



CITY OF DURHAM | NORTH CAROLINA

Date: October 31, 2012

To: Amy Wolff, Durham City County Planning Department
From: Bill Judge PE, City of Durham Department of Transportation
Subject: Carolina Crossing II (Z1200004) Traffic Impact Analysis

The Unified Development Ordinance (UDO) requires that a Traffic Impact Analysis (TIA) be prepared for proposed developments estimated to generate 150 or more peak-hour vehicle trips. The proposed Carolina Crossing II development includes 168,000 square-feet of medical office. The development is expected to generate 6,655 daily trips with 284 a.m. peak-hour trips (224 entering and 60 exiting) and 292 p.m. peak-hour trips (79 entering and 213 exiting). The proposed development is located on the west side of Farrington Road and south side of Cleora Drive. The expected completion year is 2013, and the TIA analysis year is 2014. The Carolina Crossing II TIA was prepared by Kimley-Horn and Associates, Inc. in February 2012.

Study Area

The study area includes the following intersections:

- NC 54 and I-40 Westbound Ramp;
- NC 54 and I-40 Eastbound Ramps;
- NC 54 and Farrington Road;
- NC 54 and Celeste Circle / Falconbridge Road;
- Celeste Circle and NC 54 Service Road;
- Farrington Road and Cleora Drive;
- Cleora Drive and Site Driveway #1; and
- Cleora Drive and Site Driveway #2.

Trip Generation

Trip generation numbers are based on the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 8th Edition*, 2008. Although the ITE *Trip Generation Manual* includes medical office as a category, the proposed site is 50% larger than the largest medical office complex included in the ITE *Trip Generation Manual*. To account for this difference, the TIA utilized the general office category (ITE land use code 710) for the a.m. peak hour and a modified rate for the p.m. peak-hour. This approach was reviewed by the City of Durham prior to the analysis. Using these adjustments, the site is expected to generate 6,655 daily trips with 284 a.m. peak-hour trips (224 entering and 60 exiting) and 292 p.m. peak-hour trips (79 entering and 213 exiting).

Traffic Data Collection

The peak-hour intersection turning movement counts were taken from 7-9 a.m. and 4-6 p.m. in September 2011, October 2011, and February 2012.

Trip Distribution and Assignment

The assignment of site traffic on the study area roadway network was based on the following trip distribution percentages:

- To/From the Southwest via NC 54: 35% of site trips;
- To/From the Northeast via NC 54: 15% of site trips;
- To/From the North via Farrington Road: 10% of site trips;
- To/From the South via Farrington Road: 10% of site trips;
- To/From the Northwest via I-40: 15% of site trips; and
- To/From the Southeast via I-40: 15% of site trips.

Approved Developments and Background Growth

There are no approved projects in the vicinity. A uniform annual compounded growth rate of 3% was utilized to determine the background traffic projections.

TIP Roadway Improvements

The following roadway projects are proposed in the area:

- NCDOT TIP Project U-5324A will provide additional through lanes, transit accommodations, and sidewalk/bicycle improvements along NC 54 from Barbee Chapel Road to I-40. Per NCDOT's FY 2013-2022 Draft TIP, right-of-way and construction are expected to begin in FY 2022.
- NCDOT TIP Project U-5517 will construct a slip ramp from northbound Farrington Road onto I-40 Eastbound. Per NCDOT's FY 2013-2022 Draft TIP, construction is expected to begin in FY 2014.
- The *NC 54-I40 Corridor Study* proposes multiple roadway, transit, pedestrian, and bicycle related improvements in this area.

The applicant proposes a number of roadway improvements to mitigate the proposed site traffic impact. These improvements may impact multiple properties that are not part of this development plan. The applicant is responsible for acquiring additional right-of-way and/or construction easements needed to complete these roadway improvements in accordance with NCDOT and City of Durham standards.

