



# Carolina Ridge

## **DRAFT** TIA Update Memorandum

### Lincoln County, NC

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## BACKGROUND

Carolina Ridge is a proposed residential community located on 599 acres south of NC 73 between Ingleside Farm Road (SR 1383) and Little Egypt Road (SR 1386) in Lincoln County, NC. In 2006 WSP (formerly known as Chas. H Sells, Inc) conducted a Traffic Impact Analysis (TIA) for this site then referred to as *Carolina Ridge by Del Webb at Ingleside*. Based on the study, NCDOT required specific roadway improvements at the intersection of NC 73 and Little Egypt Road as well as the two site entrance intersections. While the developer, Pulte Homes, successfully obtained the site plan approval from the County in May 2006, construction never started due to the economic recession.

Several major development projects and roadway improvements have occurred in the study area since the 2006 TIA was completed. These include the new NC 16 Bypass, NC 73 widening and signal system, Lowe's, Wal-Mart Supercenter and the Walgreens on NC 73 between NC 16 Bypass and NC 16 Business. Many of these changes were accounted for in the original TIA, but due to the dated information the 2006 TIA is no longer a reliable technical assessment.

Shea Homes is now interested in building the residential community over the next seven years with minor modifications to the 2006 site plan. The current site plan, as shown in Figure 1, includes 1,350 senior adult detached housing and up to 300 single family units. This TIA Update Memorandum was prepared to reevaluate the potential development traffic impacts using current traffic data and NCDOT traffic analysis guidelines.

## STUDY AREA

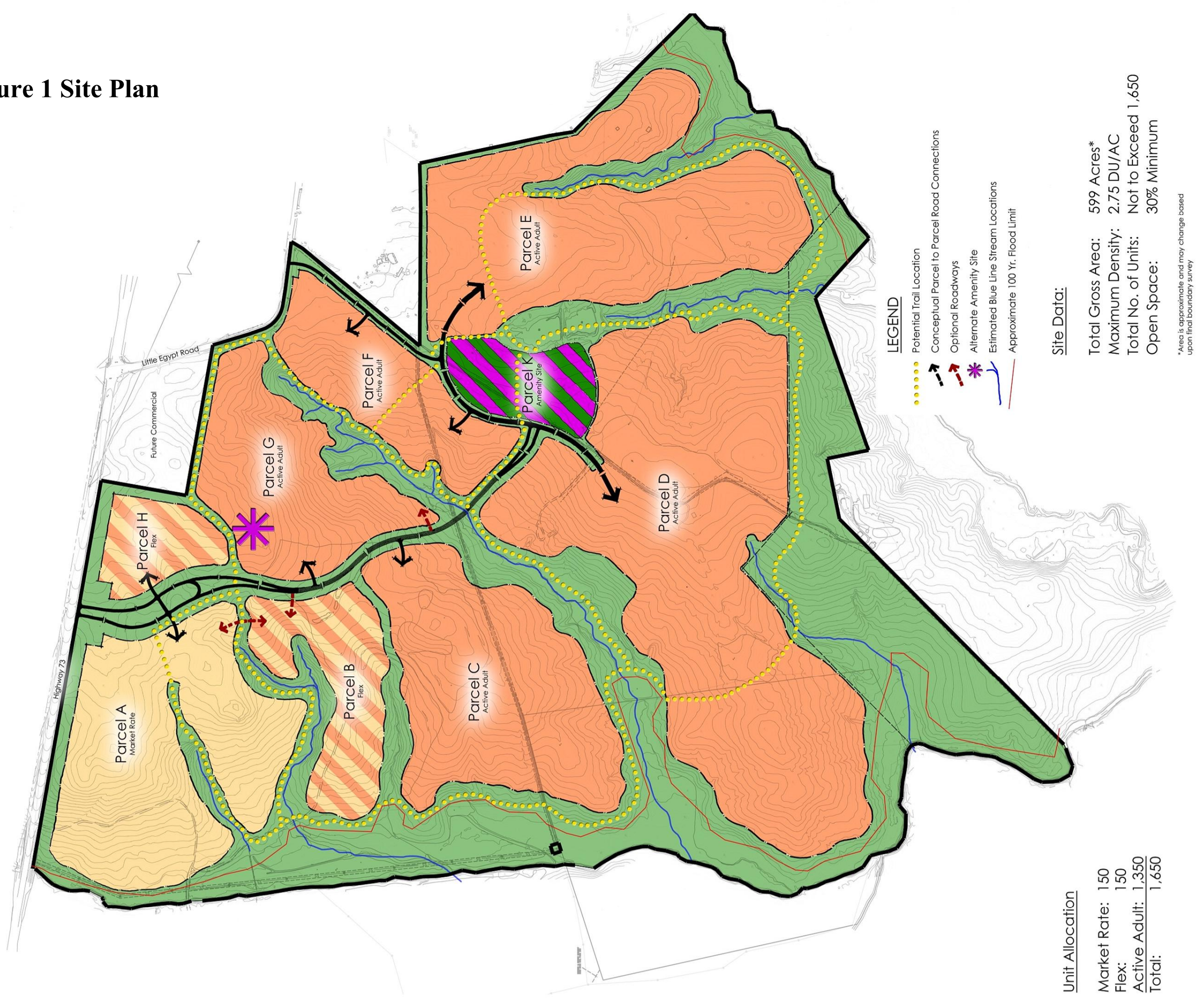
The following intersections, determined through coordination with the County and NCDOT, are included for the current study:

1. NC 73 and Little Egypt Rd.....Signalized
2. NC 73 and NC 16 SB Ramps.....Signalized
3. NC 73 and NC 16 NB Ramps.....Signalized
- 4. NC 73 and Lowe's/Walmart Entrance 1.....Signalized**
- 5. NC 73 and Lowe's/Walmart Entrance 2.....Signalized**
6. NC 73 and NC 16 Business.....Signalized
7. NC 73 and Connector to Ingleside Farm Rd..... Unsignalized
8. Ingleside Farm Rd and Connector.....Unsignalized
9. NC 73 and School Bus Entrance/ Proposed Site Entrance 1.....Unsignalized
- 10. NC 73 and Main School Entrance.....Unsignalized**
11. Little Egypt Road and Proposed Site Entrance 2.....Unsignalized

Figure 1 shows the study area. The Lowe's/Walmart entrance intersections (# 4 & 5 listed above) and the main school entrance (E Lincoln High School) on NC 73 were not included in the original TIA.

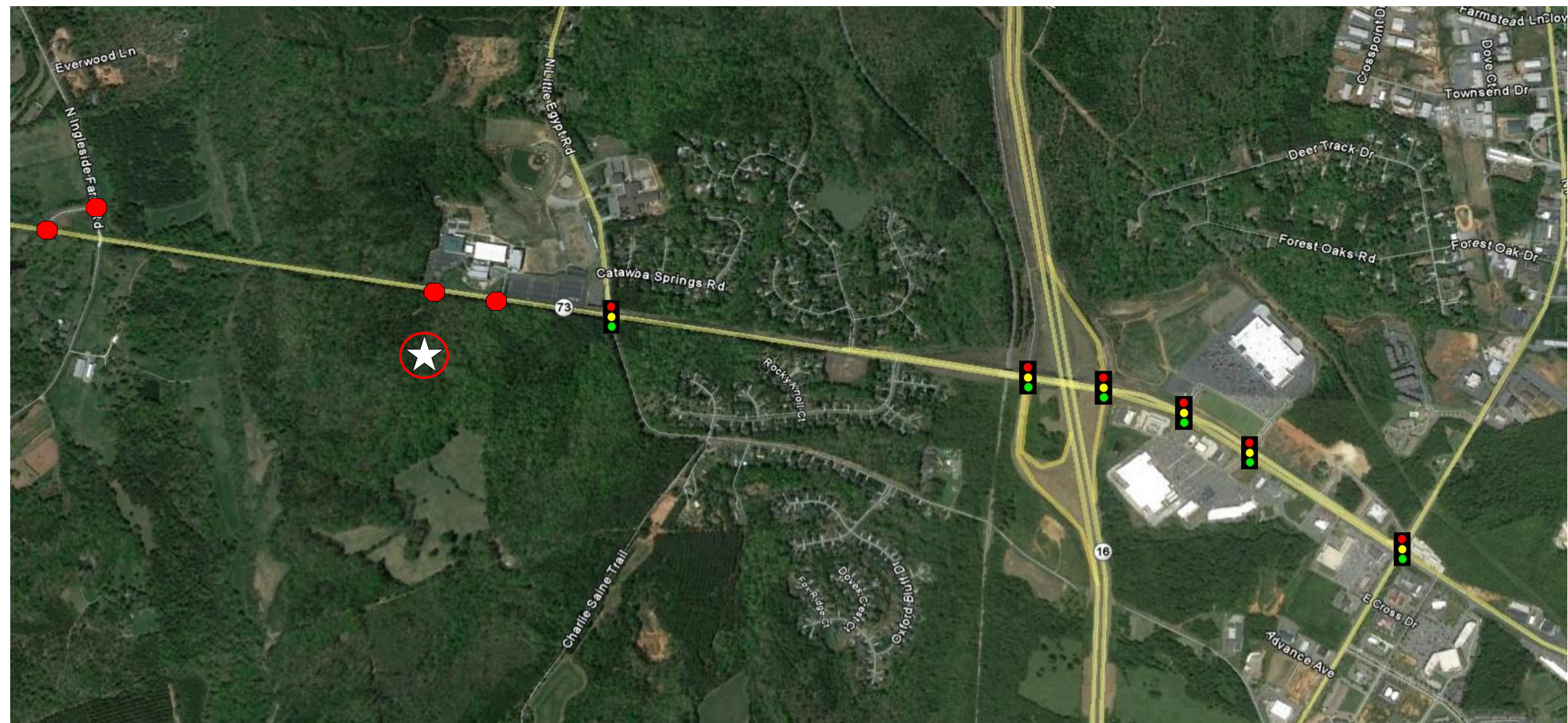


Figure 1 Site Plan





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\*\*\* Not to Scale



Copyright: 2013 Google Maps

**Intersections:**

NC Hwy 73 & Connector to Ingleside Farm Road  
Ingleside Farm Road & Connector to NC Hwy 73  
NC Hwy 73 & School Bus Entrance  
NC Hwy 73 & Main School Entrance  
NC Hwy 73 & Little Egypt Road  
NC Hwy 73 & NC Hwy 16 Southbound Ramps  
NC Hwy 73 & NC Hwy 16 Northbound Ramps  
NC Hwy 73 & Lowe's/Wal-Mart West Entrance  
NC Hwy 73 & Lowe's/Wal-Mart East Entrance  
NC Hwy 73 & NC 16 Bus

Legend	
	Signalized Intersection
	Unsignalized Intersection
	Future Site



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## Carolina Ridge Traffic Impact Analysis

**Figure 2**  
**Study Area Vicinity Map**

## METHODOLOGY

The Level of Service (LOS) analysis for signalized and unsignalized intersections was completed through the use of Synchro, version 7. The software package categorizes the LOS based on Highway Capacity Manual (HCM) methodology and criteria. According to industry standards, any signalized intersection or any approach of an unsignalized intersection is considered acceptable if the Control Delay is LOS D or better with the LOS A representing little or no delay. Any signalized intersection or approach with a LOS of E or F is considered substandard and may need mitigations to improve the operational performance.

Similar to the 2006 TIA, this TIA Update includes a total of five scenarios evaluated for the intersections potentially affected by the proposed Carolina Ridge development:

1. The “**2013 Existing Conditions Analysis**” evaluates the current intersection operational performance.
2. The “**2021 No Build Analysis**” examines the future traffic conditions where the proposed Carolina Ridge development is not constructed. This analysis takes into account background traffic growth (3% per year), a proposed mixed-use development *Cottonwood Village* in the SW quadrant of NC 73 and NC 16 Business, and any associated transportation improvements.
3. The “**2021 No Build with Improvements Analysis**” identifies the improvements to provide acceptable LOS if the development will not occur.
4. The “**2021 Build Analysis**” evaluates the intersection operational performance after distributing site generated trips through the study area intersections, and,
5. The “**2021 Build with Improvements Analysis**” identifies and evaluates the mitigation measures, if there is any degradation in the operational performance when comparing scenarios 2 and 4 above.

Intersection analyses were performed for both the AM and PM peak hours in all scenarios. This study follows the current NCDOT traffic analysis guidelines which became effective January 1<sup>st</sup>, 2012. As recommended in the current guidelines, the following three assumptions, which are different from the original 2006 TIA, are used in the study:

- A. At signalized intersections, “protected only” instead of “protected/permissive” left-turn phasing is used for future condition analyses.
- B. No Right Turn on Red (RTOR) is allowed in both existing and future condition analyses.
- C. Improvement recommendations are not dependent on “unfunded or uncommitted improvements provided by others”.



