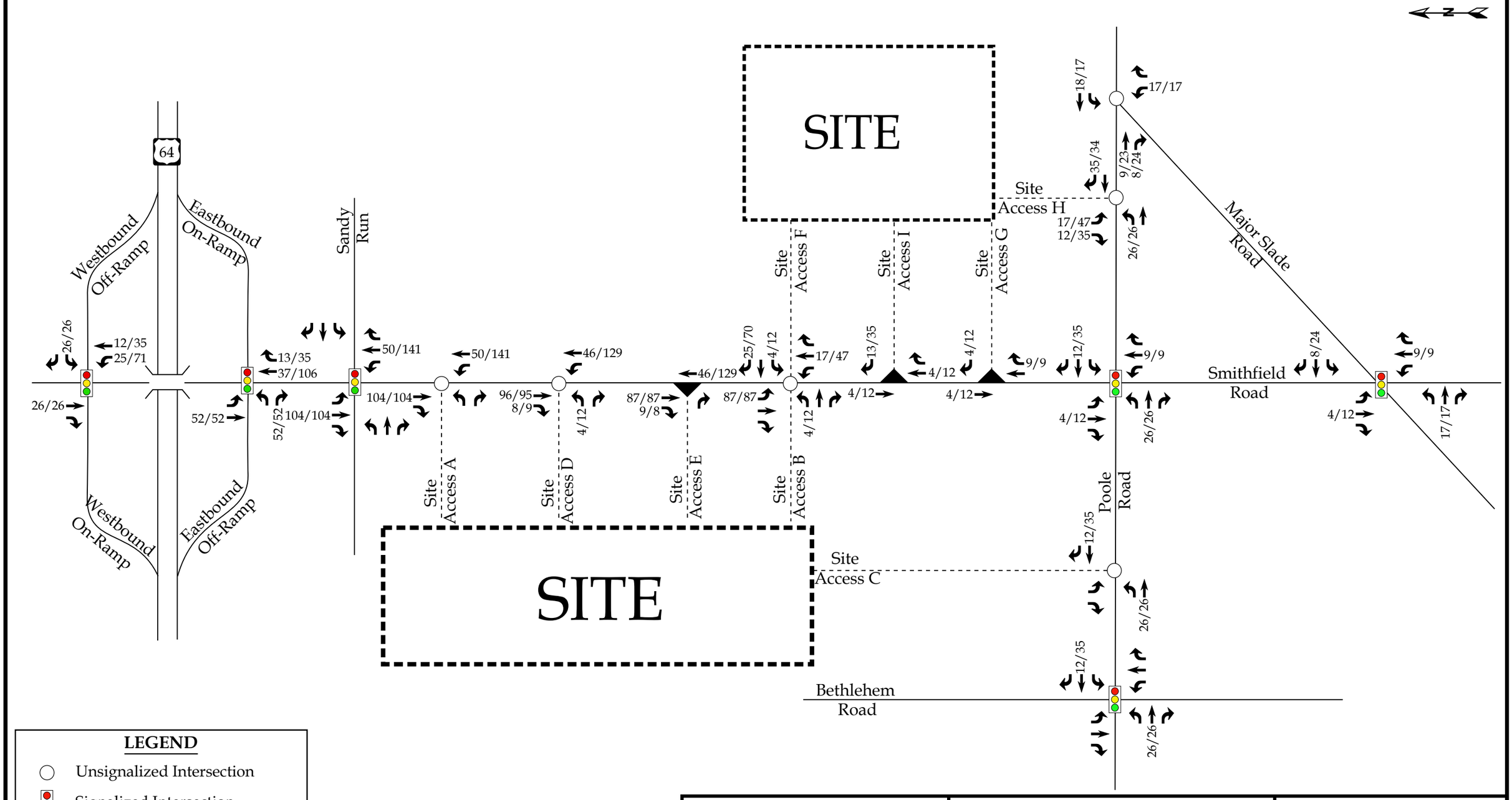
RAMEY KEMP ASSOCIATES

Poole and Smithfield
Knightdale, NC

Commercial
Site Trip Assignment - Phase 1b

Scale: Not to Scale | Figure 11a


SITE
SITE
64
Westbound Off-Ramp
Eastbound On-Ramp
Westbound On-Ramp
Eastbound Off-Ramp
Sandy Run
Site Access A
Site Access D
Site Access E
Site Access B
Site Access G
Site Access H
Site Access C
Major Slade Road
Smithfield Road
Poole Road
Bethlehem Road
13/11
7/16
13/32
20/48
26/22
52/44
27/64
43/37
9/7
9/22
18/42
4/4
34/30
9/7
2/5
22/46
36/35
5/11
2/5
4/4
7/8
9/7
16/15
5/11
4/10
9/21
7/16
43/37
2/5
13/11
7/16
LEGEND
Unsignalized Intersection
Signalized Intersection
Right-In/Right-Out Intersection
X / Y Weekday AM / PM Peak Hour Site Trips
RAMEY KEMP ASSOCIATES
Poole and Smithfield
Knightdale, NC
Commercial
Site Trip Assignment - Phase 2
Scale: Not to Scale
Figure 11b

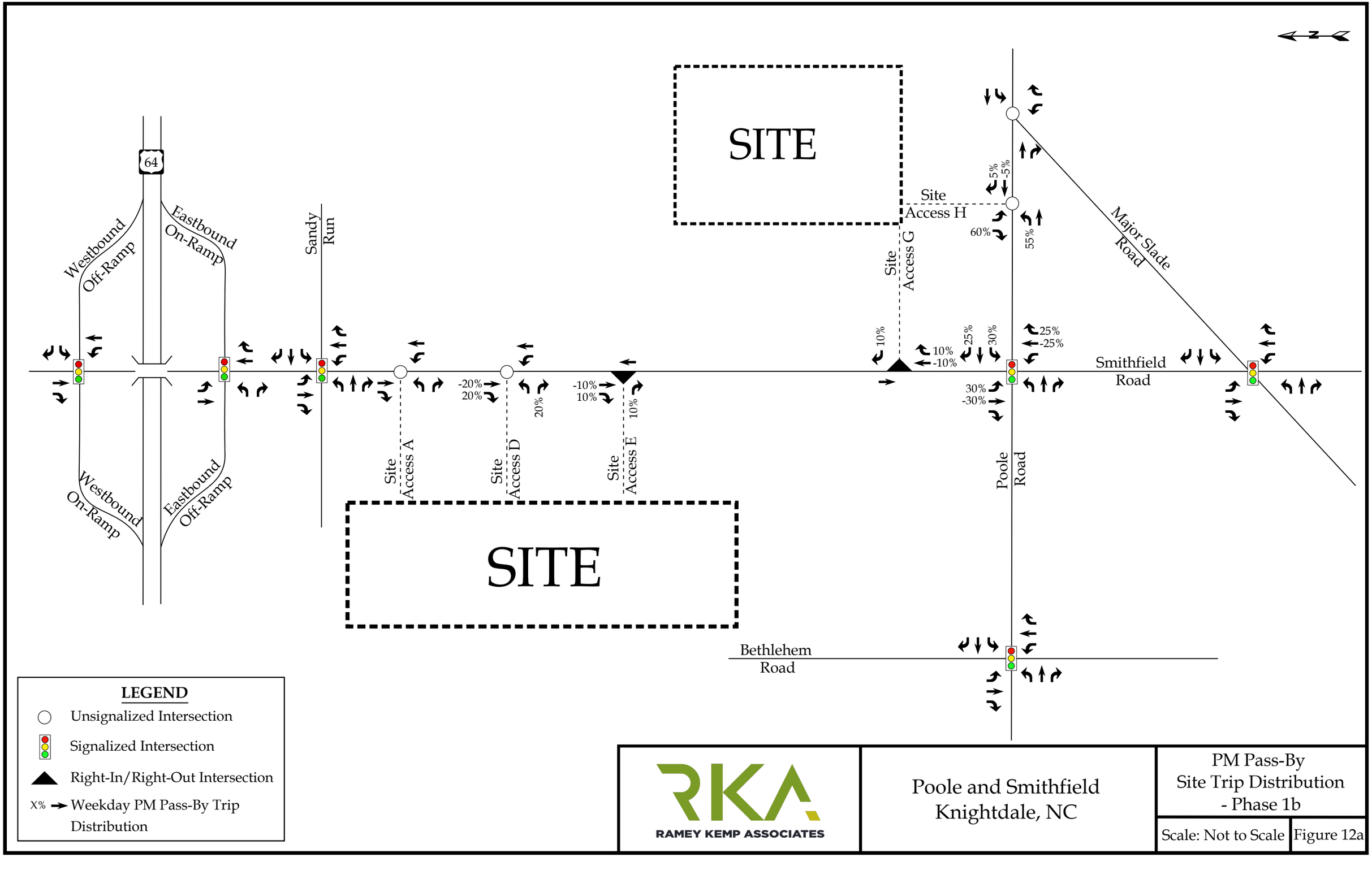


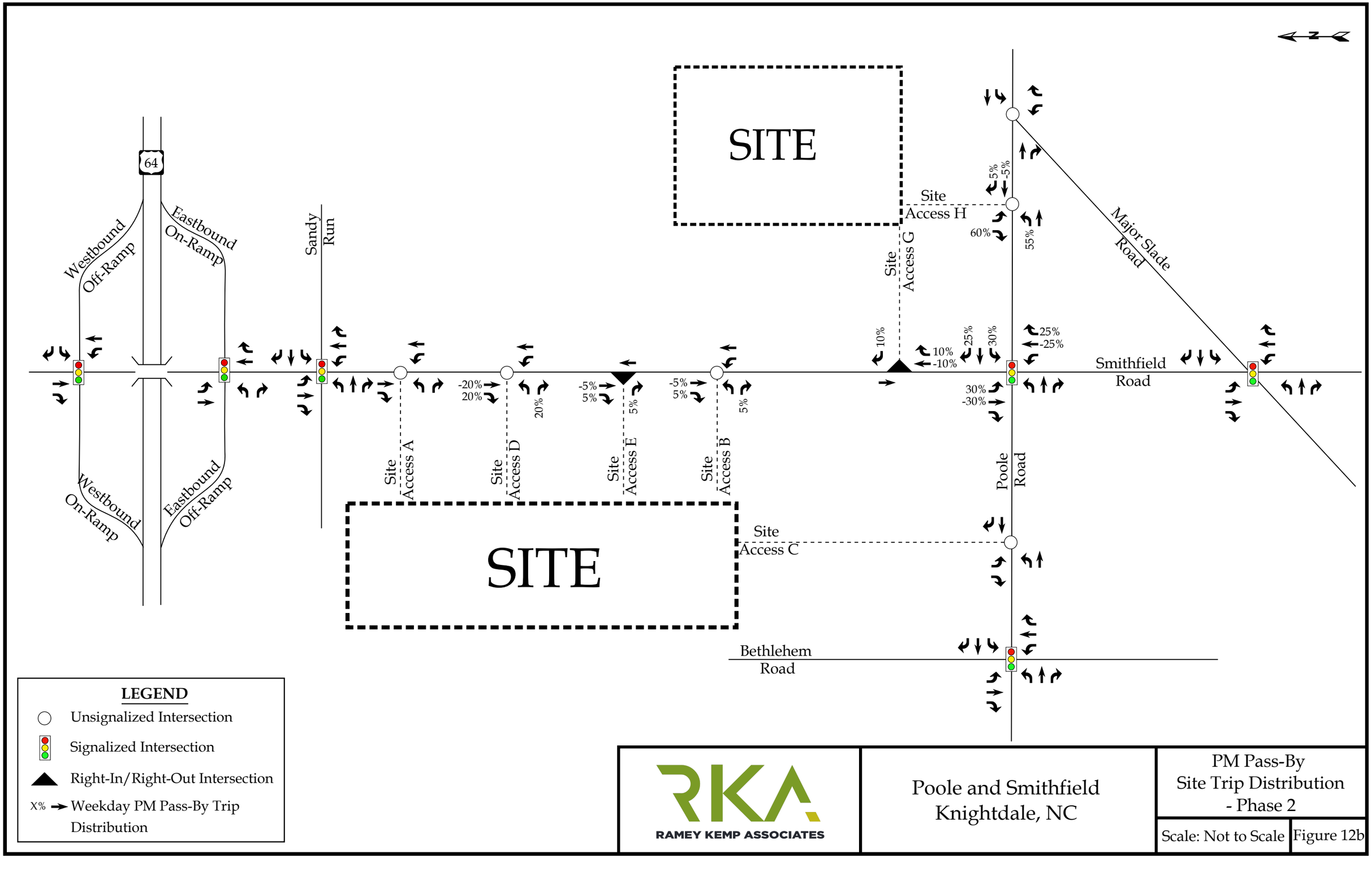
RAMEY KEMP ASSOCIATES

Poole and Smithfield
Knightdale, NC

Commercial
Site Trip Assignment - Full-Build

Scale: Not to Scale | Figure 11c


SITE
SITE
64
Westbound Off-Ramp
Eastbound On-Ramp
Westbound On-Ramp
Eastbound Off-Ramp
Sandy Run
Site Access A
Site Access D
Site Access E
Site Access G
Site Access H
Major Slade Road
Smithfield Road
Poole Road
Bethlehem Road
-20%
20%
20%
-10%
10%
10%
10%
10%
-10%
25%
30%
25%
-25%
30%
-30%
5%
-5%
60%
55%
LEGEND
Unsignalized Intersection
Signalized Intersection
Right-In/Right-Out Intersection
X% Weekday PM Pass-By Trip Distribution
RAMEY KEMP ASSOCIATES
Poole and Smithfield
Knightdale, NC
PM Pass-By
Site Trip Distribution
- Phase 1b
Scale: Not to Scale
Figure 12a

