



LINCOLN COUNTY PLANNING & INSPECTIONS DEPARTMENT
302 NORTH ACADEMY STREET, SUITE A, LINCOLNTON, NORTH CAROLINA 28092
704-736-8440 OFFICE 704-736-8434 INSPECTION REQUEST LINE 704-732-9010 FAX

To: Board of Commissioners
Planning Board

From: Randy Hawkins, Zoning Administrator

Date: January 17, 2014

Re: PD #2014-1
Shea Homes Limited Partnership, applicant
Parcel ID# 85734, 02441, 31428, 51876, 32945, 58834, 58835, 86073, 86072,
86071 and 51881

The following information is for use by the Lincoln County Board of Commissioners and Planning Board at their joint meeting/public hearing on February 3, 2014.

REQUEST

The applicant is requesting the rezoning of approximately 600 acres from CU PD-R (Conditional Use Planned Development-Residential) to PD-R (Planned Development-Residential) to permit a development with up to 1,650 single-family detached and attached homes, mostly restricted to older adults but with up to 300 homes not age-restricted. A concept plan and a report are included as part of the rezoning application and would serve as the master plan for the development.

The plan is similar to one that was approved in a parallel conditional use rezoning in 2006. At the request of Pulte Homes, this property was rezoned from R-T (Transitional Residential), B-N (Neighborhood Business) and I-G (General Industrial) to CU PD-R to permit 1,571 homes, all restricted to older adults. That plan never got off the ground but is still in effect, due to an approved five-year zoning vested right and the state's Permit Extension Act, which lengthened the running time for development approvals by four years.

Shea Homes has opted to apply for a rezoning rather than applying to modify the 2006 plan, which was approved in a quasi-judicial process. Under the Lincoln County Unified Development Ordinance (UDO), planned developments are now subject to approval through a legislative rezoning that doesn't require the issuance of a conditional use permit.

PD-R is a zoning option provided under the UDO to encourage a mix of housing types, allowing a density bonus in return for the provision of a higher quality development. The proposed overall density is 2.75 units per acre.

SITE AREA AND DESCRIPTION

The property is located on the south side of N.C. 73 and west side of Little Egypt Road in Catawba Springs Township. It is adjoined by property zoned R-T, R-SF (Residential Single Family), CU B-G (Conditional Use General Business), CU R-S (Conditional Use Residential Suburban), CU PD-R and I-G. Land uses in this area include residential, institutional and industrial. Public water and sewer are available in this area. The Lincoln County Land Use Plan designates this property as Mixed Residential (e.g., single-family, multi-family, town home, patio home), suitable for densities ranging from 2 to 8 units per acre, proportional to the amount of open space preserved. Under the proposed plan, at least 30 percent of the acreage would be set aside as open space.

REQUESTED WAIVERS

The General Development Standards (Article 3) of the UDO apply to planned developments, unless specifically waived by the Board of Commissioners. In this case, the applicant is requesting a waiver from the minimum parking requirements for the clubhouse and a waiver from the UDO's specific landscaping, screening and buffer requirements for internal areas of the development, with the provision that the applicant will submit its own landscaping plan for each phase.

The applicant is also requesting waivers from the UDO's Subdivision Standards (Article 5). Under the Section 9.6.9.F of the UDO, the Planning Board is authorized to grant waivers from the subdivision standards if it makes certain findings. The Planning Board will hold a hearing on this request following the zoning hearing.

TRAFFIC ANALYSIS

A traffic impact analysis has been submitted as part of the rezoning application. NCDOT's comments on the analysis are also included.

STAFF'S RECOMMENDATION

Staff recommends approval of the rezoning request. See proposed statement on following page for rationale.



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Zoning Amendment Staff's Proposed Statement of Consistency and Reasonableness

Case No. **PD #2014-1**

Applicant **Shea Homes Limited Partnership.**

Parcel ID# **85734, 02441, 31428, 51876, 32945, 58834, 58835, 86073, 86072, 86071 and 51881**

Location **south side of N.C. 73, west side of Little Egypt Road**

Proposed amendment **Rezone from CU PD-R to PD-R**

This proposed amendment **is consistent** with the Lincoln County Comprehensive Land Use Plan and other adopted plans in that:

This property is located in an area designated by the Land Use Plan as Mixed Residential, suitable for densities ranging from 2-8 units per acre, proportional to the amount of open space preserved. The proposed density is 2.75 units per acre. At least 30 percent of the acreage will be set aside as open space.

This proposed amendment **is reasonable and in the public interest** in that:

This property is located on a main highway near a freeway, close to a regional commercial center and other services. Public water and sewer are readily available in this area. Because this development will be mostly restricted to older adults, the impact on schools, roads and utilities will be less than other types of residential development. This development will offer new housing options, create jobs, substantially increase the county's tax base, and generate significant revenues to help pay for utility improvements.



Planned Development Rezoning Application

Lincoln County Planning and Inspections Department
Zoning Administrator
302 N. Academy St., Lincolnton, NC 28092
Phone: (704)736-8440 Fax: (704)732-9010

Part I

Applicant Name Shea Homes, L.P.

Applicant Address 8800 N. Gainey Center Dr. Suite 370, Scottsdale AZ 85258

Applicant Phone Number 480-367-3770

Property Owner's Name See attached pages

Property Owner's Address See attached pages

Property Owner's Phone Number _____

Part II

Property Location South side of NC 73, West of Little Egypt Rd.

Property ID # (10 digits) See attached pages Property Size Approx 600 ac +/-

Parcel # (5 digits) See attached pages Book(s) _____ Page(s) _____

Part III

Existing Zoning District PD-R CU Proposed Zoning District PD-R

Briefly describe how the property is currently being used and any existing structures.

undeveloped, vacant

Briefly described the proposed planned development.

develop a new residential community of up to 1650 homes including both age restricted and non-age restricted homes

***SEE PLANNING DEPT. FOR PLANNED DEVELOPMENT FEES.**

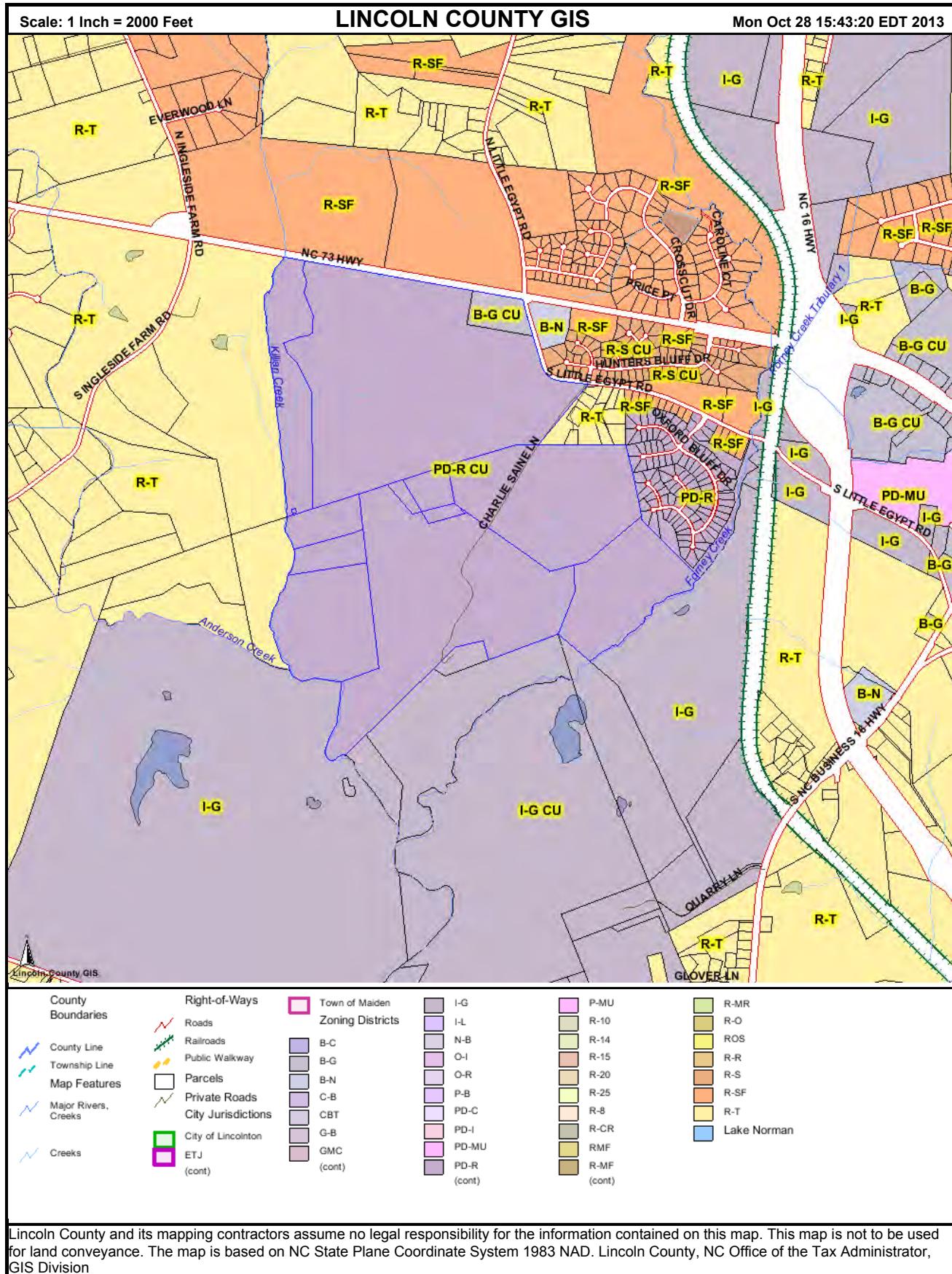
I hereby certify that all of the information provided for this application and attachments is true and correct to the best of my knowledge.