## 2013 EXISTING CONDITION ANALYSIS

The existing intersection lane configurations are illustrated in Figure 3. Intersection photos and field visit sketches are included in Appendix A. Traffic counts for the existing intersections were collected between the hours of 7:00 - 9:00 AM and 4:00 - 6:00 PM on Tuesday October 8, 2013. The peak hour traffic counts are provided in Appendix B and depicted in Figure 4.

The traffic signals on NC 73 are part of the NC 73 CLS. Signal plans, which are included in Appendix C, were obtained from NCDOT, and used to develop the existing traffic model. At the time when this report was prepared, the signal system timing plans were being tweaked by NCDOT Division 12 signal technicians. The signal timing parameters therefore were optimized in Synchro for the existing condition analysis.

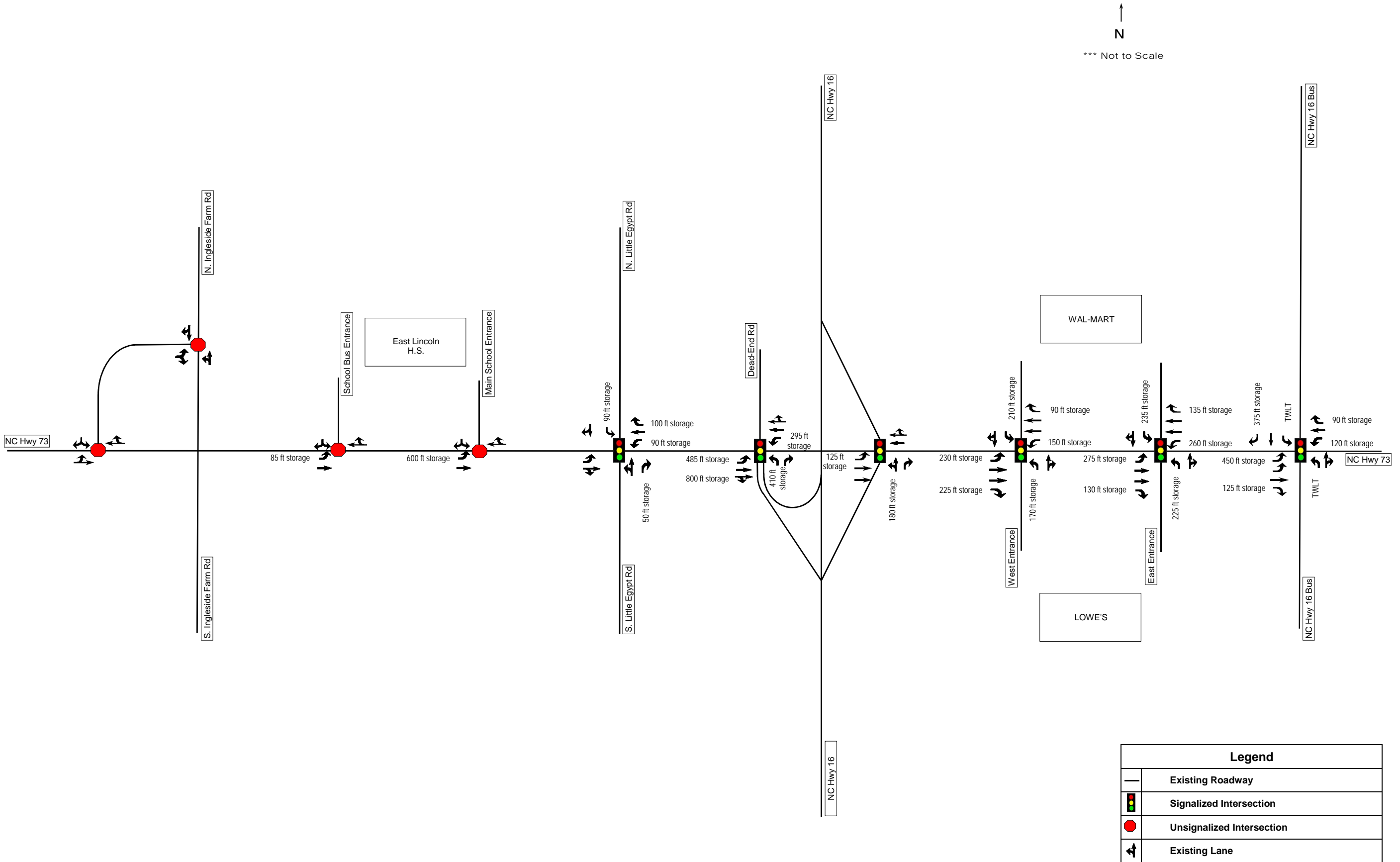
Existing volumes, traffic flow characteristics, and intersection geometrics collected during field visits were used to determine the level of service. Table 1 lists the LOS results from the 2013 Existing Conditions Analysis. Delay and LOS results are reported for each intersection approach. Intersection average delays (based on a weighted average of the approaches) and LOS are also reported for signalized intersections.

The analyses show that all the signalized intersections currently operate at an overall acceptable (D or better) LOS during both AM and PM peak hours. At the intersection of NC 73 and NC 16 Business, both the westbound and northbound approaches operate at LOS E during the PM peak hour with queues exceeding 400 feet.

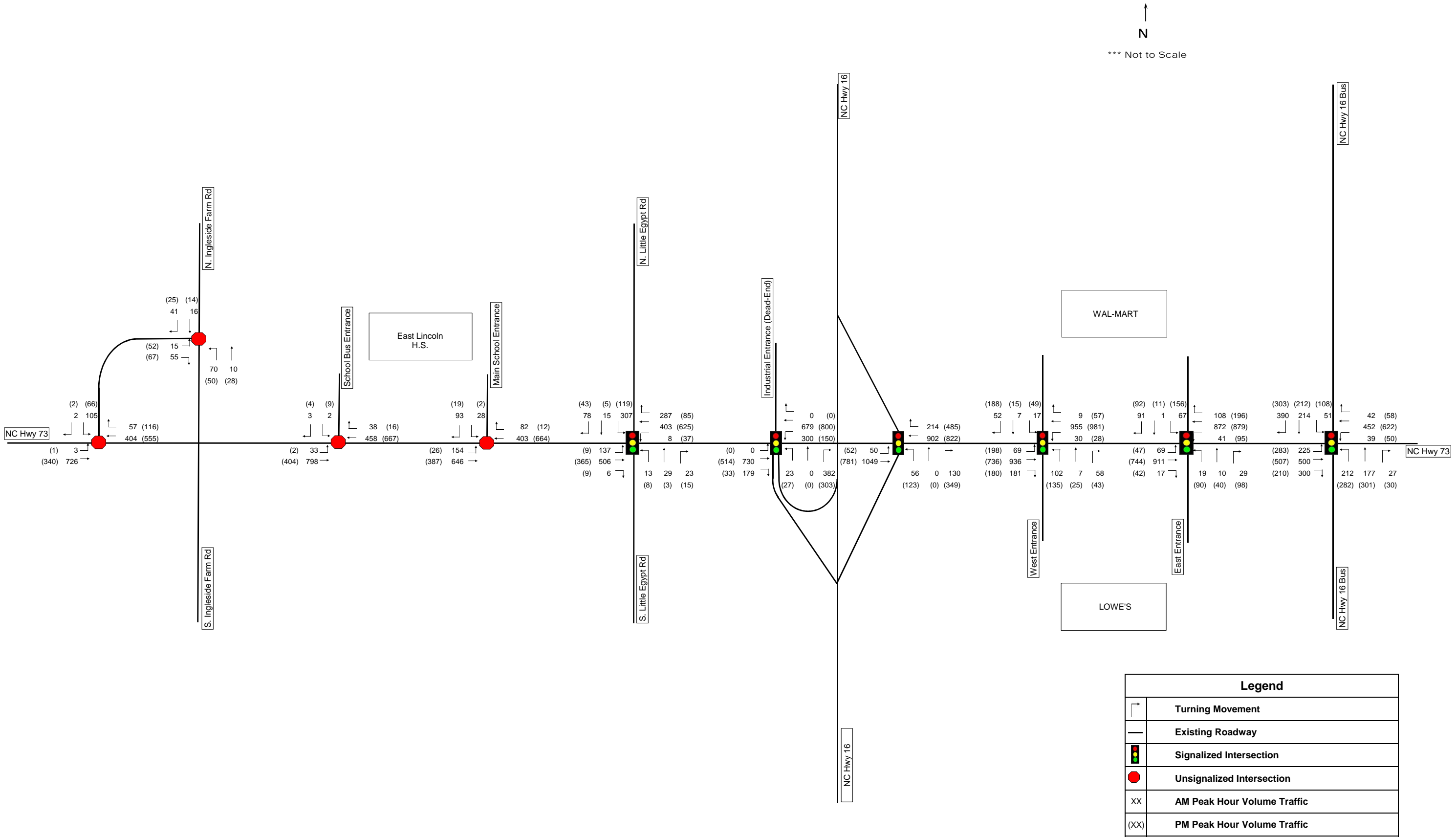
NC 16 Bypass northbound and southbound ramp approaches both operate with 50 to 60 seconds of delays during peak hours. The delays are largely caused by the heavy turning movements between NC 16 Bypass and NC 73 east of the bypass, including major trip generators such as Lowe's and Walmart which also experience moderate delays at their driveways.

During the AM peak hour, the capacity analysis shows excessive exit traffic delays at the East Lincoln High School main entrance. The southbound right-turn traffic (93 vph) at the main school entrance accounts for 77% of the approach volumes (121 vph). The relatively low left-turn exit traffic volumes (28 vph) suggest that, due to the anticipated delays and safety concerns at this location, most eastbound trips likely choose to exit the school via the entrance on Little Egypt Road and turn left at the signalized NC 73 / Little Egypt Road intersection.

Traffic simulations indicate that gaps in the NC 73 through traffic stream created by the adjacent traffic signal at Little Egypt Road (approximately 1,000 feet to the east) provide adequate opportunities for the school exit traffic. The eastbound left-turn traffic on NC 73 does not appear to have any queuing or delay issues in both the capacity analysis and traffic simulations.







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**Carolina Ridge  
Traffic Impact Analysis**

**Figure 4  
Existing (2013) Traffic Volumes**

**Table 1 Existing (2013) Condition LOS Analysis**

Intersection	Approach		Existing (2013)			
			AM		PM	
			Delay (sec)	LOS	Delay (sec)	LOS
NC Hwy 73 @ S. Little Egypt Rd (SR 1386)	signalized	Intersection Average	23.8	C	11.8	B
		NB - S. Little Egypt Rd	18.3	B	23.2	C
		SB - N. Little Egypt Rd	32.2	C	25.8	C
		EB - NC Hwy 73	15.0	B	6.2	A
		WB - NC Hwy 73	27.7	C	11.1	B
NC Hwy 73 @ NC Hwy 16 SB ramps	signalized	Intersection Average	18.4	B	13.5	B
		NB - NC Hwy 16 SB ramps	53.2	D	54.4	D
		EB - NC Hwy 73	16.0	B	10.2	B
		WB - NC Hwy 73	6.2	A	1.3	A
NC Hwy 73 @ NC Hwy 16 NB ramps	signalized	Intersection Average	7.8	A	22.2	C
		NB - NC Hwy 16 NB ramp	58.3	E	55.6	E
		EB - NC Hwy 73	2.6	A	7.7	A
		WB - NC Hwy 73	4.5	A	19.3	B
NC Hwy 73 @ Walmart/Lowes West Entrance	signalized	Intersection Average	10.1	B	17.8	B
		NB - West Entrance	57.0	E	74.7	E
		SB - West Entrance	47.1	D	48.3	D
		EB - NC Hwy 73	6.1	A	7.3	A
		WB - NC Hwy 73	4.0	A	10.6	B
NC Hwy 73 @ Walmart/Lowes East Entrance	signalized	Intersection Average	10.3	B	16.0	B
		NB - East Entrance	48.6	D	44.4	D
		SB - East Entrance	59.1	E	60.0	E
		EB - NC Hwy 73	4.3	A	6.2	A
		WB - NC Hwy 73	6.4	A	7.7	A
NC Hwy 73 @ NC Hwy 16 Business	signalized	Intersection Average	35.5	D	49.3	D
		NB - NC Hwy 16 Business	49.5	D	65.4	E
		SB - NC Hwy 16 Business	23.6	C	40.6	D
		EB - NC Hwy 73	35.1	D	39.6	D
		WB - NC Hwy 73	39.9	D	56.6	E
NC Hwy 73 @ Connector to Ingleside Farm Rd	unsignalized	Signalized Intersection Average	--	--	--	--
		SB - Connector	56.3	F	25.4	D
		EB - NC Hwy 73	0.1	A	0.0	A
		WB - NC Hwy 73	0.0	A	0.0	A
Ingleside Farm Rd @ Connector to NC Hwy 73	unsignalized	EB - Connector	9.1	A	9.6	A
		NB - Ingleside Farm Rd	6.6	A	4.8	A
		SB - Ingleside Farm Rd	0.0	A	0.0	A
NC Hwy 73 @ School Bus Entrance/ Site Entrance 1	unsignalized	Signalized Intersection Average	--	--	--	--
		NB - Site Entrance 1	--	--	--	--
		SB - School Bus Entrance	20.2	C	20.9	C
		EB - NC Hwy 73	0.3	A	0.0	A
		WB - NC Hwy 73	0.0	A	0.0	A
NC Hwy 73 @ Main School Entrance	unsignalized	SB - School Entrance	697.2	F	18.9	C
		EB - NC Hwy 73	2.9	A	1.2	A
		WB - NC Hwy 73	0.0	A	0.0	A
Unacceptable LOS						

## 2021 NO BUILD ANALYSIS

The full build-out of the site is currently scheduled for 2020. Thus, the design year in this study is 2021, or one year past build-out. An annual growth rate of 3% was applied to the existing traffic to estimate the design year 2021 background traffic volumes which are shown in Figure 5. In addition, the 2021 No Build traffic volumes also include trips generated from the proposed Cottonwood Village development located in the SW quadrant of NC 73/ NC 16 Business intersection.

