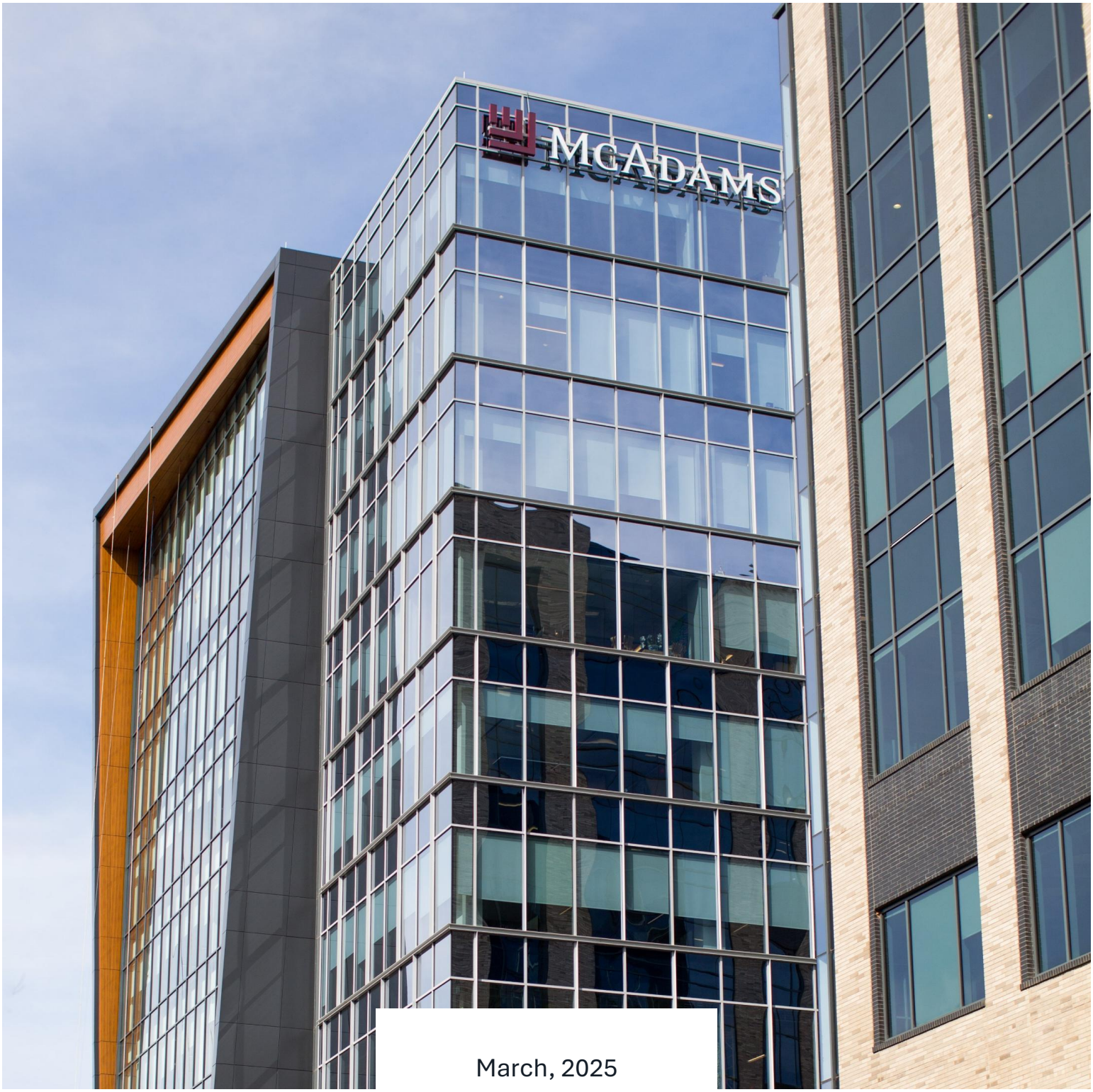


March, 2025

Hopkins Farm

Traffic Impact Analysis, Knightdale, North Carolina

McADAMS

Hopkins Farm

Knightdale, North Carolina

Traffic Impact Analysis

NC Lic. # C-0293

Digitally signed by Nate Bouquin
Date: 2025.03.28 09:19:07 -04'00'

Project Number:	LEN24015	Date:	March 2025
Prepared By:	Emerson Walston	Reviewed By:	Nate Bouquin, PE, PTOE

Executive Summary

The proposed residential development will be located north of Poole Road and east of Bethlehem Road in Knightdale, North Carolina. Site access will be served via one (1) existing full movement access to Bethlehem Road via connection to Greythorne Place and one (1) proposed full movement access on Poole Road. The site is currently undeveloped and is expected to consist of a maximum of 108 single family homes and 73 townhomes. The proposed site is expected to be built-out by the year 2029; however, future year analysis is based on Build+1 (2030) and Build+10 (2039) conditions per Town of Knightdale (Town) Traffic Impact Analysis (TIA) requirements. The purpose of this TIA is to determine the potential traffic impacts of this development and to identify transportation improvements that may be required to mitigate the impacts on the roadway network.

A Memorandum of Understanding (MOU) was reviewed and approved by the North Carolina Department of Transportation (NCDOT) and the Town, reviewing the TIA scope and assumptions. The MOU and approval correspondence is provided in the appendix of this study. Based on the approved scoping, the following intersections are included in this TIA study area:

- Poole Road and Hodge Road
- Poole Road and Bethlehem Road
- Poole Road and Smithfield Road
- Bethlehem Road and Grasshopper Road
- Bethlehem Road and Greythorne Place
- Bethlehem Road and Cross Cut Place / Widewaters Parkway
- Poole Road and Future NC 540 Southbound Ramps
- Poole Road and Future NC 540 Northbound Ramps
- Poole Road and Site Access #1 (*Proposed*)

To determine the traffic impacts of the proposed development, the following analysis scenarios are included in this study:

- Existing (2024) Traffic Conditions
- No-Build (2030) Traffic Conditions
- Build (2030) Traffic Conditions
- No-Build (2039) Traffic Conditions
- Build (2039) Traffic Conditions

Peak hour traffic counts were conducted at the existing study intersections in December 2024 and January 2025, while Wake County public schools were in session, and balanced between study intersections, as appropriate to determine Existing (2024) traffic volumes. The base year of the study was shown to be 2024 to be conservative. To account for background development growth, a 3% annual growth rate was applied to the existing traffic volumes to determine Projected (2030) and Projected (2039) traffic volumes. Adjacent development traffic from three (3) approved nearby developments were also applied to determine the No-Build (2030) and No-Build (2039) traffic volumes. These adjacent developments were:

- Haven at Griffith Meadows
- Lyndon Oaks
- Hodge Road Planned Development / Banks 20

Based on coordination with NCDOT and the Town, it was determined that the NCDOT State Transportation Improvement Program (STIP) R-2829B and Strategic Transportation Prioritization (SPOT) HL-0031 projects should be included in this study as both projects are expected to provide future improvements within the study area.

Based on the Institute for Transportation Engineers (ITE) *Trip Generation Manual*, 11th Edition, and the suggested method of trip calculations provided in NCDOT's *Rate vs. Equation spreadsheet* trips for the proposed development were calculated for weekday daily, weekday AM peak hour, and weekday PM peak hour. A summary of this trip generation is provided in Table ES-1.

TABLE ES-1: TRIP GENERATION

Land Use (ITE Code)	Density	Calculation Methodology	Daily Trips	AM Peak Hour			PM Peak Hour		
				Enter	Exit	Total	Enter	Exit	Total
Single Family Detached (210)	108 units	Adjacent / Equation	1,083	20	60	80	67	40	107
Single Family Attached (215)	73 units	Adjacent / Equation	506	8	24	32	24	16	40
		TOTAL	**1,589**	**28**	**84**	**112**	**91**	**56**	**147**

The peak hour site traffic was distributed throughout the network according to the site trip distribution approved by NCDOT and Town staff within the MOU. This site traffic was added onto the No-Build (2030) and No-Build (2039) traffic volumes to determine the Build (2030) and Build (2039) traffic volumes, respectively, for the capacity analysis.

Capacity analysis was conducted at all study intersections according to NCDOT and Town guidelines utilizing the methodology contained in the *Highway Capacity Manual*, 6th Edition, published by the Transportation Research Board. Refer to Table ES-2 for a summary of the capacity analysis results.

TABLE ES-2: CAPACITY ANALYSIS SUMMARY

Intersection	Conditions	APPROACH	Weekday AM Peak Hour		Weekday PM Peak Hour	
			LOS and Approach Delay (seconds)	Overall Delay (seconds)	LOS and Approach Delay (seconds)	Overall Delay (seconds)
Poole Road and Hodge Road	Existing (2024)	EB WB NB SB	D (36) D (36) D (51) E (61)	D (41)	B (19) D (40) C (23) C (29)	C (26)
	No-Build (2030)	EB WB NB SB	D (51) D (55) F (87) C (24)	D (52)	C (33) C (21) E (64) D (49)	D (39)
	Build (2030)	EB WB NB SB	D (50) E (57) F (90) C (24)	D (53)	D (35) C (27) E (64) D (50)	D (41)
	No-Build (2039)	EB WB NB SB	F (117) F (119) F (170) C (27)	F (108)	F (94) E (70) F (98) F (159)	F (112)
	Build (2039)	EB WB NB SB	F (116) F (126) F (170) C (27)	F (110)	F (103) E (69) F (98) F (162)	F (116)
Poole Road and Bethlehem Road	Existing (2024)	EB WB NB SB	A (7) A (10) C (25) C (25)	B (16)	B (14) B (11) B (19) C (25)	B (17)
	No-Build (2030)	EB WB NB SB	A (9) B (15) C (34) D (41)	C (24)	C (28) B (19) C (24) D (43)	C (30)
	Build (2030)	EB WB NB SB	B (10) B (18) D (35) D (44)	C (26)	C (35) C (21) C (27) E (55)	D (36)

TABLE ES-2: CAPACITY ANALYSIS SUMMARY (CONT)

Intersection	Conditions	APPROACH	Weekday AM Peak Hour		Weekday PM Peak Hour	
			LOS and Approach Delay (seconds)	Overall Delay (seconds)	LOS and Approach Delay (seconds)	Overall Delay (seconds)
Poole Road and Bethlehem Road	No-Build (2039)	EB WB NB SB	B (14) C (30) D (43) E (61)	D (37)	E (79) C (32) C (27) F (93)	E (64)
	Build (2039)	EB WB NB SB	B (15) D (37) D (43) E (68)	D (42)	F (135) D (36) C (27) F (101)	F (88)
Poole Road and Smithfield Road	Existing (2024)	EB WB NB SB	D (51) D (51) B (19) A (9)	C (24)	D (52) D (38) B (14) C (24)	C (27)
	No-Build (2030)	EB WB NB SB	D (55) D (55) C (34) B (20)	D (36)	F (91) E (59) B (16) D (48)	D (47)
	Build (2030)	EB WB NB SB	E (56) E (55) C (34) B (19)	D (36)	F (93) E (59) B (16) D (48)	D (48)
	No-Build (2039)	EB WB NB SB	F (84) E (63) F (135) C (27)	F (93)	F (166) E (65) C (21) F (151)	F (109)
	Build (2039)	EB WB NB SB	F (118) E (68) F (124) C (26)	F (92)	F (169) E (66) C (21) F (152)	F (110)

TABLE ES-2: CAPACITY ANALYSIS SUMMARY (CONT)

Intersection	Conditions	APPROACH	Weekday AM Peak Hour		Weekday PM Peak Hour	
			LOS and Approach Delay (seconds)	Overall Delay (seconds)	LOS and Approach Delay (seconds)	Overall Delay (seconds)
Bethlehem Road and Grasshopper Road	Existing (2024)	EB WB NB SB	B (13) C (22) B (13) B (13)	C (17)	D (34) B (11) B (11) B (14)	C (24)
	No-Build (2030)	EB WB NB SB	C (18) F (62) C (19) C (19)	E (37)	F (107) B (13) B (13) C (21)	F (64)
	Build (2030)	EB WB NB SB	C (18) F (65) C (19) C (20)	E (38)	F (110) B (13) B (13) C (21)	F (66)
	No-Build (2039)	EB WB NB SB	E (38) F (303) E (41) E (46)	F (150)	F (350) C (18) C (18) E (47)	F (200)
	Build (2039)	EB WB NB SB	E (39) F (309) E (42) E (49)	F (153)	F (355) C (18) C (18) E (48)	F (203)
Bethlehem Road and Greythorne Place	Existing (2024)	WB[2] NB SB[1]	B (11) -- A (8)	N/A	B (11) -- A (8)	N/A
	No-Build (2030)	WB[2] NB SB[1]	B (12) -- A (8)	N/A	B (13) -- A (8)	N/A
	Build (2030)	WB[2] NB SB[1]	B (14) -- A (8)	N/A	B (15) -- A (8)	N/A
	No-Build (2039)	WB[2] NB SB[1]	B (14) -- A (9)	N/A	C (15) -- A (9)	N/A
	Build (2039)	WB[2] NB SB[1]	C (16) -- A (9)	N/A	C (19) -- A (9)	N/A

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

TABLE ES-2: CAPACITY ANALYSIS SUMMARY (CONT)

Intersection	Conditions	APPROACH	Weekday AM Peak Hour		Weekday PM Peak Hour	
			LOS and Approach Delay (seconds)	Overall Delay (seconds)	LOS and Approach Delay (seconds)	Overall Delay (seconds)
Bethlehem Road and Cross Cut Place / Widewaters Parkway	Existing (2024)	WB[2] NB SB[1]	B (14) -- A (8)	N/A	C (16) -- A (8)	N/A
	No-Build (2030)	EB WB NB SB	A (5) A (6) A (8) A (5)	A (7)	A (6) A (6) A (7) A (8)	A (7)
	Build (2030)	EB WB NB SB	A (5) A (7) A (8) A (5)	A (7)	A (6) A (6) A (7) A (9)	A (8)
	No-Build (2039)	EB WB NB SB	A (6) A (8) B (10) A (6)	A (9)	A (8) A (8) A (8) B (11)	A (10)
	Build (2039)	EB WB NB SB	A (6) A (8) B (11) A (6)	A (9)	A (8) A (8) A (8) B (12)	A (10)
Poole Road and Future NC 540 Southbound Ramps	No-Build (2030)	EB WB NB	B (19) B (13) C (26)	B (20)	B (14) B (15) B (17)	B (16)
	Build (2030)	EB WB NB	B (19) B (13) C (26)	B (20)	B (14) B (18) B (17)	B (16)
	No-Build (2039)	EB WB NB	B (18) B (13) C (26)	B (20)	B (16) B (17) C (25)	C (20)
	Build (2039)	EB WB NB	B (19) B (13) C (27)	B (20)	B (16) B (19) C (26)	C (21)

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

TABLE ES-2: CAPACITY ANALYSIS SUMMARY (CONT)

Intersection	Conditions	APPROACH	Weekday AM Peak Hour		Weekday PM Peak Hour	
			LOS and Approach Delay (seconds)	Overall Delay (seconds)	LOS and Approach Delay (seconds)	Overall Delay (seconds)
Poole Road and Future NC 540 Northbound Ramps	No-Build (2030)	EB WB NB	C (22) C (26) E (61)	C (29)	B (14) C (25) E (56)	C (21)
	Build (2030)	EB WB NB	C (22) C (27) E (61)	C (29)	B (13) C (26) D (54)	C (21)
	No-Build (2039)	EB WB NB	D (42) D (41) F (93)	D (46)	B (14) C (30) E (60)	C (21)
	Build (2039)	EB WB NB	D (41) D (43) F (93)	D (47)	B (14) C (31) E (60)	C (22)
Poole Road and Site Access #1	Build (2030)	EB[1] WB SB[2]	A (9) -- B (15)	N/A	A (8) -- B (11)	N/A
	Build (2039)	EB[1] WB SB[2]	A (10) -- C (18)	N/A	A (8) -- B (13)	N/A

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

Based on review of adjacent development and background information provided by NCDOT and the Town, the following improvements are expected to be constructed by **others** and were included in the future year analyses:

Poole Road and Hodge Road

- Restripe the westbound shared through-right lane on Poole Road to that of a through lane. – NCDOT STIP R-2829B
- Construct a shared westbound through-right lane on Poole Road. – NCDOT STIP R-2829B
- Construct an exclusive northbound right-turn lane on Hodge Road with a minimum of 100 feet of full width storage and appropriate deceleration and taper. – Hodge Road Planned Development / Banks 20
- Extend the existing northbound left-turn lane on Hodge Road to have 100 feet of full width storage and appropriate deceleration and taper. – Hodge Road Planned Development / Banks 20
- Extend the existing eastbound left-turn lane on Poole Road to the intersection with River Dreams Drive. – Hodge Road Planned Development / Banks 20
- Restripe the westbound shared through-right turn lane on Poole Road to that of a through lane. – Hodge Road Planned Development / Banks 20
- Construct an exclusive westbound right-turn lane on Poole Road with a minimum of 675 feet of full width storage and appropriate deceleration and taper. – Hodge Road Planned Development / Banks 20
- Construct an additional southbound left-turn lane on Hodge Road with 300 feet of full width storage and appropriate deceleration and taper. – Hodge Road Planned Development / Banks 20