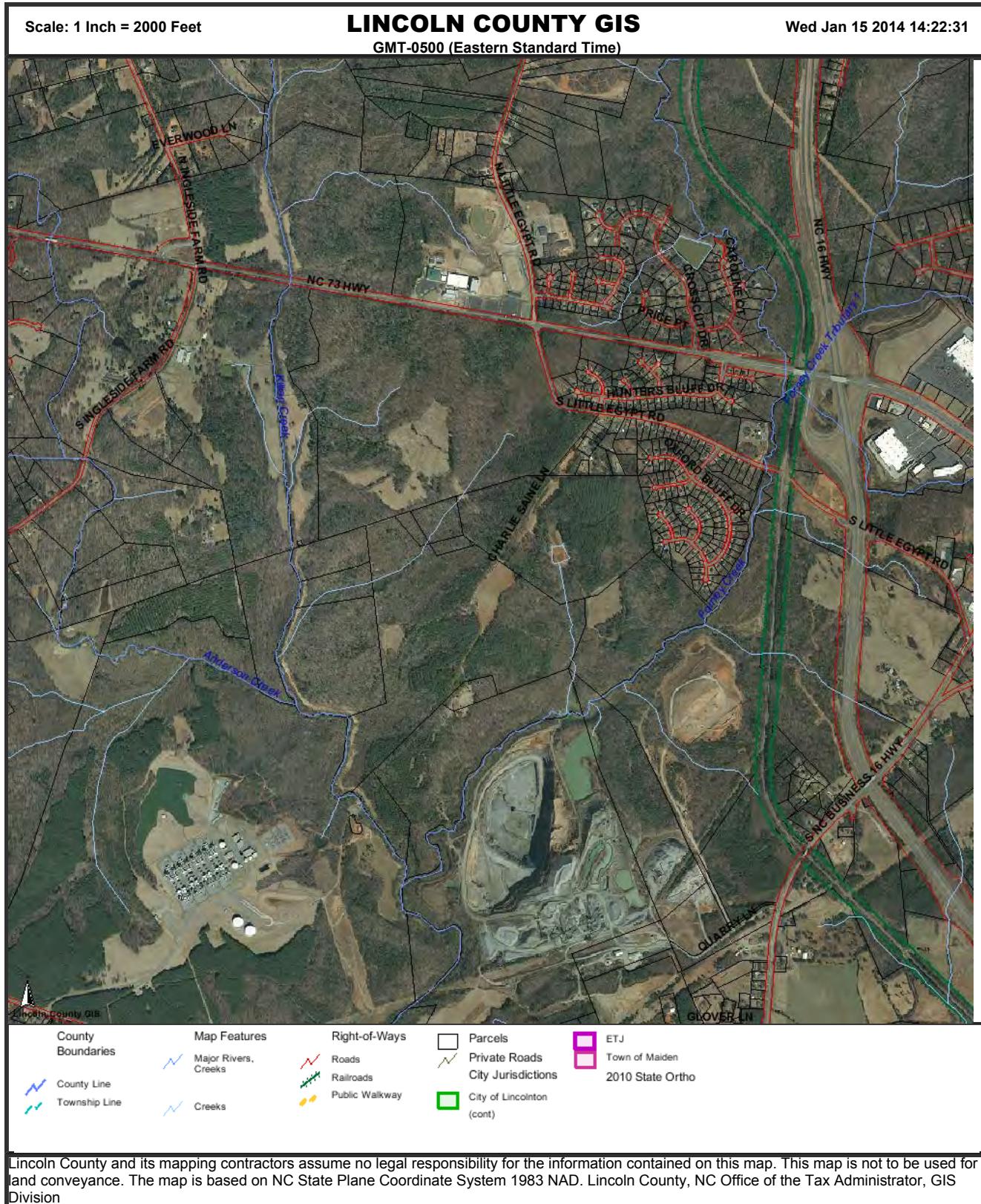
Applicant

10-17-13
Date

The property is currently owned by members of the Clark Family, East Lincoln Land Company, Fairfax Village, Inc. [REDACTED] The property is currently zoned PD-R CU. The map pin numbers for the project are listed below and the owner's addresses are taken from County tax records:

1. 3692-45-4688-(85734)- (n/f) Caroline Clark Morrison, PO Box9, Lincolnton, NC 28093
2. 3692-64-3634- portion-(02441)- David Clark, Jr. Allison Thorne Clark, Walter & Caroline Clark, PO Box 9, Lincolnton, NC 28093
3. 3692-83-2109- (31428)-Fairfax Village, Inc., PO Box 9, Lincolnton, NC 28093
4. 3692-91-3528- (51876)-East Lincoln Land Co., PO Box 9, Lincolnton, NC 28093
5. 3692-62-5814- (32945) Fairfax Village, Inc., PO Box 9, Lincolnton, NC 28093
6. 3692-62-6686- (58834)-Fairfax Village, Inc., PO Box 9, Lincolnton, NC 28093
7. 3692-62-2881- (58835)-East Lincoln Land Co., PO Box 9, Lincolnton, NC 28093
8. 3692-41-8375- (86073)-Walter Clark, PO Box 9, Lincolnton, NC 28093
9. 3692-42-8194- (86072)-Walter Clark, Delane F. Clark, PO Box 9, Lincolnton, NC 28093
10. 3692-42-8500- (86071)-Walter Clark, PO Box 9, Lincolnton, NC 28093
11. [REDACTED]
12. 3692-61-4678- (518810)-East Lincoln Land Co., PO Box 9, Lincolnton, NC 28093





Planned Development Report for

Carolina Ridge by Shea Homes

Lincoln County, North Carolina

Developed by Shea Homes Active Lifestyle Communities

8800 N. Gainey Center Drive, Suite 370

Scottsdale, Arizona 85258

Prepared by

Shea Homes

and

The Walter Fields Group, Inc.

1919 S. Boulevard, Suite 101

Charlotte, NC 28203

January 13, 2014

I. Introduction

Carolina Ridge is proposed to be a master planned community comprised primarily of active adult and age restricted residents. The housing types shall be single family detached homes and single family attached homes including a variety of specialty products. This community will be located on an approximately 589 acre site on the south side of Highway N.C. 73 west of Little Egypt Road. N.C. 73 provides access to the new NC 16 to the east and US 321 to the west. These routes connect to I-85, I-40, I-77 and I-485. Major employment centers located in the general area include Lincolnton, Hickory, Mooresville, Huntersville and Charlotte. Land uses surrounding the site include single family residential, industrial, institutional and vacant land. Carolina Ridge will consist of up to 1,650 for-sale homes. Consistent with the provisions herein, as many as 300 of the total of 1650 homes may be converted to housing that would not be strictly restricted to active adult use. The Preliminary Development Concept Plan with vicinity map is attached for reference.

Age restricted and age targeted communities are designed and built for the consumer over the age of 55. Active-adult is a defined term in the real estate industry and allows the builder to restrict sales to individuals and couples over the age of 50 or 55 years, depending on the community and consistent with the Housing For Older Persons Act of 1995 (HOPA). Carolina Ridge will restrict all or a portion of the sales to active adults in accordance with HOPA. Restrictive Covenants on each real estate transaction within the designated active adult planning areas ensure that the planning area will stay age restricted and not convert over time to a market rate, non age restricted planning area. As a result of the age restrictions, age restricted housing has an average of 1.8 persons per household and no children (except for that allowed via HOPA). The resulting impact on community infrastructure such as schools, roads and utility system is less than that of non age-restricted home. This fact is well documented across the nation.

A key feature of the Carolina Ridge community will be the ample open spaces and the community clubhouse. A minimum of 30% of the Site will be left undeveloped as natural buffer area and/or passive and programmed open space or developed with active uses such as a community clubhouse. The open space will be anchored by a spacious and attractive community club where members will be able to take advantage of social gathering spaces, health and wellness programs, pools and a fitness center. The clubhouse will be open to all Carolina Ridge residents. Social Memberships will be mandatory for all Carolina Ridge residents residing in age-restricted units and outside memberships may be offered at the sole discretion of Club Ownership. The location of the community clubhouse is generally indicated on the Concept Plan along with a potential alternate location.

Homes within the community will be offered for sale. Homes may range in size from approximately 1,000 square feet to approximately 3,500 square feet as dictated by the consumer or demand.

Of the proposed 1,650 homes located within the community, all or portions of three planning areas may accommodate up to 300 traditional, single family attached or detached non age restricted homes. These

three areas are designated on the Preliminary Development Concept Plan that accompanies this report. The planning areas contemplated as having the ability to be either age restricted or non age restricted are designated as "Flex" parcels on the Preliminary Development Concept Plan. Such designation shall be subject to the normal staff review processes and shall be subject to the maximum home number of 1,650 noted above and all of the provisions outlined below under Design and Performance Standards. The property is currently zoned PD-R CU and the zoning proposed in this application is the Planned Residential Development district, as defined in the new Unified Development Ordinance, and will allow up to approximately 2.75 dwelling units per gross acre, with a maximum unit count not to exceed 1,650 as currently approved under the PD-R CU.

II. Property Ownership

The property is currently owned by members of the Clark Family, East Lincoln Land Company, and Fairfax Village, Inc. The property is currently zoned PD-R CU. The map pin numbers for the project are listed below:

1. 3692-45-4688
2. 3692-64-3634- portion
3. 3692-83-2109
4. 3692-91-3528
5. 3692-62-5814
6. 3692-62-6686
7. 3692-62-2881
8. 3692-41-8375
9. 3692-42-8194
10. 3692-42-8500
11. 3692-42-5794
12. 3692-61-4678

III. Infrastructure/Services

Traffic Impact

Data from the Institute of Transportation Engineers (ITE) Trip Generation Manual, 7th Edition, indicates that the average trips generated per dwelling unit on an average weekday in an active adult community is roughly 40 percent of that generated in a traditional single family detached community. Because those eligible for age restricted housing travel is usually not tied strongly to the requirements of a full-time job, school schedules or children's extracurricular activities, they will often time their trips to avoid morning and evening rush hour traffic. The data indicates that age restricted communities generate 26 - 27 percent of the trips that a non age restricted community would generate during weekday peak hours.

The presence of on-site club amenities, fitness centers, et al results in an even further reduction in trip generation.

Access and Roads

Carolina Ridge will include public and/or private streets, sidewalks and walking trails. The proposed roads within the community will provide access to the planned homes and Club. Public streets within the community will be designed and built to NCDOT standards and will be dedicated to NCDOT. Private streets may also be utilized within the community. Private streets will conform to NCDOT standards for construction in terms of pavement requirements. Walking and/or bike trails are proposed in the common areas and open space to accommodate pedestrian traffic as well as recreational uses. Guard houses with or without gates within private and/or public rights of way may be located throughout the Site subject to the necessary local and State approvals. Golf cart pathways and/or parking spaces may be located throughout the community subject to the necessary local and State approvals. The Applicant may develop individual community components with single or multiple access points and may also construct a direct connection to the adjoining undeveloped retail site at a location that will be determined when that site is developed.

Ingress and egress to the community will be provided via connections to Highway 73 and Little Egypt Road. Interior streets will service the community and provide connectivity with the proposed entrances to Highway 73 and Little Egypt Road. The location and alignment of the internal roadways and any perimeter access points or entrances shown on the Preliminary Development Concept Plan may be modified or relocated to accommodate final site plan and architectural construction plans and adjustments required to implement the project. Project entrances may be relocated subject to the normal requirements of NCDOT and/or Lincoln County. The Applicant has met with NCDOT and has provided information for their review as to the potential impacts and any required mitigation related to the project.

Sidewalks may be provided on one side of the public and/or private local streets within the community. Sidewalks shall be at least four feet in width and either attached to back of curb or separated from curb creating a parkway landscape strip. The side of the street that the sidewalk may be located on may vary. If required, street lighting will be provided. The applicant reserves the right under the UDO to apply for modifications to the standards for sidewalks and sidewalk locations to allow for pedestrian pathways as an adjunct to or replacement for paved street side sidewalks, specifically adjacent to or related to private streets.

Water and Sewer

The community will be served with public water and public sanitary sewer provided by Lincoln County and built to County standards. The community's anticipated impact on public water and sewer will be far less than that of a typical residential neighborhood because of the inclusion of age restricted housing. Age restricted homes use less water and sewer than homes allowing families with children. Studies indicate that age restricted housing consumes roughly half the water and sewer capacity that a typical or non age restricted subdivision consumes.

Utilities

Telephone service, cable TV, electricity and natural gas will be provided by local utility companies. Utilities within the community shall be placed underground. (The main feed lines, transformers and back flow preventers may be located above ground.)

Garbage Collection

It is anticipated that garbage collection will be handled by a private service. However, if a public agency provides garbage collection services to the area in the future, the community may utilize such services.

IV. Project Phasing

The community will be constructed with streets and infrastructure installed in multiple phases. Construction is planned to begin in 2014, with an anticipated build out of the project in approximately 2021. The commencement of the project and the duration of the construction will be subject to variation based on securing the necessary development approvals, to market conditions, and to normal delays caused by weather or other forces beyond the control of the Applicant.