This mixed-use development was proposed to consist of apartment homes, office buildings, and a shopping center. According to the latest Cottonwood Village TIA dated July 19, 2010 (Appendix D), this development would generate 5071 daily trips, including 297 new trips in the AM peak hour and 429 new trips in the PM peak hour. The Cottonwood Village TIA also indicated that no improvements were proposed/ required for any of the existing intersections in the study area. It is expected that Cottonwood Village will be built-out prior to 2021, the design year for this study. The off-site development trips (Figure 6) were then added to the future background traffic to estimate the Future No Build traffic volumes (Figure 7).

The results of the 2021 No Build analyses are summarized in Table 2. With the background traffic growth and off-site development traffic, the analyses show higher delays at all the intersections in the study area. Both the NC 16 Bypass northbound ramp intersection and the NC 73 / NC 16 Business intersection will operate at an overall unacceptable LOS during the PM peak hour.

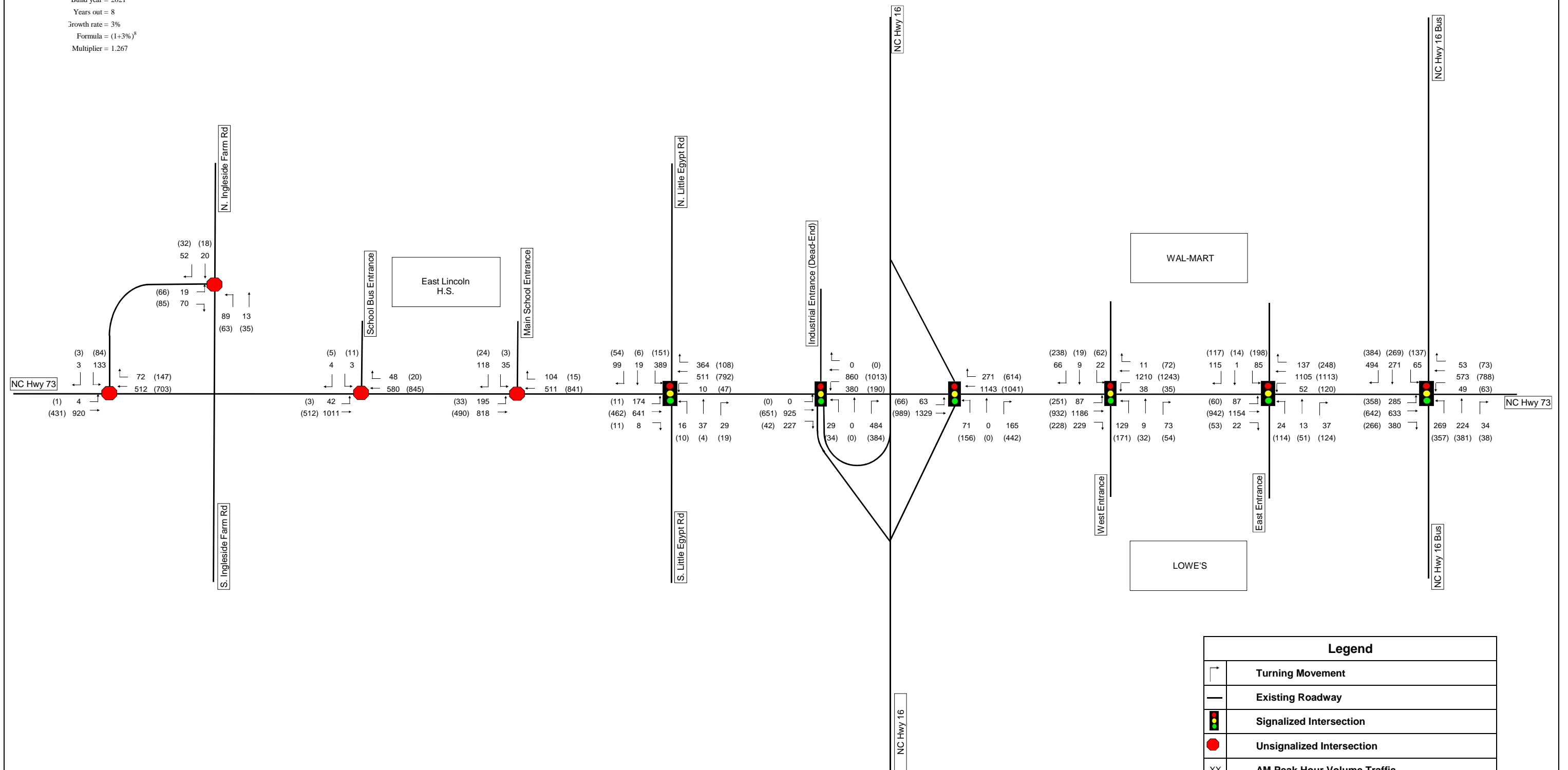
The unsignalized minor street approaches along NC 73, such as the main school entrance and the connector to Ingleside Farm Road, will experience significantly higher delays in the AM peak hour according to the capacity analysis. The traffic simulations show that the exit traffic at the main school entrance, which consists of primarily right-turn vehicles, will still benefit from the gaps created by the adjacent traffic signal and maintain a normal operation.

At the intersection of NC 73 and the connector to Ingleside Farm Road, however, almost all the vehicles coming off Ingleside Farm Road turn left onto eastbound NC 73. The queue on the southbound approach during the AM peak hour might back up to the Ingleside Farm Road intersection. Preliminary analysis indicates that this intersection will meet the peak hour signal warrant during both the AM and PM peak hours in 2021.

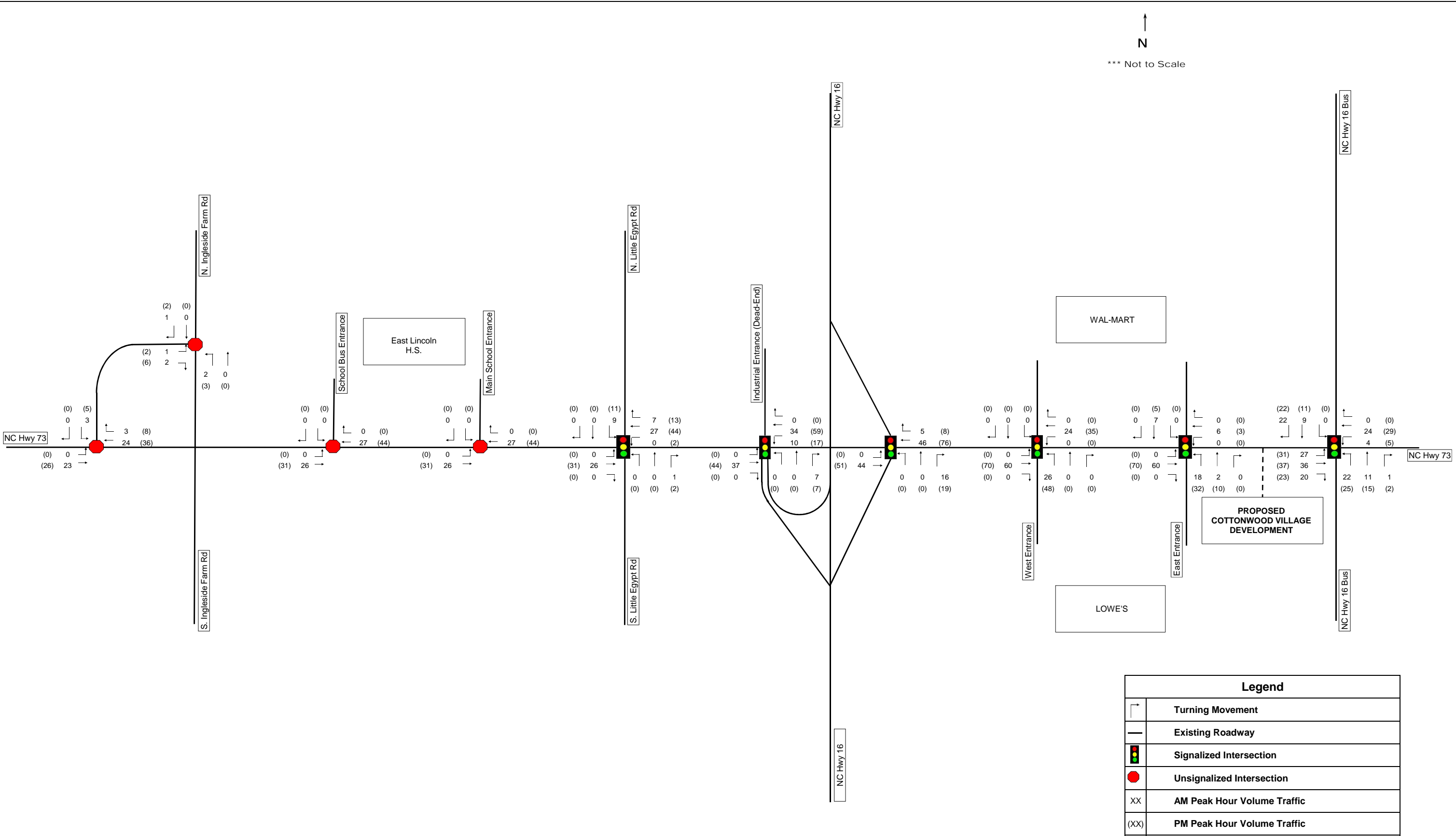


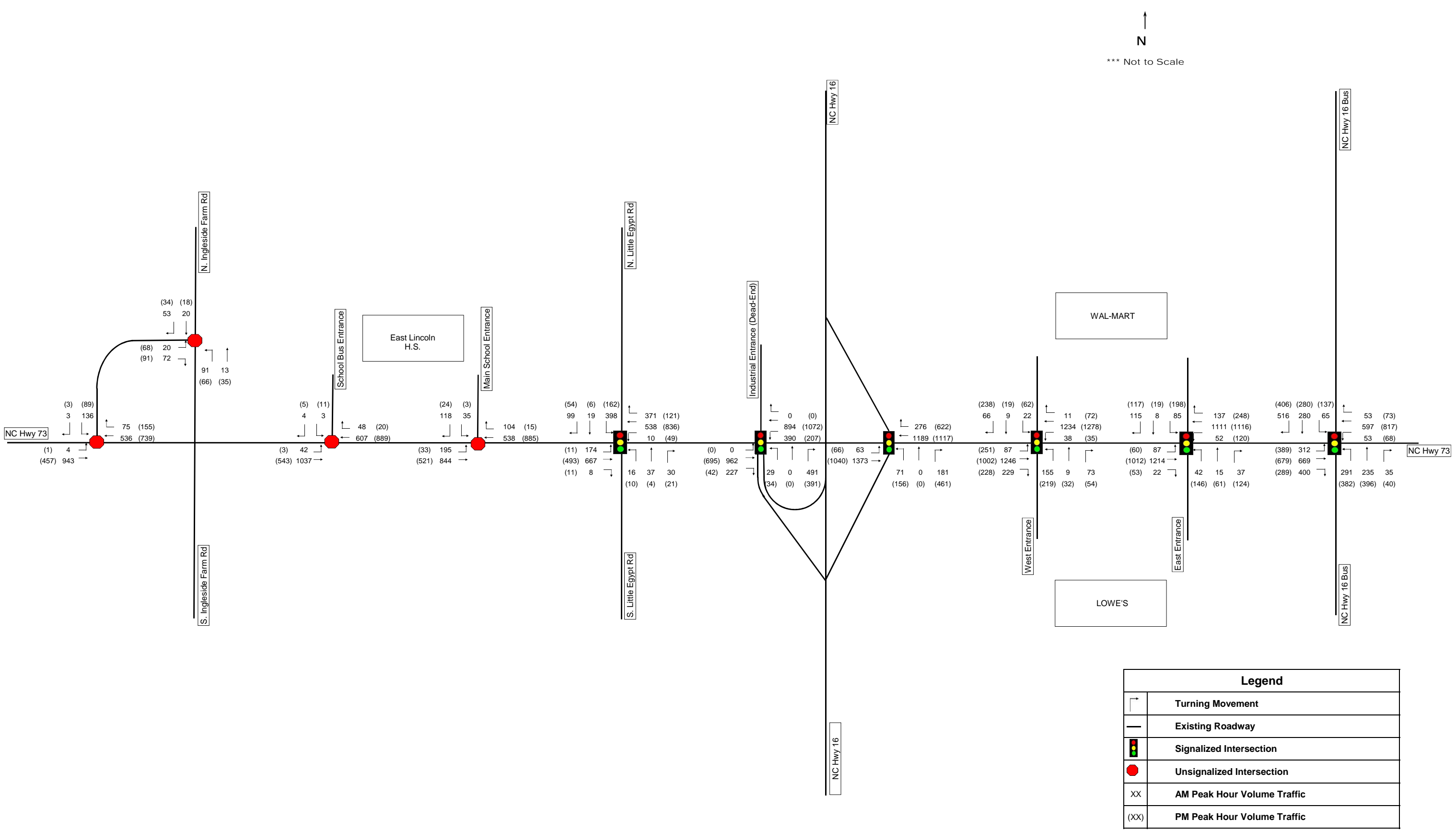
Build year = 2021  
Years out = 8  
Growth rate = 3%  
Formula =  $(1+3\%)^8$   
Multiplier = 1.267