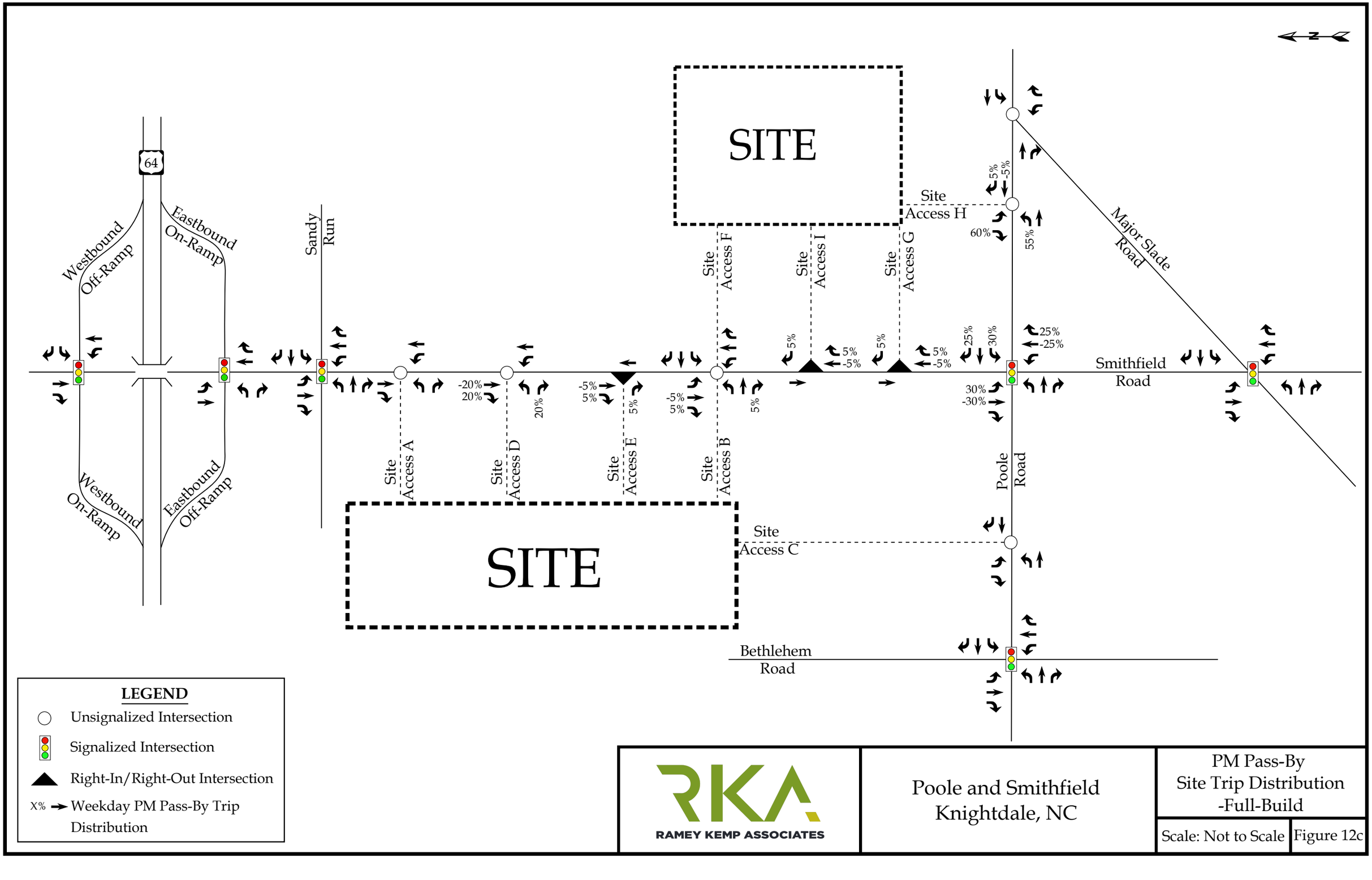


RAMEY KEMP ASSOCIATES

Poole and Smithfield
Knightdale, NC

PM Pass-By
Site Trip Distribution
- Phase 2

Scale: Not to Scale | Figure 12b

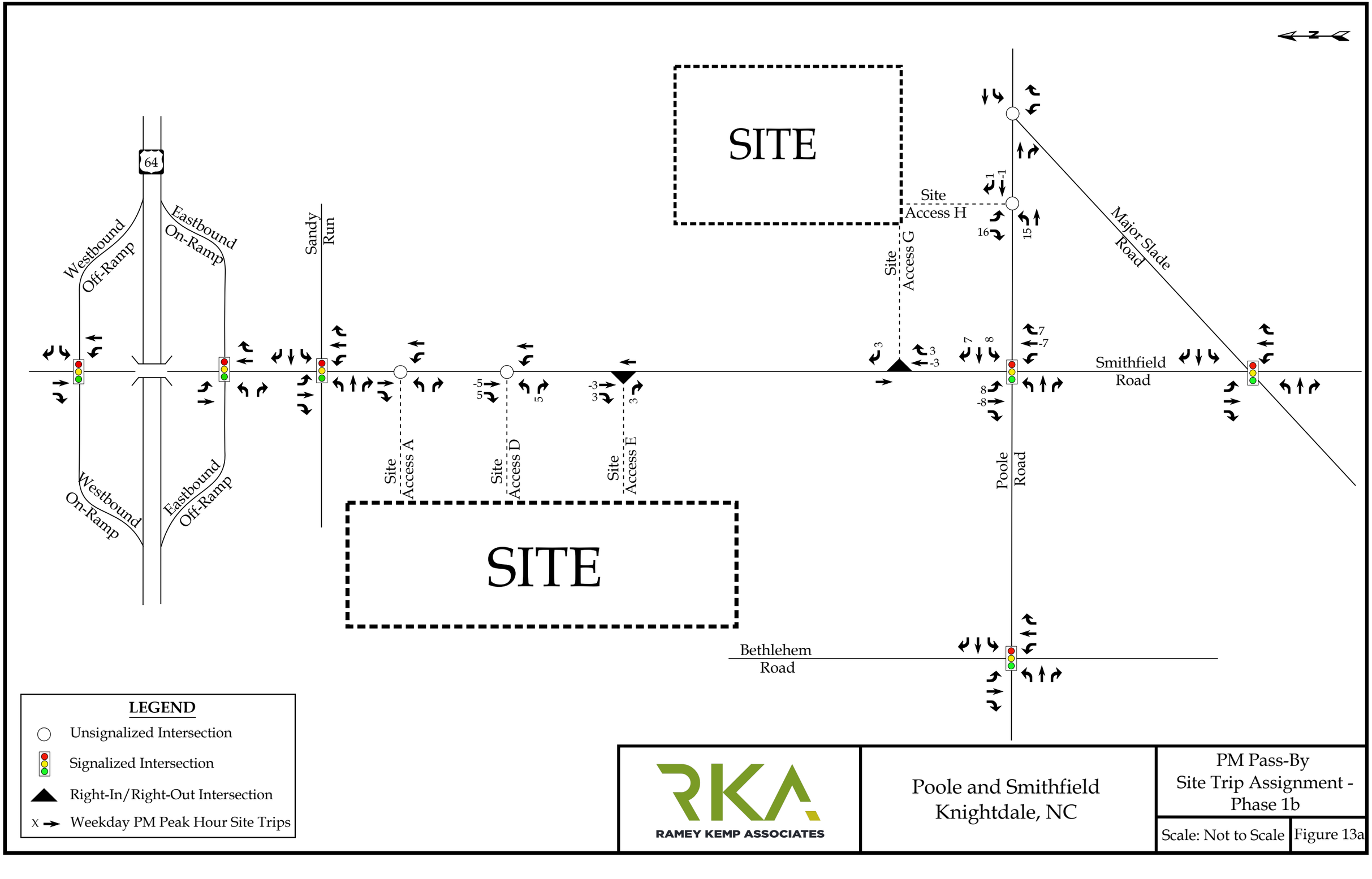


RAMEY KEMP ASSOCIATES

Poole and Smithfield
Knightdale, NC

PM Pass-By
Site Trip Distribution
-Full-Build

Scale: Not to Scale | Figure 12c

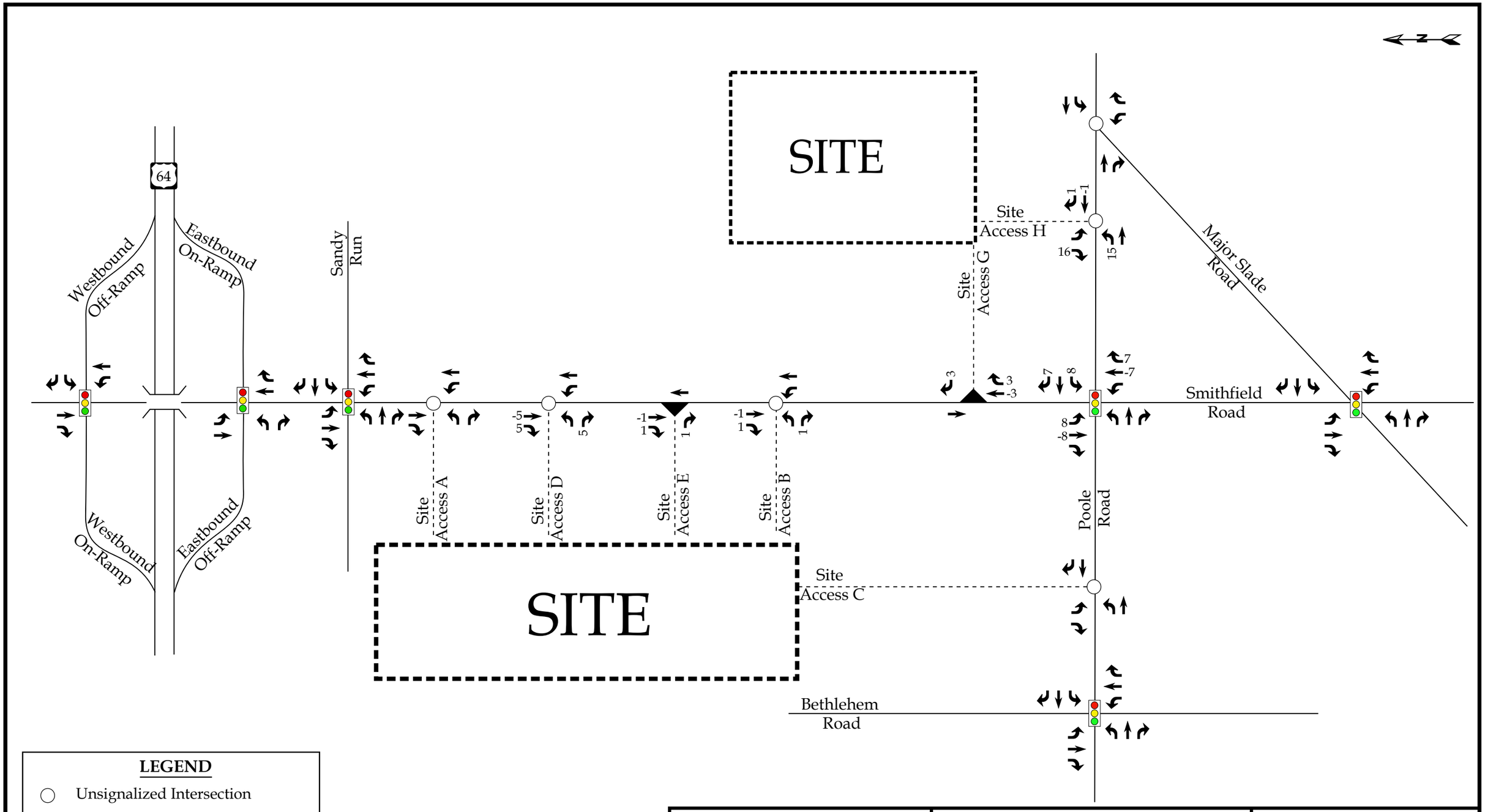


RAMEY KEMP ASSOCIATES

Poole and Smithfield
Knightdale, NC

PM Pass-By
Site Trip Assignment - Phase 1b

Scale: Not to Scale | Figure 13a

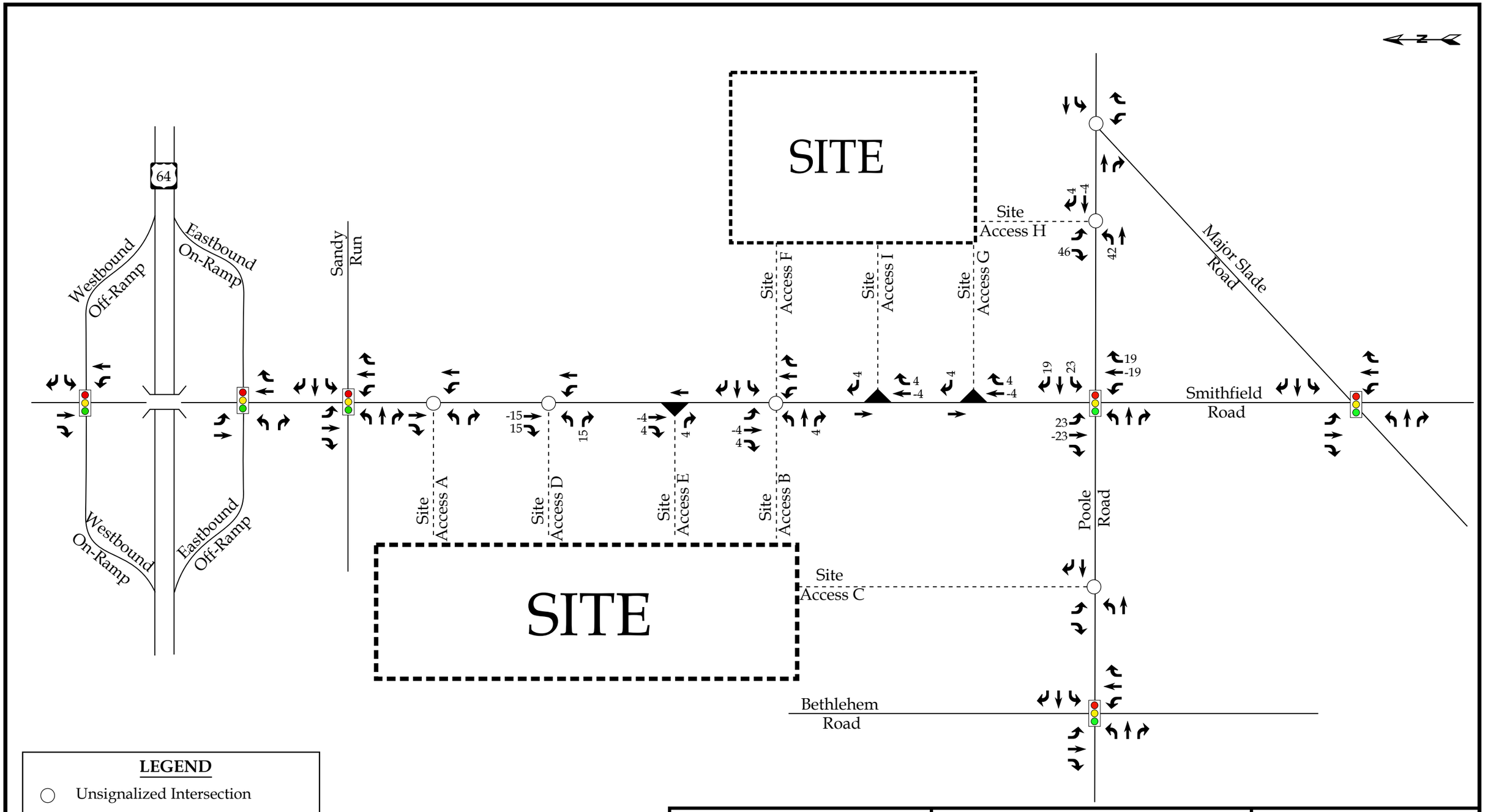


RAMEY KEMP ASSOCIATES

Poole and Smithfield
Knightdale, NC

PM Pass-By
Site Trip Assignment - Phase 2

Scale: Not to Scale | Figure 13b



LEGEND

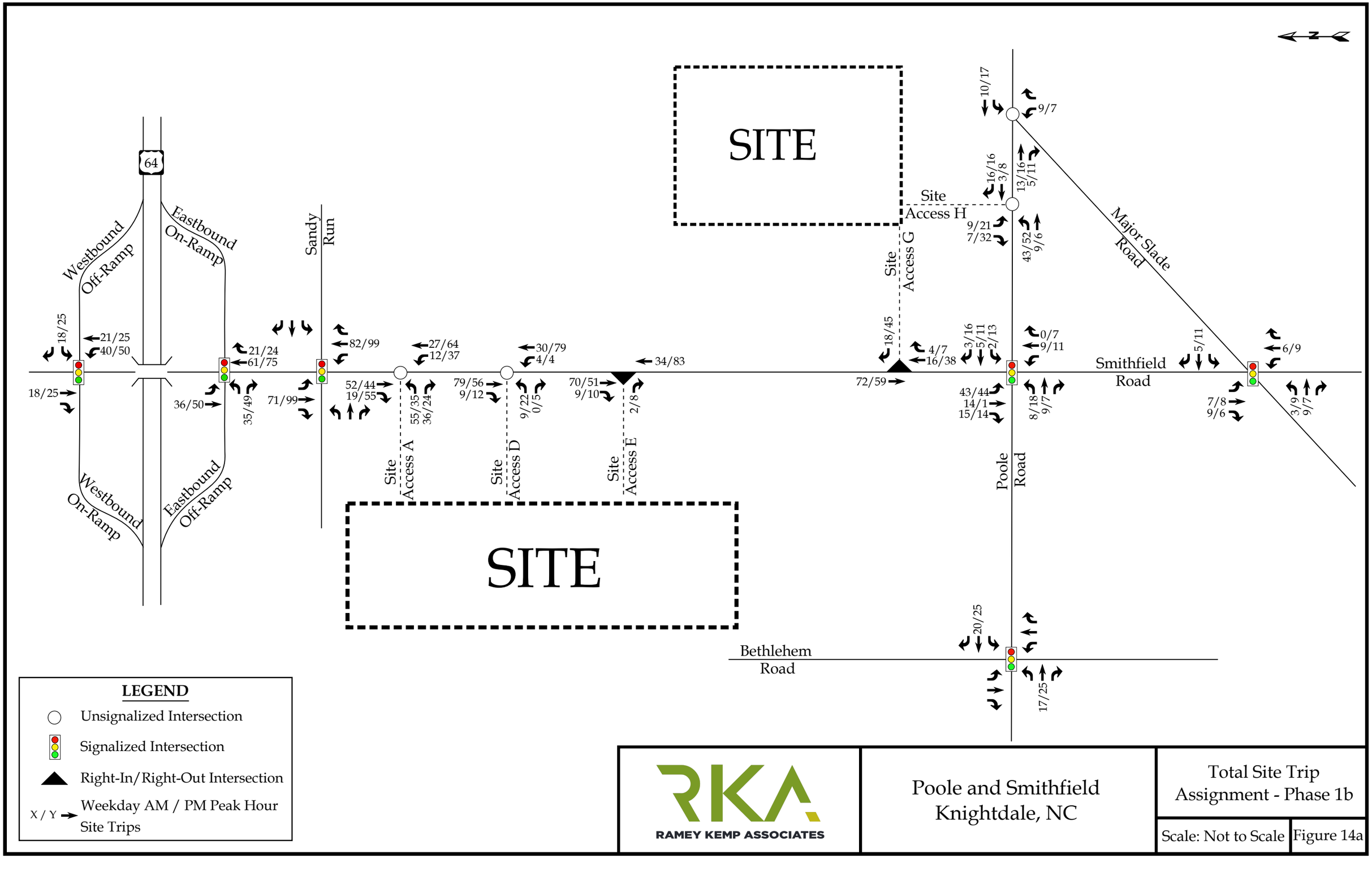
- Unsignalized Intersection
- Signalized Intersection
- Right-In/Right-Out Intersection
- X → Weekday PM Peak Hour Site Trips