V. Design and Performance Standards

Community Clubhouse

The amenity package for the community will be anchored by a signature Clubhouse. The Clubhouse will be a key focal point of the community and feature attractive architecture including elements complementary to the area. The Clubhouse will be designed to promote social interaction, health and wellness and community involvement for the members and may include an indoor and/or outdoor pool, grand living room, billiards, golf simulators, multi-purpose room(s) and a fitness center including fitness equipment and movement studio. In addition, the Club may include Spa services and/or food and beverage services. A modification in the PD-R regulations is requested from the vehicular parking space requirement outlined in the Unified Development Ordinance to allow a minimum of 50 vehicular parking spaces and ten bicycle parking spaces within the parking area for the Clubhouse. The Club's final programming will be defined by the consumer, in the developer's opinion, at their sole and absolute discretion.

To the greatest extent possible, no direct beams of light from outdoor lighting at the Club will shine directly into any principal residential structures. The Club construction may begin at any time but will commence no later than 24 months after the first home building permit is issued. A modification in the PD-R regulations is requested in order to allow a 10 foot setback for the Clubhouse.

Open Space

Carolina Ridge shall provide 30% of the site as open space including natural areas and stream buffers. A walking trail system, outdoor recreational uses and the community clubhouse will be located within the open space areas. The walking trail and the common open space improvements will be installed in each phase as that phase proceeds and shall be completed within twelve months of the issuance of the first home Certificate of Occupancy within the associated phase. All of the common area open space areas will be owned and maintained by a Homeowner's Association (HOA), or similar entity. The Club may be owned privately and structured as a private equity or non-equity club or be a HOA owned facility.

Homeowner's Association

A Private Club Owner, Homeowner's Association, or similar entity, shall be responsible for maintenance of the Clubhouse and any other buildings located within the open space. In addition, the Homeowner's Association, or similar entity, may maintain the individual lawns of the single family attached or detached homes.

Environmental Protection Measures

Designated open space will be owned and maintained by the Private Club Owner, Homeowner's Association or similar entity.

Wetlands and streams on the Site will be identified and delineated by a certified professional wetland scientist and the delineation will be presented to the United States Army Corps of Engineers (USACE). Impacts to streams and wetlands that require permits and approvals from the USACE and/or the North Carolina Department of Environment and Natural Resources (NCDENR) will be applied for appropriately.

Buffers shall be provided along the streams within the Site and along the Site's boundaries in accordance with permitting and mitigation requirements for Lincoln County or NCDENR permits, which ever has jurisdiction. Storm water treatment facilities as may be required may be located within buffers and open space areas so as to blend development and environmental efforts and requirements.

Tree clearing will be limited to that necessary to implement the development plan, including providing for access to and improving the appearance of open space areas and to remove vegetation and debris that may be unsightly, hazardous or otherwise unsafe. Grading of the property will be in accordance with an approved grading plan. A sedimentation and erosion control plan shall be developed for approval by Lincoln County or NCDENR, whichever has jurisdiction.

The development of this community will be carefully planned to create a desirable community that is a unique place to live. The Petitioner will work closely with the appropriate governmental agencies in obtaining the necessary permits for the community.

Setbacks and Yards

Land Use	Min. Building Front Setback See Notes	Min. Side Yard See Notes	Min. Rear Yard See Notes
Estate Homes	20'	3'	15'
Villas and Garden Home Buildings Specialty Products	20'	3'	15'

Notes:

- Awnings and balconies may encroach into the required setback area.
- Decks may encroach into required rear yards.
- HVAC equipment, brick ledges, stairs, building façade elements that do not extend to the ground and fireplaces may encroach into required yards.
- Side yards shall be a minimum of three feet and all buildings shall meet minimum separations required by building code. To address any fire protection requirements, alternative construction

materials and/or techniques may be utilized to address minimum building separations, thereby mitigating this requirement.

- No side and/or rear yard setbacks shall be required for those lots and/or units which adjoin common open space.
- Setbacks along each side of a particular street may vary to add interest and variety to the streetscape by utilizing a setback as short as 10' so long as the average setback for each side of the particular street is equal to at least 75% of the minimum setback.
- Within specific building areas and with certain product types, zero lot line structures may be constructed with no side yards.
- The development of the site may include a variety of specialty product types of detached and attached housing types including but not limited to such forms as duplex, triplex, stacked flats, townhomes, row houses, or other designs which the market would support of that may be designed for the site limited to the areas within the community that do not adjoin any existing single family development that is outside of the boundary of the project.

Building Height

Land Use	Maximum Building Height*
Detached homes	40 feet
Attached homes	40 feet*

Note:

*A modification in the PD-R regulations is requested to allow specialty product types of up to 60 feet in height on any portion of the site that does not adjoin any existing single family development that is outside of the boundary of the project.

Lot Standards

Land Use	Minimum Lot Size-See Notes
Single Family Detached Residential	3,000 square feet
Villas, Garden Homes, Specialty Products	Not Applicable

Notes

- Villas, Garden Homes, and Specialty Products are not required to be located on an individual lot.
- Lot Width - No minimum lot width shall be required for single family detached units as long as the above minimum lot size is provided.

Screening

If buildings are located within 100 feet of a street right-of-way line which defines the outer boundary of the Site, an appropriate buffer shall be placed on the property to screen said building from said right-of-way. However, grading may occur within the buffer area. A modification in the PD-R regulations is requested in order to allow a waiver of the internal screening, landscaping, trees, buffer and parking lot landscaping requirements outlined in Section 3.4 of the Unified Development Ordinance so long as a specific landscape plan is provided along with the submission of development plans for each development phase or sub-phase.

Street Design

Primary roads within the Site may include curb, gutter and a sidewalk of at least four feet in width on a minimum of one side of the street or may include private streets without curb and gutter or sidewalks as long as other pedestrian facilities serving the area are provided and so long as road cross sections are acceptable to Lincoln County and/or NCDOT. The side of the street that the sidewalk may be located on can vary.

Construction traffic shall be limited to temporary construction roads that will access the Site from Highway 73 and Little Egypt Road at locations to be reviewed and approved by NCDOT. Cul-de-sac roads may be used throughout the community with varying block lengths and widths. Existing and/or proposed roads within the Site shall not be required to extend to abutting parcels but may be extended at the discretion of the developer.

Due to the topography of the site and the natural limitations to development caused by slopes and streams, the Applicant reserves the right to apply of modifications or waivers to subdivision standards relating to road connectivity (connectivity ratio), cul-de-sac roads, sidewalks, minimum number of entrances. The applicant further reserves this same right for matters that may arise during the design and development phases of the project that are not foreseen at the time of zoning approval.

Golf cart pathways and/or parking areas may be located throughout the community subject to the necessary local and State approvals.

Signage

Carolina Ridge entry signage may include project identification signs which may be incorporated into an architectural feature such as a monument sign or wall integrated into a well-designed streetscape treatment. The architectural feature shall meet necessary NCDOT and County standards. Signs at the entrances to individual communities will also be permitted as will interior directional signs providing direction to locations within the project.

RV and Boat Storage Area

An area may be provided within the community for RV and/or boat storage purposes. The location of the RV /boat storage, if any will be defined as part of development review submission, subject to staff review and approval.

Lawn Maintenance Area

An area may be provided within the community for one or more lawn maintenance buildings and related needs. The location of the lawn maintenance building(s), if any, will be determined during the design and development phase of the project subject to staff review and approval. Model Homes, Sales Offices, Temporary Sales Facilities, Construction Trailers and Welcome Centers may be located throughout the Site and may be constructed and occupied prior to the completion of subdivision approval and installation of infrastructure. Such uses may be located on the Site throughout the construction and sales phases of the development.

Grading

Grading of the site and other site development activities including, but not limited to, installation of water and sewer lines and other infrastructure and vertical construction may occur prior to the approval of final plats. All such activities are subject to normal staff review and approval procedures.

Alterations to Preliminary Development Concept Plan

The development depicted on the Preliminary Development Concept Plan is conceptual and schematic in nature and is intended to reflect the general arrangement or location of land uses within the Project. Accordingly, the configuration and placement of uses and streets may be altered or modified during design development and construction phases within the development area boundaries conceptualized on the Preliminary Development Concept Plan and in accordance with provisions in the Unified Development Ordinance including approved variances to the same. The applicant reserves the right to modify the mix of dwelling types and, as long as the total unit count of 1,650 is not exceeded, densities may vary from one planning area to another.

Vesting


Pursuant to North Carolina General Statutes, due to the size of the development, the level of investment, the scope and timing of infrastructure improvements associated with the development, the anticipated long term build-out of its various components, economic cycles and market conditions, this Petition includes vesting of the approved planned development rezoning plan associated with this Petition for a five (5) year period. If during the pendency of the vesting period the N.C. General Statutes are amended allowing for a vesting period longer than 5 years, the extended vesting period will be applied to the site dated from the date of approval of this rezoning.

Cost Sharing and Special Financing Districts

The Applicant will work in concert with Lincoln County officials under the cost sharing mechanisms already provided for in the Unified Development Ordinance and the County will review information provided by the applicant to fund or reimburse the Applicant for any and all costs associated with oversizing and extending utilities for future growth which are above and beyond the infrastructure requirements demanded solely by the project. Additionally, the County will work with the Applicant to explore the viability of creating special financing district(s) which may be used to fund qualified public infrastructure within the project.

Applicability

Throughout this Rezoning Application and Development Report, the terms “Owner”, “Owners”, “Petitioner” or “Petitioners,” “Applicant” or “Applicants”, and “Developer” or “Developers” if and where they appear shall, with respect to the Site, be deemed to include the heirs, devisees, personal representatives, successors in interest and assignees of the owner or owners of the Site who may be involved in its development from time to time.



Community Meeting Report, Carolina Ridge by Shea Homes, LP

November 14, 2013

Representing Shea Homes were Walter Fields, Stephen Pace, and Jay Seymour

The meeting was held at the Unity Presbyterian Church and it is estimated that approximately 100 to 120 people attended the meeting, including representative from several media and press organizations. The meeting lasted approximately 1.5 hours and the Shea team stayed on for another half hour talking to individuals about specific questions or comments. Sign in sheets of those who chose to sign in are available for review.

Walter Fields opened the meeting with a description of the background of the property and the previously approved Pulte plan for the site approved years ago. The Shea plan is, for all practical purposes, the same as the Pulte plan and proposes an active adult community with up to 1650 total residences which is the same number of total residences proposed by Pulte. The only difference in the two plan is that the Shea plan has the option to convers a maximum of 300 residences a non-age restricted housing.

Jay Seymour described the Shea company and in particular its Trilogy group that specializes in active adult communities. The showed a video and spoke about the market for active adult housing in North Carolina.

Walter Fields reviewed the changes that had occurred in the community since the Pulte plan was approved, including numerous road improvements that did not exist when the Pulte plan was approved and then opened the floor for questions.

There were a number of questions about traffic in the area and how this proposal would affect that. Many offered observations about traffic conditions and asked about what road improvements were planned. Others expressed concern if NC 73 were to be widened that their yards would be affected. The Shea team answered those questions with the information available and responded that a traffic study had been furnished to NCDOT.

Several questions were asked about the timing of the development and how the units might be mixed on the site. A question was asked about the undeveloped retail site at the corner of Little Egypt and NC 73 but it was pointed out that that property is not part of the rezoning currently under consideration. There were questions about the location of construction entrances and how much the residences would cost. Another question was where the entire development could change over to open market, non-age restricted housing which, it was pointed out by the Shea team, would not be allowed by the rezoning plan. Others, who were not familiar with the history of the site, asked why this site was even chosen for such a development. The Shea team address each in turn including staying after the meeting if there were follow-up questions.

