



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 16, 2015

Re: PD #2014-2
SBG, LLC, applicant
Parcel ID# 32954

The following information is for use by the Lincoln County Board of Commissioners and Planning Board at their joint meeting/public hearing on February 2, 2015.

REQUEST

The applicant is requesting the rezoning of 116 acres from B-N (Neighborhood Business) and R-T (Transitional Residential) to PD-MU (Planned Development Mixed Use) to permit 220 single-family homes, 200 multi-family dwelling units, 40 townhomes and 100,000 square feet of commercial space.

A site plan and guidelines for the proposed development have been submitted as part of the rezoning application and would serve as the master plan for the development if the rezoning request is approved. A traffic impact analysis and an addendum, a technical memorandum concerning an off-site intersection, have also been submitted.

SITE AREA AND DESCRIPTION

The property is located at 799 N. NC 16 Hwy., on the west side of N.C. 16 Business near the southern end of Triangle Circle. It is adjoined by property zoned B-N, R-T, R-SF (Residential Single-Family) and I-G (General Industrial). Land uses in this area include residential, business and industrial. Public water and sewer are available at this location.

A 2.7-acre portion of this property along Triangle Circle is in a WS-IV Critical Area watershed district. The rest of the property is not located in a water-supply watershed. None of the property is located in a floodplain.

PLAN CONFORMANCE

The front portion of this property is identified by the NC 16 Corridor Vision Plan as a potential community center. The plan calls for a mix of commercial and office uses with

upper-story residential units, built in an urban or downtown-type setting with on-street parking, an urban green or open space, as well as a natural area with a small amphitheater near the creek and pond at the southern edge of this property. The plan also calls for a new road network that would provide alternate travel routes between N.C. 16 Business and Optimist Club Road, Rufus Road and Triangle Circle through this property.

The NC 16 Corridor Vision Plan refers to the rear of this property (the area west of the Duke Energy transmission right-of-way) as a potential part of a business park, citing the Lincoln County Land Use Plan's designation of the area between the N.C. 16 Business corridor and N.C. 16 bypass as an industrial employment center.

Strategy 1.3.1 of the Land Use Plan calls for locating denser development in areas where it will be supported by existing public utility and transportation infrastructure with adequate capacity or where such adequate capacity will be developed concurrently.

Strategy 6.1.1 calls for encouraging mixed-use development in which residential and commercial uses are well-integrated with each other and aesthetically pleasing. Strategy 6.1.2 calls for connectivity within planned developments and with adjoining tracts.

STAFF'S RECOMMENDATION

Staff recommends that the rezoning request be approved. 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 #2014-2**

Applicant **SBG, LLC**

Parcel ID# **32954**

Location **799 N. NC 16 Hwy**

Proposed amendment **Rezone from B-N and R-T to PD-MU to permit 220 single-family detached homes, 200 multi-family dwelling units, 40 townhomes and 100,000 square feet of commercial space**

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

This proposal is consistent with the NC 16 Corridor Vision Plan's goal of creating a community center built in an urban-type style and including a green and an amphitheater for community activities. It is consistent with the corridor plan's goal of creating a new road network to provide alternate travel routes between N.C. 16 Business and Optimist Club Road, Rufus Road and Triangle Circle. The proposal is consistent with Strategy 6.1.1 of the Land Use Plan, which encourages mixed-use developments in which residential and commercial uses are well-integrated and aesthetically pleasing. It is also consistent with Strategy 6.1.2, which calls for connectivity within planned developments and with adjoining tracts.

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

Public water and sewer are available to serve the proposed development. This property is located in an area with a mix of residential and business uses. The proposed commercial section of the development is adjoined by property zoned business. The proposed residential sections are adjoined by property zoned residential. The proposed development will offer a mix of housing options. As part of this proposed amendment, improvements will be made at the intersection of Optimist Club Road and Triangle Circle to alleviate congestion. The main street of this development will connect to a planned future phase of Airlee Business Park, benefiting the park by providing direct access to N.C. 16 Business.



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 SBG, LLC

Applicant Address 7804 Fairview Rd, PMB 327, Charlotte, NC 28226

Applicant Phone Number 980-233-1239

Property Owner Name Rivercross Investments, LLC

Property Owner Address PO Box 99, Lincolnton, NC 28093

Property Owner Phone Number 980-233-1239

PART II

Property Location NC Business 16 Hwy, Triangle Circle

Property ID (10 digits) 4603-50-1197 Property size 116.21

Parcel # (5 digits) 32954 Deed Book(s) 1178 Page(s) 99

PART III

Existing Zoning District BN/RT Proposed Zoning District PD-MU

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

Vacant

Briefly described the proposed planned development.

Propose to develop 220 single-family units, 40 Townhomes, 200 apartments, and 100,000 sf of general office/retail

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

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

Applicant's Signature

4/15/2014

Date



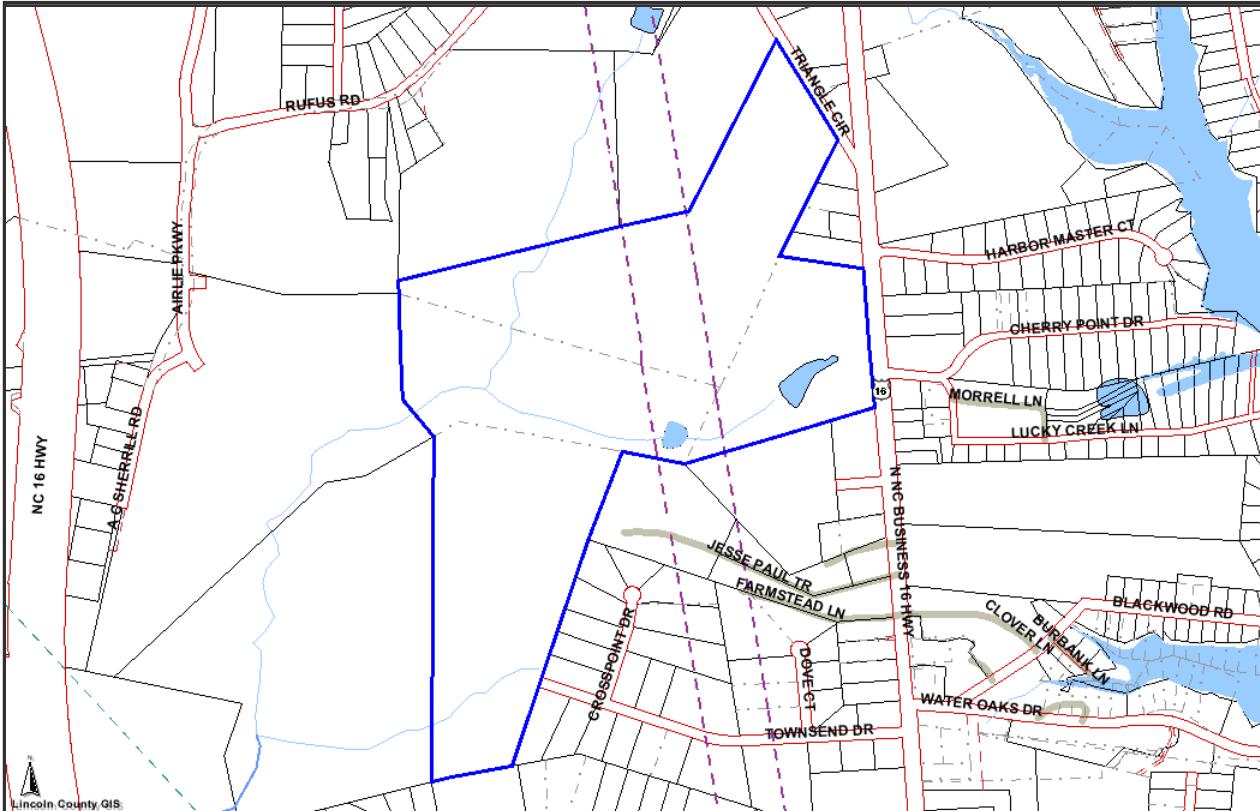
Lincoln County, NC

Office of the Tax Administrator, GIS Mapping Division

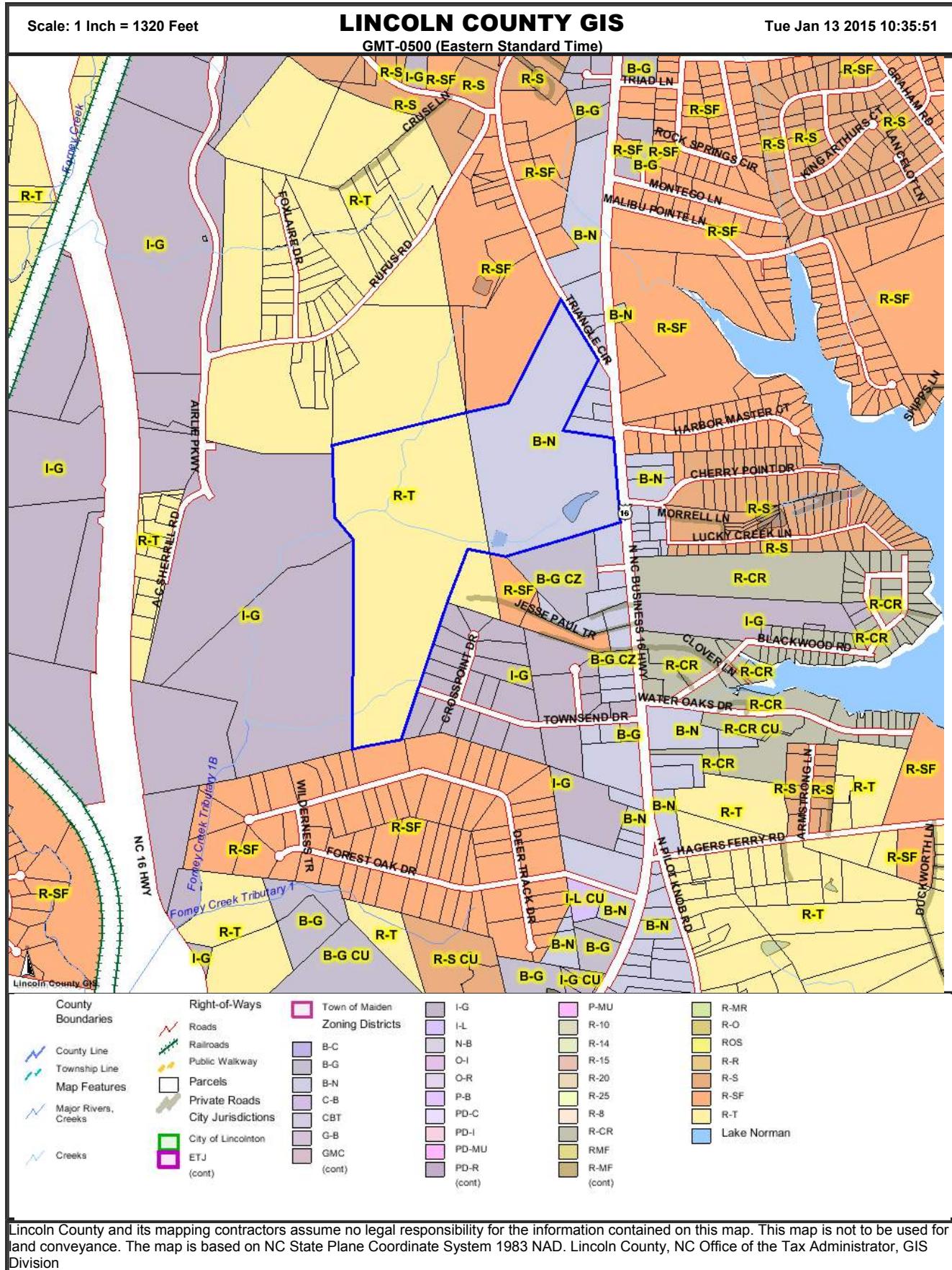
Lincoln County and its mapping contractors assume no legal responsibility for the information contained on this map. This map is not to be used for land conveyance. The map is based on NC State Plane Coordinate System 1983 NAD.



Date: 1/13/2015 Scale: 1 Inch = 1000 Feet



PHOTOS		PARCEL INFORMATION FOR 4603-50-1197					
 Photo Not Available		Parcel ID 32954 Owner RIVERCROSS INVESTMENTS LLC % JAMES M MOORE JR Map 4603-19 Mailing Address P O BOX 99 Account 0144169 Address LINCOLNTON NC 28093-0099 Deed 1178-99 Recorded 6/8/2000 Sale Price \$1,067,000 Land Value \$2,279,606 Total Value \$2,279,606 Previous Parcel 32954 ----- All values are for tax year 2014. ----- Description NIXON LD SEE PARCEL#60161 Deed Acres 116.58 Address 799 N NC 16 HWY Tax Acres 79.87 Township CATAWBA SPRINGS Tax/Fire District EAST LINCOLN / EL SEWER Improvement No Improvements					
 Photo Not Available		Parcel ID 60161 Owner RIVERCROSS INVESTMENTS LLC % JAMES M MOORE JR Map 4603-19 Mailing Address P O BOX 99 Account 0144169 Address LINCOLNTON NC 28093-0099 Deed 1178-99 Recorded 6/8/2000 Sale Price \$1,067,000 Land Value \$286,846 Total Value \$286,846 Previous Parcel 32954 ----- All values are for tax year 2014. ----- Description NIXON LD SEE PARCEL#32954 Deed Acres 116.58 Address N NC 16 HWY Tax Acres 36.34 Township CATAWBA SPRINGS Tax/Fire District EAST LINCOLN Improvement No Improvements					
 Photo Not Available		Zoning District Calculated Acres Voting Precinct Calculated Acres R-T 68.41 TRIANGLE (TR30) 116.22 B-N 47.8 Watershed Class Calculated Acres Voting Precinct Calculated Acres Not in a watershed 113.47 Not in the sewer district 35.9 WS-IVC 2.74 In the sewer District 80.32 2000 Census County Tract Block 37109 071100 2016 115.8 37109 071200 4029 0.42 Flood Zone Description Panel X NO FLOOD HAZARD 3710460200 62.7 X NO FLOOD HAZARD 3710460300 53.51					





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Community Involvement Meeting Report

PD #2014-2

Southeastern Land Development, LLC, applicant

A community involvement meeting on this rezoning request was held on August 6, 2014, at Unity Presbyterian Church. More than 70 people turned out for the meeting. Sonny Crater, land acquisitions manager for Simonini Group, spoke on behalf of the applicant. He also addressed questions and concerns raised by the audience.

Crater began his presentation by acknowledging concerns about increased traffic congestion on N.C. 16 Business as a result of this development. He assured the audience that Simonini will mitigate traffic issues to which this proposed development would contribute. Crater cited the impending increase in traffic volume on N.C. 16 Business regardless of whether or not this proposed development is approved.

Crater described his vision for the proposed Rivercross development as being comparable to Villages at Rosedale in Huntersville. He presented the vision and site plans for the development via a slideshow presentation. Crater discussed Simonini Group's niche of developing mixed-use communities through merging elements of different development models. The proposed development would include apartments, single-family residential housing, and a commercial section arranged in a cluster design with a 10-acre common open space central to the development. Crater said that the vision for this development is a multi-use, multi-age group "walkable community," citing the functionality and aesthetics of a cluster subdivision design. He explained that the 10-acre park will not abut any residential yards.

Crater stated that Ryan Homes has agreed to contract with Simonini Group to construct single-family houses in the development. He explained that while some flexibility will be maintained, there will be a sense of compatibility of styles (one section consisting of mainly ranch style homes and another section consisting of mainly two-story style homes) in the single-family section of the development.

Crater said that the commercial section of the proposed development will include about 100,000 square feet of commercial or office space fronting N.C. 16 Business. He said that the intentions are to include some open space in this section as well, but specific

designs have not yet been decided upon, citing flexibility for demand of prospective businesses. Proposed road improvements on N.C. 16 Business include a right-turn deceleration lane southbound for the main entrance. This entrance will align with Cherry Point Drive, and a traffic signal will be installed when NCDOT decides that it is warranted. Other road improvements include a right turn deceleration lane southbound on Triangle Circle, and possible mitigation at the intersection of Triangle Circle and Optimist Club Road.

The anticipated start date for site work is April 2015, and the anticipated start date for construction of homes is September 2015.

Several residents raised concerns about traffic on N.C. 16 Business:

"The words in this [traffic] study gloss over the issue, but the numbers don't."

"There needs to be a light [at the intersection of Cherry Point Lane and the proposed entrance] immediately."

"I don't think the infrastructure is there to support it."

"Have you considered just one entrance on Triangle Circle without an entrance on Highway 16?"

"A couple of traffic lights aren't going to decrease volume. If you do this, and the next developer does one, and the next one, five years down the road we will be looking back saying we should have stopped this."

"Have you considered properties west of New 16?"

Several residents expressed concerns about N.C. 16 Business becoming similar to Independence Boulevard in Charlotte, citing a lack of infrastructure to support the traffic volume.

In addressing questions and concerns about traffic issues, Crater stated that a lack of connectivity and the lack of zoning regulations on N.C. 16 Business for many years led to the current traffic congestion issues. He stated that the proposed development exhibits connectivity and a sense of cohesiveness. He also stated that very few trips will be generated northbound on N.C. 16 Business from this proposed development.

Other citizens raised concerns about community needs and impacts on schools:

"I'm not sure we have a need for this. What statistics do you have to support the need?"

"What about the impact on our schools? Where are we going to put the students?"

"Do you have any stipulations on what types of businesses can be added in the commercial section? We have enough consignment shops. We want upscale businesses."

"You have a lot more research to do before a community will embrace this."

Some citizens mentioned a common vision for site of the proposed development as a town center and recreational area, because there is a current lack of a focal point for the Denver community.

Crater responded by citing his plan to establish an open-space focal point within the community. He stated that this is an opportunity to "set the tone" for the type of cohesive development needed along N.C. 16 Business. He also stated that he will be glad to spend more time with local interest groups and with any adjoining landowners to try to achieve common goals. In addressing concerns about school overcrowding, Crater stated: "I think the development will end up being age-targeted."

Crater stated that eventually the land will be developed, even if this proposed developed is not approved. "We'll do a better job than anybody," he said. "Sooner or later somebody's going to want to develop there."

Citizens raised concerns about the quality of the housing. Crater stated that homes are anticipated to be in the \$250,000 range.

The final comment of the evening was that the developer should consider providing space in the commercial section of the development for a Sheriff's Office substation.



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Community Involvement Meeting Report

PD #2014-2

SBG, LLC, applicant

A second community involvement meeting on this rezoning request was held on January 13, 2015, at Unity Presbyterian Church. Approximately 45 citizens turned out for the meeting. Attendees included Commissioner Martin Oakes, Planning Board Chair Christine Poinsette and Planning and Inspections Director Andrew Bryant. Sonny Crater, land acquisitions manager for Simonini Group, spoke on behalf of the applicant. He also addressed questions and concerns raised by the audience.

Crater opened the meeting by acknowledging concerns that were raised at the first community involvement meeting on August 6, 2014. In his introduction and overview of the proposed Rivercross development, Crater focused on "weaknesses" and "opportunities" along N.C. 16 Business cited in the NC 16 Corridor Vision Plan. Some of the identified opportunities include creation of a town center, attraction of businesses and consumers, contribution to and accommodation of regional events, potential to drive growth and redevelopment of the area, incorporation of green spaces and greenways, and creation of a small town environment/atmosphere.

Crater stated that since the last community involvement meeting, he has added features to the rezoning plan to conform with the Corridor Vision Plan, which identifies the Rivercross site as a potential "community center." Those features include a downtown type area, a center green, a farmers market and a small amphitheater. Crater said, not counting the Duke Energy transmission right-of-way, approximately 28% of the proposed development would be open space, including a 10-acre linear park.

"Our purpose is to create an environment that doesn't exist here (in this area)," he said. "This will be an enhancement to the value of the homes in the community and in Denver."

He then went over proposed on-site and off-site traffic improvements. Improvements identified as Alternative 1B in an addendum to the original traffic study are planned at the intersection of Triangle Circle and Optimist Club Road. Crater also pointed out that Rivercross will provide a connection to Airlie Business Park, which would provide an alternate route for traffic movement between Hwy. 16 Business and Hwy. 16 Bypass.

After concluding his formal presentation, he fielded questions and concerns from the audience. The topic that dominated discussion was current and anticipated traffic issues.

"When will traffic signals be installed? Can you explain what the conditions are that would warrant that traffic light?"

"Do the signals have to be installed as soon as warranted by NCDOT, or does the developer have the leeway to delay the installation?"

"You're putting all these homes into an infrastructure that can barely support what's already here."

Planning and Inspection Director Andrew Bryant explained that the signals must be installed within a reasonable time frame following NCDOT's decision that they are warranted. He further explained that the signals would be bonded by the developer, so funds will be available for installation once deemed necessary by NCDOT.

Crater stated that while there is no doubt that this development will impact traffic, he is offering alternative routes and solutions to a problem that will "exist whether (Rivercross) is here or not".

Other concerns included the appearance of Hwy. 16 Business and potential impacts on emergency services and schools.

"What type of community sign are you going to construct?"

"What type of restrictions will you have in place so that there is not an abundance of unattractive temporary signs along Highway 16 in and around your development?"

"What will you do to ensure that the rear of the businesses do not appear unattractive?"

"What about the potential traffic impact of delivery trucks?"

"With the approval of Trilogy, the new homes going into Covington, and the approval of the hotel (at Cottonwood Village), has the availability of adequate emergency services been considered?"

"Do we have the potential capacity at our schools to accommodate the new students that will need to be enrolled with the development of this community along with Covington on Webbs Road?"

Bryant noted that the school district line currently splits the Rivercross site. "Either school it would go to has the capacity," he said.

Commissioner Martin Oakes informed the audience that enrollment in public schools has declined for the past five years. Bond money has already been approved to construct a new school on Old Plank Road at a site that has already been purchased by the county.

