Traffic Impact Analysis
Pumpkin Creek C-Store
Wilmington, NC

RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

TRAFFIC IMPACT ANALYSIS

FOR

PUMPKIN CREEK C-STORE

LOCATED

IN

WILMINGTON, NORTH CAROLINA

Prepared For:
4361 Blue Clay Road Property LLC
Wilmington, North Carolina

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

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RKA Project No. 17210

Prepared By: SH

Reviewed By: TA

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TRAFFIC IMPACT ANALYSIS
PUMPKIN CREEK C-STORE
WILMINGTON, NORTH CAROLINA

1. INTRODUCTION

The contents of this report present the findings of the Traffic Impact Analysis (TIA) conducted for the proposed Pumpkin Creek C-Store development to be located in the northwest quadrant of the intersection of Blue Clay Road and North College Road in Wilmington, North Carolina. The purpose of this study is to determine the potential impacts to the surrounding transportation system created by traffic generated by the proposed development, as well as recommend improvements to mitigate the impacts.

The proposed development, anticipated to be completed in 2018, is assumed to consist of a 5,000 square foot (s.f.) convenience market with gasoline pumps.

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

- Existing (2017) Traffic Conditions
- Background (2018) Traffic Conditions
- Combined (2018) Traffic Conditions

1.1. Site Location and Study Area

The development is proposed to be located in the northwest quadrant of the intersection of North College Road and Blue Clay Road in Wilmington, North Carolina. Refer to Figure 1 for the site location map.

The study area for the TIA was determined through coordination with the Wilmington Metropolitan Planning Organization (WMPO) and the approved scoping document can be found in Appendix A. The approved study area consists of the following existing intersection:

- North College Road and Blue Clay Road

1.2. Proposed Land Use and Site Access

The proposed development, anticipated to be completed in 2018, is assumed to consist of the following uses:

- 5,000 s.f. Convenience Market with Gasoline Pumps

Site access is proposed via a full movement driveway on Blue Clay Road and a right-in/right-out driveway on North College Road.

1.3. Adjacent Land Uses

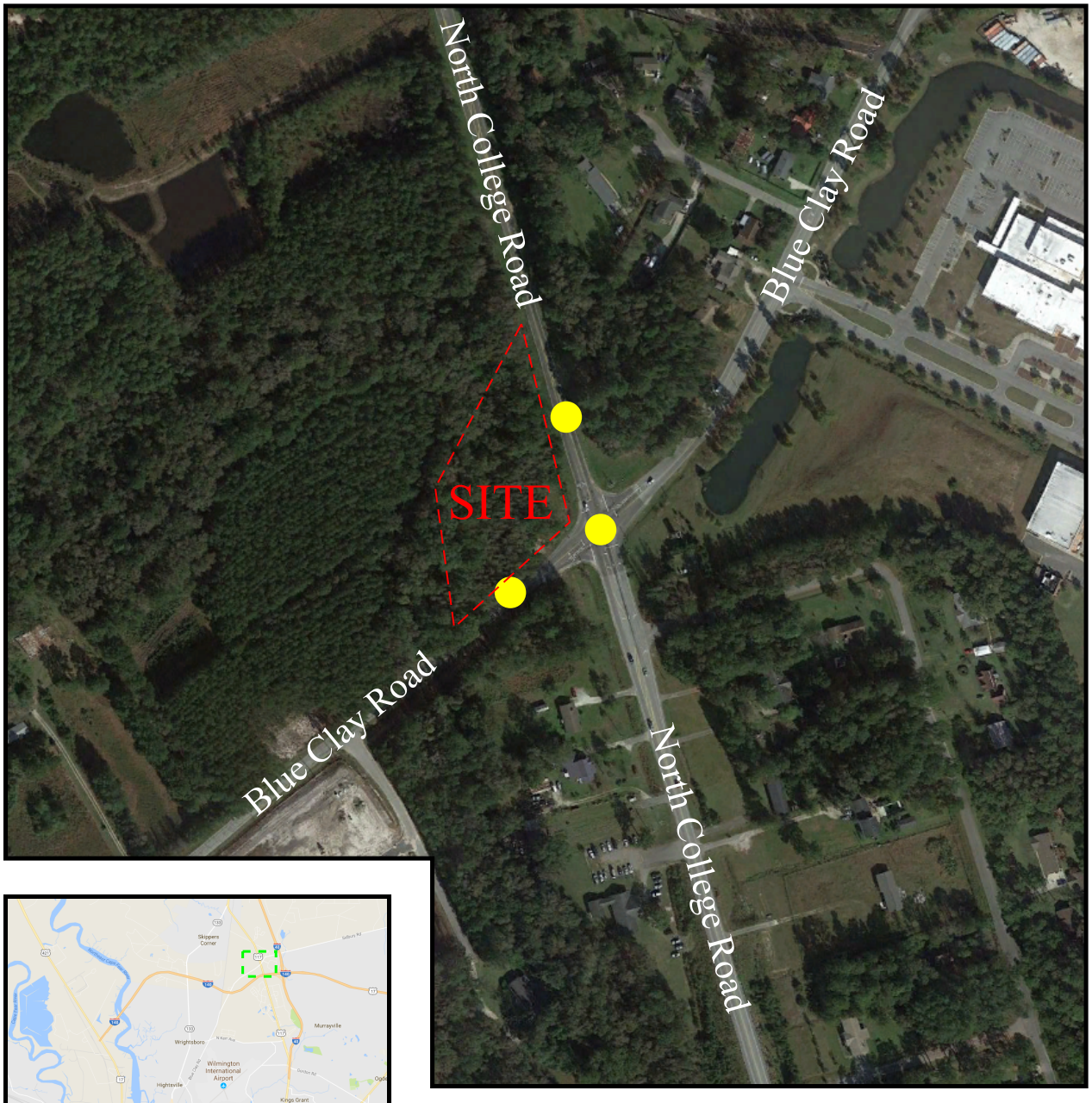
The proposed development is located in an area consisting primarily of undeveloped land and residential development. Cape Fear Community College is located in the southeast quadrant of the intersection of North College Road and Blue Clay Road.

1.4. Existing Roadways

North College Road (NC 132) is a two-lane roadway running in a north-south direction with a posted speed limit of 45 miles per hour (mph) within the study area. Based on the most recent data (2015) from the NCDOT, North College Road had an average annual daily traffic (AADT) volume of approximately 14,000 vehicles per day (vpd) south of its intersection with Blue Clay Road.

Blue Clay Road (SR 1318) is a two-lane roadway running in an east-west direction with a posted speed limit of 55 miles per hour (mph) within the study area. Based on the most recent data (2015) from the NCDOT, Blue Clay Road had an average annual daily traffic (AADT) volume of approximately 5,400 vehicles per day (vpd) west of its intersection with North College Road.

Existing lane configurations (number of traffic lanes on each intersection approach), lane widths, storage capacities, and other intersection and roadway information was collected through field reconnaissance by Ramey Kemp & Associates, Inc. (RKA). Refer to Figure 3 for an illustration of the existing lane configurations within the study area.



N

LEGEND

- Proposed Site Location
- Study Intersection
- Study Area

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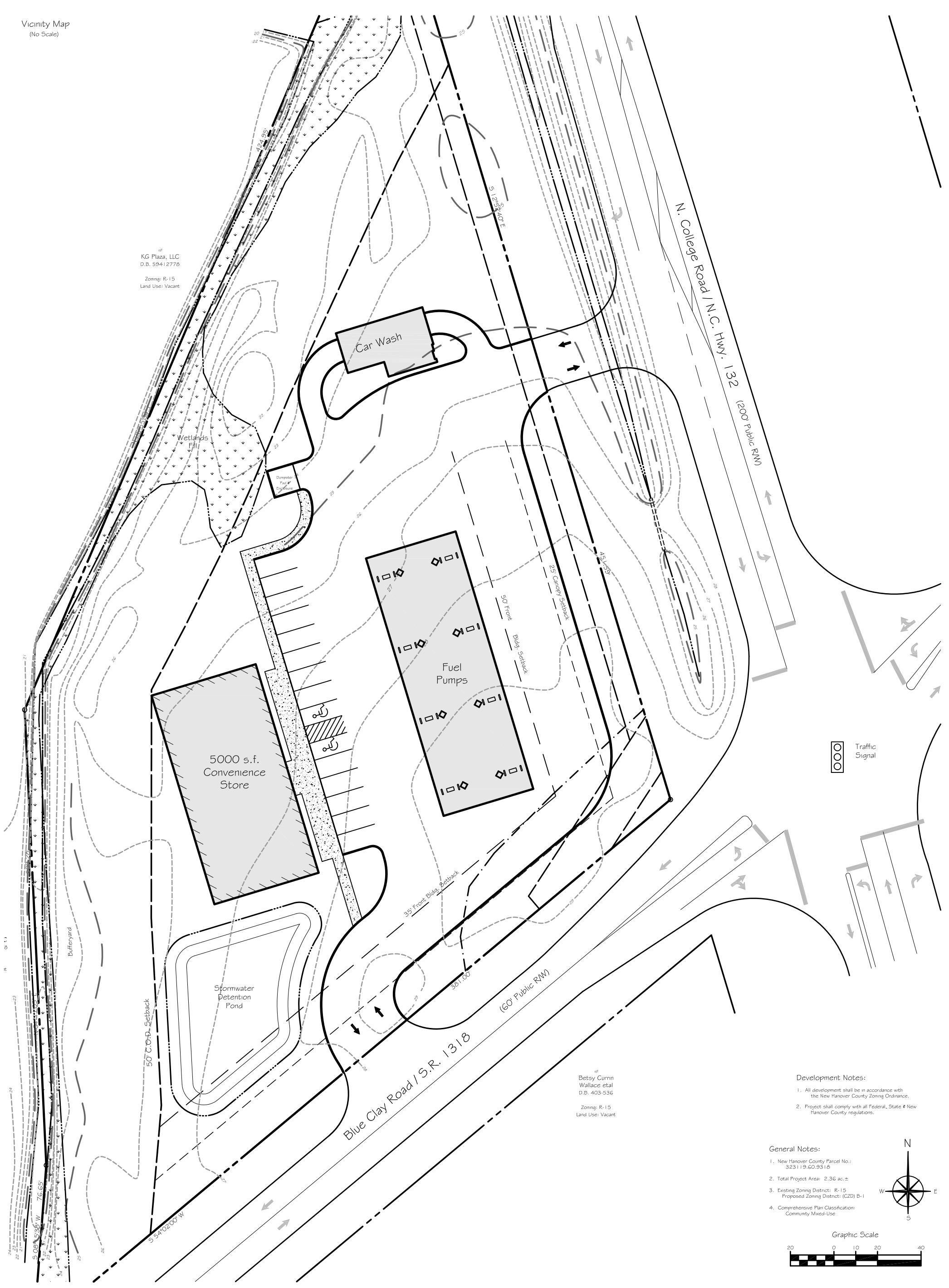
Pumpkin Creek C-Store
Wilmington, NC