N  
\*\*\* Not to Scale



Legend	
	Turning Movement
	Existing Roadway
	Signalized Intersection
	Unsignalized Intersection
XX	AM Peak Hour Volume Traffic
(XX)	PM Peak Hour Volume Traffic







**Table 2 Future No Build (2021) LOS Analysis**

Intersection	Approach		No Build (2021)			
			AM		PM	
			Delay (sec)	LOS	Delay (sec)	LOS
NC Hwy 73 @ S. Little Egypt Rd (SR 1386)	signalized	Intersection Average	39.5	D	17.0	B
		NB - S. Little Egypt Rd	20.5	C	27.8	C
		SB - N. Little Egypt Rd	52.2	D	37.4	D
		EB - NC Hwy 73	36.0	D	7.7	A
		WB - NC Hwy 73	37.4	D	16.8	B
NC Hwy 73 @ NC Hwy 16 SB ramps	signalized	Intersection Average	27.5	C	18.4	B
		NB - NC Hwy 16 SB ramps	49.1	D	51.4	D
		EB - NC Hwy 73	27.1	C	15.3	B
		WB - NC Hwy 73	19.2	B	9.3	A
NC Hwy 73 @ NC Hwy 16 NB ramps	signalized	Intersection Average	11.7	B	60.0	E
		NB - NC Hwy 16 NB ramp	59.9	E	72.9	E
		EB - NC Hwy 73	6.4	A	13.4	B
		WB - NC Hwy 73	8.6	A	85.1	F
NC Hwy 73 @ Walmart/Lowes West Entrance	signalized	Intersection Average	16.8	B	38.8	D
		NB - West Entrance	56.4	E	98.1	F
		SB - West Entrance	42.2	D	40.7	D
		EB - NC Hwy 73	14.2	B	29.8	C
		WB - NC Hwy 73	10.8	B	35.0	C
NC Hwy 73 @ Walmart/Lowes East Entrance	signalized	Intersection Average	18.5	B	26.8	C
		NB - East Entrance	49.4	D	41.7	D
		SB - East Entrance	58.7	E	61.5	E
		EB - NC Hwy 73	10.5	B	16.6	B
		WB - NC Hwy 73	17.9	B	23.3	C
NC Hwy 73 @ NC Hwy 16 Business	signalized	Intersection Average	52.7	D	98.5	F
		NB - NC Hwy 16 Business	68.9	E	131.3	F
		SB - NC Hwy 16 Business	31.3	C	72.1	E
		EB - NC Hwy 73	57.1	E	73.6	E
		WB - NC Hwy 73	57.6	E	128.5	F
NC Hwy 73 @ Connector to Ingleside Farm Rd	unsignalized	Signalized Intersection Average	--	--	--	--
		SB - Connector	339.9	F	65.9	F
		EB - NC Hwy 73	0.1	A	0.0	A
		WB - NC Hwy 73	0.0	A	0.0	A
Ingleside Farm Rd @ Connector to NC Hwy 73	unsignalized	EB - Connector	9.4	A	10.1	B
		NB - Ingleside Farm Rd	6.7	A	5.0	A
		SB - Ingleside Farm Rd	0.0	A	0.0	A
NC Hwy 73 @ School Bus Entrance/ Site Entrance 1	unsignalized	Signalized Intersection Average	--	--	--	--
		NB - Site Entrance 1	--	--	--	--
		SB - School Bus Entrance	34.4	D	34.0	D
		EB - NC Hwy 73	0.4	A	0.1	A
		WB - NC Hwy 73	0.0	A	0.0	A
NC Hwy 73 @ Main School Entrance	unsignalized	SB - School Entrance	**	F	80.5	F
		EB - NC Hwy 73	3.8	A	1.4	A
		WB - NC Hwy 73	0.0	A	0.0	A
Unacceptable LOS						
** delays over 1,000 seconds						

## **2021 NO BUILD WITH IMPROVEMENTS ANALYSIS**

Comparing the Existing and No Build traffic analyses results, all the study area intersections are expected to experience LOS degradations. The following improvements would address the deficiencies and provide overall acceptable LOS for the roadway network in the study area. Currently there are no commitments or funding available for these improvements.

### NC 73 Closed Loop System

- Traffic signal timing optimization on the NC 73 corridor.

### NC 73 and Little Egypt Road

- Extend the westbound right-turn lane by approximately 200' to provide 300' of storage.
- Extend the southbound left-turn lane by approximately 230' to Catawba Springs Road and provide 320' of storage.
- This isolated traffic signal shall be evaluated for suitability of coordination with the traffic signals in the NC 73 signal system.

### NC 73 and NC 16 Bypass Northbound Ramps

- Widen the northbound approach (exit ramp) to provide a 180' left-turn lane, a 275' right-turn lane and a left-turn/through/right-turn shared lane with appropriate tapers.
- Signal modifications to accommodate the proposed northbound lane configuration.

### NC 73 and Lowe's/Walmart West Entrance

- Restripe the southbound approach to provide a through/left-turn shared lane and an exclusive right-turn lane.
- Signal modifications to accommodate the proposed southbound lane configuration. This should allow the southbound right-turn movement to overlap (run concurrently with) the eastbound left-turn movement.

### NC 73 and NC 16 Business

- Construct a second northbound left-turn lane with approximately 300' of storage and appropriate tapers.
- Extend the westbound right-turn lane by approximately 460' and convert it to a through / right-turn shared lane with 550' of storage.
- Restrict the southbound left-turn movement at the NC 73 intersection and redirect this turning movement to NC 73 via N Pilot Knob Road upstream of the intersection, or E Cross Street / Waterside Crossing Boulevard / Crossing Center Road / S Pilot Knob Road downstream of the intersection.
- Convert the southbound approach to provide one through lane and two exclusive right-turn lanes. The through lane, which should be a min of 600' in length, will be positioned in the existing left-turn/TWLT lane.
- Signal modifications to accommodate the proposed lane configurations. This should allow the southbound dual right-turn movement to overlap (run concurrently with) the eastbound dual left-turn movement.

NC 73 and Connector to Ingleside Farm Road

- Install an actuated traffic signal at this intersection with appropriate signal heads, poles, loop detectors, junction boxes, etc. Signal warrant analysis shall be performed before the signal installation, and the signal installation must be approved by the local jurisdictions and NCDOT.

NC 73 and Main School Entrance

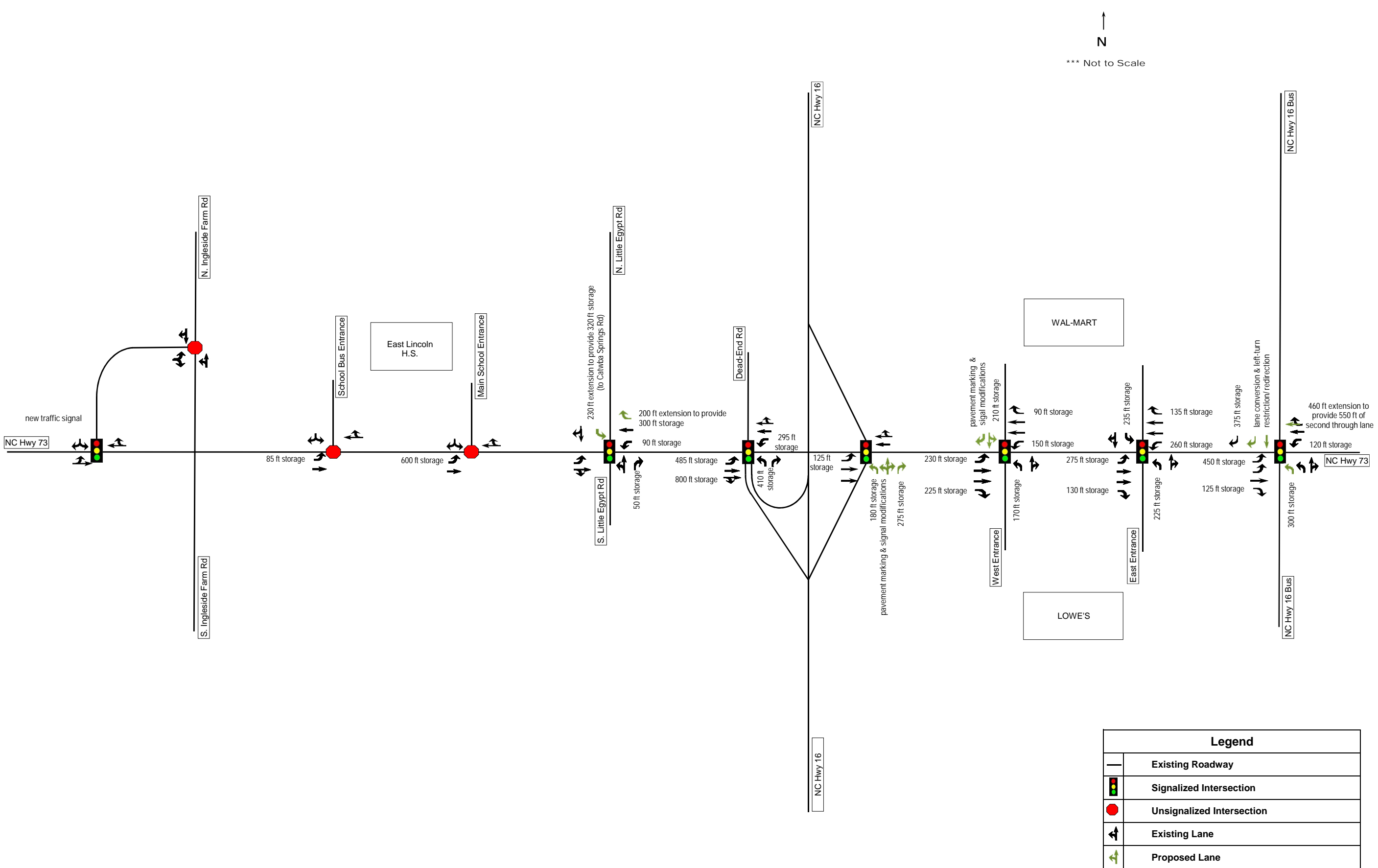
- Evaluate the school traffic access and circulation and, if deemed appropriate and necessary by the school and NCDOT, restrict the left-turn movement from the main school entrance on NC 73 by installing a right-turn channelizing island at the entrance or a “left-over” raised median on NC 73.

Table 3 compares the analysis results for the improvements discussed above with those in the No Build Condition Analysis. The proposed lane configurations are illustrated in Figure 8.