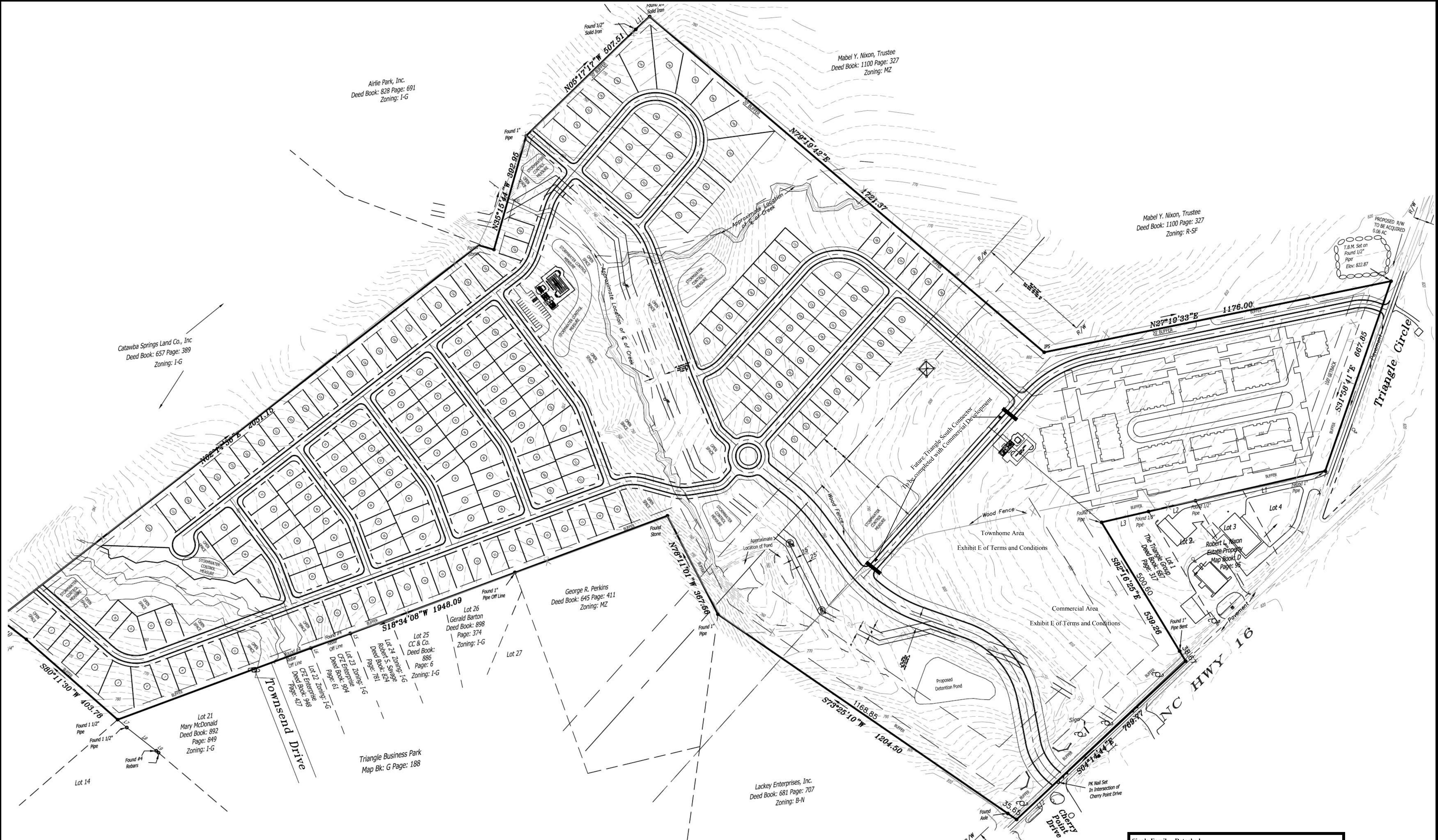
The meeting concluded with the topic that dominated much of the dialogue: traffic congestion.

"You might say your development is only going to make traffic a little worse than it currently is, but a little worse than bad is still worse than bad, whether it's a little worse or a lot worse."

"If the problem is that bad, we should not be approving changes to existing zoning that make it worse."

Commissioner Oakes said traffic congestion is not "a single development problem" but a "global problem."

In response to questions about what's being done to address this problem, Bryant pointed to the draft State Transportation Improvement Program (STIP) from NCDOT that identifies improvements to the 16 Business/73 intersection, reconfiguration of the 16 Business/Unity Church Road intersection and widening of N.C. 73 (from 16 Business to Beatties Ford Road) as sources of future relief.



Rivercross

Master Planned Terms & Conditions

This document is used in conjunction with the Master Planned exhibits submitted for the rezoning application for **Rivercross** to define the approved plan for the project. The details of this document shall control in the event of any conflict with the approved plan or zoning ordinance requirements.

General Provisions

The development depicted on the Master Plan is intended to reflect a generalized arrangement of the site in terms of buildings and uses. Final lot configuration, placement and size of individual site elements, street alignments, etc may be altered or modified within limits of the Ordinance described in Section 9.5.12, and the standards established within these notes during the design development (engineering and platting) and construction phases. Street alignments, lot layouts, and building placements may be modified in width and depth dimensions to accommodate final road alignment and lot locations. The Petitioner reserves the right to make minor modifications and adjustments to the Master Plan, including reconfiguring buildings and street layouts, subject to staff approval, provided the total office/commercial space, residential lots, and multi-family site does not exceed the maximum permitted. Any major modifications will require resubmittal to the Board of Commissioners.

I. Project Setting

The project is located off of NC Highway 16 Business 1 mile north of the intersection of Highway 73 and Highway 16 Business. It is located directly across from Cherry Point Drive and is just to the south of Triangle road South. The project is adjacent to Hecht Realty to the north and abuts a planned future phase of Airlie Business Park on the western side of the property.

II. Project Description

A. Brief Project Narrative: This project is proposed as PD-MU and shall contain up to 220 single family detached residential, 200 multi-family units (or townhomes in lieu of multi-family), 40 townhomes, and commercial uses up to 100,000 square feet. The site will also be amenitized including a 12 acre+ centralized park, pool/cabana facilities for owners, and center green located within the commercial area.

B. Location: Tax ID#: 4603-50-1197

C. Size: 116.21 Acre

D. Proposed Use(s):

1. Single Family detached

220 home sites

52' lots- approximately 123 lots

62' lots-approximately 97 lots

2. Single Family attached (Townhomes) in commercial area.

40 lots

2. Multi-family (or single-family attached in lieu of multi-family), The project will consist of 8 12, 18, or 24 unit buildings and the total will be 200 units. Primary off-street parking will be surface parking with parking primarily to the back side of the buildings. Units and bedroom counts will be primarily as listed below.

200 units

50 one-bedroom units
30 two-bedroom units
20 three-bedroom units

3. Retail/Office-100,000 square feet heated area. the commercial area identified on the Master Plan, the following uses shall be permitted, subject to a maximum 54000 square foot limit per tenant space (to allow for a potential grocer), , and subject to the Use Specific Standards of the Lincoln County Unified Ordinance where applicable.

Allowable Uses

A. Civic

Civic Club or community center
College
Child day care center (7 or more persons)
Child day care center (1-6)
Family home care
Hospital
Museum, library
Park, open area
Place of worship<500
Public facility
Recreation facility, private
Recreation facility, public
Technical, trade, business school
Utility, minor

B. Commercial

Agricultural supply/equipment sales

Amusement center, indoors
Artist studio, gallery
Bank or financial institution
Bar or nightclub
Bed and breakfast
Catering, food
Contractors Office
Convenience store without fuel services
Farmers Market
Funeral Home
Gas station/ convenience store
Indoor Recreation
Machinery Repair
Newspaper Publisher
Office, general
Office, medical
Photo finishing laboratory
Post office
Radio or television studio
Recreational club, private
Restaurant, general
Restaurant, fast food
Restaurant, fast food, with drive through
Retail, neighborhood
Retail, general
Service, neighborhood
Service, general
Veterinarian, animal hospital

The following uses will not be permitted

Adult Establishments
Industrial and Manufacturing
Auto Sales Lots
Flea Markets
Boat dealer/Boat Sales

E. Amenities

Single-Family Area

The Single-Family area will include a Pool/Cabana. The Pool is to be complete during phase I of the development and prior to plat recording for additional single-family detached phases.

The Multi-Family area will include a Pool/Cabana. It will be constructed at the time of construction of the multi-family units and will be the sole responsibility of the apartment builder.

Sidewalks-Sidewalks shall be provided in front of all residential lots, around small parks, and both sides of the public streets in the townhome section and entry area.

Street Trees- will be planted along all rights of way within the single family section and conform to Lincoln County Unified Development Ordinance Article 3.

Trail System- The area along the Duke Energy transmission right-of-way will be made available for a leg of the Carolina Thread Trail.

Central Park-the single-family area will include an approximately 8 acre park surrounded by streets with parking provided on the park side of each street. Lots shall not back into the park and only be located on the opposite side of the street to allow access to all residents and visitors to the community, plus provide a visually pleasing park setting for pedestrians, bicyclers, and motorists.

Multi-Family Area

The Multi-Family area will include a Pool/Cabana. It will be constructed at the time of construction of the multi-family units and will be the sole responsibility of the apartment builder.

Central Park- multi-family residents will have access to the central park located in the single-family portion of the development, plus access to the greenway area under the Duke Energy transmission right-of-way.

Commercial Area - Exhibit E, F, G, H

The commercial area will include a centralized square to host outdoor events and exhibits.

An area within the commercial phase or to the southside of the main boulevard will be designated for a future amphitheater

F. Densities/Intensities:

- Commercial – Allows for a maximum of 100,000 square feet, plus 40 townhomes. The commercial will be built on a portion of the property that contains approximately 30 acres.
- Residential -- Apartments (200), and Single-Family Detached (220 lots) will be constructed on the remaining 86 acres of the site. The density on that portion of the site is 5 units per acre.

G. Open Space, Buffer Yards, and Landscaping-Open Space-Exhibit K

Open Space-The project will offer almost 40% of the site as Open Space, which is greater than the 12.5% requirement. Exclusive of the Duke Power Transmission easement open space is approximately 28%. Almost all (if not all) of the Open Space is usable. Parts of the open space will be well organized as in the Central Park, Square in the Commercial area, and Greenway along the Duke Power Transmission easement.

Buffer Yards- Class C Buffer Yards will be provided along all project boundaries per Lincoln County Unified Development Ordinance 2.4.E.3.

Landscaping- Landscaping for the development shall conform to requirements specified in the Lincoln County Unified Development Ordinance 3.4. In addition, the developer will provide appropriate Entry Monuments, Landscaping, and Identification along key locations of the development. Examples are provided in Attachments.

H. Establishment of a Property Owners Association

A Property Owners Association shall be established and will be responsible for maintaining all private roadways/right-of-way landscaping, signs, amenities, storm water features, parking areas, and common open space.

I. Restrictive Covenants

Restrictive Covenants will be created and recorded prior to final plat recordation of each portion and/or phase of the development to establish, among other items, permitted uses and maintenance responsibilities of the property management association. Restrictive Covenants will also include language that ensures stream buffers, perimeter buffers, and setback areas are protected.

J. Parking, Lighting, and Signage

Parking- parking for residential, apartments, and commercial areas shall conform to Lincoln County Unified Development Ordinance.

Lighting- lighting for residential, apartments, and commercial areas shall conform to Lincoln County Unified Development Ordinance.

Signage- signage for the development shall conform to the Lincoln County Unified Development Ordinance.

K. Storm Water Compliance

Rivercross Development will be subject to Lincoln County storm water management regulations in place at the time of preliminary plat submittal. Storm water detention ponds and/or BMPs will be incorporated into the design. Low impact (LID) measures will be incorporated into the design where feasible. All storm water measure will conform to requirements in the Lincoln County Unified Development Ordinance.

L. Permitting

The petitioner understands that all permits from Lincoln County and appropriate agencies must be obtained prior to grading or construction activities.

M. Water and Sewer Availability

The property is located within the East Lincoln Water and Sewer District and the Petitioner understands that water and sewer availability must be approved by Lincoln County prior to development. It is the Petitioner's responsibility to incur all permit fees, availability fees, infrastructure costs for providing water and sewer throughout the development. The Petitioner will comply with all district's water and sewer standards.

Water and Sewer is currently available within the property.

N. Development Phasing Plan-Exhibit A

Phase I- Entry way from Highway 16 and entry from Triangle South reaching single-family detached area containing 79 lots. The phase will also define the northern edge of the interior park. This phase also completes the connector stub to Airlie Business Park.

Phase II- Is the area south of the interior park and completes the road network surrounding the park. This area contains approximately 82 single family lots. The pool/cabana for the single-family lots in the development will begin construction and be completed during the second phase of the development.

Phase III- Is the finale single family phase. This area contains approximately 59 single family lots. This will complete the single family portion of the development.

Apartment Phase- containing 200 apartment dwellings

Commercial Phase-containing up to 100,000 square feet of commercial uses plus 40 townhomes.

O. Timing of Phases

Phase I- completion (sellout) – October 2017

Phase II- completion (sellout)- July 2019

Phase III- completion (sellout)- December 2020

Apartment- completion 2016

Commercial- completion- 2019

P. Vehicular Access and Road Improvements

Vehicular Access: There will be three primary access points into Rivercrosss.

1. The main access will be provided on the east side of the site entering from Highway 16 Business. Location of this entrance will be across from Cherry Point Lane. This access will be the main boulevard providing entrance points to all the commercial properties, and leading into the single-family residential site. The boulevard will reach an intermediate pause as it intersects into a four way traffic circle. This boulevard shall also serve as the future connection from Triangle Road South that will become the main access point from Triangle South to NC 16 Business as shown in the NC 16 Corridor Plan. This access will be provided during Phase I of the site development.
2. A second primary access will enter from Triangle Road South from the northeastern portion of the site. This access will run along the edge of the apartment phase and provide a second access to the single family residential areas of the development. This access shall also form the new route of Triangle South and its eventual connection to the main boulevard in Rivercross per item 1 above.

3. A third primary access will link the boulevard, extended from the northern most leg of the traffic circle, to a future phase of Airlie Business Park. This connection will be provided in the first phase of the development.

Improvements to Existing Roads Fronting Rivercross: A Traffic Impact Analysis has been prepared for this project. Based upon NCDOT and Lincoln County comments, road improvements will be required. Improvements by the developer include, per phase of construction and intersection location:

Phase I-the following road improvements will be complete in conjunction with Phase I of Rivercross.

1. NC 16 Business at Site Access

- a. Construct a right-turn lane on southbound NC 16 Business with 200 feet of storage and appropriate taper.
- b. Revise the pavement markings on the northbound NC 16 Business approach to provide a left-turn lane (into site) with 375 feet of storage.
- c. Revise the pavement markings on the southbound NC 16 Business approach to provide a left-turn lane (into Cherry Point Drive) with 100 feet of storage.
- d. Resurface NC 16 Business within the roadway and pavement marking construction limits.
- e. Construct two exit lanes on the eastbound Site Entrance with a minimum of 250 of storage and appropriate taper.
- f. Install a traffic signal at this intersection with appropriate signal heads, controller and cabinet, poles, loop detectors, junction boxes, etc. Signal warrant analysis should be performed before signal installation. The traffic signal shall coordinate with adjacent traffic signal (s) on NC 16 Business if required by NCDOT Div. 12.

2. Main Boulevard Extended from traffic circle for a future connection into Airlie Business Park.

3. Triangle Circle South Access Drive

- a. Construct a right-turn lane on eastbound (southbound) Triangle Circle with 50 feet of storage and appropriate taper
- b. Construct a left turn lane on westbound (northbound) Triangle Circle with 100 feet of storage and appropriate taper
- c. Construct two exit lanes on the Site Entrance approach with a minimum of 100 feet of storage and appropriate taper.

Off-site Road Improvements – The following improvements will be provided prior to the issuance of certificates of occupancy for any homes.”

1. Optimist Club Road and Triangle Circle (Alternative 1B)-Exhibit J

- Construct a right-turn lane on eastbound Optimist Club Road with 350 feet of storage and appropriate taper.
- Construct a left-turn land on northbound Triangle Circle with 250 feet of storage and appropriate taper.
- Install a traffic signal at this intersection with appropriate signal heads, controller and cabinet, poles, loop detectors, junction boxes, etc. Signal warrants analysis should be performed before installation. This traffic signal shall coordinate with the adjacent traffic signal(s) on NC 16 Business. The traffic signal at Optimist Club and Triangle South will be installed at a time when NCDOT agrees traffic conditions warrant such installation. The developer shall provide adequate bonding as assurance to the installation of the traffic signal.

Other Roadway Improvements

1. Triangle South Site Access Connection to Main Boulevard

Install two lane connector road linking Triangle Site Access Road to Main Boulevard. This road shall be installed at the beginning of the commercial or apartment phase of the site, whichever comes first.

III. Residential Dimensional Standards

Dimensional Standards: Single-Family Detached

Alley loaded Single-Family Residential detached lots (less than 50' wide): Note: This section has been entered to consider the possibility that parts of the single-family detached may utilize alleys. Per the current plan no alley loaded single-family are shown on the master plan.

Front Set back: 5' ft from R/W

Side: 5', however, the home may be placed to one side of the lot for zero lot or sideyard homes. In any event the total separation of buildings on adjoining lots is 10'.

Rear: 15 ft from centerline of alley or lane

Accessory Structure Side/Rear set back: 5'

Minimum Lot Width: 32 Ft

Maximum Height: 40'

Encroachments: Eaves, cornice, or gutter may project up to 3 feet into any required yard.

Lot Coverage (Maximum Impervious): 80%

Front Loaded Single -Family Residential Detached Lots (Lots greater than 50' wide)

Front Setback: 20 ft

Side: 5 ft

Rear: 20 ft

Accessory Structure Side/rear Setback: 5 ft

Minimum Lot Width: 50 Ft

Maximum Height: 40'

Encroachments: An eight-foot (8') encroachment into the front setback is permitted for balconies, stoops, stairs, chimneys, open porches, bay windows. Eaves, cornice, or gutter may project up to 3 feet into any required yard.

Lot Coverage (Maximum Impervious): 80%

Alley Loaded Townhomes- Exhibit D

Front Setback: 0 ft

Sides: 0 ft (Corner-5 ft)

Rear: 15 ft from centerline of alley or lane

Parking and Vehicular Access: Primary vehicular access is provided using a rear lane or alley only. Off- street parking shall be located in the rear yard only. No curb cuts or driveways are permitted along the frontage.

Minimum Lot Width: 16 Ft

Maximum Height: 45 ft

Accessory Structures: Side end unit/Rear Setback: 5 ft

Lot Coverage (Maximum Impervious): 80%

Front Loaded Townhomes- Note: no front loaded Townhomes are shown on the Master site plan, However in the event developer/builder should convert some townhomes to alley loaded this section will apply.

Front (Minimum): 20 feet from R/W

Sides: 0 ft (Corner-5 ft)

Rear: 15 ft

Parking and Vehicular Access: Primary vehicular access is provided using front loaded garages with 20' from garage to R/W.

Minimum Lot Width: 20 Ft

Maximum Height: 45 ft

Encroachments: An eight-foot (8') encroachment into the front setback is permitted for balconies, stoops, stairs, chimneys, open porches, bay windows, and raised doorways.

Accessory Structures: Side/Rear Setback: 5 ft

Lot Coverage (Maximum Impervious): 80%

IV. Residential Design Standards

Standards for Single-Family Detached Development- Standards shall conform to Lincoln County Unified Development Code except as noted herein. Exhibit B and C

A. Orientation of Buildings to Streets and Open Space

All single-family detached dwellings shall be oriented so the primary entrance faces the street. In the case of corner lots, the primary entrance shall face the street from which the dwelling is addressed.

B. Design of Front Facades

1. All single-family detached dwellings shall provide a minimum of three (3) of the following design features for each residential unit fronting onto a street.
 - a. One (1) or more dormer windows or cupolas
 - b. A recessed entrance
 - c. A covered porch or stoop. The use of alternative roofing materials and design details as part of porches or stoops is strongly encouraged.
 - d. Pillars, posts, or pilasters-pillars, posts, or pilasters shall be in proportion to the architectural style of the home, but in no event shall a post or column be less than 8" in diameter unless posts are used in tandem.
 - e. One or more bay windows with a minimum twelve (12) inch projection from the façade plane.
 - f. Eaves with a minimum six-(6) inch projection from the façade plane
 - g. A parapet wall with an articulated design, which entails design variation rather than a simple rectilinear form
 - h. Multiple windows with a minimum of four-(4) inch wide trim or shutters.
2. Roofs shall have multiple planes and elements including hips, gables, and dormers reflecting required wall offsets or other architectural features of the building, with at least one additional plane or feature for every sixty (60) feet of façade frontage.

C. Building Foundation

1. Except for Assisted Living Facilities, Nursing Homes, and structures designed or intended for occupation by persons with physical disabilities, the finished floor elevation at the front façade shall be located above grade in accordance with the following standards.
 - a. For front setbacks of ten (10) feet or more, the foundation supporting the floor framing on the front façade shall be a minimum of eighteen (18") inches above grade, and

- b. For front setbacks of less than ten (10) feet, the foundation supporting the floor framing on the front façade shall be a minimum of twenty-four (24") above grade.
- 2. Front foundation walls or piers and side walls facing public streets shall be clad in face brick, stone, stucco or some other masonry material accurately imitating these materials. Latticework screening shall be installed between piers on the front and side building facades. Sides and rear exposed foundations may be face brick, stone, stucco, parging, or some other material imitating these materials.
- 3. Nothing in this subsection shall prevent the use of slab foundations, provided the slab is clad in the materials required in subsection two (2) and extends to the minimum height above grade specified in subsection (1) above.

D. Roof Penetrations and Equipment

All roof vents, pipes, antennas, satellite dishes, solar installations, and other roof penetrations and equipment (except chimneys) shall be located on the rear elevations or otherwise configured to the degree practicable to have a minimal visual impact as seen from the street. Solar installations that are visible from the street must be either composed of building- integrated components (such as solar shingles) that are not readily evident or be designed and mounted to match the shape, proportions, and slope of the roof.

E. Car Port Location- Car ports are prohibited

F. Garage Design

1. Garage Doors

Individual garage doors fronting a street and visible from a street shall not exceed sixteen (16') feet in width per door. A maximum of three garage doors may front a street but individual bays must be provided with a minimum separation of one (1') foot between doors. Garage doors must be carriage style doors, with windows, brackets and handles when facing a street.

2. Compatibility

The exterior materials, design features, and roof form of garages shall be compatible with the building it serves.