Site Location Map

Scale: Not to Scale | Figure 1

Vicinity Map
(No Scale)



Development Notes:

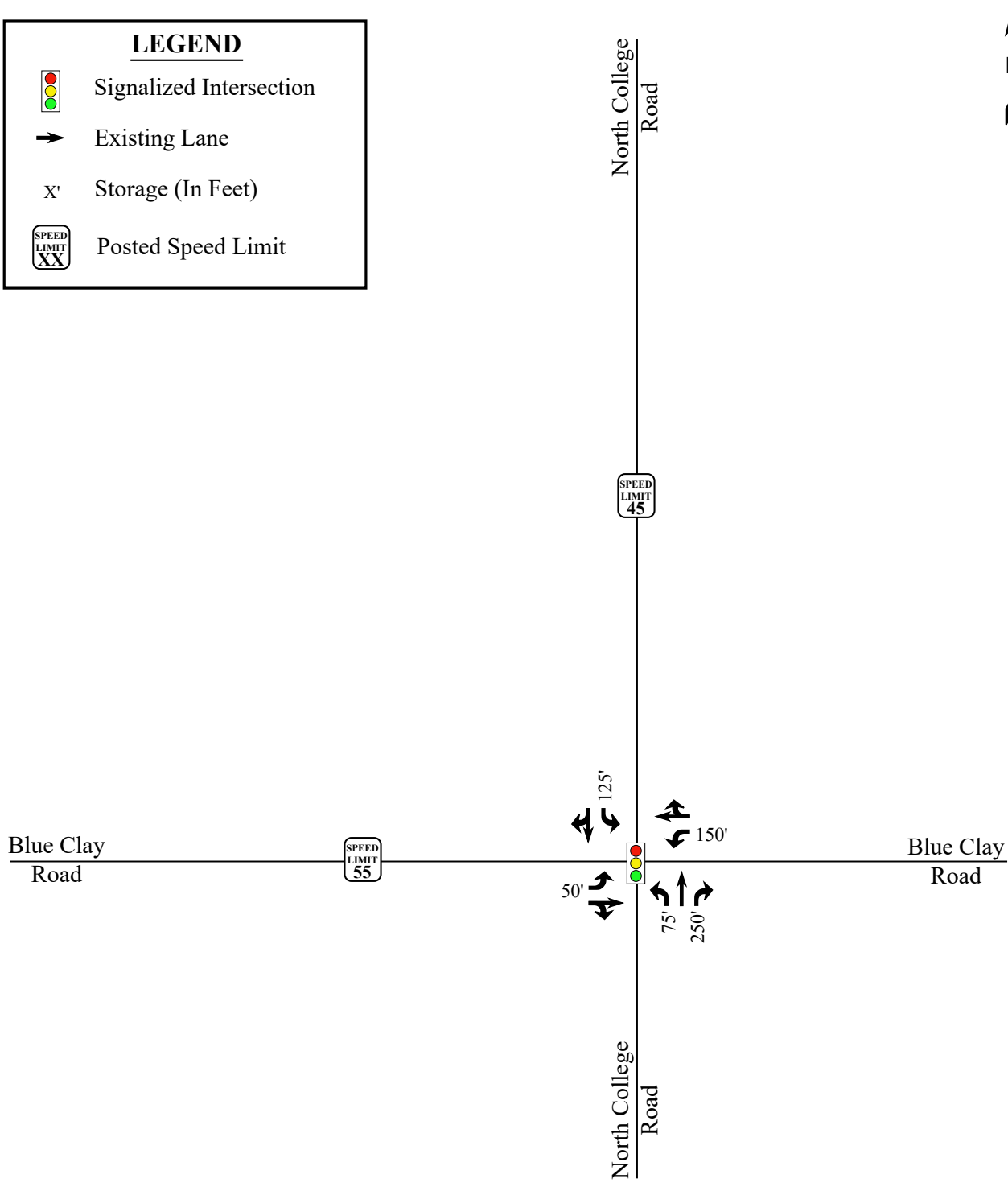
1. All development shall be in accordance with the New Hanover County Zoning Ordinance.
2. Project shall comply with all Federal, State & New Hanover County regulations.

General Notes:

1. New Hanover County Parcel No.: 323119.60.9318
2. Total Project Area: 2.36 ac.±
3. Existing Zoning District: R-15
   Proposed Zoning District: (CZD) B-1
4. Comprehensive Plan Classification: Community Mixed-Use

N
W E
S

Graphic Scale
20 0 10 20 40



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Pumpkin Creek C-Store
Wilmington, NC

Existing
Lane Configurations

Scale: Not to Scale

Figure 3

2. EXISTING (2017) PEAK HOUR CONDITIONS

2.1. Existing (2017) Peak Hour Traffic

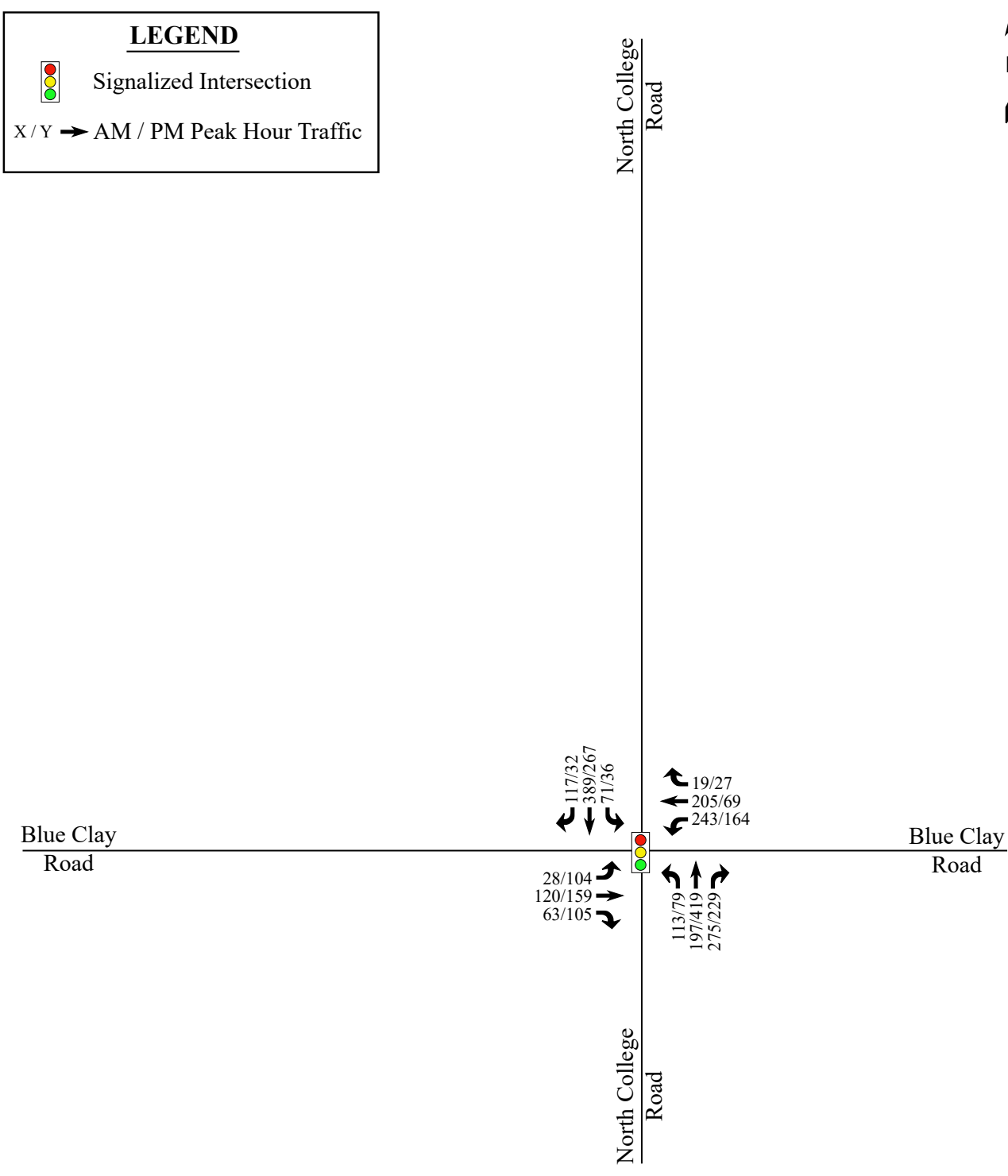
Existing peak hour traffic volumes were determined based on traffic counts conducted at the study intersections listed below, in September of 2017 by RKA during a typical weekday AM (7:00 AM – 9:00 AM) and PM (4:00 PM – 6:00 PM) peak periods:

- North College Road and Blue Clay Road

Refer to Figure 4 for existing (2017) weekday AM and PM peak hour traffic volumes. A copy of the count data is located in Appendix B of this report. It is worth noting that the count was performed when school was in session.