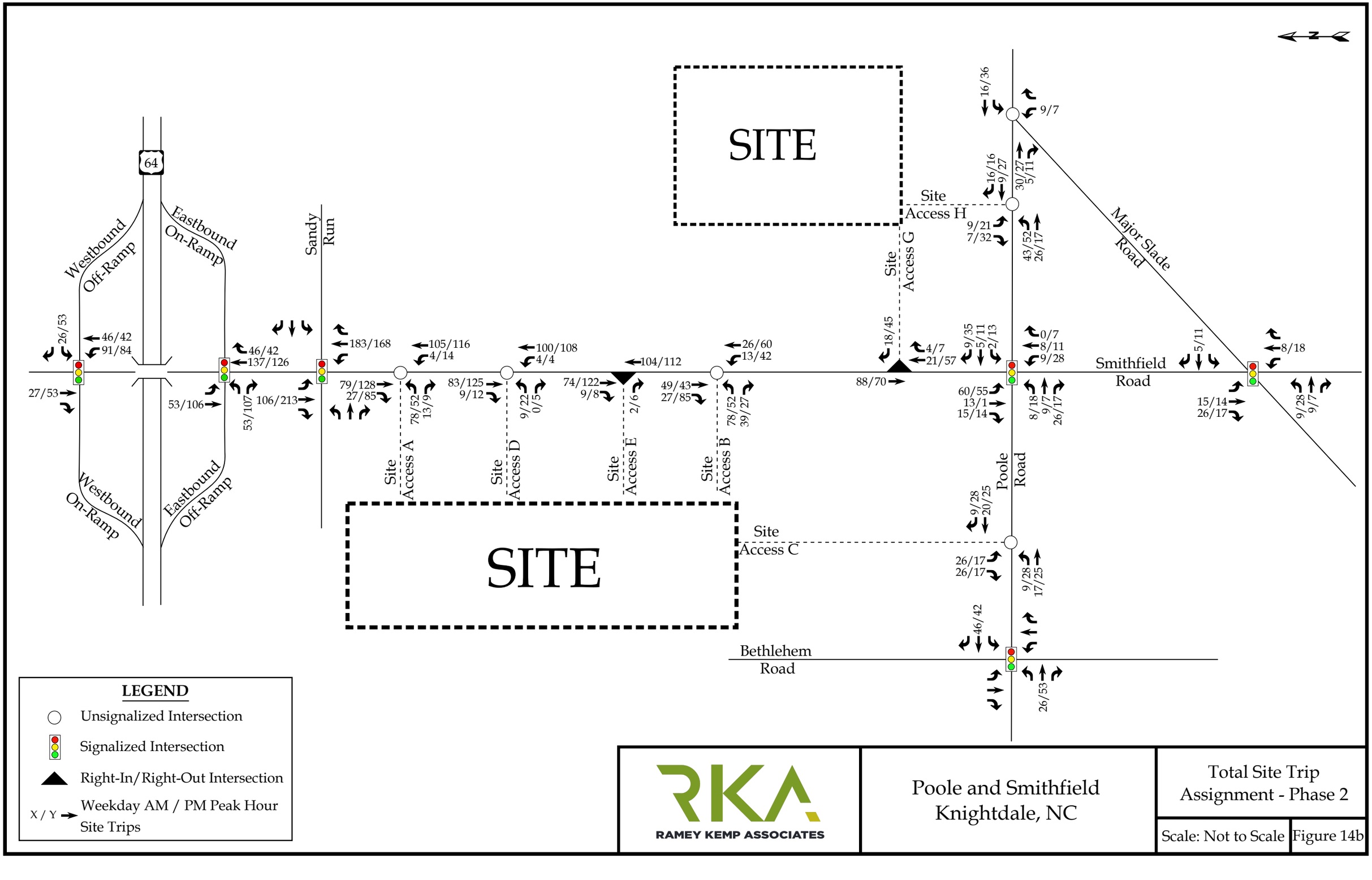
RAMEY KEMP ASSOCIATES

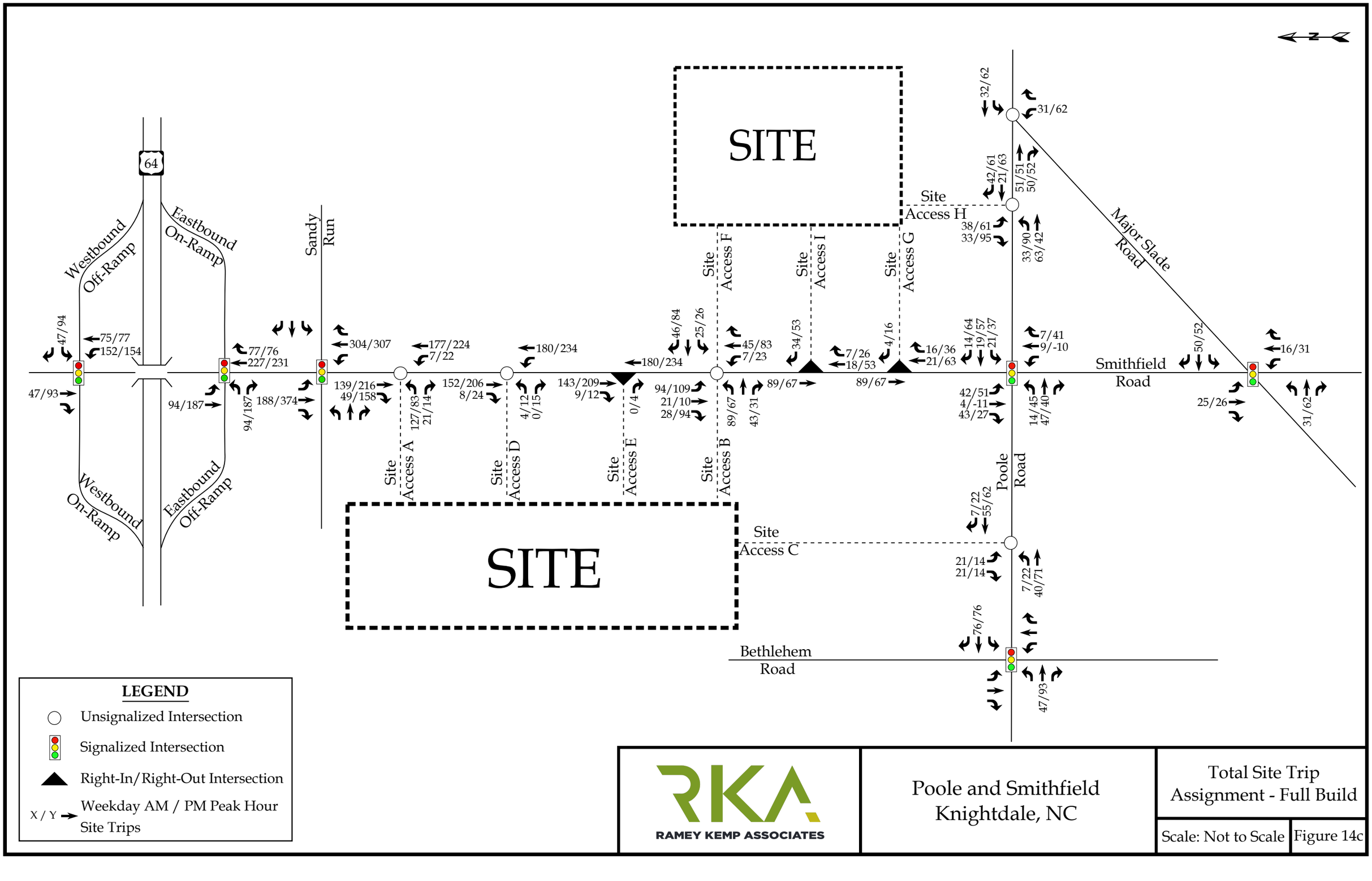
Poole and Smithfield
Knightdale, NC

PM Pass-By
Site Trip Assignment - Full Build

Scale: Not to Scale | Figure 13c


SITE
SITE
64
Westbound Off-Ramp
Eastbound On-Ramp
Westbound On-Ramp
Eastbound Off-Ramp
Sandy Run
Site Access A
Site Access D
Site Access E
Site Access G
Site Access H
Major Slade Road
Smithfield Road
Poole Road
Bethlehem Road
18/25
21/25
40/50
18/25
21/24
61/75
36/50
35/49
71/99
82/99
52/44
19/55
27/64
12/37
55/35
36/24
30/79
4/4
79/56
9/12
9/22
0/5
70/51
9/10
34/83
2/8
18/45
72/59
4/7
16/38
10/17
9/7
16/16
3/8
13/16
5/11
9/21
7/32
43/52
9/6
3/16
5/11
2/13
0/7
9/11
43/44
14/1
15/14
8/18
9/7
5/11
6/9
7/8
9/6
3/9
9/7
20/25
17/25
LEGEND
Unsignalized Intersection
Signalized Intersection
Right-In/Right-Out Intersection
X / Y
Weekday AM / PM Peak Hour Site Trips
RAMEY KEMP ASSOCIATES
Poole and Smithfield
Knightdale, NC
Total Site Trip Assignment - Phase 1b
Scale: Not to Scale
Figure 14a


SITE
SITE
64
Westbound Off-Ramp
Eastbound On-Ramp
Westbound On-Ramp
Eastbound Off-Ramp
Sandy Run
Site Access A
Site Access D
Site Access E
Site Access B
Site Access G
Site Access H
Site Access C
Major Slade Road
Smithfield Road
Poole Road
Bethlehem Road
26/53
46/42
91/84
27/53
53/106
46/42
137/126
53/107
106/213
183/168
79/128
27/85
105/116
4/14
78/52
13/9
83/125
9/12
100/108
4/4
9/22
0/5
74/122
9/8
104/112
2/6
49/43
27/85
26/60
13/42
78/52
39/27
88/70
18/45
4/7
21/57
9/35
5/11
2/13
60/55
13/1
15/14
16/36
9/7
16/16
9/27
30/27
5/11
9/21
7/32
43/52
26/17
0/7
8/11
9/28
8/18
9/7
26/17
5/11
15/14
26/17
8/18
9/28
9/7
9/28
20/25
26/17
26/17
9/28
17/25
46/42
26/53
LEGEND
Unsignalized Intersection
Signalized Intersection
Right-In/Right-Out Intersection
X / Y
Weekday AM / PM Peak Hour Site Trips
RAMEY KEMP ASSOCIATES
Poole and Smithfield
Knightdale, NC
Total Site Trip Assignment - Phase 2
Scale: Not to Scale
Figure 14b



LEGEND

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

RAMEY KEMP ASSOCIATES

Poole and Smithfield
Knightdale, NC

Total Site Trip Assignment - Full Build

Scale: Not to Scale | Figure 14c

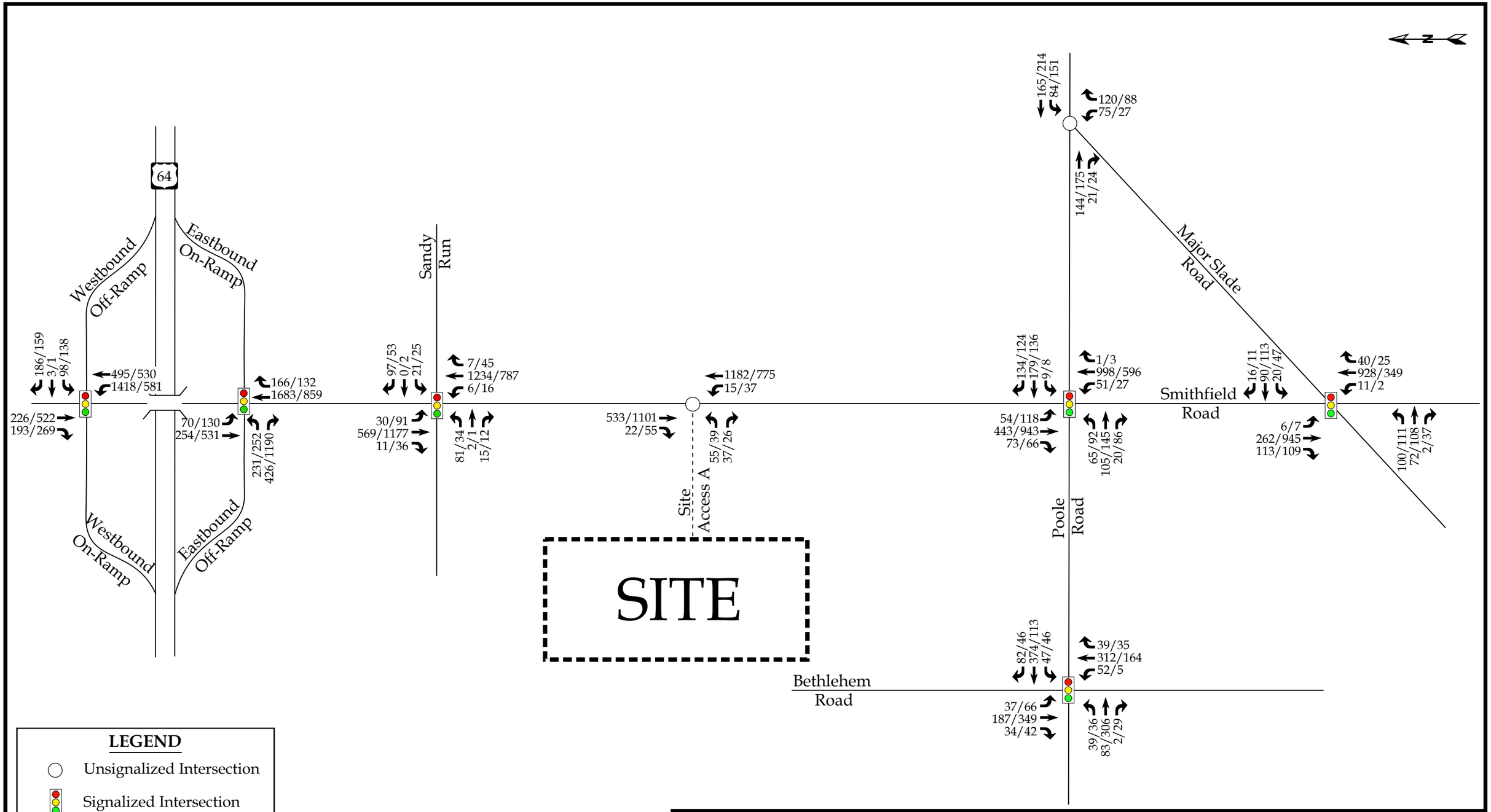
5. 2026/2029/2032 BUILD TRAFFIC CONDITIONS

5.1. 2026/2029/2032 Build Peak Hour Traffic Volumes

To estimate traffic conditions with the site fully built-out, the total site trips were added to the 2026/2029/2032 no-build traffic volumes to determine the 2026/2029/2032 build traffic volumes. Refer to Figures 15a, 15b, 15c, and 15d for an illustration of the 2026/2029/2032 build peak hour traffic volumes with the proposed site under Phase 1a, Phase 1b, Phase 2, and Full-Build, respectively.