G. Building Materials

- 1. The following building materials are prohibited:
 - a. Metal siding and exposed smooth-finished concrete block for all building elevations; and
 - b. Synthetic stucco (EIFS) within two (2) feet of the grade level and within two (2) feet of the exterior door jamb.
- 2. Front facades shall have a minimum of twenty-five percent (25%) brick, stone or stucco detailing, except when a specific architectural style (i.e. Cape Cod, etc.) suggests that full siding coverage is appropriate.

H. Architectural Variability

1. Any given house façade must be distinctly different than those of the two lots on either side and the house most directly across the street.

V. Standards for Single-Family Attached, and Townhouses Structures.

A. Orientation of Buildings to Streets and Open Space

All single-family attached dwellings shall be oriented so the primary entrance faces the street. In the case of corner lots, the primary entrance shall face the street from which the dwelling is addressed.

B. Building Size

Individual building footprints shall not exceed fifteen thousand (15,000) square feet.

C. Design of Front Facades

1. Front facades shall provide a minimum of three (3) of the following design features for each residential unit fronting onto a street.
 - a. One (1) or more dormer windows or cupolas
 - b. A recessed entrance
 - c. A covered porch
 - d. Pillars, posts, or pilasters
 - e. One or more bay windows with a minimum twelve (12) inch projection from the façade plane.
 - f. Eaves with a minimum six-(6) inch projection from the façade plane
 - g. A parapet wall with an articulated design, which entails design variation rather than a simple rectilinear form
 - h. Multiple windows with a minimum of four-(4) inch wide trim or shutters.
2. Roofs shall have multiple planes and elements including hips, gables, and dormers reflecting required wall offsets or other architectural features of the building, with at least one additional plane or feature for every sixty (60) feet of façade frontage.

D. Building Foundations

1. Except for structures required to be designed or intended for occupation by persons with physical disabilities, the finished floor elevations at the front façade shall be located above grade in accordance with the following standards.
 - a. For front setbacks of ten (10) or more, the finished floor elevation of the front façade shall be a minimum of eighteen (18) inches above grade.
 - b. For front setbacks of ten (10) or less, the finished floor elevation of the front façade shall be a minimum of twenty-four (24) inches above grade.

2. Exposed front foundations walls or piers shall be clad in brick, stone, or stucco or some other masonry material accurately imitating these materials. Latticework screening shall be installed between piers on front and side building facades.
3. Nothing in this subsection shall prevent the use of slab foundations provided the slab is clad in the materials required in subsection (2) and extends to the minimum height above grade as specified in subsection (1) above.

E. Garages

1. Design
 - a. Garage doors may front a street. Garage doors must be carriage style doors, with windows, brackets and handles when facing a street.
 - b. The exterior materials, design features, and roof form of garages shall be compatible with the building it serves.
 - c. Individual garage doors facing a street shall not exceed 60% of the width of each townhome.

F. Building Materials

1. The following materials shall be prohibited:
 - a. Metal siding and exposed smooth-finished concrete block for all building elevations; and
 - b. Synthetic stucco (EFIS) within two (2) of the grade level and within two (2) feet of any exterior door jamb.
2. Buildings shall have a minimum of fifty percent (50%) brick, stone, or stucco on front facades (per building, not per unit), and thirty percent (30%) brick, stone, or stucco on side façade when facing a public street.
3. Residential roofs shall be clad in wood shingles, standing seam metal, terne, slate, asphalt shingles or similar material.

G. Off-Street Parking

Single-family attached, townhouse, or two-to four-family, dwellings shall comply with the standards of Lincoln County Unified Development Ordinance

1. Off-street parking is allowed in front of each townhome except for alley-loaded townhomes.
2. On-street parking specifically designed into new streets constructed with the buildings may be used to meet no more than twenty (20) percent of the off-street standard.

H. Roof Penetrations and Equipment

To the degree practical, all roof vents, pipes, antennas, satellite dishes, and other roof penetrations and equipment (except for chimneys) shall be located on the rear elevations or configured to have minimal visual impact as seen from the street.

VI. Multi-Family Design Standards –Exhibit I

Multi-Family Design Standards and architecture shall meet the requirements of the Lincoln County Unified Development Ordinance along with specifications, details, and/or exceptions listed below.

A. Materials

1. Apartment building walls shall be brick, cast concrete, stucco, cementitious siding, or other building materials similar in appearance and durability. All accessory buildings shall be clad in materials similar in appearance to the principle structure.
2. Pitched roofs shall be clad in wood shingles, standing seam metal, corrugated metal, slate, or asphalt shingle or similar material.

VII. Commercial Design Standards

Commercial design standards and architecture shall meet the requirements of the Lincoln County Unified Development Ordinance along with specifications, details, and/or exceptions listed below.

A. Materials

1. Commercial building walls shall be brick, cast concrete, stucco, marble, cementitious siding, or other building materials similar in appearance and durability. Regular or decorative concrete block may be used on building walls not visible from a public street or as an accent material only. All accessory buildings shall be clad in materials similar in appearance to the principle structure.
2. Pitched roofs shall be clad in wood shingles, standing seam metal, corrugated metal, slate, diamond tab asphalt shingle or similar material.
3. Flat roofs shall incorporate parapet walls to conceal the flat portions of the roof that are visible on the front and side or rear when visible from a public street.
4. Signs on the inside of glazed openings may be neon.

B. Configuration

1. Two wall materials may be combined horizontally on one façade. The heavier material should be below.
2. Sky-lights shall be flat (non-bubble)
3. At least 70% of the street level frontages shall be windows or doorways. Street level windows shall be visually permeable. Mirrorized glass is not permitted in any location. Faux or display casements are not permitted in lieu of exterior window treatments for the frontage elevation.
4. No frontage wall shall remain unpierced by a window or functional general access doorway for more than 16 feet.

C. Exceptions

1. Residential above commercial uses shall not be required

EXHIBIT A

Development Phasing

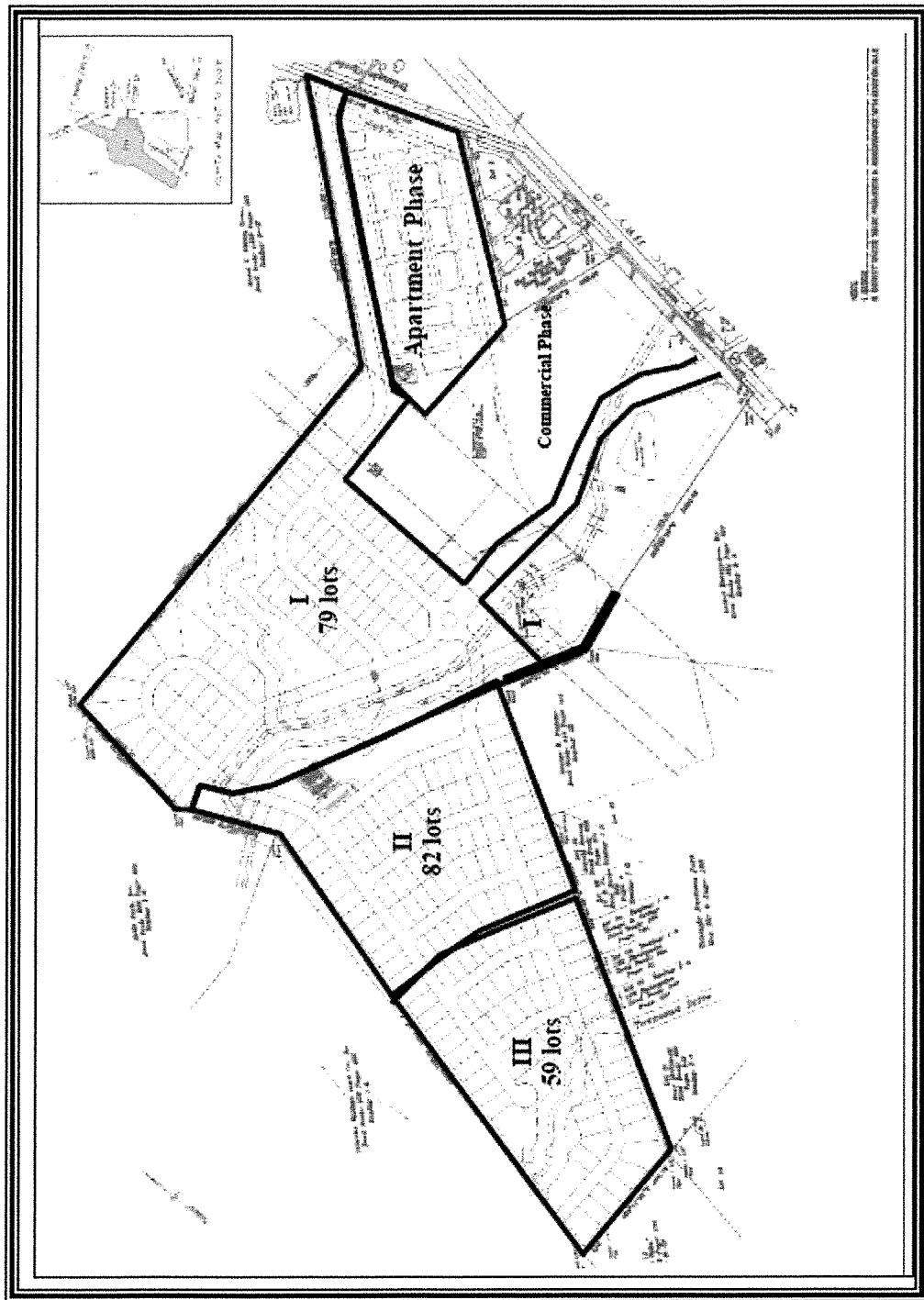


EXHIBIT B

One Story Homes
Representative Single-Family Detached



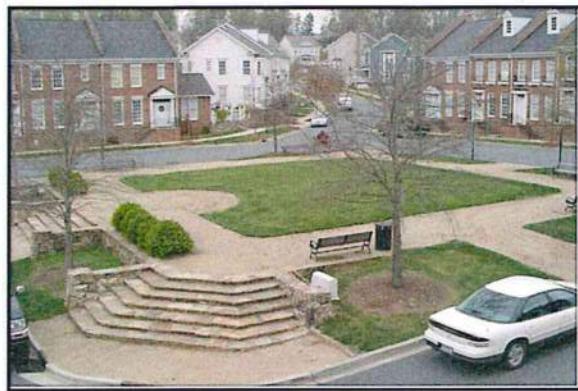
EXIHBIT C

Two-Story Homes
Representative Single-Family Detached



EXHIBIT D

Examples of Alley Loaded Townhomes



EXITBIT E

Community Center

(for illustration purposes)

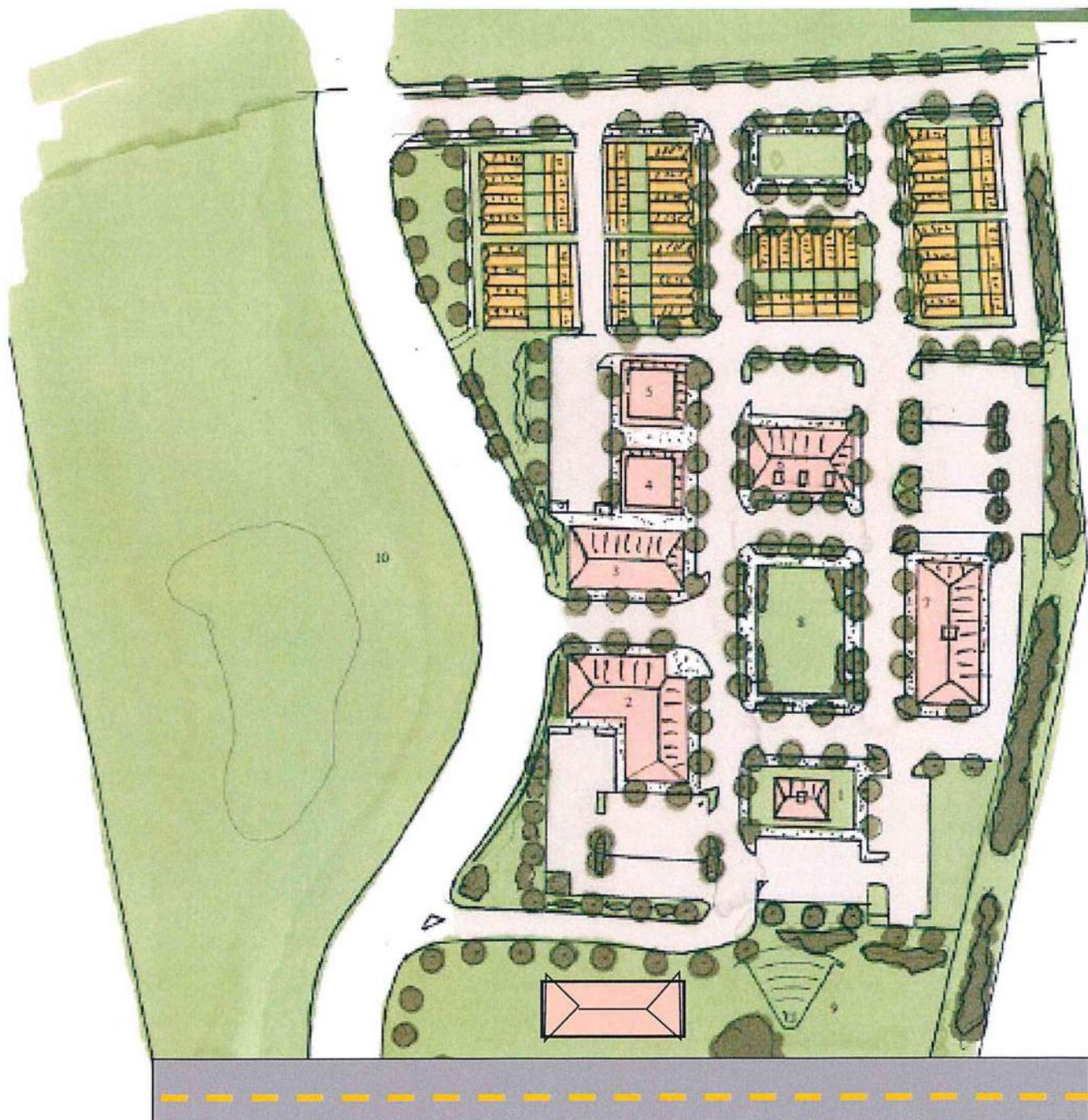
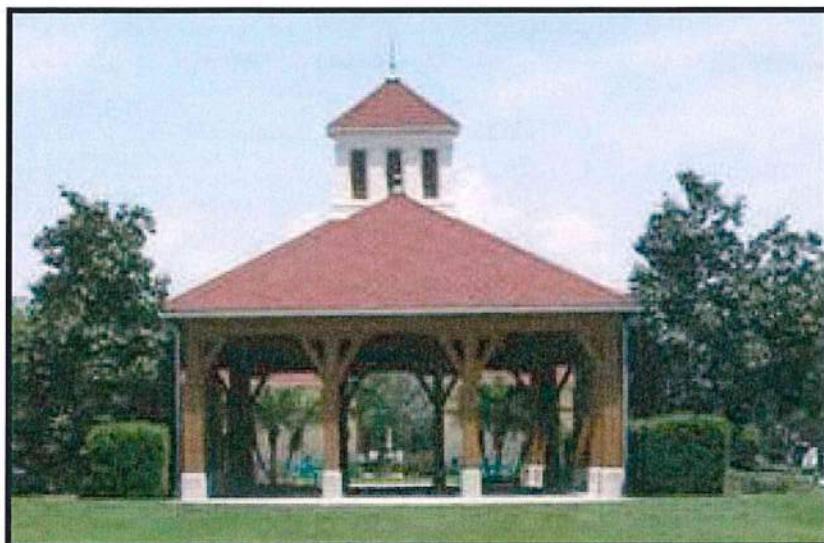


EXHIBIT F

Commercial and Civic Buildings

Farmers Market Pavilion



General Store

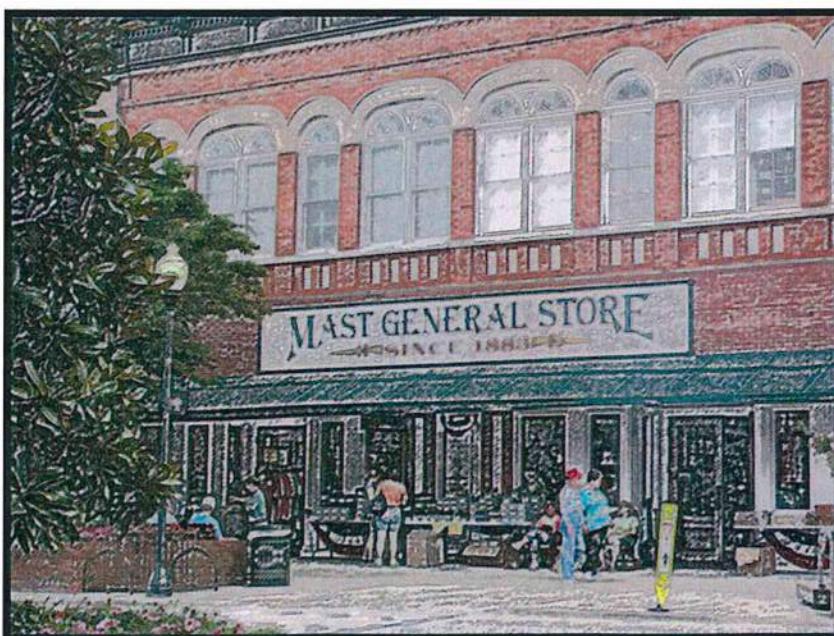


EXHIBIT G

Examples of Commercial Buildings



EXHIBIT H

Examples of Commercial Buildings

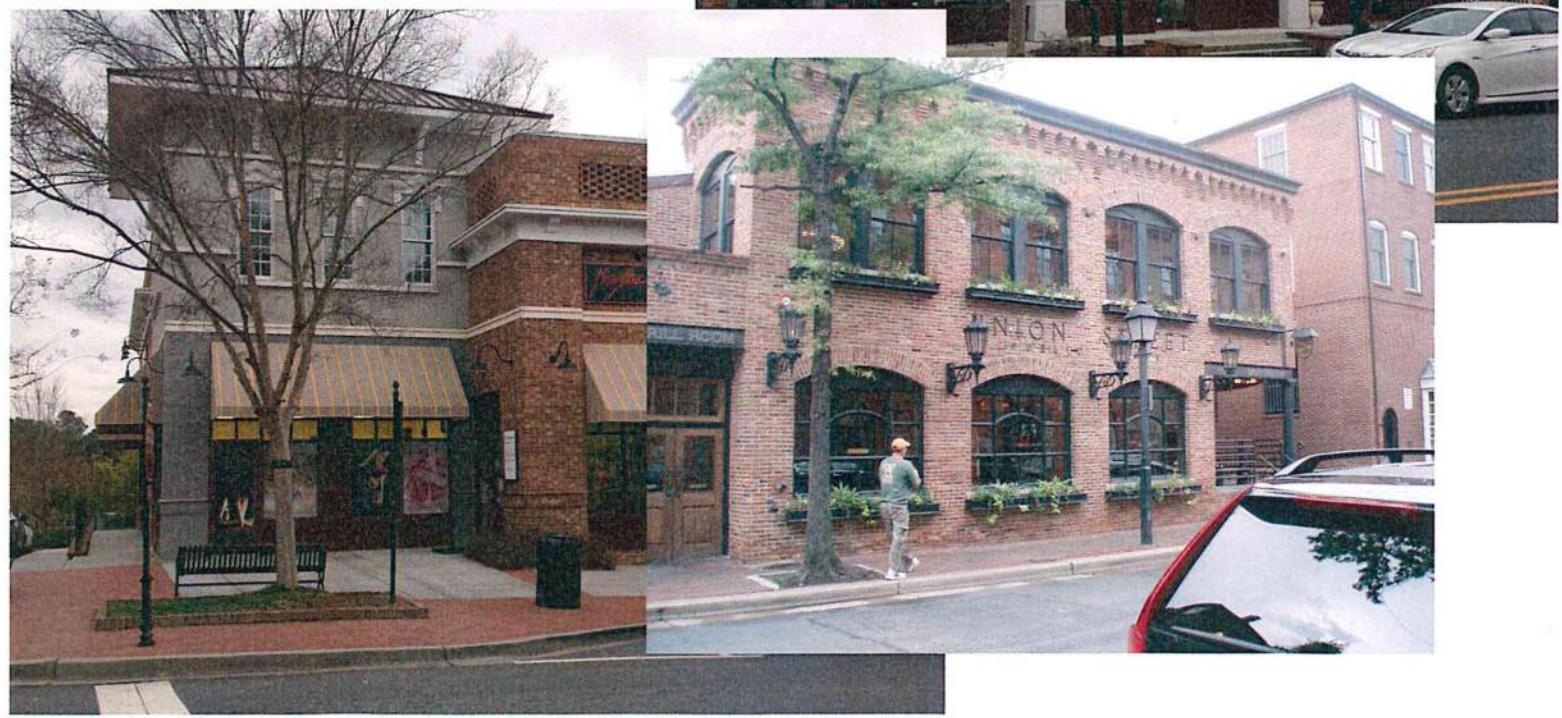
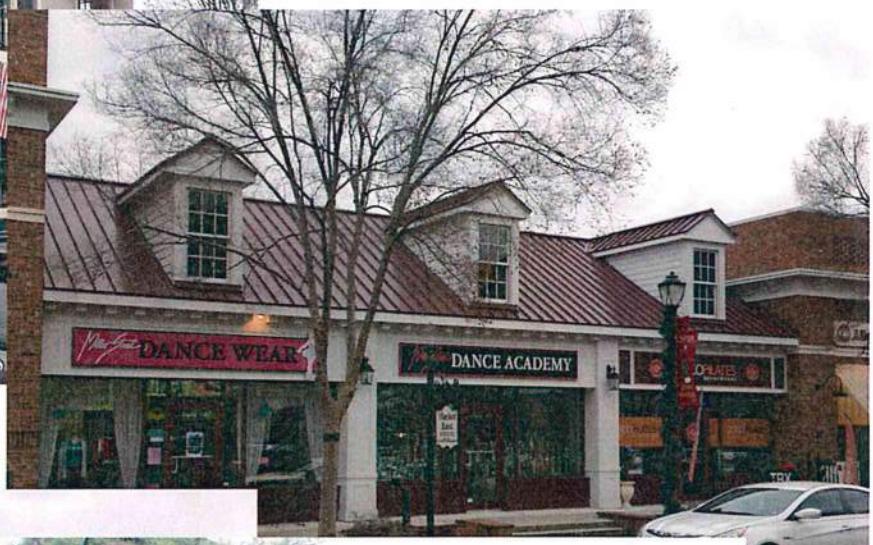


