



TRAFFIC IMPACT ANALYSIS

FOR

TERRAVITA

LOCATED

IN

KNIGHTDALE, NC

Prepared For:

Terravita Development, LLC
933 Old Knight Road
Knightdale, NC 27545



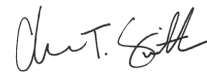
NOVEMBER 2024

DRMP Project No. 24682

Prepared By: CDS

Reviewed By: CTS

**TRAFFIC IMPACT
ANALYSIS
FOR
TERRAVITA
LOCATED IN
KNIGHTDALE, NC**



11/13/24

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Prepared By:

DRMP, Inc.
License #F-1524

TRAFFIC IMPACT ANALYSIS TERRAVITA

Knightsdale, North Carolina

EXECUTIVE SUMMARY

1. Development Overview

A Traffic Impact Analysis (TIA) was conducted for the proposed Terravita development in accordance with the Knightsdale (Town) Unified Development Ordinance (UDO) and North Carolina Department of Transportation (NCDOT) capacity analysis guidelines. The proposed Terravita development is to be located south of Buffalo Road between Quiet Oaks Drive and Bobbitt Drive in Knightsdale, North Carolina. The proposed development, anticipated to be completed in 2029, is assumed to consist of 170 single-family lots and 75 townhomes. Access to the parcel is proposed via one full movement driveway along Buffalo Road and internal connections to Quiet Oaks Road, Bobbitt Drive, Proc Ridge Lane, and the Old Knight Road extension (a part of the Weldon Village adjacent development).

2. Existing Traffic Conditions

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

- Buffalo Road and Lucas Road
- Buffalo Road and Quiet Oaks Drive
- Buffalo Road and Bobbitt Drive
- Buffalo Road and Horton Road
- Horton Road and Horton Mill Drive
- Horton Road and Old Knight Road
- Horton Road and Lucas Road

Existing peak hour traffic volumes were determined based on traffic counts conducted at the study intersection listed above, in October of 2024 during a typical weekday AM (7:00 AM – 9:00 AM) and PM (4:00 PM – 6:00 PM) peak periods. Traffic volumes were balanced between study intersections, where appropriate.

3. Future Traffic Conditions

Through coordination with the Town, it was determined that an annual growth rate of 3% would be used to generate 2030 (build-out+1) projected weekday AM and PM peak hour traffic volumes. Per the Town’s UDO, a 3% growth rate was applied to the existing traffic counts to project to the year 2030. For the +10 future analysis required by the Town UDO, traffic was projected beyond 2030 using a 1% growth rate. The following adjacent developments were identified to be included as an approved adjacent development in this study:

- Haywood Glen
- Weldon Village
- Brio Development

Based on coordination with the Town, no roadway improvement projects are planned within the study area.

4. Site Trip Generation

Average weekday daily, AM peak hour, and PM peak hour trips for the proposed development were estimated using methodology contained within the ITE Trip Generation Manual, 11.1th Edition. Table E-1 provides a summary of the trip generation potential for the site.

Table E-1: Site Trip Generation

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	Weekday AM Peak Hour Trips (vph)		Weekday PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Single Family Lots (210)	170 DU	1,644	30	91	103	61
Townhomes (215)	75 DU	522	8	25	24	17
Total Trips		2,166	38	116	127	78

5. Capacity Analysis Summary

The analysis considered weekday AM and PM peak hour traffic for 2024 existing, 2030 no-build, 2030 build, and 2039 future conditions. Refer to Section 7 of the TIA for the capacity analysis summary performed at each study intersection.

6. Recommendations

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

Improvements by Weldon Village

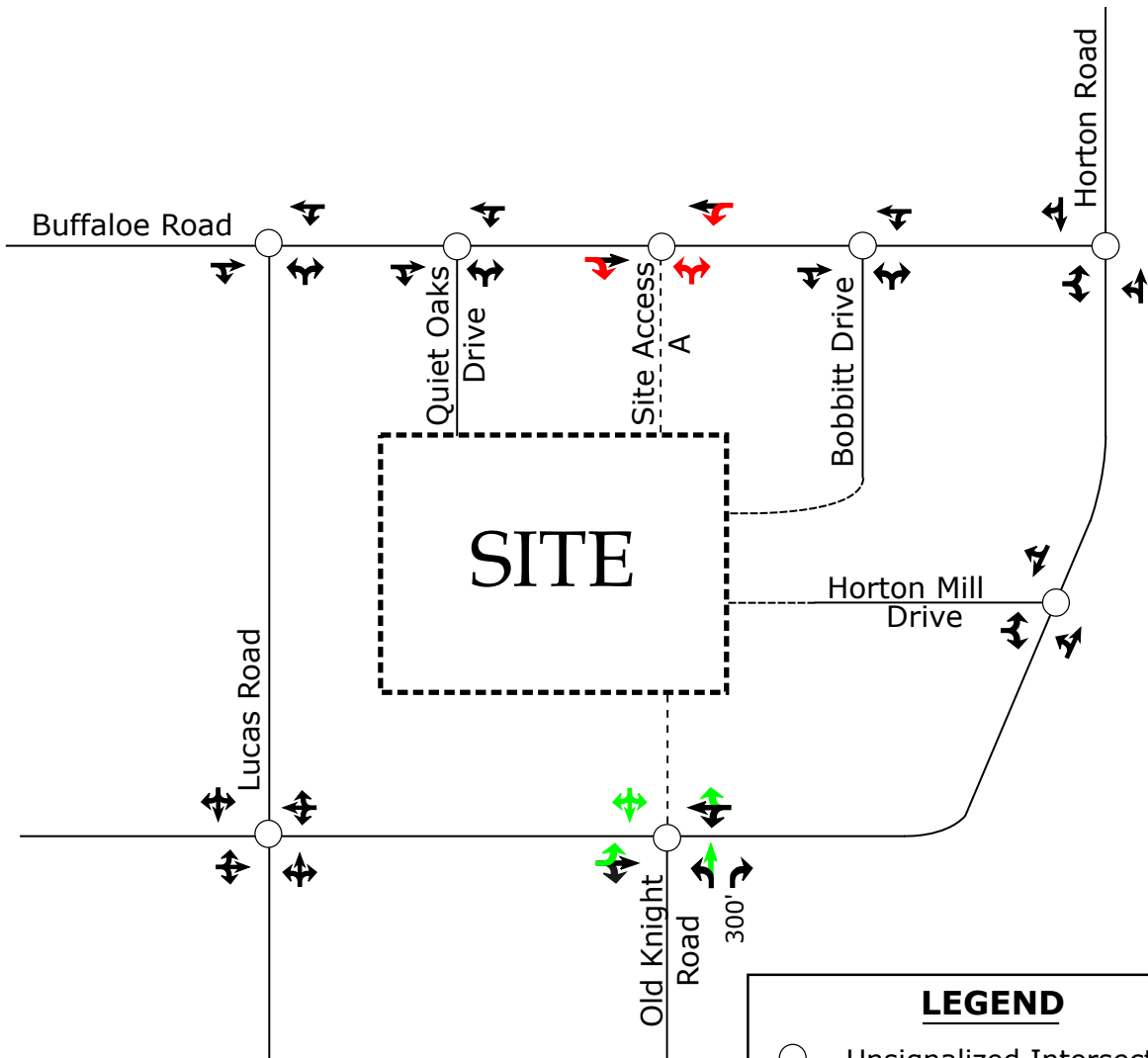
Horton Road and Old Knight Road

- Construct southbound approach (of Old Knight Road) with one ingress lane and one egress lane.
- Provide stop control for southbound approach.
- Construct eastbound left turn lane (on Horton Road) with 100' of storage plus appropriate deceleration and taper.

Recommended Modifications by Developer

Buffaloe Road and Site Access

- Construct northbound approach (of the proposed site access) with one ingress lane and one egress lane. Provide stop-control for the northbound approach.



LEGEND

- Unsignalized Intersection
- ➔ Existing Lane
- ➔ Improvement by Developer
- ➔ Improvement by Others
- x' Storage (In Feet)



Terravita
Knightdale, NC

Recommended Lane
Configurations

Scale: Not to Scale | Figure E-

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TRAFFIC IMPACT ANALYSIS

Terravita Knightdale, North Carolina

1. INTRODUCTION

The contents of this report present the findings of the Traffic Impact Analysis (TIA) conducted for the proposed Terravita residential development to be located south of Buffaloe Road between Quiet Oaks Drive and Bobbitt Drive in Knightdale, North Carolina. The purpose of this study is to determine the potential impacts to the surrounding transportation system created by traffic generated by the proposed development, as well as recommend improvements to mitigate the impacts.

The proposed development, anticipated to be completed in 2029, is assumed to consist of the following uses:

- 170 single-family homes
- 75 townhomes

Per the Town of Knightdale's Unified Development Ordinance (UDO), the study analyzes traffic conditions during the weekday AM and PM peak hours for the following scenarios:

- 2024 Existing Traffic Conditions
- 2030 (build year+1) No-Build Traffic Conditions
- 2030 (build year+1) Build Traffic Conditions
- 2039 (build year+10) Future Traffic Conditions

1.1. Site Location and Study Area

Refer to Figure 1 for the site location map.

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

- Buffaloe Road and Lucas Road
- Buffaloe Road and Quiet Oaks Drive
- Buffaloe Road and Bobbitt Drive
- Buffaloe Road and Horton Road

- Horton Road and Horton Mill Drive
- Horton Road and Old Knight Road
- Horton Road and Lucas Road

1.2. Proposed Land Use and Site Access

The proposed development is assumed to consist of the following uses:

- 170 single-family homes
- 75 townhomes

Access is proposed via one (1) new full movement driveway along Buffalo Road and internal connections to Quiet Oaks Road, Bobbitt Drive, Proc Ridge Lane, and the Old Knight Road extension (a part of the Weldon Village adjacent development). Refer to Figure 2 for a copy of the preliminary site plan.

1.3. Adjacent Land Uses

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

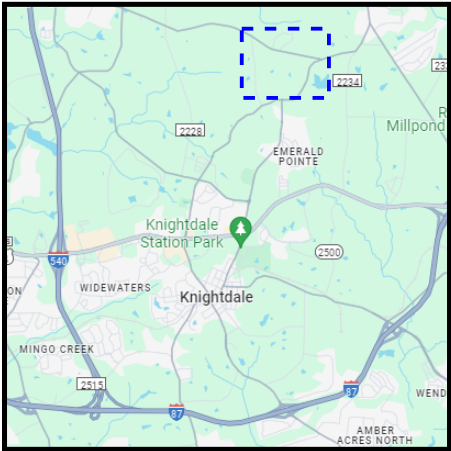
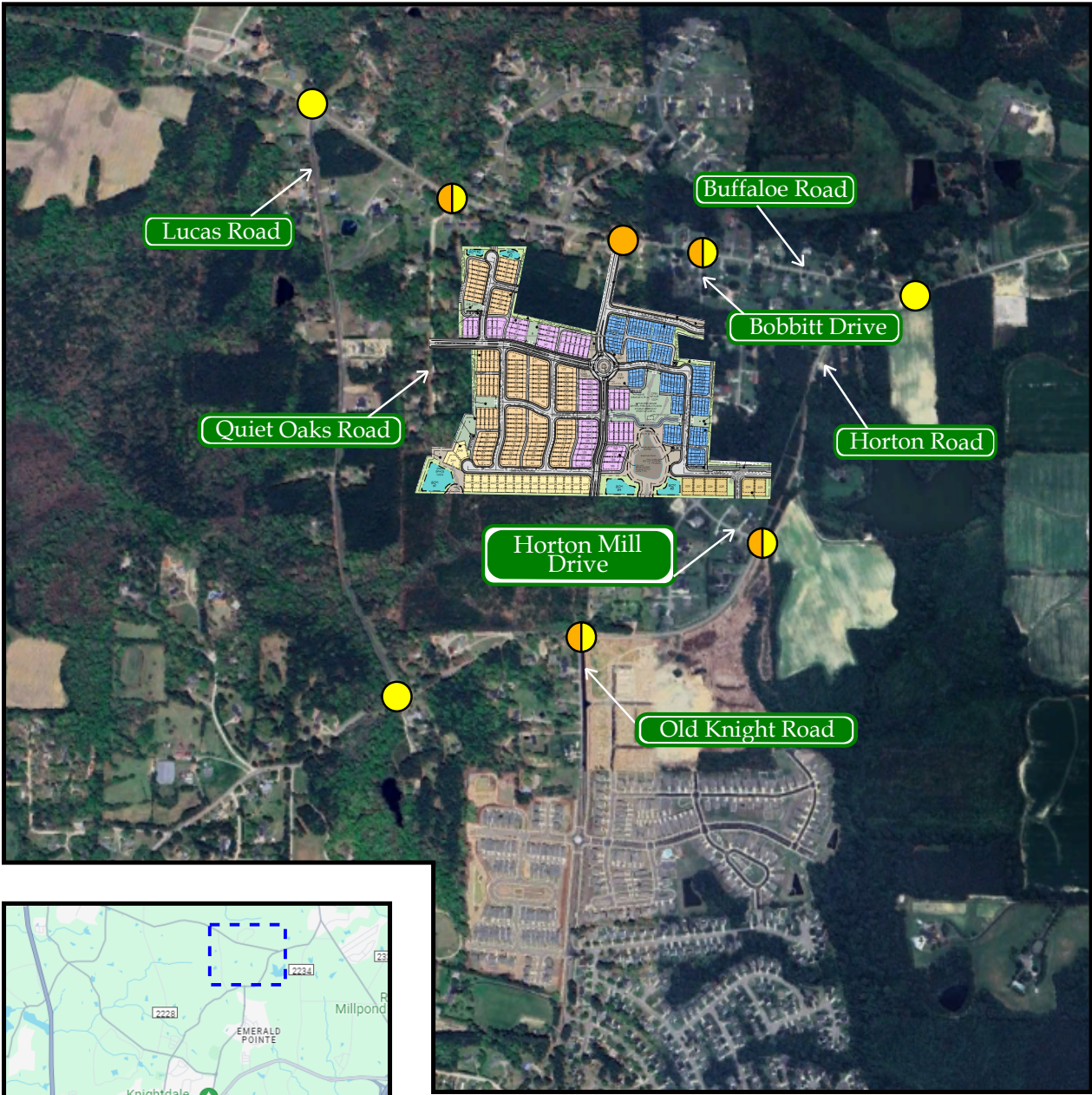
1.4. Existing Roadways

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

Table 1: Existing Roadway Inventory

Road Name	Route Number	Typical Cross Section	Speed Limit	2023 AADT (vpd)
Buffaloe Road	SR 2215	2-lane undivided	45 mph	3,900
Lucas Road	SR 2260	2-lane undivided	45 mph	1,200
Bobbitt Drive	N/A	2-lane undivided	Not Posted (25 mph assumed)	*
Horton Road	SR 2231	2-lane undivided	45 mph	1,900
Horton Mill Drive	N/A	2-lane undivided	Not Posted (25 mph assumed)	*
Old Knight Road	SR 2049	2-lane undivided	45 mph	*

*ADT based on the traffic counts from 2023 and assuming the weekday PM peak hour volume is 10% of the average daily traffic.