Questions were asked about where water and sewer service was to be provided, will local contractors be able to bid on work, and when the project is expected to be completed. A question was asked about police and fire service. It was noted that those agencies review the plan as well and no issues have been raised. A question was raised about a buffer on the east side of the site and it was noted that the buffer would be added to the plan.

At the end of the evening, the Shea team committed to hold a follow-up meeting to provide additional information as it become available about the traffic study and to verify or clarify information discussed at the meeting such as the number of school age children that could result if the full 300 units were converted to non-age restricted housing. Since the meeting the Shea team has only received two additional comments about the plan and has addressed those to the individuals directly.



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

PAT MCCRORY
GOVERNOR

ANTHONY J. TATA
SECRETARY

January 9, 2014

Brian D. Dehler, PE, Roadway/Planning Department Manager
WSP USA Corp.
128 Talbert Road, Suite A
Mooresville, NC 28117

**Re: Draft Traffic Impact Analysis Update Memorandum
Carolina Ridge, Lincoln County, NC**

Dear Mr. Dehler:

The North Carolina Department of Transportation has completed its review of the Traffic Impact Analysis (TIA) dated November 5, 2013, prepared by WSP for the Carolina Ridge residential community in eastern Lincoln County being proposed by Shea Homes. NCDOT Division 12 staff performed this review in collaboration with the Congestion Management Section as well as the Municipal & School Transportation Assistance Section, and has the following comments:

General Comments:

- TIP Project R-2706 proposes to widen NC 73. This project is not currently scheduled. It is likely that a four-lane divided expressway will be the ultimate cross-section for NC 73. The developer should be advised that any access and intersection operation approved as part of this driveway permit application may be modified in the future once this TIP project is completed. The developer should also reserve additional right of way for this future widening.

Synchro Analysis Comments:

- A SIMTraffic Queuing and Blocking Report should be included in the Final TIA to quantify overall queuing through the network of signals. SimTraffic reports should also be included. These reports may be submitted in an appendix as a PDF, rather than printed copies.

Recommended Improvements for the Developer to Make:

NC 73 and Little Egypt Road

- The analysis used protected-only operation for EB NC 73, which follows the NCDOT Congestion Management Analysis Guidelines. However, if it

already exists, and no significant geometric changes are recommended that could affect the left turn, using protected-permitted phasing is acceptable. In NCDOT's review, this movement, as well as the WB movement, was changed to protected-permitted phasing.

- Change the configuration of this northbound intersection approach by constructing an exclusive left-turn lane with 100-ft of storage and appropriate taper. The approach would be three lanes; SB thru, NB left, and NB thru & right.
- Extend the westbound left-turn lane by approximately 110-ft to provide 200-ft of storage.
- Extend the westbound right-turn lane by approximately 50-ft to provide 150-ft of storage.
- Change the configuration of the southbound intersection approach by making the thru lane become the left turn lane and construct a thru and right lane with the taper for this lane beginning at the East Lincoln High School entrance.

NC 73 and School Bus Entrance / Site Entrance 1

- Construct two northbound exit lanes at the site entrance with 175-ft of storage and appropriate tapers.
- Restripe the left turn lane between the main school entrance and site entrance 1 so that the result is two, back-to-back left-turn lanes with equal tapers, deceleration lengths, and storage lengths.
- Install an actuated traffic signal at this intersection with appropriate signal heads, poles, loop detectors, junction boxes, etc. This traffic signal should coordinate with the adjacent signal at the NC 73 and Little Egypt Road intersection. NCDOT is in agreement to have this signal in operation once the new intersection has been constructed and the signal has been installed.
- Construct an eastbound right-turn lane with 100-ft of storage and appropriate taper.

Little Egypt Road and Site Entrance 2

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

NC73 and NC 16Bypass Northbound Ramps

- Widen the northbound approach ramp to provide a 300-ft left turn lane, a 300-ft right-turn lane, and a left-turn/thru/right-turn shared lane with appropriate tapers.
- Make signal modifications to accommodate the proposed northbound lane configuration.

Please be advised that proposed signals and signal improvements will require coordination and approval through the Division 12 Traffic Engineer, Byron Engle. Also, offsite improvements for widening, turn lanes, etc. will require separate encroachment agreements for each location, however, these and the associated construction plans should be submitted along with the driveway permit application in one package as one

entire project submittal. Preliminary plans should be submitted to DWP_DIV12_DIST3@nedot.gov for review and comment prior to full application submittal. Once plans are finalized, a minimum of one hard copy plan set and associated agreement forms will need to be submitted for formal approval.

Please let me know if you have any questions.

Yours very truly,



M. L. Poe, PE
District Engineer

MLP:mp

cc: M. L. Holder, PE, Division Engineer
Byron Engle, PE, Division Traffic Engineer
Jim Dunlop, PE, Congestion Management Western Regional Engineer
Joel Cranford, PE, MSTA Engineer



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November 11, 2013

Mr. Jeff Hinkle
Shea Homes
8800 N Gainey Center Dr, Suite 370
Scottsdale, AZ, 85258

Re: Engineer's Opinion on Carolina Ridge Development Off-Site Improvements

Mr. Hinkle,

We have completed the draft Carolina Ridge TIA Update Memorandum following the methodology and relatively conservative assumptions in the current NCDOT Traffic Capacity Analysis Guidelines. This study identifies the roadway improvement needs for the 2021 build conditions, but noted that many of the recommended improvements are also needed in 2021 without the proposed development to provide acceptable traffic operational performance. We would like to make you aware that NCDOT will not accept improvement recommendations based on "unfunded or uncommitted improvements provided by others" under the current guidelines. That being said, we believe it would be unreasonable to hold Shea Homes responsible for all the off-site improvements to address existing and projected deficiencies unrelated to the proposed development.

While NCDOT and the County will ultimately determine the extent of improvements required, we offer the following opinions on reasonable expectations of the developer's share of improvements. The turn lane improvements listed below would also require appropriate transitions and bay tapers.

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.
- Coordinate this traffic signal with the NC 73 signal system if deemed appropriate and necessary by NCDOT.

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.

The improvements listed above, although they may also be required in no build conditions, are in the immediate vicinity of the site. At these locations the traffic impacts from site generated trips are expected to be more intense and predictable, and therefore should be addressed by the developer.

As with any planning level traffic studies, development traffic impacts further away from the site depend on trip generation, distribution, and traffic growth assumptions which may differ from the reality in the future design year 2021. The study clearly reveals a long list of improvements needed today and in the build out year even if this new community were never developed so are clearly not needs that result from impacts from the proposed development. In addition, the improvement needs identified for the intersection of NC 73 and NC 16 Business and other locations to the east of the site are likely beyond the means of a single developer.. It is thus our opinion that limiting the developer's responsibilities to the improvements west of NC 16 Bypass in the vicinity of the site would be reasonable and fair to provide feasible and meaningful solutions to improve the traffic conditions brought on by the proposed development.

It is noted that improvement options discussed above are similar, yet more conservative than the previous improvements, as listed below, required by NCDOT in 2006 for the proposed *Carolina Ridge by Del Webb at Ingleside* development.

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

Please let me know if you have any questions.

Sincerely,

A handwritten signature in black ink that reads "Brian D. Dehler".

Brian D. Dehler, PE





Carolina Ridge

DRAFT TIA Update Memorandum

Lincoln County, NC

Prepared for:

Jeff Hinkle

Shea Homes

8800 N. Gainey Center Drive, Suite 370
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Prepared by:

WSP USA Corp.

License # F-0891

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November 5, 2013

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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.

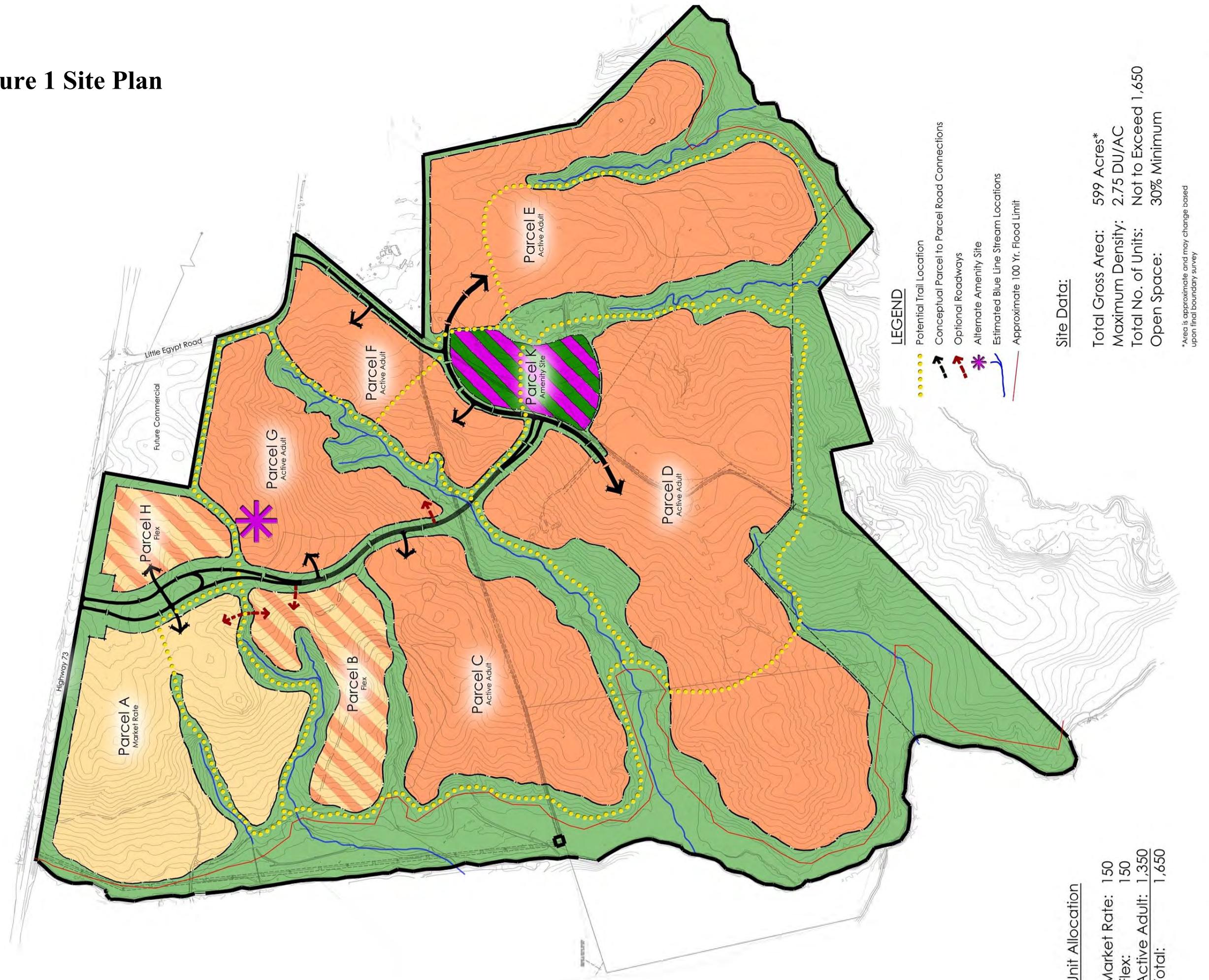
STUDY AREA

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.