EXHIBIT I

Examples of Apartment Buildings



EXHIBIT J

Off-site Road Improvements.
Optimist/Triangle

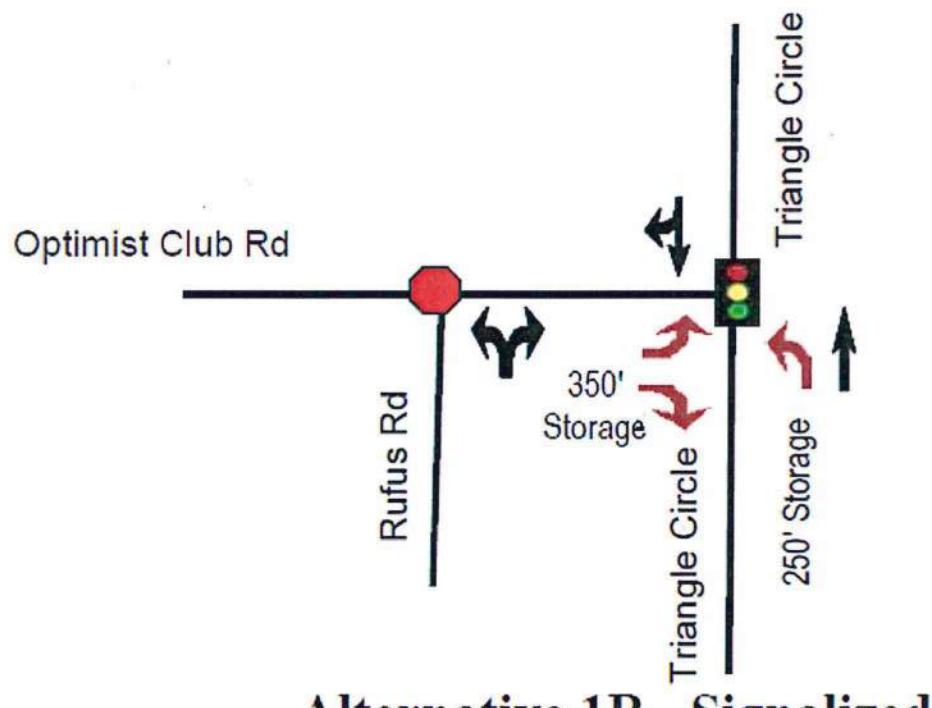
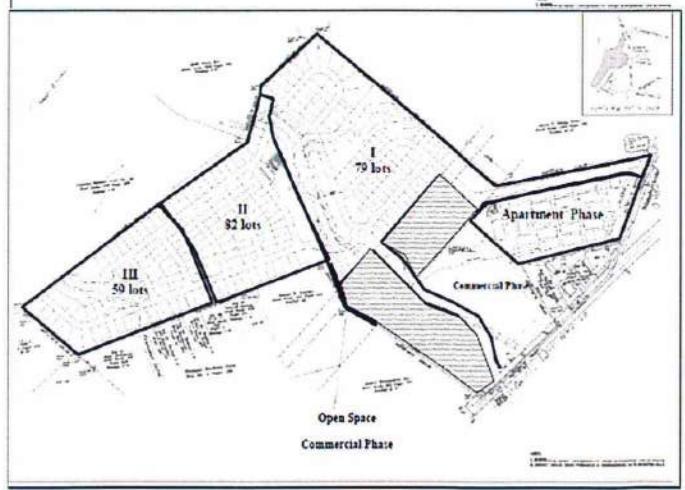
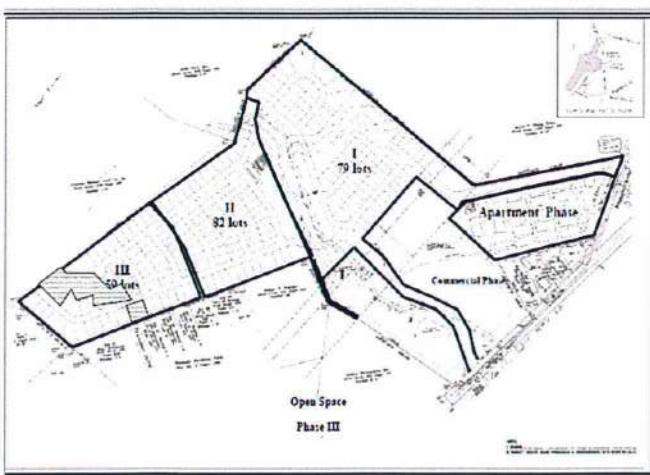
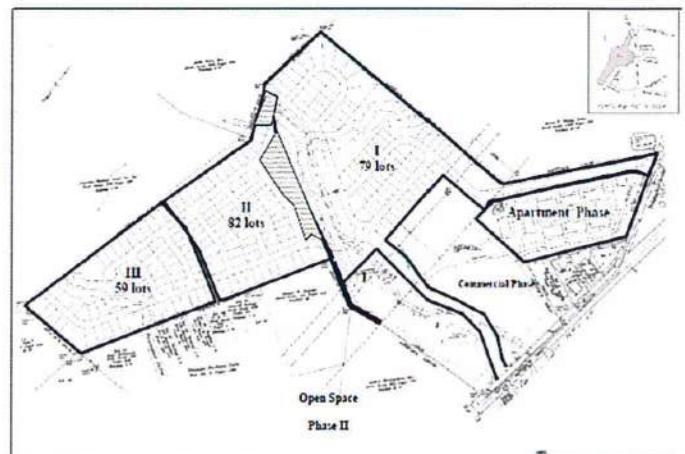
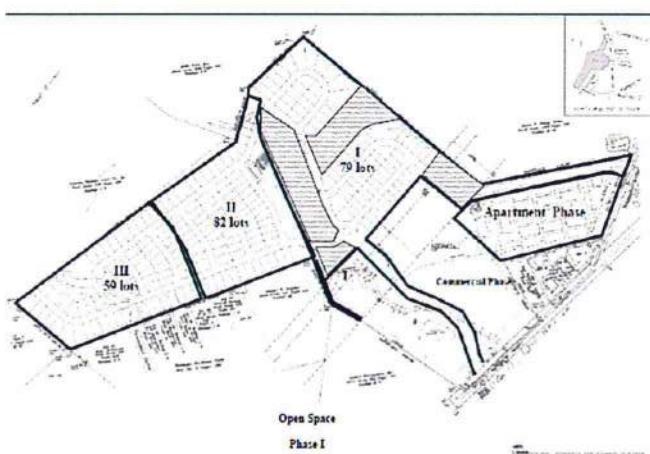


EXHIBIT K

Open Space



April 8, 2014
Updated May 23, 2014

SRS Engineering, LLC
801 Mohawk Drive
West Columbia, SC 29169

Mr. Sonny Crater
Land Acquisitions Manager
Simonini Group

**RE: Traffic Impact & Access Study
Rivercross: NC 16B at Triangle Circle
Lincoln County/Denver, NC**

Dear Mr. Crater:

As requested, SRS Engineering, LLC (SRS) has completed an assessment of the traffic impacts associated with the development of the new mixed-use development, which will include residential dwellings as well as commercial land-uses to be located along Triangle Circle and North Carolina 16 Business (NC 16B) in Lincoln County/Denver, NC. This report studies intersections along NC 16B as well as Optimist Club Road as requested by NCDOT as well as addresses the recent comments dated May 12, 2014 from staff received on the prior submittal of this report dated April 8, 2014. The following provides a summary of this study's findings.

PROJECT DESCRIPTION

The project site is located on the west side of NC 16B, south of Triangle Circle and is referred to as Rivercross. The project proposal is to construct a new mixed-use development which will provide both residential dwellings units as well as commercial uses which will be located along the site's frontage of NC 16B. The development site totals 113-acres which will be developed as 220 single-family detached units, 240 apartments and 30-acres of commercial development which has been anticipated as 100,000 square-feet (sf) of general retail commercial. As scheduled, this project is planned to be constructed and occupied within a six-year period (2020). **Figure 1** (Figures located at end of report) depicts the site location in relation to the regional roadway system.

Access to/from the development is planned via two access drives, one each to/from NC 16B and Triangle Circle South. Based on the current development plan, connectivity within the site is planned which will allow travel between the residential and commercial uses planned within the site. The Triangle Circle South access is anticipated to mainly serve the apartment complex as well as a small percentage of both the single-family units and commercial uses. The NC 16B access is anticipated to serve as the main access for the commercial uses, single-family unit and a small percentage of apartment traffic. **Figure 2** depicts the current development plan proposal.

EXISTING CONDITIONS

A comprehensive field inventory of the project study area was conducted in March 2014. The field inventory included a collection of geometric data, traffic volumes and traffic control within the study area. The following sections detail the current traffic conditions and include a description of intersections serving the site and traffic flow in close proximity to the project.

Study Area Intersections

As identified by NCDOT Division Engineering staff (Div #12, District #3), eight (8) intersections were required to be analyzed in order to determine project impact on the surrounding roadway network;

1. NC 16 By-Pass at Optimist Club Road (includes north and south U-Turns);
2. NC 16B at Unity Church Road/Triangle Circle North (signalized);
3. Triangle Circle at Optimist Club Road;
4. Optimist Club Road at Rufus Road;
5. NC 16B at Triangle Circle South;
6. NC 16 B at Hagers Ferry Road (includes channelized-right movement);
7. Hagers Ferry Road at N. Pilot Knob Road; and
8. NC 73 at NC 16B (signalized).

Figure 3 illustrates the existing geometrics and traffic control for the study area intersections and roadways.

Traffic Volumes

In order to determine the existing traffic volume flow patterns within the study area, manual turning movement counts were performed. Weekday morning (7:00-9:00 AM) and evening (4:00-6:00 PM) peak period turning movement specific counts were conducted at the above referenced study area intersections. These counts included autos, heavy vehicles and pedestrian movements where applicable. It should be noted that traffic volume data for intersection #8 (NC 73 at NC 16B) was provided by NCDOT staff.

Summarized count sheets for the study area intersections are included in the Appendix of this report. **Figures 4 & 5**, graphically depict the respective 2014 Existing AM and PM peak-hour traffic volumes for the study area intersections. It should be noted that no adjustments to the collected traffic volumes (balancing) occurred with exception of the Triangle Circle at Optimist Club Road and Optimist Club Road at Rufus Road intersections and the group of intersections that make up NC 16B, Hagers Ferry Road, N. Pilot Knob Road and the right-turn movement for N. Pilot Knob Road to NC 16B north. Were slight imbalances were identified; adjustments were made (upwardly) in order to develop a balanced network for these intersections.

FUTURE CONDITIONS

The project is anticipated to be built-out over a six year period resulting in occupancy in 2020. As such, 2020 has been used for the future year analysis for purposes of this report

Future No-Build Traffic Conditions

Planned Roadway Improvements

Based on discussions with NCDOT staff, the adjacent intersection of NC 16B at Hagers Ferry Road/North Pilot Knob Road will be improved to provide the following:

1. Realign North Pilot Knob Road with Hagers Ferry Road to NC16B and construct a three-lane cross-section to allow for a westbound left-turn lane;
2. Install a right-turn lane on northbound NC 16B approach to North Pilot Knob Road;
3. Install a right-turn lane on the westbound Hagers Ferry Road approach to North Pilot Knob Road;
4. Install traffic signal control at the NC 16B at North Pilot Knob Road intersection; and
5. Remove the segment of Hagers Ferry Road between NC 16B and North Pilot Knob Road, thereby closing the intersection of NC 16B at Hagers Ferry Road and creating a STOP controlled three-legged intersection at the intersection of Hagers Ferry Road and North Pilot Knob Road.

This project has just recently been design and funded and is anticipated to be completed by 2017. Based on this, this NCDOT project has been included in both the future No-Build and Build analysis.

Background Development

Based on discussions with NCDOT staff, two projects are approved within the study area which should be accounted for in the future year analysis. First is the Carolina Ridge development which is located to the southwest of the NC 16 By-Pass at NC 73 interchange opposite East Lincoln High School. This project is to contain a total of 1,650 residential units consisting of 300 single-family dwelling units and 1,350 senior housing units. Details on traffic generated by this approved project was provided by NCDOT staff and is to be included in the future conditions analysis of this report as 100-percent build-out of this expected development.

The second development is located to the west of the proposed Rivercross development along Optimist Club Road. Airlie Park Phase I is to consist of 1,060,000 sf of industrial park use. It is planned on the south side of Optimist Club Road along Airlie Parkway extending down to the intersection of Airlie Parkway and Rufus Road. Details on traffic generated by this project was also provided by NCDOT staff and is to be included in the future conditions analysis at 60-percent of the expected build-out (Phase I) of this development.

Annual Growth Rate

NCDOT staff has identified a 2-percent annual growth rate for this study area in order to project future conditions. The anticipated 2020 No-Build AM and PM peak-hour traffic volumes, which reflect the annual 2-percent growth rate, and traffic anticipated by the afore-mentioned projects, are shown in **Figures 6 & 7**.

Site-Generated Traffic

Traffic volumes expected to be generated by the proposed project were forecasted using the Eighth Edition of the ITE *Trip Generation* manual, as published by the Institute of Transportation Engineers. Land-Use Codes #210 (Single-Family Detached), 220 (Apartments) and 820 (Shopping Center) have been used to estimate the specific site-generated traffic. These trip generation estimates have been submitted to NCDOT staff and approved for use in this report. **Table 1** depicts the anticipated site-generated traffic.

Table 1
PROJECT TRIP-GENERATION SUMMARY¹
Rivercross

Time Period	220 Single-Family Units (a)	240 Apartment Units (b)	100,000 sf General Retail (c)	5% Internal Capture ² (d)	20% Pass-By Credit ³ (e)	Total New Trips (Σ (a thru c)-d-e)
Weekday Daily	2,150	1,580	6,800	530	1,250	8,750
Weekday AM Peak-Hour						
Enter	41	24	94	No Internal Capture	12	147
Exit	<u>123</u>	<u>97</u>	<u>60</u>		<u>12</u>	<u>268</u>
Total	164	121	154	Taken	24	415
Weekday PM Peak-Hour						
Enter	135	98	312	25	57	463
Exit	<u>79</u>	<u>52</u>	<u>324</u>	<u>22</u>	<u>57</u>	<u>375</u>
Total	214	150	636	47	114	838

¹ ITE *Trip Generation* manual, 8th Ed. 2008, LUC's 210 (Single-Family), 220 (Apartment) & 820 (Shopping Center).

² Internal Capture rate due to mixed-use development of 5% assumed.

³ Pass-by percentage of 20% assumed based on adjacent roadway traffic. Applied to retail uses only after Internal Capture taken.

The calculations have broken down the development into its specific uses for estimation of trips to be generated for each use as well as pass-by trips. For this report, a 5-percent internal capture or “multi-use trips” was estimated as well as a 20-percent pass-by was assigned to the retail components of the development; both approved by NCDOT for use in this report. After accounting for internal capture and pass-by, the development can be expected to generate a total of 8,750 *new* external trips on a weekday daily basis, of which a total of 415 *new* external trips (147 entering and 268 exiting) are expected during the AM peak-hour. During the PM peak-hour, 838 *new* external trips (463 entering, 375 exiting) are expected.

Distribution Pattern

The directional distribution of site-generated traffic on the study area roadways has been based on an evaluation of existing travel patterns in the study area. Two separate patterns have been developed, one for the residential dwellings units of the development and one for the commercial retail components. The anticipated patterns, which have been approved by NCDOT staff for use in this report, are shown in **Table 2** and also depicted graphically in **Figures 8 & 9** for the respective residential and commercial uses. These distribution patterns have been applied to the site-generated traffic volumes from Table 1 to develop the site-generated specific volumes for the study area intersections illustrated in **Figures 10 & 11** for the respective AM and PM peak hours. Located in the Appendix of this report are the broken down trip assignments for the residential and commercial uses which were summed together resulting in the presented total site-generated figures (10 & 11). It should be noted that the assignment of residential trips

to the site access drives has accounted for the location/proximity of the apartments and the single family units to likely access points that residences will utilize when entering and exiting the site.

Table 2
TRIP DISTRIBUTION PATTERN
Rivercross

Roadways	Percent Enter/Exit	
	Residential	Commercial
NC 16	North	10
	South	24
NC 16 Business	North	10
	South	5
NC 73	East	20
	West	20
Hagers Ferry Road	East	2
N. Pilot Knob Road	South	5
Unity Church Road	East	2
Optimist Club Road	West	2
Total	100	100

Note: Based on the existing traffic patterns.

Future Build Traffic Conditions

The site-generated traffic, as depicted in Figures 10 & 11 has been added to the respective 2020 No-Build traffic volumes shown in Figures 6 & 7. This results in the peak-hour Build traffic volumes, which are graphically depicted in **Figures 12 & 13**. These volumes were used as the basis to determine potential improvement measures necessary to mitigate traffic impacts caused by the project.

TRAFFIC OPERATIONS

Analysis Methodology

A primary result of capacity analysis is the assignment of Level-of-Service (LOS) to traffic facilities under various traffic flow conditions. The concept of Level-of-Service is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A Level-of-Service designation provides an index to the quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

Six Levels-of-Service are defined for each type of facility (signalized and unsignalized intersections). They are given letter designations from A to F, with LOS A representing the best operating conditions and LOS F the worst.

Since the Level-of-Service of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of Levels-of-Service depending on the time of day, day of week, or period of a year.

Analysis Results

As part of this TIAS, capacity analyses have been performed at the study area intersections under both Existing and Future (No-Build & Build) conditions. As requested by County staff, results of these

analyses also indicate individual approaches as well as over-all service levels. **Table 3** provided the Level-of Service Summary table.

Table 3
LEVEL-OF-SERVICE SUMMARY
Rivercross

Intersections	Approach	Existing 2014				2020 No-Build				2020 Build			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Delay (Sec)	LOS	Delay (Sec)	LOS	Delay (Sec)	LOS	Delay (Sec)	LOS	Delay (Sec)	LOS	Delay (Sec)	LOS
NC 16 B at Triangle Circle North/Unity Church Road (Signalized)	Over-All Average	55.7	E	62.2	E	110.7	F	109.2	F	120.7	F	124.5	F
	NB: NC 16B	45.6	D	75.8	E	78.8	E	133.8	F	92.4	F	168.7	F
	SB: NC 16B	60.0	E	34.9	C	155.1	F	41.7	D	167.7	F	50.4	D
	EB: Triangle Circle (s)	59.3	E	98.1	F	72.6	E	221.2	F	86.4	F	227.4	F
	WB: Unity Church Rd	57.7	E	59.8	E	77.3	E	63.8	E	72.3	E	65.4	E
NC 73 at NC 16 B (Signalized)	Over-All Average	36.8	D	59.9	E	48.6	D	106.9	F	53.9	D	121.6	F
	NB: NC 16B	58.3	E	104.5	F	91.7	F	187.3	F	101.0	F	205.2	F
	SB: NC 16B	25.3	C	45.8	D	32.0	C	109.6	F	41.8	D	144.2	F
	EB: NC 73	31.2	C	40.0	D	39.9	D	48.8	D	43.1	D	65.9	E
	WB: NC 73	44.8	D	61.7	E	50.9	D	114.7	F	49.3	D	105.0	F
NC 16B at N Pilot Knob Rd (Signalized)	Over-All Average	Future Intersection Created by NCDOT Re-Alignment Project of North Pilot Knob Road & Hagers Ferry Road				21.4	C	22.1	C	22.7	C	28.9	C
	NB: NC 16B	30.2	C	27.1	C	32.3	C	31.4	C				
	SB: NC 16B	15.8	B	12.6	B	16.7	B	15.2	B				
	WB: N Pilot Knob Rd	22.9	C	35.7	D	25.3	C	59.7	E				
NC 16 at Optimist Club Rd (Unsignalized)	NB: NC 16 Left	31.4	D	17.3	C	45.6	E	24.6	C	52.7	F	28.9	D
	SB: NC 16 Left	15.2	C	38.3	E	27.9	D	101.5	F	31.7	D	247.3	F
	EB: Optimist Club Rd Rt	27.9	D	11.3	B	77.4	F	13.1	B	96.4	F	14.1	B
	WB: Optimist Club Rd Rt	14.5	B	19	C	20.6	C	186.9	F	31.3	D	350.9	F
NC 16 NB U-Turn (Unsignalized)	NB U-Turn: NC 16	23.3	C	12.6	B	51.5	F	21.1	C	108.6	F	37.3	E
NC 16 SB U-Turn (Unsignalized)	SB U-Turn: NC 16	12.6	B	18.8	C	16.3	C	24.1	C	16.8	C	28.1	D
Optimist Club Rd at Rufus Rd (Unsignalized)	NB: Rufus Rd	10.8	B	13.1	B	11.5	B	15.9	C	12.4	B	21.3	C
	EB: Optimist Club Rd	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
	WB: Optimist Club Rd	0.2	A	0.6	A	11.5	B	0.6	A	12.4	B	0.6	A
Optimist Club Rd at Triangle Circle (Unsignalized)	NB: Triangle Circle (S)	7.0	A	5.6	A	7.8	A	6.0	A	8.2	A	7.4	A
	SB: Triangle Circle (N)	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
	EB: Optimist Club Rd	13.0	B	24.4	C	26.7	D	135.3	F	129.3	F	592.1	F
NC 16B at Triangle Circle South (Unsignalized)	NB: NC 16B	1.4	A	5.6	A	5.4	A	9.2	A	8.0	A	17.0	C
	SB: NC 16B	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
	EB: Triangle Circle (S)	20.7	C	18.5	C	27.7	D	39.3	E	51.2	F	193.9	F
NC 16B at Hagers Ferry Road (Unsignalized)	NB: NC 16B	0.0	A	0.0	A					Three Intersections Closed by Re-Alignment Project. Two New Intersection Created, NC16B at Hagers Ferry Road (Signalized) & North Pilot Knob Road at Hagers Ferry Road (Unsignalized)			
	SB: NC 16B	3.3	A	2.8	B								
	WB: Hagers Ferry Rd	28.9	D	21.7	C								
Hagers Ferry Road at N Pilot Knob Rd (Unsignalized)	NB: N Pilot Knob Rd	0.1	A	0.4	A					Two New Intersection Created, NC16B at Hagers Ferry Road (Signalized) & North Pilot Knob Road at Hagers Ferry Road (Unsignalized)			
	EB: Hagers Ferry Rd	10.6	B	12.3	B								
	WB: Hagers Ferry Rd	15.8	C	15.0	B								
NC 16B at N Pilot Knob Rd Right-Turn (Unsignalized)	NB: NC 16B	0.0	A	0.0	A								
	SB: NC 16B	0.0	A	0.0	A								
	WB: N Pilot Knob Right	13.5	B	30.8	D								
N Pilot Knob Rd at Hagers Ferry Road (Unsignalized)	NB: N Pilot Knob Rd	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
	SB: N Pilot Knob Rd	1.4	A	3.3	A	1.4	A	3.3	A	1.4	A	3.3	A
	WB: Hagers Ferry Rd	12.4	B	13.5	B	12.7	B	16.5	C				
NC 16B at Site Access (Signalized)	Over-All Average									Unsignalized			
	NB: NC 16B									12.5	B	18.0	C
	SB: NC 16B									9.0	A	11.3	B
	EB: Site Access									45.8	E	>500.0	F
	WB: Cherry Point									470.6	F	>500.0	F
Triangle Circle South at Site Access (Unsignalized)	NB: Site Access									0.5	A	1.1	A
	EB: Triangle Circle (S)									10.8	B	15.4	C
	WB: Triangle Circle (S)									0.0	A	0.0	A

Key/Notes:

1. Analysis completed using the HCM methodology for the unsignalized intersections and the percentile methodology for the signalized intersections as requested by NCDOT staff.