5.2. Analysis of 2026/2029/2032 Build Peak Hour Traffic Conditions

Study intersections were analyzed with the 2026/2029/2032 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 8 of this report.



LEGEND

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

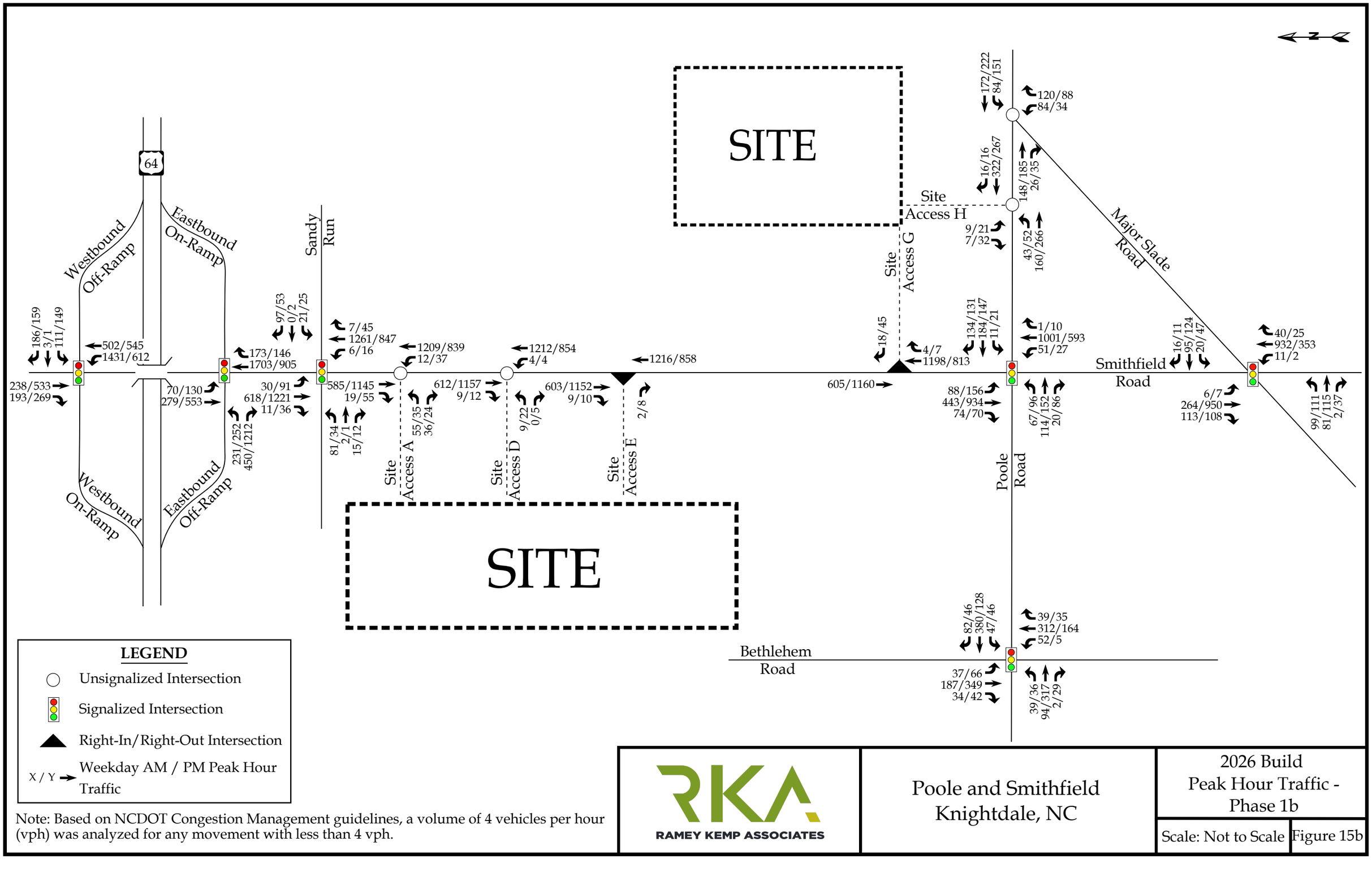
Note: Based on NCDOT Congestion Management guidelines, a volume of 4 vehicles per hour (vph) was analyzed for any movement with less than 4 vph.

RKA
RAMEY KEMP ASSOCIATES

Poole and Smithfield
Knightdale, NC

2026 Build
Peak Hour Traffic -
Phase 1a

Scale: Not to Scale | Figure 15a



LEGEND

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

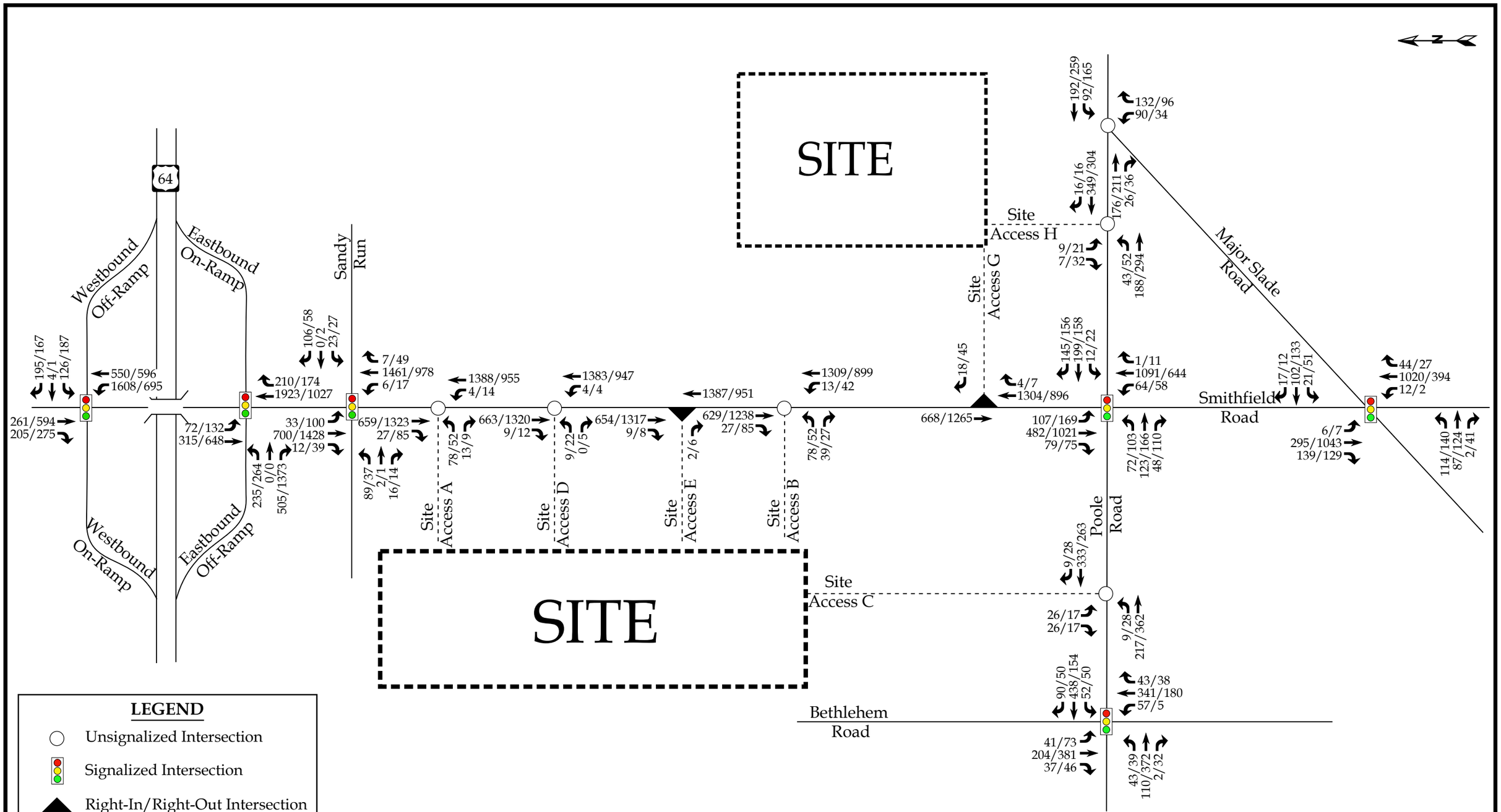
Note: Based on NCDOT Congestion Management guidelines, a volume of 4 vehicles per hour (vph) was analyzed for any movement with less than 4 vph.

RAMEY KEMP ASSOCIATES

Poole and Smithfield
Knightdale, NC

2026 Build
Peak Hour Traffic - Phase 1b

Scale: Not to Scale | Figure 15b



LEGEND

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

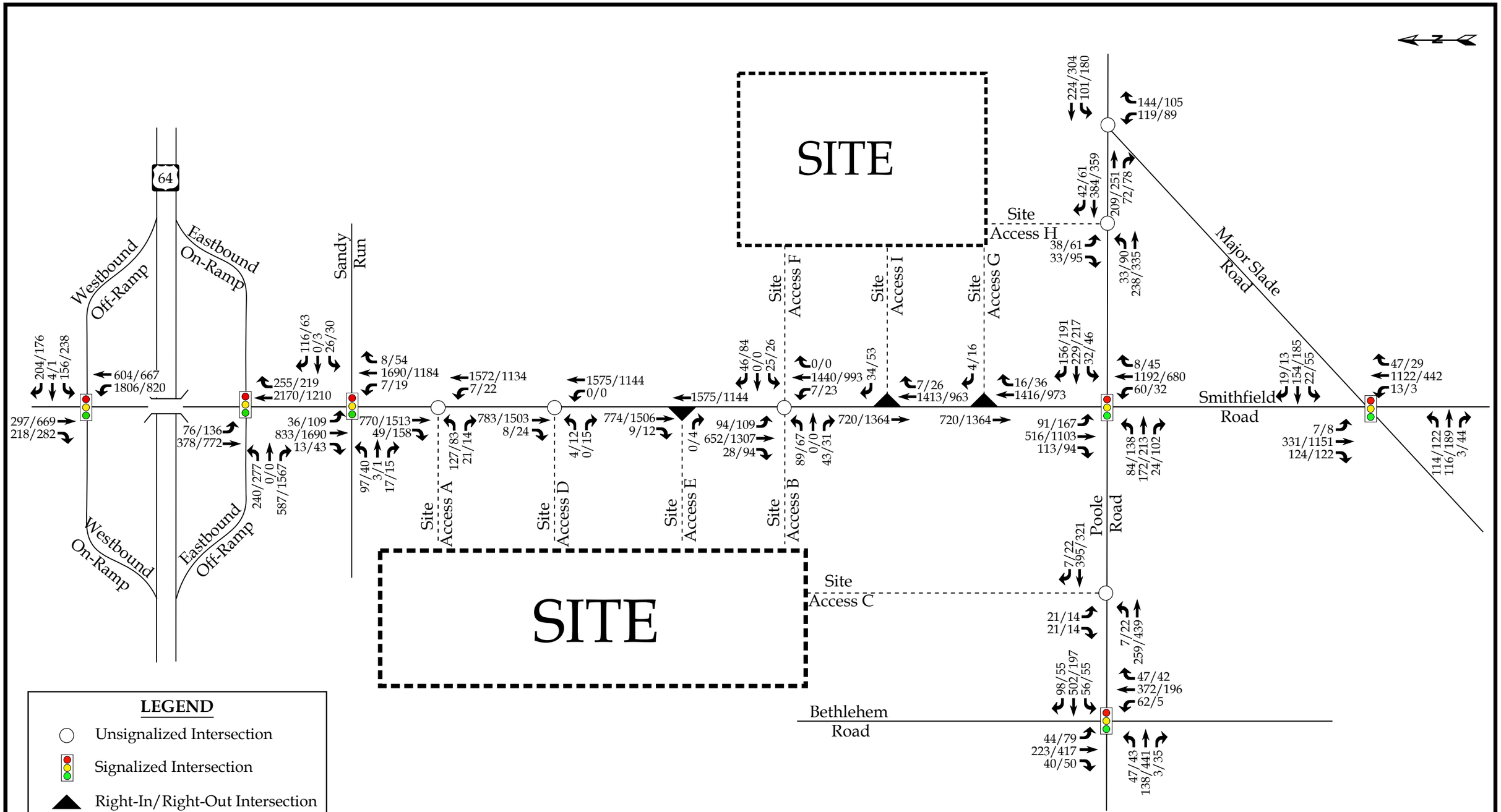
Note: Based on NCDOT Congestion Management guidelines, a volume of 4 vehicles per hour (vph) was analyzed for any movement with less than 4 vph.

RAMEY KEMP ASSOCIATES

Poole and Smithfield
Knightdale, NC

2029 Build
Peak Hour Traffic - Phase 2

Scale: Not to Scale | Figure 15c



LEGEND

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

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.

RKA
RAMEY KEMP ASSOCIATES

Poole and Smithfield
Knightdale, NC

2032 Build
Peak Hour Traffic -
Full Build

Scale: Not to Scale | Figure 15d

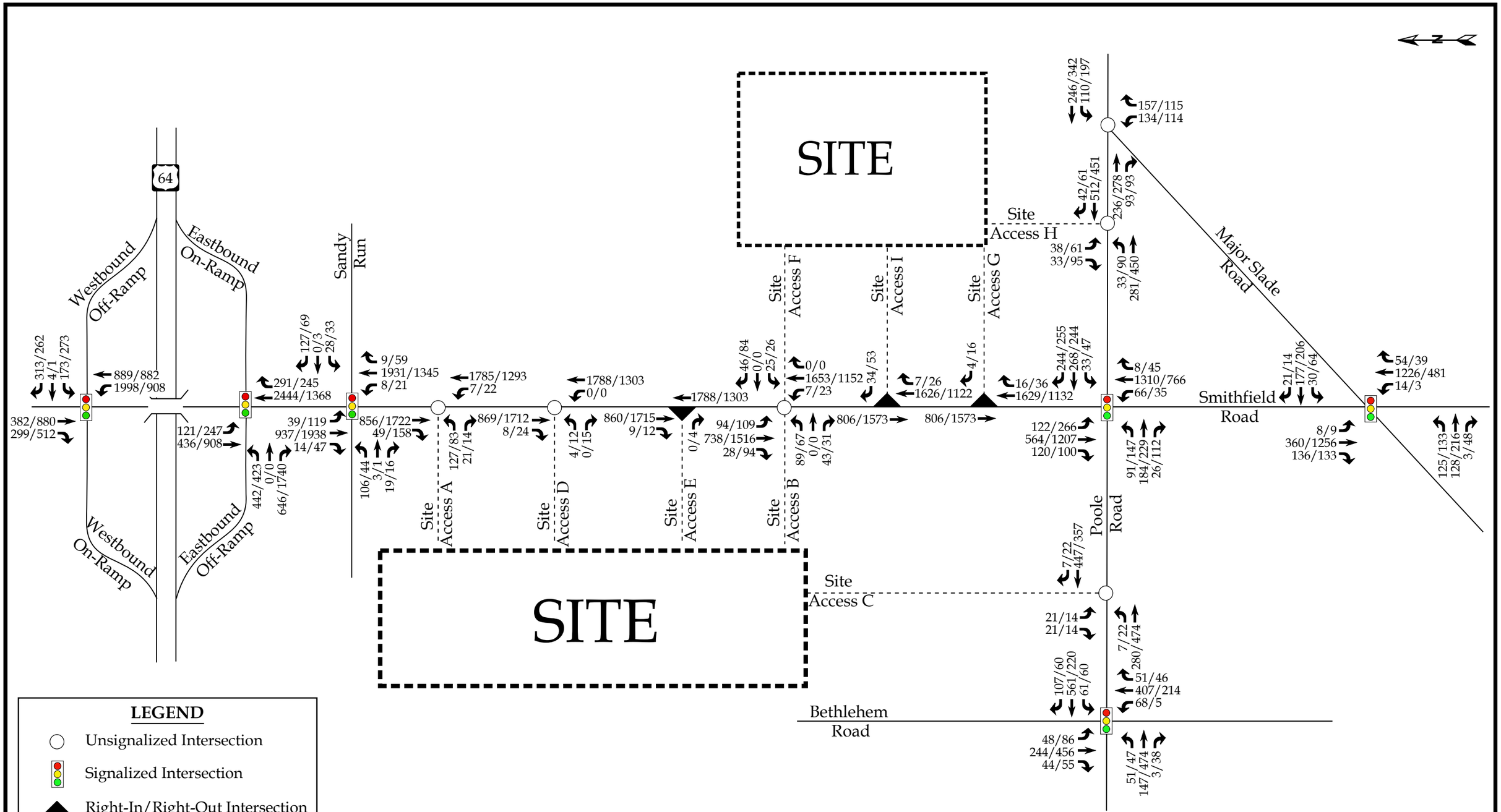
6. 2041 FUTURE TRAFFIC CONDITIONS

6.1. 2041 Future Peak Hour Traffic Volumes

Per the Town of Knightdale TIA guidelines, an analysis of the proposed development ten (10) years after build-out is required. In order to estimate traffic conditions ten years beyond build-out of the proposed development, 2032 build volumes were grown to the future year 2041 using the NCDOT and Town approved 1% annual growth rate. Refer to Figure 16 for an illustration of the 2041 future traffic volumes.