LEGEND

- Study Intersection
- Proposed Site Access
- ▭ Study Area



Terravita
Knightdale, NC

Site Location Map

Scale: Not to Scale Figure 1



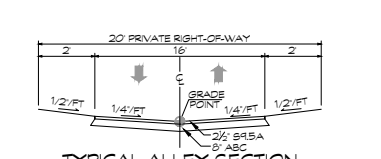
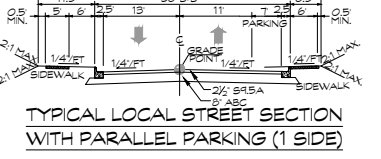
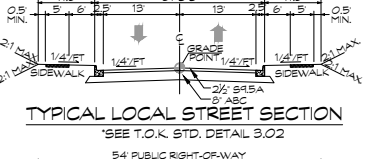
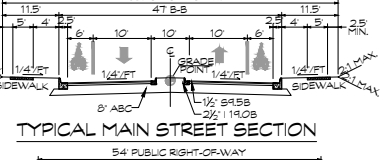
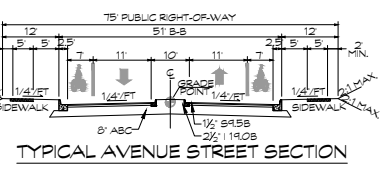
BUILDING SETBACK TABLE LOT AREA CALCULATIONS

SINGLE FAMILY BUILDING SETBACKS		MIN		MAX	
FRONT	10 FT	N/A			
CORNER SIDE	10 FT	N/A			
SIDE YARD SETBACK	20%	N/A			
REAR YARD SETBACK	25 FT	N/A			
TOWNHOME BUILDING SETBACKS	MIN		MAX		
FRONT	10 FT	25 FT			
SIDE YARD SETBACK	10 FT	N/A			
REAR YARD SETBACK	15 FT	N/A			

GROSS SITE AREA		MIN		MAX	
AREA IN INTERNAL PUBLIC STREET RIGHT-OF-WAY	13.55 AC				
AREA IN EXISTING ACCESS EASEMENT	2.72 AC				
NET SITE AREA	44.53 AC				
AREA IN APPROX 59X120 SINGLE FAMILY RESIDENTIAL LOTS	2.91 AC				
AREA IN APPROX 30X140 SINGLE FAMILY RESIDENTIAL LOTS	10.56 AC				
AREA IN APPROX 35X140 REAR-LOADED SINGLE FAMILY RESIDENTIAL LOTS	5.83 AC				
AREA IN REAR-LOADED TOWNHOUSE LOTS	18.50 AC				
TOTAL AREA IN OPEN SPACE	41.50%				
AREA IN ACTIVE RECREATIONAL OPEN SPACE	9.60%				
AREA IN COMMON AREA OPEN SPACE	11.23%				
AREA IN PRIVATE ALLEY EASEMENTS	13.52%				
TOTAL UNITS PROPOSED	245				
59' SINGLE FAMILY (4 BEDROOM)	17				
61'	6				
100'	100				
47'	47				
75'	75				

OPEN SPACE AREA TABLE LOT AREA TABLE

LOT NO.	TOTAL OPEN SPACE AREA (SF)		ACTIVE OPEN SPACE AREA (SF)		PASSIVE OPEN SPACE AREA (SF)		COMMON OPEN SPACE AREA (SF)	
	(AC)	(SF)	(AC)	(SF)	(AC)	(SF)	(AC)	(SF)
1000	15.43	15,535	4.28	4,418	5.00	5,117	11.15	11,440
1001		7,617		7,617		0		7,617
1002		24,063		11,291		0		11,291
1003		5,824		0		5,824		5,824
1004		138,243		34,908		27,162		76,773
1005		3,791		0		3,791		3,791
1006		5,875		0		5,875		5,875
1007		6,502		0		6,502		6,502
1008		11,507		0		11,507		11,507
1009		291,942		84,301		124,119		73,522
1010		619		0		619		619
1011		1,049		0		1,049		1,049
1012		1,123		0		1,123		1,123
1013		600		0		600		600
1014		1,823		0		1,823		1,823
1015		18,191		0		18,191		18,191
1016		15,265		0		15,265		15,265
1017		46,168		24,299		0		21,869
1018		3,466		0		0		3,466
1019		9,668		0		0		9,668
TOTALS (SF)	672,270	186,425	218,003	485,845				
TOTALS (AC)	15.43	4.28	5.00	11.15				



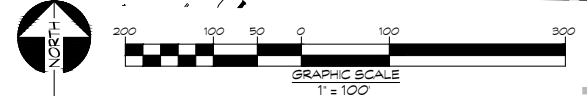
OPEN SPACE

LOT #	(AC)	(SF)
1000	15.43	15,535
1001		7,617
1002		24,063
1003		5,824
1004		138,243
1005		3,791
1006		5,875
1007		6,502
1008		11,507
1009		291,942
1010		619
1011		1,049
1012		1,123
1013		600
1014		1,823
1015		18,191
1016		15,265
1017		46,168
1018		3,466
1019		9,668
TOTALS (AC)	15.43	4.28
TOTALS (SF)		15,535

GENERAL NOTES:

- THE CONCEPTUAL PLAN WAS PREPARED BY CHARLES R. WALKER, III, PLA AND ENTITLEMENT PRESERVATION GROUP.
- THIS PLAN IS CONCEPTUAL IN NATURE AND SUBJECT TO CHANGE AS DESIGN PROGRESSES.
- BOUNDARY INFORMATION IS TAKEN FROM A SURVEY BY THIS OFFICE.
- SITE TOPOGRAPHIC INFORMATION IS TAKEN FROM A COMBINATION OF DATA FROM A SURVEY PERFORMED BY THIS OFFICE AND WAKE COUNTY GIS INFORMATION.
- PLANE-METRIC AND TOPOGRAPHIC INFORMATION FOR AREAS OUTSIDE OF THIS SITE ARE TAKEN FROM WAKE COUNTY GIS INFORMATION.
- ALL MATERIALS AND CONSTRUCTION SHALL BE IN STRICT ACCORDANCE WITH THE TOWN OF KNIGHTDALE, NCDOT, AND NCEM STANDARDS AND SPECIFICATIONS.
- THERE ARE NO FEMA DESIGNATED FLOOD ZONES LOCATED ON THIS PROPERTY.
- EXISTING UTILITIES SHOWN ARE APPROXIMATE. CONTRACTOR RESPONSIBLE FOR LOCATION OF ALL EXISTING ABOVE AND BELOW GROUND UTILITY FIELD LOCATION PRIOR TO ANY CONSTRUCTION.
- NO NEW BUFFER IMPACTS SHALL OCCUR PRIOR TO APPROVAL FROM NCEM.
- WETLAND AND STREAM BUFFER LOCATIONS ARE SUBJECT TO FIELD VERIFICATION.
- STORMWATER CONTROL MEASURES ARE CONCEPTUAL AND ARE SUBJECT TO FUTURE SIZING CALCULATIONS AND DESIGN.

NOT FOR CONSTRUCTION FOR REVIEW ONLY



TERRAVITA

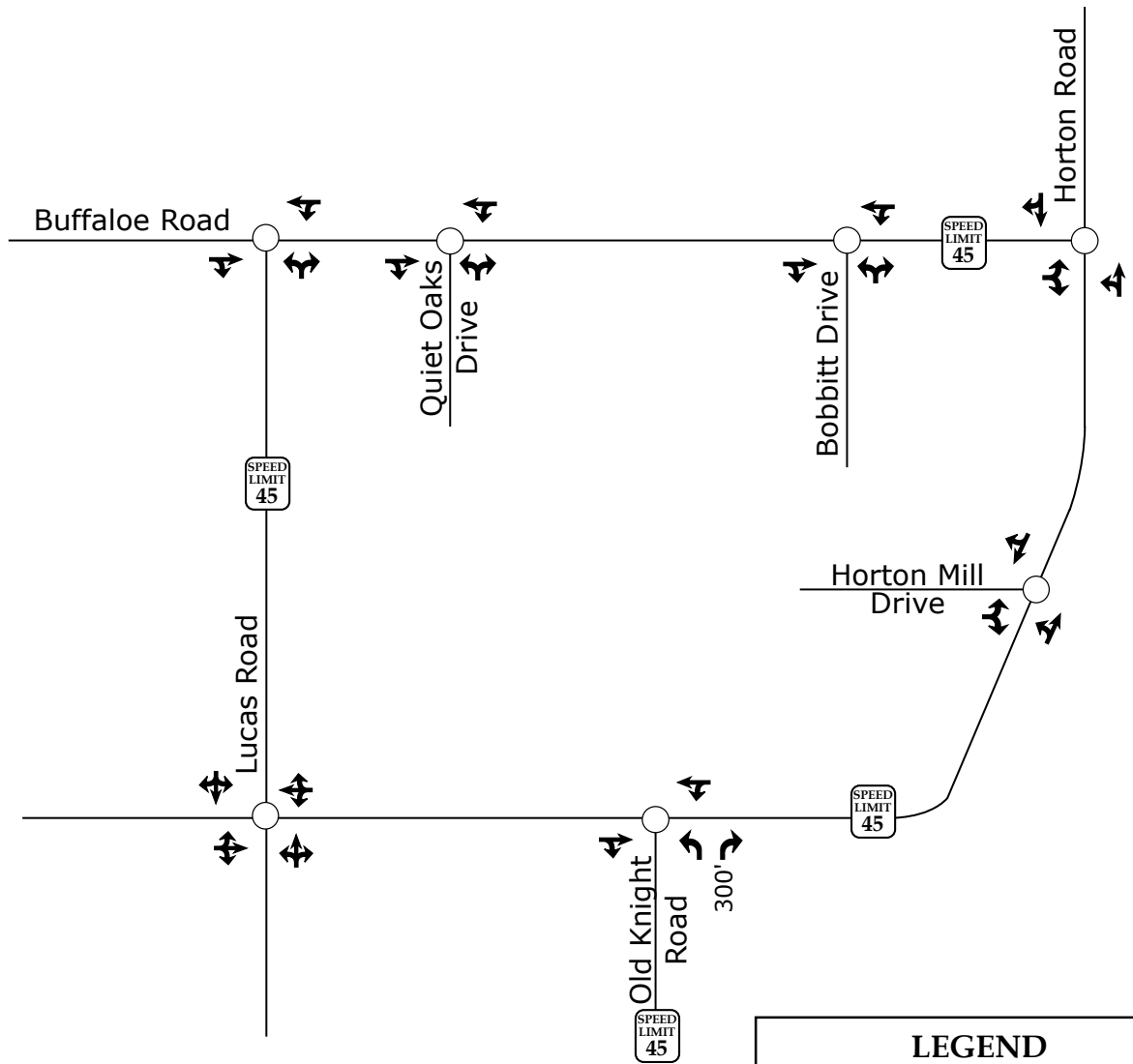
SCALE	1"=100'
DATE	JULY 21, 2023
PROJECT NUMBER	2016-012.004
CLIENT	SITE INVESTMENTS, LLC
PLAN TYPE	SKETCH PLAN REVIEW

OVERALL PRELIMINARY SITE LAYOUT PLAN

TOWN COMMENTS	12/14/2023
TOWN COMMENTS	3/18/2024
TOWN COMMENTS	5/17/2024
RELEASED FOR CONSTRUCTION DATE: (SEE COVER)	NO DYES