Poole Road and Smithfield Road

- Construct an exclusive eastbound left-turn lane on Poole Road with a minimum of 225 feet of full width storage and appropriate deceleration and taper. – NCDOT SPOT HL-0031
- Construct an exclusive westbound left-turn lane on Poole Road with a minimum of 75 feet of full width storage and appropriate deceleration and taper. – NCDOT SPOT HL-0031
- Construct an exclusive northbound left-turn lane on Smithfield Road with a minimum of 175 feet of full width storage and appropriate deceleration and taper. – NCDOT SPOT HL-0031
- Construct an exclusive southbound left-turn lane on Smithfield Road with a minimum of 125 feet of full width storage and appropriate deceleration and taper. – NCDOT SPOT HL-0031

Bethlehem Road and Cross Cut Place / Widewaters Parkway

- Construct Widewaters Parkway as the eastbound approach with one (1) ingress lane and one (1) egress lane. – Lyndon Oaks
- Construct a single-lane roundabout with all approaches operating under yield control. – Lyndon Oaks

Poole Road and Future NC 540 Southbound Ramps

- Construct NC 540 Southbound Ramps as the northbound approach with one (1) ingress lane and three (3) egress lanes striped as two (2) exclusive left-turn lanes and one (1) exclusive right-turn lane. – NCDOT STIP R-2829B
- Construct an additional eastbound through lane on Poole Road. – NCDOT STIP R-2829B
- Construct an exclusive eastbound right-turn lane on Poole Road with a minimum of 500 feet of full width storage and appropriate deceleration and taper. – NCDOT STIP R-2829B
- Construct an additional westbound through lane on Poole Road. – NCDOT STIP R-2829B
- Construct an exclusive westbound left-turn lane on Poole Road with a minimum of 250 feet of full width storage and appropriate deceleration and taper. – NCDOT STIP R-2829
- Install a traffic signal. – NCDOT STIP R-2829

Poole Road and Future NC 540 Northbound Ramps

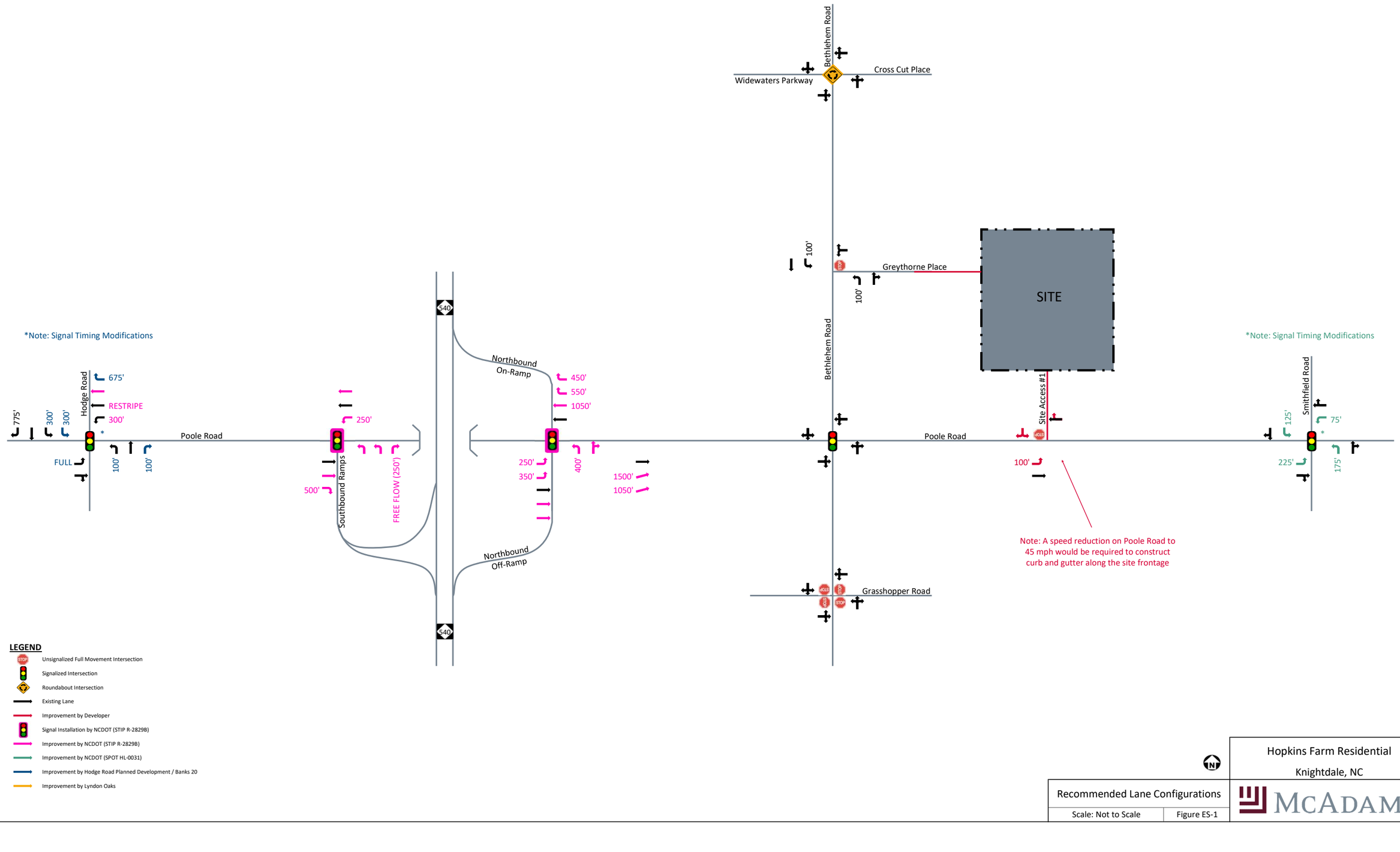
- Construct NC 540 Northbound Ramp Off-Ramp as the northbound approach with two (2) egress lanes striped as a left-turn lane with a minimum of 400 feet of full width storage and appropriate deceleration and taper and a shared through-right turn lane. – NCDOT STIP R-2829B
- Construct NC 540 Northbound On-Ramp as the northern leg of the intersection with two (2) ingress lanes. – NCDOT STIP R-2829B
- Construct two (2) additional eastbound through lanes on Poole Road. – NCDOT STIP R-2829B
- Construct exclusive dual eastbound left-turn lanes on Poole Road with a minimum of 250 feet and 350 feet of full width storage and appropriate deceleration and taper, respectively. – NCDOT STIP R-2829B
- Construct an additional westbound through lane on Poole Road. – NCDOT STIP R-2829B
- Construct exclusive dual westbound right-turn lanes on Poole Road with a minimum of 450 feet and 550 feet of full width storage and appropriate deceleration and taper, respectively. – NCDOT STIP R-2829
- Install a traffic signal. – NCDOT STIP R-2829B

Based on the findings in the TIA, the improvements below have been recommended to be constructed by the **developer** to mitigate traffic impacts by the proposed development:

Poole Road and Site Access #1

- Construct Site Access #1 as the southbound approach with one (1) ingress lane and one (1) egress lane.
- Provide stop control on the southbound approach of the proposed site driveway.
- Construct an exclusive eastbound left-turn lane on Poole Road with a minimum of 100 feet of full width storage and appropriate deceleration and taper.

Figure ES-1, on the following page, provides a graphical representation of recommended improvements at the study intersections.



Hopkins Farm Residential

Knightdale, NC

Recommended Lane Configurations

Scale: Not to Scale | Figure ES-1

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Traffic Impact Analysis

Hopkins Farm

Knightdale, North Carolina

INTRODUCTION

The proposed residential development will be located north of Poole Road and east of Bethlehem Road in Knightdale, North Carolina. Site access will be served via one (1) existing full movement access to Bethlehem Road via connection to Greythorne Place and one (1) proposed full movement access on Poole Road. The purpose of this Traffic Impact Analysis (TIA) is to determine the potential traffic impacts of this development and to identify transportation improvements that may be required to mitigate the impacts on the roadway network. The site is currently undeveloped and is expected to consist of the following land uses at full buildout:

- 108 single family homes
- 73 townhomes

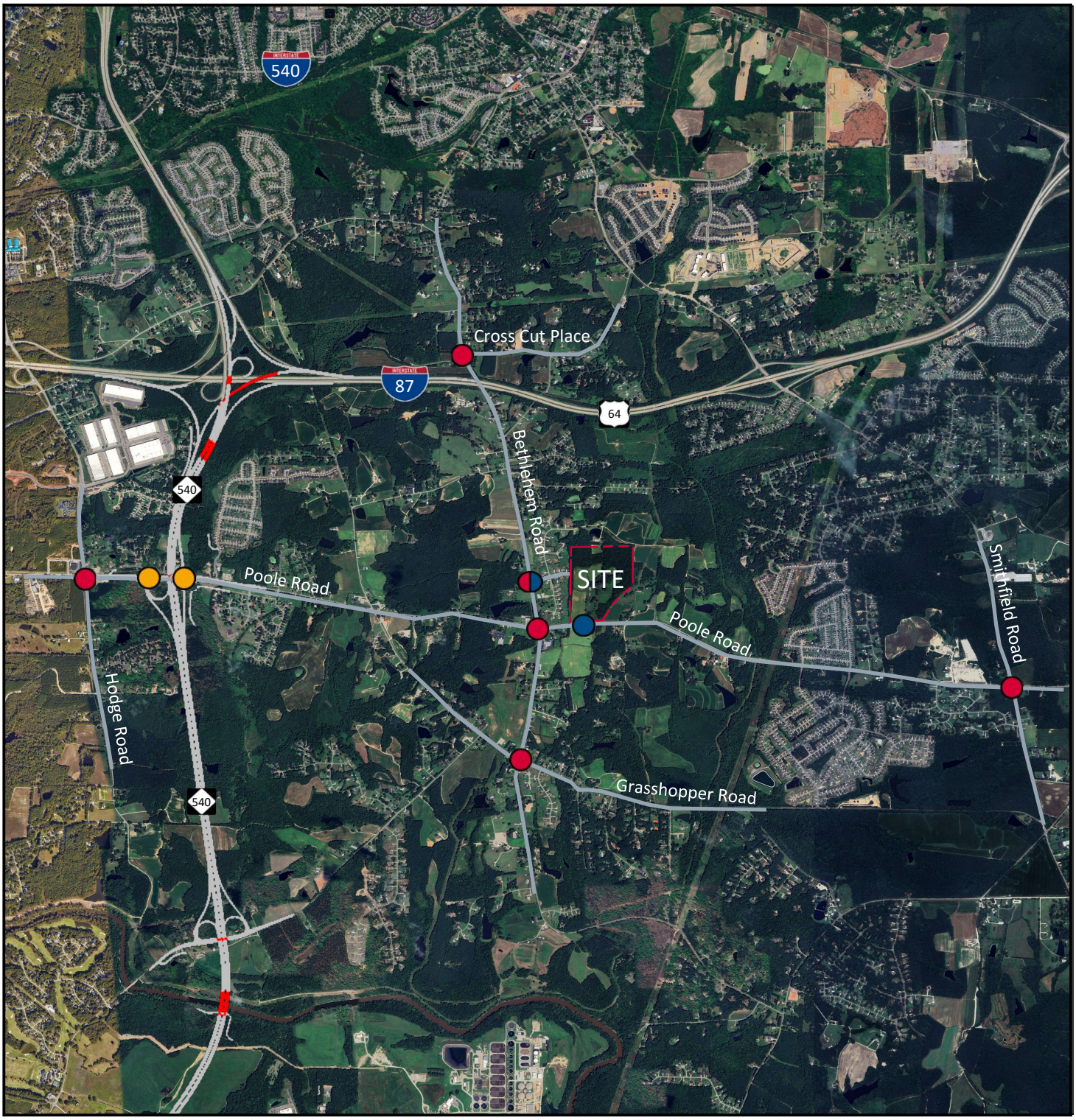
The proposed site is to be built-out by the year 2029; however, future year analysis is based on Build+1 (2030) and Build+10 (2039) conditions per Town of Knightdale (Town) TIA requirements. A Memorandum of Understanding (MOU) was reviewed and approved by the North Carolina Department of Transportation (NCDOT) and the Town, outlining the TIA scope and assumptions. The MOU and approval correspondence is provided in Appendix A. Based on the approved scoping; the following intersections are included in this TIA study area:

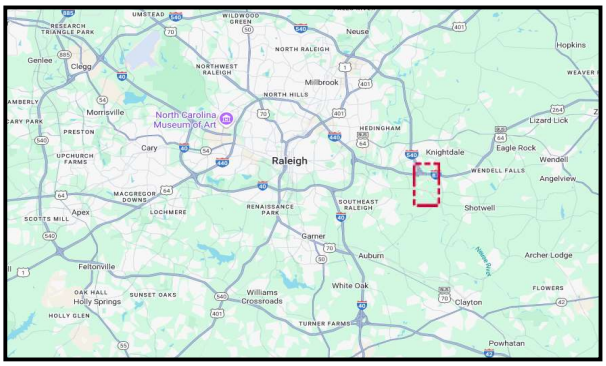
- Poole Road and Hodge Road
- Poole Road and Bethlehem Road
- Poole Road and Smithfield Road
- Bethlehem Road and Grasshopper Road
- Bethlehem Road and Greythorne Place
- Bethlehem Road and Cross Cut Place / Widewaters Parkway
- Poole Road and Future NC 540 Southbound Ramps
- Poole Road and Future NC 540 Northbound Ramps
- Poole Road and Site Access #1 (*Proposed*)

Refer to Figure 1 for a map of the study area. Figure 2 provides the most up to date preliminary site plan available at time of preparation of this study.

To determine the traffic impacts of the proposed development, the following analysis scenarios are included in this study:

- Existing (2024) Traffic Conditions
- No-Build (2030) Traffic Conditions
- Build (2030) Traffic Conditions
- No-Build (2039) Conditions
- Build (2039) Conditions





LEGEND

- Existing Study Intersection
- Future Study Intersection
- Site Access
- Site Location

Hopkins Farm Residential

Knightdale, NC

Site Location Map

Scale: Not to Scale | Figure 1

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- 32 FL SINGLE FAMILY (60'x120')
- 24 RL SINGLE FAMILY (40'x115')
- 24 RL SINGLE FAMILY (37'x115')
- 23 RL SINGLE FAMILY (35'x115')
- 68 RL TOWNHOMES (22'x95')

171 TOTAL

MATCHLINE SHEET C2.2
MATCHLINE SHEET C2.1

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

EXISTING CONDITIONS

The proposed development is located in an area primarily consisting of residential development and undeveloped land. Figure 3 provides a graphical representation of the existing lane configuration, storage capacity, traffic control type, and intersection spacing within the study area. Roadway characteristics within the study area is shown in Table 1. Average Annual Daily Traffic (AADT) data is provided based on the most recent count data provided by NCDOT. This AADT data provides the average Vehicles Per Day (vpd) for the subject facility based on typical operations. This AADT data is provided for informational purposes only and is not utilized for capacity analysis calculations within this study.