Capacity Analysis

Capacity analyses were performed using the a.m. and p.m. peak-hour for the following scenarios:

- Existing (2012) conditions;
- No-Build (2014) conditions (2012 existing + background growth);
- Build (2014) conditions (2012 existing + background growth + site traffic); and
- Build (2014) with improvements conditions (2012 existing + background growth + site traffic + improvements).

The applicant adjusted the ideal flow rates and the peak-hour factors based on collected field data. These changes were reviewed and accepted by NCDOT.

This development is located within a Suburban Transit Area. As permitted under Comprehensive Plan Policy 2.3.2f and UDO Section 6.9.1.C, the applicant is utilizing the Compact Tier Standards, where the adopted LOS standard is LOS E. However, two of the study area intersections (NC 54 / I-40 Westbound Ramp and Celeste Circle / NC 54 Service Road) are located within the Suburban Tier where the adopted LOS standard is LOS D. The following table summarizes the average delay for the various Levels of Service (LOS) for unsignalized and signalized intersections:

	Signalized Intersections	Unsignalized Intersections
Level of Service	Average Vehicle Delay (Seconds)	Average Vehicle Delay (Seconds)
A	0-10	0-10
B	10-20	10-15
C	20-35	15-25
D	35-55	25-35
E	55-80	35-50
F	>80	>50

NC 54 and I-40 Westbound Ramp

The following table summarizes the Levels of Service at this existing signalized intersection in the Suburban Tier with an adopted LOS Standard of LOS D:

Scenario	a.m. LOS	p.m. LOS
Existing (2012)	B	A
No-Build (2014)	B	A
Build (2014)	C	A

The analysis indicates that the intersection will operate at acceptable levels of service for all scenarios and traffic conditions. No improvements are recommended or required at this intersection.

NC 54 and I-40 Eastbound Ramps

The following table summarizes the Levels of Service at this existing signalized intersection in the Suburban Transit Area with an adopted LOS Standard of LOS E:

Scenario	a.m. LOS	p.m. LOS
Existing (2012)	B	B
No-Build (2014)	B	B
Build (2014)	B	C

The analysis indicates that the intersection will operate at acceptable levels of service for all scenarios and traffic conditions. No improvements are recommended or required at this intersection.

NC 54 and Farrington Road

The following table summarizes the Levels of Service at this existing signalized intersection in the Suburban Transit Area with an adopted LOS Standard of LOS E:

Scenario	a.m. LOS	p.m. LOS
Existing (2012)	D	D
No-Build (2014)	D	D
Build (2014)	E	E
Build (2014) with improvements	D	D

The analysis indicates that the overall intersection will operate at acceptable levels of service for all scenarios and traffic conditions. Although the overall intersection will operate at acceptable levels of service, there are multiple movements with excessive queuing and delays for the Build (2014) condition. The TIA recommended the following required improvements to address the queuing and delays at this intersection:

- Construct a second southbound left-turn lane on Farrington Road at NC 54 with a minimum of 250 feet of storage plus appropriate tapers;
- Construct a concrete island with a 4ft. minimum width along Farrington Road from NC 54 to Cleora Drive;
- Extend the existing eastbound left-turn lane on NC 54 at Farrington Road to provide a minimum of 300 feet of storage plus appropriate tapers;
- Construct an exclusive eastbound right-turn lane on NC 54 at Farrington Road with a minimum of 250 feet of storage plus appropriate tapers; and
- Construct an exclusive westbound right-turn lane on NC 54 at Farrington Road to maximize the storage between Farrington Road and the I-40 Eastbound Ramps with appropriate tapers.

With the improvements listed above the intersection is expected to operate at an acceptable LOS D for both peak-hours for the Build (2014) with improvements condition.

NC 54 and Celeste Circle / Falconbridge Road

The following table summarizes the Levels of Service at this existing signalized intersection in the Suburban Transit Area with an adopted LOS Standard of LOS E:

Scenario	a.m. LOS	p.m. LOS
Existing (2012)	C*	C*
No-Build (2014)	C*	C*
Build (2014)	C*	C*

* Unsignalized operation, with LOS reported for the worst (NB) approach

The analysis indicates that the intersection will operate at acceptable levels of service for all scenarios and traffic conditions. No improvements are recommended or required at this intersection.