PRIEST, CRAVEN & ASSOCIATES, INC.
 LAND USE CONSULTANTS / PLANNERS / LANDSCAPE DESIGNERS / SURVEYORS / ENGINEERS
 3803 - B Computer Drive, Suite 104 Raleigh, N.C. 27609. Phone 919 / 781-0300, Fax 919 / 782-1288. Email PCA@PriestCraven.com / Firm # C-0488

SHEET #
C2.00



LEGEND

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



Terravita
Knightdale, NC

2024 Existing
Lane Configurations

Scale: Not to Scale | Figure 3

2. 2024 EXISTING PEAK HOUR CONDITIONS

2.1. 2024 Existing Peak Hour Traffic Volumes

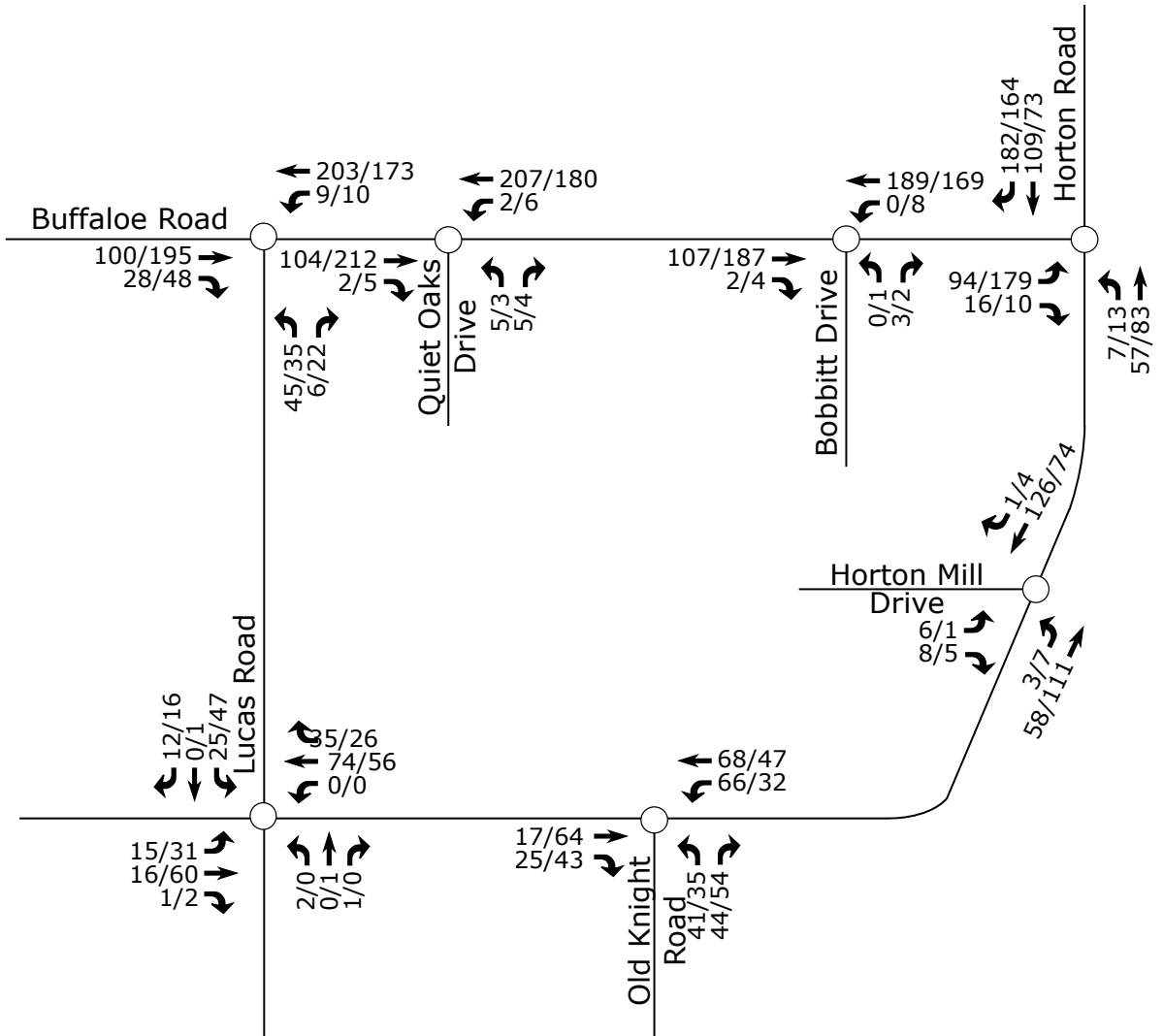
Existing peak hour traffic volumes were determined based on traffic counts conducted at the study intersections listed below, in October of 2024 during a typical weekday AM (7:00 AM – 9:00 AM) and PM (4:00 PM – 6:00 PM) peak periods:

- Buffalo Road and Lucas Road
- Buffalo Road and Quiet Oaks Drive
- Buffalo Road and Bobbitt Drive
- Buffalo Road and Horton Road
- Horton Road and Horton Mill Drive
- Horton Road and Old Knight Road
- Horton Road and Lucas Road

Weekday AM and PM traffic volumes were balanced between study intersections, where appropriate. It should be noted that traffic volumes at the intersection of Buffalo Road and Quiet Oaks Drive were not recorded. Google Earth and the Town parcel map shows that 16 single family homes are located along Quiet Oaks Drive. The Institute for Transportation Engineers (ITE) Trip Generation Manual, 11th edition, was used to generate traffic for those 16 single-family homes. Through volumes were then balanced along Buffalo Road with the Lucas Road intersection. Refer to Figure 4 for 2024 existing weekday AM and PM peak hour traffic volumes. A copy of the count data is located in Appendix B of this report.

2.2. Analysis of Existing Peak Hour Traffic Conditions

The 2024 existing weekday AM and PM peak hour traffic volumes were analyzed to determine the current levels of service at the study intersections under existing roadway conditions. The results of the analysis are presented in Section 7 of this report.



LEGEND

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

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

	Terravita Knightdale, NC	2024 Existing Peak Hour Traffic	
		Scale: Not to Scale	Figure 4

3. 2030 NO-BUILD PEAK HOUR CONDITIONS

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

3.1. Ambient Traffic Growth

Through coordination with the Town, it was determined that an annual growth rate of 3% would be used to generate 2030 projected weekday AM and PM peak hour traffic volumes. Per the Town UDO, a 1% growth rate was applied to the projected traffic for every year after 2030 in the future analysis. Refer to Figures 5a and 5b for 2030 and 2039 projected peak hour traffic, respectively.

3.2. Adjacent Development Traffic

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

- Haywood Glen
- Weldon Village
- Brio Development

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

Table 2: Adjacent Development Information

Development Name	Location	Build-Out Year	Land Use / Intensity	TIA Performed
Haywood Glen	Southeast quadrant of Horton Road and Old Knight Road	2025	107 single-family homes and 10,000 s.f. of commercial	N/A <i>Trip generation letter applied to roadway network</i>
Weldon Village	South of proposed site, internal connectivity proposed	2029	Mixed-use consisting of residential, office, and retail	October 2022 By RKA
Brio Development	South of Buffaloe Road, west of Lucas Road	2027	Mixed-use residential and retail	May 2021 By RKA

The Haywood Glen development is expected to be constructed by the end of 2025. After the TIA was approved, a trip generation letter was done for the proposed site, adding on commercial square footage. The trip generation from the letter was distributed based on distributions for the proposed site and engineering judgement. Weldon Village is expected to be constructed the same year as the proposed development and are proposed to have interconnectivity. Roadway improvements at the intersection of Horton Road and Old Knight Road are considered under all future analysis conditions of the proposed site. The Brio development along Buffaloe Road, west of the proposed site, is expected to be constructed by the end of 2027. Site trips expected to utilize the study area were included in all future analysis.

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

3.3. Future Roadway Improvements

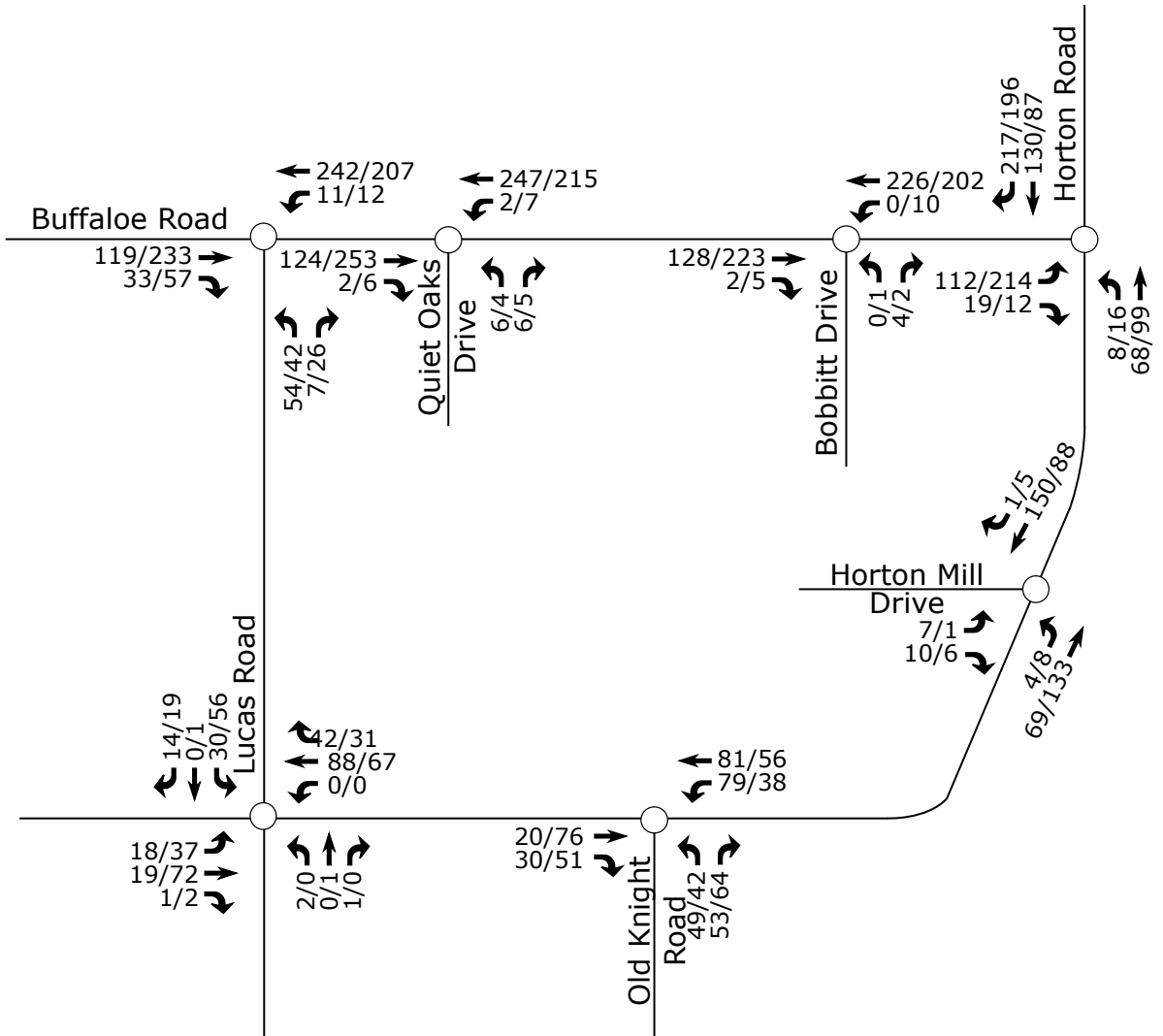
Based on coordination with the Town, it was determined there were no future roadway improvements to consider with this study.

3.4. No-Build Peak Hour Traffic Volumes

The 2030 no-build traffic volumes were determined by projecting the 2024 existing peak hour traffic to the year 2030, and adding the adjacent development trips. For the future analysis, a 1% growth rate was applied beyond the year 2030 to 2039. Refer to Figures 7a and 7b for illustrations of the 2030 and 2039 no-build peak hour traffic volumes at the study intersections.