TABLE 1: ROADWAY CHARACTERISTICS

Road Name	Route #	Maintained By	Typical Cross Section	Speed Limit	AADT (year of data)
Poole Road	SR 1007	NCDOT	2-lane undivided	55 mph / 45 mph	12,000 vpd (2023)
Hodge Road	SR 2516	NCDOT	2-lane undivided	45 mph	17,000 vpd (2023)
Bethlehem Road	SR 5270	NCDOT	2-lane undivided	45 mph	5,900 vpd (2023)
Smithfield Road	SR 2233	NCDOT	2-lane undivided	45 mph	18,500 vpd (2023)
Grasshopper Road	SR 2511	NCDOT	2-lane undivided	55 mph (Statutory)	5,500 vpd (2023)
Greythorne Place	SR 5277	NCDOT	2-lane undivided	25 mph (Assumed)	280 vpd (2024)*
Cross Cut Place	SR 2512	NCDOT	2-lane undivided	55 mph	1,300 vpd (2023)

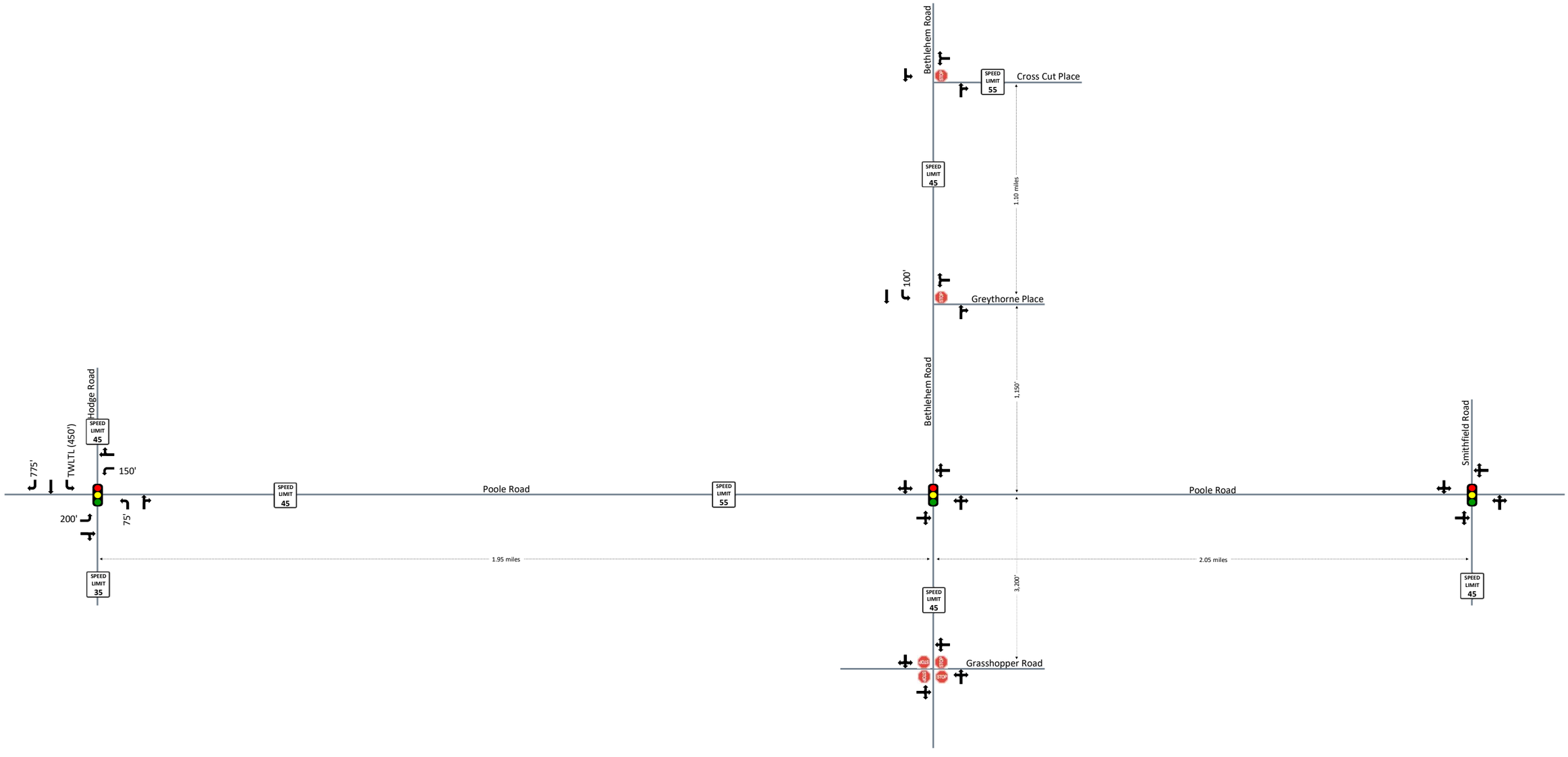
*AADT determined based on Existing (2024) traffic volumes assuming that the weekday PM peak hour accounts for approximately 10% of the daily traffic on the roadway.

Existing peak hour turning movement counts were conducted in December 2024 and January 2025 during typical weekday AM (7:00 – 9:00 AM) and weekday PM (4:00 – 6:00 PM) peak hours. The base year of the study was shown to be 2024 to be conservative. This data was collected at the following existing study intersections:

- Poole Road and Hodge Road
- Poole Road and Bethlehem Road
- Poole Road and Smithfield Road
- Bethlehem Road and Grasshopper Road
- Bethlehem Road and Greythorne Place
- Bethlehem Road and Cross Cut Place / Widewaters Parkway

Peak hour traffic volumes were determined from these traffic counts and balanced between study intersections, where appropriate. Traffic count data is provided in Appendix B. Refer to Figure 4 for the Existing (2024) peak hour traffic volumes. Current signal plans were obtained from NCDOT and are included in Appendix C.

The Existing (2024) traffic volumes were analyzed utilizing the current lane configurations to determine existing operations for the study area.



LEGEND

- Unsignalized Full Movement Intersection
- Signalized Intersection
- X' Storage Length (In Feet)
- Y' Intersection Spacing

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Knightdale, NC

Existing Lane Configurations

Scale: Not to Scale | Figure 3

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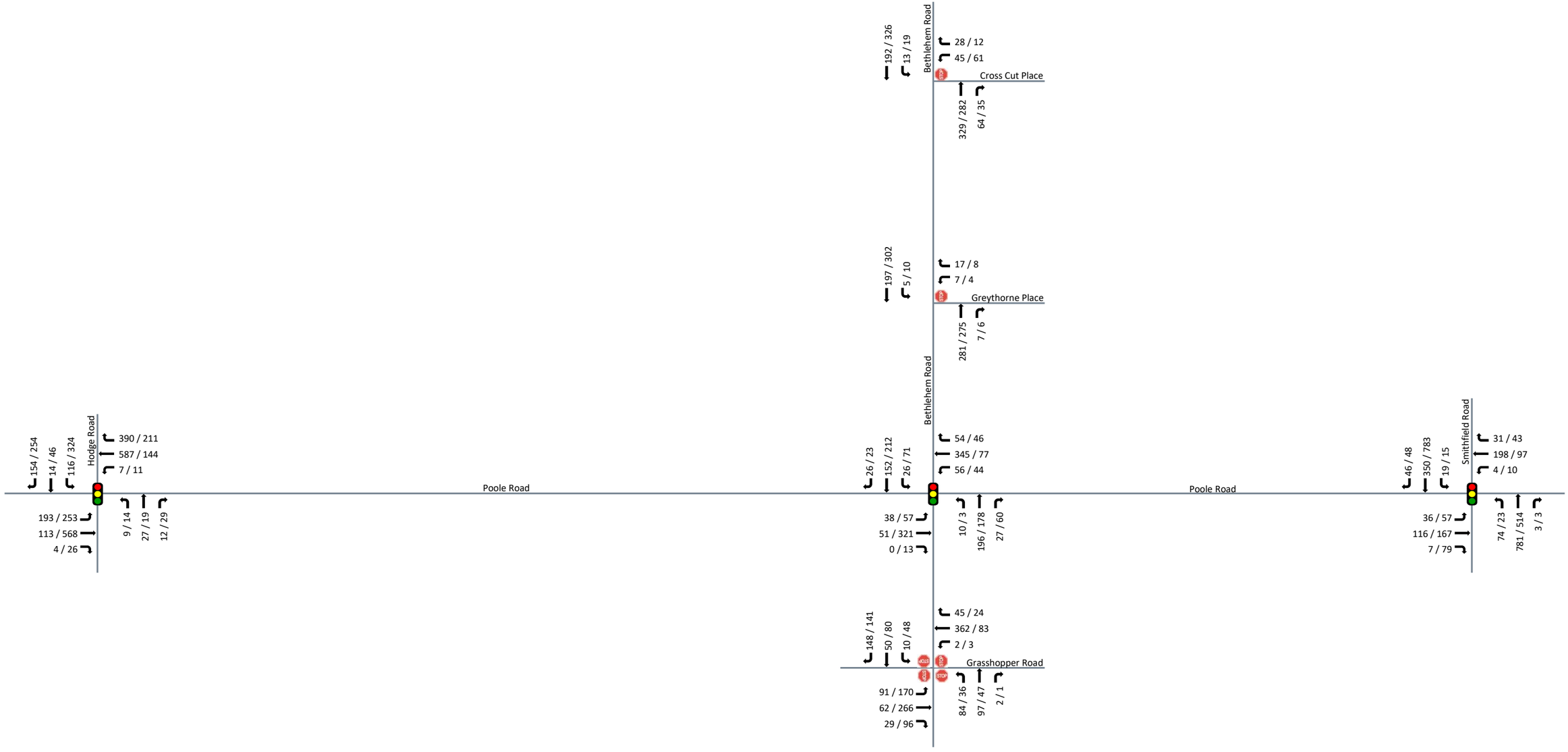

LEGEND

- Unsignalized Full Movement Intersection
- Signalized Intersection
- Roundabout Intersection
- XX / YY — AM / PM Site Trips

Hopkins Farm Residential

Knightdale, NC

Existing (2024)
Peak Hour Traffic Volumes

Scale: Not to Scale | Figure 4

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NO-BUILD CONDITIONS

In order to account for background growth in the study area prior to the proposed developments buildout year of 2029, the existing traffic count volumes were grown at a set growth rate and nearby approved adjacent development traffic was added to the study area based on their approved TIA's. Per the approved MOU, the existing traffic counts were grown at a 3% annual growth rate to determine projected traffic volumes. Refer to Figure 5A and 5B for the Projected (2030) and Project (2039) traffic volumes, respectively.

To account for the traffic volumes of the adjacent developments approved in the area, the traffic from those developments were also compiled and added to the analysis. The adjacent development traffic volumes are provided on Figure 6. Based on the approved MOU, the following developments were included:

TABLE 2: ADJACENT DEVELOPMENTS

Development Name	Location	Land Use / Density	Build-out Year	Firm Completing TIA
Haven at Griffith Meadows	North of Poole Road and east of Bethlehem Road	200 single family homes	2025	Timmons Group
Lyndon Oaks*	West of Bethlehem Road and between I-87 and Old Faison Road	308 single family homes 192 townhomes 10,000 sq. ft. of retail 5,000 sf. ft. high-turnover restaurant	2031	Ramey Kemp Associates
Hodge Road Planned Development / Banks 20 (Phase 1-3)*	South of Poole Road and along both sides of Hodge Road	1,052 single family homes 660 townhomes 10,000 sq. ft. of retail	2034	Exult Engineering

*Buildout is expected after the proposed development; however, these adjacent developments were included in the analysis based on coordination with the Town to be conservative.

Based on coordination with NCDOT and Town staff, it was determined that State Transportation Improvement Program (STIP) R-2829B and Strategic Transportation Prioritization (SPOT) HL-0031 projects should be included in this study as these projects are expected to provide future improvements within the study area. STIP R-2829B is expected to be completed in 2028 and SPOT HL-0031 is expected to be completed in 2024. NCDOT STIP R-2829B involves the expansion of NC 540 from the existing section of NC 540 at the interchange with I-87 to south of Rock Quarry Road. As part of STIP R-2829B, two (2) new interchanges are expected to be constructed along Poole Road to provide access to NC 540. SPOT HL-0031 involves construction of exclusive left-turn lanes on all approaches at the intersection of Poole Road and Smithfield Road.

Future (2030 and 2039) traffic volumes for the intersection of Poole Road with Hodge Road and the future intersections of Poole Road with NC 540 are based on interpolation between base year 2025 traffic volumes and future year 2045 traffic volumes from the STIP R-2829B Traffic Forecast.

According to the MOU and NCDOT, the following background roadway improvements are expected within the study area:

Poole Road and Hodge Road

- Restripe the westbound shared through-right lane on Poole Road to that of a through lane. – NCDOT STIP R-2829B
- Construct a shared westbound through-right lane on Poole Road. – NCDOT STIP R-2829B
- Construct an exclusive northbound right-turn lane on Hodge Road with a minimum of 100 feet of full width storage and appropriate deceleration and taper. – Hodge Road Planned Development / Banks 20
- Extend the existing northbound left-turn lane on Hodge Road to have 100 feet of full width storage and appropriate deceleration and taper. – Hodge Road Planned Development / Banks 20
- Extend the existing eastbound left-turn lane on Poole Road to the intersection with River Dreams Drive. – Hodge Road Planned Development / Banks 20
- Restripe the westbound shared through-right turn lane on Poole Road to that of a through lane. – Hodge Road Planned Development / Banks 20
- Construct an exclusive westbound right-turn lane on Poole Road with a minimum of 675 feet of full width storage and appropriate deceleration and taper. – Hodge Road Planned Development / Banks 20
- Construct an additional southbound left-turn lane on Hodge Road with 300 feet of full width storage and appropriate deceleration and taper. – Hodge Road Planned Development / Banks 20

Poole Road and Smithfield Road

- Construct an exclusive eastbound left-turn lane on Poole Road with a minimum of 225 feet of full width storage and appropriate deceleration and taper. – NCDOT SPOT HL-0031
- Construct an exclusive westbound left-turn lane on Poole Road with a minimum of 75 feet of full width storage and appropriate deceleration and taper. – NCDOT SPOT HL-0031
- Construct an exclusive northbound left-turn lane on Smithfield Road with a minimum of 175 feet of full width storage and appropriate deceleration and taper. – NCDOT SPOT HL-0031
- Construct an exclusive southbound left-turn lane on Smithfield Road with a minimum of 125 feet of full width storage and appropriate deceleration and taper. – NCDOT SPOT HL-0031

Bethlehem Road and Cross Cut Place / Widewaters Parkway

- Construct Widewaters Parkway as the eastbound approach with one (1) ingress lane and one (1) egress lane. – Lyndon Oaks
- Construct a single-lane roundabout with all approaches operating under yield control. – Lyndon Oaks

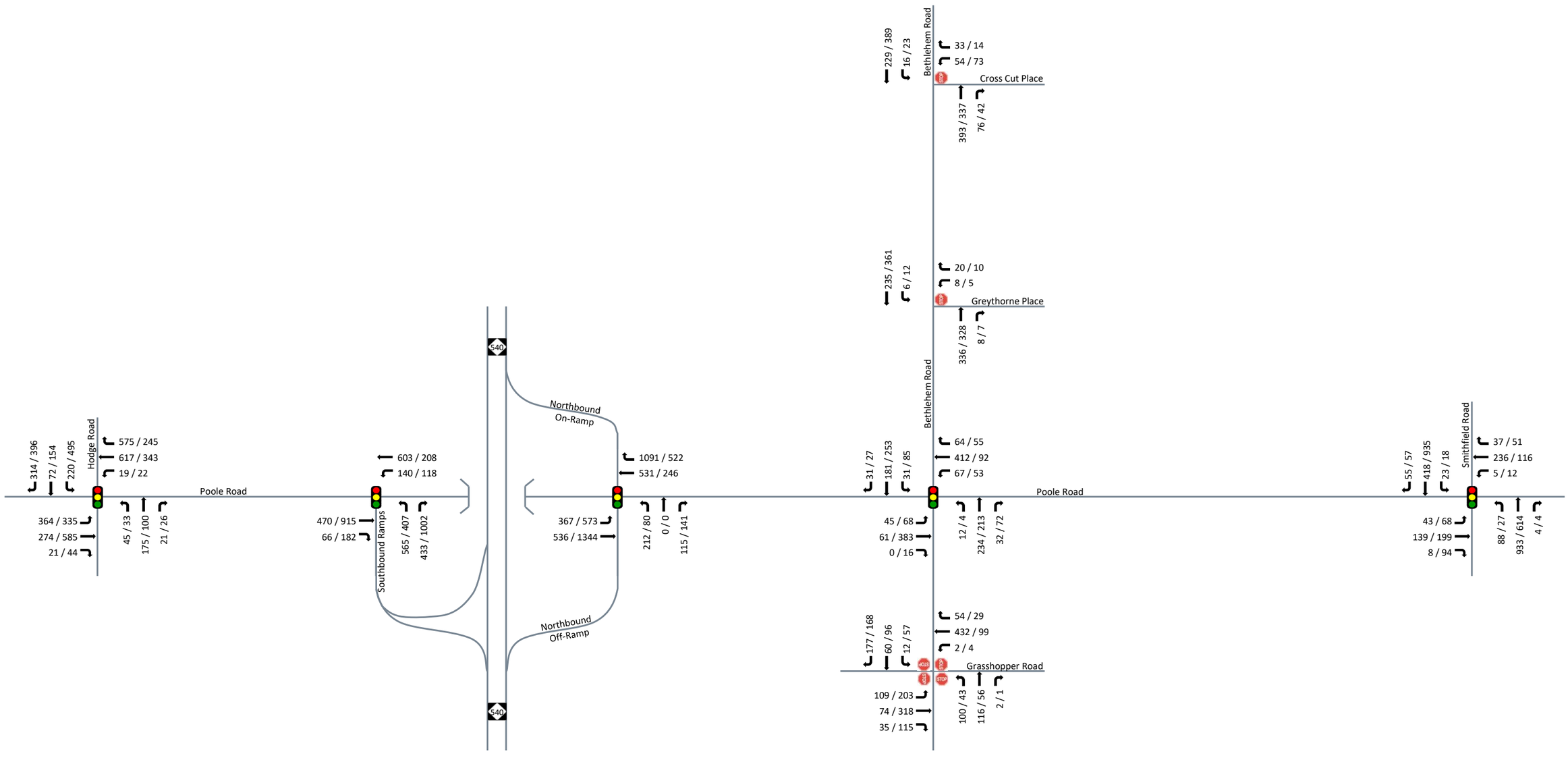
Poole Road and Future NC 540 Southbound Ramps

- Construct NC 540 Southbound Ramps as the northbound approach with one (1) ingress lane and three (3) egress lanes striped as two (2) exclusive left-turn lanes and one (1) exclusive right-turn lane. – NCDOT STIP R-2829B
- Construct an additional eastbound through lane on Poole Road. – NCDOT STIP R-2829B
- Construct an exclusive eastbound right-turn lane on Poole Road with a minimum of 500 feet of full width storage and appropriate deceleration and taper. – NCDOT STIP R-2829B
- Construct an additional westbound through lane on Poole Road. – NCDOT STIP R-2829B
- Construct an exclusive westbound left-turn lane on Poole Road with a minimum of 250 feet of full width storage and appropriate deceleration and taper. – NCDOT STIP R-2829
- Install a traffic signal. – NCDOT STIP R-2829

Poole Road and Future NC 540 Northbound Ramps

- Construct NC 540 Northbound Ramp Off-Ramp as the northbound approach with two (2) egress lanes striped as a left-turn lane with a minimum of 400 feet of full width storage and appropriate deceleration and taper and a shared through-right turn lane. – NCDOT STIP R-2829B
- Construct NC 540 Northbound On-Ramp as the northern leg of the intersection with two (2) ingress lanes. – NCDOT STIP R-2829B
- Construct two (2) additional eastbound through lanes on Poole Road. – NCDOT STIP R-2829B
- Construct exclusive dual eastbound left-turn lanes on Poole Road with a minimum of 250 feet and 350 feet of full width storage and appropriate deceleration and taper, respectively. – NCDOT STIP R-2829B
- Construct an additional westbound through lane on Poole Road. – NCDOT STIP R-2829B
- Construct exclusive dual westbound right-turn lanes on Poole Road with a minimum of 450 feet and 550 feet of full width storage and appropriate deceleration and taper, respectively. – NCDOT STIP R-2829
- Install a traffic signal. – NCDOT STIP R-2829B

Appendix D provides a full summary of the adjacent developments and background improvements included in this analysis. In order to account for future year analysis without the proposed development, the Projected (2030) and Projected (2039) traffic volumes were added to the adjacent development trips to determine the No-Build (2030) and No-Build (2039) traffic volumes. Figure 7A and 7B provides the No-Build (2030) and No-Build (2039) traffic volumes, respectively.