2.2. Analysis of Existing (2017) Peak Hour Traffic

The existing (2017) weekday AM and PM peak hour traffic volumes were analyzed to determine the current levels of service at the study intersections under existing roadway conditions. Signal information was obtained from NCDOT and is included in Appendix C. The results of the analysis are presented in Section 7 of this report.



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Existing (2017)
Peak Hour Traffic

Scale: Not to Scale

Figure 4

3. BACKGROUND (2018) PEAK HOUR CONDITIONS

In order to account for growth of traffic and subsequent traffic conditions at a future year, background traffic projections are needed. Background 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. Background 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 WMPO, it was determined that an annual growth rate of 1% would be used to generate projected (2018) weekday AM and PM peak hour traffic volumes. Refer to Figure 5 for projected (2018) peak hour traffic.

3.2. Adjacent Development Traffic

Through coordination with the WMPO, Cape Fear Community College expansion was identified to be included as an adjacent development in this study. This development is located southeast of the intersection of North College Road and Blue Clay Road in Wilmington, NC. A TIA was completed by Davenport in July 2013. According to this TIA the Cape Fear Community College expansion will have a Phase 1 buildout year of 2015 and a full buildout year of 2033. For purposes of this analysis and with approval from the WMPO, only Phase 1 was taken into account as this phase is not fully operational at the time of this study. The Phase 1 expansion is expected to consist of a 30,000 s.f. academic building and a 108,000 s.f. academic building. Site traffic from this development was distributed through the study area according to the approved trip generation and trip distribution from the Cape Fear Community College TIA. Adjacent development trips are shown in Figure 6. Adjacent development information can be found in Appendix D.

3.3. Future Roadway Improvements

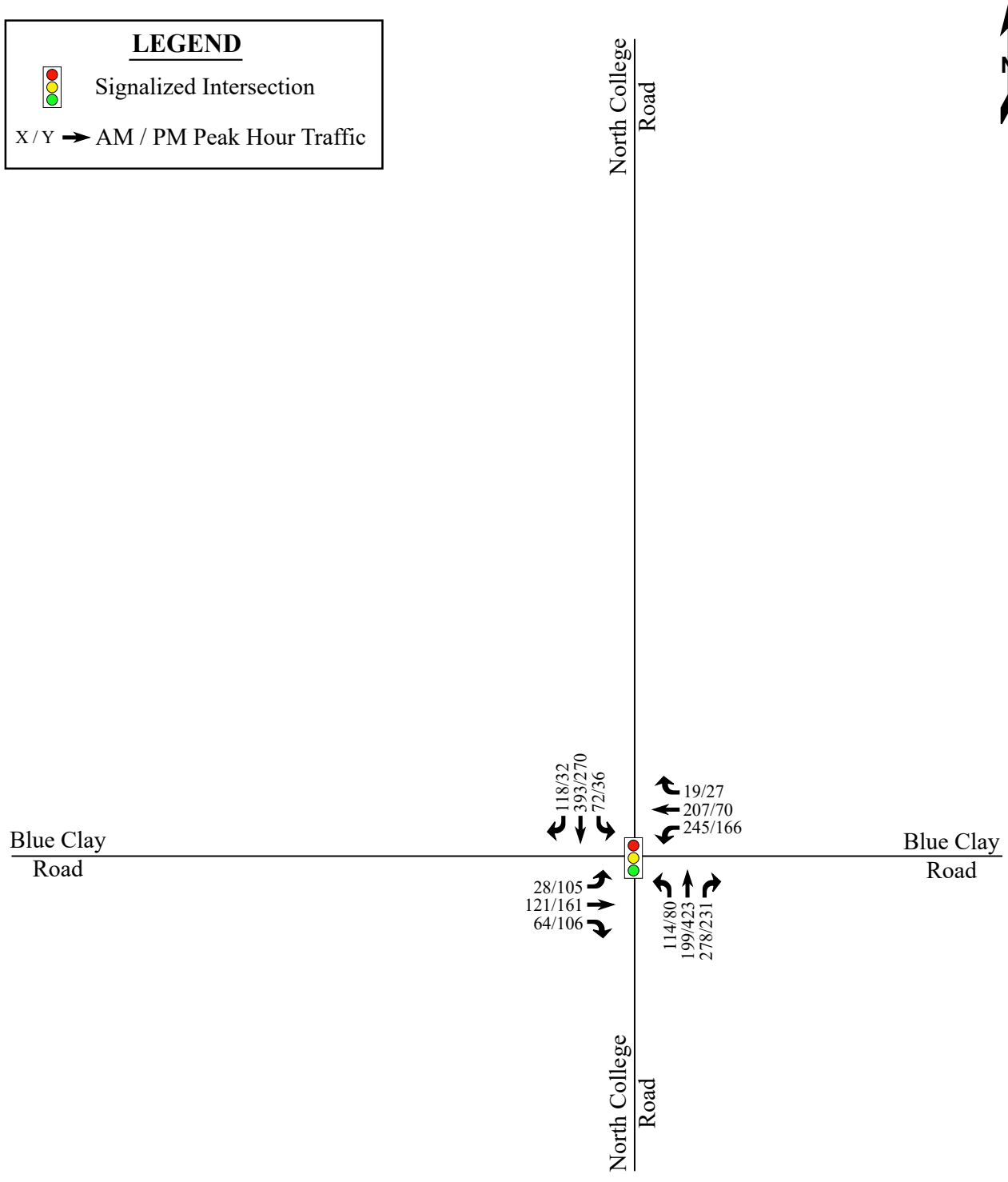
Based on coordination with the WMPO, it was determined there were no future roadway improvements to consider with this study.

3.4. Background (2018) Peak Hour Traffic Volumes

The background (2018) traffic volumes were determined by projecting the existing (2017) peak hour traffic to the year 2018, and adding the adjacent development trips. Refer to Figure 7 for an illustration of the background (2018) peak hour traffic volumes at the study intersections.

3.5. Analysis of Background (2018) Peak Hour Traffic Conditions

The background (2018) AM and PM peak hour traffic volumes at the study intersections were analyzed with existing geometric roadway conditions and traffic control. The analysis results are presented in Section 7 of this report.



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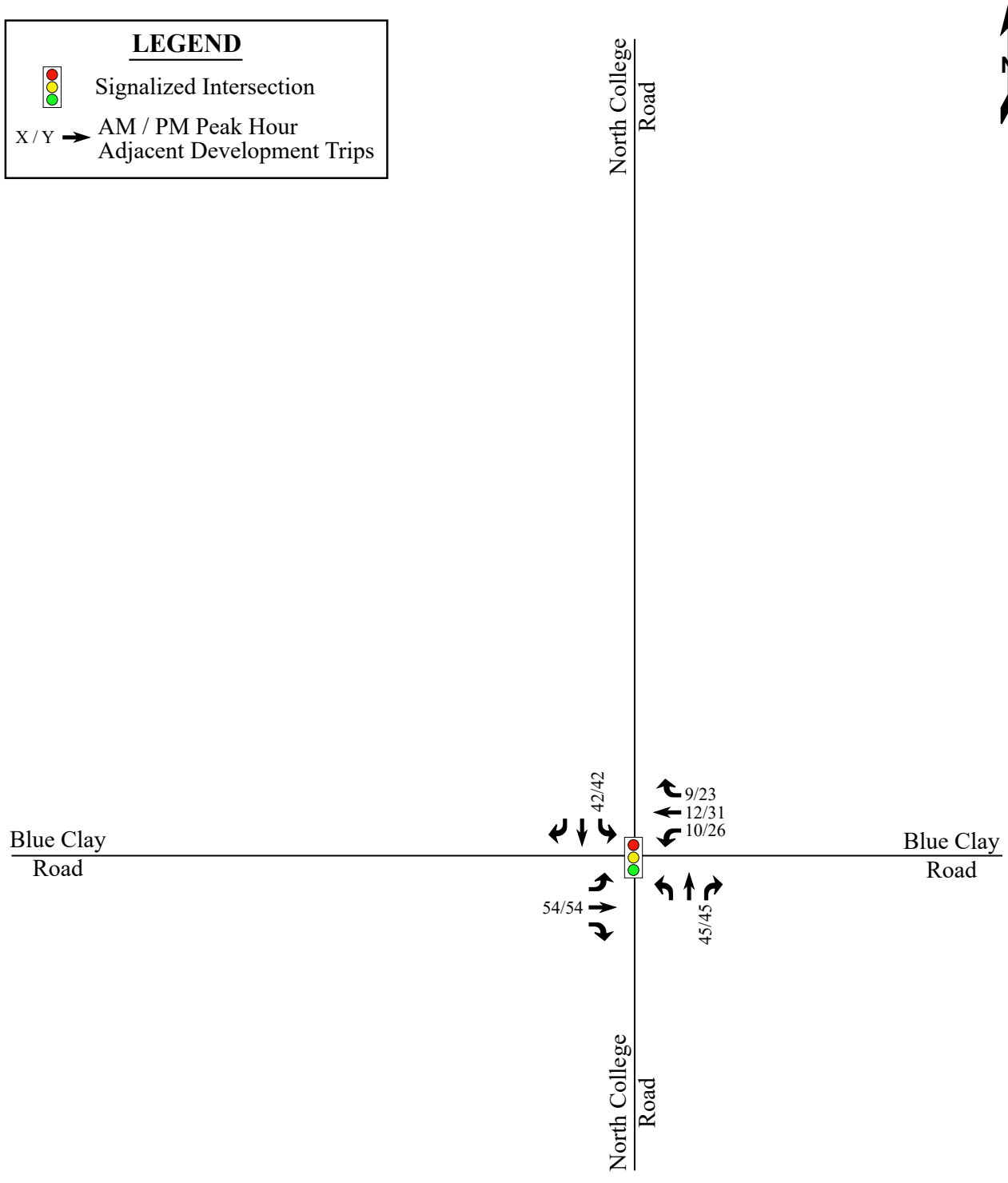
Wilmington, NC