**Table 3 No Build vs No Build with Improvements Conditions LOS Analysis**

Intersection	Approach		No Build (2021)				No Build (2021) with Improvements			
			AM		PM		AM		PM	
			Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
NC Hwy 73 @ S. Little Egypt Rd (SR 1386)	signalized	Intersection Average	39.5	D	17.0	B	39.5	D	17.0	B
		NB - S. Little Egypt Rd	20.5	C	27.8	C	20.5	C	27.8	C
		SB - N. Little Egypt Rd	52.2	D	37.4	D	52.2	D	37.4	D
		EB - NC Hwy 73	36.0	D	7.7	A	36.0	D	7.7	A
		WB - NC Hwy 73	37.4	D	16.8	B	37.4	D	16.8	B
NC Hwy 73 @ NC Hwy 16 SB ramps	signalized	Intersection Average	27.5	C	18.4	B	23.6	C	15.4	B
		NB - NC Hwy 16 SB ramps	49.1	D	51.4	D	44.9	D	37.7	D
		EB - NC Hwy 73	27.1	C	15.3	B	28.5	C	20.6	C
		WB - NC Hwy 73	19.2	B	9.3	A	10.5	B	5.1	A
NC Hwy 73 @ NC Hwy 16 NB ramps	signalized	Intersection Average	11.7	B	60.0	E	10.1	B	29.7	C
		NB - NC Hwy 16 NB ramp	59.9	E	72.9	E	62.2	E	54.4	D
		EB - NC Hwy 73	6.4	A	13.4	B	6.7	A	12.4	B
		WB - NC Hwy 73	8.6	A	85.1	F	4.6	A	32.0	C
NC Hwy 73 @ Walmart/Lowes West Entrance	signalized	Intersection Average	16.8	B	38.8	D	15.0	B	25.9	C
		NB - West Entrance	56.4	E	98.1	F	56.9	E	66.4	E
		SB - West Entrance	42.2	D	40.7	D	33.3	C	30.6	C
		EB - NC Hwy 73	14.2	B	29.8	C	11.7	B	21.8	C
		WB - NC Hwy 73	10.8	B	35.0	C	10.0	A	20.4	C
NC Hwy 73 @ Walmart/Lowes East Entrance	signalized	Intersection Average	18.5	B	26.8	C	15.6	B	21.2	C
		NB - East Entrance	49.4	D	41.7	D	49.4	D	41.4	D
		SB - East Entrance	58.7	E	61.5	E	58.7	E	60.8	E
		EB - NC Hwy 73	10.5	B	16.6	B	6.7	A	12.7	B
		WB - NC Hwy 73	17.9	B	23.3	C	15.3	B	14.1	B
NC Hwy 73 @ NC Hwy 16 Business	signalized	Intersection Average	52.7	D	98.5	F	39.3	D	52.4	D
		NB - NC Hwy 16 Business	68.9	E	131.3	F	55.2	E	60.5	E
		SB - NC Hwy 16 Business	31.3	C	72.1	E	42.8	D	60.7	E
		EB - NC Hwy 73	57.1	E	73.6	E	32.3	C	39.1	D
		WB - NC Hwy 73	57.6	E	128.5	F	35.9	D	56.9	E
NC Hwy 73 @ Connector to Ingleside Farm Rd	unsignalized	Signalized Intersection Average	--	--	--	--	14.7	B	12.7	B
		SB - Connector	339.9	F	65.9	F	28.1	C	25.1	C
		EB - NC Hwy 73	0.1	A	0.0	A	16.9	B	6.1	A
		WB - NC Hwy 73	0.0	A	0.0	A	8.2	A	14.8	B
Ingleside Farm Rd @ Connector to NC Hwy 73	unsignalized	EB - Connector	9.4	A	10.1	B	9.4	A	10.1	B
		NB - Ingleside Farm Rd	6.7	A	5.0	A	6.7	A	5.0	A
		SB - Ingleside Farm Rd	0.0	A	0.0	A	0.0	A	0.0	A
NC Hwy 73 @ School Bus Entrance/ Site Entrance 1	unsignalized	Signalized Intersection Average	--	--	--	--	--	--	--	--
		NB - Site Entrance 1	--	--	--	--	--	--	--	--
		SB - School Bus Entrance	34.4	D	34.0	D	34.4	D	34.0	D
		EB - NC Hwy 73	0.4	A	0.1	A	0.4	A	0.1	A
		WB - NC Hwy 73	0.0	A	0.0	A	0.0	A	0.0	A
NC Hwy 73 @ Main School Entrance	unsignalized	SB - School Entrance	**	F	80.5	F	**	F	80.5	F
		EB - NC Hwy 73	3.8	A	1.4	A	3.8	A	1.4	A
		WB - NC Hwy 73	0.0	A	0.0	A	0.0	A	0.0	A
Unacceptable LOS										
** delays over 1,000 seconds										



## SITE TRIP GENERATION AND DISTRIBUTION

The 1,650 lot development is proposed to consist of 1,350 active/senior adult detached housing units and 300 single-family detached housing units. The site is proposed to have two access points. The main entrance will be located on NC 73 opposite a bus entrance for East Lincoln High School. A secondary site entrance is proposed on Little Egypt Road (see Figure 1).

It is estimated that the proposed Carolina Ridge development will generate a total of 7,679 daily trips. Of those daily trips, 479 trips will be generated during the AM peak hour (hourly, 7 AM – 9 AM) and 598 trips will be generated during the PM peak hour (hourly, 4 PM – 6 PM). Table 4 summarizes the trip generation estimates.

**Table 4 Carolina Ridge Site Trip Generation**

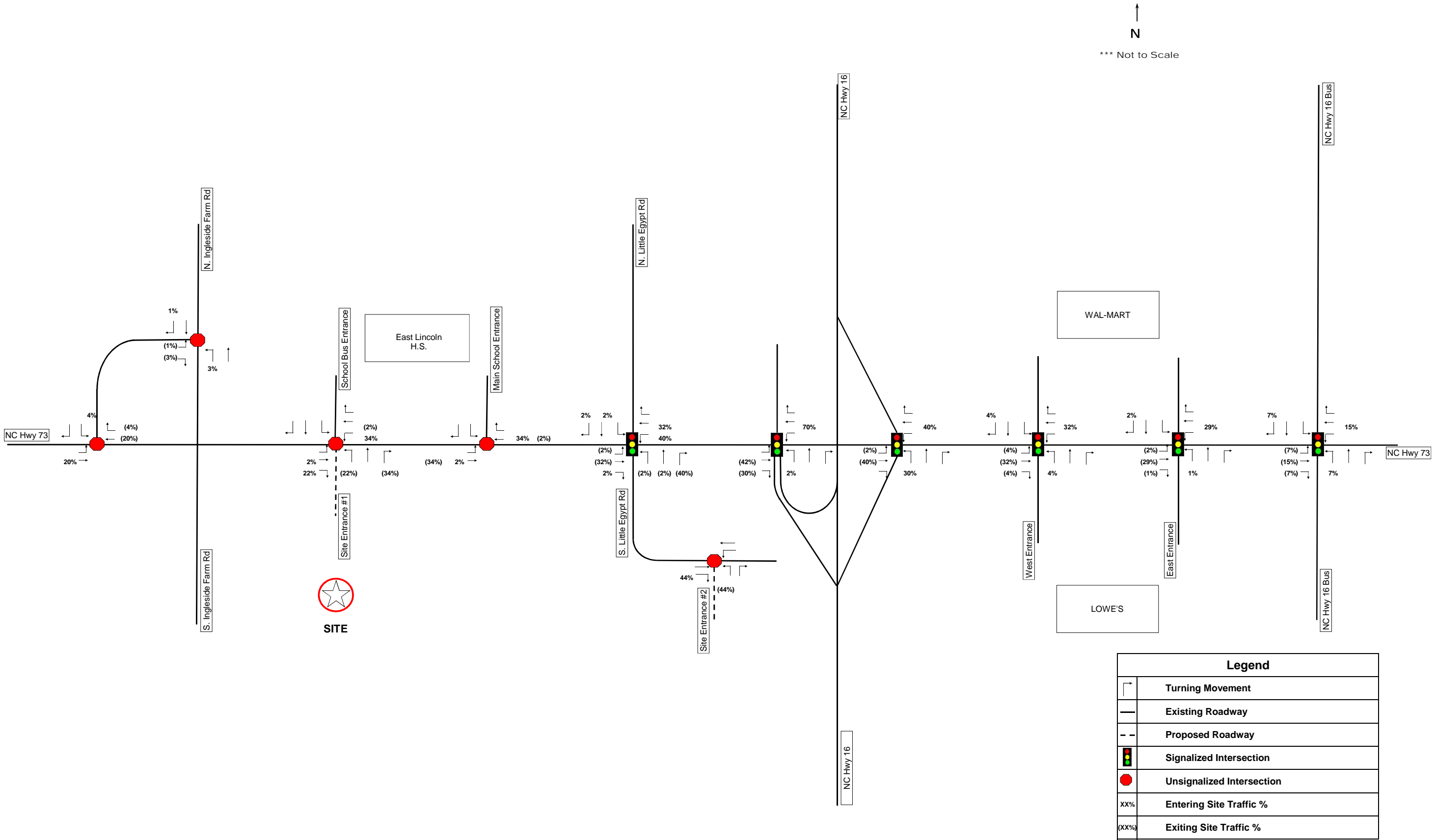
ITE CODE	LAND USE	SIZE		Average Daily Trips (24 Hours)			AM Peak Hour (One Hour Between 7 and 9 AM)			PM Peak Hour (One Hour Between 4 and 6 PM)		
				Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
210	Single Family	300	DU	1,443	1,443	2,886	55	165	220	178	104	282
251	Senior Adult Housing - Detached	1,350	DU	2,397	2,397	4,793	91	168	259	193	123	316
<b>TOTAL NUMBER OF TRIPS</b>				<b>3,840</b>	<b>3,840</b>	<b>7,679</b>	<b>146</b>	<b>333</b>	<b>479</b>	<b>371</b>	<b>227</b>	<b>598</b>

Source: ITE Trip Generation 9th Edition, ITE Trip Generation Handbook 2nd Edition, and NCDOT Congestion Management Capacity Analysis Guidelines.

Per discussions with NCDOT, it is estimated 20% of the trips will come from the west on NC 73, 32% from NC 16 Bypass, 14% from NC 16 Business, 15% from the east on NC 73, and the rest of the site trips come from Ingleside Farm Road, Little Egypt Road, Lowes and Walmart. It is also estimated that the primary site entrance on NC 73 will accommodate 56% of the site traffic.

Figure 9 illustrates the site trip distribution patterns. The site trip volumes, as shown in Figure 10, were obtained by applying the site trip distribution percentages.

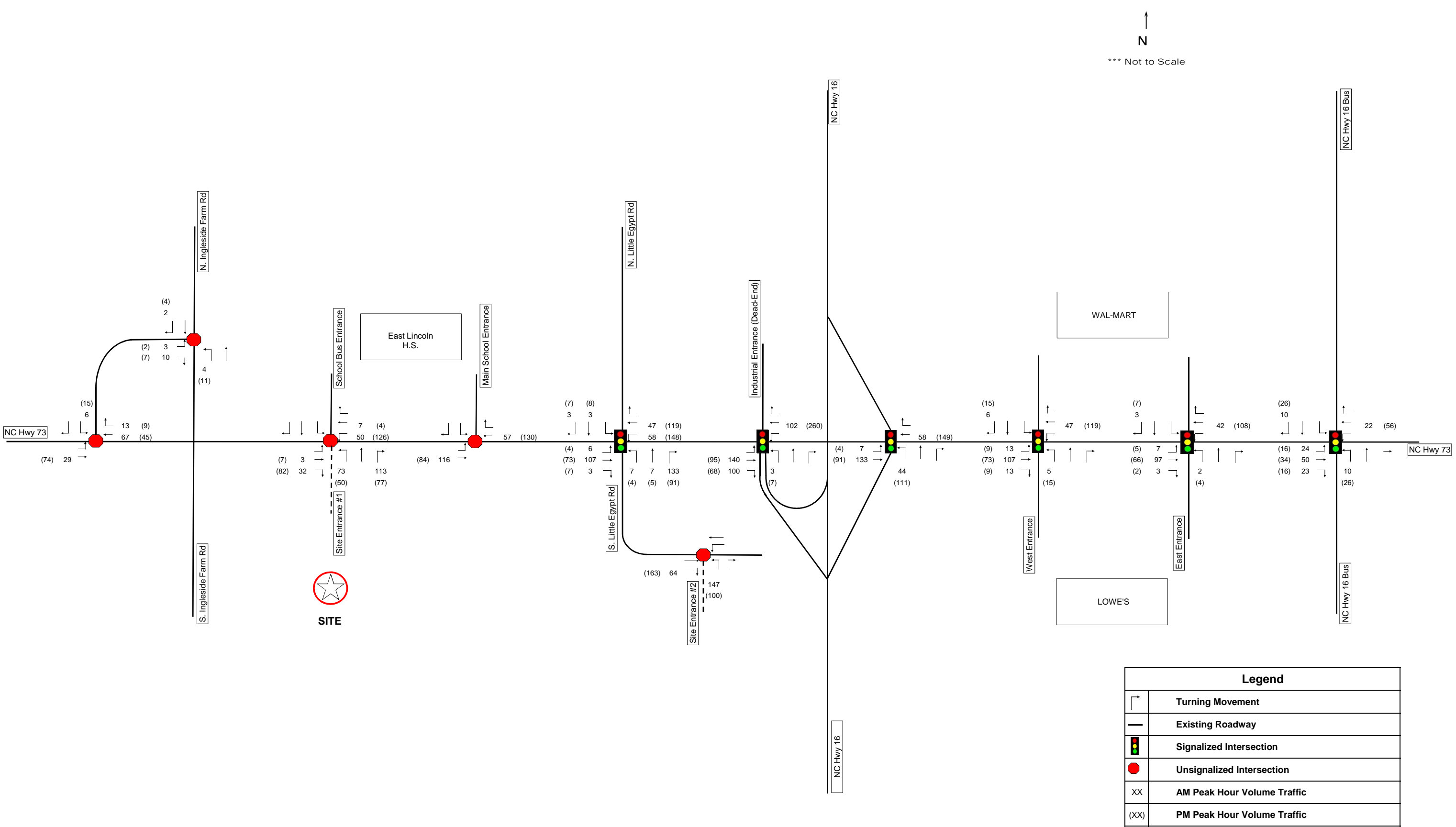




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**Carolina Ridge  
Traffic Impact Analysis**