LEGEND

- Unsignalized Full Movement Intersection
- Signalized Intersection
- Roundabout Intersection
- XX / YY — AM / PM Peak Hour Traffic

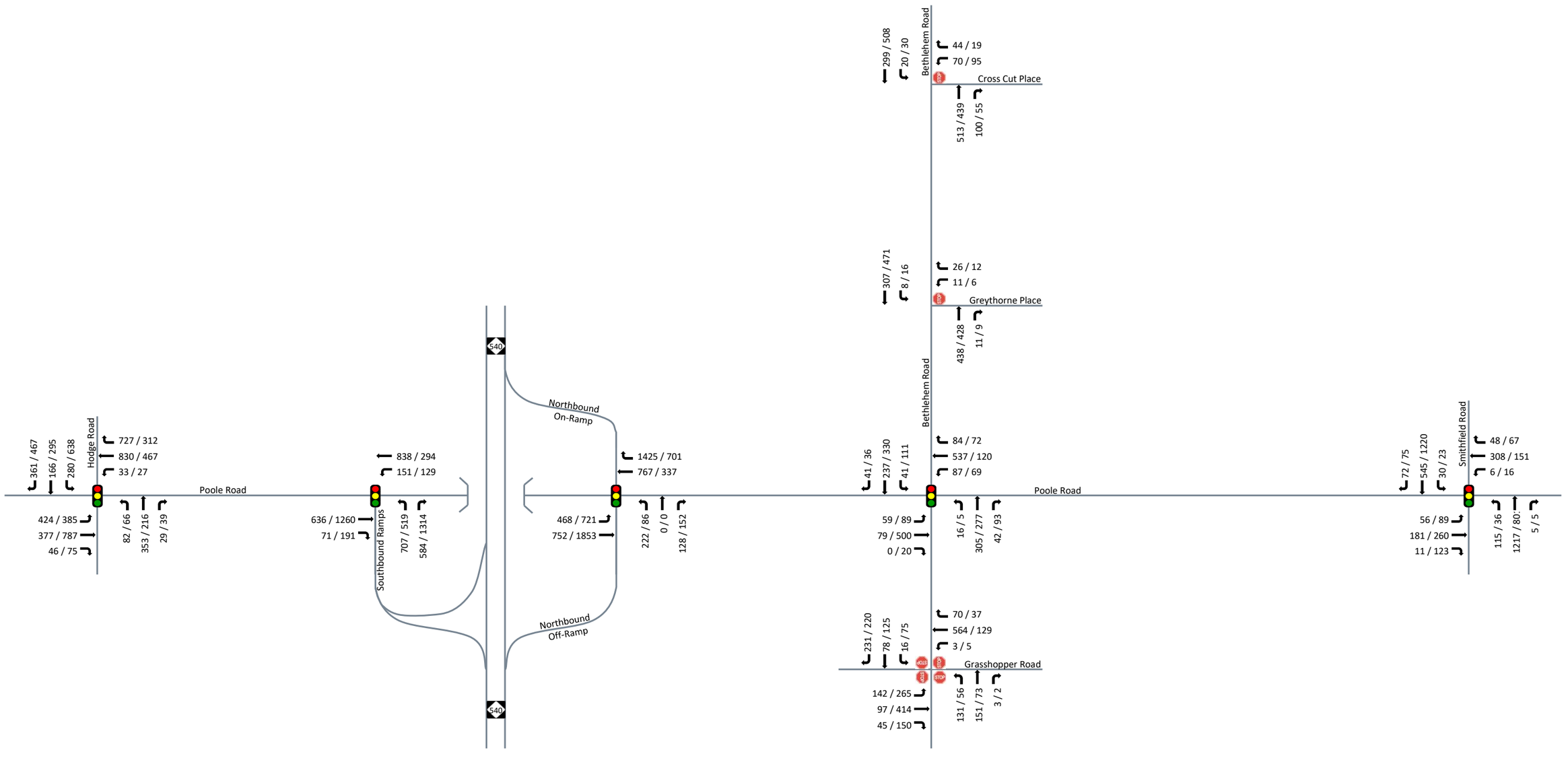
Hopkins Farm Residential

Knightdale, NC

Projected (2030)
Peak Hour Traffic Volumes

Scale: Not to Scale | Figure 5A

McAdams



LEGEND

- Unsignalized Full Movement Intersection
- Signalized Intersection
- Roundabout Intersection
- XX / YY — AM / PM Peak Hour Traffic

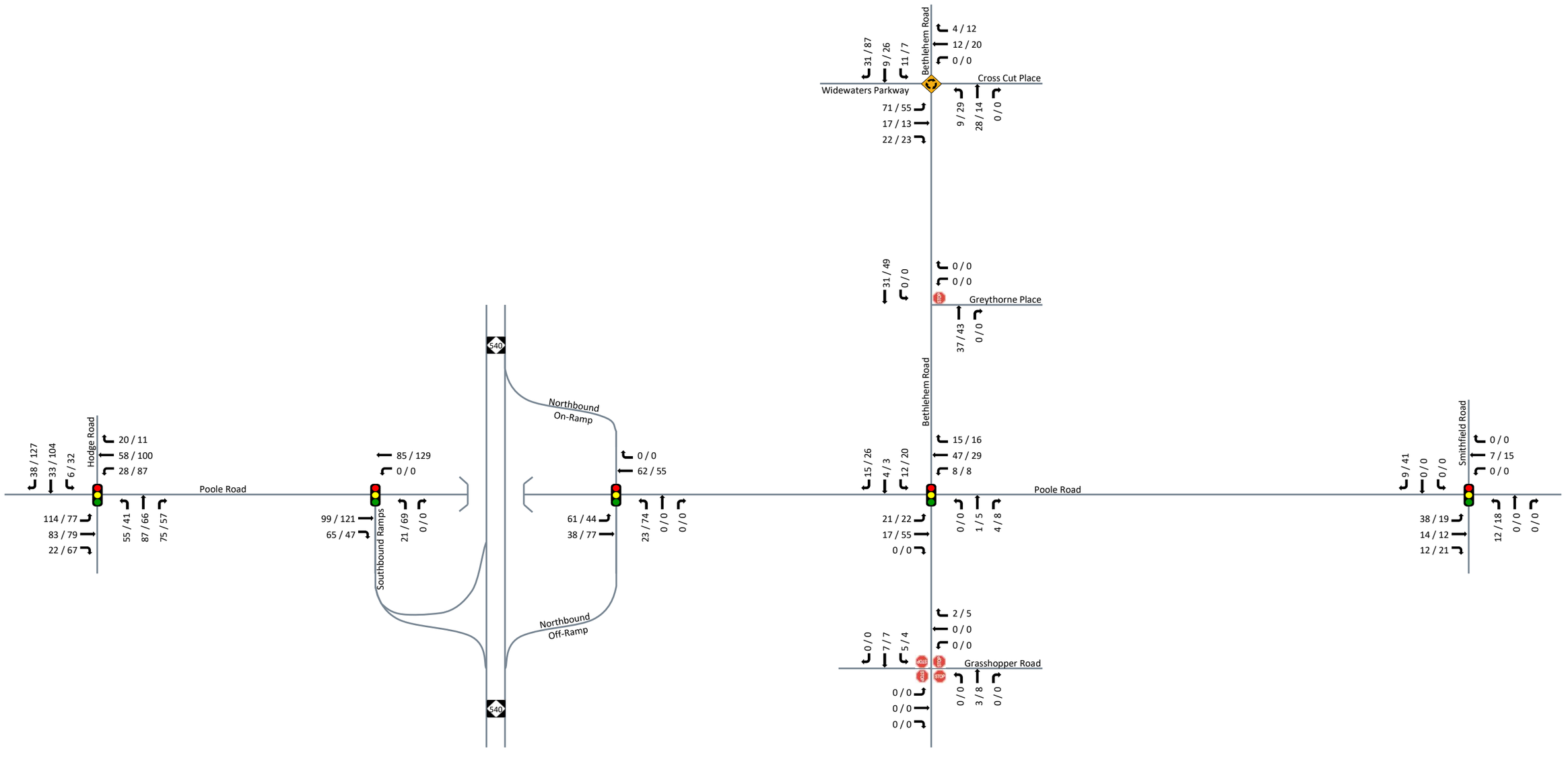
Hopkins Farm Residential

Knightdale, NC

Projected (2039)
Peak Hour Traffic Volumes

Scale: Not to Scale | Figure 5B

McAdams



LEGEND

- Unsignalized Full Movement Intersection
- Signalized Intersection
- Roundabout Intersection
- XX / YY — AM / PM Peak Hour Traffic

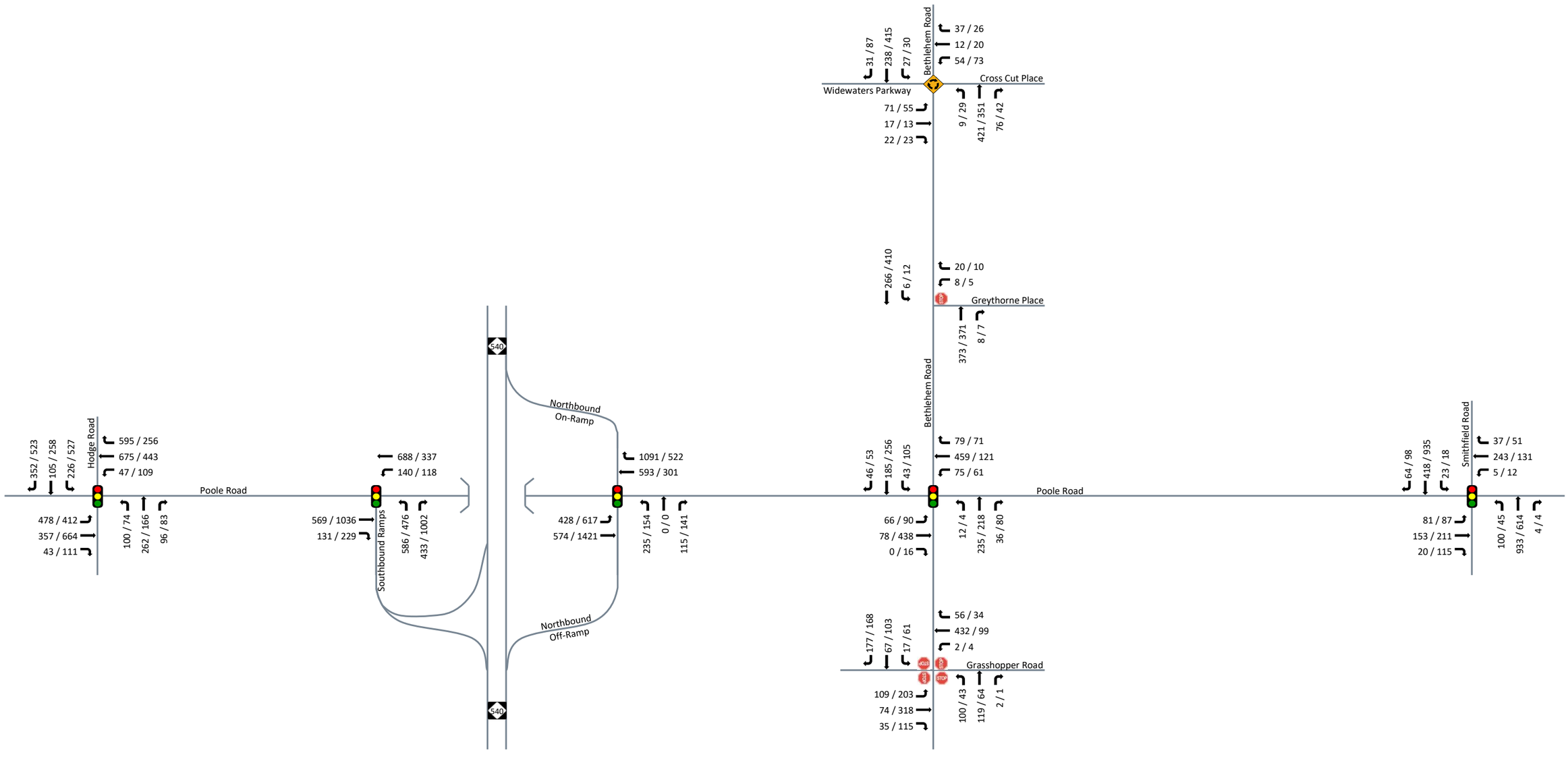
Hopkins Farm Residential

Knightdale, NC

Adjacent Development Trips

Scale: Not to Scale | Figure 6

McAdams



LEGEND

- Unsignalized Full Movement Intersection
- Signalized Intersection
- Roundabout Intersection
- XX / YY — AM / PM Peak Hour Traffic