Projected (2018)
Peak Hour Traffic

Scale: Not to Scale

Figure 5



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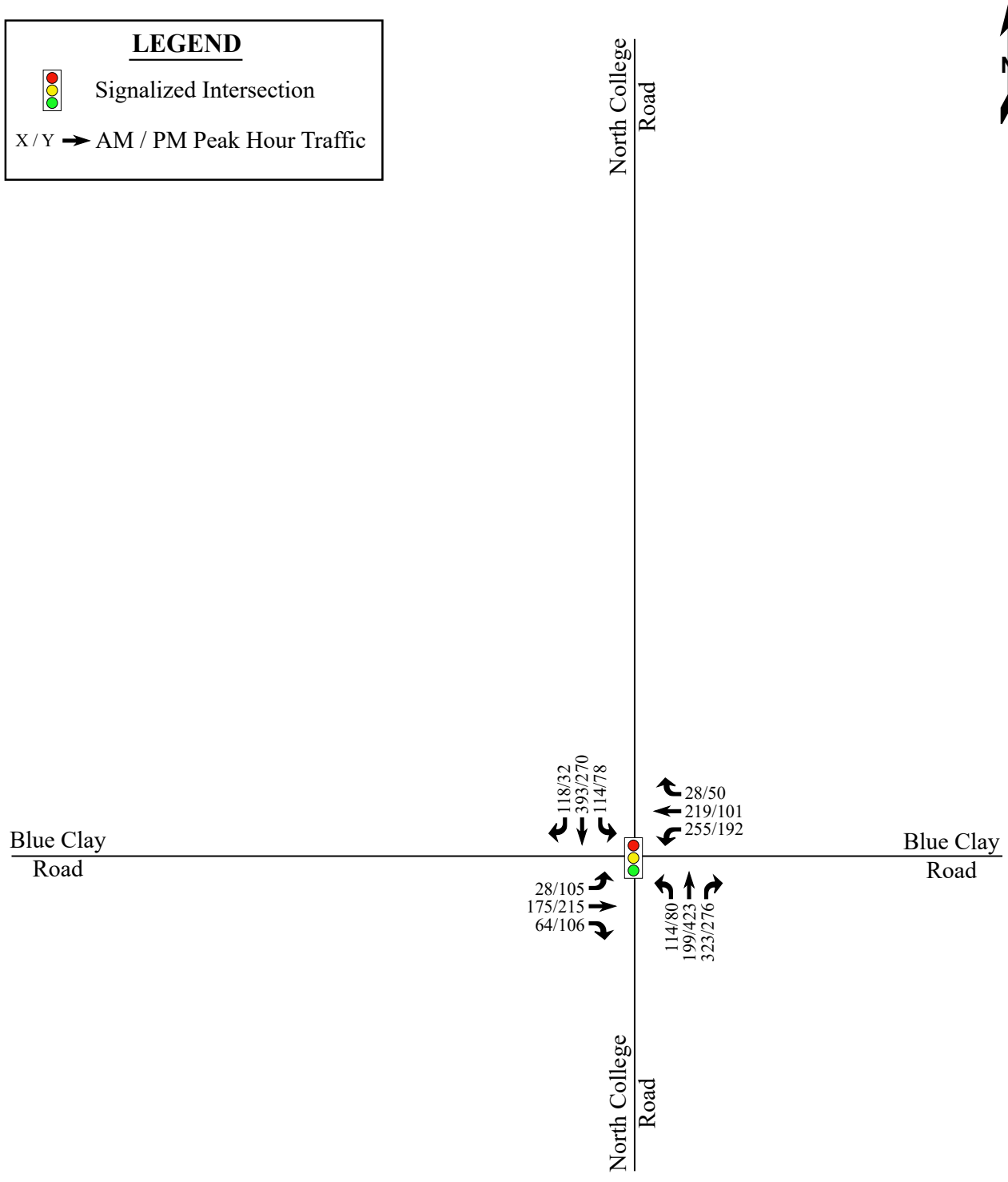
Wilmington, NC

Peak Hour Adjacent Development Trips

Scale: Not to Scale

Figure 6



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Pumpkin Creek C-Store
Wilmington, NC

Background (2018)
Peak Hour Traffic

Scale: Not to Scale | Figure 7

4. SITE TRIP GENERATION AND DISTRIBUTION

4.1. Trip Generation

The proposed development is assumed to consist of a 5,000 s.f. convenience market with gasoline pumps. 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*, 9th Edition. Table 1 provides a summary of the trip generation potential for the site.

Table 1: Trip Generation Summary

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	AM Peak Hour Trips (vph)		PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Convenience Market with Gasoline Pumps (853)	5,000 s.f.	4,300	103	102	128	127
Pass-By Trips: (63% AM, 66% PM)		*1,700*[1]	*65*	*65*	*84*	*84*
Total Primary Trips		**2,600**	**38**	**37**	**44**	**43**

1. Weekday 24 hour volumes calculated based on 10% of weekday 24 hour volumes occurring during the PM peak hour period.

It is estimated that the proposed development will generate approximately 4,300 total site trips on the roadway network during a typical 24-hour weekday period. Of the daily traffic volume, it is anticipated that 205 trips (103 entering and 102 exiting) will occur during the AM peak hour and 255 (128 entering and 127 exiting) will occur during the PM peak hour.

Pass-by trips were 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 1,700 daily trips, of which it is expected that 130 trips (65 entering and 65 exiting) will occur during the weekday AM peak hour and 168 trips (84 entering and 84 exiting) will occur during the PM peak hour. It should be noted that the pass-by trips were balanced, as it is likely that these trips would enter and exit in the same hour.

The total primary site trips are the calculated site trips after the reduction for internal capture and pass-by trips. Primary site trips are expected to generate approximately 2,600 site trips during a typical 24-hour weekday period. Of the daily traffic volume it is anticipated that 75 trips (38 entering and 37 exiting) will occur during the AM peak hour and 87 trips (44 entering and 43 exiting) will occur during the PM peak hour.

4.2. Site Trip Distribution and Assignment

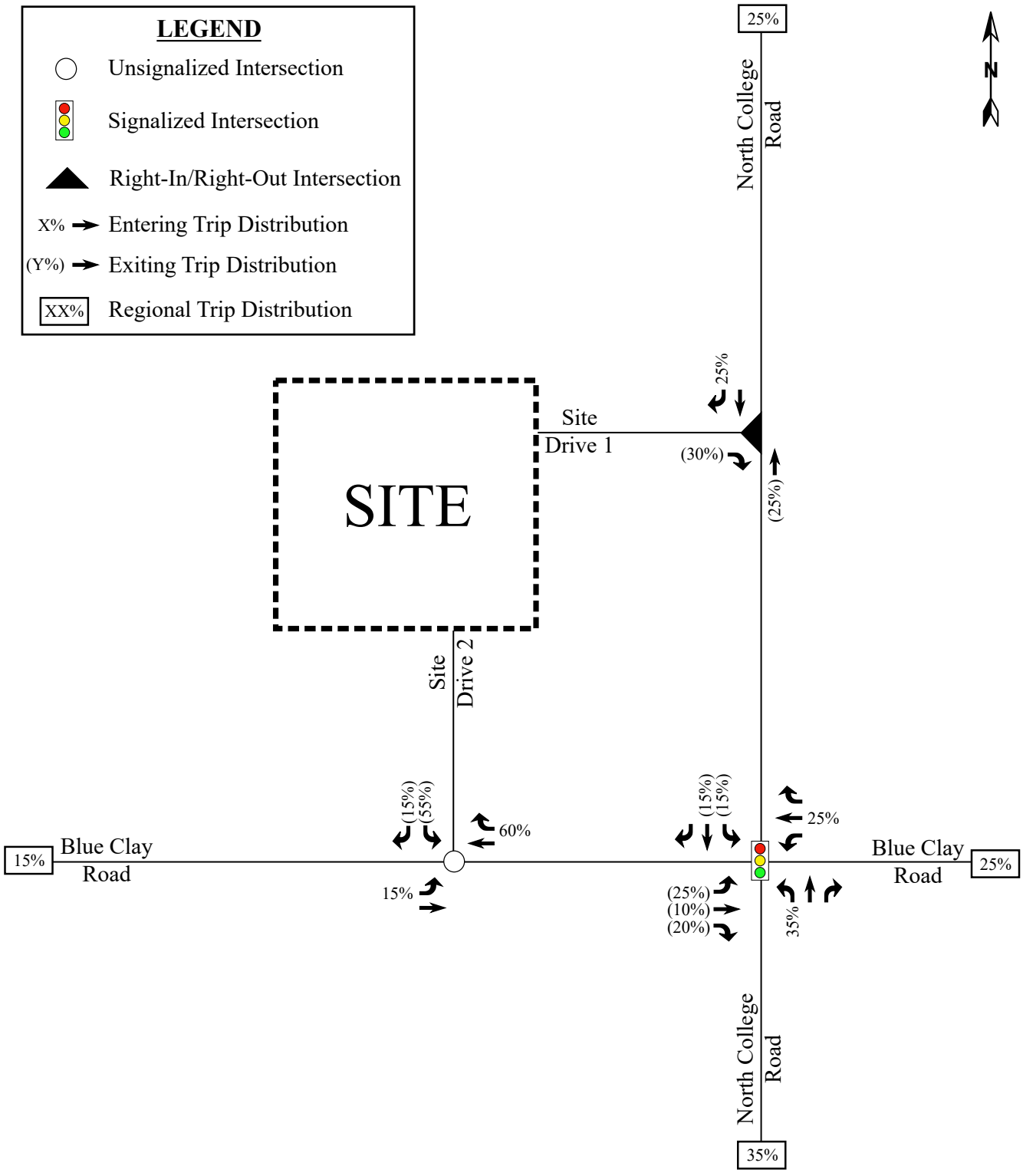
Trip distribution percentages used in assigning site traffic for this development were estimated based on a combination of existing traffic patterns, population centers adjacent to the study area, and engineering judgment. It is estimated that trips will be distributed as follows:

- 35% to/from the south via North College Road
- 25% to/from the north via North College Road
- 25% to/from the west via Blue Clay Road
- 15% to/from the east via Blue Clay Road

The site trip distribution is shown in Figure 8. Refer to Figure 9 for the primary site trip assignment.