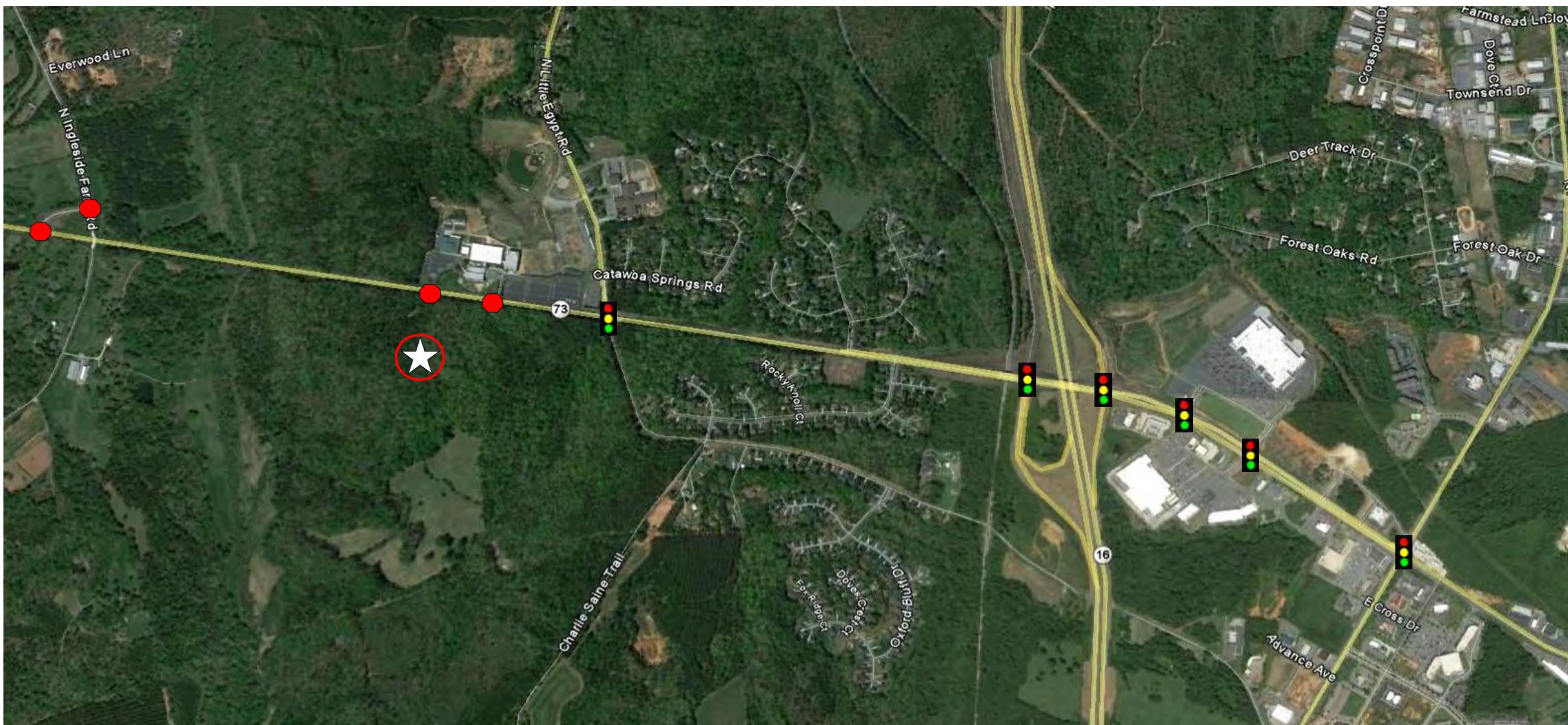
Figure 1 Site Plan



The proposed plan is preliminary and for illustrative purposes only. The final development plan is subject to change due to final site design constraints and requirements

↑
N

*** 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 1st, 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.

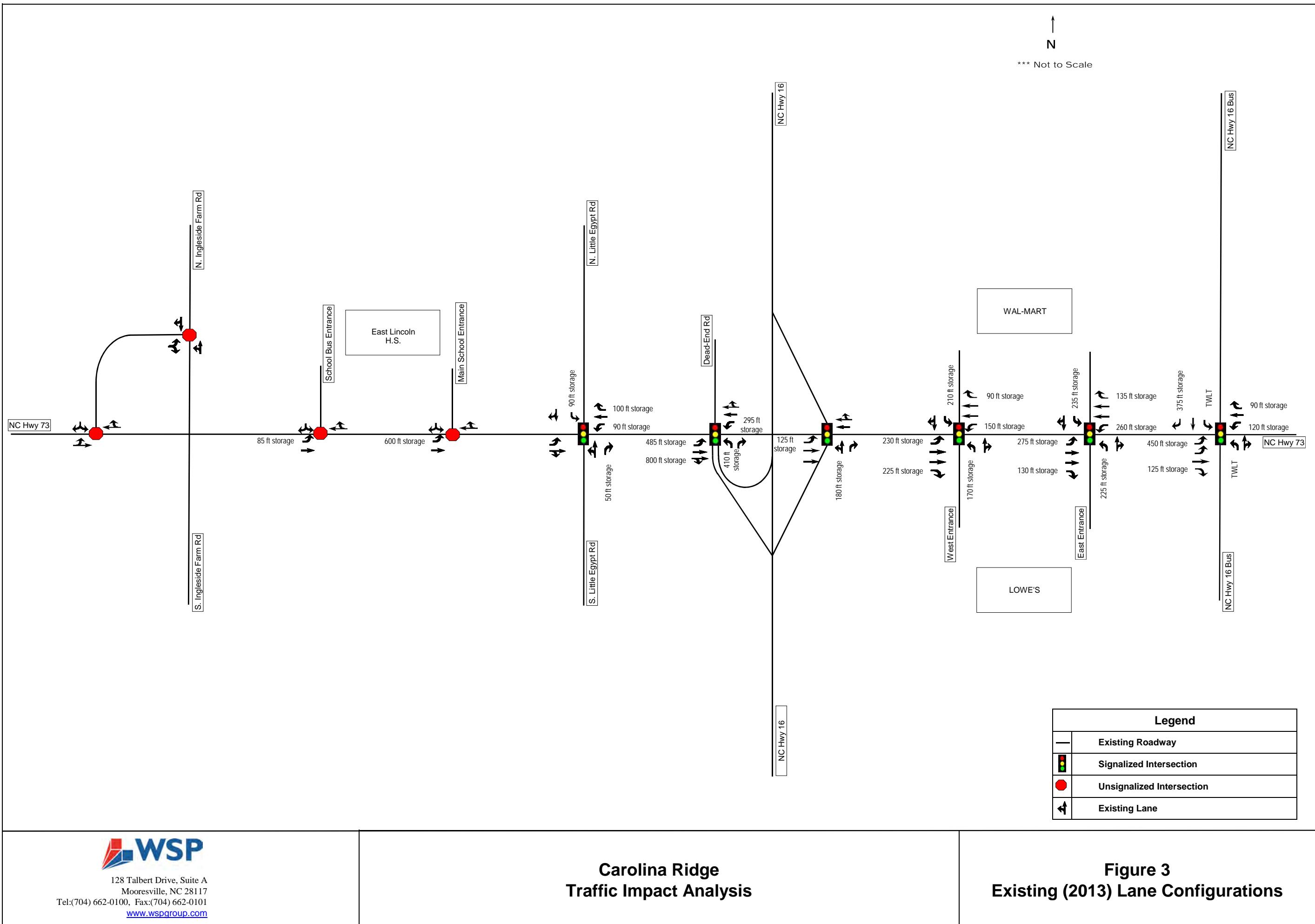
Existing volumes, traffic flow characteristics, and intersection geometrics collected during field visits were used to determine the level of service. Table 1 lists the LOS results from the 2013 Existing Conditions Analysis. Delay and LOS results are reported for each intersection approach. Intersection 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.