6.2. Analysis of 2041 Future Peak Hour Traffic

Study intersections were analyzed with the 2041 future traffic volumes using the same methodology previously discussed for existing, no-build, and build traffic conditions. The results of the capacity analysis for each intersection are presented in Section 8 of this report.



LEGEND

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

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

Poole and Smithfield
Knightdale, NC

2041 Future
Peak Hour Traffic

Scale: Not to Scale | Figure 16

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 11), 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 7 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 7: 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 Congestion Management Guidelines.

8. CAPACITY ANALYSIS

8.1. Poole Road [EB-WB] and Smithfield Road [NB-SB]

The existing signalized intersection of Poole Road and Smithfield Road was analyzed under 2022 existing, 2026/2029/2032 no-build, 2026/2029/2032 build, and 2041 future traffic conditions with lane configurations and traffic control shown in Table 8. It should be noted that under future conditions, STIP HL-0031 is expected to improve the intersection by adding exclusive left-turn lanes on all approaches. Refer to Table 8 for a summary of the analysis results. Refer to Appendix F for the Synchro capacity analysis reports. SimTraffic queuing reports can be found in Appendix U.

Table 8: Analysis Summary of Poole Road 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 WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	D D C A	C (24)	E D B C	C (29)
2026 No-Build	EB WB NB SB	1 LT, 1 TH-RT 1 LT, 1 TH, *1 RT* 1 LT, 1 TH-RT 1 LT, 1 TH-RT	D D F C	E (66)	D D C E	D (55)
2029 No-Build	EB WB NB SB	1 LT, 1 TH-RT 1 LT, 1 TH, *1 RT* 1 LT, 1 TH-RT 1 LT, 1 TH-RT	D D F C	F (87)	D D C F	E (77)
2032 No-Build	EB WB NB SB	1 LT, 1 TH-RT 1 LT, 1 TH, *1 RT* 1 LT, 1 TH-RT 1 LT, 1 TH-RT	D D F C	F (112)	D D D F	F (98)
2026 Build – Phase 1a	EB WB NB SB	1 LT, 1 TH-RT 1 LT, 1 TH, *1 RT* 1 LT, 1 TH-RT 1 LT, 1 TH-RT	D D F C	E (68)	D D C F	E (64)
2026 Build – Phase 1b	EB WB NB SB	1 LT, 1 TH-RT 1 LT, 1 TH, *1 RT* 1 LT, 1 TH-RT 1 LT, 1 TH-RT	D D F C	E (69)	E D C F	E (69)

Background improvements to lane configurations by STIP HL-0031 shown underlined.
Background improvements to lane configurations by the Poole Road Assemblage development shown in *italics*.

Table 8: Analysis Summary of Poole Road and Smithfield Road (*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)
2029 Build – Phase 2	EB WB NB SB	1 LT, 1 TH-RT 1 LT, 1 TH, *1 RT* 1 LT, 1 TH-RT 1 LT, 1 TH-RT	D D F C	F (90)	E D C F	F (97)
2032 Build – Full Build	EB WB NB SB	1 LT, 1 TH-RT 1 LT, 1 TH, *1 RT* 1 LT, 1 TH-RT 1 LT, 1 TH-RT	E E F C	F (123)	F E D F	F (115)
2026 Build – Phase 1a - **with Signal Timing Modifications**	EB WB NB SB	1 LT, 1 TH-RT 1 LT, 1 TH, *1 RT* 1 LT, 1 TH-RT 1 LT, 1 TH-RT	D E E C	D (50)	E D C E	D (53)
2026 Build – Phase 1b - **with Signal Timing Modifications**	EB WB NB SB	1 LT, 1 TH-RT 1 LT, 1 TH, *1 RT* 1 LT, 1 TH-RT 1 LT, 1 TH-RT	E F E C	D (53)	E D C E	D (55)
2029 Build – Phase 2 **- with Improvements**	EB WB NB SB	1 LT, 1 TH-RT 1 LT, 1 TH, *1 RT* 1 LT, 1 TH-RT 1 LT, 1 TH, **1 RT**	D D F C	F (89)	E D D F	E (66)
2032 Build – Full Build – **with Improvements**	EB WB NB SB	**1 LT**, 1 TH-RT **1 LT**, 1 TH, *1 RT* **1 LT**, 1 TH-RT **1 LT**, 1 TH, **1 RT**	E F F C	F (101)	F E D F	F (84)
2041 Future	EB WB NB SB	**1 LT**, 1 TH-RT **1 LT**, 1 TH, *1 RT* **1 LT**, 1 TH-RT **1 LT**, 1 TH, **1 RT**	E F F D	F (135)	F E E F	F (124)

Background improvements to lane configurations by STIP HL-0031 shown underlined.
Background improvements to lane configurations by the Poole Road Assemblage development shown in *italics*.
Improvements by Developer shown in bold.

Capacity analysis of 2022 existing traffic conditions indicates that the intersection of Poole Road and Smithfield Road is expected to operate at an overall LOS C during the weekday AM and PM peak hours. Under 2026 no-build conditions, the intersection is expected to operate at an overall LOS E during the weekday AM peak hour and an overall LOS D during the weekday PM peak hour. Capacity analysis of 2029/2032 no-build, 2026/2029/2032 build, and

2041 future build conditions indicates that the intersection is expected to operate at an overall poor level of service (LOS E or F) during the weekday AM and PM peak hours.

To mitigate poor levels of service experienced at the intersection under future conditions, an exclusive southbound right-turn lane was analyzed under 2029/2032 build conditions. An exclusive southbound right-turn lane with a minimum of 325 feet of storage is expected to improve delays and mitigate queue lengths under 2029/2032 build conditions to be better than that of 2029/2032 no-build conditions in the weekday PM peak hour and is recommended by the build-out of Phase 2 of the proposed development.

Under future conditions, the approved STIP HL-0031 does not provide adequate storage length for the proposed development. Therefore, left turn lanes would need to be extended for every approach to accommodate the queues associated with the approved adjacent developments as well as the proposed development. It should be noted that the northbound left and southbound left turn lanes' storage lengths are exceeded under 2032 no-build conditions. The extension of these turn lanes to accommodate queues is recommended under 2032 build - Full Build conditions.

A single-lane roundabout with exclusive right-turn slip lanes on each approach was considered at this intersection under 2032 build conditions to further improve level of service during the weekday AM and PM peak hours. Due to heavy volumes on the major-street under future conditions, a roundabout is not recommended at this intersection as it is not expected to improve operations or have an adequate lifespan per NCDOT standards.

In order to improve operations at this intersection to an overall LOS D, per the Town's Unified Development Ordinance (UDO), additional through capacity would be necessary to accommodate heavy volumes on the major thoroughfare. It should be noted that per the Comprehensive Transportation Plan (CTP), Smithfield Road is slated to become a four-lane divided roadway. Additionally, the proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to

construct a portion of the planned four-lane divided section. The future widening of Smithfield Road is expected to alleviate delays and queueing at this intersection.

8.2. Smithfield Road [NB-SB] and Sandy Run [EB-WB]

The existing signalized intersection of Smithfield Road and Sandy Run was analyzed under 2022 existing, 2026/2029/2032 no-build, 2026/2029/2032 build, and 2041 future traffic conditions with existing lane configurations and traffic control. Refer to Table 9 for a summary of the analysis results. Refer to Appendix G for the Synchro capacity analysis reports. SimTraffic queuing reports can be found in Appendix U.

Table 9: Analysis Summary of Smithfield Road and Sandy Run

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, 1 TH-RT 1 LT, 1 TH-RT	E D C A	C (21)	D D B A	B (12)
2026 No-Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT, 1 TH-RT 1 LT, 1 TH-RT	F E D A	C (34)	D E C B	C (21)
2029 No-Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT, 1 TH-RT 1 LT, 1 TH-RT	F E E A	D (52)	E E D C	C (31)
2032 No-Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT, 1 TH-RT 1 LT, 1 TH-RT	F E F A	F (86)	E E D D	D (42)
2026 Build – Phase 1a	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT, 1 TH-RT 1 LT, 1 TH-RT	F E D A	D (41)	D E C B	C (25)
2026 Build – Phase 1b	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT, 1 TH-RT 1 LT, 1 TH-RT	F E E A	D (44)	E E D C	C (31)
2029 Build – Phase 2	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT, 1 TH-RT 1 LT, 1 TH-RT	F E F A	F (89)	E E C E	D (49)

Table 9: Analysis Summary of Smithfield Road and Sandy Run (*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)
2032 Build – Full Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT, 1 TH-RT 1 LT, 1 TH-RT	F E F B	F (155)	E E E F	F (106)
2029 Build – Phase 2 – **with Improvements***	EB WB NB SB	**1 LT**, 1 TH-RT 1 LT-TH-RT 1 LT, 1 TH-RT 1 LT, 1 TH-RT	F C F A	E (77)	F E B C	C (27)
2032 Build – Full Build – **with Improvements***	EB WB NB SB	**1 LT**, 1 TH-RT 1 LT-TH-RT 1 LT, 1 TH-RT 1 LT, 1 TH-RT	F D F A	F (131)	E D D F	F (90)
2041 Future	EB WB NB SB	**1 LT**, 1 TH-RT 1 LT-TH-RT 1 LT, 1 TH-RT 1 LT, 1 TH-RT	F D F A	F (189)	E D F F	F (158)

Improvements by Developer shown in bold.
*Right-Turn-On-Red turned on to analyze realistic operations.

Capacity analysis of 2022 existing, 2026/2029 no-build, and 2026 build traffic conditions indicates that the intersection of Smithfield Road and Sandy Run is expected to operate at an overall LOS D or better during the weekday AM and PM peak hours. Under 2032 no-build and 2029 build conditions, the intersection is expected to operate at an overall LOS F during the weekday AM peak hour and an overall LOS D or worse during the weekday PM peak hour. Capacity analysis of 2032 build and 2041 future conditions indicates that the intersection is expected to operate at an overall LOS F during the weekday AM and PM peak hours.

In order to improve operations at this intersection to an overall LOS D, per the Town's Unified Development Ordinance (UDO), an exclusive eastbound left-turn lane with a minimum of 275 feet of storage would be needed. Furthermore, additional through capacity would be necessary to accommodate heavy volumes on the major thoroughfare. It should be noted that per the Comprehensive Transportation Plan (CTP), Smithfield Road is slated to become a

four-lane divided roadway. Additionally, the proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to construct a portion of the planned four-lane divided section. Interconnectivity within the proposed development to surrounding existing residential developments is expected to provide alternative routes for traffic exiting the site to access Smithfield Road. The future widening of Smithfield Road as well as interconnectivity to existing residential streets is expected to alleviate traffic utilizing this intersection and decrease delays and queueing.

It should be noted that the exclusive eastbound left-turn lane on Sandy Run is only needed to meet the Town's UDO standards and improve the delays during the weekday AM and PM peak hours. An exclusive eastbound left-turn lane is not desired or recommended at this intersection due to constructability issues and constraints. After all recommended improvements have been built out for the proposed development, it will be determined if this improvement is warranted based on further coordination with NCDOT.

8.3. Smithfield Road [NB-SB] and I-87 (US 64/264) Eastbound Ramps [EB]

The existing signalized intersection of Smithfield Road and I-87 (US 64/264) Eastbound Ramps were analyzed under 2022 existing, 2026/2029/2032 no-build, 2026/2029/2032 build, and 2041 future traffic conditions with the lane configurations and traffic control shown in Table 10. Under 2045 future conditions, the intersection was analyzed as half of a diverging diamond interchange, per future roadway improvements associated with STIP I-6007. Refer to Table 10 for a summary of the analysis results. Refer to Appendix H for the Synchro capacity analysis reports. SimTraffic queuing reports can be found in Appendix U.

Table 10: Analysis Summary of Smithfield Road and I-87 (US 64/264) Eastbound Ramps

ANALYSIS SCENARIO	NODE	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	3	EB NB SB	1 LT, 1 RT 2 TH, 1 RT 1 LT, 1 TH	D A B	B (14)	F A D	D (51)
2026 No-Build	3	EB NB SB	1 LT, 1 RT 2 TH, 1 RT 1 LT, 1 TH	C B D	C (24)	F A D	F (118)
2029 No-Build	3	EB NB SB	1 LT, 1 RT 2 TH, 1 RT 1 LT, 1 TH	C B D	C (26)	F A D	F (151)
2032 No-Build	3	EB NB SB	1 LT, 1 RT 2 TH, 1 RT 1 LT, 1 TH	D C D	C (32)	F A D	F (190)
2026 Build – Phase 1a	3	EB NB SB	1 LT, 1 RT 2 TH, 1 RT 1 LT, 1 TH	C B D	C (24)	F A D	F (129)
2026 Build – Phase 1b	3	EB NB SB	1 LT, 1 RT 2 TH, 1 RT 1 LT, 1 TH	C B D	C (25)	F A D	F (136)
2029 Build – Phase 2	3	EB NB SB	1 LT, 1 RT 2 TH, 1 RT 1 LT, 1 TH	D B D	C (28)	F A D	F (196)
2032 Build – Full Build	3	EB NB SB	1 LT, 1 RT 2 TH, 1 RT 1 LT, 1 TH	E C D	D (41)	F A E	F (264)

Table 10: Analysis Summary of Smithfield Road and I-87 (US 64/264) Eastbound Ramps (*continued*)

ANALYSIS SCENARIO	NODE	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
				Approach	Overall (seconds)	Approach	Overall (seconds)
2041 Future	3	EB NB SB	1 LT, 1 RT 2 TH, 1 RT 1 LT, 1 TH	F E D	F (119)	F B F	F (338)
2045 Future – *with STIP I-6007 Improvements*	33	EB SB	2 RT 1 TH	E A	D (38)	F F	F (179)
	35	WB SB	2 TH 1 LT	E F	F (83)	E E	E (78)
	38	EB NB	1 LT 2 TH	F C	C (34)	E A	B (17)

Improvements to lane configurations by STIP I-6007 shown underlined.

Capacity analysis of 2022 existing traffic conditions indicates that the intersection of Smithfield Road and I-87 (US 64/264) Eastbound Ramps is expected to operate at an overall LOS D or better during the weekday AM and PM peak hours. Under 2026/2029/2032 no-build and 2026/2029/2032 build, the intersection is expected to operate at an overall LOS D or better during the weekday AM peak hour and LOS F during the weekday PM peak hour. Under 2041 future conditions, the intersection is expected to operate at LOS F during the weekday AM and PM peak hours. This intersection was analyzed as half of a diverging diamond interchange under 2045 future conditions per future roadway improvements associated with STIP I-6007. Until the diverging diamond interchange improvements are completed, long delays and queues would be expected at the intersection, particularly for the eastbound off-ramp.