The pass-by site trips were distributed based on existing traffic patterns with consideration given to the proposed driveway access and site layout. Refer to Figure 10 for the pass-by site trip distribution. Pass-by site trips are shown in Figure 11.

The total site trips were determined by adding the primary site trips and the pass-by site trips. Refer to Figure 12 for the total peak hour site trips at the study intersections. It is worth noting these distributions were reviewed and approved by the WMPO prior to the submittal of this study.



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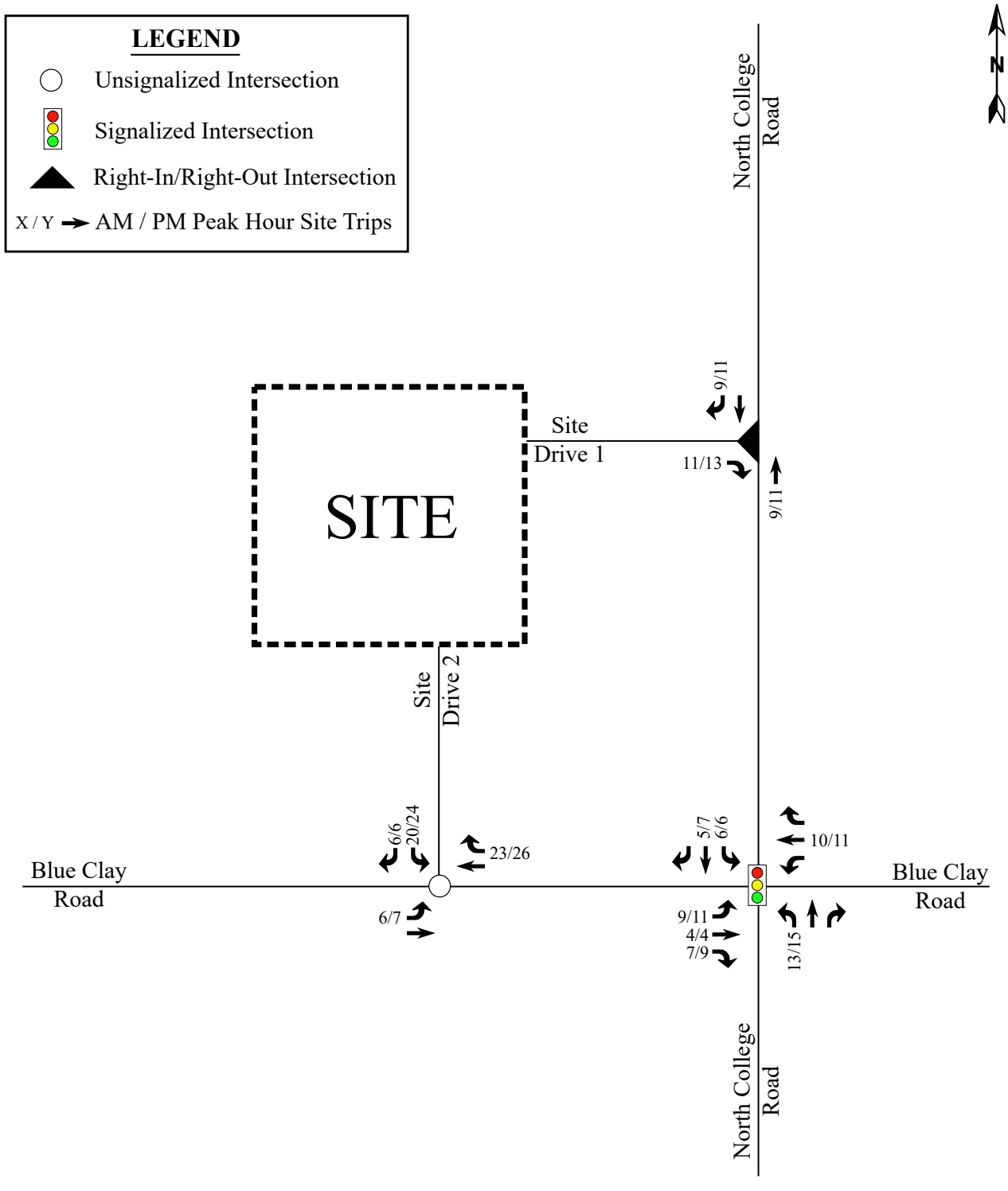
Site Trip Distribution

Scale: Not to Scale | Figure 8



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Primary Site Trip Assignment

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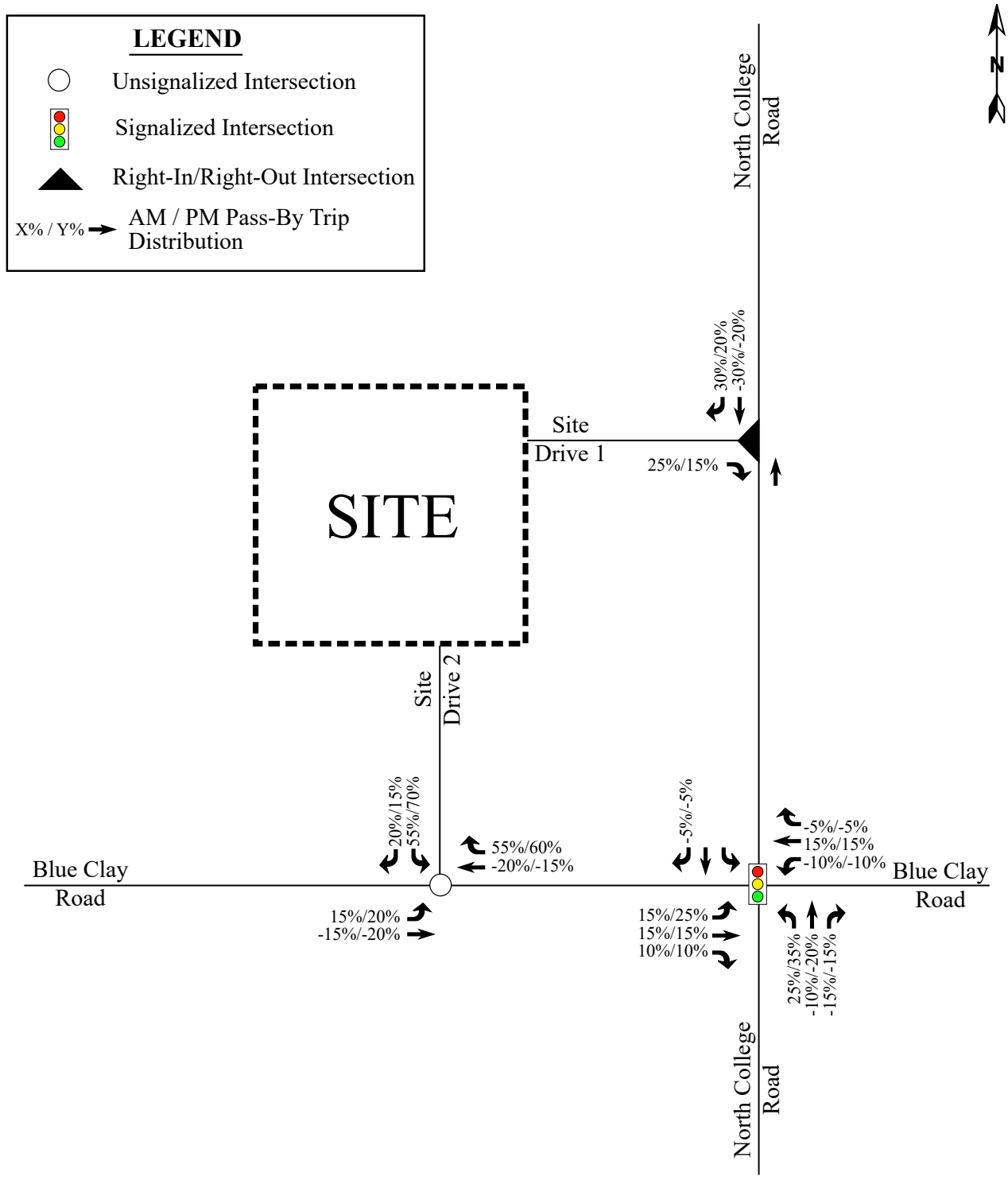