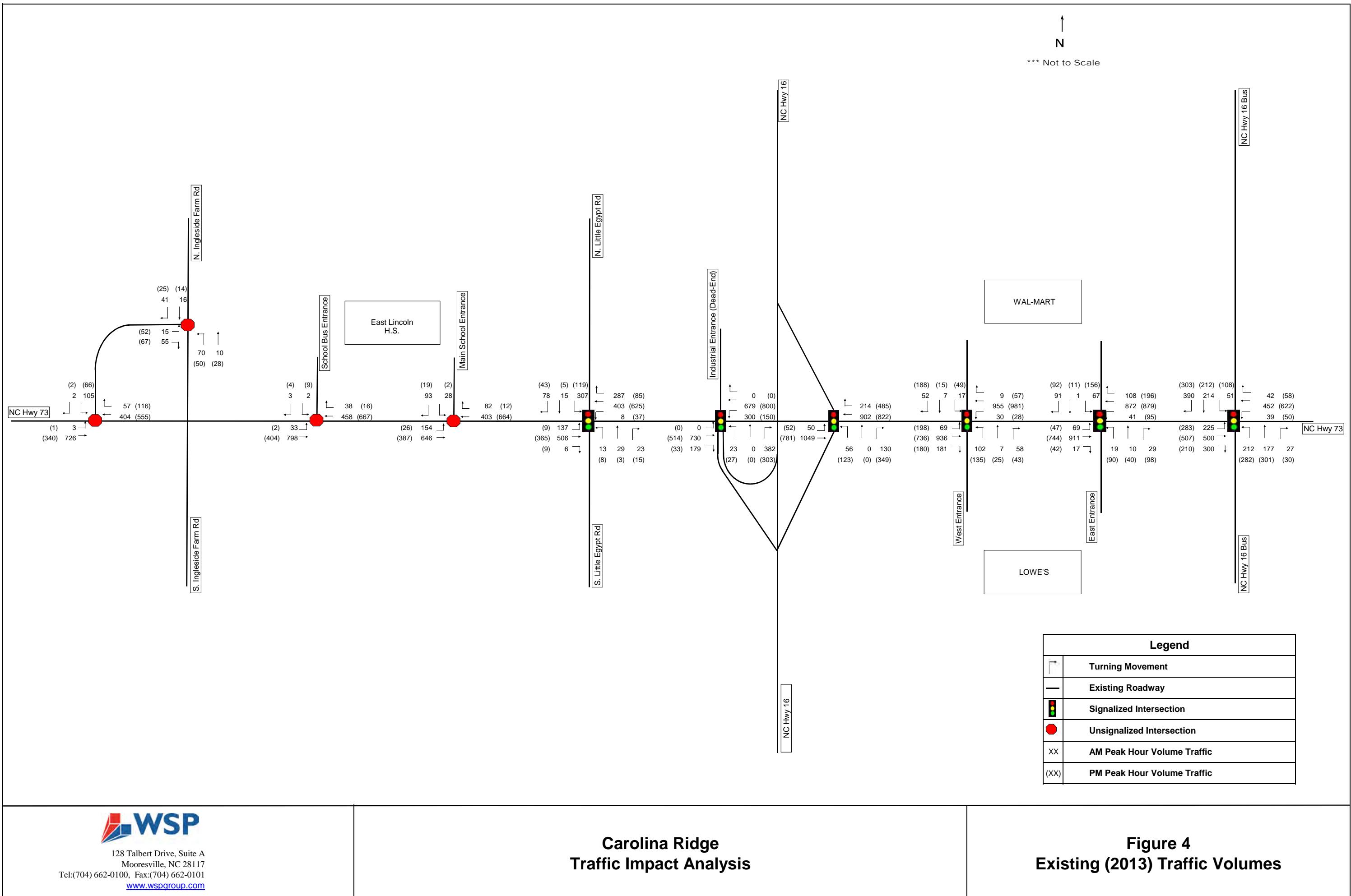


Table 1 Existing (2013) Condition LOS Analysis

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

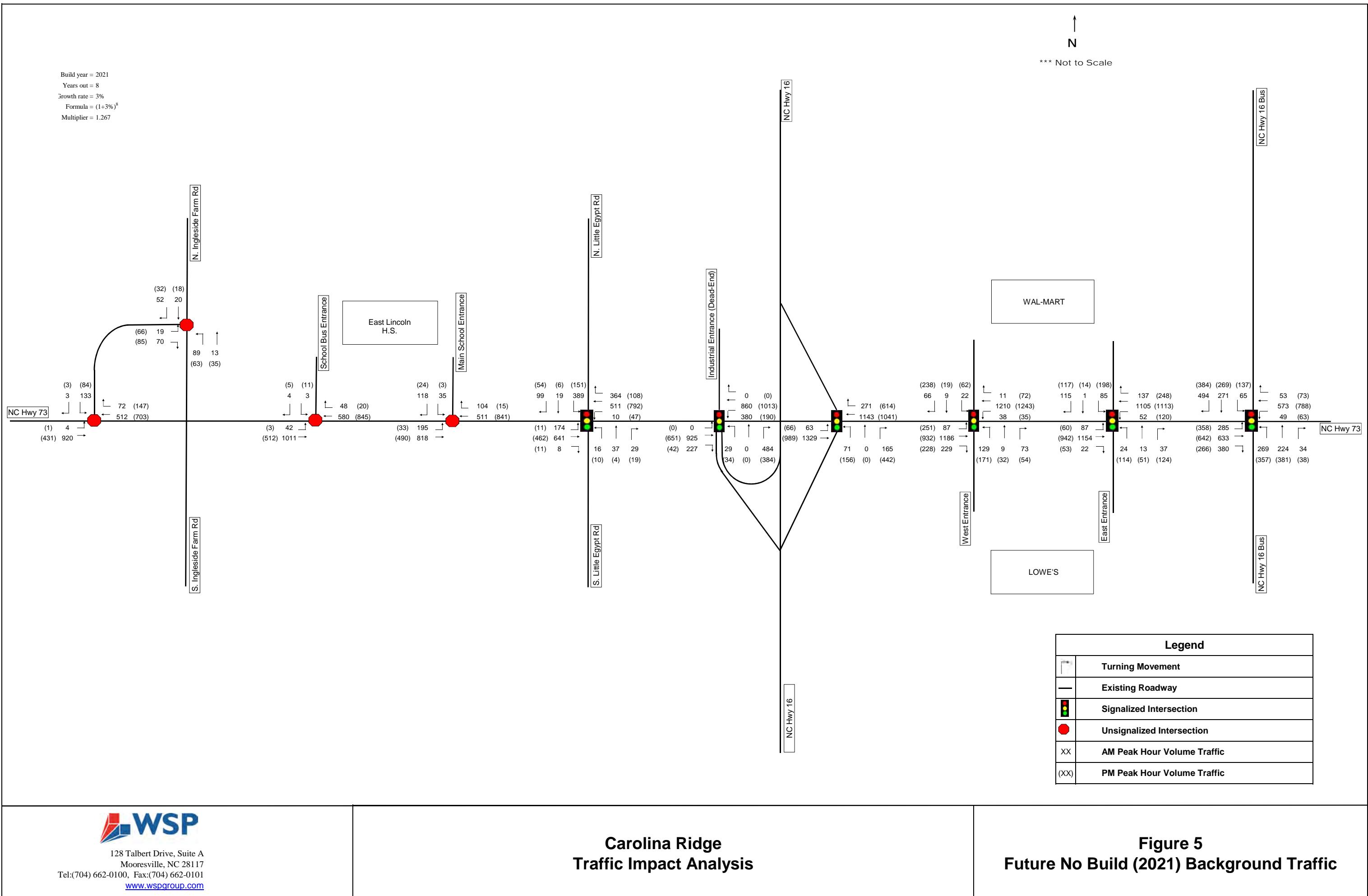
The full build-out of the site is currently scheduled for 2020. Thus, the design year in this study is 2021, or one year past build-out. An annual growth rate of 3% was applied to the existing traffic to estimate the design year 2021 background traffic volumes which are shown in Figure 5. In addition, 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.

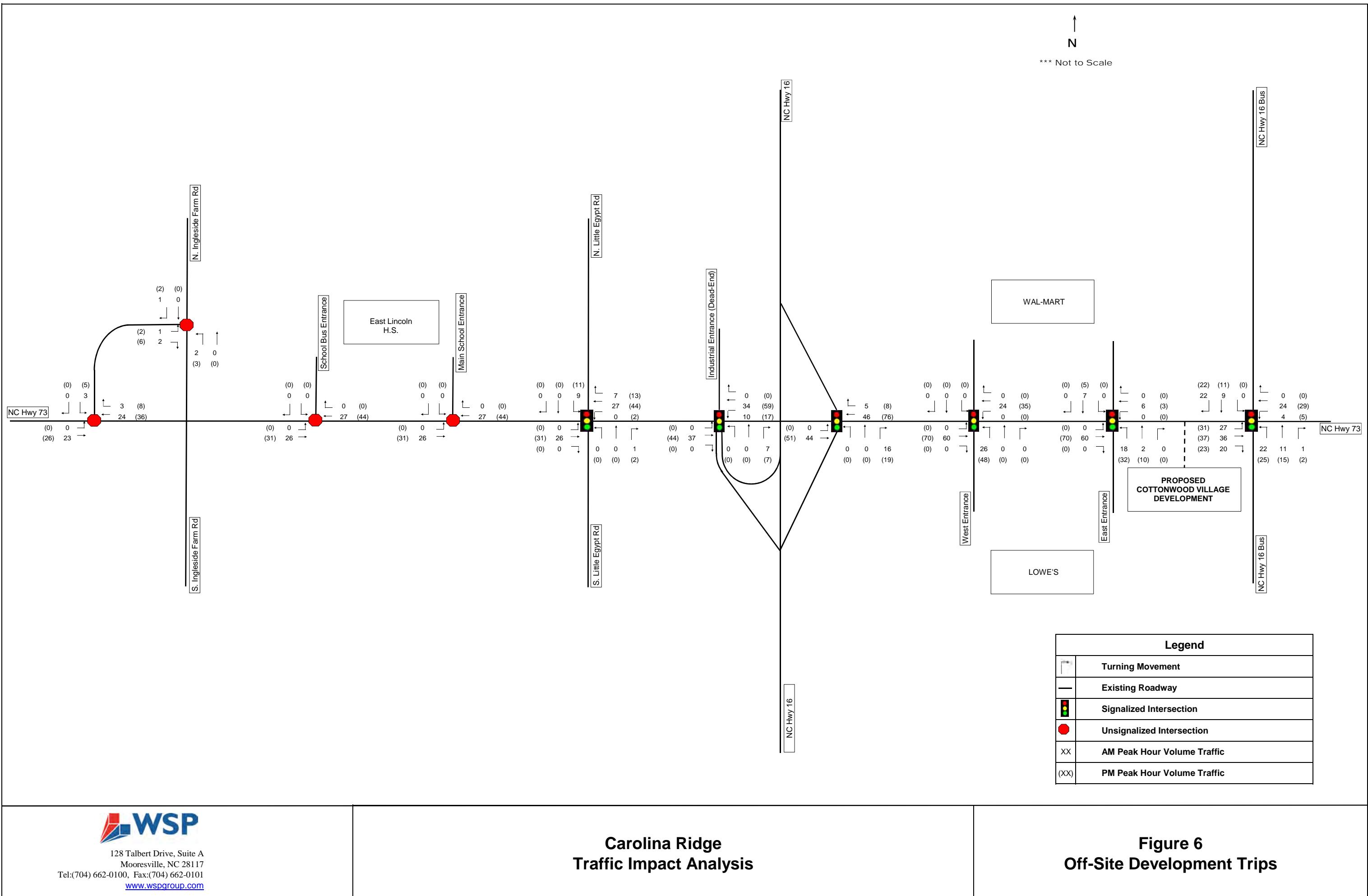
This mixed-use development was proposed to consist of apartment homes, office buildings, and a shopping center. According to the latest Cottonwood Village TIA dated July 19, 2010 (Appendix D), this development would generate 5071 daily trips, including 297 new trips in the AM peak hour and 429 new trips 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.





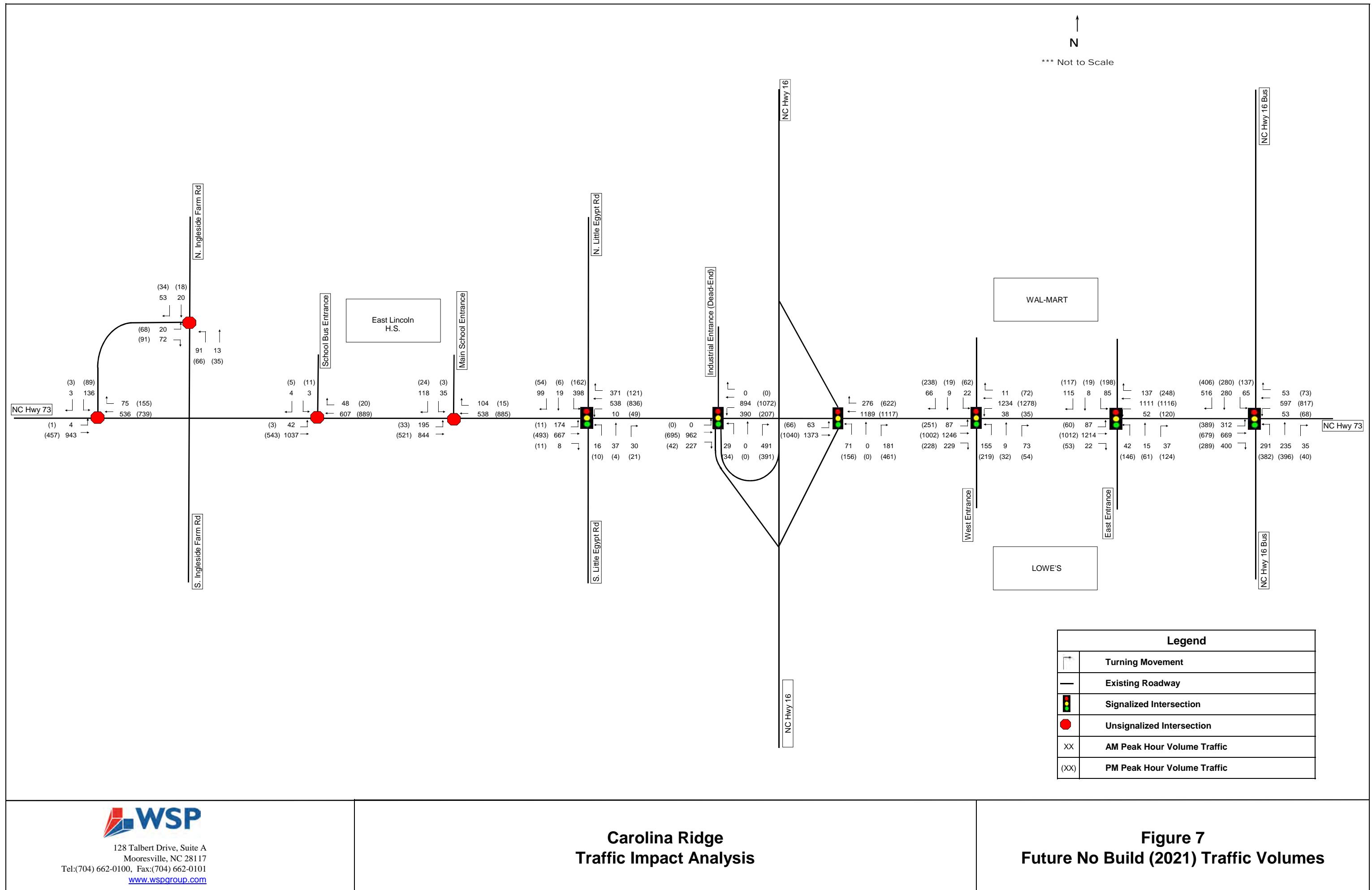


Table 2 Future No Build (2021) LOS Analysis

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 or 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.