It should be noted that this signal is currently operating in free run conditions, which means that there is not time of day signal timings that adjust the signal timings throughout the day to account for traffic pattern changes. Coordinated timings during the weekday peak hours would be beneficial by dedicating the appropriate green time to the heavier movements. Additionally, the improvements associated with STIP I-6007 are expected to convert this

intersection to a diverging diamond interchange and relieve delays and queuing at the intersection.

Per the Comprehensive Transportation Plan (CTP), Smithfield Road is slated to become a four-lane divided roadway. Additionally, the proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to construct a portion of the planned four-lane divided section. The future widening of Smithfield Road is expected to alleviate delays and queueing at this intersection. Due to these reasons and the expectation that improvements to I-540 will further improve traffic patterns along Smithfield Road, no further improvements are recommended by the proposed development.

8.4. Smithfield Road [NB-SB] and I-87 (US 64/264) Westbound Ramps [WB]

The existing signalized intersections of Smithfield Road and I-87 (US 64 / 264) WB Ramps were analyzed under 2022 existing, 2026/2029/2032 no-build, 2026/2029/2032 build, and 2041 future traffic conditions with the lane configurations and traffic control shown in Table 11. Refer to Table 11 for a summary of the analysis results. Under 2041 future, the intersection was analyzed as half of a diverging diamond interchange, per future roadway improvements associated with STIP I-6007. Refer to Table 11 for a summary of the analysis results. Refer to Appendix I for the Synchro capacity analysis reports. SimTraffic queuing reports can be found in Appendix U.

Table 11: Analysis Summary of Smithfield Road and I-87 (US 64 / 264) Westbound Ramps

ANALYSIS SCENARIO	NODE	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	4	WB NB SB	1 LT, 1 TH-RT 1 LT, 1 LT-TH 1 TH, 1 RT	D B B	B (16)	D A B	B (14)
2026 No-Build	4	WB NB SB	1 LT, 1 TH-RT 2 LT, 1 TH 1 TH, 1 RT	D D C	D (35)	D C B	C (26)
2029 No-Build	4	WB NB SB	1 LT, 1 TH-RT 2 LT, 1 TH 1 TH, 1 RT	D E C	D (53)	D C B	C (28)
2032 No-Build	4	WB NB SB	1 LT, 1 TH-RT 2 LT, 1 TH 1 TH, 1 RT	D F C	F (82)	D D B	C (33)
2026 Build – Phase 1a	4	WB NB SB	1 LT, 1 TH-RT 2 LT, 1 TH 1 TH, 1 RT	D D C	D (39)	D C B	C (26)
2026 Build – Phase 1b	4	WB NB SB	1 LT, 1 TH-RT 2 LT, 1 TH 1 TH, 1 RT	D D C	D (42)	D C B	C (28)
2029 Build – Phase 2	4	WB NB SB	1 LT, 1 TH-RT 2 LT, 1 TH 1 TH, 1 RT	D F C	E (77)	D D B	C (39)

Table 11: Analysis Summary of Smithfield Road and I-87 (US 64 / 264) Westbound Ramps (*continued*)

ANALYSIS SCENARIO	NODE	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
				Approach	Overall (seconds)	Approach	Overall (seconds)
2032 Build – Full Build	4	WB NB SB	1 LT, 1 TH-RT 2 LT, 1 TH 1 TH, 1 RT	D F C	F (132)	E F C	F (96)
2041 Future	4	WB NB SB	1 LT, 1 TH-RT 2 LT, 1 TH 1 TH, 1 RT	F F C	F (223)	E F C	F (229)
2045 Future – *with STIP I-6007 Improvements*	43	WB NB	1 RT 1 TH	E A	C (21)	E A	C (21)
	45	EB SB	1 TH 1 TH	C D	C (29)	E E	E (70)
	48	WB SB	1 LT 1 TH	E A	C (28)	E A	C (23)

Improvements to lane configurations by STIP I-6007 shown underlined.

Capacity analysis of 2022 existing, 2026/2029 no-build, 2026 build traffic conditions indicates that the intersection of Smithfield Road and I-87 (US 64/264) Westbound Ramps is expected to operate at an overall LOS D or better during the weekday AM and PM peak hours. Under 2032 no-build and 2029 build, the intersection is expected to operate at an overall poor LOS (E or F) during the weekday AM peak hour and an overall LOS D or better during the weekday PM peak hour. Capacity analysis of 2032 build and 2041 future conditions indicate that the intersection is expected to operate at an overall LOS F during the weekday AM and PM peak hours. This intersection was analyzed as half of a diverging diamond interchange under 2045 future conditions per future roadway improvements associated with STIP I-6007. Until the diverging diamond interchange improvements are completed, long delays and queues would be expected at the intersection, particularly for the northbound left turn on Smithfield Road.

It should be noted that this signal is currently operating in free run conditions, which means that there is not time of day signal timings that adjust the signal timings throughout the day

to account for traffic pattern changes. Coordinated timings during the weekday peak hours would be beneficial by dedicating the appropriate green time to the heavier movements. Additionally, the improvements associated with STIP I-6007 are expected to convert this intersection to a diverging diamond interchange and relieve delays and queuing at the intersection.

Per the Comprehensive Transportation Plan (CTP), Smithfield Road is slated to become a four-lane divided roadway. Additionally, the proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to construct a portion of the planned four-lane divided section. The future widening of Smithfield Road is expected to alleviate delays and queueing at this intersection. Due to these reasons and the expectation that improvements to I-540 will further improve traffic patterns along Smithfield Road, no further improvements are recommended by the proposed development.

8.5. Smithfield Road [NB-SB] and Major Slade Road [EB-WB]

The existing signalized intersection of Smithfield Road and Major Slade Road was analyzed under 2022 existing, 2026/2029/2032 no-build, 2026/2029/2032 build, and 2041 future traffic conditions with existing lane configurations and traffic control. Refer to Table 12 for a summary of the analysis results. Refer to Appendix J for the Synchro capacity analysis reports. SimTraffic queuing reports can be found in Appendix U.

Table 12: Analysis Summary of Smithfield Road and Major Slade 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 WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	D D B A	B (19)	E D A C	C (26)
2026 No-Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	E D C A	C (24)	E D B D	D (38)
2029 No-Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	E D C A	C (31)	E D B E	E (60)
2032 No-Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	E D E B	D (46)	E D B F	F (93)
2026 Build – Phase 1a	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	E D C A	C (24)	E D B D	D (42)
2026 Build – Phase 1b	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	E D C A	C (26)	E D B D	D (45)
2029 Build – Phase 2	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	E D D B	C (34)	E D B F	E (84)

Table 12: Analysis Summary of Smithfield Road and Major Slade Road (*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)
2032 Build – Full Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	F E E A	D (54)	F E C E	E (71)
2029 Build – Phase 2 – **with Improvements**	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH, **1 RT**	E D D A	C (34)	E D C E	D (52)
2032 Build – Full Build – **with Improvements**	EB WB NB SB	**1 LT**, 1 TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH, **1 RT**	D F D A	D (49)	D F B E	D (54)
2041 Future	EB WB NB SB	**1 LT**, 1 TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH, **1 RT**	E F E A	E (71)	D F C F	F (87)

Improvements by Developer shown in bold.

Capacity analysis of 2022 existing, 2026 no-build, and 2026 build traffic conditions indicates that the intersection of Smithfield Road and Major Slade Road is expected to operate at an overall LOS D or better during the weekday AM and PM peak hours. Under 2029 no-build and 2029 build conditions, the intersection is expected to operate at an overall LOS C during the weekday AM peak hour and an overall LOS E during the weekday PM peak hour. Capacity analysis of 2032 no-build indicates that the intersection is expected to operate at LOS D in during the AM peak hour and LOS F during the PM peak hours, while 2032 build conditions indicate that 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.

Due to poor levels of service during the weekday PM peak hour under 2029 build conditions, an exclusive southbound right-turn lane was analyzed at the intersection. With this

improvement, the intersection is expected to operate at an overall LOS D or better during the weekday AM and PM peak hours. It is recommended that an exclusive southbound right-turn lane with a minimum of 100 feet of storage be constructed at this intersection with the build out of Phase 2 of the proposed development. Capacity analysis of 2041 future traffic conditions indicates that the intersection is expected to operate at an overall LOS E during the weekday AM peak hour and an overall LOS F during the weekday PM peak hour.

In order to improve operations at this intersection to an overall LOS D, per the Town's Unified Development Ordinance (UDO), under 2032 build conditions, an exclusive eastbound left-turn lane was analyzed in addition to the exclusive southbound right-turn lane. With these improvements, the intersection is expected to operate at an overall LOS D during the weekday AM and PM peak hours. It should be noted that per the Comprehensive Transportation Plan (CTP), Smithfield Road is slated to become a four-lane divided roadway. Additionally, the proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to construct a portion of the planned four-lane divided section. The future widening of Smithfield Road is expected to further alleviate delays and queueing at this intersection.

It should be noted that the exclusive eastbound left-turn lane on Major Slade Road is only needed to meet the Town's UDO standards and improve the delays during the week-day PM peak hour. An exclusive eastbound left-turn lane is not desired or recommended at this intersection due to constructability issues and constraints. After all recommended improvements have been built out for the proposed development, it will be determined if this improvement is warranted based on further coordination with NCDOT.

8.6. Poole Road [EB-WB] and Major Slade Road [NB]

The existing unsignalized intersection of Poole Road and Major Slade Road was analyzed under 2022 existing, 2026/2029/2032 no-build, 2026/2029/2032 build, and 2041 future traffic conditions with the lane configurations and traffic control shown in Table 13. Refer to Table 13 for a summary of the analysis results. Refer to Appendix K for the Synchro capacity analysis reports. SimTraffic queuing reports can be found in Appendix U.

Table 13: Analysis Summary of Poole Road and Major Slade 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 WB NB	1 TH-RT 1 LT-TH 1 LT-RT	-- A[1] B[2]	N/A	-- A[1] A[2]	N/A
2026 No-Build	EB WB NB	1 TH-RT 1 LT-TH 1 LT-RT	-- A[1] B[2]	N/A	-- A[1] B[2]	N/A
2029 No-Build	EB WB NB	1 TH-RT 1 LT-TH 1 LT-RT	-- A[1] B[2]	N/A	-- A[1] B[2]	N/A
2032 No-Build	EB WB NB	1 TH-RT 1 LT-TH 1 LT-RT	-- A[1] C[2]	N/A	-- A[1] B[2]	N/A
2026 Build – Phase 1a	EB WB NB	1 TH-RT 1 LT-TH 1 LT-RT	-- A[1] B[2]	N/A	-- A[1] B[2]	N/A
2026 Build – Phase 1b	EB WB NB	1 TH-RT 1 LT-TH 1 LT-RT	-- A[1] B[2]	N/A	-- A[1] B[2]	N/A
2029 Build – Phase 2	EB WB NB	1 TH-RT 1 LT-TH 1 LT-RT	-- A[1] C[2]	N/A	-- A[1] B[2]	N/A
2032 Build – Full Build	EB WB NB	1 TH-RT 1 LT-TH 1 LT-RT	-- A[1] C[2]	N/A	-- A[1] E[2]	N/A
2032 Build – Full Build **with Improvements**	EB WB NB	1 TH-RT 1 LT-TH 1 LT, **1 RT**	-- A[1] C[2]	N/A	-- A[1] C[2]	N/A

Table 13: Analysis Summary of Poole Road and Major Slade Road (*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)
2041 Future	EB WB NB	1 TH-RT 1 LT-TH 1 LT, **1 RT**	-- A[1] C[2]	N/A	-- A[1] E[2]	N/A

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

Improvements by Developer shown in bold.

Capacity analysis of 2022 existing, 2026/2029/2032 no-build, 2026/2029 build, and 2041 future traffic conditions indicates that the major-street left-turn movement and the minor-street approach at the intersection of Poole Road and Major Slade Road is expected to operate at LOS C or better during the weekday AM and PM peak hours. Under 2032 build conditions, the northbound minor-street movement is expected to degrade to an LOS E during the weekday PM peak hour.

Poor levels of service are not uncommon on a stop-controlled minor-street approach when heavy volumes are experienced on the major thoroughfare (Poole Road). An exclusive northbound right-turn lane was analyzed to mitigate poor levels of service experienced on the minor-street approach during the weekday PM peak hour under 2032 build conditions. With this right-turn lane, the major-street left-turn movement and the minor-street approach are expected to operate at LOS C during the weekday AM and PM peak hours under 2032 build conditions. An exclusive northbound right-turn lane with a minimum of 100 feet of storage and appropriate taper is recommended at full build-out of the proposed development.

8.7. Poole Road [EB-WB] and Bethlehem Road [NB-SB]

The existing unsignalized intersection of Poole Road and Bethlehem Road was analyzed under 2022 existing, 2026/2029/2032 no-build, 2026/2029/2032 build, and 2041 future traffic conditions with the lane configurations and traffic control shown in Table 14. Refer to Table 14 for a summary of the analysis results. Refer to Appendix L for the Synchro capacity analysis reports. SimTraffic queuing reports can be found in Appendix U.

Table 14: Analysis Summary of Poole Road and Bethlehem 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 WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A A E C	C (28)	A A B E	C (29)
2026 No-Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A A F D	D (55)	A A B F	D (45)
2029 No-Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A A F F	F (99)	A A B F	E (69)
2032 No-Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A A F F	F (147)	A A C F	F (99)
2026 Build – Phase 1a	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A A F D	D (54)	A A B F	D (47)
2026 Build – Phase 1b	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A A F D	E (56)	A A B F	D (48)
2029 Build – Phase 2	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A B F F	F (102)	A A C F	E (74)

Table 14: Analysis Summary of Poole Road and Bethlehem Road (*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)
2032 Build – Full Build	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A B F F	F (155)	B A C F	F (115)
2029 Build – Phase 2 - *with Signal Timing Modifications*	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	B C C C	C (27)	C C B C	C (24)
2032 Build – Full Build - *with Signal Timing Modifications*	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	B C D C	C (34)	C C B D	C (29)
2041 Future	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	C D D D	D (43)	D C C D	D (35)

Capacity analysis of the 2029 and 2032 no-build and build scenarios indicates that the intersection of Poole Road and Bethlehem Road is expected to operate at an overall poor LOS (E or F) during the weekday AM and PM peak hours. It should be noted that 2022 existing condition during the weekday AM and PM peak hours, 2026 no-build conditions during the weekday PM peak hour, and 2026 build conditions during the weekday AM and PM peak hour are expected to operate at an overall LOS D or better.

Signal timing modifications were considered at this intersection in an effort to mitigate the poor levels of service experienced at this intersection during the weekday AM and PM peak hours under 2029/2032 no-build and 2029/2032 build conditions. With these signal timing modifications, the intersection is expected to operate at an overall LOS C or better during the weekday AM and PM peak hours under 2029/2032 build conditions. Under 2041 future conditions, the intersection is expected to operate at an overall LOS D during the weekday AM and PM peak hours. It should be noted that while this study analyzes the signal with

modified signal timings, NCDOT typically updates all signals periodically to account for changes in traffic patterns as a part of signal maintenance.

8.8. Smithfield Road [NB-SB] and Site Access A [EB]

The proposed unsignalized intersection of Smithfield Road and Site Access A was analyzed under 2026/2029/2032 build traffic conditions with the lane configurations and traffic control shown in Table 15. Refer to Table 15 for a summary of the analysis results. Refer to Appendix M for the Synchro capacity analysis reports. SimTraffic queuing reports can be found in Appendix U.