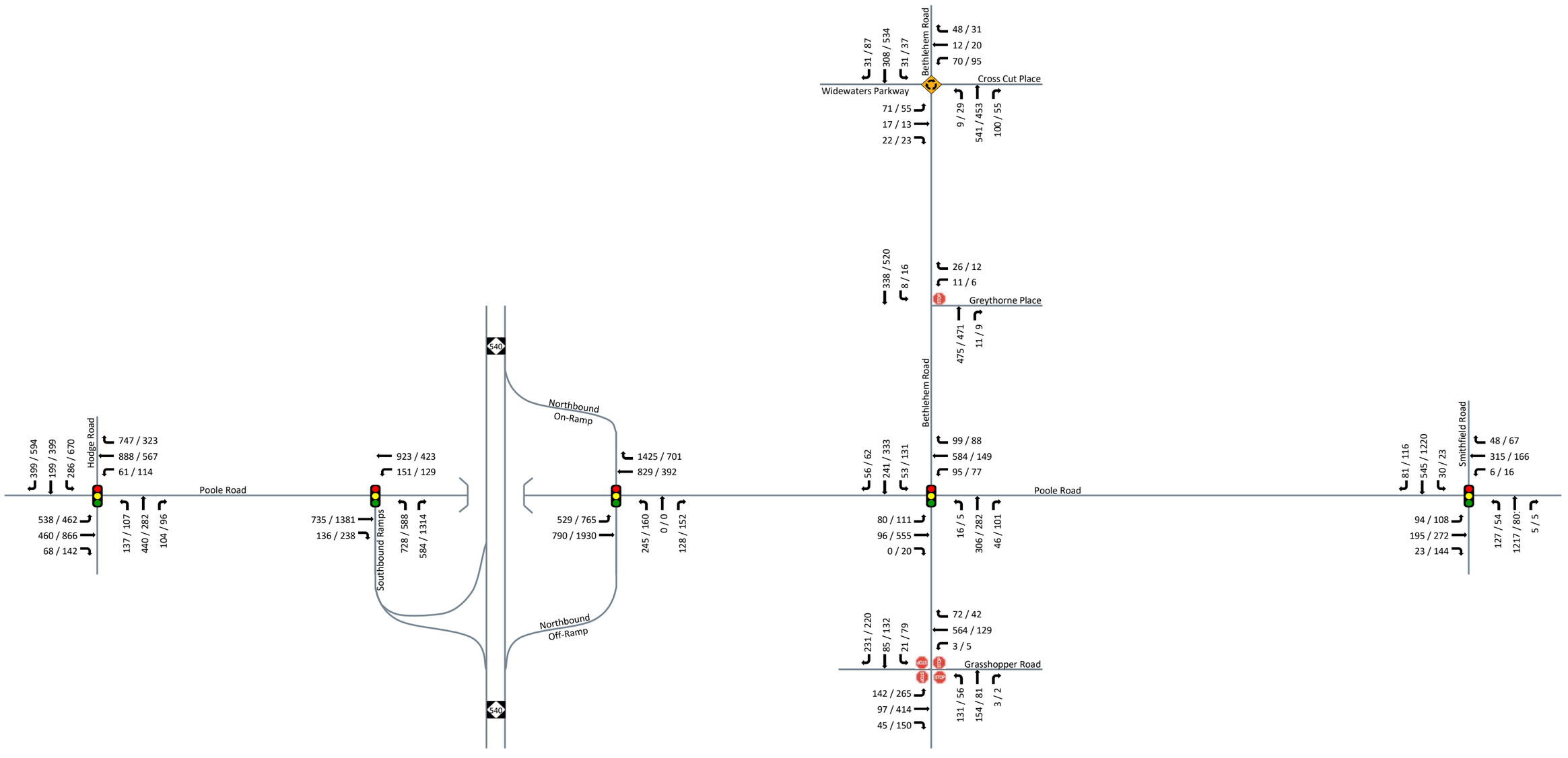
Hopkins Farm Residential

Knightdale, NC

No-Build (2030)
Peak Hour Traffic Volumes

Scale: Not to Scale | Figure 7A

McAdams



LEGEND

- Unsignalized Full Movement Intersection
- Signalized Intersection
- Roundabout Intersection
- XX / YY — AM / PM Peak Hour Traffic

Hopkins Farm Residential

Knightdale, NC

No-Build (2039)
Peak Hour Traffic Volumes

Scale: Not to Scale | Figure 7B

McAdams

BUILD CONDITIONS

The proposed development is expected to consist of a maximum of 108 single-family homes and 73 townhomes. Based on the Institute for Transportation Engineers (ITE) *Trip Generation Manual*, 11th Edition, and the suggested method of trip calculations provided in NCDOT's *Rate vs. Equation spreadsheet*, trips for the proposed development were calculated for weekday daily, weekday AM peak hour, and weekday PM peak hour. A summary of this trip generation is provided in Table 3.

TABLE 3: TRIP GENERATION

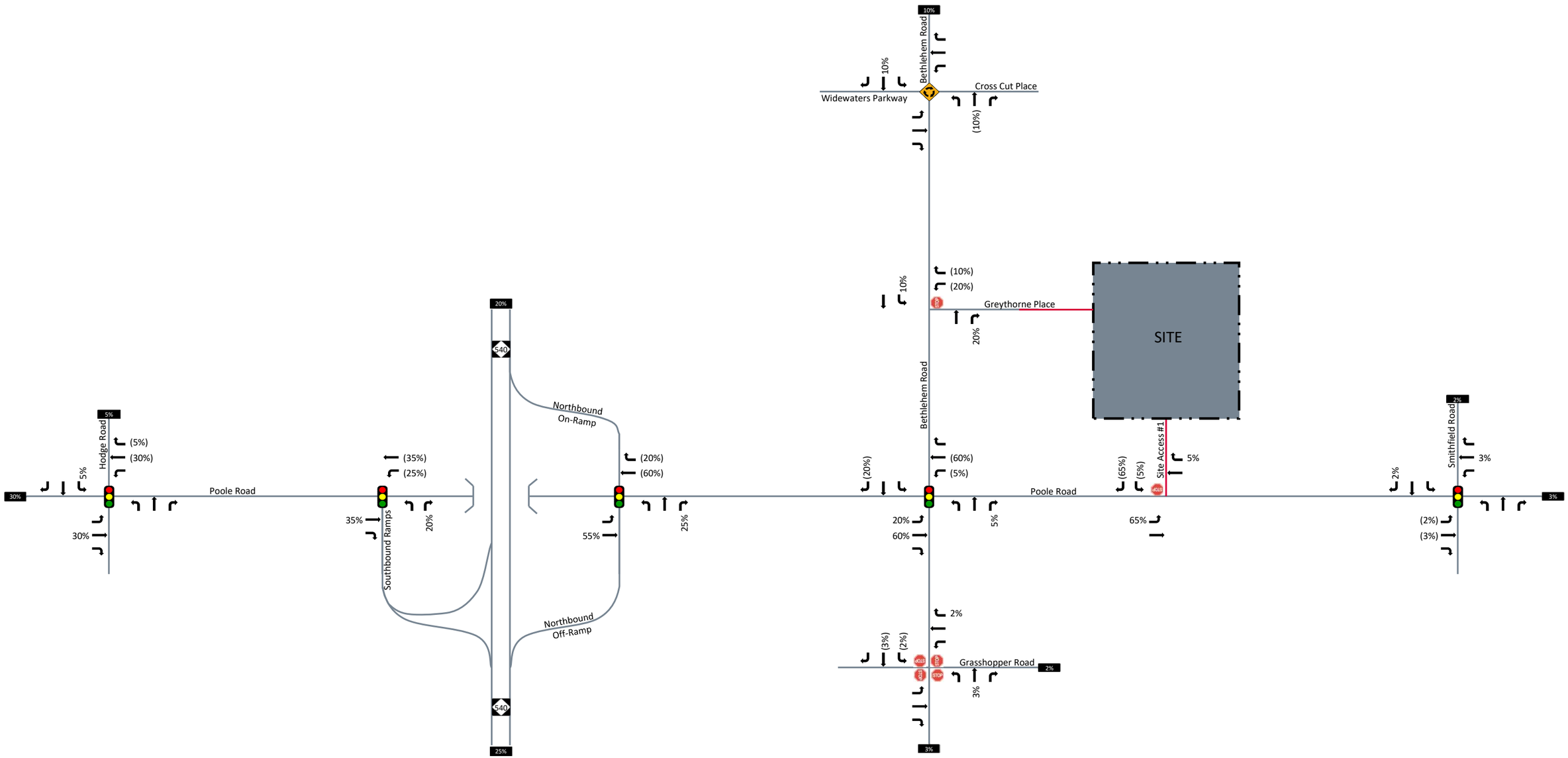
Land Use (ITE Code)	Density	Calculation Methodology	Daily Trips	AM Peak Hour			PM Peak Hour		
				Enter	Exit	Total	Enter	Exit	Total
Single Family Detached (210)	108 units	Adjacent / Equation	1,083	20	60	80	67	40	107
Single Family Attached (215)	73 units	Adjacent / Equation	506	8	24	32	24	16	40
		TOTAL	**1,589**	**28**	**84**	**112**	**91**	**56**	**147**

Based on the existing traffic patterns, population centers surrounding the development, and engineering judgment the site trips were distributed according to the regional distributions listed as follows:

- 30% to/from the west via Poole Road
- 25% to/from the south via NC 540
- 20% to/from the north via NC 540
- 10% to/from the north via Bethlehem Road
- 5% to/from the north via Hodge Road
- 3% to/from the east via Poole Road
- 3% to/from the south via Bethlehem Road
- 2% to/from the north via Smithfield Road
- 2% to/from the east via Grasshopper Road

Refer to Figure 8 for the detailed trip distribution percentages within the study area. The trip generation and distribution were approved by NCDOT and the Town within the MOU provided in Appendix A.

The trip distribution was applied to the trip generation to determine the trip assignment for the proposed development site trips at all study intersections. Refer to Figure 9 for the site trip assignment. To determine the future traffic volumes at the study intersections with buildout of the proposed site, the No-Build (2030) and No-Build (2039) traffic volumes were added to the site trip assignment to determine Build (2030) and Build (2039) traffic volumes. Refer to Figure 10A and 10B for the Build (2030) and Build (2039) traffic volumes, respectively.



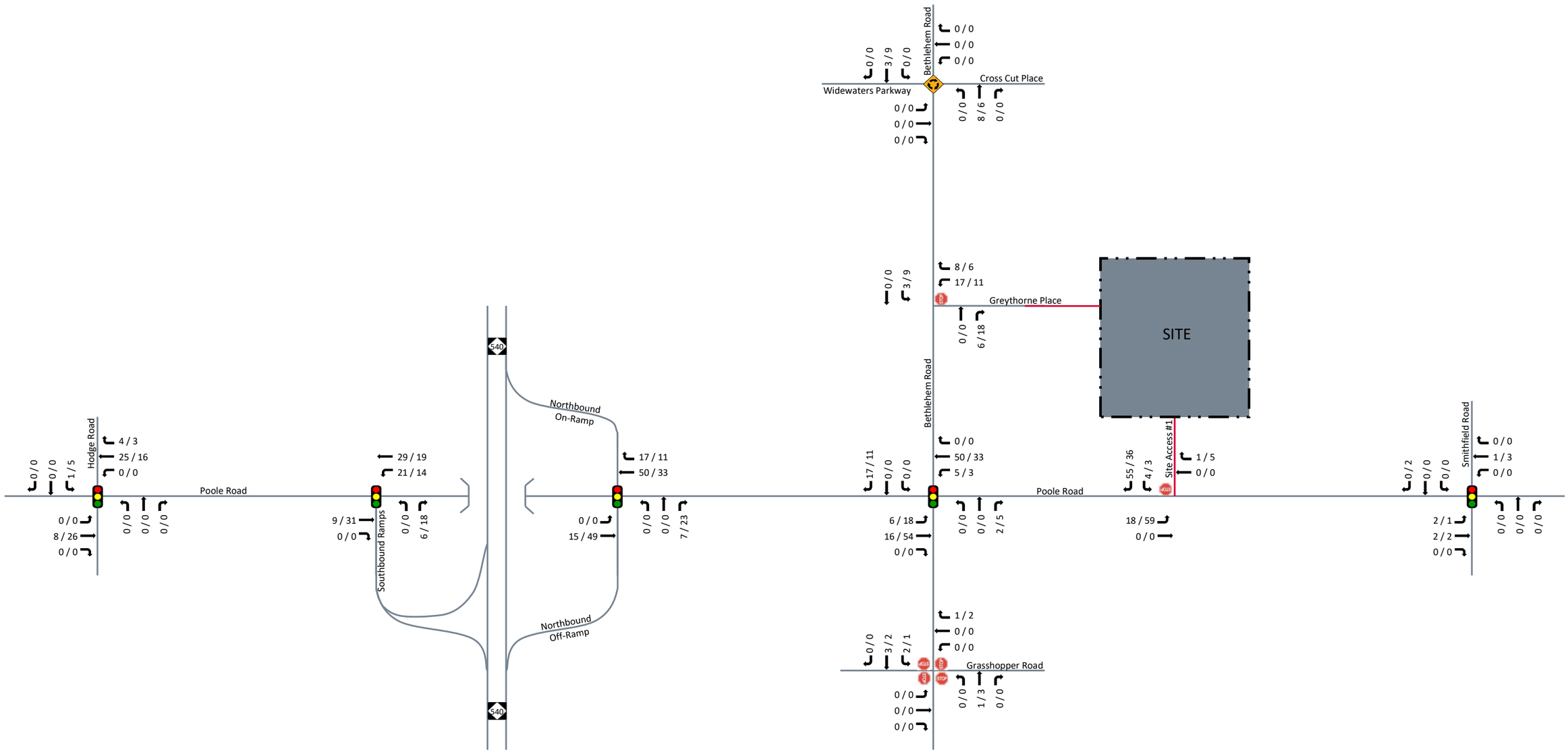
Hopkins Farm Residential

Knightdale, NC

Site Trip Distribution

Scale: Not to Scale | Figure 8

McAdams



LEGEND

- Unsignalized Full Movement Intersection
- Signalized Intersection
- Roundabout Intersection
- XX / YY — AM / PM Site Trips

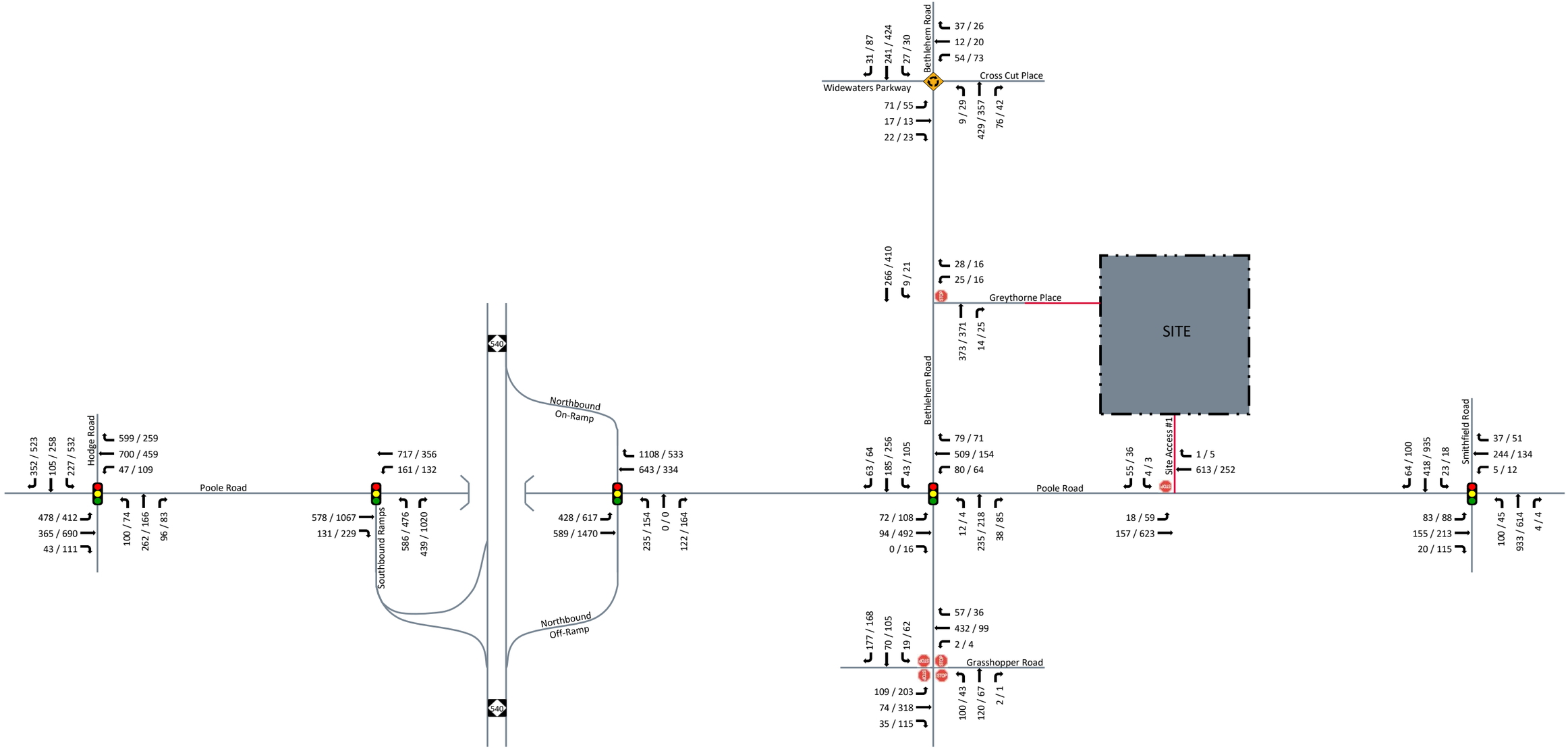
Hopkins Farm Residential

Knightdale, NC

Site Trip Assignment

Scale: Not to Scale | Figure 9

McAdams



LEGEND

- Unsignalized Full Movement Intersection
- Signalized Intersection
- Roundabout Intersection
- XX / YY — AM / PM Peak Hour Traffic