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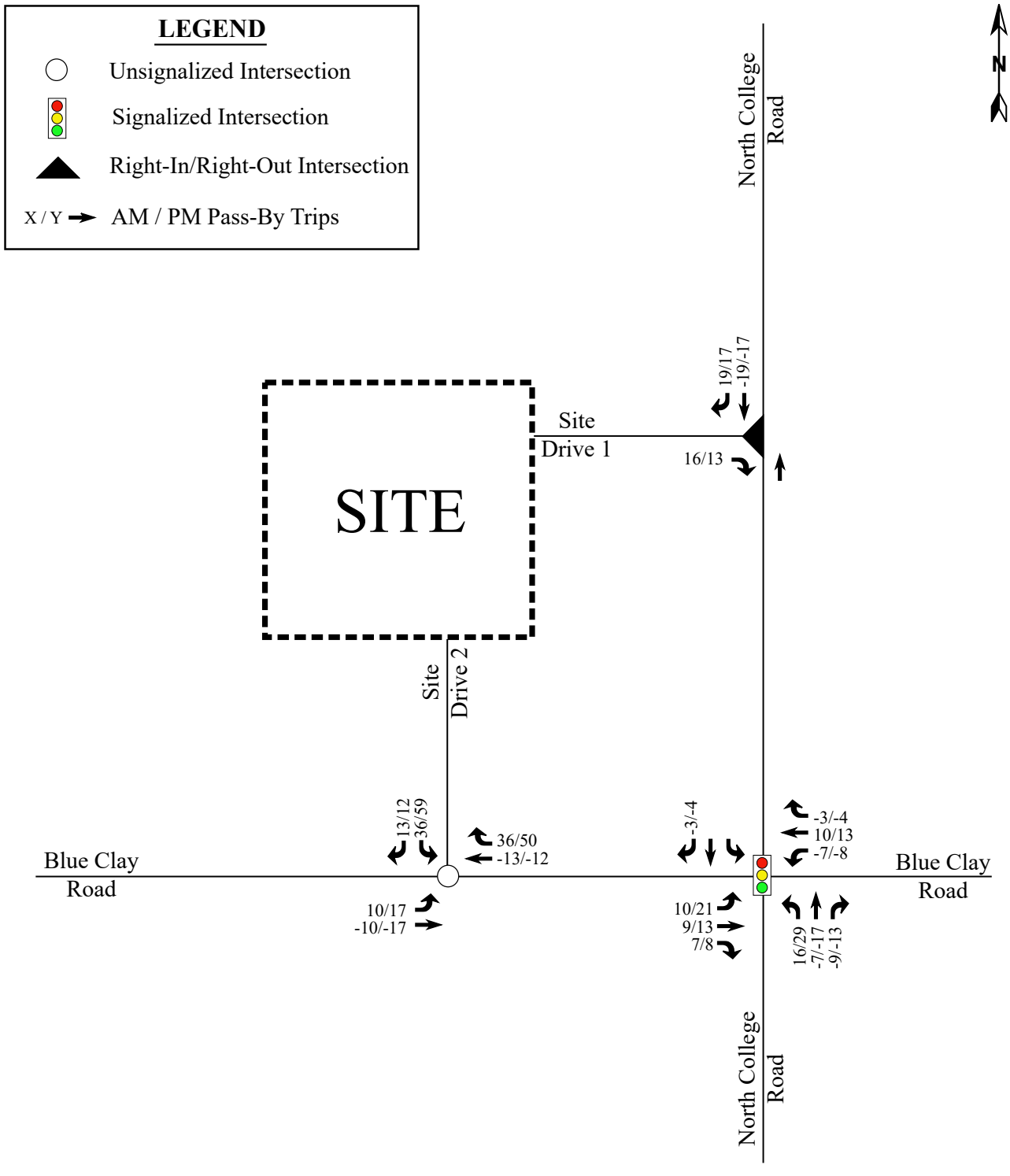
Pass-By
Trip Distribution

Scale: Not to Scale | Figure 10



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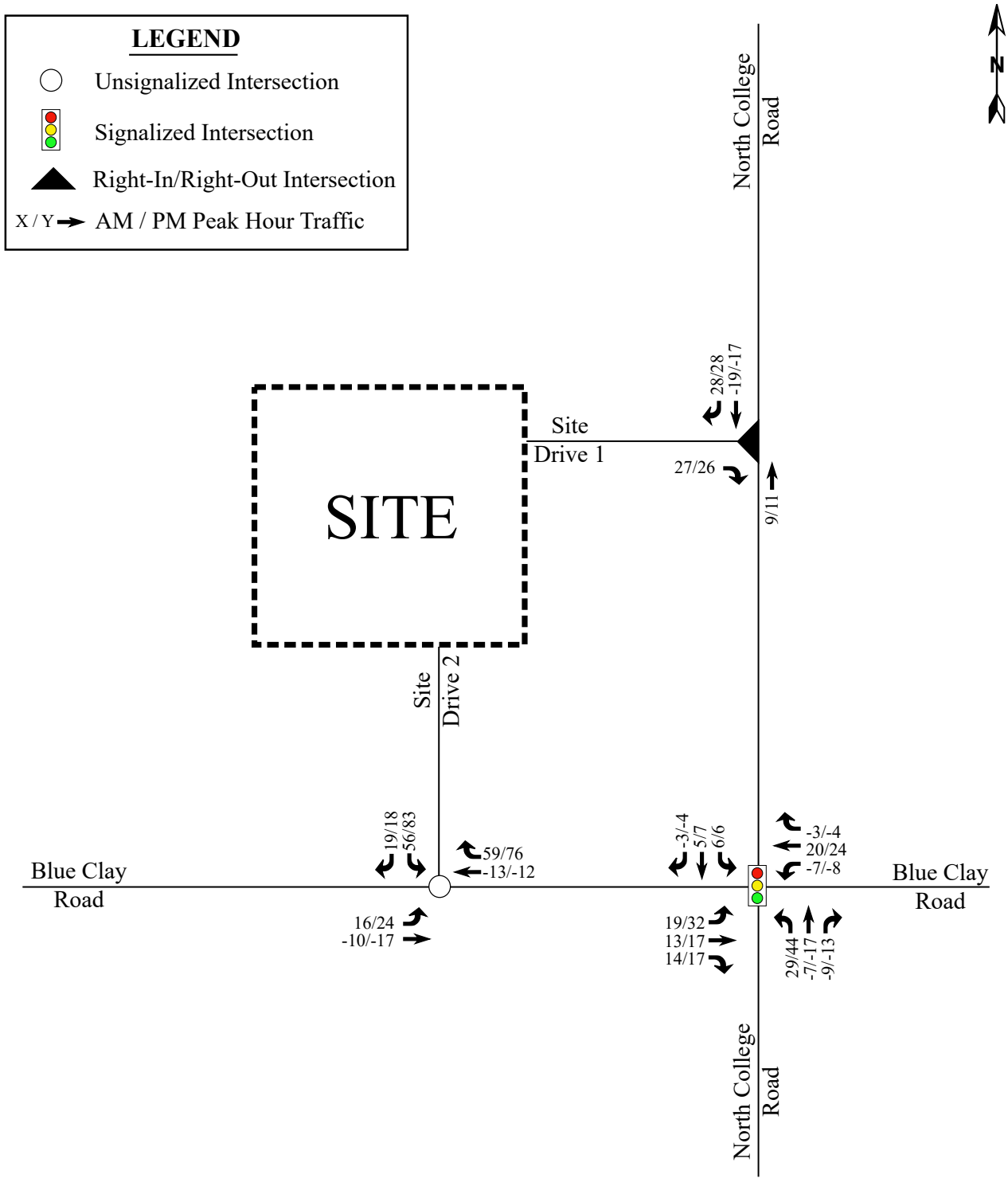
Wilmington, NC

Pass-By
Trip Assignment

Scale: Not to Scale | Figure 11



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Total Site
Trip Assignment

Scale: Not to Scale | Figure 12

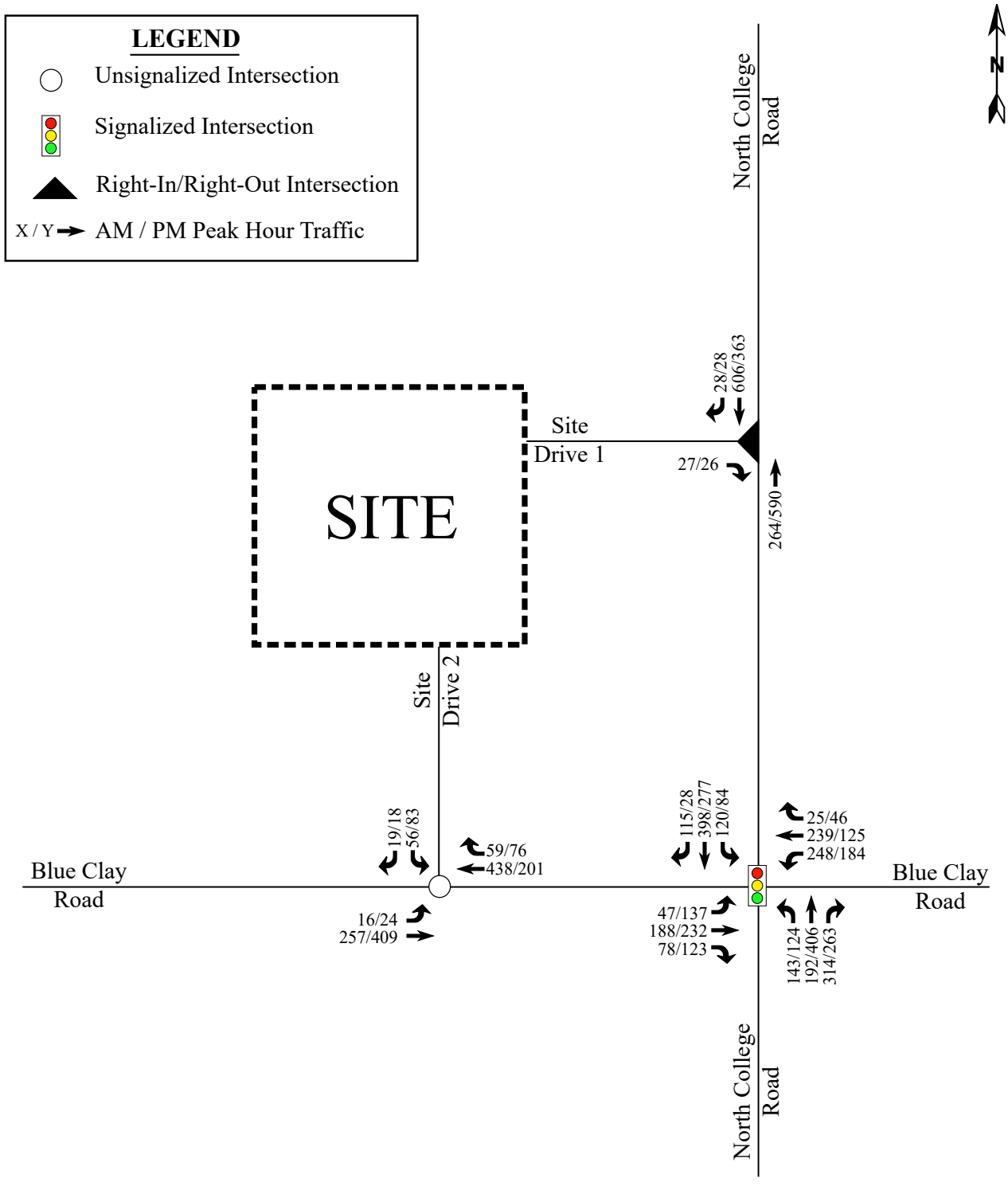
5. COMBINED (2018) TRAFFIC CONDITIONS

5.1. Combined (2018) Peak Hour Traffic Volumes

To estimate traffic conditions with the site fully built-out, the total site trips were added to the background (2018) traffic volumes to determine the combined (2018) traffic volumes. Refer to Figure 13 for an illustration of the combined (2018) peak hour traffic volumes with the proposed site fully developed.