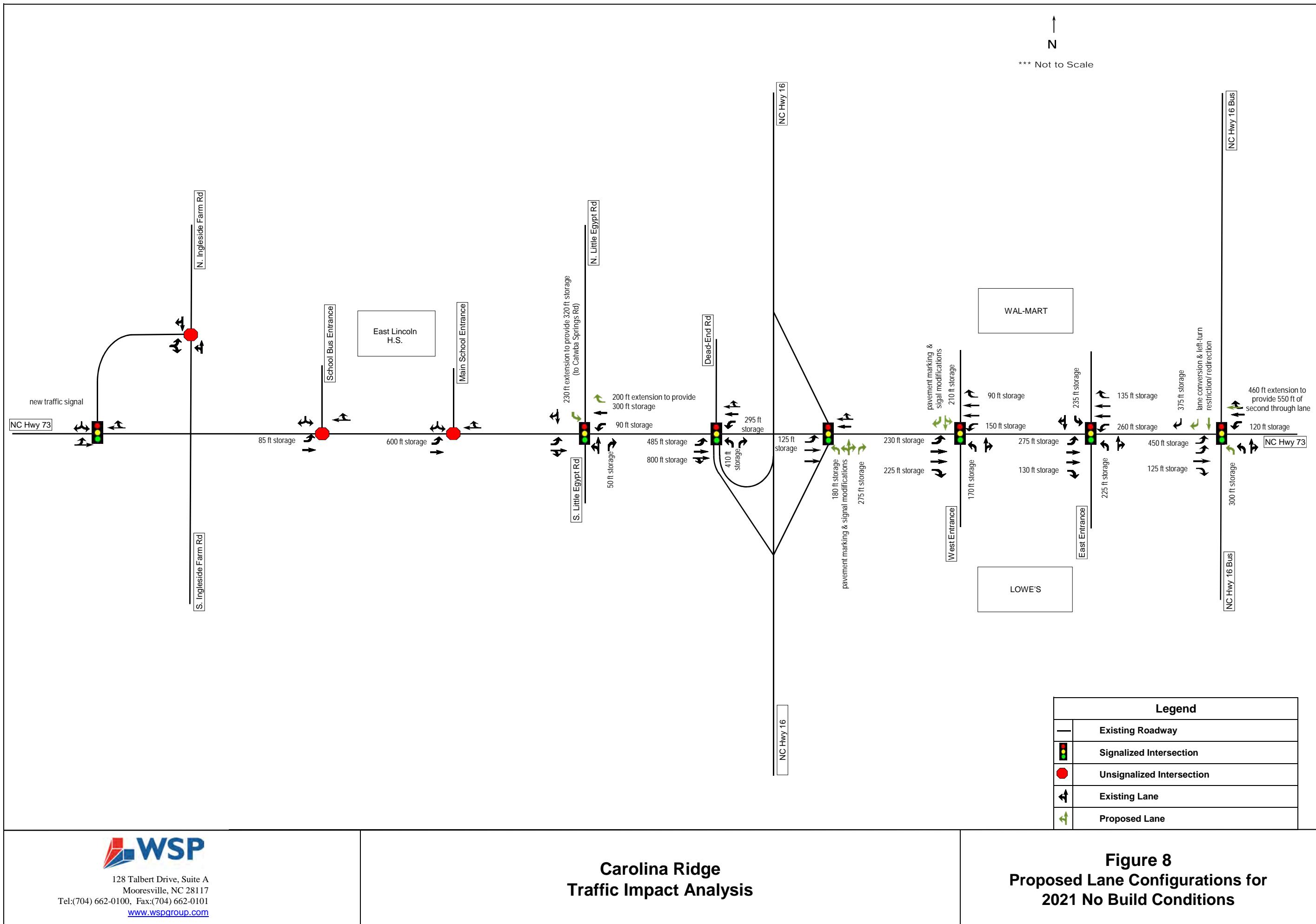
Table 3 compares the analysis results for the improvements discussed above with those in the No Build Condition Analysis. The proposed lane configurations are illustrated in Figure 8.

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.

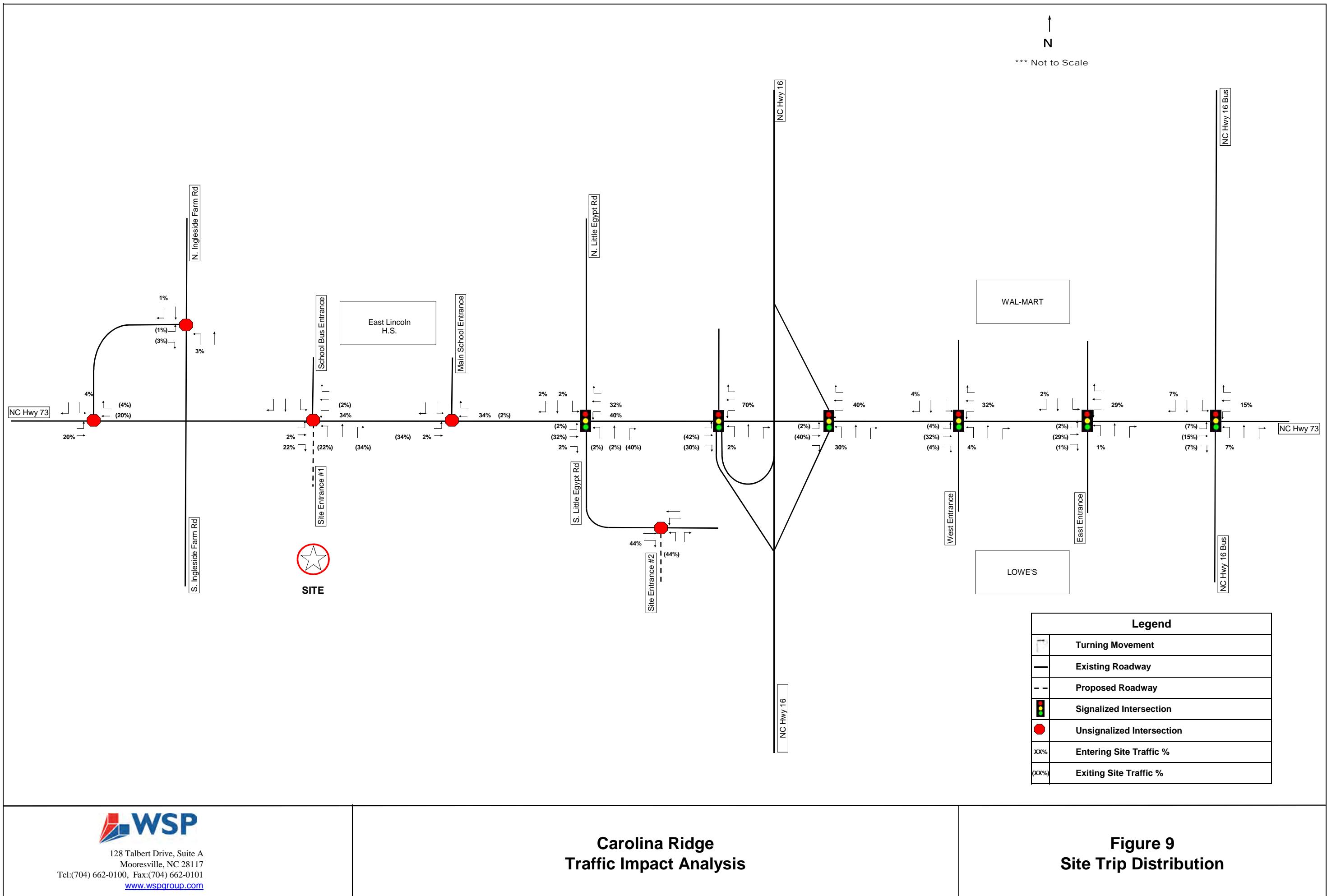
Table 4 Carolina Ridge Site Trip Generation

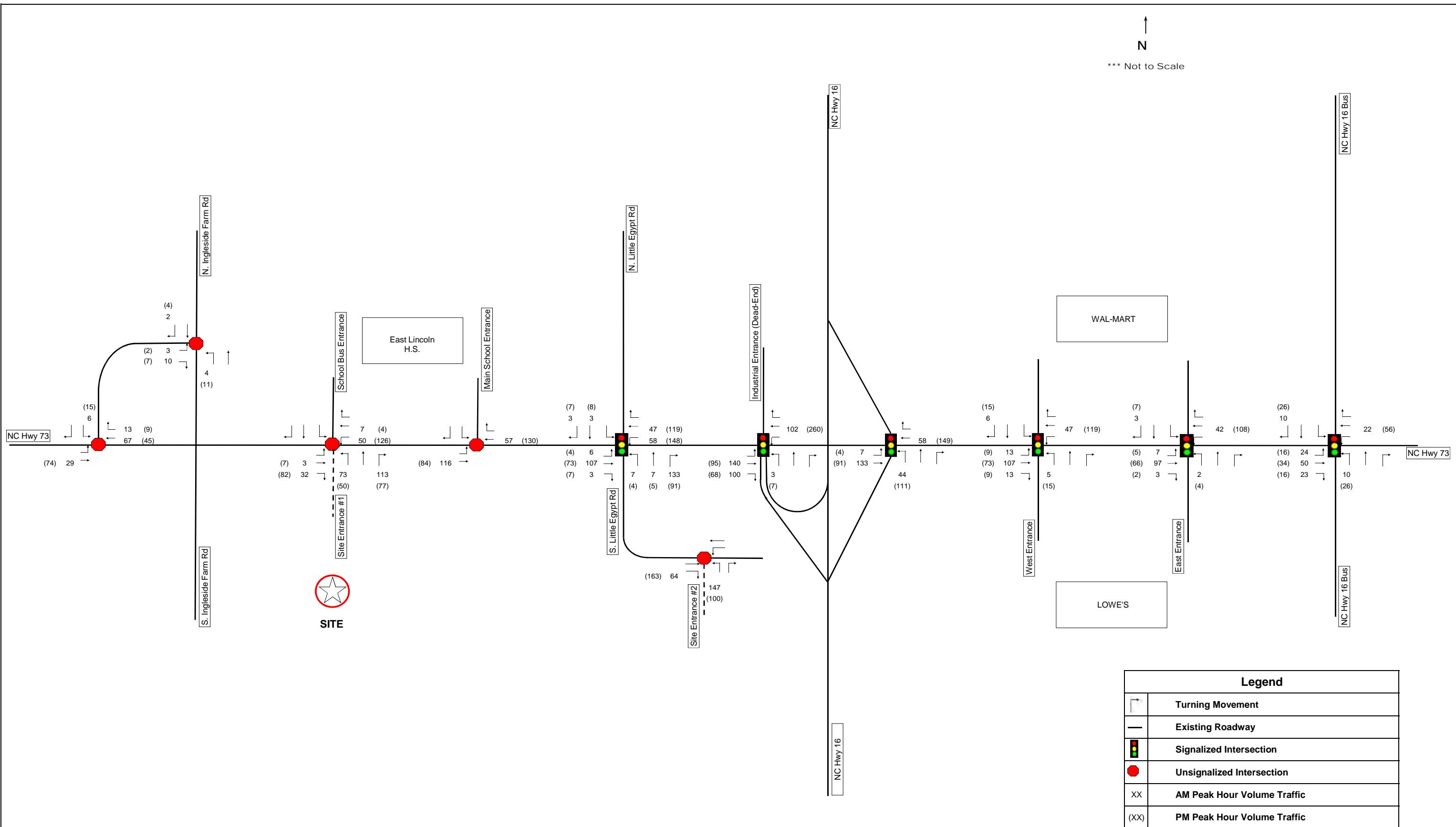
ITE CODE	LAND USE	SIZE		Average Daily Trips (24 Hours)			AM Peak Hour (One Hour Between 7 and 9 AM)			PM Peak Hour (One Hour Between 4 and 6 PM)		
				Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
210	Single Family	300	DU	1,443	1,443	2,886	55	165	220	178	104	282
251	Senior Adult Housing - Detached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