Bolded indicate failing conditions.

Indicates intersection operates with failing conditions during one or more peak-hours due to background traffic/existing constraints, not directly caused by project traffic.

Indicates intersection or approach operates with failing conditions during one or more peak-hours due to project traffic.

As shown in Table 3, under 2014 Existing traffic volume conditions, the signalized study area intersection of NC 16B at Triangle Circle North/Unity Church Road operates at an over-all LOS E during both the AM and PM peak-hours. Further review of this analysis indicates that the eastbound and westbound approach operations, which operate under split phasing, operate poorly during both the AM and PM peak hours and is the main reason for the over-all poor service levels as well as the northbound approach of NC 16B which operates under constrained operations (PM peak-hour). The signalized intersection of NC 73 at NC 16B operates at an acceptable service level during the AM peak-hour and a poor service level (LOS E) during the PM peak-hour. The main reason this intersection operates poorly are the large peak-hour volumes of traffic which cannot be accommodated with the current lane geometry with an emphasis on the northbound approach of NC 16B which operates poorly during both the AM and PM peak hours. Analysis for the unsignalized study area intersections indicate that currently, each intersection operates at acceptable service levels during both peak-hours studied with exception of a single movement at the NC 16 By-Pass at Optimist Club Road intersection where the southbound left-turn movement from NC 16 By-Pass to eastbound Optimist Club Road movement currently operates at a LOS E.

Under future 2020 No-Build traffic volume conditions, which account for the addition of a normal annual growth (2% per-year) and traffic anticipated by the Airlie Park Phase I (60-percent) and Carolina Ridge developments, operations at the study area intersections are anticipated to change significantly when compared to Existing Conditions. Under this condition, the signalized study area intersection of NC 16B at Triangle Circle North/Unity Church Road will continue to operate poorly during both peak hours studied (LOS F). The NC 73 at NC 16B intersection is expected to operate at a LOS D during the AM peak-hour and a LOS F during the PM peak-hour. Three of the unsignalized intersections in the study area are also expected to operate poorly; the NC 16 at Optimist Club Road, Optimist Club Road at Triangle Circle and NC 16B at Triangle Circle South, are each expected to operate poorly during one or more of the peak hours studied. These poor service levels are not due to the proposed Rivercross, but rather anticipated growth in the area. This is especially true in the along the Triangle Circle intersections and Optimist Club Road intersections which are being impacted by the anticipated annual growth as well as the large scale Airlie Industrial Park (60%) which is going to be provided access to/from Optimist Club Road. It should be noted that the planned NCDOT roadway projects re-aligning the NC 16B at Hagers Ferry Road and North Pilot Knob Road at Hagers Ferry Road intersection is anticipated to result in acceptable service levels at the newly aligned intersections.

Under 2020 Build conditions, which include the addition of traffic related to the Rivercross development, the same intersections that operated poorly under the No-Build condition will continue to operate poorly with some additional delay. The signalized intersections of NC 16B at Triangle Circle North/Unity Church Road and NC 73 at NC 16B both operated poorly under the Existing and No-Build conditions and therefore continue to do so under the Build condition. The same is true for the unsignalized intersections of NC 16 at Optimist Club Road, Optimist Club Road at Triangle Circle and NC 16B at Triangle Circle South. The project does result in an incremental impact at these intersections, but is not the direct cause for the poor conditions as they each operated poorly during one or more of the peak hours studied under No-Build conditions.

The project is not the cause of any intersection to deteriorate from an over-all acceptable service level to an unacceptable service level. Two intersections have one approach each that deteriorates to poor conditions due to the addition of project traffic. The NC 16B at NC 73 intersection eastbound approach, (PM peak-hour) which operates at an over-all poor conditions under Existing, No-Build and Build and the new NC 16B at North Pilot Knob Road intersection (PM peak-hour), which operates at an over-all service level.

The proposed site access drive located along Triangle Circle South is expected to operate at good service levels during both peak hours. The access along NC 16B opposite Cherry Point Drive will operate poorly during both peak hours without additional infra-structure and/or traffic control improvements. A detail for the access drives geometries and traffic controls are described in the next section of this report.

MITIGATION

The final phase of the analysis process is to identify mitigating measures which may either minimize the impact of the project on the transportation system or tend to alleviate poor service levels not caused by the project. The following describes measures necessary to mitigate the project's impact.

Proposed Site Access Drives

The project proposes one access drive to/from NC 16B, and one access to/from Triangle Circle South. The specific geometric and traffic control requirements for each proposed access driveway is discussed in detail below:

NC 16B Access Drive

This access is to be located opposite Cherry Point Drive approximately 1,130-feet south of the NC 16B at Triangle Circle South intersection. The following describes the suggested geometry for this proposed access:

- ***Eastbound (Site Access) Approach:*** Construct site drive to provide a three-lane cross-section with one lane entering the site and two lanes exiting the site designated as a separate left-turn lane and a shared through/right-turn lane;
- ***Westbound (Cherry Point Drive) Approach:*** Existing geometry of a two lane cross-section; one lane entering and one lane exiting; Cherry Point Drive is anticipated to remain however, it is advisable (due to right-of way constraints) to widen the Cherry Point Drive approach to provide a separate left-turn lane and a shared through/right-turn lane which would align with the proposed site access;
- ***Northbound (NC 16B) Approach:*** A pseudo left-turn lane for traffic entering the site will be provided by the existing center left-turn lane located within NC 16B;
- ***Southbound (NC 16B) Approach:*** Construct a separate right-turn lane for traffic entering the site. This lane should provide a 200-full length turning lane and a 100-foot taper; and
- ***Traffic Control:*** Place intersection under STOP sign control where vehicles exiting the site will be required to stop.

Initially, this intersection should be placed under STOP sign control. As later phases of the residential units come on-line along with the commercial retail portion of the site, traffic control at this intersection may need to be improved to potentially traffic signal control. It is suggested that once constructed and occupied in later phases, this intersection should be monitored in order to determine if signalization should be installed. When signalized, the northbound left-turn movement from NC 16B should be provided a formal turning lane with a storage length of at least 300-feet and a 100-foot taper. This would result in an impact to the two-way left-turn lane in front of the Westpointe Shops located to the south.

If/when signalization is installed, at full build-out of the site; this intersection would improve to the following operations (percentile methodology):

- AM Peak-Hour: LOS C, delay=29.5 sec., and
- PM Peak-Hour: LOS D, delay=54.6 sec.

Triangle Circle South Access Drive

This access is to be located opposite a private residence drive approximately 670-feet northwest of the NC 16B at Triangle Circle South intersection. The following describes the suggested geometry for this proposed access:

- **Northbound (Site Access) Approach:** Construct site drive to provide a three-lane cross-section with one lane entering the site and two lanes exiting the site designated as a separate left-turn lane and a separate right-turn lane;
- **Eastbound (Triangle Circle South) Approach:** Anticipated right-turning traffic entering the site as this intersection should be provided a separate right-turn lane. This lane should provide a 150-length and a 100-foot taper;
- **Westbound (Triangle Circle South) Approach:** The volume of expected left-turns movements from Triangle Circle South entering the site is nearly meets warrants for a separate left-turn lane. Given the separation between this access and the NC 16B intersection, it is suggested that a separate left-turn for site-generated traffic be provided. This lane should provide a 150-foot storage length. Exact taper will depend on the method chosen to widen Triangle Circle South whether it be symmetrical or a-symmetrical; and
- **Traffic Control:** Place intersection under STOP sign control where vehicles exiting the site will be required to stop.

Sight Distance Considerations

All previously-cited access drive intersections should be designed/constructed to meet current applicable NCDOT/County standards and/or guidelines in terms of sight distance. It is assumed that the project's civil engineer will depicted the sight distances within the site plan/submittal information.

Off-Site Study Area Intersections

As shown in Table 3, the project has only a minimal impact on the adjacent off-site signalized study area intersections of both NC 16B at Triangle Circle North/Unity Church Road and NC 73 at NC 16B. While both of these intersections are expected to operate poorly under one or more of the peak hours under the Build condition; they also operated poorly under both Existing and No-Build conditions. As such, the project is not the cause of these poor service levels.

The unsignalized study area intersections are similar in that project traffic is not the direct cause of the presented poor service levels. The following intersections operate poorly under Build conditions, but also under No-Build conditions:

- NC 16 at Optimist Club Road;
- Optimist Club Road at Triangle Circle; and
- NC 16B at Triangle Circle South;

Approaches at two intersections are expected to operate poorly due to the Rivercross development, the eastbound approach of the NC 16B at NC 73 intersection (intersection operates poorly under all conditions studied) and the westbound approach of the NC 16B at North Pilot Knob Road intersection where the over all intersection operates at a LOS C, but the eastbound approach is anticipated to degrade from a LOS D to a LOS F under the Build condition. Based on the over-all service levels under the studied Existing, No-Build and Build at these intersections, no improvements are recommended at this time.

It should be noted that Lincoln County specifically requested the Optimist Club Road at Triangle Circle intersection be reviewed for potential improvements due to the proximity of this intersection to the site and the access drives. This intersection serves a significant volume of traffic due to it being used as a commuter route between NC 16B and NC 16 and the future Airlie Industrial Park. It is anticipated to operate poorly under both No-Build and Build conditions. The following improvements have been reviewed in order to improve both operations and vehicular circulation at this intersection:

- Northbound Triangle Circle South- If possible, widen roadway to provide separate northbound left-turn lane from Triangle Circle to Optimist Club Road; and
- Eastbound Optimist Club Road- If possible, widen roadway to provide a separate eastbound right-turn lane from Optimist Club Road to Triangle Circle.

The feasibility of providing these two separate turning lanes must review at a minimum two things, first is adequate right-of-way available (or can it be obtained) to provide either turning lane which will be reviewed by the project's Site/Civil Engineer. Secondly, the existing constraint of the adjacent Rufus Road intersection located just to the east of Triangle Circle along Optimist Club Road must be accounted for which may provide design challenges in providing this separate right-turn lane. This will also be reviewed by the project's Site/Civil Engineer in order to determine its feasibility.

If both of these improvements are implemented at this intersection, the delay for the minor street left-turn movement (Optimist Club to northbound Triangle Circle) will nearly be halved as compared to the Build conditions however this movement will continue to operate at a LOS F.

Discussions with NCDOT has lead to the review of the two intersection of NC 16B at Triangle North/Unity Church Road and NC 16B at NC 73. Both of these intersections operate poorly under Existing conditions and therefore, the poor operations under the Build conditions are not due to project traffic. As requested, improvements have been reviewed at each intersection in order to enhance operations however; the feasibility of these improvements must be reviewed.

- NC 16B at Triangle Circle North/Unity Church Road- The main reason for poor conditions at this intersection are two fold, first the signal operations of split phasing where the eastbound and westbound approaches occur under separate phases, and secondly the high traffic volumes entering and exiting both Triangle Circle north and Unity Church Road.
 1. Widen both the eastbound and westbound approaches in order to provide separate left-turn lane and a shared through/right-turn lane;
 2. Construct a northbound right-turn lane to serve the heavy volume of traffic from NC 16B to Unity Church Road. This lane should be a minimum of 200-feet in length with a 100-foot taper.
 3. Construct a southbound right-turn lane to serve the heavy volume of traffic from NC 16B to Triangle Circle north. This lane should be a minimum of 200-feet in length with a 100-foot taper.

4. With these improvements Investigate the potential of operating under protected/permitted phasing rather than under the current split phasing

Review of these infra-structure improvements will require right-of-way along both Triangle Circle north as well as Unity Church Road in addition to the right-turn lane northbound on NC 16B. Impact to the adjacent Daytona Pitt Stop (southeast quadrant of intersection), Carolina Trust Bank (southwest quadrant) and CITGO (northwest quadrant) are likely from a right-of-way standpoint as well as impact to their respective existing access drives which would require modification or removal to achieve the improvement

- NC 73 at NC 16B- NCDOT staff has indicated that they are reviewing the potential of adding an additional through lane in the eastbound direction of NC 73 that would merge to the existing one-operating lane once through the intersection.

Review of this improvement may require right-of-way along the south side of NC 73 from Rite Aid and Waterside Crossing. While it has been indicated that the eastbound through lane might be shared with the right-turn movement, the right-turn movement is over 300 vehicles during the AM peak-hour and nearly 300 during the PM peak-hour. Based on this a separate right-turn lane for this movement should continue to be provided.

The NC 16 at Optimist Club Road intersection currently has a single approach/conflict movement that operates poorly being the southbound left-turn movement from southbound NC 16 to eastbound Optimist Club Road during the PM peak-hour. Future 2020 No-Build conditions indicate five movements that will operate poorly at this intersection without the project:

1. NC 16 Northbound left-turn to westbound Optimist Club Road;
2. NC 16 Southbound left-turn to eastbound Optimist Club Road;
3. Eastbound right-turn from Optimist Club Road to southbound NC 16;
4. Westbound right-turn from Optimist Club Road to northbound NC 16; and
5. Northbound U-turn from NC 16 north to NC 16 south.

These movements are anticipated to operate poorly under this condition due to growth of traffic in area as well as the high volume of peak directional traffic traveling NC 16.

Future Build conditions indicate that the same five intersection movements listed above will continue to operate poorly when project traffic is accounted for.

The critical movement appears to be the northbound directional flow of NC 16 which accounts for the poor operations at the southbound left-turn and the westbound right-turn. One solution to this capacity issue maybe to place this intersection under “half signal” control which would control the northbound NC 16, westbound right-turn and southbound left-turn movements. This signalization would have an insignificant effect on the southbound NC 16 movements but would improve operations for tow movements that have the greatest delay at this intersection being the southbound left-turn and the westbound right-turn movements. Planning of this traffic signal should be considered as growth along Optimist Club Road increases under the No-Build condition mainly due to the planned industrial park.

SUMMARY

SRS has completed a Traffic Impact Study relative to the development of the new mixed-use project known as Rivercross to be located along NC 16B at Triangle Circle South in Lincoln County/Denver, NC. As proposed, a total of 330 residential units are being planned (220 single-family detached units and 110 apartments) as well as 100,000 sf of commercial retail is being planned and is expected to be built/occupied by 2020.

The project will construct the access drives and roadway improvements at these access drives in order to support the project traffic. Recommendations have been made pertaining to the site access drive(s) which will serve the development, with the main access being located along NC 16B opposite Cherry Point Drive and the second located along Triangle Circle South.

In addition, the project will review the potential of improving the adjacent intersection of Optimist Club Road at Triangle Circle in order to add separate turning lanes along both Optimist Club Road (eastbound approach) at Triangle Circle South (northbound approach) which will aid traffic flow and circulation through this intersection.

Analysis conducted for this report indicate that under Existing conditions, the two signalized intersections of NC 16B at Triangle Circle North/Unity Church Road and NC 73 at NC 16B both operate poorly during the PM peak-hour and acceptably during the AM peak-hour.

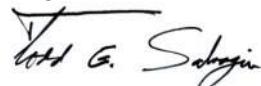
Unsignalized intersections are similar being that most intersections defined within the study area operate acceptably under current conditions and degrade to poor conditions under the No-Build scenario prior to the addition of project traffic. Much of the reasoning for this is due to regional growth in the area which includes the 2-percent annual growth as well as the Airlie Park Phase I Industrial Park and the Carolina Ridge development.

Further review of the operations in the study area as well as the projected traffic volumes indicates that NC 16B currently serves a significant volume of through traffic within the study area. This three-lane roadway serves nearly 2,000 two-way trips during the AM peak-hour and 1,500-1,600 two-way trips during the PM peak-hour. Estimated daily trips are likely 15,000 trips a day which is significant for a three-lane arterial.

Recommendations to accommodate the two proposed site access drives have been made which include turning lanes, suggested traffic control and possible enhancements as the Rivercross builds out. Specifically the site access to/from NC 16B may require traffic signalization if/when traffic signal warrants are met.

If you have any questions or comments regarding any information contained within this report, please contact me at (803) 361 3265.