3.5. Analysis of No-Build Peak Hour Traffic Conditions

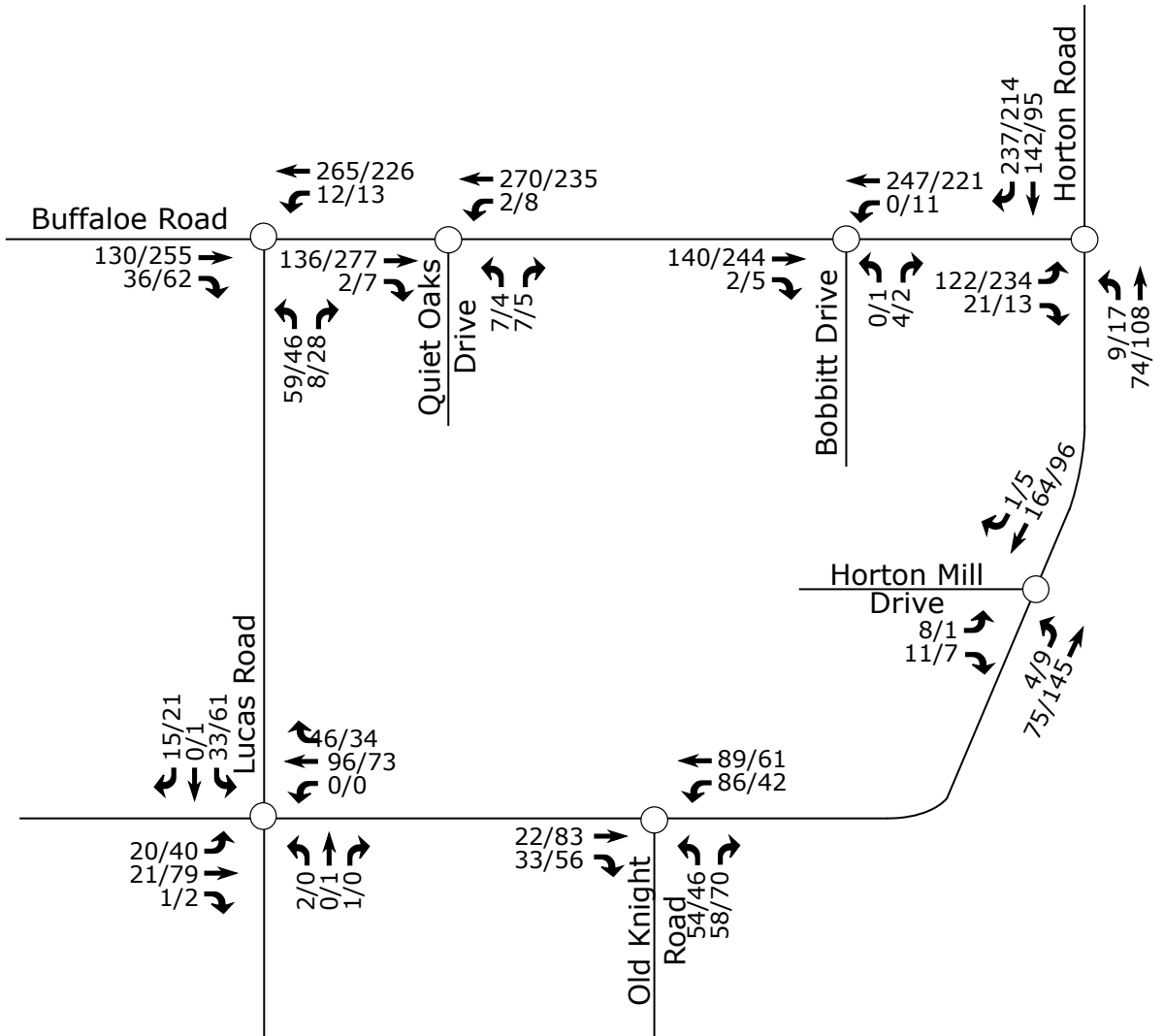
The 2030 no-build AM and PM peak hour traffic volumes at the study intersections were analyzed with future geometric roadway conditions and traffic control. The analysis results are presented in Section 7 of this report.



LEGEND

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

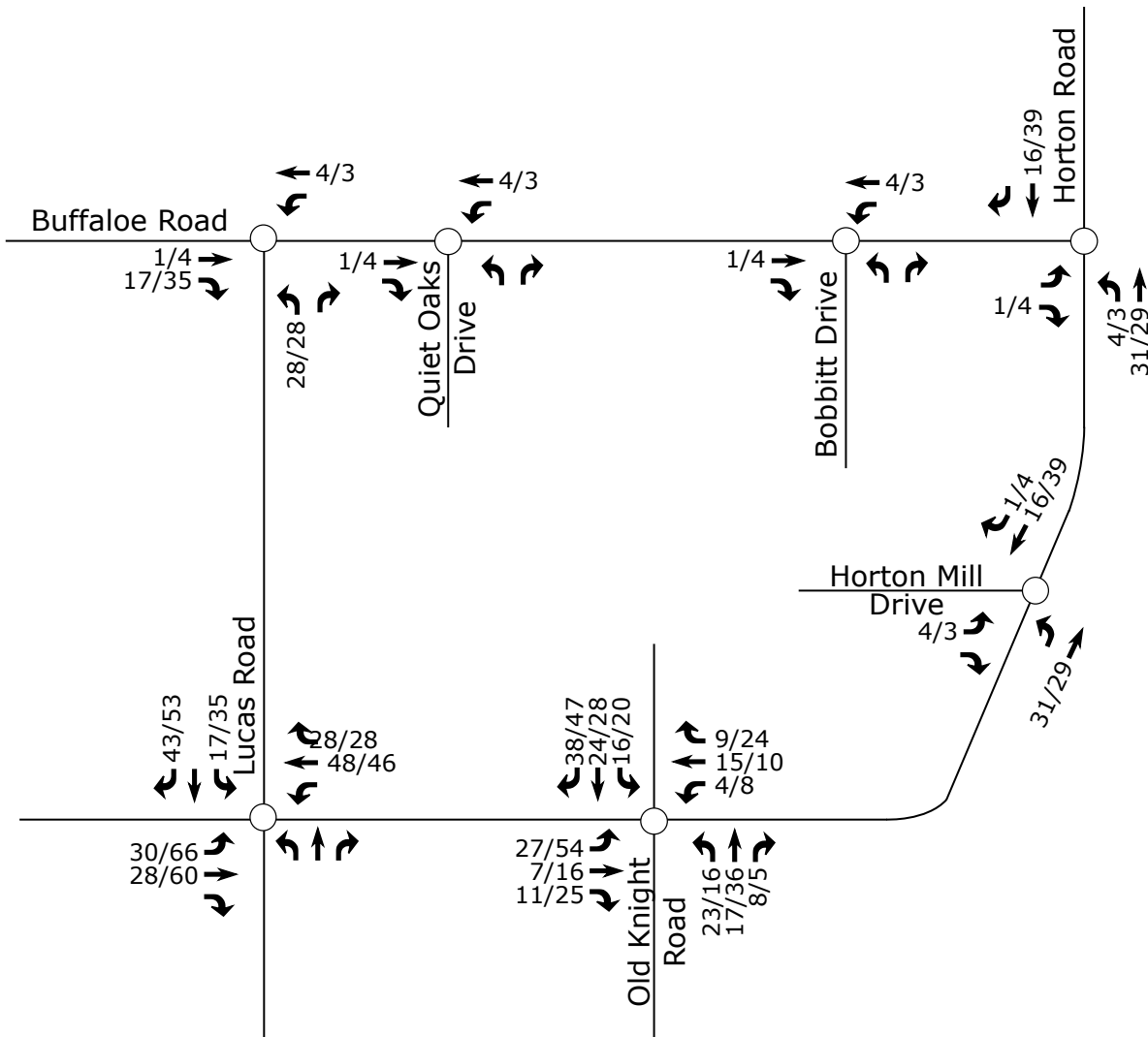
	Terravita Knightdale, NC	2030 Projected Peak Hour Traffic	
		Scale: Not to Scale	Figure 5a



LEGEND

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

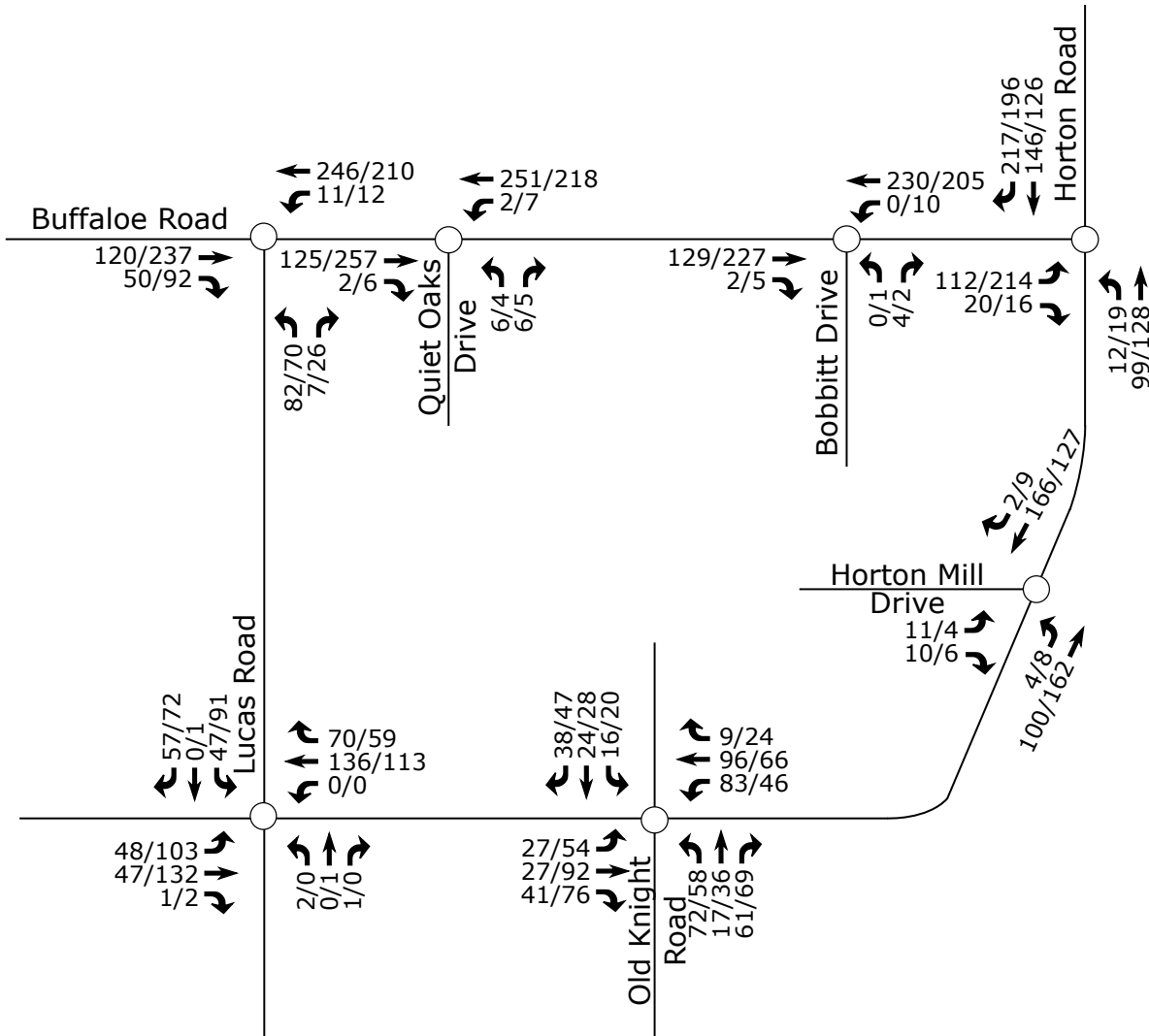
	Terravita Knightdale, NC	2039 Projected Peak Hour Traffic	
		Scale: Not to Scale	Figure 5b



LEGEND

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

	Terravita Knightdale, NC	Peak Hour Adjacent Development Trips	
		Scale: Not to Scale	Figure 6

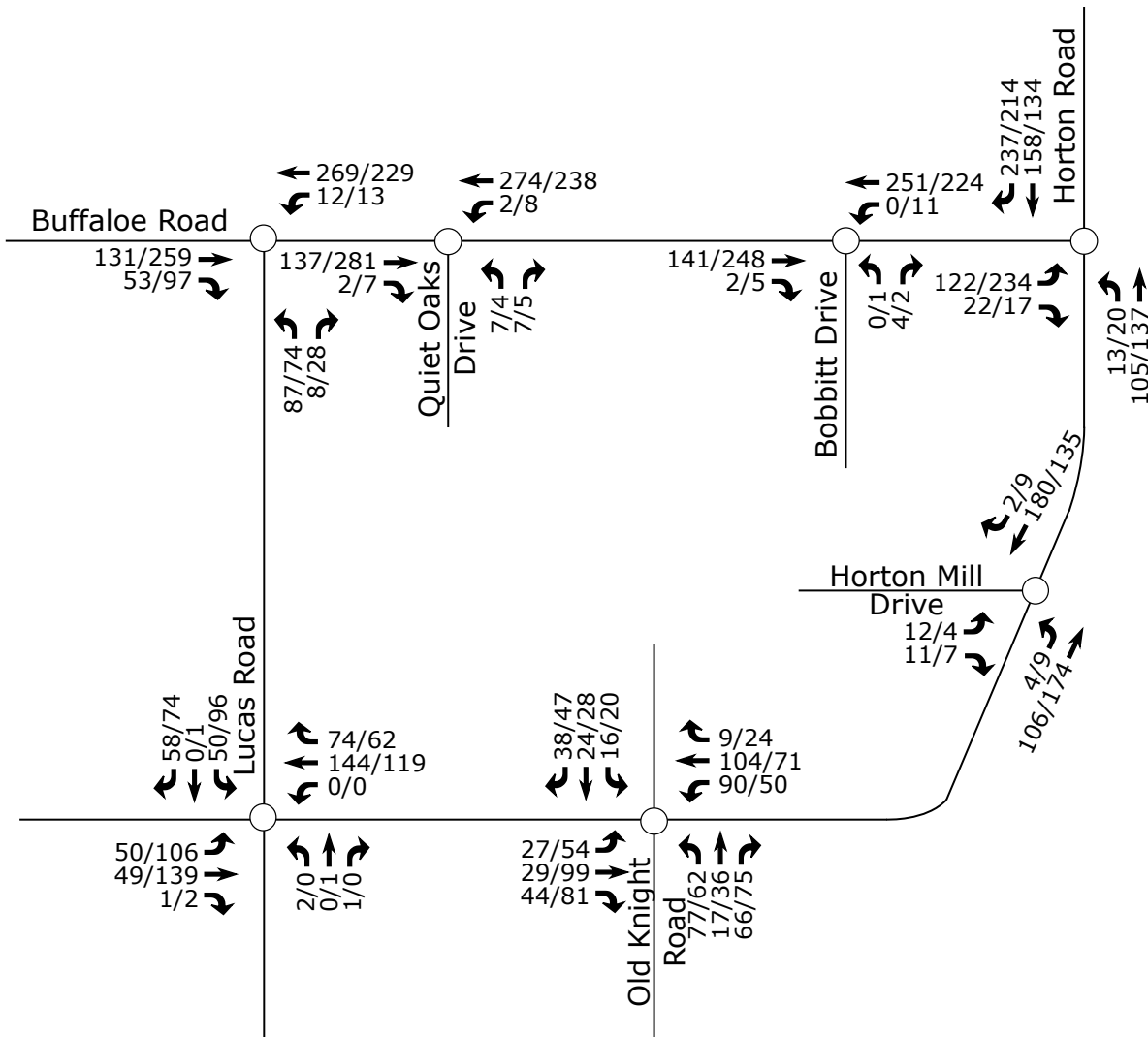


LEGEND

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

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

	Terravita Knightdale, NC	2030 No-Build Peak Hour Traffic	
		Scale: Not to Scale	Figure 7a