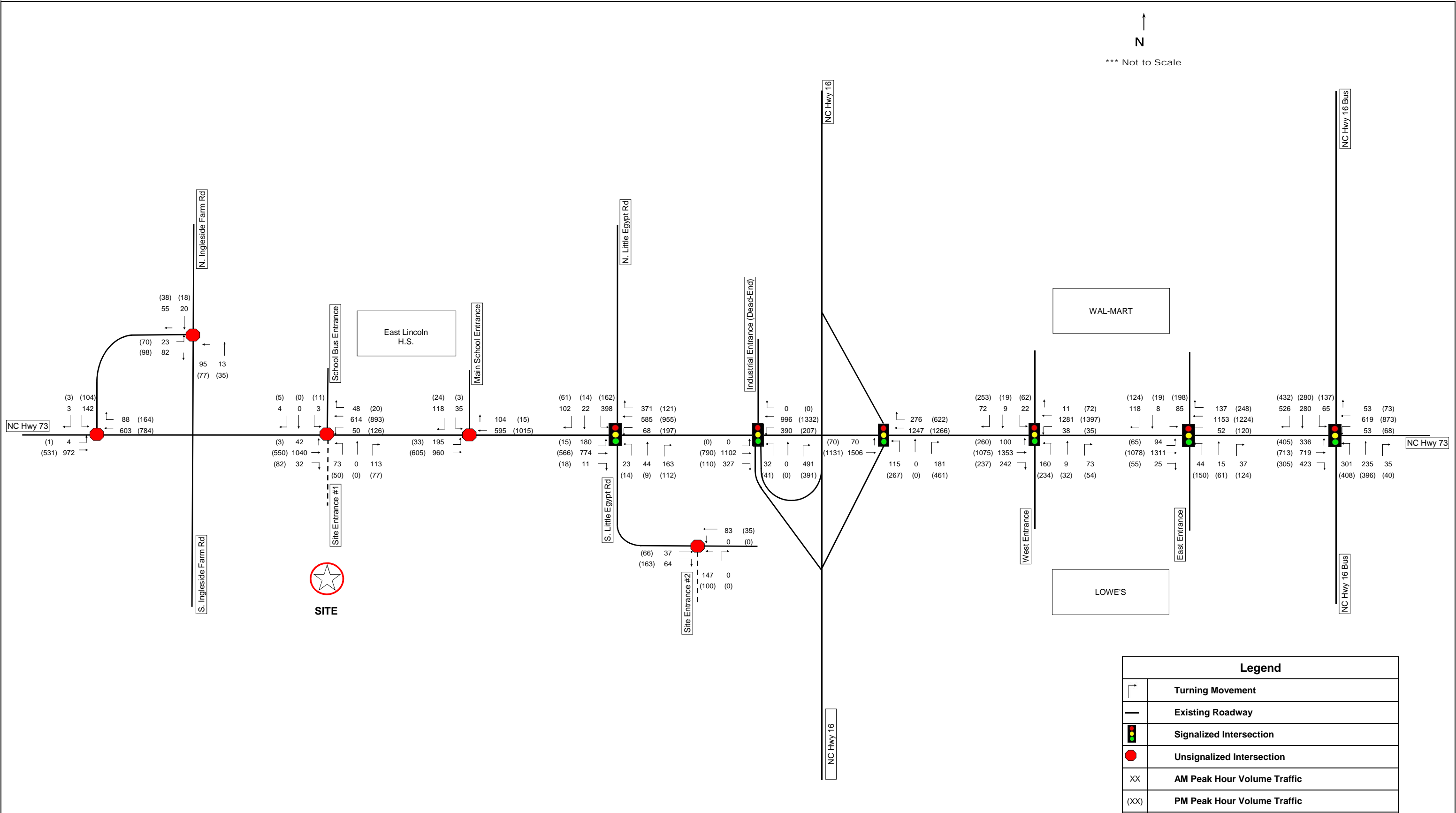
**Figure 9  
Site Trip Distribution**



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**Carolina Ridge  
Traffic Impact Analysis**

**Figure 10  
Site Traffic Volumes**



## **2021 BUILD ANALYSIS**

The total future build condition traffic volumes, as shown in Figure 11 on the previous page, include both the site trips and traffic volumes from the Future No Build Analysis. Table 5 compares the 2021 Build Conditions capacity analysis results with those for the No Build Condition analysis.

As expected, the site traffic will add delays to all the existing intersections. The unsignalized intersection of the NC 73 and School Bus Entrance/ Site Entrance 1 as well as the T-intersection of NC 73 and the connector to Ingleside Farm Road are expected to have excessive delays on the minor street approaches. Preliminary analysis indicates that the peak hour signal warrant will be met at both locations.

It is assumed that, at the NC 73 and School Bus Entrance/ Site Entrance intersection, a 100 feet long westbound left-turn lane will be provided on NC 73 by revising the existing pavement markings. This new westbound left-turn lane, along with the taper required, will reduce the existing eastbound left-turn lane at the main school entrance intersection to approximately 400 feet of storage. Capacity analysis and traffic simulations show that this turn lane length reduction will not affect the school entrance operation.



**Table 5 2021 Build vs No Build Conditions LOS Analysis**

Intersection	Approach		No Build (2021)				Build (2021)			
			AM		PM		AM		PM	
			Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
NC Hwy 73 @ S. Little Egypt Rd (SR 1386)	signalized	Intersection Average	39.5	D	17.0	B	43.3	D	22.2	C
		NB - S. Little Egypt Rd	20.5	C	27.8	C	23.8	C	39.6	D
		SB - N. Little Egypt Rd	52.2	D	37.4	D	64.0	E	58.1	E
		EB - NC Hwy 73	36.0	D	7.7	A	36.6	D	6.9	A
		WB - NC Hwy 73	37.4	D	16.8	B	43.5	D	20.8	C
NC Hwy 73 @ NC Hwy 16 SB ramps	signalized	Intersection Average	27.5	C	18.4	B	30.0	C	17.3	B
		NB - NC Hwy 16 SB ramps	49.1	D	51.4	D	48.9	D	43.2	D
		EB - NC Hwy 73	27.1	C	15.3	B	35.0	C	20.0	B
		WB - NC Hwy 73	19.2	B	9.3	A	17.6	B	8.5	A
NC Hwy 73 @ NC Hwy 16 NB ramps	signalized	Intersection Average	11.7	B	60.0	E	12.8	B	81.0	F
		NB - NC Hwy 16 NB ramp	59.9	E	72.9	E	59.9	E	69.6	E
		EB - NC Hwy 73	6.4	A	13.4	B	7.5	A	16.0	B
		WB - NC Hwy 73	8.6	A	85.1	F	9.1	A	126.8	F
NC Hwy 73 @ Walmart/Lowes West Entrance	signalized	Intersection Average	16.8	B	38.8	D	17.9	B	50.6	D
		NB - West Entrance	56.4	E	98.1	F	58.6	E	149.5	F
		SB - West Entrance	42.2	D	40.7	D	42.9	D	42.6	D
		EB - NC Hwy 73	14.2	B	29.8	C	14.6	B	32.0	C
		WB - NC Hwy 73	10.8	B	35.0	C	12.7	B	50.7	D
NC Hwy 73 @ Walmart/Lowes East Entrance	signalized	Intersection Average	18.5	B	26.8	C	19.0	B	28.1	C
		NB - East Entrance	49.4	D	41.7	D	49.5	D	42.5	D
		SB - East Entrance	58.7	E	61.5	E	58.5	E	61.2	E
		EB - NC Hwy 73	10.5	B	16.6	B	11.3	B	18.0	B
		WB - NC Hwy 73	17.9	B	23.3	C	18.8	B	25.5	C
NC Hwy 73 @ NC Hwy 16 Business	signalized	Intersection Average	52.7	D	98.5	F	60.9	E	111.8	F
		NB - NC Hwy 16 Business	68.9	E	131.3	F	73.5	E	148.6	F
		SB - NC Hwy 16 Business	31.3	C	72.1	E	30.9	C	69.9	E
		EB - NC Hwy 73	57.1	E	73.6	E	72.0	E	81.5	F
		WB - NC Hwy 73	57.6	E	128.5	F	64.1	E	158.6	F
NC Hwy 73 @ Connector to Ingleside Farm Rd	unsignalized	Signalized Intersection Average	--	--	--	--	--	--	--	--
		SB - Connector	339.9	F	65.9	F	496.7	F	130.7	F
		EB - NC Hwy 73	0.1	A	0.0	A	0.2	A	0.0	A
		WB - NC Hwy 73	0.0	A	0.0	A	0.0	A	0.0	A
Ingleside Farm Rd @ Connector to NC Hwy 73	unsignalized	EB - Connector	9.4	A	10.1	B	9.5	A	10.4	B
		NB - Ingleside Farm Rd	6.7	A	5.0	A	6.7	A	5.3	A
		SB - Ingleside Farm Rd	0.0	A	0.0	A	0.0	A	0.0	A
NC Hwy 73 @ School Bus Entrance/ Site Entrance 1	unsignalized	Signalized Intersection Average	--	--	--	--	--	--	--	--
		NB - Site Entrance 1	--	--	--	--	948.5	F	351.3	F
		SB - School Bus Entrance	34.4	D	34.0	D	163.2	F	129.2	F
		EB - NC Hwy 73	0.4	A	0.1	A	0.4	A	0.0	A
		WB - NC Hwy 73	0.0	A	0.0	A	0.8	A	1.2	A
NC Hwy 73 @ Main School Entrance	unsignalized	SB - School Entrance	**	F	80.5	F	**	F	470.4	F
		EB - NC Hwy 73	3.8	A	1.4	A	3.9	A	1.6	A
		WB - NC Hwy 73	0.0	A	0.0	A	0.0	A	0.0	A
S. Little Egypt Rd (SR 1386) @ Site Entrance 2	unsignalized	NB - Site Entrance 2	--	--	--	--	10.5	B	10.3	B
		EB - S. Little Egypt Rd	--	--	--	--	0.0	A	0.0	A
		WB - S. Little Egypt Rd	--	--	--	--	0.0	A	0.0	A
Unacceptable LOS										
** delays over 1,000 seconds										

## **2021 BUILD WITH IMPROVEMENTS ANALYSIS**

Comparing the No Build and Build traffic analyses results, seven out of the ten existing intersections experience significant increases in delays (25% or greater) and/or the degradations of LOS. The following improvements are recommended to provide acceptable LOS where feasible, and similar traffic operational performance as in the 2021 No Build conditions where LOS D or better cannot be realistically achieved without excessive roadway infrastructure improvements.

### NC 73 Closed Loop System

- Traffic signal timing optimization on the NC 73 corridor.

### NC 73 and Little Egypt Road

- Extend the northbound right-turn lane by approximately 125' to provide 175' of storage.
- Extend the westbound left-turn lane by approximately 110' to provide 200' of storage.
- Extend the westbound right-turn lane by approximately 50' to provide 150' of storage.
- Extend the southbound left-turn lane by approximately 230' to Catawba Springs Road and provide 320' of storage.
- This isolated traffic signal shall be evaluated for suitability of coordination with the traffic signals in the NC 73 signal system.

### NC 73 and NC 16 Bypass Northbound Ramps

- Widen the northbound approach (exit ramp) to provide a 300' left-turn lane, a 300' right-turn lane and a left-turn/through/right-turn shared lane with appropriate tapers.
- Signal modifications to accommodate the proposed northbound lane configuration.

### NC 73 and Lowe's/Walmart West Entrance

- Restripe the southbound approach to provide a through/left-turn shared lane and an exclusive right-turn lane.
- Signal modifications to accommodate the proposed southbound lane configuration. This should allow the southbound right-turn movement to overlap (run concurrently with) the eastbound left-turn movement.