Table 15: Analysis Summary of Smithfield Road and Site 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)
2026 Build – Phase 1a	**EB** NB SB	**1 LT, 1 RT** **1 LT**, 1 TH 1 TH, **1 RT**	F[2] A[1] --	N/A	F[2] B[1] --	N/A
2026 Build – Phase 1b	**EB** NB SB	**1 LT, 1 RT** **1 LT**, 1 TH 1 TH, **1 RT**	F[2] A[1] --	N/A	F[2] B[1] --	N/A
2029 Build – Phase 2	**EB** NB SB	**1 LT, 1 RT** **1 LT**, 1 TH 1 TH, **1 RT**	F[2] A[1] --	N/A	F[2] B[1] --	N/A
2032 Build – Full Build	**EB** NB SB	**1 LT, 1 RT** **1 LT**, 1 TH 1 TH, **1 RT**	F[2] A[1] --	N/A	F[2] C[1] --	N/A
2032 Build – Full Build **Signalized**	**EB** NB SB	**1 LT, 1 RT** **1 LT**, 1 TH 1 TH, **1 RT**	F E A	D (53)	F B D	C (33)
2041 Future	**EB** NB SB	**1 LT, 1 RT** **1 LT**, 1 TH 1 TH, **1 RT**	F F A	F (88)	F B F	E (62)

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 2026/2029/2032 build and 2041 future traffic conditions indicates that the major-street left-turn movement at the intersection of Smithfield Road and Site Access A is expected to operate at LOS C or better during the weekday AM and PM peak hours while the minor-street approach is expected to operate at LOS F the weekday AM and PM peak

hours. Poor levels of service are not uncommon on an unsignalized minor-street approach when heavy through volumes are experienced on the major thoroughfare (Smithfield Road).

A traffic signal was considered at this intersection to mitigate the poor levels of service experienced on the minor-street approach and 2026/2029/2032 build traffic volumes were analyzed using the criteria contained in the *Manual on Uniform Traffic Control Devices* (MUTCD). A traffic signal was warranted during the weekday AM and PM peak hours under 2032 build conditions. Utilizing the four hours of count data collected at this intersection during the weekday AM (7-9 AM) and PM (4-6 PM) peak periods, a full signal warrant analysis was conducted to determine if the 4-hour or 8-hour warrants would be met. Based on this analysis, Warrant 2 (4-hour) and Warrant 1B (8-hour) are both expected to be met under 2032 build and 2041 future conditions in addition to Warrant 3 (peak hour). With a signal, the intersection is expected to operate at an overall LOS D or better during the weekday AM and PM peak hours under 2032 build conditions. It is recommended that the intersection be monitored for signalization and that a signal be installed when warranted. Under 2041 future conditions, the intersection is expected to operate at an overall LOS F during the weekday AM peak hour and LOS E during the weekday PM peak hour.

Turn lanes were considered based on the NCDOT *Policy on Street and Driveway Access to North Carolina Highways* (Driveway Manual). Based on the Driveway Manual, an exclusive northbound left-turn lane with a minimum of 300 feet of storage and an exclusive southbound right-turn lane with a minimum of 100 feet of storage are recommended by the proposed development. It should be noted that two (2) eastbound egress lanes were analyzed under 2026/2029/2032 build conditions and are also recommended by the proposed development.

It should be noted that the proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to construct a portion of the planned four-lane divided section, per the Comprehensive Transportation Plan (CTP). The future widening of Smithfield Road as well as the interconnectivity within the proposed development is expected to further alleviate delays and queueing at this intersection and provide multiple routes to exit the site to Smithfield Road.

8.9. Smithfield Road [NB-SB] and Site Access B [EB] / Site Access F [WB]

The proposed unsignalized intersection of Smithfield Road and Site Access B / Site Access F was analyzed under 2029/2032 build traffic conditions with the lane configurations and traffic control shown in Table 16. Refer to Table 16 for a summary of the analysis results. Refer to Appendix N for the Synchro capacity analysis reports. SimTraffic queuing reports can be found in Appendix U.

Table 16: Analysis Summary of Smithfield Road and Site Access B / Site Access F

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)
2029 Build – Phase 2	**EB** NB SB	**1 LT, 1 RT** **1 LT**, 1 TH 1 TH, **1 RT**	F[2] A[1] --	N/A	F[2] B[1] --	N/A
2032 Build – Full Build	**EB** **WB** NB SB	**1 LT-TH, 1 RT** **1 LT-TH-RT** **1 LT**, 1 TH, **1 TH-RT** **1 LT, 2 TH, 1 RT**	F[2] F[2] A[1] C[1]	N/A	F[2] F[2] B[1] B[1]	N/A
2032 Build – Full Build **Signalized**	**EB** **WB** NB SB	**1 LT-TH, 1 RT** **1 LT-TH-RT** **1 LT**, 1 TH, **1 TH-RT** **1 LT, 2 TH, 1 RT**	D E B C	C (21)	E E B A	B (16)
2041 Future	**EB** **WB** NB SB	**1 LT-TH, 1 RT** **1 LT-TH-RT** **1 LT**, 1 TH, 1 TH-**RT** **1 LT**, 2 TH, **1 RT**	D E B D	C (31)	E E B B	B (16)

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 2029/2032 build traffic conditions indicates that the major-street left-turn movements at the intersection of Smithfield Road and Site Access B / Site Access F are expected to operate at LOS C or better during the weekday AM and PM peak hours while the minor-street approaches are expected to operate at LOS F the weekday AM and PM peak

hours. Poor levels of service are not uncommon on an unsignalized minor-street approach when heavy through volumes are experienced on the major thoroughfare (Smithfield Road).

A traffic signal was considered at this intersection to mitigate the poor levels of service experienced on the minor-street approach and 2029/2032 build traffic volumes were analyzed using the criteria contained in the *Manual on Uniform Traffic Control Devices* (MUTCD). A traffic signal was warranted during the weekday AM peak hour under 2029 build conditions and during the weekday AM and PM peak hours under 2032 build conditions. Utilizing the four hours of count data collected at this intersection during the weekday AM (7-9 AM) and PM (4-6 PM) peak periods, a full signal warrant analysis was conducted to determine if the 4-hour or 8-hour warrants would be met. Based on this analysis, Warrant 2 (4-hour) is expected to be met under 2032 build and 2041 future conditions in addition to Warrant 3 (peak hour). With a signal, the intersection is expected to operate an overall LOS C or better during the weekday AM and PM peak hours under 2032 build and 2041 future conditions. It is recommended that the intersection be monitored for signalization and that a signal be installed when warranted.

Turn lanes were considered based on the NCDOT *Policy on Street and Driveway Access to North Carolina Highways* (Driveway Manual). Based on the Driveway Manual, an exclusive northbound left-turn lane with a minimum of 125 feet of storage, an exclusive southbound left-turn lane with a minimum of 200 feet of storage, and an exclusive right-turn lane with a minimum of 75 feet of storage are warranted and recommended by the proposed development. It should be noted that two (2) eastbound egress lanes were analyzed under 2029/2032 build conditions and are also recommended by the proposed development.

It should be noted that the proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to construct a portion of the planned four-lane divided section, per the Comprehensive Transportation Plan (CTP). The future widening of Smithfield Road is expected to further alleviate delays and queueing at this intersection.

8.10. Poole Road [EB-WB] and Site Access C [SB]

The proposed unsignalized intersection of Poole Road and Site Access C was analyzed under 2029/2032 build traffic conditions with lane configurations and traffic control shown in Table 17. Refer to Table 17 for a summary of the analysis results. Refer to Appendix O for the Synchro capacity analysis reports. SimTraffic queuing reports can be found in Appendix U.

Table 17: Analysis Summary of Poole Road and Site Access C

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)
2029 Build – Phase 2	EB WB **SB**	**1 LT,** 1 TH 1 TH-**RT** **1 LT, 1 RT**	A[1] -- B[2]	N/A	A[1] -- B[2]	N/A
2032 Build – Full Build	EB WB **SB**	**1 LT,** 1 TH 1 TH-**RT** **1 LT, 1 RT**	A[1] -- B[2]	N/A	A[1] -- B[2]	N/A
2041 Future	EB WB **SB**	1 LT-**TH** 1 TH-**RT** **1 LT, 1 RT**	A[1] -- B[2]	N/A	A[1] -- C[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 2029/2032 build and 2041 future traffic conditions indicates that the major-street left-turn movement and the minor-street approach at the intersection of Poole Road and Site Access C are expected to operate at LOS C or better during the weekday AM and PM peak hours.

Turn lanes were considered based on the NCDOT *Policy on Street and Driveway Access to North Carolina Highways* (Driveway Manual). Based on the Driveway Manual, an exclusive eastbound left-turn lane with a minimum of 50 feet of storage and appropriate deceleration and taper length is warranted and recommended. Separate left and right turn lanes were considered on Site Access C.

8.11. Smithfield Road [NB-SB] and Site Access D [EB]

The proposed unsignalized intersection of Smithfield Road and Site Access D was analyzed under 2032 build traffic conditions with the lane configurations and traffic control shown in Table 18. Refer to Table 18 for a summary of the analysis results. Refer to Appendix P for the Synchro capacity analysis reports. SimTraffic queuing reports can be found in Appendix U.

Table 18: Analysis Summary of Smithfield Road and Site 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)
2026 Build – Phase 1b	**EB** NB SB	**1 LT-RT** **1 LT**-TH 1 TH-**RT**	F[2] A[1] --	N/A	F[2] B[1] --	N/A
2029 Build – Phase 2	**EB** NB SB	**1 LT-RT** **1 LT**-TH 1 TH-**RT**	F[2] A[1] --	N/A	F[2] B[1] --	N/A
2032 Build – Full Build	**EB** NB SB	**1 LT-RT** **1 LT**-TH 1 TH, **1 TH-RT**	F[2] A[1] --	N/A	F[2] B[1] --	N/A
2026 Build – Phase 1b **w Improvements**	**EB** NB SB	**1 LT, 1 RT** **1 LT**-TH 1 TH-**RT**	F[2] A[1] --	N/A	F[2] B[1] --	N/A
2029 Build – Phase 2 **w Improvements**	**EB** NB SB	**1 LT, 1 RT** **1 LT**-TH 1 TH-**RT**	F[2] A[1] --	N/A	F[2] B[1] --	N/A
2032 Build – Full Build **w Improvements**	**EB** NB SB	**1 LT, 1 RT** **1 LT**-TH 1 TH, **1 TH-RT**	F[2] A[1] --	N/A	F[2] B[1] --	N/A
2041 Future	**EB** NB SB	**1 LT, 1 RT** **1 LT**-TH 1 TH, **1 TH-RT**	F[2] B[1] --	N/A	F[2] C[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 2032 build and 2041 future traffic conditions indicates that the major-street left-turn movement at the intersection of Smithfield Road and Site Access D is expected to operate at LOS C or better during the weekday AM and PM peak hours while the minor-

street approach is expected to operate at LOS F during the weekday AM and PM peak hours. Poor levels of service are not uncommon on an unsignalized minor-street approach when heavy through volumes are experienced on the major thoroughfare (Smithfield Road).

Turn lanes were considered based on the NCDOT *Policy on Street and Driveway Access to North Carolina Highways* (Driveway Manual). Based on the Driveway Manual, no exclusive turn lanes are warranted at the build-out of the proposed development. Although a northbound left turn lane is not warranted based on the turn lane criteria, it is likely that a left turn lane will be required on Smithfield Road based on the high volume of through traffic. Separate eastbound left and right turn lanes are recommended on Site Access D to improve delays exiting the site.

It should be noted that the proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to construct a portion of the planned four-lane divided section, per the Comprehensive Transportation Plan (CTP). The future widening of Smithfield Road is expected to further alleviate delays and queueing at this intersection.

8.12. Smithfield Road [NB-SB] and Site Access E [EB]

The proposed right-in/right-out intersection of Smithfield Road and Site Access E was analyzed under 2032 build traffic conditions with the lane configurations and traffic control shown in Table 19. Refer to Table 19 for a summary of the analysis results. Refer to Appendix Q for the Synchro capacity analysis reports. SimTraffic queuing reports can be found in Appendix U.

Table 19: Analysis Summary of Smithfield Road and Site Access E

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)
2026 Build – Phase 1b	**EB** NB SB	**1 RT** 1 TH 1 TH-**RT**	B[1] -- --	N/A	C[1] -- --	N/A
2029 Build – Phase 2	**EB** NB SB	**1 RT** 1 TH 1 TH-**RT**	B[1] -- --	N/A	D[1] -- --	N/A
2032 Build – Full Build	**EB** NB SB	**1 RT** **2 TH** 1 TH, **1 TH-RT**	B[1] -- --	N/A	C[1] -- --	N/A
2041 Future	**EB** NB SB	**1 RT** **2 TH** 1 TH, **1 TH-RT**	B[1] -- --	N/A	C[1] -- --	N/A

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

Capacity analysis of 2032 build and 2041 future traffic conditions indicates that the minor-street approach at the intersection of Smithfield Road and Site Access E is expected to operate at LOS D or better during the weekday AM and PM peak hours.

Turn lanes were considered based on the NCDOT *Policy on Street and Driveway Access to North Carolina Highways* (Driveway Manual). Based on the Driveway Manual, no exclusive turn lanes are warranted at the build-out of the proposed development.

It should be noted that the proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to construct a portion of the planned four-lane divided section, per the Comprehensive Transportation Plan (CTP). The future widening of Smithfield Road is expected to further alleviate delays and queueing at this intersection.

8.13. Smithfield Road [NB-SB] and Site Access G [WB]

The proposed right-in/right-out intersection of Smithfield Road and Site Access G was analyzed under 2032 build traffic conditions with the lane configurations and traffic control shown in Table 20. Refer to Table 20 for a summary of the analysis results. Refer to Appendix R for the Synchro capacity analysis reports. SimTraffic queuing reports can be found in Appendix U.

Table 20: Analysis Summary of Smithfield Road and Site Access G

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)
2026 Build – Phase 1b	**WB** NB SB	**1 RT** 1 TH, **1 RT** 1 TH	D[1] -- --	N/A	C[1] -- --	N/A
2029 Build – Phase 2	**WB** NB SB	**1 RT** 1 TH, **1 RT** 1 TH	D[1] -- --	N/A	C[1] -- --	N/A
2032 Build – Full Build	**WB** NB SB	**1 RT** **2 TH, 1 RT** 1 TH	C[1] -- --	N/A	B[1] -- --	N/A
2041 Future	**WB** NB SB	**1 RT** **2 TH, 1 RT** 1 TH	C[1] -- --	N/A	B[1] -- --	N/A

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

Capacity analysis of 2032 build and 2041 future traffic conditions indicates that the minor-street approach at the intersection of Smithfield Road and Site Access G is expected to operate at LOS C or better during the weekday AM and PM peak hours.

Turn lanes were considered based on the NCDOT *Policy on Street and Driveway Access to North Carolina Highways* (Driveway Manual). Based on the Driveway Manual, an exclusive northbound right-turn lane with a minimum of 50 feet of storage and appropriate deceleration and taper length is warranted.

It should be noted that the proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to construct a portion of the planned four-lane divided section, per the Comprehensive Transportation Plan (CTP). The future widening of Smithfield Road is expected to further alleviate delays and queueing at this intersection.

8.14. Poole Road [EB-WB] and Site Access H [SB]

The proposed unsignalized intersection of Poole Road and Site Access H was analyzed under 2032 build traffic conditions with lane configurations and traffic control shown in Table 21. Refer to Table 21 for a summary of the analysis results. Refer to Appendix S for the Synchro capacity analysis reports. SimTraffic queuing reports can be found in Appendix U.

Table 21: Analysis Summary of Poole Road and Site Access H

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)
2026 Build – Phase 1b	EB WB **SB**	**1 LT**, 1 TH 1 TH, **1 RT** **1 LT, 1 RT**	A[1] -- B[2]	N/A	A[1] -- B[2]	N/A
2029 Build – Phase 2	EB WB **SB**	**1 LT**, 1 TH 1 TH, **1 RT** **1 LT, 1 RT**	A[1] -- B[2]	N/A	A[1] -- B[2]	N/A
2032 Build – Full Build	EB WB **SB**	**1 LT**, 1 TH 1 TH, **1 RT** **1 LT, 1 RT**	A[1] -- B[2]	N/A	A[1] -- C[2]	N/A
2041 Future	EB WB **SB**	**1 LT**, 1 TH 1 TH, **1 RT** **1 LT, 1 RT**	A[1] -- C[2]	N/A	A[1] -- C[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 2032 build and 2041 future traffic conditions indicates that the major-street left-turn movement and the minor-street approach at the intersection of Poole Road and Site Access H is expected to operate at LOS C or better during the weekday AM and PM peak hours.