5.2. Analysis of Combined (2018) Peak Hour Traffic

Study intersections were analyzed with the combined (2018) traffic volumes using the same methodology previously discussed for existing and background traffic conditions. Intersections were analyzed with improvements necessary to accommodate future traffic volumes. The results of the capacity analysis for each intersection are presented in Section 7 of this report.



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Pumpkin Creek C-Store
Wilmington, NC

Combined (2018)
Peak Hour Traffic

Scale: Not to Scale

Figure 13

6. TRAFFIC ANALYSIS PROCEDURE

Study intersections were analyzed using the methodology outlined in the *2010 Highway Capacity Manual* (HCM) 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 9.1), was used to complete the analyses for most of the study area intersections. Please note that the unsignalized capacity analysis does not provide an overall level of service for an intersection; only delay for an approach with a conflicting movement.

The HCM defines capacity as "the maximum hourly rate at which persons or vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under prevailing roadway, traffic, and control conditions." Level of service (LOS) is a term used to represent different driving conditions, and is defined as a "qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers." Level of service varies from Level "A" representing free flow, to Level "F" where breakdown conditions are evident. Refer to Table 2 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 2: Highway Capacity Manual – Levels-of-Service and Delay

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

6.1. Adjustments to Analysis Guidelines

Capacity analysis at all study intersections was completed according to the NCDOT Congestions Management Guidelines. A summary of adjustments to these guidelines made throughout the analysis is provided below:

- For the analysis of the existing signalized intersection at North College Road and Blue Clay Road, existing signal plans were obtained from NCDOT. The existing settings were used in the existing (2017) Synchro analysis. It should be noted that both the eastbound and westbound approaches have a small detector loop for the right-turn movement, although neither have a designated right-turn lane striped. Through coordination with the WMPO, these detector loops were not included in the analysis model due to due to software limitations. It should be noted that the eastbound and westbound approaches likely operate as though having a small right-turn lane in field conditions, thus necessitating the additional detection loops.

7. CAPACITY ANALYSIS

7.1. North College Road and Blue Clay Road

The existing signalized intersection of North College Road and Blue Clay Road was analyzed under existing (2017), background (2018), and combined (2018) traffic conditions with the lane configurations and traffic control shown in Table 3. Refer to Table 3 for a summary of the analysis results. Refer to Appendix E for the Synchro capacity analysis reports.

Table 3: Analysis Summary of North College Road and Blue Clay Road

ANALYSIS SCENARIO	LANE GROUP	Weekday AM Peak Hour					Weekday PM Peak Hour				
		Queue 95th / Max (ft)	Lane LOS	Delay (sec)	Approach (sec)	Overall (sec)	Queue 95th / Max (ft)	Lane LOS	Delay (sec)	Approach (sec)	Overall (sec)
Existing (2017) Conditions	EBL	28/149	B	16	C (31)	C (22)	86/150	B	18	C (31)	C (24)
	EBT/R	--	C	33			--	D	36		
	WBL	169/178	C	23	C (20)		122/156	B	19	B (18)	
	WBT/R	--	B	17			--	B	16		
	NBL	105/125	C	27	B (20)		56/162	B	16	C (26)	
	NBT	--	C	24			--	C	35		
	NBR	155/140	B	14			124159	B	13		
	SBL	46/88	B	13	C (21)		27/44	B	13	B (17)	
	SBT/R	--	C	22			--	B	18		
Background (2018) Conditions	EBL	29/149	B	15	C (32)	D (46)	93/150	C	20	D (46)	D (39)
	EBT/R	--	C	34			--	D	54		
	WBL	369/250	F	185	F (102)		295/245	F	110	E (70)	
	WBT/R	--	B	17			--	B	19		
	NBL	116/140	C	35	C (25)		55/174	B	14	C (29)	
	NBT	--	C	29			--	D	40		
	NBR	197/228	B	19			162/350	B	15		
	SBL	143/224	D	46	C (29)		99/91	D	48	C (22)	
	SBT/R	--	C	25			--	B	16		
Combined (2018) Conditions	EBL	43/149	B	16	C (34)	D (45)	117/149	C	21	D (54)	D (39)
	EBT/R	--	D	37			--	E	66		
	WBL	361/250	F	175	F (94)		276/250	F	96	E (59)	
	WBT/R	--	B	18			--	B	19		
	NBL	177/174	D	51	C (29)		85/174	B	17	C (28)	
	NBT	--	C	29			--	D	40		
	NBR	190/138	B	19			153/117	B	15		
	SBL	153/143	D	47	C (29)		104/96	D	47	C (23)	
	SBT/R	--	C	25			--	B	16		

Table 3 (continued): Analysis Summary of North College Road and Blue Clay Road

ANALYSIS SCENARIO	LANE GROUP	Weekday AM Peak Hour					Weekday PM Peak Hour				
		Queue 95th / Max (ft)	Lane LOS	Delay (sec)	Approach (sec)	Overall (sec)	Queue 95th / Max (ft)	Lane LOS	Delay (sec)	Approach (sec)	Overall (sec)
Combined (2018) Conditions – **Improved**	EBL EBT/R	43/149 --	B E	19 75	E (67)	D (49)	96/149 --	B E	17 55	D (45)	D (40)
	WBL WBT/R	307/219 --	E C	77 21	D (49)		227/162 --	E B	62 16	D (40)	
	NBL NBT NBR	206/175 -- 186/194	F C B	88 27 14	C (34)		174/175 -- 157/350	E D B	64 39 15	C (35)	
	SBL SBT/R	128/143 --	D E	52 58	E (57)		119/143 --	E D	57 40	D (43)	

For the analysis of the existing signalized intersection at North College Road and Blue Clay Road, existing signal plans were obtained from NCDOT. The existing settings were used in the Synchro analysis for existing traffic scenarios as shown in Table 3. Capacity Analysis indicates the intersection is expected to operate at an overall LOS C during both weekday AM and PM peak hours. It should be noted that both the eastbound and westbound approaches have a small detector loop for the right-turn movement although neither have a designated right-turn lane striped. Through coordination with the WMPO, these detector loops were not included in the analysis model due to software limitations. It should be noted that the eastbound and westbound approaches likely operate as though having a small right-turn lane in field conditions, thus necessitating the additional detection loops.

The westbound and southbound left-turn movements currently operate as protected-permitted phasing; per Congestion Management Guidelines, they should be analyzed as protected-only phasing for all future scenarios. Capacity analysis of background (2018) and combined (2018) traffic conditions indicates the intersection of North College Road and Blue Clay Road is expected to operate at an overall LOS D during the weekday AM and PM peak hours.

Based on WMPO standards, improvements are required for approaches at intersections if background to combined traffic conditions increase in delay by 25% or more, the LOS degrades by at least one level, or the LOS is an F. The westbound approach meets this threshold, operating at a LOS F during the weekday AM peak hour; however, from background

(2018) to combined (2018) traffic conditions the westbound approach decreases in delay by 8 seconds during the weekday AM peak hour. This is not uncommon for intersections operating at acceptable levels of service because there is available capacity. The westbound left-turn movement is more heavily traveled, removing the pass-by trips from this movement and adding them to the westbound thru movement decreases the delay per vehicle and ultimately the overall approach delay. No improvements by the developer are recommended for this intersection.

Per the FHWA *Signalized Intersections: An Informational Guide*, protected phasing treatment should be implemented if the cross product of the left-turn movement and opposing (through) traffic is greater than 45,000 for a left-turn movement that crosses 1 opposing lane of traffic. Under combined (2018) traffic conditions, the cross-product of the northbound left-turn movement is expected to be approximately 56,900 during the weekday AM peak hour and protected phasing treatment should be recommended. Per Congestion Management Guidelines, the northbound left-turn movement was analyzed as protected-only phasing for combined (2018) improved traffic conditions. It should be noted that due to this change in phasing, the cycle length and signal timings were optimized in the Synchro software. It is recommended that a signal modification plan be developed by the NCDOT. The results of the analyses performed for these conditions is shown in Table 3 as "Improved". Under combined (2018) improved traffic conditions, the intersection is expected to operate at an overall LOS D during both the weekday AM and PM peak hours.

The addition of the northbound left-turn movement protected phasing treatment increased the overall delay for the intersection by 6 seconds during the weekday AM peak hour and 1 second during the weekday PM peak hour. The exclusive protected-only phase assigned to the northbound left-turn movement increases the delay for the southbound through and right-turn movements, increasing the overall southbound approach delay and ultimately the overall intersection delay. Additionally, the change in cycle length and signal timings improved the LOS for the westbound approach; however, the additional time given to the westbound left-turn movement increases the delay for the eastbound through and right-turn movements, increasing the overall eastbound approach delay.

It should be noted that under all traffic conditions, right-turns-on-red were turned off, although field conditions allow for right-turns-on-red for all approaches. Additionally, under all future traffic conditions, protected-permitted phasing was analyzed as protected-only phasing. Due to this, the intersection is expected to operate with less delay for all scenarios than shown in Table 3.

The northbound left-turn lane is expected to operate at an acceptable LOS during the weekday AM and PM peak hours under the existing Dallas permitted signal phasing; however, based on the cross product rule for protected phasing treatment, it is recommended for NCDOT to change the northbound left-turn movement to permitted-protected phasing and develop a signal modification plan.