### NC 73 and NC 16 Business

- Extend the eastbound right-turn lane by approximately 50' to provide 175' of storage.
- Construct a second northbound left-turn lane from E Cross Drive to NC 73 with approximately 400' of storage and appropriate tapers.
- Extend the westbound right-turn lane by approximately 460' and convert it to a through / right-turn shared lane with 550' of storage.
- Restrict the southbound left-turn movement at the NC 73 intersection and redirect this turning movement to NC 73 via N Pilot Knob Road upstream of the intersection, or E Cross Street / Waterside Crossing Boulevard / Crossing Center Road / S Pilot Knob Road downstream of the intersection.
- Convert the southbound approach to provide one through lane and two exclusive right-turn lanes. The through lane, which should be a min of 600' in length, will be positioned in the existing left-turn/TWLT lane.

- Signal modifications to accommodate the proposed lane configurations. This should allow the southbound dual right-turn movement to overlap (run concurrently with) the eastbound dual left-turn movement.

#### NC 73 and Connector to Ingleside Farm Road

- Install an actuated traffic signal at this intersection with appropriate signal heads, poles, loop detectors, junction boxes, etc. Signal warrant analysis shall be performed before the signal installation, and the signal installation must be approved by the local jurisdictions and NCDOT.

*Note: the subject intersection is expected to meet the peak hour signal warrant in the 2021 No Build conditions. It is recommended that traffic conditions should be monitored as the proposed development phases in to determine when a traffic signal will be warranted.*

#### NC 73 and School Bus Entrance / Site Entrance 1

- Construct two northbound exit lanes at the site entrance with 175' of storage and appropriate tapers.
- Restripe the westbound approach to provide a left-turn lane with 100' of storage and appropriate tapers.
- Install an actuated traffic signal at this intersection with appropriate signal heads, poles, loop detectors, junction boxes, etc. Signal warrant analysis shall be performed before the signal installation, and the signal installation must be approved by the local jurisdictions and NCDOT. This traffic signal should coordinate with the adjacent signal at the NC 73 and Little Egypt Road intersection.

#### NC 73 and Main School Entrance

- Evaluate the school traffic access and circulation and, if deemed appropriate and necessary by the school and NCDOT, restrict the left-turn movement from the main school entrance on NC 73 by installing a right-turn channelizing island at the entrance or a "left-over" raised median on NC 73.

#### Little Egypt Road and Site Entrance 2

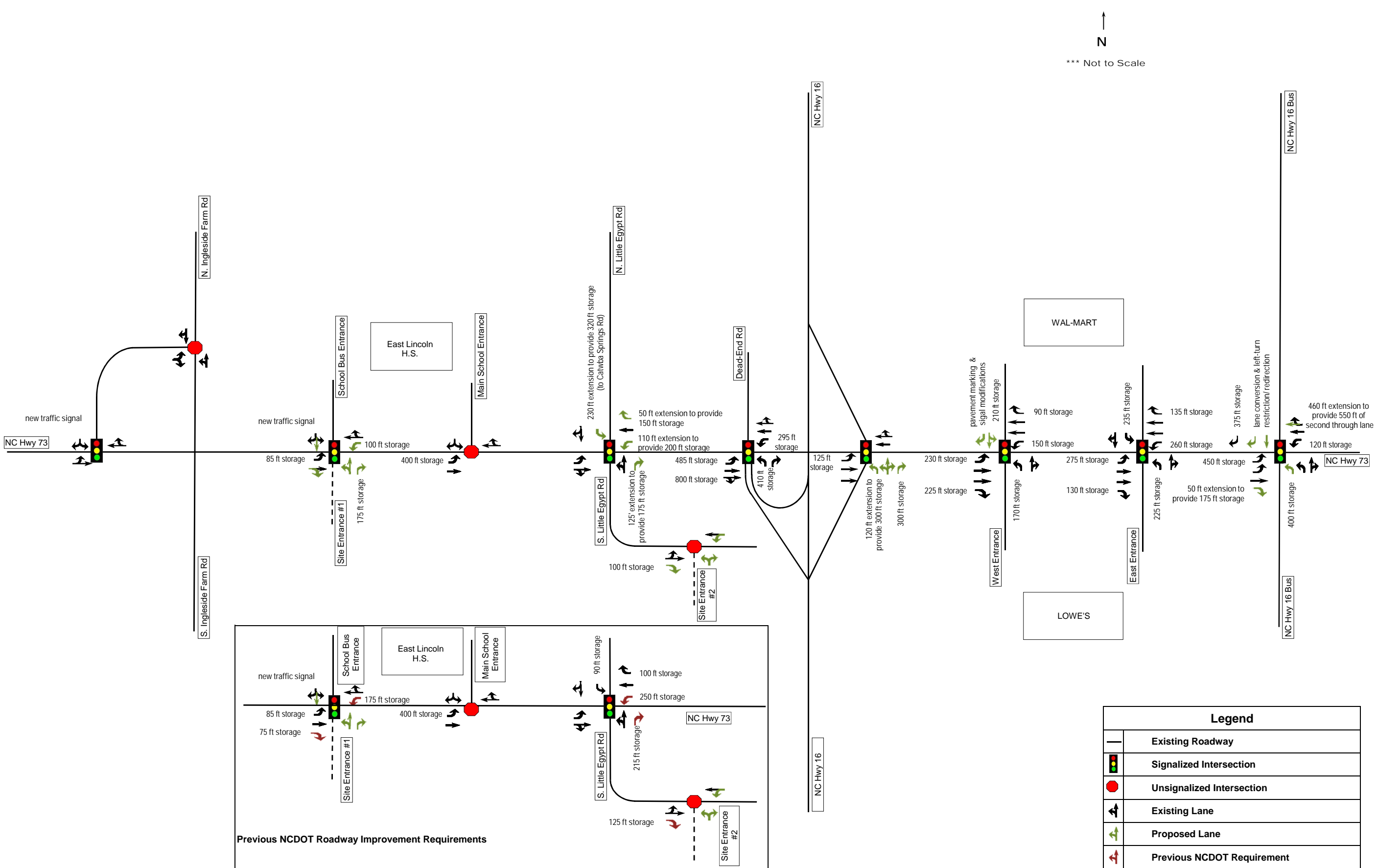
- Construct an eastbound (southbound) right-turn lane on Little Egypt Road with 100' of storage and appropriate tapers.

Table 6 compares the analysis results for the improvements discussed above with those in the No Build Condition Analysis. The proposed lane configurations are illustrated in Figure 12.

**Table 6 No Build vs Build with Improvements Condition LOS Analysis**

Intersection	Approach		No Build (2021)				Build (2021) with Improvements			
			AM		PM		AM		PM	
			Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
NC Hwy 73 @ S. Little Egypt Rd (SR 1386)	signalized	Intersection Average	39.5	D	17.0	B	43.8	D	19.9	B
		NB - S. Little Egypt Rd	20.5	C	27.8	C	29.1	C	50.6	D
		SB - N. Little Egypt Rd	52.2	D	37.4	D	61.7	E	66.5	E
		EB - NC Hwy 73	36.0	D	7.7	A	38.2	D	7.0	A
		WB - NC Hwy 73	37.4	D	16.8	B	43.4	D	14.0	B
NC Hwy 73 @ NC Hwy 16 SB ramps	signalized	Intersection Average	27.5	C	18.4	B	26.8	C	14.3	B
		NB - NC Hwy 16 SB ramps	49.1	D	51.4	D	48.5	D	36.8	D
		EB - NC Hwy 73	27.1	C	15.3	B	32.1	C	18.4	B
		WB - NC Hwy 73	19.2	B	9.3	A	13.3	B	5.6	A
NC Hwy 73 @ NC Hwy 16 NB ramps	signalized	Intersection Average	11.7	B	60.0	E	13.4	B	36.8	D
		NB - NC Hwy 16 NB ramp	59.9	E	72.9	E	63.7	E	62.2	E
		EB - NC Hwy 73	6.4	A	13.4	B	12.0	B	11.8	B
		WB - NC Hwy 73	8.6	A	85.1	F	5.2	A	42.8	D
NC Hwy 73 @ Walmart/Lowes West Entrance	signalized	Intersection Average	16.8	B	38.8	D	15.8	B	28.7	C
		NB - West Entrance	56.4	E	98.1	F	58.9	E	74.6	E
		SB - West Entrance	42.2	D	40.7	D	31.5	C	29.6	C
		EB - NC Hwy 73	14.2	B	29.8	C	11.3	B	23.8	C
		WB - NC Hwy 73	10.8	B	35.0	C	12.4	B	23.9	C
NC Hwy 73 @ Walmart/Lowes East Entrance	signalized	Intersection Average	18.5	B	26.8	C	12.6	B	21.9	C
		NB - East Entrance	49.4	D	41.7	D	49.5	D	42.5	D
		SB - East Entrance	58.7	E	61.5	E	58.5	E	61.2	E
		EB - NC Hwy 73	10.5	B	16.6	B	3.9	A	13.6	B
		WB - NC Hwy 73	17.9	B	23.3	C	12.0	B	15.5	B
NC Hwy 73 @ NC Hwy 16 Business	signalized	Intersection Average	52.7	D	98.5	F	40.8	D	53.5	D
		NB - NC Hwy 16 Business	68.9	E	131.3	F	56.2	E	70.3	E
		SB - NC Hwy 16 Business	31.3	C	72.1	E	42.2	D	62.8	E
		EB - NC Hwy 73	57.1	E	73.6	E	29.0	C	36.5	D
		WB - NC Hwy 73	57.6	E	128.5	F	51.0	D	55.9	E
NC Hwy 73 @ Connector to Ingleside Farm Rd	unsignalized	Signalized Intersection Average	--	--	--	--	13.2	B	12.0	B
		SB - Connector	339.9	F	65.9	F	32.4	C	28.8	C
		EB - NC Hwy 73	0.1	A	0.0	A	14.5	B	5.3	A
		WB - NC Hwy 73	0.0	A	0.0	A	7.2	A	13.8	B
Ingleside Farm Rd @ Connector to NC Hwy 73	unsignalized	EB - Connector	9.4	A	10.1	B	9.5	A	10.4	B
		NB - Ingleside Farm Rd	6.7	A	5.0	A	6.7	A	5.3	A
		SB - Ingleside Farm Rd	0.0	A	0.0	A	0.0	A	0.0	A
NC Hwy 73 @ School Bus Entrance/ Site Entrance 1	unsignalized	Signalized Intersection Average	--	--	--	--	14.6	B	8.9	A
		NB - Site Entrance 1	--	--	--	--	66.2	E	58.0	E
		SB - School Bus Entrance	34.4	D	34.0	D	46.8	D	48.1	D
		EB - NC Hwy 73	0.4	A	0.1	A	13.3	B	5.3	A
		WB - NC Hwy 73	0.0	A	0.0	A	2.8	A	4.4	A
NC Hwy 73 @ Main School Entrance	unsignalized	SB - School Entrance	**	F	80.5	F	**	F	151.7	F
		EB - NC Hwy 73	3.8	A	1.4	A	3.9	A	1.7	A
		WB - NC Hwy 73	0.0	A	0.0	A	0.0	A	0.0	A
S. Little Egypt Rd (SR 1386) @ Site Entrance 2	unsignalized	NB - Site Entrance 2	--	--	--	--	10.2	B	9.7	A
		EB - S. Little Egypt Rd	--	--	--	--	0.0	A	0.0	A
		WB - S. Little Egypt Rd	--	--	--	--	0.0	A	0.0	A
Unacceptable LOS										
** delays over 1,000 seconds										





## CONCLUSIONS AND RECOMMENDATIONS

This study indicates that the proposed Carolina Ridge development will generate a total of 7,679 daily trips. Of those daily trips, 479 trips will be generated during the AM peak hour and 598 trips will be generated during the PM peak hour.

Comparing the No Build and Build traffic analyses results, seven of the ten existing intersections experience significant increases in delays (25% or greater) and/or the degradations of LOS. The following improvements are recommended to provide acceptable LOS where feasible, and similar traffic operational performance as in the 2021 No Build conditions where LOS D or better cannot be realistically achieved without excessive roadway infrastructure improvements. It is noted that many of the recommended improvements, as highlighted in **bold** in below are also suggested for the design year 2021 without the proposed development (see No Build with Improvement Analysis).

The recommended improvements will address many roadway capacity deficiencies including those caused by the background traffic growth and off-site development. The developer's improvement responsibilities would be determined following further discussions and review by NCDOT based on the overall improvements recommended below.