LEGEND

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

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

	Terravita Knightdale, NC	2039 No-Build Peak Hour Traffic	
		Scale: Not to Scale	Figure 7b

4. SITE TRIP GENERATION AND DISTRIBUTION

4.1. Trip Generation

Average weekday daily, AM peak hour, and PM peak hour trips for the proposed development were estimated using methodology contained within the ITE *Trip Generation Manual*, 11.1 Edition. Table 3 provides a summary of the trip generation potential for the site.

Table 3: Trip Generation Summary

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	Weekday AM Peak Hour Trips (vph)		Weekday PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Single Family Lots (210)	170 DU	1,644	30	91	103	61
Townhomes (215)	75 DU	522	8	25	24	17
Total Trips		2,166	38	116	127	78

It is estimated that the proposed development will generate approximately 2,166 total site trips on the roadway network during a typical 24-hour weekday period. Of the daily traffic volume, it is anticipated that 154 trips (38 entering and 116 exiting) will occur during the weekday AM peak hour and 205 trips (127 entering and 78 exiting) will occur during the weekday PM peak hour.

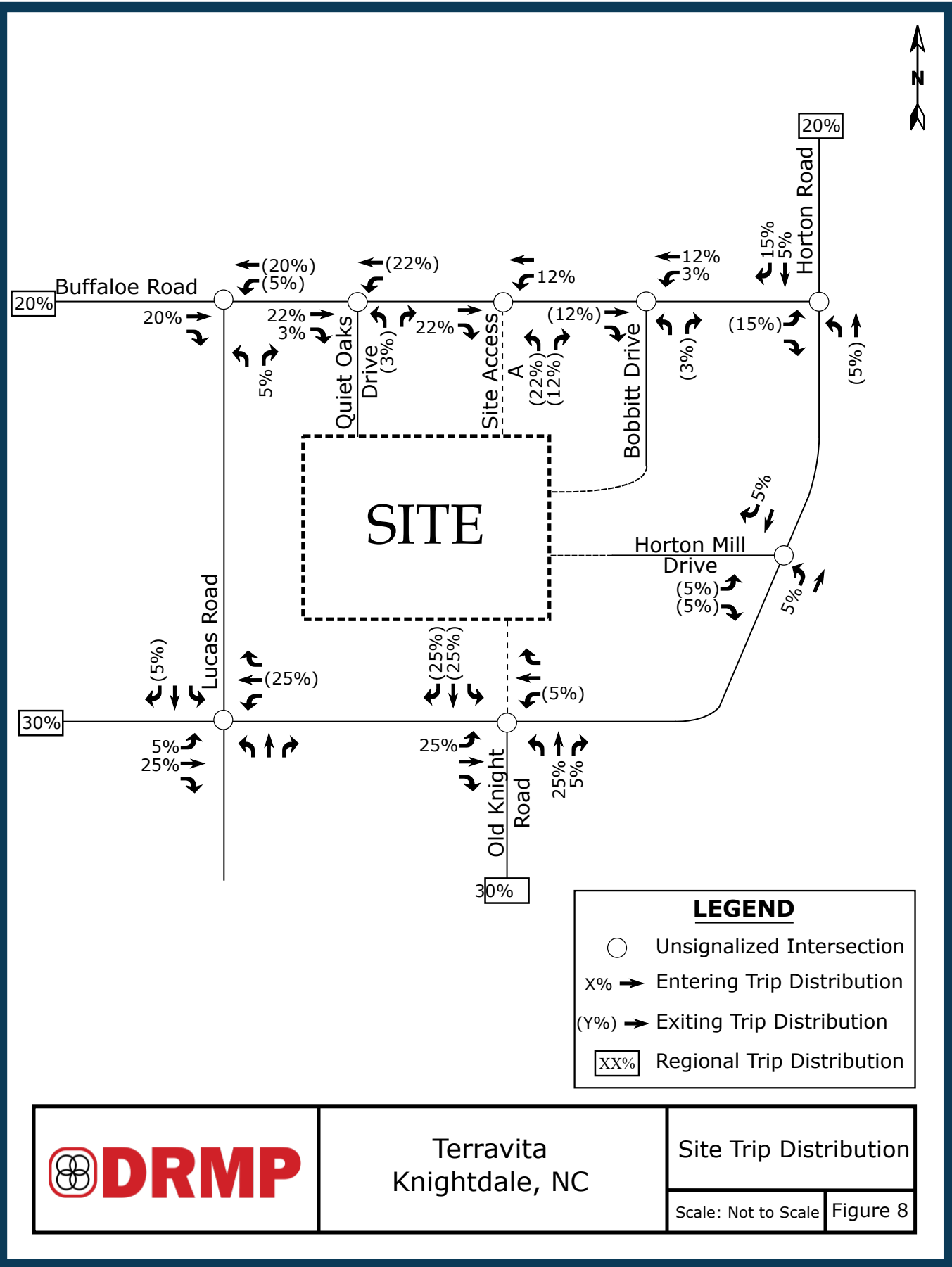
4.2. Site Trip Distribution and Assignment

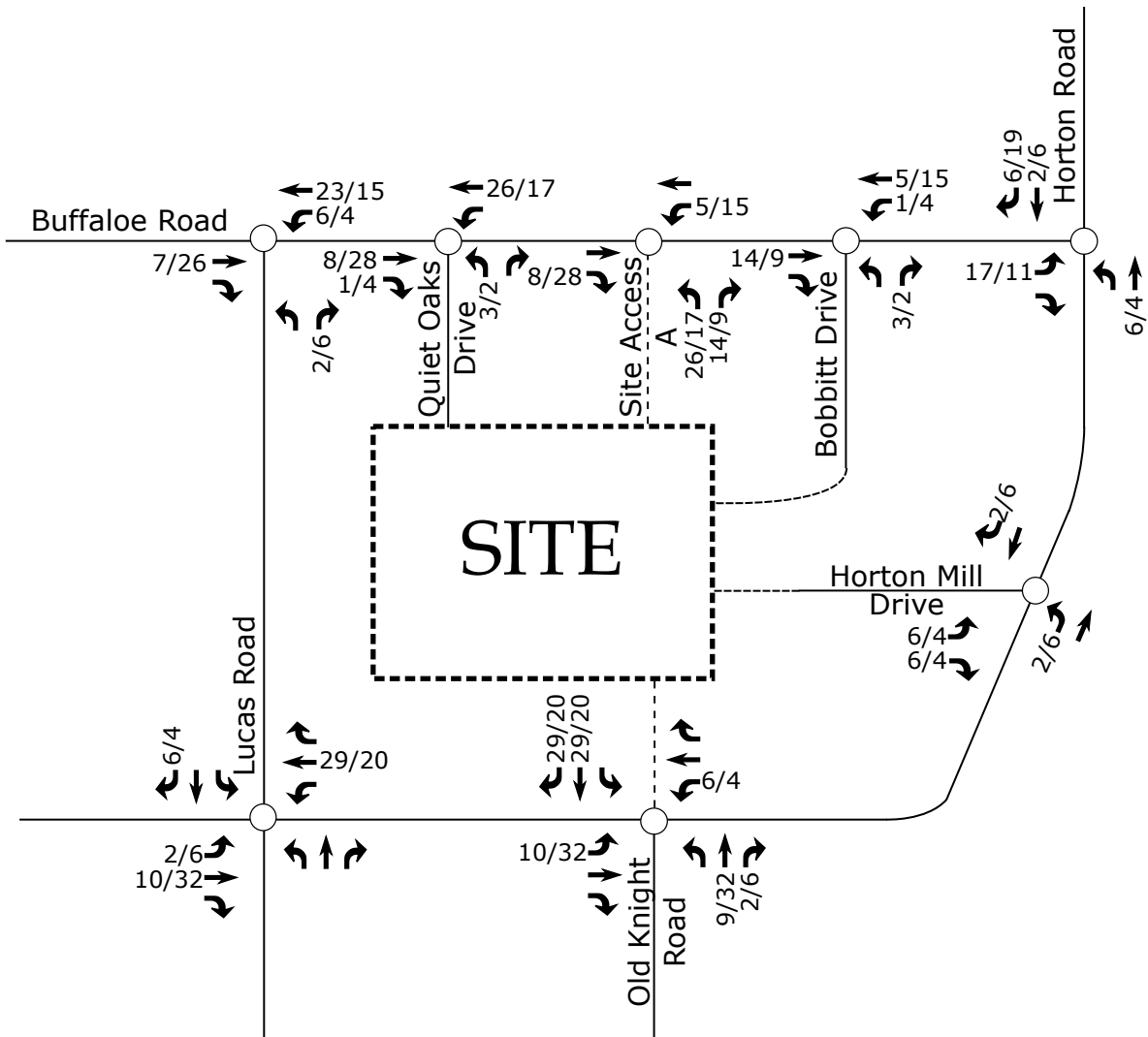
Trip distribution percentages used in assigning site traffic for this development were estimated based on a combination of existing traffic patterns, population centers adjacent to the study area, and engineering judgment.

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

- 30% to/from the south via Old Knight Road
- 30% to/from the west via Horton Road
- 20% to/from the west via Buffaloe Road
- 20% to/from the north via Horton Road

The site trip distribution is shown in Figure 8 and the site trip assignment is shown in Figure 9. Due to connectivity to an adjacent development, some trips are expected to be diverted to use the proposed Site Access. These diverted site trips are shown in Figure 10. The total site trips were determined by adding the site trip assignment and diverted trip assignment together. The total peak hour site trips are shown in Figure 11. It should be noted that the site trip distribution was approved by the Town during scoping.