7.2. North College Road and Site Drive 1

The proposed unsignalized intersection of North College Road and Site Drive 1 was analyzed under combined (2018) traffic conditions as a right-in/right-out intersection. Refer to Table 4 for a summary of the analysis results. Refer to Appendix F for the Synchro capacity analysis reports.

Table 4: Analysis Summary of North College Road and Site Drive 1

ANALYSIS SCENARIO	LANE GROUP	Weekday AM Peak Hour				Weekday PM Peak Hour			
		Queue 95th / Max (ft)	Lane LOS	Delay (sec)	Overall (sec)	Queue 95th / Max (ft)	Lane LOS	Delay (sec)	Overall (sec)
Combined (2018) Conditions	EBR	5*/82	B[1]	14	N/A	3*/63	B[1]	11	N/A
	NBT	--	--	--		--	--	--	
	SBT	--	--	--		--	--	--	
	SBR	--	--	--		--	--	--	

1. Level of service for minor-street approach.

* Due to limitations with the HCM 2010 TWSC reporting, a vehicle length of 25 feet was used to determine the 95th percentile queue in feet.

Capacity analysis of combined (2018) traffic conditions indicates the minor-street approach at the intersection of North College Road and Site Drive 1 are expected to operate at LOS B during both weekday AM and PM peak hours. A southbound right-turn lane with 25 feet of storage and appropriate taper is recommended at this intersection due to the traffic volumes along the mainline.

7.3. Blue Clay Road and Site Drive 2

The proposed unsignalized intersection of Blue Clay Road and Site Drive 2 was analyzed under combined (2018) traffic conditions with proposed lane configurations and traffic control. Refer to Table 5 for a summary of the analysis results. Refer to Appendix G for the Synchro capacity analysis reports.

Table 5: Analysis Summary of Blue Clay Road and Site Drive 2

ANALYSIS SCENARIO	LANE GROUP	Weekday AM Peak Hour				Weekday PM Peak Hour			
		Queue 95th / Max (ft)	Lane LOS	Delay (sec)	Overall (sec)	Queue 95th / Max (ft)	Lane LOS	Delay (sec)	Overall (sec)
Combined (2018) Conditions	EBL/T	--	A[1]	8	N/A	--	A[1]	8	N/A
	WBT	--	--	--		--	--	--	
	WBR	--	--	--		--	--	--	
	SBL/R	20*/186	C[2]	17		28*/188	C[2]	17	

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

* Due to limitations with the HCM 2010 TWSC reporting, a vehicle length of 25 feet was used to determine the 95th percentile queue in feet.

Capacity analysis of combined (2018) traffic conditions indicates the major-street left-turn movement at the intersection of Blue Clay Road and Site Drive 2 is expected to operate at LOS A during both weekday AM and PM peak hours. The minor-street approach is expected to operate at an LOS C during both weekday AM and PM peak hours. A westbound right-turn lane with 50 feet of storage and appropriate taper is recommended at this intersection due to the traffic volumes along the mainline.

8. CONCLUSIONS

This Traffic Impact Analysis was conducted to determine the potential traffic impacts of the proposed Pumpkin Creek C-Store, located in the northwest quadrant of the intersection of North College Road and Blue Clay Road in Wilmington, North Carolina. The proposed development, anticipated to be completed in 2018, is assumed to consist of a 5,000 square foot convenience market with gasoline pumps. Site access is proposed via one full movement driveway on Blue Clay Road and a right-in/right-out driveway on North College Road.

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

- Existing (2017) Traffic Conditions
- Background (2018) Traffic Conditions
- Combined (2018) Traffic Conditions

Trip Generation

It is estimated that the proposed development will generate approximately 4,300 total site trips on the roadway network during a typical 24-hour weekday period. Of the daily traffic volume, it is anticipated that 205 trips (103 entering and 102 exiting) will occur during the AM peak hour and 255 (128 entering and 127 exiting) will occur during the PM peak hour.

Adjustments to Analysis Guidelines

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

Intersection Capacity Analysis Summary

All the study area intersections (including the proposed site driveways) are expected to operate at acceptable levels-of-service under existing and future year conditions with the exception of the intersections listed below. A summary of the study area intersections that are expected to need improvements are as follows:

North College Road and Blue Clay Road

Based on WMPO standards, improvements are required for approaches at intersections if background to combined traffic conditions increase in delay by 25% or more, the LOS degrades by at least one level, or the LOS is an F. The westbound approach meets this threshold, operating at a LOS F during the weekday AM peak hour; however, from background (2018) to combined (2018) traffic conditions the westbound approach decreases in delay by 8 seconds during the weekday AM peak hour. This is not uncommon for intersections operating at acceptable levels of service because there is available capacity. The westbound left-turn movement is more heavily traveled, removing the pass-by trips from this movement and adding them to the westbound thru movement decreases the delay per vehicle and ultimately the overall approach delay. No improvements by the developer are recommended for this intersection.

9. RECOMMENDATIONS

Based on the findings of this study, specific geometric improvements have been identified and are recommended to accommodate future traffic conditions. See a more detailed description of the recommended improvements below. Refer to Figure 14 for an illustration of the recommended lane configuration for the proposed development.

Recommended Improvements by NCDOT

North College Road and Blue Clay Road

- Develop a signal modification plan to accommodate the northbound left-turn movement change in phasing from Dallas permitted to permitted-protected phasing.

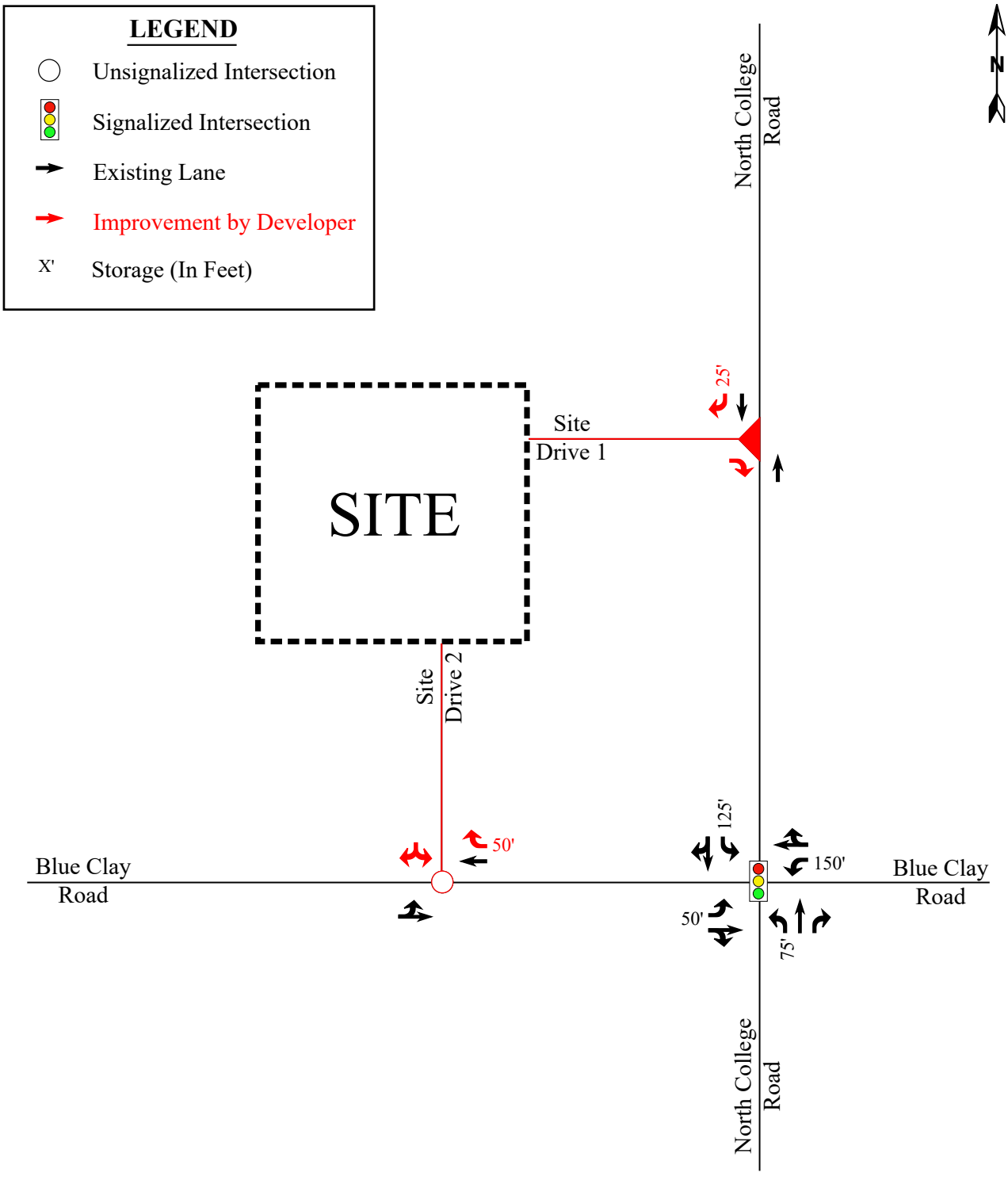
Recommended Improvements by Developer

North College Road and Site Drive 1

- Provide site access via a right-in/right-out intersection with one ingress lane and one egress lane.
- Provide stop control for Site Drive.
- Provide an exclusive southbound right-turn lane on North College Road with 25 feet of storage and appropriate taper.

Blue Clay Road and Site Drive 2

- Provide site access via a full movement intersection with one ingress lane and one egress lane.
- Provide stop control for Site Drive.
- Provide an exclusive westbound right-turn lane on Blue Clay Road with 50 feet of storage and appropriate taper.



RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Pumpkin Creek C-Store
Wilmington, NC

Recommended Lane Configurations

Scale: Not to Scale | Figure 14

RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Charleston, SC - Charlotte, NC - Raleigh, NC - Richmond, VA - Winston-Salem, NC