Regards,

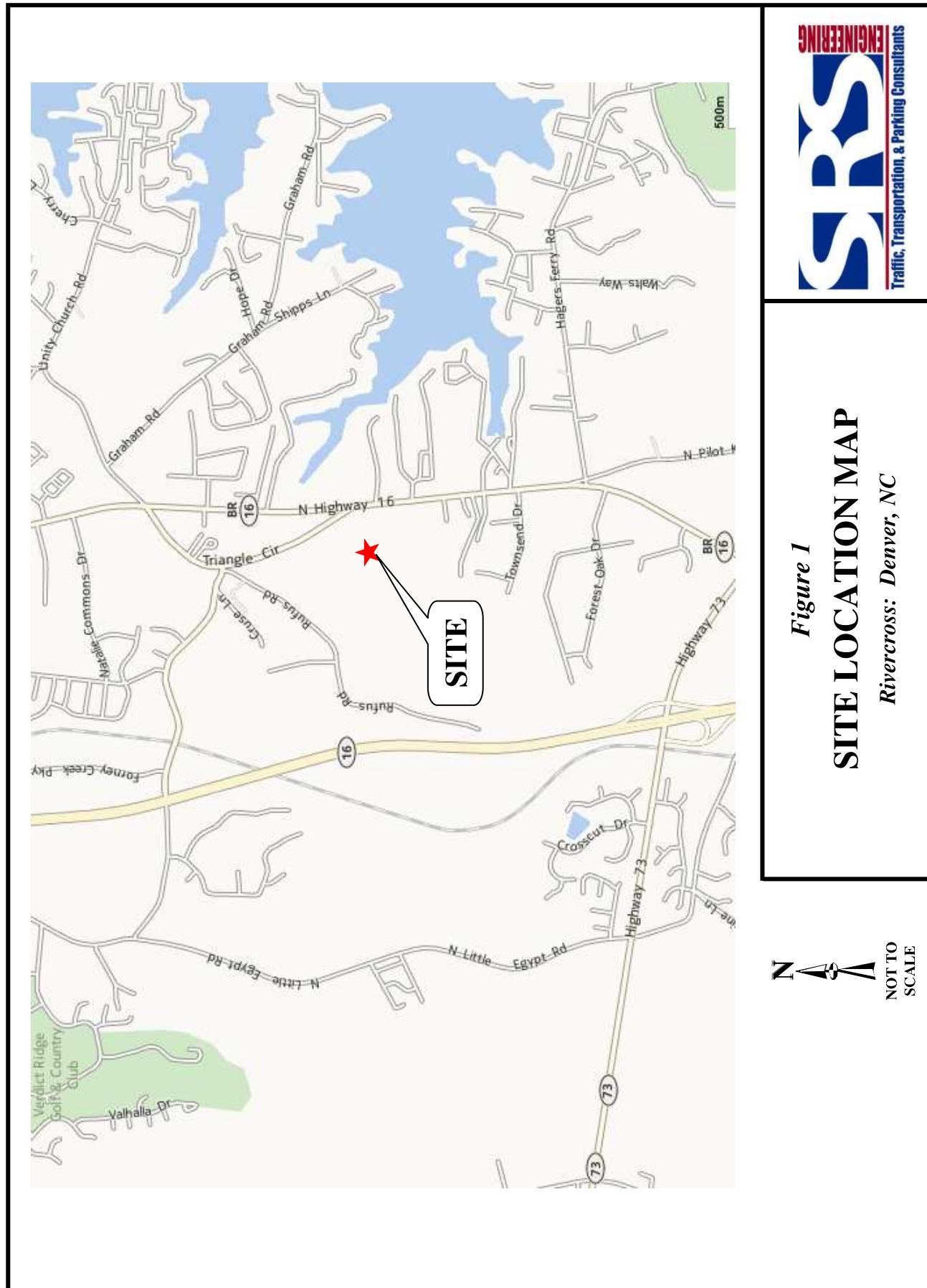


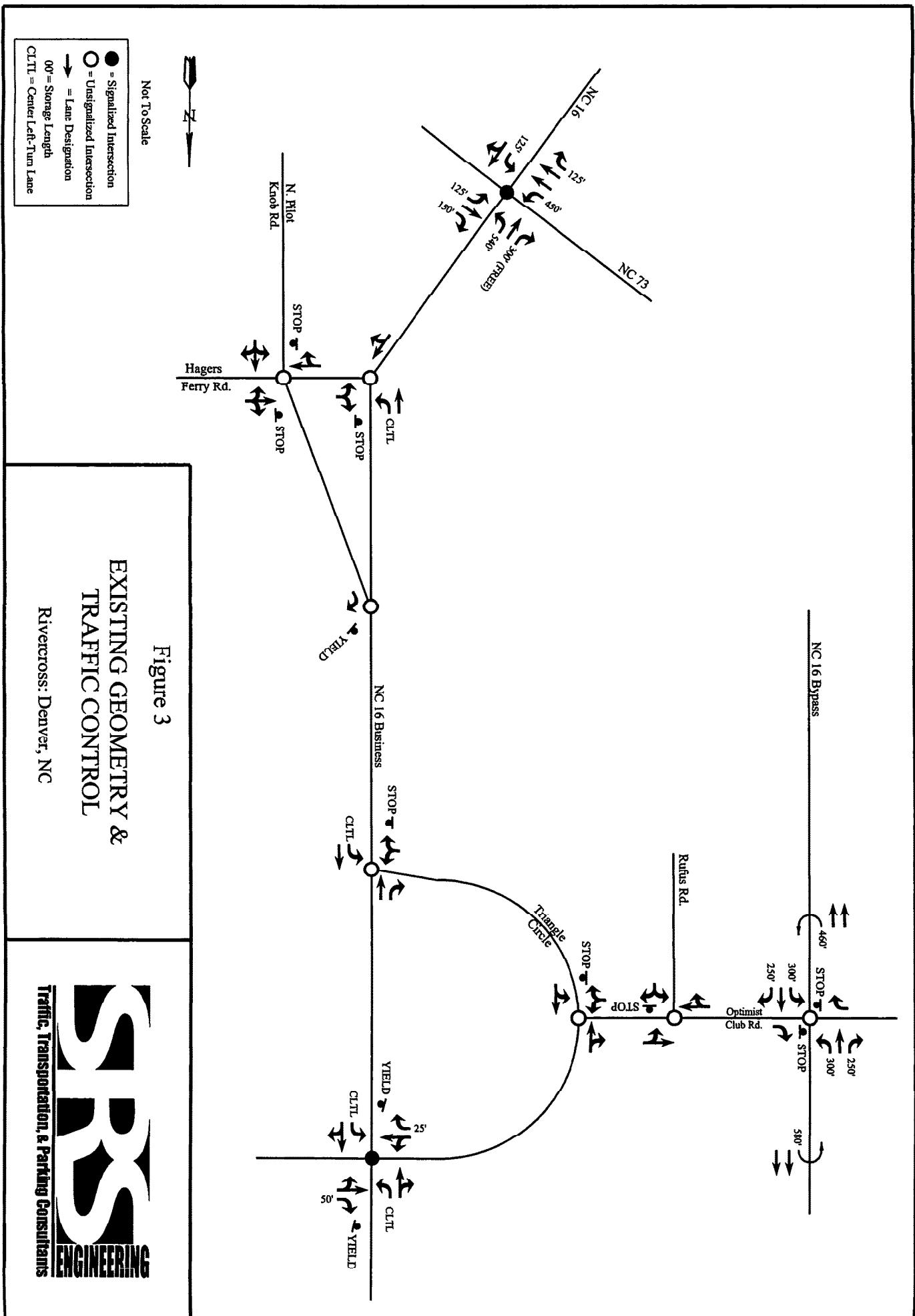
SRS ENGINEERING, LLC

Todd E. Salvagin

Principal

Attachments





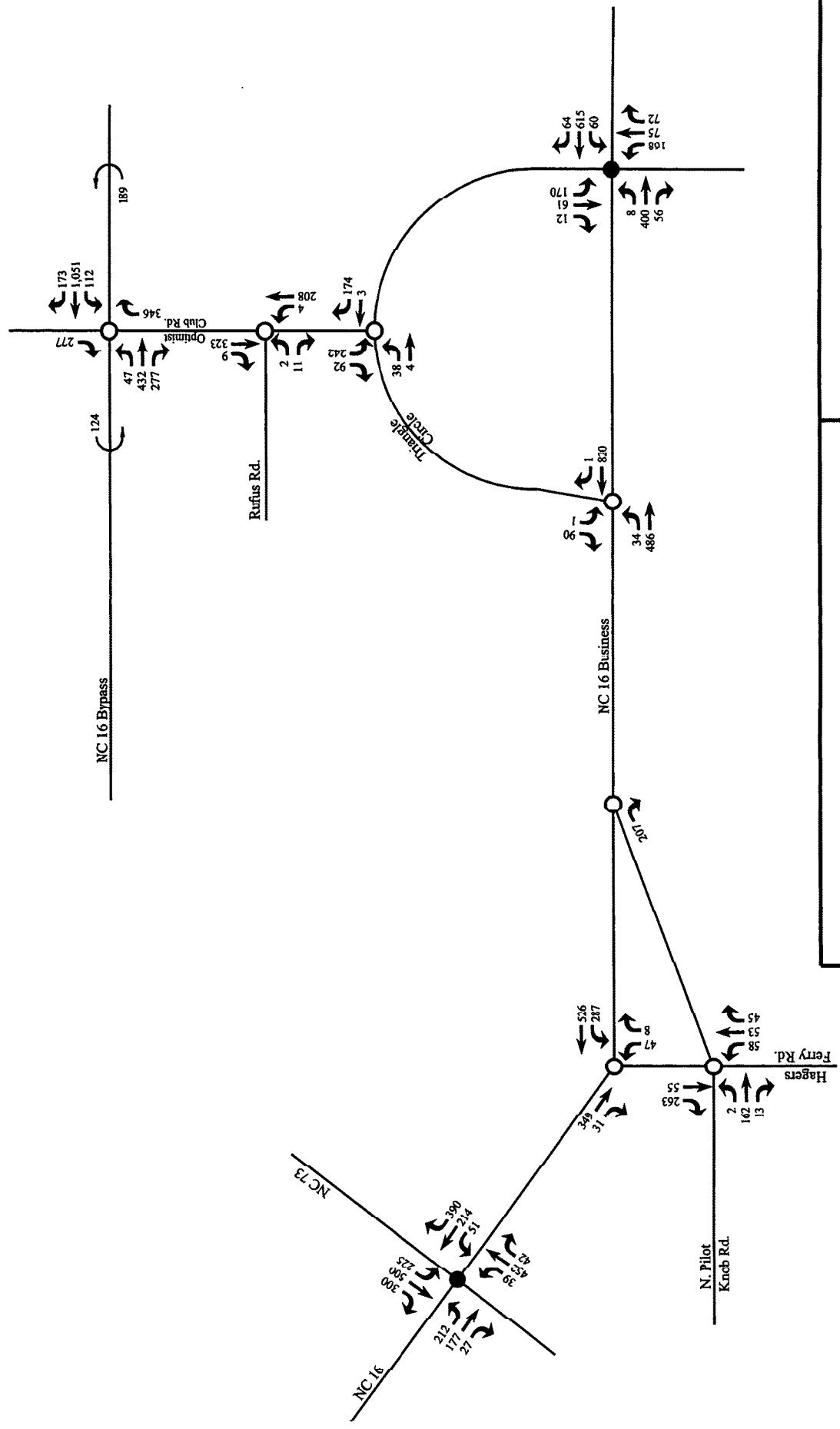
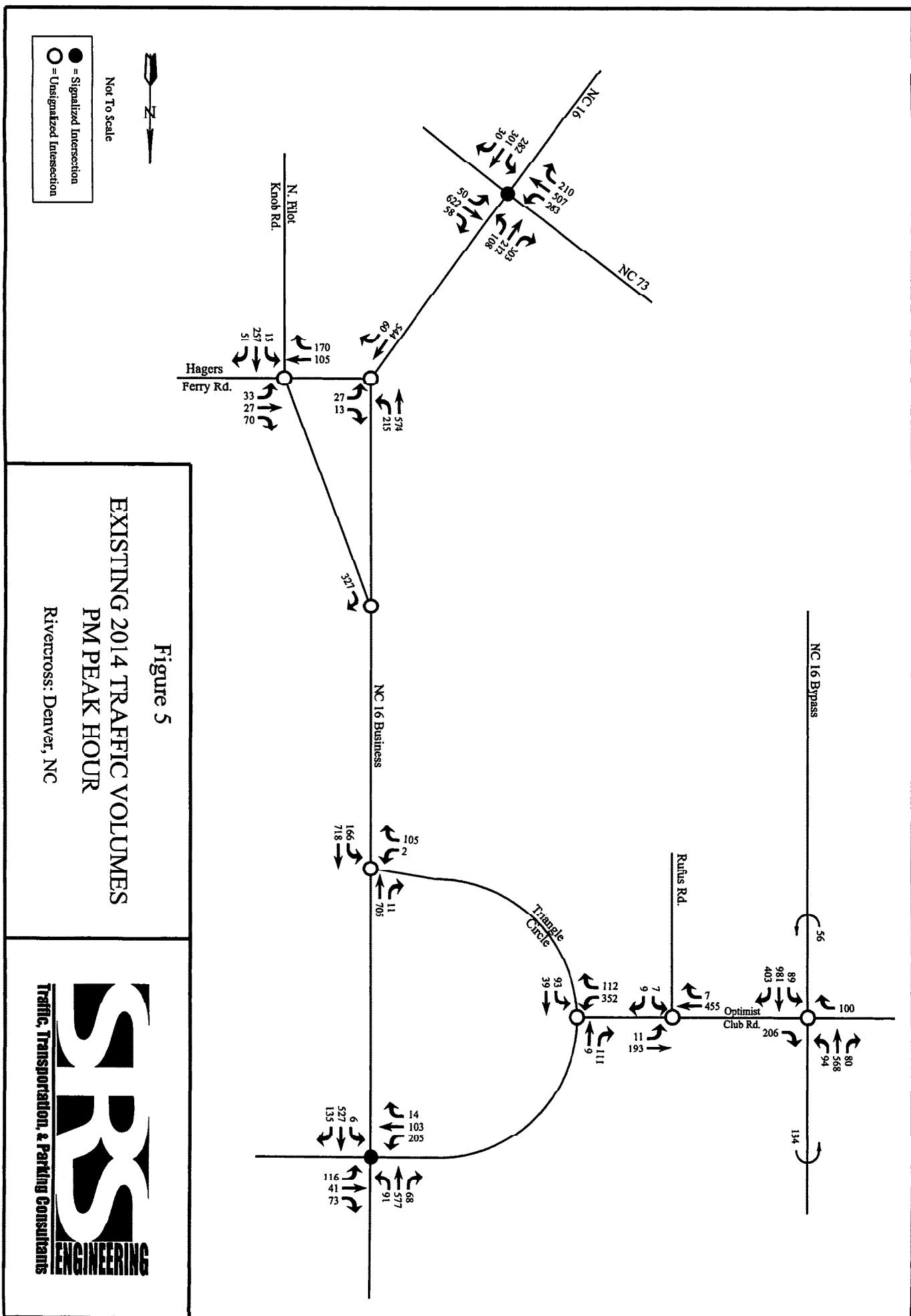
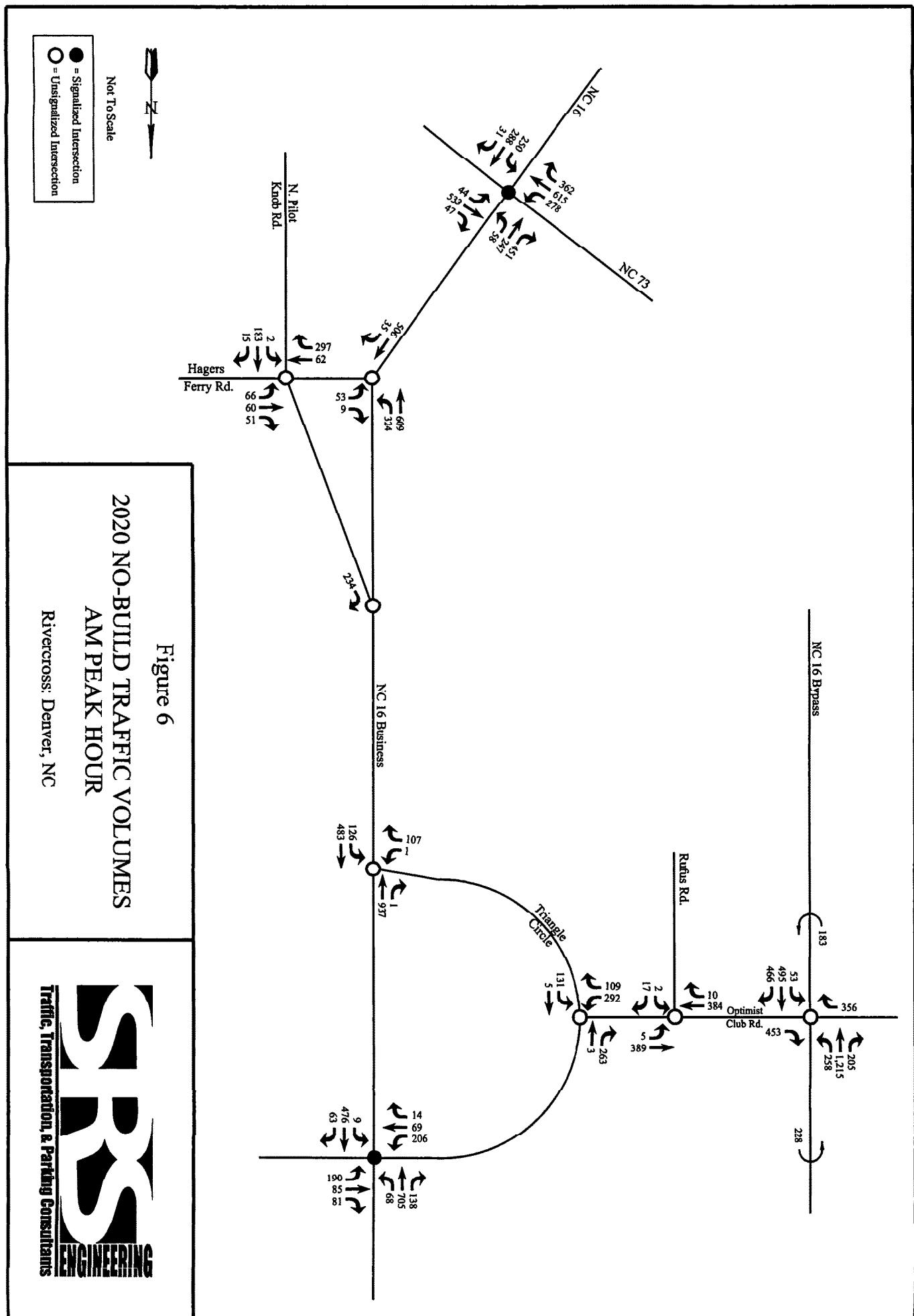
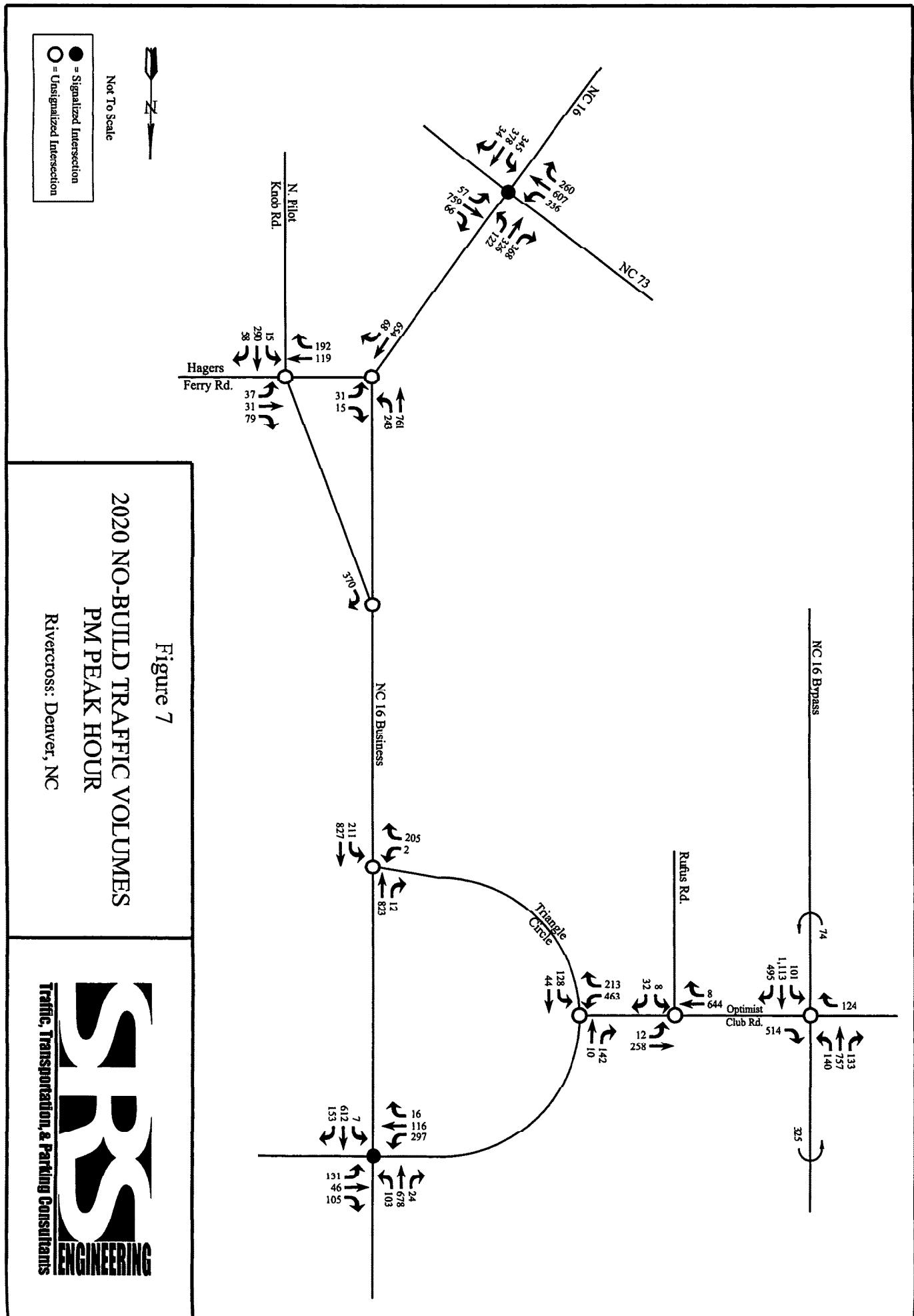


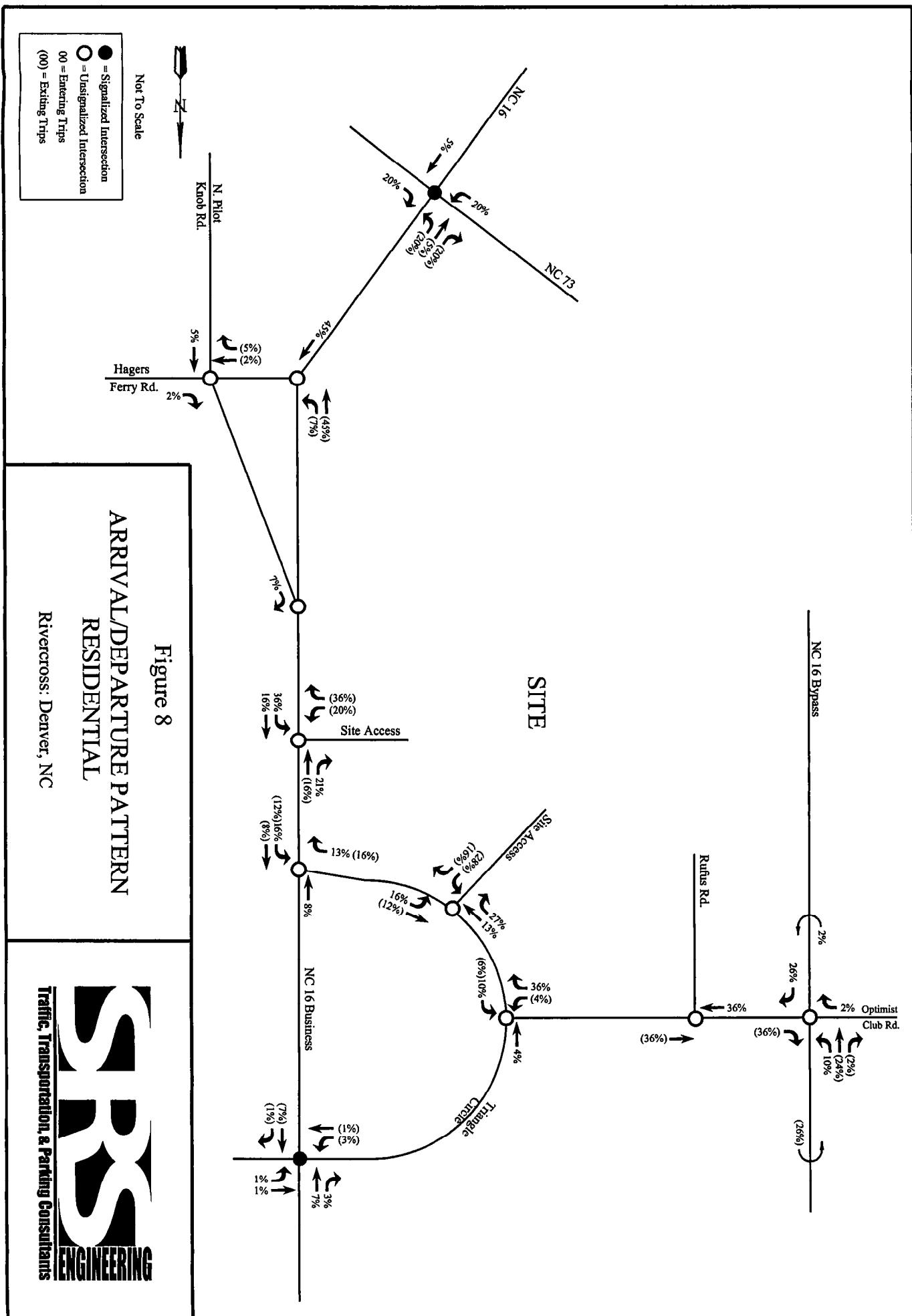
Figure 4
EXISTING 2014 TRAFFIC VOLUMES
AM PEAK HOUR