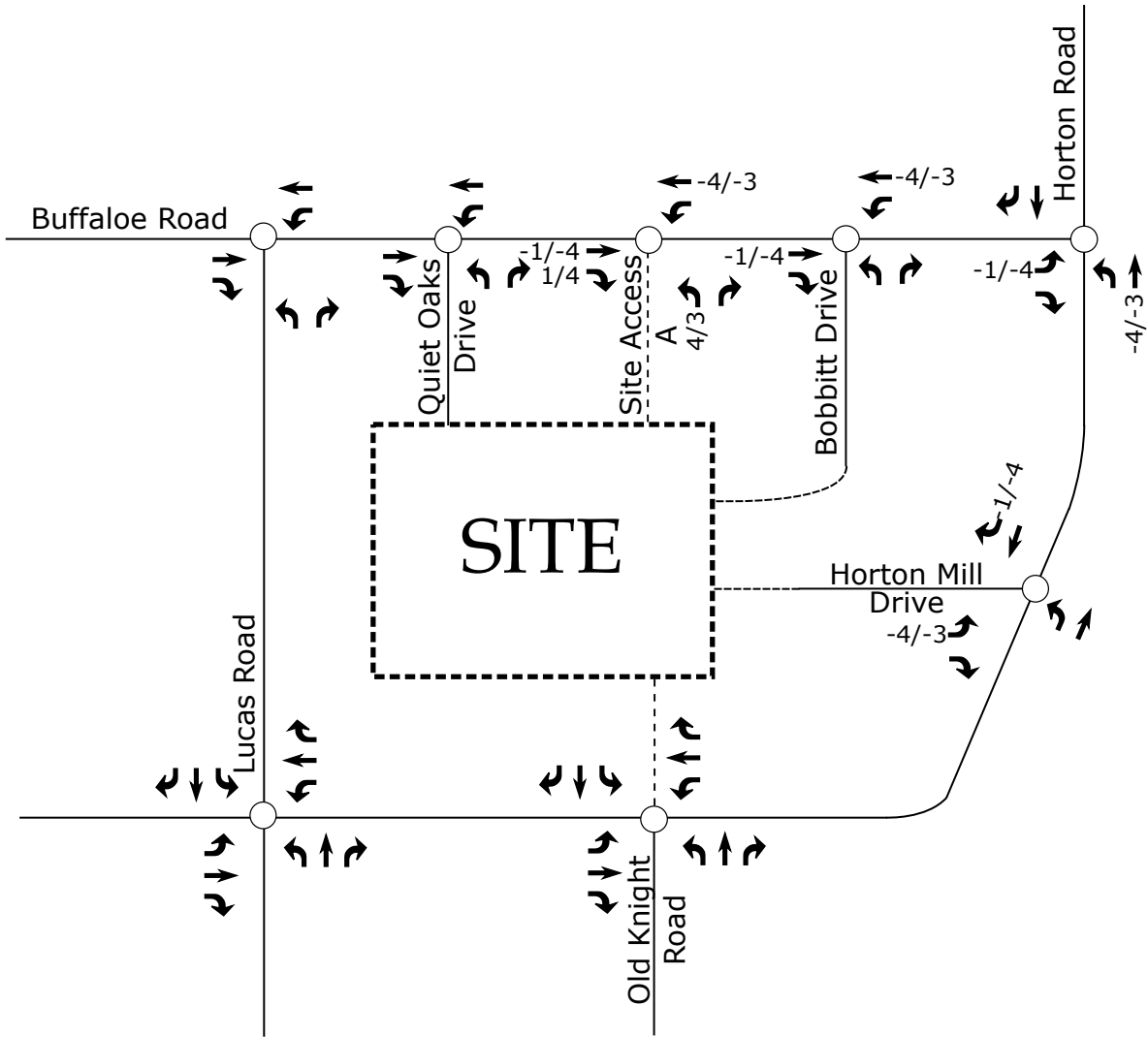




LEGEND

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

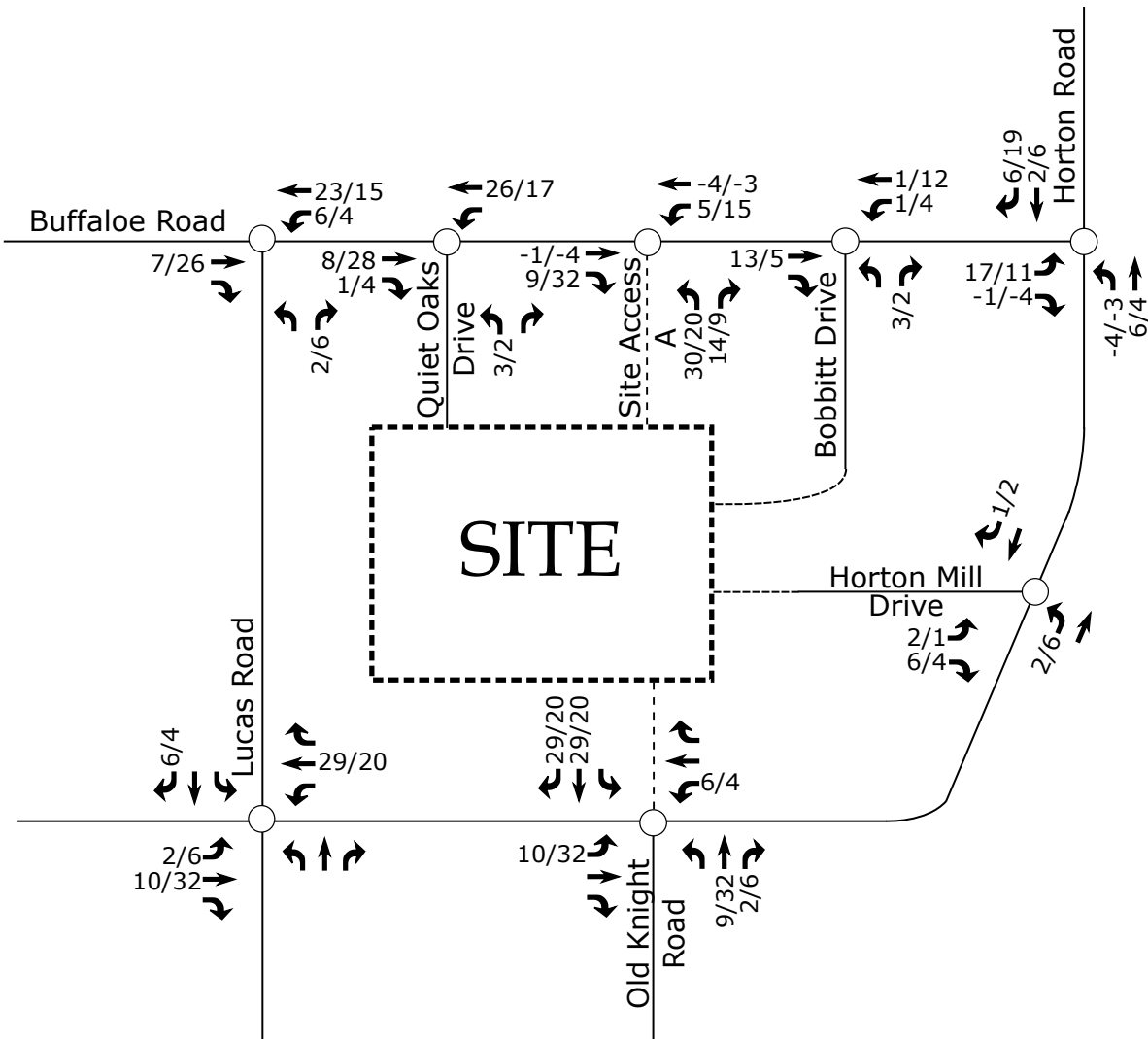
	Terravita Knightdale, NC	Site Trip Assignment	
		Scale: Not to Scale	Figure 9



LEGEND

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

	Terravita Knightdale, NC	Diverted Site Trip Assignment	
		Scale: Not to Scale	Figure 10



LEGEND

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

	Terravita Knightdale, NC	Total Site Trip Assignment	
		Scale: Not to Scale	Figure 11

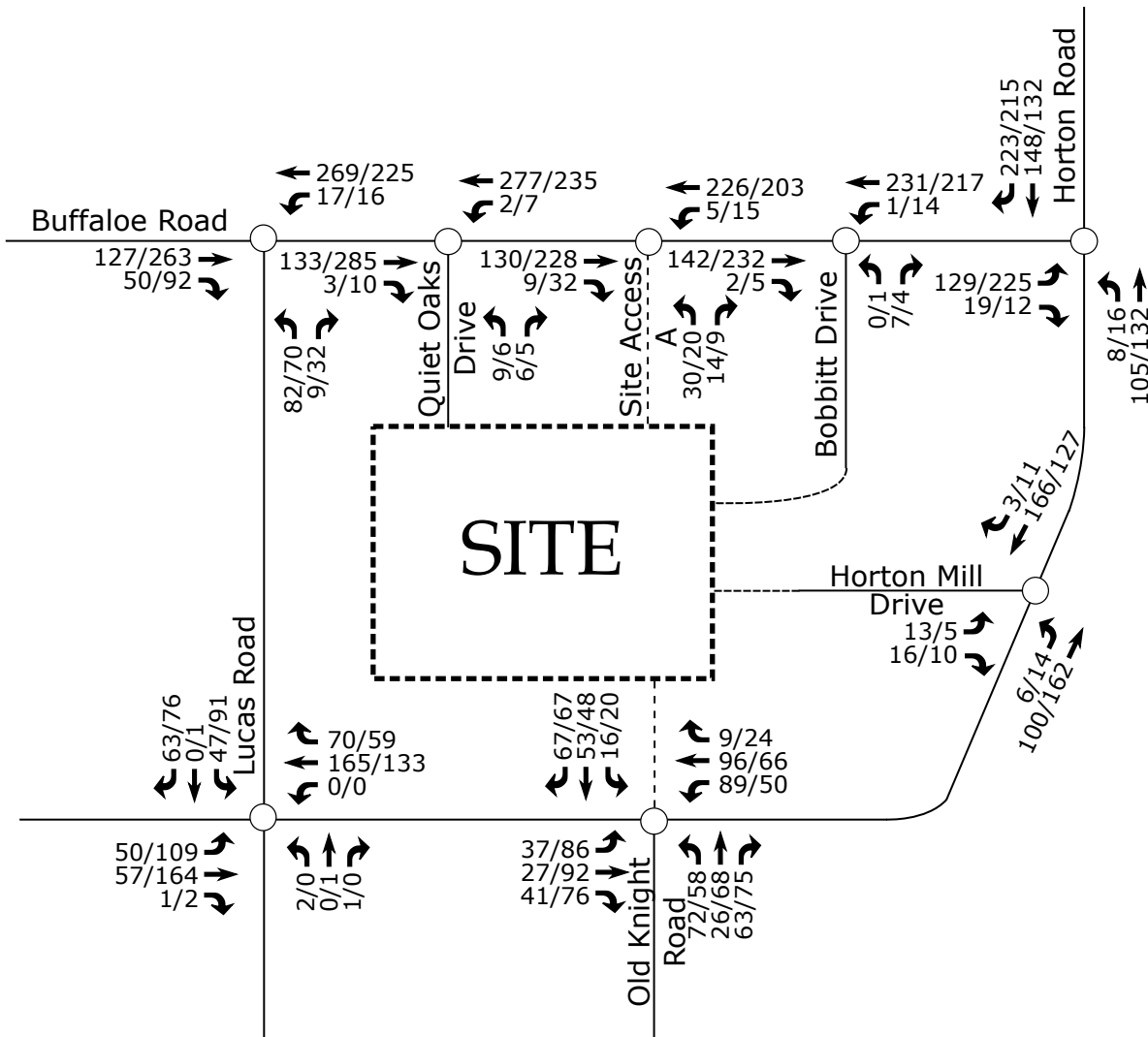
5. BUILD AND FUTURE TRAFFIC CONDITIONS

5.1. Build and Future Peak Hour Traffic Volumes

To estimate traffic conditions with the site fully built-out, the total site trips were added to the 2030 and 2039 no-build traffic volumes to determine the 2030 build and 2039 future traffic volumes. Refer to Figures 12a and 12b for an illustration of the 2030 build and 2039 future peak hour traffic volumes with the proposed site fully developed.

5.2. Analysis of Build and Future Peak Hour Traffic Conditions

Study intersections were analyzed with the 2030 build and 2039 future traffic volumes using the same methodology previously discussed for existing and no-build traffic conditions. Intersections were analyzed with improvements to accommodate future traffic volumes, if necessary. The results of the capacity analysis for each intersection are presented in Section 7 of this report.

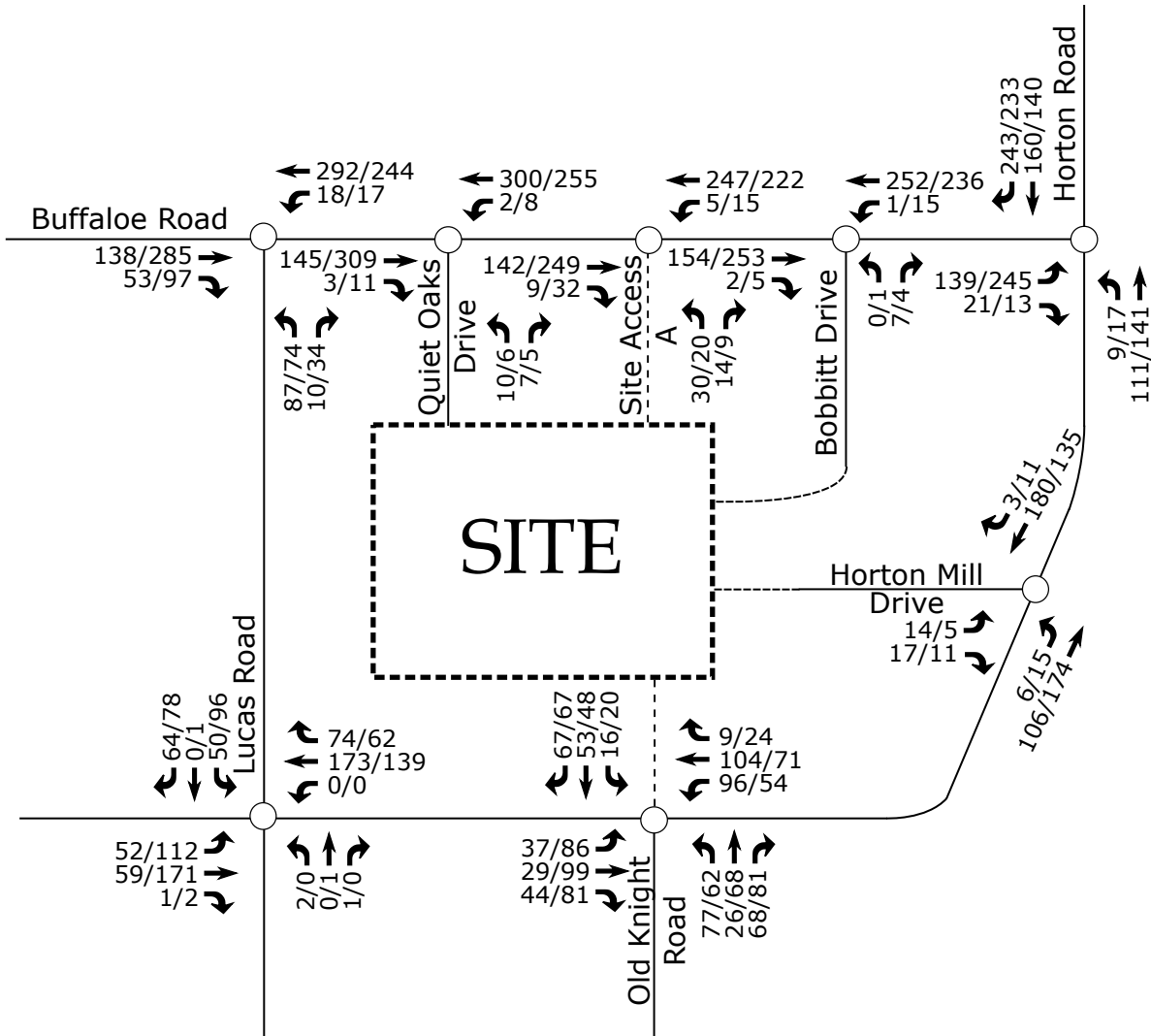


LEGEND

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

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

	Terravita Knightdale, NC	2030 Build Peak Hour Traffic	
		Scale: Not to Scale	Figure 12a



LEGEND

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

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

	Terravita Knightdale, NC	2039 Build Peak Hour Traffic	
		Scale: Not to Scale	Figure 12b

6. TRAFFIC ANALYSIS PROCEDURE

Study intersections were analyzed using the methodology outlined in the *Highway Capacity Manual* (HCM), 6th Edition published by the Transportation Research Board. Capacity and level of service are the design criteria for this traffic study. A computer software package, Synchro (Version 11.1), was used to complete the analyses for the study area intersections. Please note that the unsignalized capacity analysis does not provide an overall level of service for an intersection; only delay for an approach with a conflicting movement.