Hopkins Farm Residential

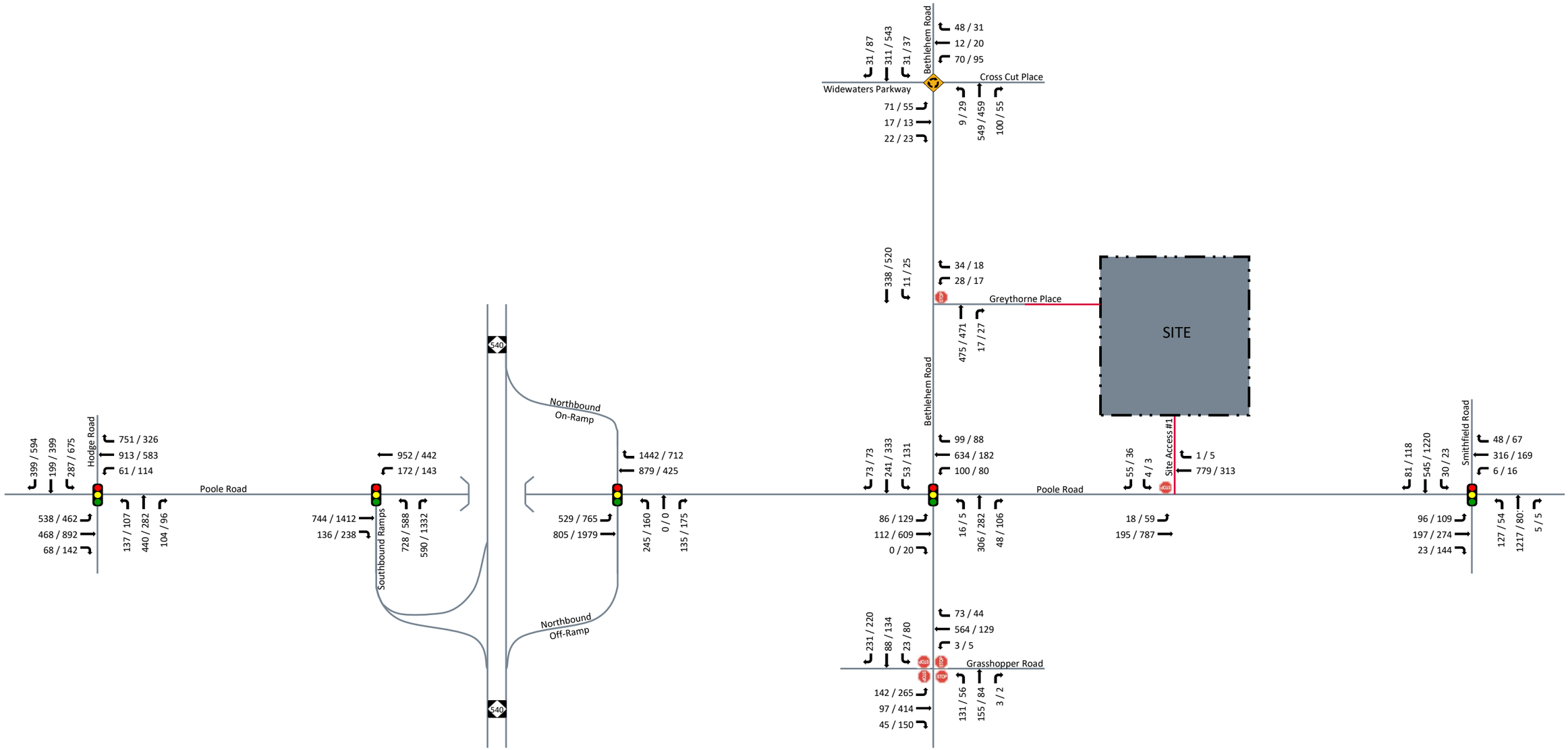
Knightdale, NC

Build (2030)

Peak Hour Traffic Volumes

Scale: Not to Scale | Figure 10A

McADAMS



LEGEND

- Unsignalized Full Movement Intersection
- Signalized Intersection
- Roundabout Intersection
- XX / YY — AM / PM Peak Hour Traffic

Hopkins Farm Residential

Knightdale, NC

Build (2039)

Peak Hour Traffic Volumes

Scale: Not to Scale | Figure 10B

McAdams

CAPACITY ANALYSIS

The intersections and analysis scenarios included in this study were analyzed to determine the potential impact by the proposed development and to recommend improvements to mitigate any potential impacts. The capacity analysis reviews the level of service (LOS), delay, and vehicle queues expected under each analysis scenario utilizing the methodology contained in the *Highway Capacity Manual* (HCM), 6th Edition, published by the Transportation Research Board.

LOS is a qualitative measurement of traffic operations based on the average total vehicle delay of the movement, approach, or intersection. The HCM includes six levels of service, ranging from level "A" (free flow conditions) to level "F" (where over-saturated conditions are evident). Table 4 provides a summary of the thresholds for each LOS under both unsignalized (stop-control) and signalized operations.

TABLE 4: HIGHWAY CAPACITY MANUAL – LEVELS OF SERVICE + DELAY CRITERIA

Level of Service (LOS)	Unsignalized	Signalized
	Average Control Delay (Seconds per vehicle)	Average Control Delay (Seconds per vehicle)
A	≤ 10	≤ 10
B	> 10 and ≤ 15	> 10 and ≤ 20
C	> 15 and ≤ 25	> 20 and ≤ 35
D	> 25 and ≤ 35	> 35 and ≤ 55
E	> 35 and ≤ 50	> 55 and ≤ 80
F	> 50	> 80

Computer software packages, Synchro (version 11.1) and SIDRA (version 9.1), were utilized for the analysis of operations within this study. Within Synchro, SimTraffic was also used to review queue lengths and the operations of intersections within the context of location and spacing in the study area. The capacity analysis summary table for each study intersection provides the delay and LOS for each approach and overall intersection, when appropriate. More detailed queues and delay information is provided in the appendix.

Per the NCDOT *Congestion Management Capacity Analysis Guidelines*, several assumptions were applied to the full study. A summary of these assumptions is provided below:

- A Peak Hour Factor (PHF) of 0.90 was used for all analysis scenarios and intersections.
- A heavy vehicle percentage of 2% was applied to all analysis scenarios and intersections.
- For allowable movements with volumes less than four (4), a volume of four (4) was applied in the capacity analysis. In order to present accurate information within the traffic volume figures, this was not applied to those conditions.

POOLE ROAD + HODGE ROAD

The intersection of Poole Road and Hodge Road is currently a signalized, four-leg intersection. This intersection was analyzed under Existing (2024), No-Build (2030), Build (2030), No-Build (2039), and Build (2039) conditions. Based on coordination with Town and NCDOT staff, Hodge Road Planned Development / Banks 20 and STIP R-2829B are expected to construct improvements at the subject intersection prior to the 2029 buildout of the proposed development. These improvements were included under all future year analyses (No-Build and Build conditions). The improvements included as adjacent development improvements are:

- Restripe the westbound shared through-right lane on Poole Road to that of a through lane. – NCDOT STIP R-2829B
- Construct a shared westbound through-right lane on Poole Road. – NCDOT STIP R-2829B
- Construct an exclusive northbound right-turn lane on Hodge Road with a minimum of 100 feet of full width storage and appropriate deceleration and taper. – Hodge Road Planned Development / Banks 20
- Extend the existing northbound left-turn lane on Hodge Road to have 100 feet of full width storage and appropriate deceleration and taper. – Hodge Road Planned Development / Banks 20
- Extend the existing eastbound left-turn lane on Poole Road to the intersection with River Dreams Drive. – Hodge Road Planned Development / Banks 20
- Restripe the westbound shared through-right turn lane on Poole Road to that of a through lane. – Hodge Road Planned Development / Banks 20
- Construct an exclusive westbound right-turn lane on Poole Road with a minimum of 675 feet of full width storage and appropriate deceleration and taper. – Hodge Road Planned Development / Banks 20
- Construct an additional southbound left-turn lane on Hodge Road with 300 feet of full width storage and appropriate deceleration and taper. – Hodge Road Planned Development / Banks 20

Table 5 provides the capacity analysis for the subject intersection with the lane configurations and traffic control shown in the table. Refer to Appendix F for the Synchro capacity analysis reports. Copies of the SimTraffic queueing and performance reports can be found in Appendix O.

TABLE 5: CAPACITY ANALYSIS SUMMARY OF POOLE ROAD + HODGE ROAD

Conditions	APPROACH	Lane Configurations	Weekday AM Peak Hour		Weekday PM Peak Hour	
			LOS and Approach Delay (seconds)	Overall Delay (seconds)	LOS and Approach Delay (seconds)	Overall Delay (seconds)
Existing (2024)	EB	1 LT, 1 TH-RT	D (36)	D (41)	B (19)	C (26)
	WB	1 LT, 1 TH-RT	D (36)		D (40)	
	NB	1 LT, 1 TH-RT	D (51)		C (23)	
	SB	1 LT, 1 TH, 1 RT	E (61)		C (29)	
No-Build (2030)	EB	1 LT, 1 TH-RT	D (51)	D (52)	C (33)	D (39)
	WB	1 LT, 2 TH, 1 RT	D (55)		C (21)	
	NB	1 LT, 1 TH, 1 RT	F (87)		E (64)	
	SB	2 LT, 1 TH, 1 RT	C (24)		D (49)	

Background Improvements by Banks 20 / STIP R-2829B are shown underlined.

TABLE 5: CPACITY ANALYSIS SUMMARY OF POOLE ROAD + HODGE ROAD (CONT)						
			Weekday AM Peak Hour		Weekday PM Peak Hour	
Conditions	**APPROACH**	**Lane Configurations**	**LOS and Approach Delay (seconds)**	**Overall Delay (seconds)**	**LOS and Approach Delay (seconds)**	**Overall Delay (seconds)**
Build (2030)	EB WB NB SB	1 LT, 1 TH-RT 1 LT, 2 TH, 1 RT 1 LT, 1 TH, 1 RT 2 LT, 1 TH, 1 RT	D (50) E (57) F (90) C (24)	D (53)	D (35) C (27) E (64) D (50)	D (41)
No-Build (2039)	EB WB NB SB	1 LT, 1 TH-RT 1 LT, 2 TH, 1 RT 1 LT, 1 TH, 1 RT 2 LT, 1 TH, 1 RT	F (117) F (119) F (170) C (27)	F (108)	F (94) E (70) F (98) F (159)	F (112)
Build (2039)	EB WB NB SB	1 LT, 1 TH-RT 1 LT, 2 TH, 1 RT 1 LT, 1 TH, 1 RT 2 LT, 1 TH, 1 RT	F (116) F (126) F (170) C (27)	F (110)	F (103) E (69) F (98) F (162)	F (116)

Background Improvements by adjacent developments are shown underlined.

Capacity analysis of Existing (2024) traffic conditions indicate that the intersection of Poole Road and Hodge Road currently operates at an overall LOS D or better during the weekday AM and PM peak hours.

Under future traffic conditions, STIP R-2829B is expected to restripe the westbound shared through-right lane on Poole Road to that of a through lane and construct an shared westbound through-right lane on Poole Road, and the Hodge Road Planned Development / Banks 20 is expected to construct exclusive northbound and westbound right-turn lanes, extend the northbound and eastbound left-turn lanes, restripe the westbound through-right lane (that was constructed by NCDOT STIP R-2829B) to that of a through lane, and construct an additional southbound left-turn lane on Hodge Road. Capacity analysis of No-Build (2030) and Build (2030) traffic conditions indicates that the intersection is expected to operate at an overall LOS D during the weekday AM and PM peak hour. Capacity analysis of No-Build (2039) and Build (2039) traffic conditions indicates that the intersection is expected to operate at an overall LOS F during the weekday AM and PM peak hour.

It should be noted that the proposed development is expected to account for approximately one (1) second of additional delay to the overall intersection during the weekday AM peak hour and two (2) seconds of additional delay to the overall intersection during the weekday PM peak hour based on comparison of the No-Build (2030) and Build (2030) operations. Additionally, the proposed development is expected to account for less than 2% of the overall total traffic at this intersection upon buildout of the proposed development in 2030. Due to the minor impacts at this intersection by the proposed development, no improvements are recommended by the proposed development.

POOLE ROAD + BETHLEHEM ROAD

The intersection of Poole Road and Bethlehem Road is currently a signalized, four-leg intersection. This intersection was analyzed under Existing (2024), No-Build (2030), Build (2030), No-Build (2039), and Build (2039) conditions.

Table 6 provides the capacity analysis for the subject intersection with the lane configurations and traffic control shown in the table. Refer to Appendix G for the Synchro capacity analysis reports. Copies of the SimTraffic queueing and performance reports can be found in Appendix O.

TABLE 6: CAPACITY ANALYSIS SUMMARY OF POOLE ROAD + BETHLEHEM ROAD

Conditions	APPROACH	Lane Configurations	Weekday AM Peak Hour		Weekday PM Peak Hour	
			LOS and Approach Delay (seconds)	Overall Delay (seconds)	LOS and Approach Delay (seconds)	Overall Delay (seconds)
Existing (2024)	EB	1 LT-TH-RT	A (7)	B (16)	B (14)	B (17)
	WB	1 LT-TH-RT	A (10)		B (11)	
	NB	1 LT-TH-RT	C (25)		B (19)	
	SB	1 LT-TH-RT	C (25)		C (25)	
No-Build (2030)	EB	1 LT-TH-RT	A (9)	C (24)	C (28)	C (30)
	WB	1 LT-TH-RT	B (15)		B (19)	
	NB	1 LT-TH-RT	C (34)		C (24)	
	SB	1 LT-TH-RT	D (41)		D (43)	
Build (2030)	EB	1 LT-TH-RT	B (10)	C (26)	C (35)	D (36)
	WB	1 LT-TH-RT	B (18)		C (21)	
	NB	1 LT-TH-RT	D (35)		C (27)	
	SB	1 LT-TH-RT	D (44)		E (55)	
No-Build (2039)	EB	1 LT-TH-RT	B (14)	D (37)	E (79)	E (64)
	WB	1 LT-TH-RT	C (30)		C (32)	
	NB	1 LT-TH-RT	D (43)		C (27)	
	SB	1 LT-TH-RT	E (61)		F (93)	
Build (2039)	EB	1 LT-TH-RT	B (15)	D (42)	F (135)	F (88)
	WB	1 LT-TH-RT	D (37)		D (36)	
	NB	1 LT-TH-RT	D (43)		C (27)	
	SB	1 LT-TH-RT	E (68)		F (101)	

Capacity analysis of Existing (2024), No-Build (2030), Build (2030), No-Build (2039), and Build (2039) traffic conditions indicate that the intersection of Poole Road and Bethlehem Road is expected to operate at an overall LOS D or better during the weekday AM and PM peak hours with the exception of the PM peak hour under No-Build (2039) and Build (2039) conditions (LOS E/F).

It should be noted that the proposed development is expected to account for approximately two (2) seconds of additional delay to the overall intersection during the AM peak hour and six (6) seconds of additional delay to the overall intersection during the PM peak hour based on comparison of the No-Build (2030) and Build (2030) operations. Additionally, it is expected that site traffic from the proposed development is expected to be primarily mainline eastbound-westbound through traffic along Poole Road at this intersection. Due to the acceptable future operations, no improvements are recommended by the proposed development.

POOLE ROAD + SMITHFIELD ROAD

The intersection of Poole Road and Smithfield Road is currently a signalized, four-leg intersection. This intersection was analyzed under Existing (2024), No-Build (2030), Build (2030), No-Build (2039), and Build (2039) conditions. Based on coordination with Town and NCDOT staff, SPOT HL-0031 is expected to construct improvements at the subject intersection prior to the 2029 buildout of the proposed development. These improvements were included under all future year analyses (No-Build and Build conditions). The improvements included as NCDOT improvements are:

- Construct an exclusive eastbound left-turn lane on Poole Road with a minimum of 225 feet of full width storage and appropriate deceleration and taper.
- Construct an exclusive westbound left-turn lane on Poole Road with a minimum of 75 feet of full width storage and appropriate deceleration and taper.
- Construct an exclusive northbound left-turn lane on Smithfield Road with a minimum of 175 feet of full width storage and appropriate deceleration and taper.
- Construct an exclusive southbound left-turn lane on Smithfield Road with a minimum of 125 feet of full width storage and appropriate deceleration and taper.

Table 7 provides the capacity analysis for the subject intersection with the lane configurations and traffic control shown in the table. Refer to Appendix H for the Synchro capacity analysis reports. Copies of the SimTraffic queueing and performance reports can be found in Appendix O.

TABLE 7: CAPACITY ANALYSIS SUMMARY OF POOLE ROAD + SMITHFIELD ROAD

Conditions	APPROACH	Lane Configurations	Weekday AM Peak Hour		Weekday PM Peak Hour	
			LOS and Approach Delay (seconds)	Overall Delay (seconds)	LOS and Approach Delay (seconds)	Overall Delay (seconds)
Existing (2024)	EB	1 LT-TH-RT	D (51)	C (24)	D (52)	C (27)
	WB	1 LT-TH-RT	D (51)		D (38)	
	NB	1 LT-TH-RT	B (19)		B (14)	
	SB	1 LT-TH-RT	A (9)		C (24)	
No-Build (2030)	EB	1 LT, 1 TH-RT	D (55)	D (36)	F (91)	D (47)
	WB	1 LT, 1 TH-RT	D (55)		E (59)	
	NB	1 LT, 1 TH-RT	C (34)		B (16)	
	SB	1 LT, 1 TH-RT	B (20)		D (48)	
Build (2030)	EB	1 LT, 1 TH-RT	E (56)	D (36)	F (93)	D (48)
	WB	1 LT, 1 TH-RT	E (55)		E (59)	
	NB	1 LT, 1 TH-RT	C (34)		B (16)	
	SB	1 LT, 1 TH-RT	B (19)		D (48)	

Background Improvements by SPOT HL-0031 are shown underlined.