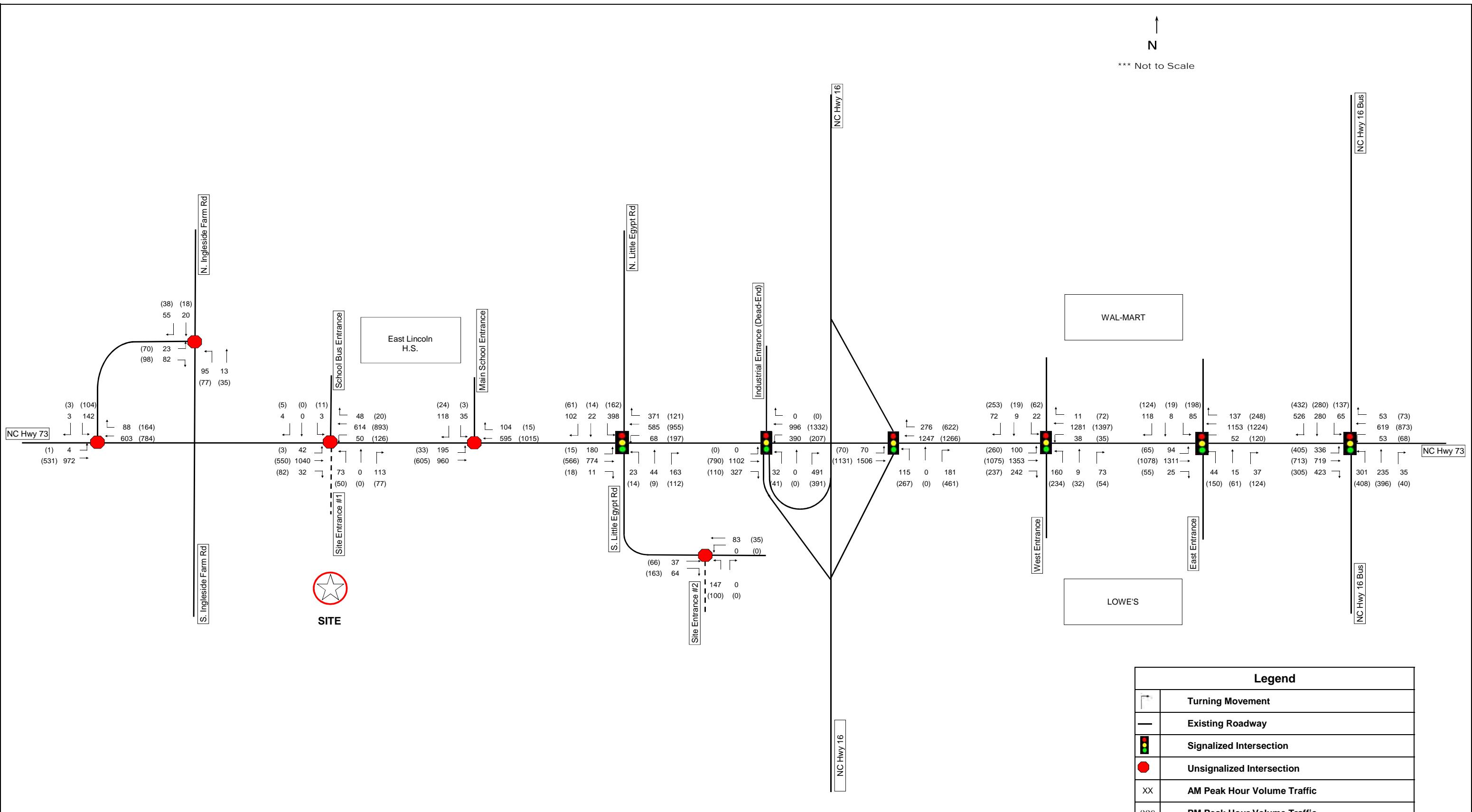
Source: ITE Trip Generation 9th Edition, ITE Trip Generation Handbook 2nd Edition, and NCDOT Congestion Management Capacity Analysis Guidelines.

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.







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 or 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.

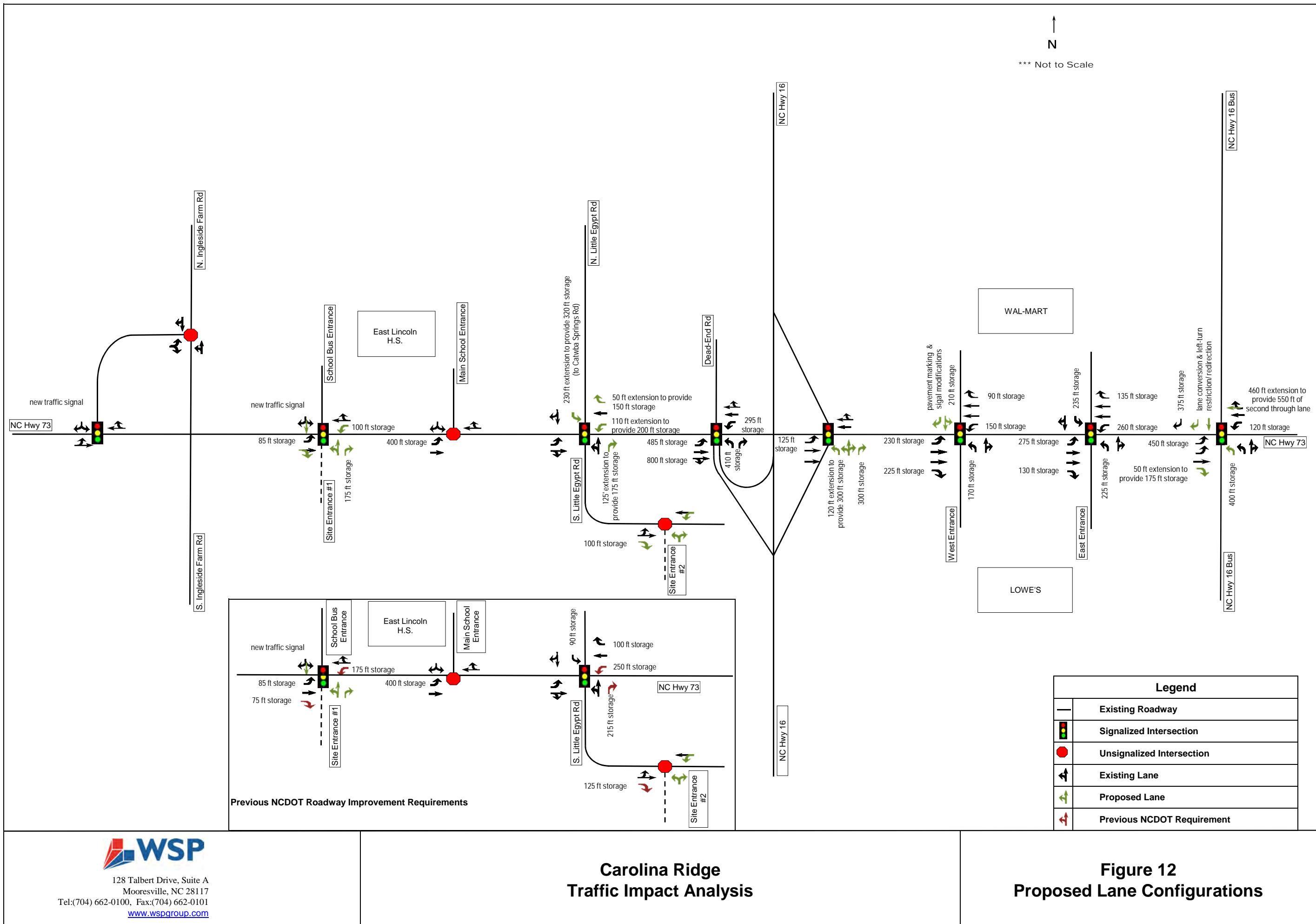
Little Egypt Road and Site Entrance 2

- 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		AM		PM		AM		PM		AM		PM		AM		PM		
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
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	22.2	C	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	50.6	D	
	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	66.5	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	48.2	D	7.0	A	
NC Hwy 73 @ NC Hwy 16 SB ramps	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	14.0	B	
	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	14.3	B	
	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	36.8	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	18.4	B	
NC Hwy 73 @ NC Hwy 16 NB ramps	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	5.6	A	
	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	36.8	D	
	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	62.2	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	11.8	B	
NC Hwy 73 @ NC Hwy 16 SB - NC Hwy 73	Intersection Average	10.1	B	17.8	B	16.8	B	38.8	D	15.0	C	25.9	C	17.9	B	50.6	B	15.8	B	28.7	C	
	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	74.6	E	
	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	29.6	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	23.8	C	
NC Hwy 73 @ Walmart/Lowes West Entrance	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	23.9	C	
	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	21.9	C	
	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	42.5	D	
	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	61.2	E	
NC Hwy 73 @ NC Hwy 16 NB - NC Hwy 73	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	53.5	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	70.3	E	
	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	62.8	E	
	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	36.5	D	
NC Hwy 73 @ Walmart/Lowes East Entrance	WB - NC Hwy 73	6.4	A	7.7	A	17.9	B	23.3	C	15.3	B	14.1	B	18.8	C	25.5	C	12.0	B	15.5	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	53.5	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	70.3	E	
	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	62.8	E	
NC Hwy 73 @ NC Hwy 16 Business	WB - 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	36.5	D	
	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	28.8	C	
	EB - NC Hwy 73	0.1	A	0.0	A	0.1	A	0.0	A	0.0	A	0.2	A	0.0	A	0.0	A	0.0	A	0.0	A	
Ingleside Farm Rd @ Connector to NC Hwy 73	WB - 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	10.4	B	
	SB - 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	5.3	A	
	Signaled Intersection Average	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	NC Hwy 73 @ School Bus Entrance 1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	948.5	F	351.3	F	66.2	E	58.0
Ingleside Farm Rd @ Connector to NC Hwy 73	WB - 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	48.1	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	0.0	A	0.0	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	0.0	A	
	NC Hwy 73 @ Main School Entrance	697.2	F	18.9	C	**	F	80.5	F	**	F	80.5	F	**	F	470.4	F	**	F	151.7	F	
NC Hwy 73 @ School Bus Entrance/ Site Entrance 1	SB - School Bus Entrance	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	1.7	A	
	EB - 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	0.0	A	
Unacceptable LOS																						

** delays over 1,000 seconds