### Recommended Improvements

#### NC 73 Closed Loop System (Improvements by NCDOT)

- **Traffic signal timing optimization or the NC 73 corridor.**
- **Evaluated the signal at NC 73 and Little Egypt Road for the suitability of coordination/inclusion with NC 73 CLS.**

#### NC 73 and Main School Entrance (Improvements by NCDOT)

- **Evaluate the school traffic access and circulation and, if deemed appropriate and necessary by the school and NCDOT, restrict the left-turn movement from the main school entrance on NC 73 by installing a right-turn channelizing island at the entrance or a "left-over" raised median on NC 73.**

#### NC 73 and Little Egypt Road

- Extend the northbound right-turn lane by approximately 125' to provide 175' of storage.
- Extend the westbound left-turn lane by approximately 110' to provide 200' of storage.
- **Extend the westbound right-turn lane by approximately 50' (200') to provide 150' (300') of storage.**
- **Extend the southbound left-turn lane by approximately 230' to Catawba Springs Road and provide 320' of storage.**
- **Coordinate this traffic signal with the NC 73 signal system if deemed appropriate and necessary by NCDOT.**

NC 73 and NC 16 Bypass Northbound Ramps

- **Widen the northbound approach** (exit ramp) to provide a 300' (**180'**) left-turn lane, a 300' (**275'**) right-turn lane and a left-turn/through/right-turn shared lane with appropriate tapers.
- **Signal modifications to accommodate the proposed northbound lane configuration.**

NC 73 and Lowe's/Walmart West Entrance

- **Restripe the southbound approach to provide a through/left-turn shared lane and an exclusive right-turn lane.**
- **Signal modifications to accommodate the proposed southbound lane configuration. This should allow the southbound right-turn movement to overlap (run concurrently with) the eastbound left-turn movement.**

NC 73 and NC 16 Business

- Extend the eastbound right-turn lane by approximately 50' to provide 175' of storage.
- **Construct a second northbound left-turn lane** from E Cross Drive to NC 73 with approximately 400' (**300'**) of storage and appropriate tapers.
- **Extend the westbound right-turn lane by approximately 460' and convert it to a through / right-turn shared lane with 550' of storage.**
- **Restrict the southbound left-turn movement at the NC 73 intersection and redirect this turning movement to NC 73 via N Pilot Knob Road upstream of the intersection, or E Cross Street / Waterside Crossing Boulevard / Crossing Center Road / S Pilot Knob Road downstream of the intersection.**
- **Convert the southbound approach to provide one through lane and two exclusive right-turn lanes. The through lane, which should be a min of 600' in length, will be positioned in the existing left-turn/TWLT lane.**
- **Signal modifications to accommodate the proposed lane configurations. This should allow the southbound dual right-turn movement to overlap (run concurrently with) the eastbound dual left-turn movement.**

NC 73 and Connector to Ingleside Farm Road

- **Install an actuated traffic signal at this intersection with appropriate signal heads, poles, loop detectors, junction boxes, etc. Signal warrant analysis shall be performed before the signal installation, and the signal installation must be approved by the local jurisdictions and NCDOT.**

*Note: the subject intersection is expected to meet the peak hour signal warrant in the 2021 No Build conditions. It is recommended that traffic conditions should be monitored as the proposed development phases in to determine when a traffic signal will be warranted.*

NC 73 and School Bus Entrance / Site Entrance 1

- Construct two northbound exit lanes at the site entrance with 175' of storage and appropriate tapers.
- Restripe the westbound approach to provide a left-turn lane with 100' of storage and appropriate tapers.

- Install an actuated traffic signal at this intersection with appropriate signal heads, poles, loop detectors, junction boxes, etc. Signal warrant analysis shall be performed before the signal installation, and the signal installation must be approved by the local jurisdictions and NCDOT. This traffic signal should coordinate with the adjacent signal at the NC 73 and Little Egypt Road intersection.

#### Little Egypt Road and Site Entrance 2

- Construct an eastbound (southbound) right-turn lane on Little Egypt Road with 100' of storage and appropriate tapers.

*It should be noted that this study, as recommended in the NCDOT Traffic Analysis Guidelines, does not allow Right Turn on Red (RTOR) or protected/permissive left-turn operations for future condition analyses to provide a more conservative estimate of the development traffic impacts. In reality, RTOR is allowed by the state law unless otherwise posted. Protected/permissive left-turn phasing can often improve the efficiency of the traffic signal operations, and thus it is commonly used at locations with moderate turning movement conflicts and minimal safety or sight distance concerns. If either or both operations are allowed in the analyses, it is expected that certain improvements listed above, such as the improvements for the NC 73 and NC 16 Bypass northbound exit ramp intersection, might not be the most efficient solutions to provide acceptable LOS in the build conditions.*

For comparison purposes, the following is list of roadway improvements previously required by NCDOT for the *Carolina Ridge by Del Webb at Ingleside* in 2006.

#### **Previous NCDOT Requirements**

##### NC 73 and Little Egypt Road

- Extend westbound left-turn lane on NC 73 to a total of 250 feet storage.
- Construct a northbound right-turn lane on Little Egypt Road with 215 feet storage.

##### NC 73 and Site Entrance 1

- This entrance must line up with the school entrance.
- A signal will not be placed here until real traffic counts show a signal is warranted.
- Construct a 175' left-turn lane on westbound NC 73.
- Construct a 75' right-turn lane on eastbound NC 73.

##### Little Egypt Road and Site Entrance 2

- Construct a 125 foot right-turn lane on Little Egypt Road

The differences in the improvement recommendations are primarily caused by the more conservative analysis methodologies as required by the NCDOT, the new traffic pattern (including traffic movements associated with section of NC 16 Bypass between NC 150 and NC 73 which were not included in the original study), and the lack of uncommitted or unfunded improvements provided by others that were previously assumed for the intersections along NC 73 at NC 16 Business, Little Egypt Road, and the connector road to Ingleside Farm Road.

Table 7 on the following page summarizes the capacity analysis results for this study.



Table 7 LOS Analysis Summary

Intersection	Approach	Existing (2013)			No Build (2021)			No Build (2021) with Improvements			Build (2021)			Build (2021) with Improvements					
		AM	PM	LOS	AM	PM	LOS	AM	PM	LOS	AM	PM	LOS	AM	PM	LOS			
		Delay (sec)	Delay (sec)	LOS	Delay (sec)	Delay (sec)	LOS	Delay (sec)	Delay (sec)	LOS	Delay (sec)	Delay (sec)	LOS	Delay (sec)	Delay (sec)	LOS			
NC Hwy 73 @ S. Little Egypt Rd (SR 1386)	Intersection Average	23.8	C	11.8	B	39.5	D	17.0	B	39.5	D	17.0	B	43.3	D	43.8	D	19.9	B
	NB - S. Little Egypt Rd	18.3	B	23.2	C	20.5	C	27.8	C	20.5	C	27.8	C	23.8	C	39.6	D	29.1	C
	SB - N. Little Egypt Rd	32.2	C	25.8	C	52.2	D	37.4	D	52.2	D	37.4	D	64.0	E	58.1	E	61.7	E
	EB - NC Hwy 73	15.0	B	6.2	A	36.0	D	7.7	A	36.0	D	7.7	A	36.6	D	6.9	A	38.2	D
	WB - NC Hwy 73	27.7	C	11.1	B	37.4	D	16.8	B	37.4	D	16.8	B	43.5	D	20.8	C	43.4	D
NC Hwy 73 @ NC Hwy 16 SB ramps	Intersection Average	18.4	B	13.5	B	27.5	C	18.4	B	23.6	C	15.4	B	30.0	C	17.3	B	26.8	C
	NB - NC Hwy 16 SB ramps	53.2	D	54.4	D	49.1	D	51.4	D	44.9	D	37.7	D	48.9	D	43.2	D	48.5	D
	EB - NC Hwy 73	16.0	B	10.2	B	27.1	C	15.3	B	28.5	C	20.6	C	35.0	C	20.0	B	32.1	C
	WB - NC Hwy 73	6.2	A	1.3	A	19.2	B	9.3	A	10.5	B	5.1	A	17.6	B	8.5	A	13.3	B
	Intersection Average	7.8	A	22.2	C	11.7	B	60.0	E	10.1	B	29.7	C	12.8	B	81.0	F	13.4	B
NC Hwy 73 @ NC Hwy 16 NB ramps	NB - NC Hwy 16 NB ramp	58.3	E	55.6	E	59.9	E	72.9	E	62.2	E	54.4	D	59.9	E	69.6	E	63.7	E
	EB - NC Hwy 73	2.6	A	7.7	A	6.4	A	13.4	B	6.7	A	12.4	B	7.5	A	16.0	B	12.0	B
	WB - NC Hwy 73	4.5	A	19.3	B	8.6	A	85.1	F	4.6	A	32.0	C	9.1	A	126.8	F	5.2	A
	Intersection Average	10.1	B	17.8	B	16.8	B	38.8	D	15.0	B	25.9	C	17.9	B	50.6	D	15.8	B
	NB - West Entrance	57.0	E	74.7	E	56.4	E	98.1	F	56.9	E	66.4	E	58.6	E	149.5	F	58.9	E
NC Hwy 73 @ Walmart/Lowes West Entrance	SB - West Entrance	47.1	D	48.3	D	42.2	D	40.7	D	33.3	C	30.6	C	42.9	D	42.6	D	31.5	C
	EB - NC Hwy 73	6.1	A	7.3	A	14.2	B	29.8	C	11.7	B	21.8	C	14.6	B	32.0	C	11.3	B
	WB - NC Hwy 73	4.0	A	10.6	B	10.8	B	35.0	C	10.0	A	20.4	C	12.7	B	50.7	D	12.4	B
	Intersection Average	10.3	B	16.0	B	18.5	B	26.8	C	15.6	B	21.2	C	19.0	B	28.1	C	12.6	B
	NB - East Entrance	48.6	D	44.4	D	49.4	D	41.7	D	49.4	D	41.4	D	49.5	D	42.5	D	49.5	D
NC Hwy 73 @ Walmart/Lowes East Entrance	SB - East Entrance	59.1	E	60.0	E	58.7	E	61.5	E	58.7	E	60.8	E	58.5	E	61.2	E	58.5	E
	EB - NC Hwy 73	4.3	A	6.2	A	10.5	B	16.6	B	6.7	A	12.7	B	11.3	B	18.0	B	3.9	A
	WB - NC Hwy 73	6.4	A	7.7	A	17.9	B	23.3	C	15.3	B	14.1	B	18.8	B	25.5	C	12.0	B
	Intersection Average	35.5	D	49.3	D	52.7	D	98.5	F	39.3	D	52.4	D	60.9	E	111.8	F	40.8	D
	NB - NC Hwy 16 Business	49.5	D	65.4	E	68.9	E	131.3	F	55.2	E	60.5	E	73.5	E	148.6	F	56.2	E
NC Hwy 73 @ NC Hwy 16 Business	SB - NC Hwy 16 Business	23.6	C	40.6	D	31.3	C	72.1	E	42.8	D	60.7	E	30.9	C	69.9	E	42.2	D
	EB - NC Hwy 73	35.1	D	39.6	D	57.1	E	73.6	E	32.3	C	39.1	D	72.0	E	81.5	F	29.0	C
	WB - NC Hwy 73	39.9	D	56.6	E	57.6	E	128.5	F	35.9	D	56.9	E	64.1	E	158.6	F	51.0	D
	Signalized Intersection Average	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	SB - Connector	56.3	F	25.4	D	339.9	F	65.9	F	28.1	C	25.1	C	496.7	F	130.7	F	32.4	C
Ingleside Farm Rd @ Connector to NC Hwy 73	EB - NC Hwy 73	0.1	A	0.0	A	0.1	A	0.0	A	16.9	B	6.1	A	0.2	A	0.0	A	14.5	B
	WB - NC Hwy 73	0.0	A	0.0	A	0.0	A	0.0	A	8.2	A	14.8	B	0.0	A	0.0	A	7.2	A
	EB - Connector	9.1	A	9.6	A	9.4	A	10.1	B	9.4	A	10.1	B	9.5	A	10.4	B	9.5	A
	NB - Ingleside Farm Rd	6.6	A	4.8	A	6.7	A	5.0	A	6.7	A	5.0	A	6.7	A	5.3	A	6.7	A
	SB - Ingleside Farm Rd	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
NC Hwy 73 @ School Bus Entrance/ Site Entrance 1	Signalized Intersection Average	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	NB - Site Entrance 1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	SB - School Bus Entrance	20.2	C	20.9	C	34.4	D	34.0	D	34.4	D	34.0	D	163.2	F	129.2	F	46.8	D
	EB - NC Hwy 73	0.3	A	0.0	A	0.4	A	0.1	A	0.4	A	0.1	A	0.4	A	0.0	A	13.3	B
	WB - NC Hwy 73	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.8	A	1.2	A	2.8	A
NC Hwy 73 @ Main School Entrance	SB - School Entrance	697.2	F	18.9	C	**	F	80.5	F	**	F	80.5	F	**	F	470.4	F	**	F
	EB - NC Hwy 73	2.9	A	1.2	A	3.8	A	1.4	A	3.8	A	1.4	A	3.9	A	1.6	A	3.9	A
	WB - NC Hwy 73	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
Unacceptable LOS		delays over 1,000 seconds																	