Turn lanes were considered based on the NCDOT *Policy on Street and Driveway Access to North Carolina Highways* (Driveway Manual). Based on the Driveway Manual, an exclusive eastbound left-turn lane with a minimum of 100 feet of storage and an exclusive westbound right-turn lane with a minimum of 75 feet of storage, both with appropriate deceleration and

taper length, are warranted and recommended at the build out of the proposed development. It should be noted that two (2) southbound egress lanes were analyzed under 2032 build conditions and are also recommended by the proposed development.

8.15. Smithfield Road [NB-SB] and Site Access I [WB]

The proposed right-in/right-out intersection of Smithfield Road and Site Access I was analyzed under 2032 build traffic conditions with the lane configurations and traffic control shown in Table 22. Refer to Table 22 for a summary of the analysis results. Refer to Appendix T for the Synchro capacity analysis reports. SimTraffic queuing reports can be found in Appendix U.

Table 22: Analysis Summary of Smithfield Road and Site Access I

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)
2032 Build – Full Build	**WB** NB SB	**1 RT** **2 TH, 1 RT** 1 TH	C[1] -- --	N/A	B[1] -- --	N/A
2041 Future	**WB** NB SB	**1 RT** **2 TH, 1 RT** 1 TH	C[1] -- --	N/A	B[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 2032 build and 2041 future traffic conditions indicates that the major-street left-turn movement and the minor-street approach at the intersection of Smithfield Road and Site Access I is expected to operate at LOS C or better during the weekday AM and PM peak hours.

Turn lanes were considered based on the NCDOT *Policy on Street and Driveway Access to North Carolina Highways* (Driveway Manual). Based on the Driveway Manual, an exclusive northbound right-turn lane with a minimum of 50 feet of storage and appropriate deceleration and taper length is warranted.

It should be noted that the proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to construct a portion

of the planned four-lane divided section, per the Comprehensive Transportation Plan (CTP). The future widening of Smithfield Road is expected to further alleviate delays and queueing at this intersection.

9. CONCLUSIONS

This Traffic Impact Analysis was conducted to determine the potential traffic impacts of the proposed development, to be located north of Poole Road and along both sides of Smithfield Road in Knightdale, North Carolina. The proposed development is expected to be a mixed-use development and be built out by 2030. Access to the site is proposed via two (2) full-movement driveways along Poole Road and via two (2) full movement driveways, three (3) right-in/right-out driveways, and one (1) full movement intersection along Smithfield Road.

It should be noted that the Town of Knightdale (Town) requires a no-build/build analysis year one (1) year beyond the anticipated build-out year and a future analysis year ten (10) years beyond the anticipated build-out year for the proposed development; therefore, the analysis years considered for this study under full-build conditions are 2032 and 2041. An additional analysis scenario will be included in the study to analyze improvements associated with STIP I-6007. The study analyzes traffic conditions during the weekday AM and PM peak hours for the following scenarios:

- 2022 Existing Traffic Conditions
- 2025+1 No-Build Traffic Conditions
- 2028+1 No-Build Traffic Conditions
- 2031+1 No-Build Traffic Conditions
- 2025+1 Build Traffic Conditions – Phase 1a
- 2025+1 Build Traffic Conditions – Phase 1b
- 2028+1 Build Traffic Conditions – Phase 2
- 2031+1 Build Traffic Conditions – Full Build
- 2031+10 Future Traffic Conditions – Per Town UDO
- 2045 Future Traffic Conditions – (with STIP I-6007 Improvements)

Trip Generation

It is estimated that the proposed development will generate approximately 15,748 total site trips on the roadway network during a typical 24-hour weekday period. Of the daily traffic volume, it is anticipated that 846 trips (324 entering and 522 exiting) would occur during the

weekday AM peak hour and 1,328 trips (721 entering and 607 exiting) would 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

A summary of the study area intersections that are expected to need improvements is shown in Section 8 of this report. Traffic on Smithfield Road is relatively heavy and is expected to continue to increase in the future. The Town's Transportation Plan identifies Smithfield Road as a 4-lane roadway, and the development will be constructing half of the ultimate section along the site frontage to contribute towards the ultimate improvement. In addition to widening Smithfield Road, the development is proposing several turn lane and traffic signal improvements to mitigate impacts of the development.

The State Transportation Improvement Program (STIP) projects I-6007 and HL-0031 will provide significant improvements in the study area. STIP I-6007 will convert the US 264 interchange at Smithfield Road to a diverging diamond interchange, while STIP HL-0031 will add exclusive left-turn lanes to the intersection of Poole Road and Smithfield Road.

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 17 for an illustration of the recommended lane configuration for the proposed development.

Background Improvements by Adjacent Developments

The following improvements have been committed to by the Baker Roofing HQ development.

Smithfield Road and I-87 (US 64 / 264) Westbound Ramps

- Extend the exclusive southbound right-turn lane to have full storage.
- Restripe the northbound left-through lane to provide an additional left-turn lane.
- Construct a northbound through lane with a minimum of 250 feet of storage and appropriate deceleration and taper length.

The following improvements have been committed to by the Poole Road Assemblage development.

Smithfield Road and Poole Road

- Construct a channelized westbound right-turn lane that operates under yield control with a minimum of 100 feet of storage and appropriate deceleration and taper length.
- Coordinate with NCDOT to develop a signal modification plan for the intersection.

Improvements by NCDOT STIP I-6007

STIP I-6007 is expected to convert the I-87 (US 64 / 264) interchange at Smithfield Road to a diverging diamond interchange.

Improvements by NCDOT STIP HL-0031

STIP HL-0031 is expected to improve the intersection of Poole Road and Smithfield Road by adding exclusive turn lanes on every approach.

Recommended Improvements by Developer

Poole Road and Smithfield Road

- Provide an exclusive southbound right-turn lane with a minimum of 325 feet of storage and appropriate deceleration and taper length. *[Phase 2]*
- Extend the southbound left-turn lane storage to a minimum of 325 feet with appropriate deceleration and taper length. *[Full Build]*
- Extend the northbound left-turn lane storage to a minimum of 425 feet with appropriate deceleration and taper length. *[Full Build]*
- Extend the eastbound left-turn lane storage to a minimum of 425 feet with appropriate deceleration and taper length. *[Full Build]*
- Extend the westbound left-turn lane storage to a minimum of 375 feet with appropriate deceleration and taper length. *[Full Build]*
- Extend the westbound right-turn lane storage to a minimum of 225 feet with appropriate deceleration and taper length. *[Full Build]*

Smithfield Road and Major Slade Road

- Provide an exclusive southbound right-turn lane with a minimum of 100 feet of storage and appropriate deceleration and taper length. *[Phase 2]*

Poole Road and Major Slade Road

- Provide an exclusive northbound right-turn lane with a minimum of 100 feet of storage and appropriate deceleration and taper length. *[Full Build]*

Smithfield Road and Site Access A

The proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to construct a portion of the planned four-lane divided section.

- Construct eastbound approach with one (1) ingress lane and two (2) egress lanes striped as one left-turn lane and one right-turn lane. *[Phase 1a]*
- Provide an exclusive northbound left-turn lane with a minimum of 300 feet of storage and appropriate taper. *[Phase 1b]*

- Provide an exclusive southbound right-turn lane with a minimum of 100 feet of storage and appropriate taper. *[Phase 1b]*
- Monitor intersection for signalization and install traffic signal when warranted. *[Full Build]*

Smithfield Road and Site Access B / Site Access F

The proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to construct a portion of the planned four-lane divided section.

- Construct eastbound approach with one (1) ingress lane and two (2) egress lanes striped as one shared left-through turn lane and one right-turn. *[Phase 2]*
- Provide an exclusive northbound left-turn lane with a minimum of 125 feet of storage and appropriate taper. *[Phase 2]*
- Provide an exclusive southbound right-turn lane with a minimum of 75 feet of storage and appropriate taper. *[Phase 2]*
- Construct westbound approach with one (1) ingress lane and two (1) egress lanes striped as one (1) shared left-thru lane and one (1) right-turn lane. *[Full Build]*
- Provide an exclusive southbound left-turn lane with a minimum of 200 feet of storage and appropriate taper. *[Full Build]*
- Monitor intersection for signalization and install traffic signal when warranted. *[Full Build]*

Poole Road and Site Access C

- Construct southbound approach with one (1) ingress lane and two (2) egress lanes striped as a separate left turn lane and right turn lane. *[Phase 2]*
- Provide an exclusive eastbound left-turn lane with a minimum of 50 feet of storage and appropriate taper. *[Phase 2]*
- Provide stop-control for the southbound approach *[Phase 2]*

Smithfield Road and Site Access D

The proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to construct a portion of the planned four-lane divided section.

- Construct eastbound approach with one (1) ingress lane and two (2) egress lanes striped as a separate left turn lane and right turn lane. *[Phase 1b]*
- Although a northbound left turn lane on Smithfield Road is not warranted based on the turn lane criteria, it is likely that a left turn lane will be required based on the high volume of through traffic.
- Provide stop-control for the eastbound approach. *[Phase 1b]*

Smithfield Road and Site Access E

The proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to construct a portion of the planned four-lane divided section.

- Construct eastbound approach with one (1) ingress lane and one (1) egress lane striped a right-in/right-out. *[Phase 1b]*
- Provide stop-control for the eastbound approach. *[Phase 1b]*

Smithfield Road and Site Access G

The proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to construct a portion of the planned four-lane divided section.

- Construct westbound approach with one (1) ingress lane and one (1) egress lane striped a right-in/right-out. *[Phase 1b]*
- Provide an exclusive northbound right-turn lane with a minimum of 50 feet of storage and appropriate taper. *[Phase 1b]*
- Provide stop-control for the westbound approach. *[Phase 1b]*

Poole Road and Site Access H

- Construct southbound approach with one (1) ingress lane and two (2) egress lanes striped as one left-turn lane and one right-turn lane. *[Phase 1b]*
- Provide an exclusive eastbound left-turn lane with a minimum of 100 feet of storage and appropriate taper. *[Phase 1b]*
- Provide an exclusive westbound right-turn lane with a minimum of 75 feet of storage and appropriate taper. *[Phase 1b]*
- Provide stop-control for the southbound approach *[Phase 1b]*

Smithfield Road and Site Access I

The proposed development is expected to provide approximately 0.6 miles of widening along its frontage on either side of Smithfield Road to construct a portion of the planned four-lane divided section.

- Construct westbound approach with one (1) ingress lane and one (1) egress lane striped a right-in/right-out. *[Full Build]*
- Provide an exclusive northbound right-turn lane with a minimum of 50 feet of storage and appropriate taper. *[Full Build]*
- Provide stop-control for the westbound approach. *[Full Build]*

Improvements Needed to Meet Town's UDO Requirements

Smithfield Road and Sandy Run

- Provide an exclusive eastbound left-turn lane with a minimum of 275 feet of storage and appropriate deceleration and taper length. *[Phase 2]*

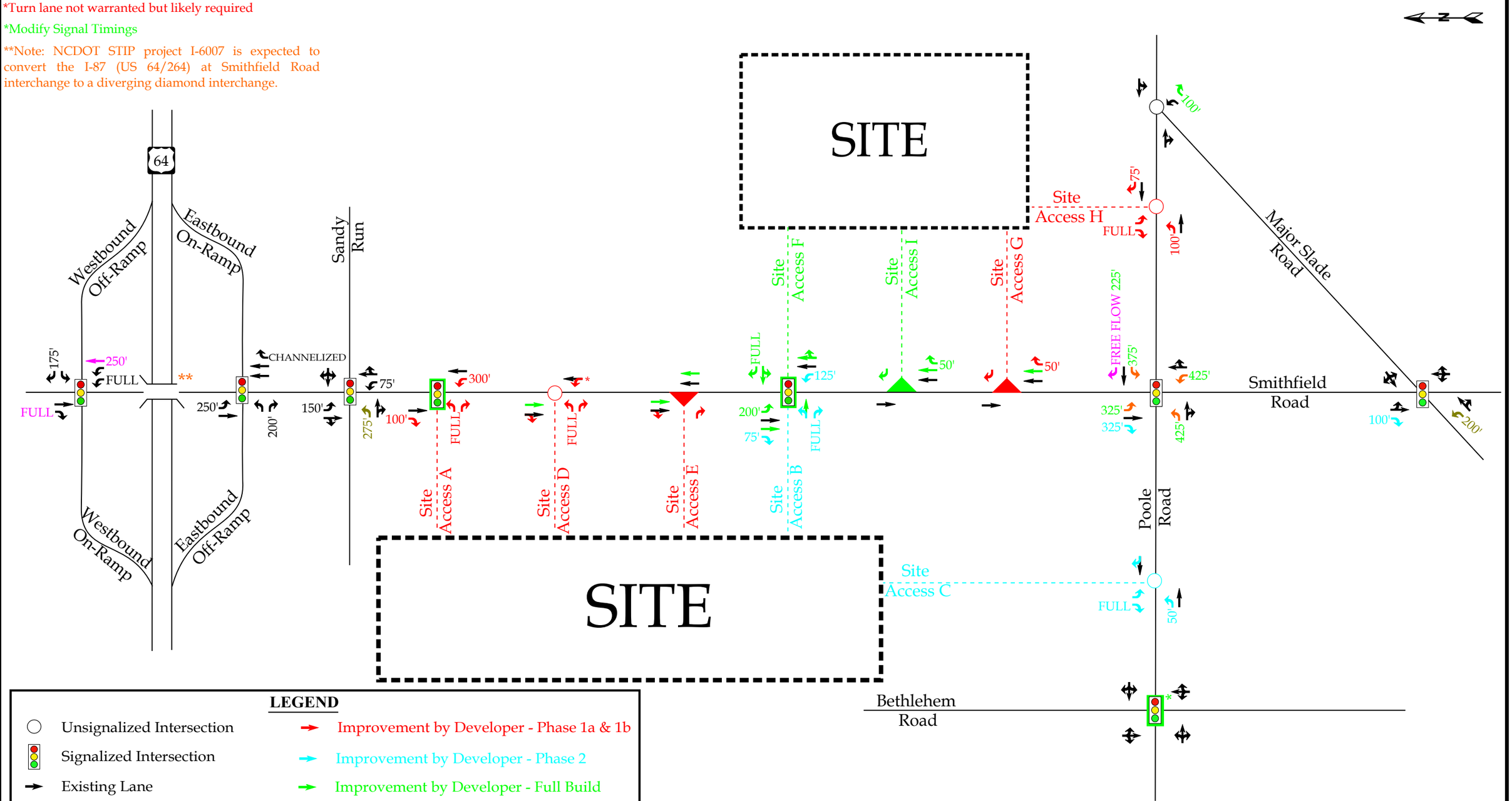
Smithfield Road and Major Slade Road

- Provide an exclusive eastbound left-turn lane with a minimum of 200 feet of storage and appropriate deceleration and taper length. *[Full Build]*

*Turn lane not warranted but likely required

*Modify Signal Timings

**Note: NCDOT STIP project I-6007 is expected to convert the I-87 (US 64/264) at Smithfield Road interchange to a diverging diamond interchange.



LEGEND

- Unsignalized Intersection
- Signalized Intersection
- Existing Lane
- Right-In/Right-Out Intersection
- Improvement by NCDOT STIP
- X' Storage (In Feet)
- Improvement by Developer - Phase 1a & 1b
- Improvement by Developer - Phase 2
- Improvement by Developer - Full Build
- Background Improvement by Adjacent Development
- Improvement to Meet Town's UDO Req
- Monitor for Signalization

RKA RAMEY KEMP ASSOCIATES

Poole and Smithfield
Knightdale, NC

Recommended Lane Configurations

Scale: Not to Scale | Figure 17