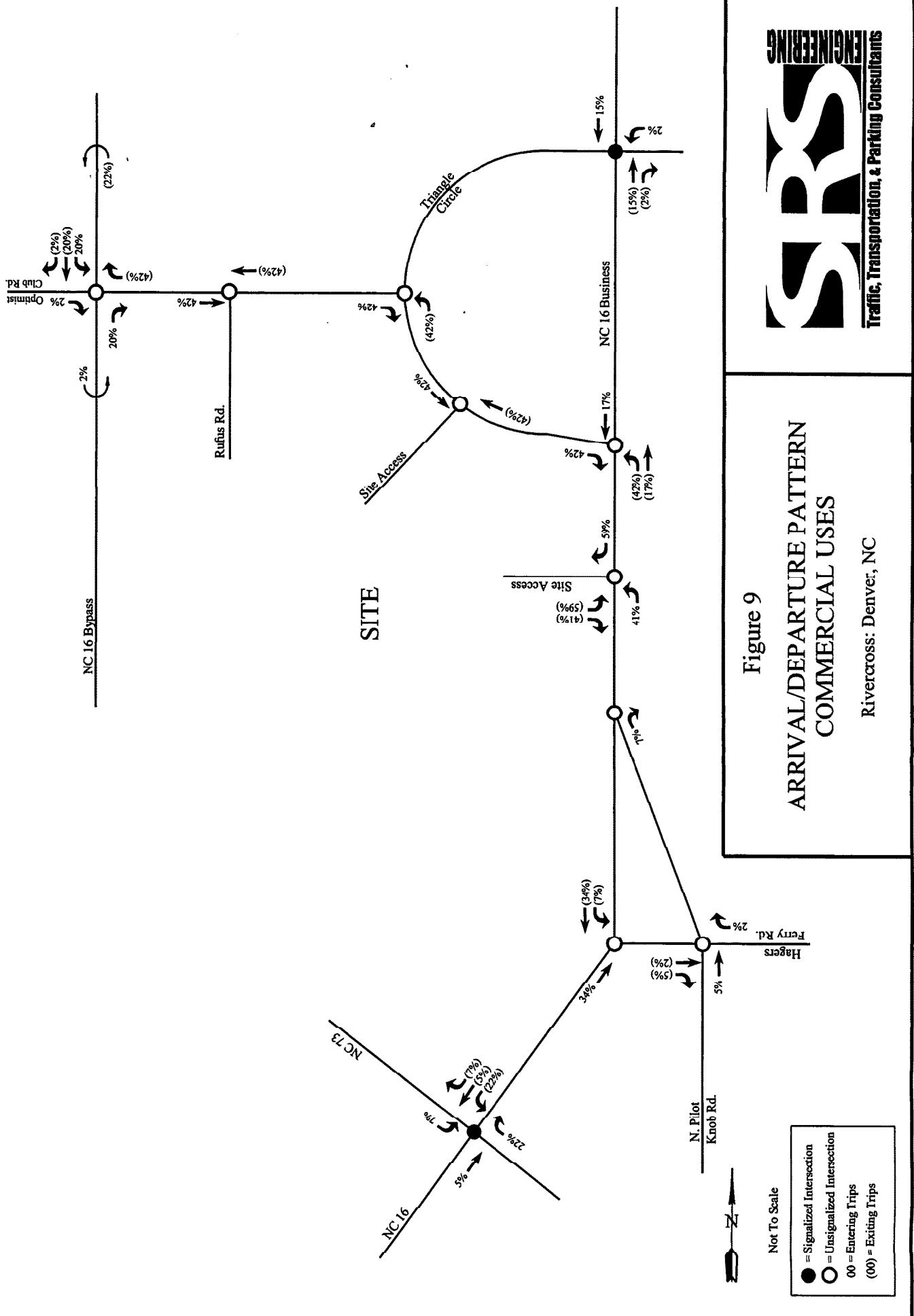
Rivercross: Denver, NC

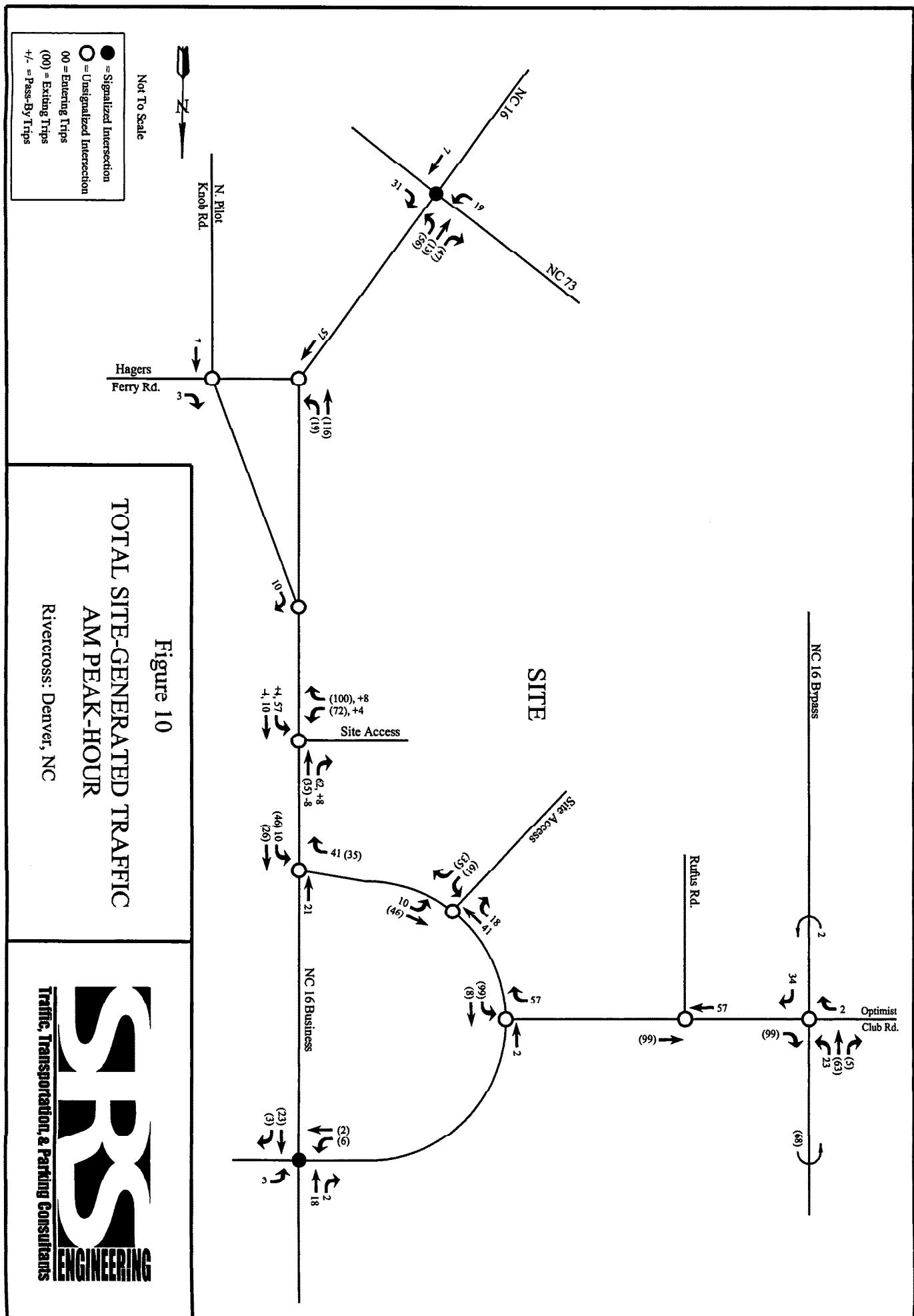


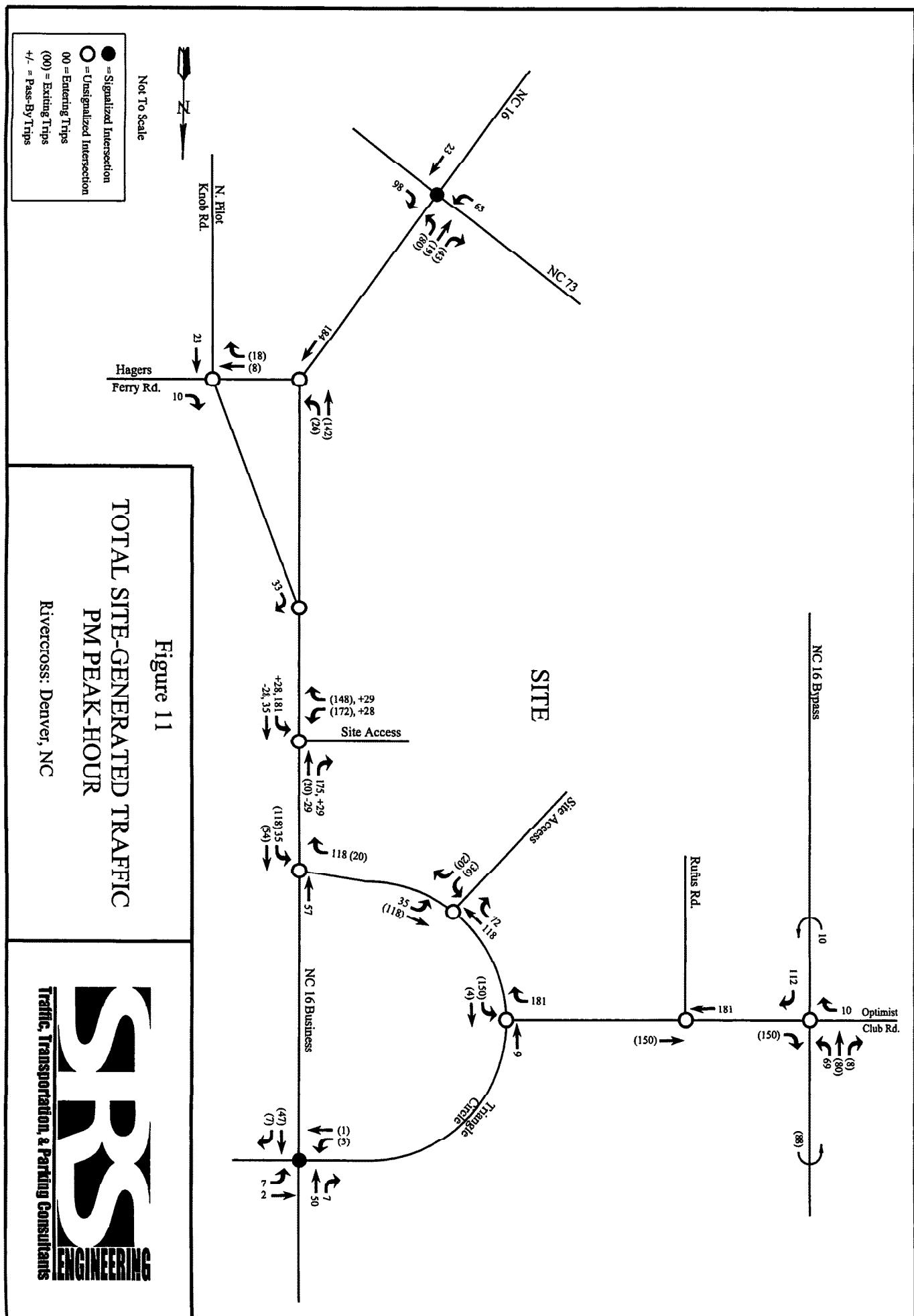












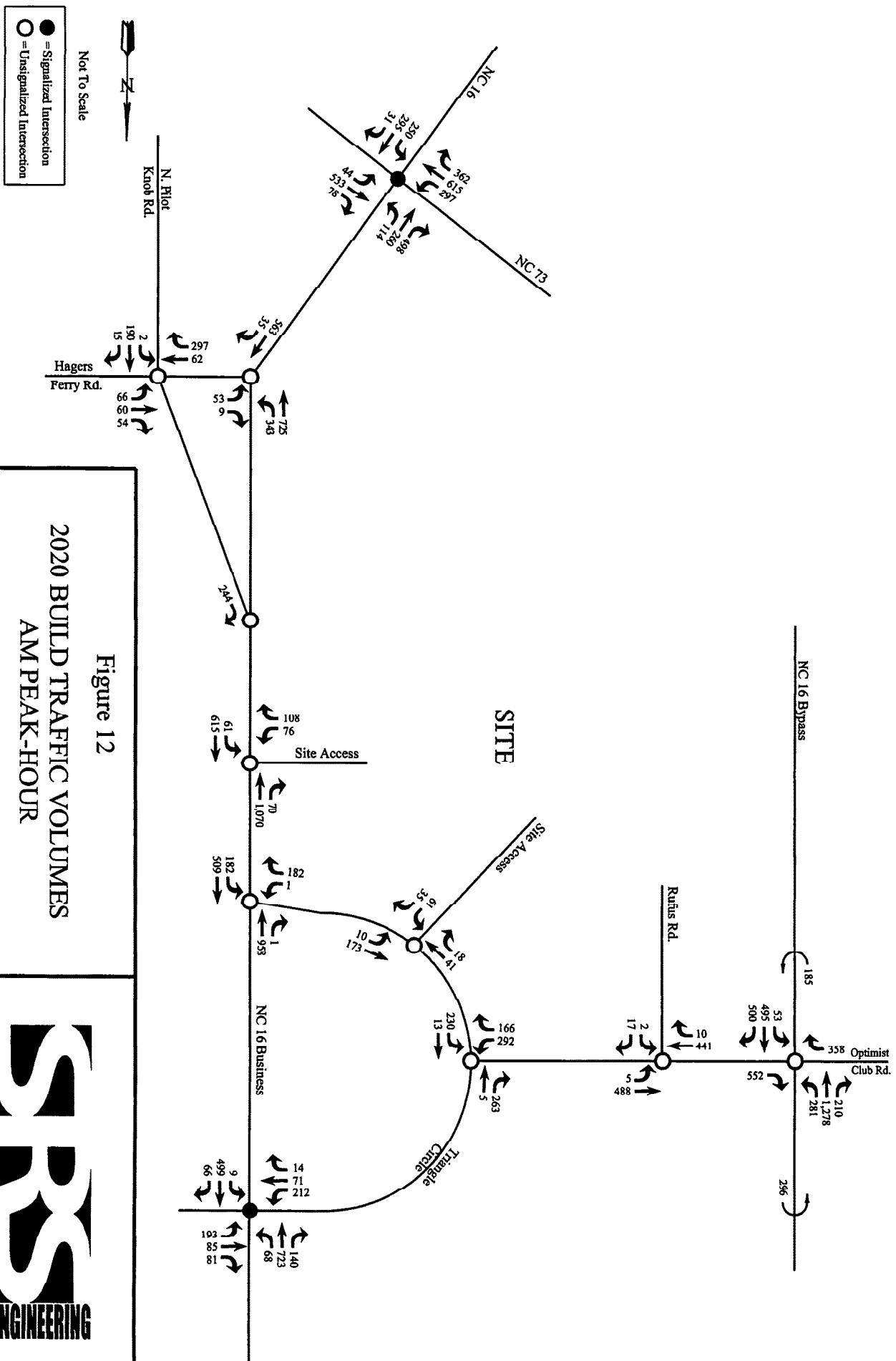
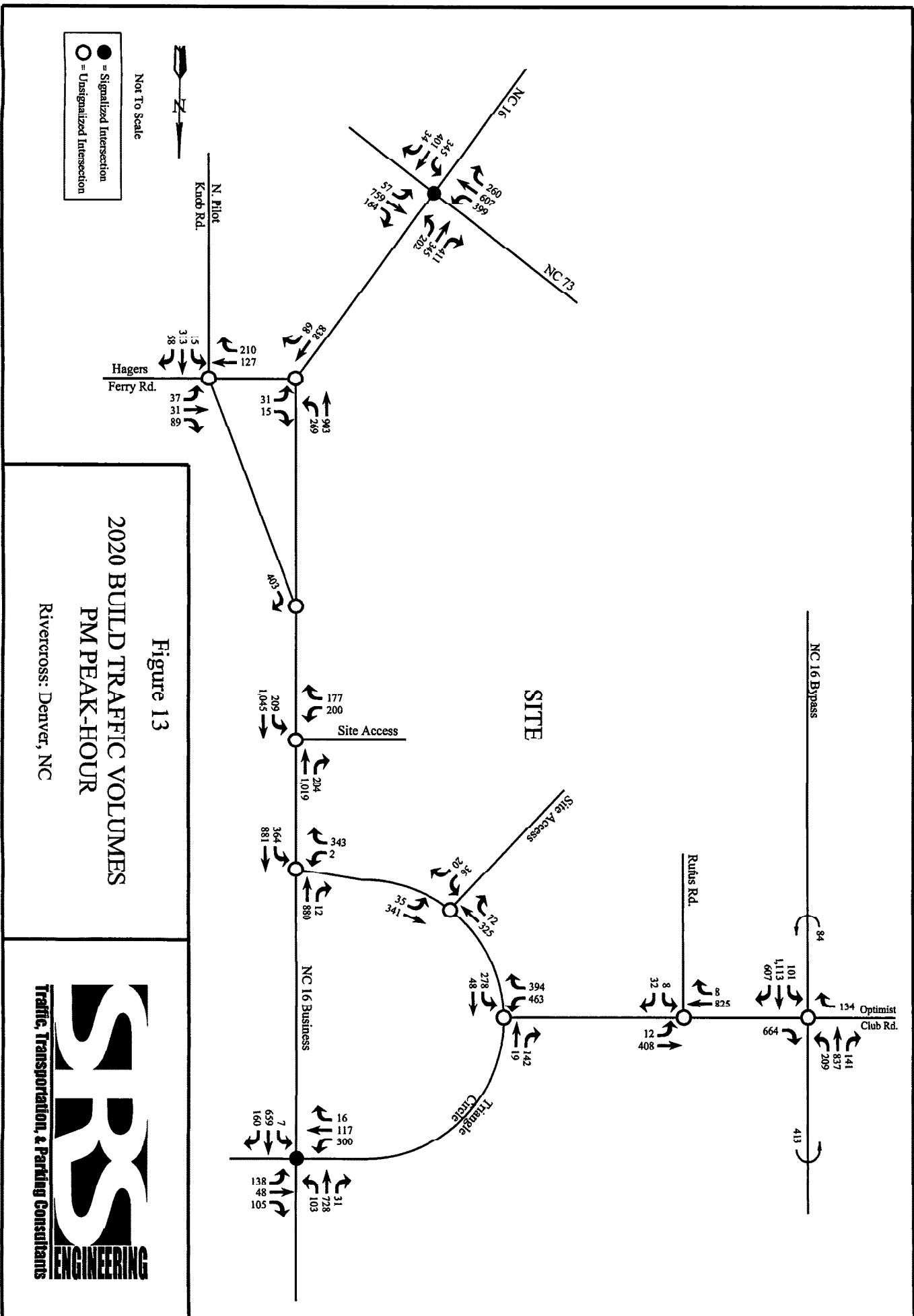


Figure 12

2020 BUILD TRAFFIC VOLUMES AM PEAK-HOUR

Rivercross: Denver, NC

SEB ENGINEERING



SBS ENGINEERING

Traffic, Transportation, & Parking Consultants

MEMORANDUM

To: Michael Poe, PE, NCDOT
Andrew Bryant, AICP, Lincoln County

From: Gavin Teng, PE, PTOE

CC: Sarah Wicklund, PE, Dan Brewer, PE, WSP

Date: December 3, 2014

Project Name: Optimist Club Road/Triangle Circle Intersection Improvement Traffic Analysis

Reference Number: 1420020.000

Re: **Optimist Club Road/Triangle Circle Intersection Improvement Traffic Analysis
Technical Memorandum**

Introduction

Rivercross is a proposed mixed-use development located on the west side of NC 16 Business and south of Triangle Circle in Lincoln County, NC. As identified in the Traffic Impact Analysis completed by SRS Engineering Inc (Appendix A), the Rivercross development, along with other proposed developments in the area (e.g. Airlie Park Phase 1, an industrial development), is expected to cause significant traffic impact at the currently unsignalized intersection of Optimist Club Road and Triangle Circle .

WSP is tasked by Simonini Group to evaluate the intersection improvement options at Optimist Club Road and Triangle Circle intersection. This memo is prepared to document the traffic analysis results and cover the following topics:

- Study Area
- Intersection Improvement Alternative Traffic Analysis
- Conclusions and Recommendations

Study Area

The study area, shown in Figure 1, includes the following two intersections:

Optimist Club Road/Triangle Circle.....*unsignalized three-legged-intersection*

Optimist Club Road/Rufus Road*unsignalized three-legged-intersection*

Optimist Club Road (SR 1380) is an east-west two-lane roadway in the study area connecting Triangle Circle to NC 16. There is no AADT available for this roadway. The speed limit along this road is 45 miles per hour (mph). The Right-of-Way is approximately 50'.

Triangle Circle (SR 1388) is a north-south two-lane roadway that connects to NC 16 Business at both termini. Land uses along this roadway are primarily residential. The 2013 AADT traffic along this roadway was 1,800 vpd south of Optimist Club Road. The posted speed limit along Triangle Circle is 45 mph. The Right-of-Way is approximately 60'.

Rufus Road (SR 1387) is a north-south two-lane roadway, approximately 6,300' in length. Rufus Road interests with Optimist Club Road less than 100 feet away from the intersection of Optimist Club Road and Triangle Circle, and terminates near NC 16 Bypass in the southern end. Land uses along this roadway are primarily residential. The posted speed limit is 45 mph. The Right-of-Way is approximately 60'.