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

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

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

6.1. Adjustments to Analysis Guidelines

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

7. CAPACITY ANALYSIS

The following study intersections were analyzed under 2024 existing, 2030 no-build, 2030 build, and 2039 future traffic conditions:

- Buffalo Road and Lucas Road
- Buffalo Road and Quiet Oaks Drive
- Buffalo Road and Bobbitt Drive
- Buffalo Road and Horton Road
- Horton Road and Horton Mill Drive
- Horton Road and Old Knight Road
- Horton Road and Lucas Road

The proposed site access was analyzed under 2030 build and 2039 future traffic conditions. Refer to Tables 5-12 for a summary of capacity analysis results. Refer to Appendices D-L for the Synchro capacity analysis reports and SimTraffic queueing reports.

7.1. Buffalo Road and Lucas Road

Refer to the table below for a summary of the capacity analysis of the subject intersection during the analysis scenarios.

Table 5: Analysis Summary of Buffalo Road and Lucas Road

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2024 Existing	EB	1 TH-RT	--		--	
	WB	1 LT-TH	A (8) ¹	N/A	A (8) ¹	N/A
	NB	1 LT-RT	B (11) ²		B (11) ²	
2030 No-Build	EB	1 TH-RT	--		--	
	WB	1 LT-TH	A (8) ¹	N/A	A (8) ¹	N/A
	NB	1 LT-RT	B (13) ²		B (14) ²	
2030 Build	EB	1 TH-RT	--		--	
	WB	1 LT-TH	A (8) ¹	N/A	A (8) ¹	N/A
	NB	1 LT-RT	B (13) ²		B (14) ²	
2039 Future	EB	1 TH-RT	--		--	
	WB	1 LT-TH	A (8) ¹	N/A	A (8) ¹	N/A
	NB	1 LT-RT	B (14) ²		C (15) ²	

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

2. Level of service for minor-street approach.

Capacity analysis of all traffic conditions indicates the major street left-turn movement is expected to operate at LOS A during the AM and PM peak hours. Additionally, the minor street approach is expected to operate at LOS C or better during the AM and PM peak hours. No significant queuing is expected at the intersection.

No improvements are recommended by the developer.

7.2. Buffalo Road and Quiet Oaks Drive

Refer to the table below for a summary of the capacity analysis of the subject intersection during the analysis scenarios.

Table 6: Analysis Summary of Buffalo Road and Quiet Oaks Drive

ANALYSIS SCENARIO	A P P R O A C H	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2024 Existing	EB WB NB	1 TH-RT 1 LT-TH 1 LT-RT	-- A (8) ¹ A (10) ²	N/A	-- A (8) ¹ B (11) ²	N/A
2030 No-Build	EB WB NB	1 TH-RT 1 LT-TH 1 LT-RT	-- A (8) ¹ B (10) ²	N/A	-- A (8) ¹ B (11) ²	N/A
2030 Build	EB WB NB	1 TH-RT 1 LT-TH 1 LT-RT	-- A (8) ¹ B (11) ²	N/A	-- A (8) ¹ B (12) ²	N/A
2039 Future	EB WB NB	1 TH-RT 1 LT-TH 1 LT-RT	-- A (8) ¹ B (11) ²	N/A	-- A (8) ¹ B (12) ²	N/A

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

Capacity analysis of all traffic conditions indicates the major street left-turn movement is expected to operate at LOS A during the weekday AM and PM peak hours. Additionally, the minor street approach is expected to operate at an overall LOS B or better during the AM and PM peak hours. No significant queuing is expected at the intersection.

No improvements are recommended by the developer.

7.3. Buffalo Road and Bobbitt Drive

Refer to the table below for a summary of the capacity analysis of the subject intersection during the analysis scenarios.

Table 7: Analysis Summary of Buffalo Road and Bobbitt Drive

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2024 Existing	EB	1 TH-RT	--	N/A	--	N/A
	WB	1 LT-TH	A (8) ¹		A (8) ¹	
	NB	1 LT-RT	A (10) ²		B (10) ²	
2030 No-Build	EB	1 TH-RT	--	N/A	--	N/A
	WB	1 LT-TH	A (8) ¹		A (8) ¹	
	NB	1 LT-RT	B (10) ²		B (11) ²	
2030 Build	EB	1 TH-RT	--	N/A	--	N/A
	WB	1 LT-TH	A (8) ¹		A (8) ¹	
	NB	1 LT-RT	A (10) ²		B (11) ²	
2039 Future	EB	1 TH-RT	--	N/A	--	N/A
	WB	1 LT-TH	A (8) ¹		A (8) ¹	
	NB	1 LT-RT	B (10) ²		B (11) ²	

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

Capacity analysis of all traffic conditions indicates the major street left-turn movement is expected to operate at LOS A during the weekday AM and PM peak hours. Additionally, the minor street approach is expected to operate at an overall LOS B or better during the AM and PM peak hours. No significant queuing is expected at the intersection.

No improvements are recommended by the developer.

7.4. Buffalo Road and Horton Road

Refer to the table below for a summary of the capacity analysis of the subject intersection during the analysis scenarios.

Table 8: Analysis Summary of Buffalo Road and Horton Road

ANALYSIS SCENARIO	A P P R O A C H	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2024 Existing	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	B (11) ² A (8) ¹ --	N/A	B (12) ² A (8) ¹ --	N/A
2030 No-Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	B (13) ² A (8) ¹ --	N/A	C (16) ² A (8) ¹ --	N/A
2030 Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	B (13) ² A (8) ¹ --	N/A	C (17) ² A (8) ¹ --	N/A
2039 Future	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	B (14) ² A (8) ¹ --	N/A	C (19) ² A (8) ¹ --	N/A

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

2. Level of service for minor-street approach.

Capacity analysis of all traffic conditions indicates the major street left-turn movement is expected to operate at LOS A during the weekday AM and PM peak hours. Additionally, the minor street approach is expected to operate at an overall LOS C or better during the AM and PM peak hours. No significant queuing is expected at the intersection.

No improvements are recommended by the developer.

7.5. Horton Road and Horton Mill Drive

Refer to the table below for a summary of the capacity analysis of the subject intersection during the analysis scenarios.

Table 9: Analysis Summary of Horton Road and Horton Mill Drive

ANALYSIS SCENARIO	A P P R O A C H	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2024 Existing	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	A (9) ² A (8) ¹ --	N/A	A (9) ² A (7) ¹ --	N/A
2030 No-Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	A (10) ² A (8) ¹ --	N/A	A (10) ² A (8) ¹ --	N/A
2030 Build	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	A (10) ² A (8) ¹ --	N/A	A (10) ² A (8) ¹ --	N/A
2039 Future	EB NB SB	1 LT-RT 1 LT-TH 1 TH-RT	B (10) ² A (8) ¹ --	N/A	A (10) ² A (8) ¹ --	N/A

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

2. Level of service for minor-street approach.

Capacity analysis of all traffic conditions indicates the major street left-turn movement is expected to operate at LOS A during the weekday AM and PM peak hours. Additionally, the minor street approach is expected to operate at an overall LOS B or better during the AM and PM peak hours. No significant queuing is expected at the intersection.

No improvements are recommended by the developer.

7.6. Horton Road and Old Knight Road

Refer to the table below for a summary of the capacity analysis of the subject intersection during the analysis scenarios.

Table 10: Analysis Summary of Horton Road and Old Knight Road

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2024 Existing	EB WB NB	1 TH-RT 1 LT-TH 1 LT, 1 RT	-- A (7) ¹ A (10) ²	N/A	-- A (8) ¹ A (9) ²	N/A
2030 No-Build	EB WB NB SB	<u>1 LT</u> , 1 TH-RT 1 LT-TH- <u>RT</u> 1 LT- <u>TH</u> , 1 RT <u>1 LT-TH-RT</u>	A (8) ¹ A (8) ¹ B (13) ² B (12) ²	N/A	A (8) ¹ A (8) ¹ B (13) ² B (13) ²	N/A
2030 Build	EB WB NB SB	<u>1 LT</u> , 1 TH-RT 1 LT-TH- <u>RT</u> 1 LT- <u>TH</u> , 1 RT <u>1 LT-TH-RT</u>	A (8) ¹ A (8) ¹ B (15) ² B (13) ²	N/A	A (8) ¹ A (8) ¹ C (17) ² B (15) ²	N/A
2039 Future	EB WB NB SB	<u>1 LT</u> , 1 TH-RT 1 LT-TH- <u>RT</u> 1 LT- <u>TH</u> , 1 RT <u>1 LT-TH-RT</u>	A (8) ¹ A (8) ¹ C (15) ² B (14) ²	N/A	A (8) ¹ A (8) ¹ C (18) ² C (16) ²	N/A

Improvements to lane configurations by adjacent development are shown underlined.

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

Capacity analysis of all traffic conditions indicates the major street left-turn movements are expected to operate at LOS A during the weekday AM and PM peak hours. Additionally, the minor street approaches are expected to operate at an overall LOS C or better during the AM and PM peak hours. No significant queuing is expected at the intersection.

Under no-build conditions, the Weldon Village adjacent development is expected to construct the southbound approach at the intersection and construct an eastbound left turn lane with 100 feet of storage plus appropriate deceleration and taper. The Weldon Village connection will provide indirect connectivity to the proposed development. No additional improvements are recommended by the developer.

7.7. Horton Road and Lucas Road

Refer to the table below for a summary of the capacity analysis of the subject intersection during the analysis scenarios.

Table 11: Analysis Summary of Horton Road and Lucas Road

ANALYSIS SCENARIO	APPROACH	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2024 Existing	EB	1 LT-TH-RT	A (8) ¹	N/A	A (8) ¹	N/A
	WB	1 LT-TH-RT	A (7) ¹			
	NB	1 LT-TH-RT	A (10) ²			
	SB	1 LT-TH-RT	A (10) ²			
2030 No-Build	EB	1 LT-TH-RT	A (8) ¹	N/A	A (8) ¹	N/A
	WB	1 LT-TH-RT	A (7) ¹			
	NB	1 LT-TH-RT	B (11) ²			
	SB	1 LT-TH-RT	B (11) ²			
2030 Build	EB	1 LT-TH-RT	A (8) ¹	N/A	A (8) ¹	N/A
	WB	1 LT-TH-RT	A (7) ¹			
	NB	1 LT-TH-RT	B (12) ²			
	SB	1 LT-TH-RT	B (12) ²			
2039 Future	EB	1 LT-TH-RT	A (8) ¹	N/A	A (8) ¹	N/A
	WB	1 LT-TH-RT	A (7) ¹			
	NB	1 LT-TH-RT	B (12) ²			
	SB	1 LT-TH-RT	B (12) ²			

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

2. Level of service for minor-street approach.

Capacity analysis of all traffic conditions indicates the major street left-turn movements are expected to operate at LOS A during the weekday AM and PM peak hours. Additionally, the minor street approaches are expected to operate at an overall LOS C or better during the AM and PM peak hours. No significant queuing is expected at the intersection.

No improvements are recommended by the developer.

7.8. Buffalo Road and Site Access

Refer to the table below for a summary of the capacity analysis of the subject intersection during the analysis scenarios.