Celeste Circle and NC 54 Service Road

The following table summarizes the Levels of Service at this existing signalized intersection in the Suburban Tier with an adopted LOS Standard of LOS D:

Scenario	a.m. LOS	p.m. LOS
Existing (2012)	A* (EB)	A* (WB)
No-Build (2014)	A* (EB)	A* (WB)
Build (2014)	A* (EB)	A* (WB)

* Unsignalized operation, with LOS reported for the worst approach

The analysis indicates that the intersection will operate at acceptable levels of service for all scenarios and traffic conditions. No improvements are recommended or required at this intersection.

Farrington Road and Cleora Drive

The following table summarizes the Levels of Service at this existing signalized intersection in the Suburban Transit Area with an adopted LOS Standard of LOS E:

Scenario	a.m. LOS	p.m. LOS
Existing (2012)	C*	C*
No-Build (2014)	C*	C*
Build (2014)	C*	D*
Build (2014) with improvements	C*	D*

* Unsignalized operation, with LOS reported for the worst (EB) approach

The analysis indicates that the overall intersection will operate at acceptable levels of service for all scenarios and traffic conditions. Although the overall intersection will operate at acceptable levels of service, the following safety improvements are required along Farrington Road to accommodate the additional site traffic:

- Construct an exclusive northbound left-turn lane on Farrington Road at Cleora Drive with a minimum of 100 feet of storage plus appropriate tapers;
- Construct an exclusive eastbound left-turn lane on Cleora Drive at Farrington Road with a minimum of 100 feet of storage plus appropriate tapers; and
- Construct a concrete island with a 4ft. minimum width along Farrington Road from NC 54 to Cleora Drive.

Cleora Drive and Site Driveway #1

The following table summarizes the Levels of Service at this existing signalized intersection in the Suburban Transit Area with an adopted LOS Standard of LOS E:

Scenario	a.m. LOS	p.m. LOS
Build (2014)	A*	A*

* Unsignalized operation, with LOS reported for the worst (NB) approach

The analysis indicates that the intersection will operate at acceptable levels of service with the proposed site traffic. No improvements are recommended or required at this intersection.

Cleora Drive and Site Driveway #2

The following table summarizes the Levels of Service at this existing signalized intersection in the Suburban Transit Area with an adopted LOS Standard of LOS E:

Scenario	a.m. LOS	p.m. LOS
Build (2014)	A*	A*

* Unsignalized operation, with LOS reported for the worst (NB) approach

The analysis indicates that the intersection will operate at acceptable levels of service with the proposed site traffic. No improvements are recommended or required at this intersection.

Summary of required improvements:

NC 54 and Farrington Road

1. Construct a second southbound left-turn lane on Farrington Road at NC 54 with adequate storage and appropriate tapers.
2. Extend the existing eastbound left-turn lane on NC 54 at Farrington Road to provide adequate and appropriate tapers.
3. Construct an exclusive eastbound right-turn lane on NC 54 at Farrington Road with adequate storage and appropriate tapers.
4. Construct an exclusive westbound right-turn lane on NC 54 at Farrington Road with adequate storage and appropriate tapers.

Farrington Road

1. Construct a concrete island per City of Durham and NCDOT Standards along Farrington Road from NC 54 to Cleora Drive.

Farrington Road and Cleora Drive

1. Construct an exclusive northbound left-turn lane on Farrington Road at Cleora Drive with adequate storage and appropriate tapers.
2. Construct an exclusive eastbound left-turn lane on Cleora Drive at Farrington Road with adequate storage and appropriate tapers.

Cross-Access Driveway

1. Provide a cross-access connection via the adjacent parcel(s) to the south for a driveway connection between the site and the NC 54 Service Road.