Intersection Improvement Alternative Traffic Analysis

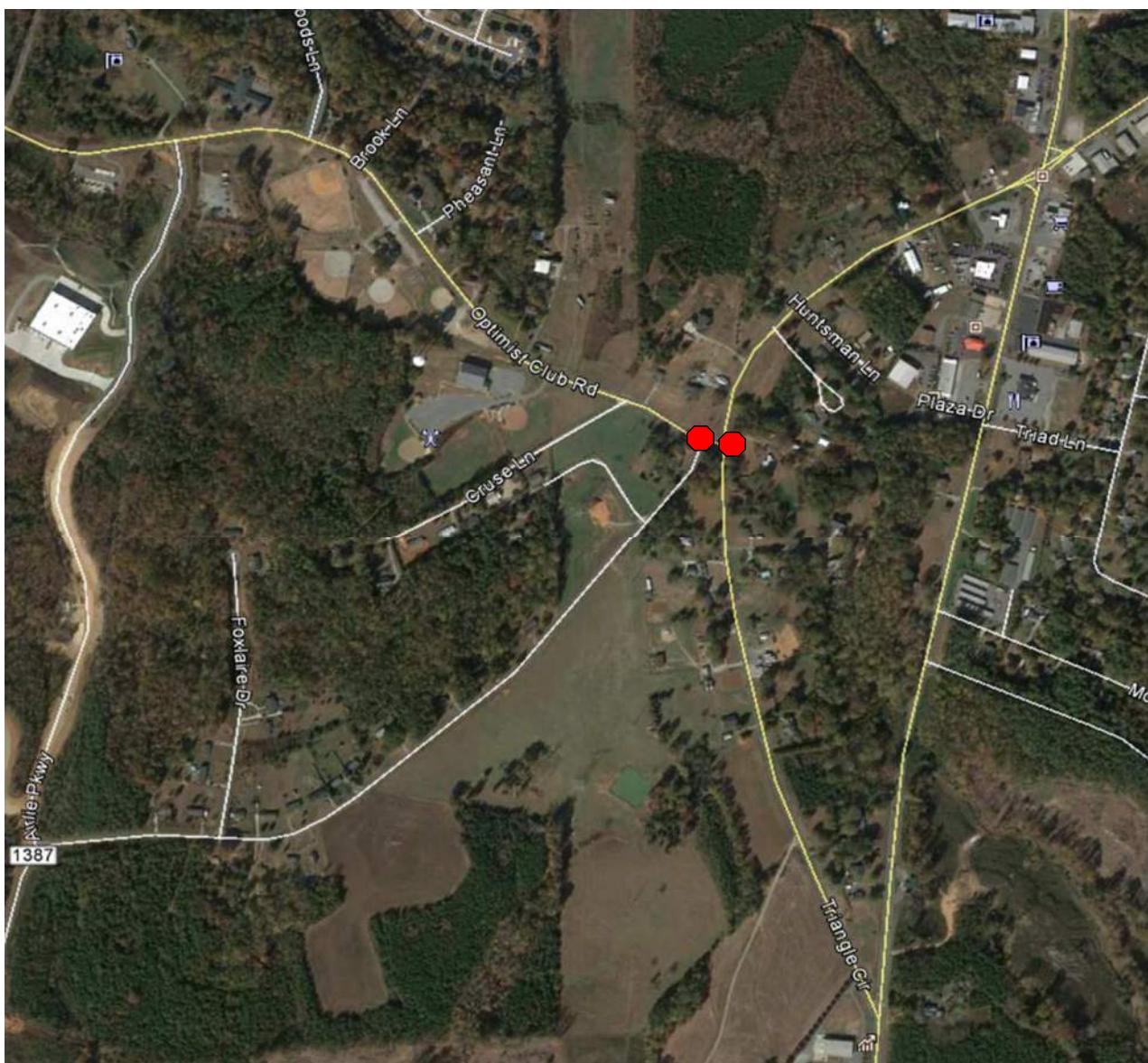
Traffic analysis was performed for the 2020 PM peak hour scenario, as this was identified as the worst condition based on SRS Engineering's previous traffic study. The analysis is based on the projected build traffic volumes documented in the original TIA. The proposed Rivercross development is expected to add 181 eastbound right-turning vehicles on Optimist Club Road and 150 northbound left-turning vehicles on Triangle

Circle in the PM peak hour in 2020 upon build-out. Five intersection improvement alternatives were developed and analyzed below. Figure 2 illustrates the proposed geometry for each alternative.

In accordance with the NCDOT Capacity Analysis Guidelines, no “Right Turn on Red” (RTOR) is allowed in this study. In addition, a Peak Hour Factor (PHF) of 0.90 is used for all analysis scenarios. Synchro 95th percentile queue lengths were documented in the report. To account for the stochastic nature of traffic flows, ten traffic simulation runs were performed for each analysis scenario with the resulting Queueing and Blocking Reports included in Appendix B. The turn lane storage length recommendations take into account both the 95th percentile queue lengths reported in Synchro capacity analyses as well as the max queue length estimated based on traffic simulations.



***Not to Scale

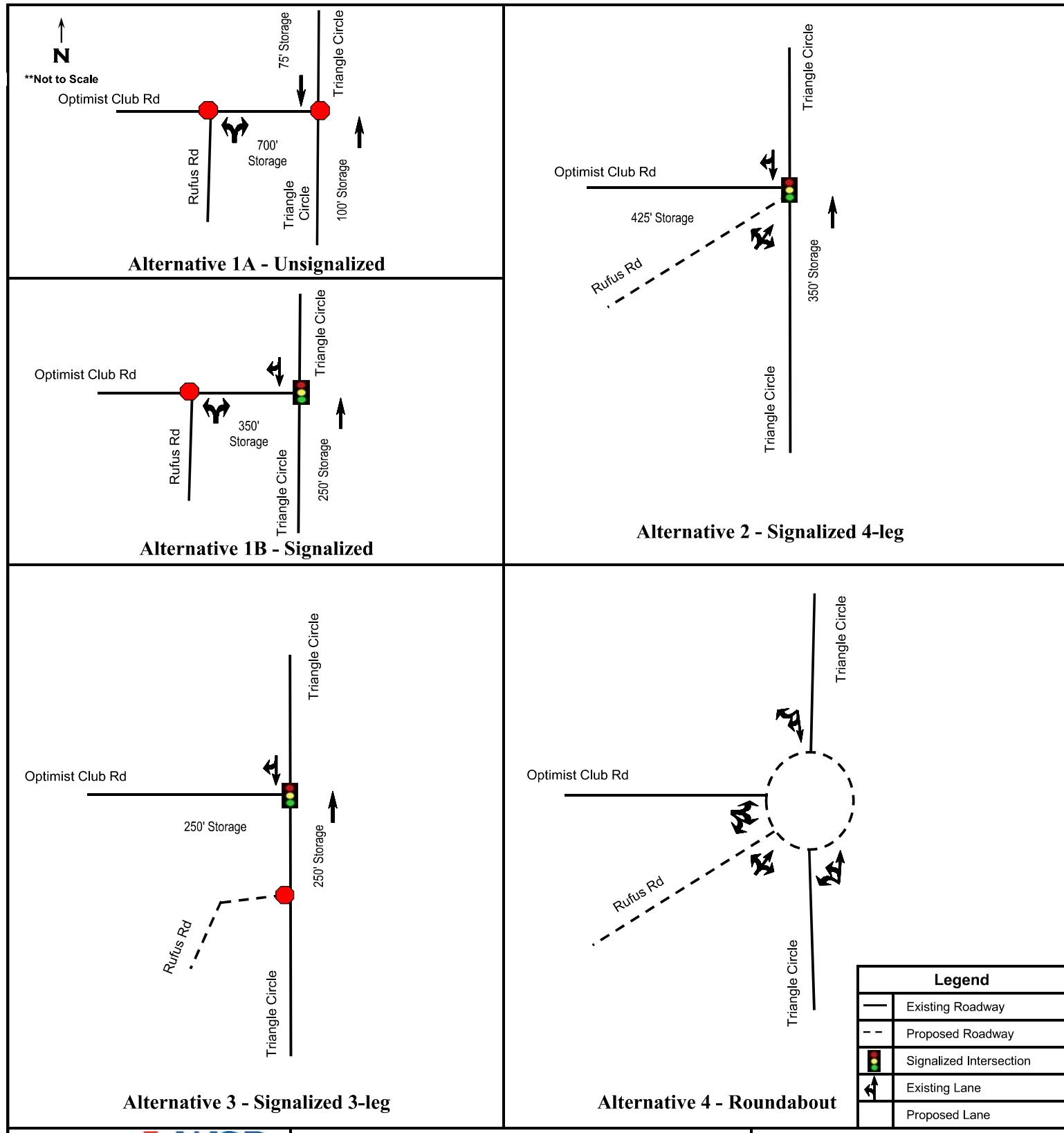


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Intersections:

Optimist Club Rd @ Triangle Circle
Optimist Club Rd @ Rufus Rd

Legend	
	Signalized Intersection
	Unsignalized Intersection



Alternative 1

Both Alternative 1A and 1B require no change in the current roadway alignments. Alternative 1A leaves the intersection of Optimist Club Road unsignalized, while Alternative 2A evaluates this intersection with a signalized operation. In both alternatives Rufus Road remains unaltered.

Alternative 1A – Unsignalized

This alternative is based on the improvements discussed in SRS Engineering's update memorandum dated April 30, 2014. Those improvements included adding an exclusive northbound left-turn lane on Triangle Circle and an exclusive right-turn lane on Optimist Club Road. This alternative also includes an exclusive southbound right-turn lane on Triangle Circle, which was not included in SRS Engineering's memo.

Table 1 lists the results of the Alternative 1A 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 reported for signalized intersections only.

The eastbound stop controlled approach on Optimist Club Road is expected to operate at an LOS F with 177 seconds of delay. While the intersection of Optimist Club Road at Rufus Road is expected to operate at an acceptable LOS, this scenario does not resolve any safety concerns related to the proximity of the intersection of Rufus Road to Triangle Circle.

Table 1: 2020 Build PM Peak Level of Service Analysis – Alternative 1A - Unsignalized

Intersection	Approach	Alternative 1A Unsignalized	
		PM	
		Delay (sec)	LOS
Optimist Club Rd @ Triangle Circle	Unsignalized	-	-
	EB	Optimist Club Rd	177.1 F
	NB	Triangle Circle	7.1 A
	SB	Triangle Circle	0.0 A
Optimist Club Rd @ Rufus Rd	Unsignalized	-	-
	EB	Optimist Club Rd	0.0 A
	WB	Optimist Club Rd	0.5 A
	NB	Rufus Rd	17.5 C
unacceptable delay			

Based on the 95th percentile queue from Synchro and the maximum queue from SimTraffic, the eastbound right-turn lane on Optimist Club Road is expected to require over a 700 ft. storage bay. This is due to the projected high volume traveling through this intersection. Approximately 64% those vehicles will be entering the intersection from the eastbound approach. The northbound left-turn lane on Triangle Circle is expected to require 100 ft. of storage and the southbound right-turn lane is expected require 75 ft. of storage. The turn lane storage needs also seem to be in line with the estimates derived from the NCDOT's Driveway Manual's turn lane warrant chart.

Table 2: 2020 Build PM Peak Queue Analysis – Alternative 1A - Unsignalized

Intersection	Approach	storage length (ft) {Prop}	Alternative 1A Unsignalized	
			95th %	Max
			queue length (ft)	queue length (ft)
Optimist Club Rd @ Triangle Circle	Unsignalized	{EBL}	767	859
		{EBR}	52	826
		{NBL}	21	95
		{SBR}	0	41
queue length exceeds storage length				

Alternative 1B – Signalized

This alternative evaluates signalizing the intersection and adding an exclusive eastbound right-turn lane and an exclusive northbound left-turn lane. Table 3 shows the results of the Alternative 1B analysis.

As a signalized intersection, Optimist Club Road at Triangle Circle is expected to operate at an overall LOS B, with all approaches operating at an acceptable LOS. Similar to Alternative 1A, this scenario does not resolve any safety concerns related to the proximity of the intersection of Rufus Road to Triangle Circle.

Table 3: 2020 Build PM Peak Level of Service Analysis – Alternative 1B - Signalized

Intersection	Approach	Alternative 1B Signalized	
		PM	
		Delay (sec)	LOS
Optimist Club Rd @ Triangle Circle	Signalized	Intersection Average	19.3 B
	EB	Optimist Club Rd	20.5 C
	NB	Triangle Circle	13.8 B
	SB	Triangle Circle	24.2 C
Optimist Club Rd @ Rufus Rd	Unsignalized		- -
	EB	Optimist Club Rd	0.0 A
	WB	Optimist Club Rd	0.5 A
	NB	Rufus Rd	17.5 C

unacceptable delay

Queue analysis, shown in Table 4, indicates the eastbound right-turn lane is expected to require 350 ft. of storage and the northbound left-turn lane is expected to require 250 ft. of storage. Based on the queuing and blocking report, there is little to no queuing penalty for the eastbound right-turn, even though the max queue is shown to extend past the storage length by 10'.

Table 4: 2020 Build PM Peak Queue Analysis – Alternative 1B - Signalized

Intersection	Approach	storage length (ft) {Prop}	Alternative 1B Signalized	
			95th %	Max
		queue length (ft)	queue length (ft)	queue length (ft)
Optimist Club Rd @ Triangle Circle	Signalized	{EBL}		#310
		{EBR}	{350}	133
		{NBL}	{250}	119

queue length exceeds storage length

m: queue is metered by upstream signal

#: volume exceeds capacity, queue may be longer

Alternative 2 – Signalized 4-leg

This alternative evaluates signalizing the intersection of Optimist Club Road and Triangle Circle and realigning Rufus Road to become a fourth leg at the intersection. Optimist Club Road and Rufus Road would operate with split phasing. Based on the projected traffic volumes, the intersection would meet the Peak Hour signal warrant in the PM peak hour. Alternative 2 also includes adding an exclusive eastbound right-turn lane on Optimist Club Road and an exclusive northbound left-turn lane on Triangle Circle. Compared to Alternative 1A or 1B, this alternative would require the acquisition of additional right-of-right in order to realign Rufus Road.

Table 5 lists the results of the Alternative 2 analysis. In this scenario, the intersection is expected operate at an acceptable LOS (D or better) on all approaches, except Rufus Road where it will operate at LOS E with 56.2 seconds of delays.

Table 5: 2020 Build PM Peak Level of Service Analysis – Alternative 2 – Signalized 4-leg

Intersection	Approach	Alternative 2 Signalized 4-leg	
		PM	
		Delay (sec)	LOS
Optimist Club Rd @ Triangle Circle	Signalized	Intersection Average	41.4
	EB	Optimist Club Rd	43.6
	NB	Triangle Circle	28.6
	SB	Triangle Circle	52.3
	NEB	Rufus Rd	56.2

unacceptable delay

The queue analysis, shown in Table 6, indicates that the eastbound right-turn lane on Optimist Club Road is expected to require 425 ft. of storage; the northbound left-turn lane on Triangle Circle is expected to require 350 ft. of storage. Based on the queuing and blocking report, there is little to no queuing penalty for the eastbound right-turn and northbound left-turn, even though the max queue is shown to slightly extend past the storage length.

Table 6: 2020 Build PM Peak Queue Analysis – Alternative 2 – Signalized 4-leg

Intersection	Approach	storage length (ft) {Prop}	Alternative 2 Signalized 4-leg	
			95th %	Max
			queue length (ft)	queue length (ft)
Optimist Club Rd @ Triangle Circle	Signalized	{EBL}	474	479
		{EBR}	418	435
		{NBL}	257	342

queue length exceeds storage length

Alternative 3 – Signalized 3-leg

This alternative evaluates signalizing the intersection of Optimist Club Road and Triangle Circle and realigning Rufus Road to intersect with Triangle Circle as a stop controlled right-in, right-out (RIRO) intersection. Changing Rufus Road to a RIRO intersection would require a detour using NC 16 Business and Triangle Circle for the few vehicles that currently turn left from Rufus Road to go west on Optimist Club Road. Alternative 3 also includes adding an exclusive eastbound right-turn lane on Optimist Club Road and an exclusive left-turn lane on Triangle Circle. This alternative would also require the acquisition of additional right-of-right in order to realign Rufus Road.

Table 7 lists the results of the Alternative 3 analysis. In this scenario, the intersection of Optimist Club Road and Triangle Circle is expected to operate at LOS C or better on all approaches. The proposed intersection of Rufus Road and Triangle Circle is expected to operate at an acceptable LOS as well.

Table 7: 2020 Build PM Peak Level of Service Analysis – Alternative 3 – Signalized 3-leg

Intersection	Approach	Alternative 3 Signalized 3-leg	
		PM	
		Delay (sec)	LOS
Optimist Club Rd @ Triangle Circle	Signalized	Intersection Average	21.3 C
	EB	Optimist Club Rd	20.9 C
	NB	Triangle Circle	15.6 B
	SB	Triangle Circle	34.0 C
Triangle Circle @ Rufus Rd	Unsignalized		- -
	EB	NC Hwy 150	12.1 B
	NB	Triangle Circle	0.0 A
	SB	Triangle Circle	0.0 A
unacceptable delay			

The queue analysis, shown in Table 8, indicates that the eastbound right-turn lane on Optimist Club Road is expected to require 250 ft. of storage. The northbound left-turn lane on Triangle Circle is expected to need 250 ft. of storage. While the max queue

exceeds the recommended storage length, the queuing and blocking report shows there is a minimal to no queuing penalty with only a few vehicles being blocked on the eastbound approach.

Table 8: 2020 Build PM Peak Queue Analysis – Alternative 3 – Signalized 3-leg

Intersection	Approach	storage length (ft) {Prop}	Alternative 3 Signalized 3-leg	
			95th %	Max
			queue length (ft)	queue length (ft)
Optimist Club Rd @ Triangle Circle	Signalized	{EBL}	357	434
		{EBR}	164	285
		{NBL}	168	227
queue length exceeds storage length				

Alternative 4 – Roundabout

This alternative evaluates constructing a roundabout that includes Triangle Circle, Optimist Club Road and the realigned Rufus Road. No additional turn lanes would be required; however, additional right-of-way would be required for the roundabout and the realignment of Rufus Road.

Analysis for the roundabout was performed using Sidra 6.0. Table 9 lists the results below. The roundabout is expected to operate at LOS A with minimal delays.

Table 9: 2020 Build PM Peak Level of Service Analysis – Alternative 4 – Roundabout

Intersection	Approach	Alternative 4 Roundabout	
		PM	
		Delay (sec)	LOS
Optimist Club Rd @ Triangle Circle	Unsignalized	Intersection Average	7.0
	EB	Optimist Club Rd	6.3
	NB	Triangle Circle	9.3
	SB	Triangle Circle	3.4
	NEB	Rufus Rd	9.7
unacceptable delay			

The queue analysis, listed below in Table 10, indicates there will be low to moderate queuing on each of the approaches. Sidra reports the queue length in both feet and number of vehicles.

Table 10: 2020 Build PM Peak Queue Analysis – Alternative 4 – Roundabout

Intersection	Approach	Roundabout	
		95th %	
		queue length (ft)	queue length (veh)
Optimist Club Rd @ Triangle Circle	Unsignalized	EB	131
		NB	101
		SB	39
		NEB	12

queue length exceeds storage length

Conclusions and Recommendations

Traffic analyses were conducted to assess possible improvements at the intersection of Optimist Club Road and Triangle Circle. The results show that leaving the intersection unsignalized could potentially cause long queues on the eastbound Optimist Club Road approach. Signalizing the intersection greatly reduces the delays and queues without requiring the major geometric changes involved with constructing a roundabout. The three signalized alternatives all operate at an acceptable LOS; however, both Alternative 2 and Alternative 3 would require the acquisition of additional right of way in order to realign Rufus Road. Realigning Rufus Road would address the safety concerns about the close proximity to Triangle Circle; however, this is an existing condition that is not caused by the proposed Rivercross development. It is therefore our opinion that realigning Rufus Road should not be the developer's responsibility.

Due to the limited existing Right-of-Way on Optimist Club Road (50') and Triangle Circle (60'), all the proposed improvement alternatives likely will require Right-of-Way and/or easement acquisitions, along with utility relocations.

Alternative 1B as summarize below and illustrate in Figure 3, in our opinion, could provide meaning improvements and warrant further consideration.

Alternative 1B:

- *Eastbound Optimist Club Road:* Construct an exclusive right-turn lane with 350 feet of storage and appropriate taper.
- *Northbound Triangle Circle:* Construct an exclusive left-turn lane with 250 feet of storage and appropriate taper.
- Install a traffic signal at this intersection with appropriate signal heads, controller and cabinet, poles, loop detectors, junction boxes, etc. Signal warrant analysis should be performed before signal installation.

With the implementation of the proposed improvements, the analysis shows the subject intersection could operate at LOS B during the PM peak hour, the worst peak period during the day. While Alternative 1B does not directly address the safety concerns associated with the Rufus Road traffic, this will set the stage for future Rufus Road realignment when funding becomes available.

It is noted that Alternative 3 (roundabout) could provide the optimum traffic operational performance. Due to the Right-of-Way required, however, it likely also has the most impact on adjacent properties which limits its feasibility as a developer-funded improvement. Table 11 on the following page summarizes the analysis results.

We would like to suggest NCDOT working with the developer and other stakeholders to identify feasible and reasonable improvements for the subject intersection, based on the intersection analysis results discussed above. Considering the existing conditions, likely impacts caused by the adjacent Airlie Park development, and the Right-of-Way acquisition needs, elements of the intersection improvements may be beyond the proposed development's obligations and implementation capacity.

Please feel free to let us know if you have any questions or comments.

CONCEPT PLAN - ALTERNATIVE 1B SIGNALIZED



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OPTIMIST CLUB / TRIANGLE CIRCLE INTERSECTION IMPROVEMENTS

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Table 11: 2020 Build PM Peak Traffic Analysis Result Summary

Intersection	Approach	No Build		Alternative 1A Unsignalized		Alternative 1B Signalized		Alternative 2 Signalized 4-leg		Alternative 3 Signalized 3-leg		Alternative 4 Roundabout	
		PM		PM		PM		PM		PM		PM	
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Optimist Club Rd @ Triangle Circle	Signalized	Intersection Average	-	-	-	19.3	B	41.4	D	21.3	C	7.0	A
	EB	Optimist Club Rd	135.3	F	177.1	F	C	43.6	D	20.9	C	6.3	A
	NB	Triangle Circle	6.0	A	7.1	A	B	28.6	C	15.6	B	9.3	A
	SB	Triangle Circle	0.0	A	0.0	A	C	52.3	D	34.0	C	3.4	A
	NEB	Rufus Rd						56.2	E			9.7	A
Optimist Club Rd @ Rufus Rd	Unsignalized		-	-	-	-	-	-	-	-	-	-	-
	EB	Optimist Club Rd	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0
	WB	Optimist Club Rd	0.6	A	0.5	A	0.5	A	0.5	A	0.5	A	0.5
	NB	Rufus Rd	15.9	C	17.5	C	17.5	C	17.5	C	17.5	C	17.5
Triangle Circle @ Rufus Rd	Unsignalized											-	-
	EB	NC Hwy 150										12.1	B
	NB	Triangle Circle										0.0	A
	SB	Triangle Circle										0.0	A
	unacceptable delay												