Table 12: Analysis Summary of Buffalo Road and Site Access

ANALYSIS SCENARIO	A P P R O A C H	LANE CONFIGURATIONS	WEEKDAY AM PEAK HOUR LEVEL OF SERVICE		WEEKDAY PM PEAK HOUR LEVEL OF SERVICE	
			Approach	Overall (seconds)	Approach	Overall (seconds)
2030 Build	EB WB NB	1 TH- RT 1 LT -TH 1 LT - RT	-- A (8) ¹ B (11) ²	N/A	-- A (8) ¹ B (12) ²	N/A
2039 Future	EB WB NB	1 TH- RT 1 LT -TH 1 LT - RT	-- A (8) ¹ B (11) ²	N/A	-- A (8) ¹ B (12) ²	N/A

Modifications to lane configurations by 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 all the 2030 build and 2039 traffic conditions indicates the major street left-turn movement is expected to operate at LOS A during the weekday AM and PM peak hours. Additionally, the minor street approach is expected to operate at an overall LOS B or better during the AM and PM peak hours. No significant queuing is expected at the intersection.

Turn lanes along Buffalo Road at the proposed Site Access were considered based on the NCDOT *Policy on Street and Driveway Access to North Carolina Highways*, but are not warranted based on peak hour volumes. Sight distance appears to be sufficient along Buffalo Road at the proposed access location. As typical, actual sight distances will be measured and verified in the field as part of the driveway permitting process. No improvements are recommended by the developer.

8. CONCLUSIONS

This Traffic Impact Analysis was conducted to determine the potential traffic impacts of the Terravita development to be located south of Buffaloe Road between Quiet Oaks Drive and Bobbitt Drive in Knightdale, North Carolina. The proposed development, anticipated to be completed in 2029, is assumed to consist of 170 single-family homes and 75 townhomes. Site access is proposed via one (1) new full movement driveway along Buffaloe Road and internal connections to Quiet Oaks Road, Bobbitt Drive, Proc Ridge Lane, and the Old Knight Road extension (a part of the Weldon Village adjacent development).

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

- 2024 Existing Traffic Conditions
- 2030 No-Build (build year+1) Traffic Conditions
- 2030 Build (build year+1) Traffic Conditions
- 2039 Future (build year+10) Traffic Conditions

Trip Generation

It is anticipated that proposed development will generate 154 total trips (38 entering and 116 exiting) during the weekday AM peak hour and 205 total trips (127 entering and 78 exiting) during the weekday PM peak hour.

Adjustments to Analysis Guidelines

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

9. RECOMMENDATIONS

Based on the findings of this study, no specific geometric improvements have been identified to accommodate future traffic conditions. See a more detailed description of the recommended modifications below. Refer to Figure 13 for an illustration of the recommended lane configuration for the proposed development.

Improvements by Weldon Village

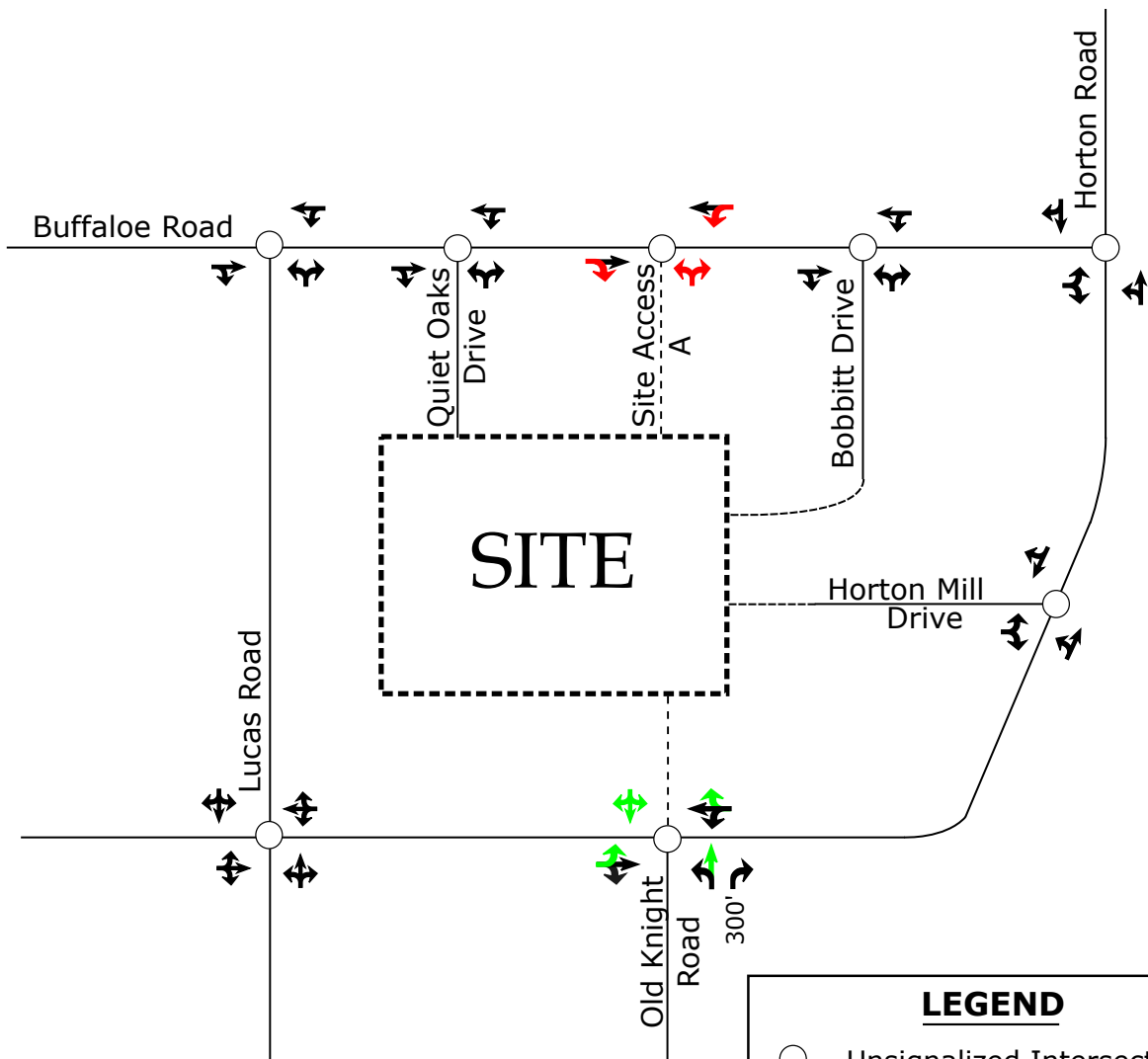
Horton Road and Old Knight Road

- Construct southbound approach (of Old Knight Road) with one ingress lane and one egress lane.
- Provide stop control for southbound approach.
- Construct eastbound left turn lane (on Horton Road) with 100' of storage plus appropriate deceleration and taper.

Recommended Modifications by Developer

Buffaloe Road and Site Access

- Construct northbound approach (of the proposed site access) with one ingress lane and one egress lane. Provide stop-control for the northbound approach.



LEGEND

- Unsignalized Intersection
- ➔ Existing Lane
- ➔ Improvement by Developer
- ➔ Improvement by Others
- x' Storage (In Feet)



Terravita
Knightdale, NC

Recommended Lane
Configurations

Scale: Not to Scale Figure 13



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

JOSH STEIN
GOVERNOR

J.R. "JOEY" HOPKINS
SECRETARY

January 13, 2025

Terravita

Traffic Impact Analysis Review Report Congestion Management Section

TIA Project: SC-2024-238
Division: 5
County: Wake



Clarence B. Bunting, P.E. Regional Engineer
Trevor S. Darnell, Project Design Engineer

Terravita

SC-2024-238

Knightdale

Wake County

Per your request, the Congestion Management Section (CMS) of the Transportation Mobility and Safety Division has completed a review of the subject site. The comments and recommendations contained in this review are based on data for background conditions presented in the Traffic Impact Analysis (TIA) and are subject to the approval of the local District Engineer's Office and appropriate local authorities.

Date Initially Received by CMS	11/26/24	Date of Site Plan	05/17/24
Date of Complete Information	11/26/24	Date of Sealed TIA	11/13/24

Proposed Development

The TIA assumes the development is completed by 2029 and consists of the following:

Land Use	Land Use Code	Size
Single-Family Detached Housing	210	170 d.u.
Single-Family Attached Housing	215	75 d.u.

Trip Generation - Unadjusted Volumes During a Typical Weekday

	IN	OUT	TOTAL
AM Peak Hour	38	116	154
PM Peak Hour	127	78	205
Daily Trips			2,166

General Reference

For reference to various documents applicable to this review please reference the following link: <https://connect.ncdot.gov/resources/safety/Pages/Congestion-Management.aspx>

Once the driveway permit has been approved and issued, a copy of the final driveway permit requirements should be forwarded to this office. If we can provide further assistance, please contact the Congestion Management Section.

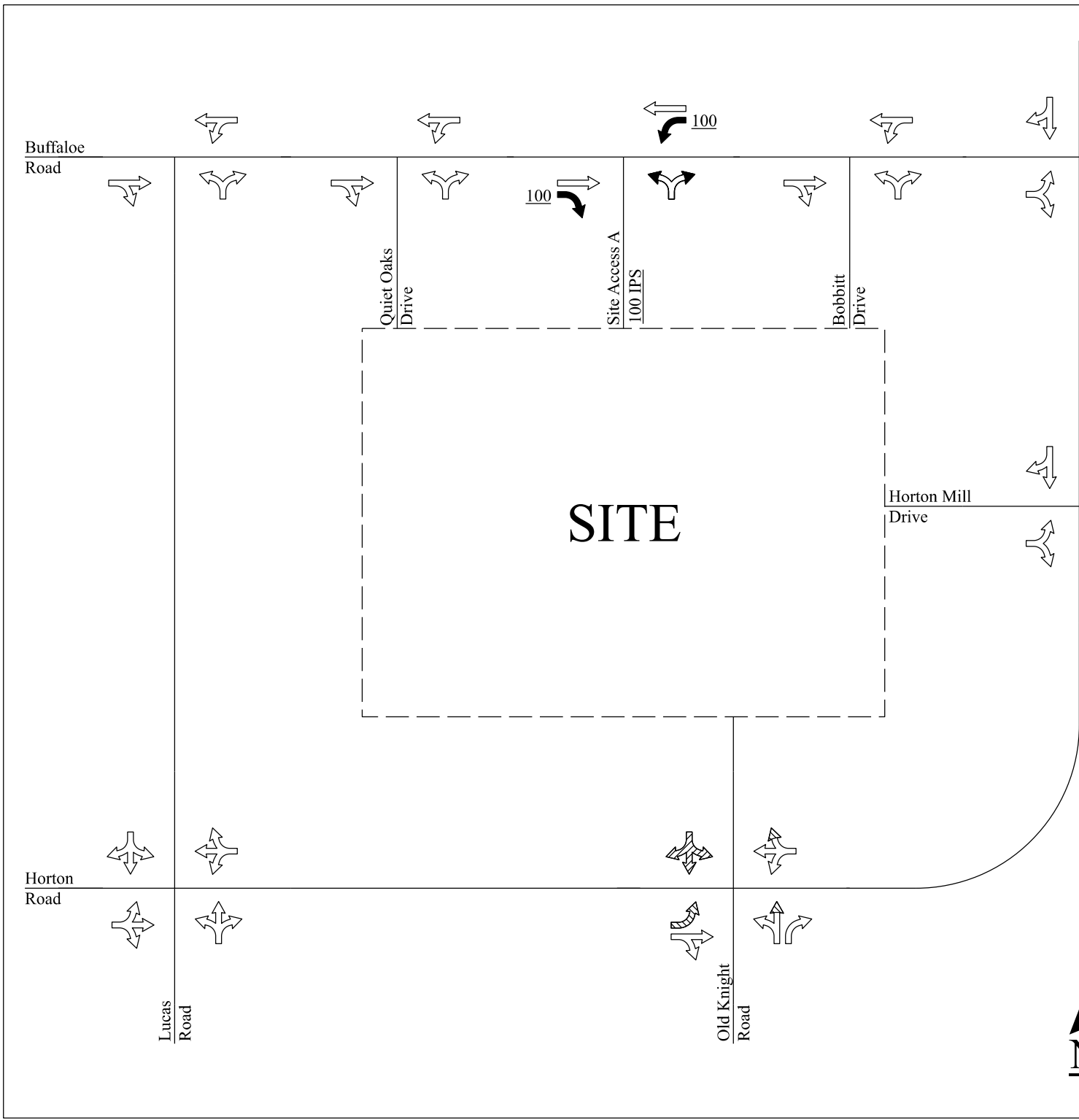
Buffaloe Road

Various driveways and roadways are located in close proximity on Buffaloe Road. If operational issues develop, access may need to be restricted.








Improvements By Others

The analysis includes background improvements by others. If these improvements are not in place at the time of construction, the site developer should provide these improvements or analysis demonstrating mitigation is not necessary.

District Note:
 If the site provides an internal connection to Quiet Oaks Drive, Quiet Oak Drive should be brought up to NCDOT standard's and restricted to right-in/right-out. - mvs



**Terravita
SC-2024-238**

-  Existing Laneage
-  Recommended Laneage
-  Laneage Built By Others
-  NCDOT Recommendation
-  Existing Signal
-  Signal Proposed By Others
-  Developer Proposed Signal
- XXX Storage
- XXX NCDOT Recommended Storage
- IPS Internal Protected Stem
- All Distances in Feet
- Drawing Not to Scale