TABLE 7: CAPACITY ANALYSIS SUMMARY OF POOLE ROAD + SMITHFIELD ROAD (CONT)

Conditions	APPROACH	Lane Configurations	Weekday AM Peak Hour		Weekday PM Peak Hour	
			LOS and Approach Delay (seconds)	Overall Delay (seconds)	LOS and Approach Delay (seconds)	Overall Delay (seconds)
No-Build (2039)	EB	1 LT, 1 TH-RT	F (84)	F (93)	F (166)	F (109)
	WB	1 LT, 1 TH-RT	E (63)		E (65)	
	NB	1 LT, 1 TH-RT	F (135)		C (21)	
	SB	1 LT, 1 TH-RT	C (27)		F (151)	
Build (2039)	EB	1 LT, 1 TH-RT	F (118)	F (92)	F (169)	F (110)
	WB	1 LT, 1 TH-RT	E (68)		E (66)	
	NB	1 LT, 1 TH-RT	F (124)		C (21)	
	SB	1 LT, 1 TH-RT	C (26)		F (152)	

Background Improvements by SPOT HL-0031 are shown underlined.

Capacity analysis of Existing (2024) traffic conditions indicates that the intersection of Poole Road and Smithfield Road currently operates at an overall LOS C during the weekday AM and PM peak hours.

Under future traffic conditions, SPOT HL-0031 is expected to construct exclusive left-turn lanes on all approaches at this intersection. Capacity analysis of No-Build (2030) and Build (2030) traffic conditions indicates that the intersection is expected to operate at an overall LOS D during the weekday AM and PM peak hours. Capacity analysis of No-Build (2039) and Build (2039) traffic conditions indicates that the intersection is expected to operate at an overall LOS F during the weekday AM and PM peak hours.

It should be noted that the proposed development is expected to account for a negligible amount of delay to the overall intersection during the weekday AM peak hour and approximately one (1) second of additional delay to the overall intersection during the PM peak hour based on comparison of the No-Build (2030) and Build (2030) operations. Additionally, the proposed development is expected to account for less than 2% of the overall total traffic at this intersection upon buildout of the proposed development in 2030. Due to the minor impacts at this intersection by the proposed development and acceptable future operations, no improvements are recommended by the proposed development.

BETHLEHEM ROAD + GRASSHOPPER ROAD

The intersection of Bethlehem Road and Grasshopper Road is currently a unsignalized, four-leg intersection operating under all-way stop control (AWSC). This intersection was analyzed under Existing (2024), No-Build (2030), Build (2030), No-Build (2039), and Build (2039) conditions.

Table 8 provides the capacity analysis for the subject intersection with the lane configurations and traffic control shown in the table. Refer to Appendix I for the Synchro capacity analysis reports. Copies of the SimTraffic queueing and performance reports can be found in Appendix O.

TABLE 8: CAPACITY ANALYSIS SUMMARY OF BETHLEHEM ROAD + GRASSHOPPER ROAD

Conditions	APPROACH	Lane Configurations	Weekday AM Peak Hour		Weekday PM Peak Hour	
			LOS and Approach Delay (seconds)	Overall Delay (seconds)	LOS and Approach Delay (seconds)	Overall Delay (seconds)
Existing (2024)	EB	1 LT-TH-RT	B (13)	C (17)	D (34)	C (24)
	WB	1 LT-TH-RT	C (22)		B (11)	
	NB	1 LT-TH-RT	B (13)		B (11)	
	SB	1 LT-TH-RT	B (13)		B (14)	
No-Build (2030)	EB	1 LT-TH-RT	C (18)	E (37)	F (107)	F (64)
	WB	1 LT-TH-RT	F (62)		B (13)	
	NB	1 LT-TH-RT	C (19)		B (13)	
	SB	1 LT-TH-RT	C (19)		C (21)	
Build (2030)	EB	1 LT-TH-RT	C (18)	E (38)	F (110)	F (66)
	WB	1 LT-TH-RT	F (65)		B (13)	
	NB	1 LT-TH-RT	C (19)		B (13)	
	SB	1 LT-TH-RT	C (20)		C (21)	
No-Build (2039)	EB	1 LT-TH-RT	E (38)	F (150)	F (350)	F (200)
	WB	1 LT-TH-RT	F (303)		C (18)	
	NB	1 LT-TH-RT	E (41)		C (18)	
	SB	1 LT-TH-RT	E (46)		E (47)	
Build (2039)	EB	1 LT-TH-RT	E (39)	F (153)	F (355)	F (203)
	WB	1 LT-TH-RT	F (309)		C (18)	
	NB	1 LT-TH-RT	E (42)		C (18)	
	SB	1 LT-TH-RT	E (49)		E (48)	

Capacity analysis of Existing (2024) traffic conditions indicates that the intersection of Bethlehem Road and Grasshopper Road currently operates at an overall LOS C during the weekday AM and PM peak hours. Capacity analysis of No-Build (2030) and Build (2030) traffic conditions indicates that the intersection is expected to operate at an overall LOS E during the weekday AM peak hour and LOS F during the weekday PM peak hour. Capacity analysis of No-Build (2039) and Build (2039) traffic conditions indicates that the intersection is expected to operate at an overall LOS F during the weekday AM and PM peak hours. Based on the AM/PM directional traffic patterns, it appears that Grasshopper Road is being used as an alternative route to Poole Road for commuter traffic in/around the area.

It should be noted that the proposed development is expected to account for approximately two (2) seconds of additional delay and to the overall intersection during the AM and PM peak hours based on comparison of the No-Build (2030) and Build (2030) operations. Additionally, the proposed development is expected to account for less than 1% of the overall total traffic at this intersection upon buildout of the proposed development in 2030. Due to the minor impacts at this intersection by the proposed development, no improvements are recommended by the proposed development.

BETHLEHEM ROAD + GREYTHORNE PLACE

The intersection of Bethlehem Road and Greythorne Place is currently an unsignalized, three-leg intersection. Upon buildout of the proposed development, site access will be served via connection to Greythorne Place. This intersection was analyzed under Existing (2024), No-Build (2030), Build (2030), No-Build (2039), and Build (2039) conditions.

Table 9 provides the capacity analysis for the subject intersection with the lane configurations and traffic control shown in the table. Refer to Appendix J for the Synchro capacity analysis reports. Copies of the SimTraffic queueing and performance reports can be found in Appendix O.

TABLE 9: CAPACITY ANALYSIS SUMMARY OF BETHLEHEM ROAD + GREYTHORNE PLACE

Conditions	APPROACH	Lane Configurations	Weekday AM Peak Hour		Weekday PM Peak Hour	
			LOS and Approach Delay (seconds)	Overall Delay (seconds)	LOS and Approach Delay (seconds)	Overall Delay (seconds)
Existing (2024)	WB[2]	1 LT-RT	B (11)	N/A	B (11)	N/A
	NB	1 TH-RT	--		--	
	SB[1]	1 LT, 1 TH	A (8)		A (8)	
No-Build (2030)	WB[2]	1 LT-RT	B (12)	N/A	B (13)	N/A
	NB	1 TH-RT	--		--	
	SB[1]	1 LT, 1 TH	A (8)		A (8)	
Build (2030)	WB[2]	1 LT-RT	B (14)	N/A	B (15)	N/A
	NB	1 TH-RT	--		--	
	SB[1]	1 LT, 1 TH	A (8)		A (8)	
No-Build (2039)	WB[2]	1 LT-RT	B (14)	N/A	C (15)	N/A
	NB	1 TH-RT	--		--	
	SB[1]	1 LT, 1 TH	A (9)		A (9)	
Build (2039)	WB[2]	1 LT-RT	C (16)	N/A	C (19)	N/A
	NB	1 TH-RT	--		--	
	SB[1]	1 LT, 1 TH	A (9)		A (9)	

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

Capacity analysis of Existing (2024), No-Build (2030), Build (2030), No-Build (2039), and Build (2039) traffic conditions indicate that both the major-street left-turn movement and the minor-street approach of the intersection of Bethlehem Road and Greythorne Place are expected to operate at LOS C or better during the weekday AM and PM peak hours. Due to the minor impacts at this intersection by the proposed development and acceptable future operations, no improvements are recommended by the proposed development.

The existing exclusive southbound left-turn lane was reviewed based on methodology outlined in the *Policy on Street and Driveway Access to North Carolina Highways* (published by NCDOT). Based on the findings from the turn lane warrant analysis, the existing 100-foot southbound left-turn lane is expected to be sufficient to accommodate future traffic volumes upon buildout of the proposed development and a northbound right-turn lane is not expected to be warranted due to the low volume of turning vehicles. Refer to Appendix P for a copy of the turn lane warrants at this intersection. Based on a review of maximum queue lengths as reported from SimTraffic, the queues for the major-street left-turn movement is not

expected to exceed 31 feet (approximately 1 vehicle) during either the weekday AM or PM peak hours and as such the existing storage length of 100 feet is expected to be sufficient to accommodate future traffic volumes at this intersection upon buildout of the proposed development.

BETHLEHEM ROAD + CROSS CUT PLACE / WIDEWATERS PARKWAY

The intersection of Bethlehem Road and Cross Cut Place / Widewaters Parkway is currently a unsignalized, three-leg intersection. This intersection was analyzed under Existing (2024), No-Build (2030), Build (2030), No-Build (2039), and Build (2039) conditions. Based on coordination with Town and NCDOT staff, Lyndon Oaks is expected to construct improvements at the subject intersection prior to the buildout of the proposed development. These improvements were included under all future year analyses (No-Build and Build conditions). The improvements included as adjacent development improvements are:

- Construct Widewaters Parkway as the eastbound approach with one (1) ingress lane and one (1) egress lane.
- Construct a single-lane roundabout with all approaches operating under yield control.

Table 10 provides the capacity analysis for the subject intersection with the lane configurations and traffic control shown in the table. Refer to Appendix K for the Synchro capacity analysis reports. Copies of the SimTraffic queueing and performance reports can be found in Appendix O.

TABLE 10: CAPACITY ANALYSIS SUMMARY OF BETHLEHEM ROAD + CROSS CUT PLACE / WIDEWATER PARKWAY

Conditions	APPROACH	Lane Configurations	Weekday AM Peak Hour		Weekday PM Peak Hour	
			LOS and Approach Delay (seconds)	Overall Delay (seconds)	LOS and Approach Delay (seconds)	Overall Delay (seconds)
Existing (2024)	WB[2] NB SB[1]	1 LT-RT 1 TH-RT 1 LT-TH	B (14) -- A (8)	N/A	C (16) -- A (8)	N/A
No-Build (2030) (Roundabout)	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A (5) A (6) A (8) A (5)	A (7)	A (6) A (6) A (7) A (8)	A (7)
Build (2030) (Roundabout)	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A (5) A (7) A (8) A (5)	A (7)	A (6) A (6) A (7) A (9)	A (8)
No-Build (2039) (Roundabout)	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A (6) A (8) B (10) A (6)	A (9)	A (8) A (8) A (8) B (11)	A (10)
Build (2039) (Roundabout)	EB WB NB SB	1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT 1 LT-TH-RT	A (6) A (8) B (11) A (6)	A (9)	A (8) A (8) A (8) B (12)	A (10)

Background Improvements by adjacent developments are shown underlined.

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

Capacity analysis of Existing (2024) traffic conditions indicate that both the major-street left-turn movement and the minor-street approach of the intersection of Bethlehem Road and Cross Cut Place currently operate at LOS C or better during the weekday AM and PM peak hours.

Under future traffic conditions, the Lyndon Oaks development is expected to construct the 4th leg (eastbound approach) and convert this intersection into a roundabout. Capacity analysis of No-Build (2030), Build (2030), No-Build (2039), and Build (2039) traffic conditions indicate that the intersection of Bethlehem Road and Cross Cut Place / Widewaters Parkway is expected to operate at an overall LOS A during the weekday AM and PM peak hours. Due to the minor impacts at this intersection by the proposed development and acceptable future operations, no improvements are recommended by the proposed development.

POOLE ROAD + FUTURE NC 540 SOUTHBOUND RAMPS

The future intersection of Poole Road and NC 540 Southbound Ramps is expected to operate as a signalized, three-leg intersection. This intersection was analyzed under No-Build (2030), Build (2030), No-Build (2039), and Build (2039) conditions. These improvements were included under all future year analyses (No-Build and Build conditions). The improvements included as part of STIP R-2829B are:

- Construct NC 540 Southbound Ramps as the northbound approach with one (1) ingress lane and three (3) egress lanes striped as two (2) exclusive left-turn lanes and one (1) exclusive right-turn lane.
- Construct an additional eastbound through lane on Poole Road.
- Construct an exclusive eastbound right-turn lane on Poole Road with a minimum of 500 feet of full width storage and appropriate deceleration and taper.
- Construct an additional westbound through lane on Poole Road.
- Construct an exclusive westbound left-turn lane on Poole Road with a minimum of 250 feet of full width storage and appropriate deceleration and taper.
- Install a traffic signal.

Table 11 provides the capacity analysis for the subject intersection with the lane configurations and traffic control shown in the table. Refer to Appendix L for the Synchro capacity analysis reports. Copies of the SimTraffic queueing and performance reports can be found in Appendix O.

TABLE 11: CAPACITY ANALYSIS SUMMARY OF POOLE ROAD + FUTURE NC 540 SOUTHBOUND RAMPS

Conditions	APPROACH	Lane Configurations	Weekday AM Peak Hour		Weekday PM Peak Hour	
			LOS and Approach Delay (seconds)	Overall Delay (seconds)	LOS and Approach Delay (seconds)	Overall Delay (seconds)
No-Build (2030)	EB	2 TH, 1 RT	B (19)	B (20)	B (14)	B (16)
	WB	1 LT, 2 TH	B (13)		B (15)	
	NB	2 LT, 1 RT	C (26)		B (17)	
Build (2030)	EB	2 TH, 1 RT	B (19)	B (20)	B (14)	B (16)
	WB	1 LT, 2 TH	B (13)		B (18)	
	NB	2 LT, 1 RT	C (26)		B (17)	
No-Build (2039)	EB	2 TH, 1 RT	B (18)	B (20)	B (16)	C (20)
	WB	1 LT, 2 TH	B (13)		B (17)	
	NB	2 LT, 1 RT	C (26)		C (25)	
Build (2039)	EB	2 TH, 1 RT	B (19)	B (20)	B (16)	C (21)
	WB	1 LT, 2 TH	B (13)		B (19)	
	NB	2 LT, 1 RT	C (27)		C (26)	

Background Improvements by STIP R-2829B are shown underlined.

Capacity analysis of No-Build (2030), Build (2030), No-Build (2039), and Build (2039) traffic conditions indicates that the intersection of Poole Road and NC 540 Southbound Ramps is expected to operate at an overall LOS C or better during the weekday AM and PM peak hours.

It should be noted that the proposed development is expected to account for a negligible amount of additional delay to the overall intersection during both the weekday AM and PM peak hours based on the No-Build (2030) and Build (2030) analysis. Due the minor impacts at this intersection by the proposed development and acceptable future operations, no improvements are recommended by the proposed development.

POOLE ROAD + FUTURE NC 540 NORTHBOUND RAMPS

The future intersection of Poole Road and NC 540 Northbound Ramps is expected to operate as a signalized, four-leg three-approach intersection. This intersection was analyzed under No-Build (2030), Build (2030), No-Build (2039), and Build (2039) conditions. These improvements were included under all future year analyses (No-Build and Build conditions). The improvements included as part of STIP R-2829B are:

- Construct NC 540 Northbound Ramp Off-Ramp as the northbound approach with two (2) egress lanes striped as a left-turn lane with a minimum of 400 feet of full width storage and appropriate deceleration and taper and a shared through-right turn lane.
- Construct NC 540 Northbound On-Ramp as the northern leg of the intersection with two (2) ingress lanes.
- Construct two (2) additional eastbound through lanes on Poole Road.
- Construct exclusive dual eastbound left-turn lanes on Poole Road with a minimum of 250 feet and 350 feet of full width storage and appropriate deceleration and taper, respectively.
- Construct an additional westbound through lane on Poole Road.
- Construct exclusive dual westbound right-turn lanes on Poole Road with a minimum of 450 feet and 550 feet of full width storage and appropriate deceleration and taper, respectively.
- Install a traffic signal.

Table 12 provides the capacity analysis for the subject intersection with the lane configurations and traffic control shown in the table. Refer to Appendix M for the Synchro capacity analysis reports. Copies of the SimTraffic queueing and performance reports can be found in Appendix O.

TABLE 12: CAPACITY ANALYSIS SUMMARY OF POOLE ROAD + FUTURE NC 540 NORTHBOUND RAMPS

Conditions	APPROACH	Lane Configurations	Weekday AM Peak Hour		Weekday PM Peak Hour	
			LOS and Approach Delay (seconds)	Overall Delay (seconds)	LOS and Approach Delay (seconds)	Overall Delay (seconds)
No-Build (2030)	EB WB NB	2 LT, 3 TH 2 TH, 2 RT 1 LT, 1 TH-RT	C (22) C (26) E (61)	C (29)	B (14) C (25) E (56)	C (21)
Build (2030)	EB WB NB	2 LT, 3 TH 2 TH, 2 RT 1 LT, 1 TH-RT	C (22) C (27) E (61)	C (29)	B (13) C (26) D (54)	C (21)
No-Build (2039)	EB WB NB	2 LT, 3 TH 2 TH, 2 RT 1 LT, 1 TH-RT	D (42) D (41) F (93)	D (46)	B (14) C (30) E (60)	C (21)
Build (2039)	EB WB NB	2 LT, 3 TH 2 TH, 2 RT 1 LT, 1 TH-RT	D (41) D (43) F (93)	D (47)	B (14) C (31) E (60)	C (22)

Background Improvements by STIP R-2829B are shown underlined.

Capacity analysis of No-Build (2030), Build (2030), No-Build (2039), and Build (2039) traffic conditions indicates that the intersection of Poole Road and NC 540 Northbound Ramps is expected to operate at an overall LOS D or better during the weekday AM and PM peak hours.

It should be noted that the proposed development is expected to account for a negligible amount of additional delay to the overall intersection during both the weekday AM and PM peak hours based on the No-Build (2030) and Build (2030) analysis. Due to the minor impacts at this intersection by the proposed development and acceptable future operations, no improvements are recommended by the proposed development.

POOLE ROAD + SITE ACCESS #1

The future intersection of Poole Road and Site Access #1 is expected to operate as an unsignalized, three-leg intersection. This intersection was analyzed under Build (2030) and Build (2039) conditions. Based on review of the capacity analysis and NCDOT Driveway Manual guidelines for left and right-turn lanes at site driveways the following improvements are recommended to be constructed by the developer:

- Construct Site Access #1 as the southbound approach with one (1) ingress lane and one (1) egress lane.
- Provide stop control on the southbound approach of the proposed site driveway.
- Construct an exclusive eastbound left-turn lane on Poole Road with a minimum of 100 feet of full width storage and appropriate deceleration and taper.

Table 13 provides the capacity analysis for the subject intersection with the lane configurations and traffic control shown in the table. Refer to Appendix N for the Synchro capacity analysis reports. Copies of the SimTraffic queueing and performance reports can be found in Appendix O.

TABLE 13: CAPACITY ANALYSIS SUMMARY OF POOLE ROAD + SITE ACCESS #1

Conditions	APPROACH	Lane Configurations	Weekday AM Peak Hour		Weekday PM Peak Hour	
			LOS and Approach Delay (seconds)	Overall Delay (seconds)	LOS and Approach Delay (seconds)	Overall Delay (seconds)
Build (2030)	EB[1]	**1 LT**, 1 TH	A (9)	N/A	A (8)	N/A
	WB	1 TH-**RT**	--		--	
	SB[2]	**1 LT-RT**	B (15)		B (11)	
Build (2039)	EB[1]	**1 LT**, 1 TH	A (10)	N/A	A (8)	N/A
	WB	1 TH-**RT**	--		--	
	SB[2]	**1 LT-RT**	C (18)		B (13)	

Improvements recommended by the Developer are shown in **bold.**

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

Capacity analysis of Build (2030) and Build (2039) traffic conditions indicates that both the major-street left-turn movement and minor-street approach at the intersection of Poole Road and Site Access #1 are expected to operate at LOS C or better during the weekday AM and PM peak hours.

Exclusive left and right-turn lanes were considered at this intersection based on the methodology outlined in *the Policy on Street and Driveway Access to North Carolina Highways* (published by NCDOT). Based on the findings from that turn lane warrant analysis using Build (2030) traffic volumes, an exclusive left-turn lane is warranted at this location. Refer to Appendix P for a copy of the turn lane warrants at this intersection.

Based on a review of maximum queue lengths as reported from SimTraffic, the queue for the major-street left-turn movement is not expected to exceed 54 feet (approximately 2 vehicles) during either the weekday AM or PM peak hours and as such the recommended storage length of 100 feet is expected to be sufficient to accommodate future traffic volumes at this intersection upon buildout of the proposed development.

PROPOSED DRIVEWAY SIGHT DISTANCE

Per the Town's Unified Development Ordinance (UDO), sight distance was also reviewed at the proposed site driveway along Poole Road. Sight distance is the metric used to describe the ability of a motorist to physically see, via a direct line of sight, objects and/or other vehicles to a degree sufficient to allow safe and efficient use of a roadway in the intended manner. Sight distance is a function of the major roadway's geometric characteristics (including both horizontal and vertical constraints) and design speed. Provided Intersection Sight Distance (ISD) values were determined via field data collection at the future intersection of Poole Road and Site Access #1 under two (2) different scenarios and evaluated based on required values for this roadway based on criteria contained within the American Association of State Highway and Transportation Officials (AAHSTO) *A Policy on Geometric Design of Highways and Streets* (Green Book), 7th Edition. Under Scenario #1, Poole Road is widened to half of the Town's typical section (four-lane median-divided) with a posted speed limit of 45 mph, this speed reduction is assumed to be required in order to accommodate curb-and-gutter along this section of roadway for the ultimate cross-section. Under Scenario #2, Poole Road is widened for the left-turn lane only (2-lane undivided) with a posted speed limit of 55 mph. Refer to Table 14 below for a summary of the provided and required sight distance values at this intersection.

TABLE 14: PROPOSED DRIVEWAY SIGHT DISTANCE SUMMARY

Intersections	Scenario	Requirements	Speed Limit	Height	Left-Turn		Right-Turn	
					Required	Provided	Required	Provided
Poole Road and Site Access #1	Scenario #1	AASHTO	45 mph	3.5 feet	625 feet	675 feet	575 feet	575 feet
	Scenario #2	AASHTO	55 mph	3.5 feet	710 feet	675 feet	575 feet	575 feet
				4 feet	710 feet	710 feet	575 feet	575 feet

Based on AASHTO ISD guidelines, the location of the proposed site driveway is expected to provide sufficient sight distance under Scenario #1 with the Town's ultimate cross-section (four-lane median-divided) and a speed reduction to 45 mph.

Sight distance is expected to be minorly constrained for the left-turn movement under Scenario #2 (maintaining a 55 mph posted speed limit) for a default 3.5 foot high object but is expected to be sufficient for an object 4 feet or higher. This is due to a vertical crest curve occurring approximately 600 feet west of the proposed driveway location that restricts motorists' ability to see west for vehicles traveling eastbound along Poole Road. It should be noted that it is expected that additional sight distance could be accommodated via driveway design during the site design process due to the minor additional vertical clearance needed and as such, sufficient sight distance is expected to be provided at this driveway. Refer to Appendix Q for the proposed driveway sight distance exhibit.

CONCLUSION / RECOMMENDATIONS

The purpose of this Traffic Impact Analysis is to determine the potential traffic impacts of this development and to identify transportation improvements that may be required to mitigate the impacts on the roadway network. The proposed residential development will be located north of Poole Road and east of Bethlehem Road in Knightdale, North Carolina. Site access will be served via one (1) existing full movement access to Bethlehem Road via connection to Greythorne Place and one (1) proposed full movement access on Poole Road. The site is currently undeveloped and is expected to consist of a maximum of 108 single family homes and 73 townhomes. The proposed site is expected to be built-out by the year 2029.

Based on the approved scoping, the following intersections were included in this TIA study area:

- Poole Road and Hodge Road
- Poole Road and Bethlehem Road
- Poole Road and Smithfield Road
- Bethlehem Road and Grasshopper Road
- Bethlehem Road and Greythorne Place
- Bethlehem Road and Cross Cut Place / Widewaters Parkway
- Poole Road and Future NC 540 Southbound Ramps
- Poole Road and Future NC 540 Northbound Ramps
- Poole Road and Site Access #1 (*Proposed*)

Capacity analysis was conducted at all study intersections according to NCDOT and Town guidelines utilizing the methodology contained in the *Highway Capacity Manual* (HCM), 6th Edition, published by the Transportation Research Board. Based on review of adjacent development and background information provided by NCDOT and the Town, the following improvements have been identified or are recommended to accommodate future traffic conditions. Figure 11 provides a graphical representation of recommended improvements at the study intersections.

Improvements by Others

Poole Road and Hodge Road

- Restripe the westbound shared through-right lane on Poole Road to that of a through lane. – NCDOT STIP R-2829B
- Construct a shared westbound through-right lane on Poole Road. – NCDOT STIP R-2829B
- Construct an exclusive northbound right-turn lane on Hodge Road with a minimum of 100 feet of full width storage and appropriate deceleration and taper. – Hodge Road Planned Development / Banks 20
- Extend the existing northbound left-turn lane on Hodge Road to have 100 feet of full width storage and appropriate deceleration and taper. – Hodge Road Planned Development / Banks 20
- Extend the existing eastbound left-turn lane on Poole Road to the intersection with River Dreams Drive. – Hodge Road Planned Development / Banks 20
- Restripe the westbound shared through-right turn lane on Poole Road to that of a through lane. – Hodge Road Planned Development / Banks 20
- Construct an exclusive westbound right-turn lane on Poole Road with a minimum of 675 feet of full width storage and appropriate deceleration and taper. – Hodge Road Planned Development / Banks 20
- Construct an additional southbound left-turn lane on Hodge Road with 300 feet of full width storage and appropriate deceleration and taper. – Hodge Road Planned Development / Banks 20

Poole Road and Smithfield Road

- Construct an exclusive eastbound left-turn lane on Poole Road with a minimum of 225 feet of full width storage and appropriate deceleration and taper. – NCDOT SPOT HL-0031
- Construct an exclusive westbound left-turn lane on Poole Road with a minimum of 75 feet of full width storage and appropriate deceleration and taper. – NCDOT SPOT HL-0031
- Construct an exclusive northbound left-turn lane on Smithfield Road with a minimum of 175 feet of full width storage and appropriate deceleration and taper. – NCDOT SPOT HL-0031
- Construct an exclusive southbound left-turn lane on Smithfield Road with a minimum of 125 feet of full width storage and appropriate deceleration and taper. – NCDOT SPOT HL-0031

Bethlehem Road and Cross Cut Place / Widewaters Parkway

- Construct Widewaters Parkway as the eastbound approach with one (1) ingress lane and one (1) egress lane. – Lyndon Oaks
- Construct a single-lane roundabout with all approaches operating under yield control. – Lyndon Oaks

Poole Road and Future NC 540 Southbound Ramps

- Construct NC 540 Southbound Ramps as the northbound approach with one (1) ingress lane and three (3) egress lanes striped as two (2) exclusive left-turn lanes and one (1) exclusive right-turn lane. – NCDOT STIP R-2829B
- Construct an additional eastbound through lane on Poole Road. – NCDOT STIP R-2829B
- Construct an exclusive eastbound right-turn lane on Poole Road with a minimum of 500 feet of full width storage and appropriate deceleration and taper. – NCDOT STIP R-2829B
- Construct an additional westbound through lane on Poole Road. – NCDOT STIP R-2829B
- Construct an exclusive westbound left-turn lane on Poole Road with a minimum of 250 feet of full width storage and appropriate deceleration and taper. – NCDOT STIP R-2829
- Install a traffic signal. – NCDOT STIP R-2829

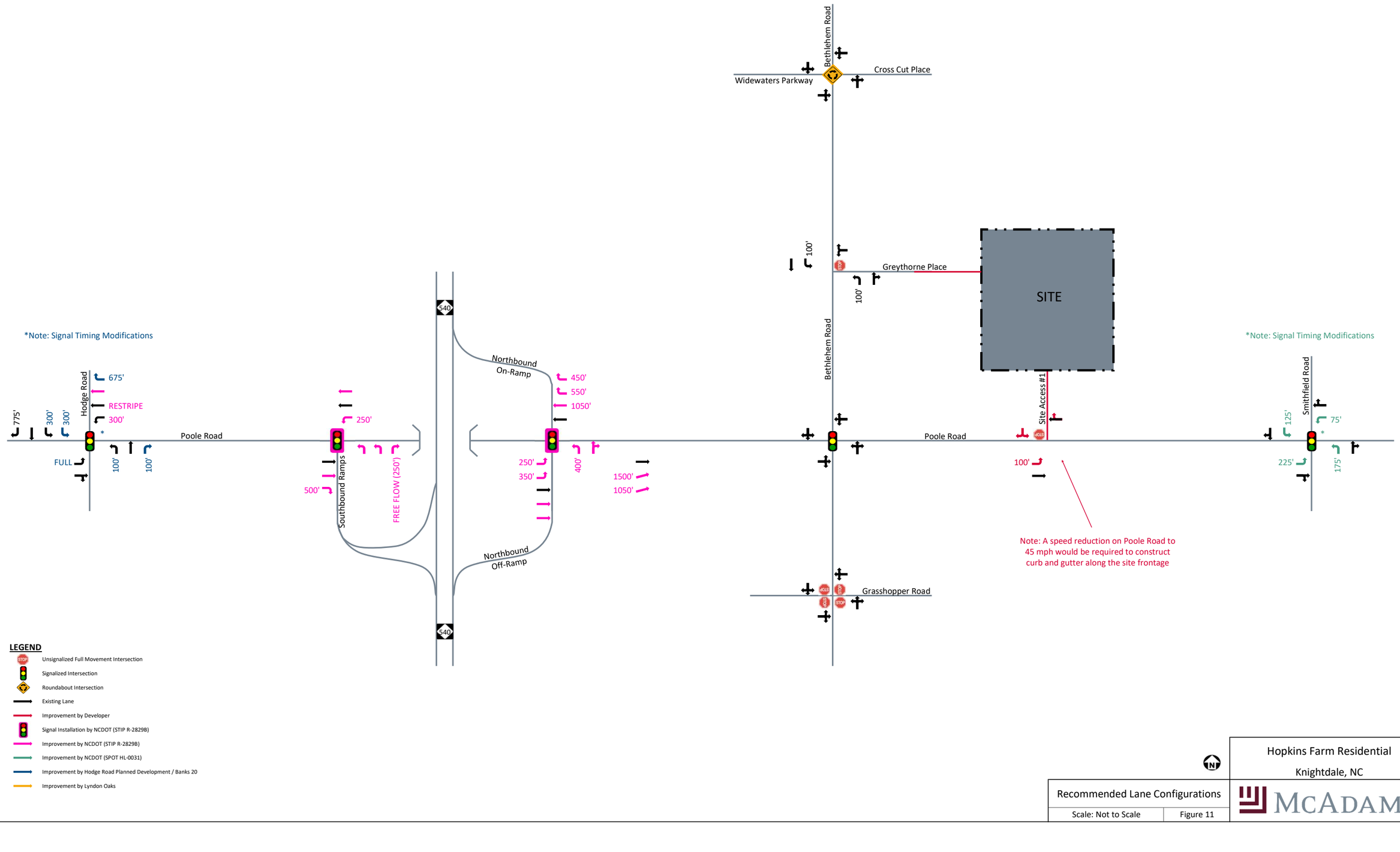
Poole Road and Future NC 540 Northbound Ramps

- Construct NC 540 Northbound Ramp Off-Ramp as the northbound approach with two (2) egress lanes striped as a left-turn lane with a minimum of 400 feet of full width storage and appropriate deceleration and taper and a shared through-right turn lane. – NCDOT STIP R-2829B
- Construct NC 540 Northbound On-Ramp as the northern leg of the intersection with two (2) ingress lanes. – NCDOT STIP R-2829B
- Construct two (2) additional eastbound through lanes on Poole Road. – NCDOT STIP R-2829B
- Construct exclusive dual eastbound left-turn lanes on Poole Road with a minimum of 250 feet and 350 feet of full width storage and appropriate deceleration and taper, respectively. – NCDOT STIP R-2829B
- Construct an additional westbound through lane on Poole Road. – NCDOT STIP R-2829B
- Construct exclusive dual westbound right-turn lanes on Poole Road with a minimum of 450 feet and 550 feet of full width storage and appropriate deceleration and taper, respectively. – NCDOT STIP R-2829
- Install a traffic signal. – NCDOT STIP R-2829B

Recommended Improvements by Developer

Poole Road and Site Access #1

- Construct Site Access #1 as the southbound approach with one (1) ingress lane and one (1) egress lane.
- Provide stop control on the southbound approach of the proposed site driveway.
- Construct an exclusive eastbound left-turn lane on Poole Road with a minimum of 100 feet of full width storage and appropriate deceleration and taper.



Hopkins Farm Residential

Knightdale, NC

Recommended Lane Configurations

Scale: Not to Scale | Figure 11

McAdams