



CITY OF DURHAM | NORTH CAROLINA

Date: November 20, 2014

To: Amy Wolff, Durham City County Planning Department
From: Bill Judge PE, City of Durham Department of Transportation
Subject: NC 54 Residential (Z1400018) 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 NC 54 Residential development includes 360 apartments. The development is expected to generate 2,305 daily trips with 182 a.m. peak-hour trips (38 entering and 144 exiting) and 216 p.m. peak-hour trips (140 entering and 76 exiting). The proposed development is located on the north side of NC 54, east of Barbee Road and west of Revere Road.

The applicant proposes one point of access to NC 54 and cross-access to the adjacent vacant properties to both the west and east along NC 54. Additionally, a second direct access point to NC 54 is proposed as a temporary right-in/right-out access. This temporary access will be removed upon the connection of the cross-access to the adjacent parcel to either the east or the west. Additionally, the temporary access to NC 54 is proposed for conformance with UDO Section 12.2.4.A.2, which would have otherwise limited the development to 90 units until such time as the second point of access to the external roadway network was provided. The expected completion year is 2016, and the TIA analysis year is 2017. The NC 54 Residential development TIA was prepared by A. Morton Thomas and Associates, Inc. in July 2014 with a revision in September 2014.

Study Area

The study area includes the following intersections:

- NC 54 and Fayetteville Road;
- NC 54 and Barbee Road;
- NC 54 and Revere Road;
- NC 54 and NC 55;
- Barbee Road and Maddry Site Drive (Z1400007);
- NC 54 and Site Drive 1 (eastern site driveway, temporary right-in/right-out access); and
- NC 54 and Site Drive 2 (western site driveway).

Trip Generation

Trip generation numbers are based on the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 9th Edition*, 2012. By utilizing Land Use Code 220 (apartments), the site is expected to generate 182 a.m. peak-hour trips and 216 p.m. peak-hour trips.

Traffic Data Collection

The peak-hour intersection turning movement counts were taken from 7-9 a.m. and 4-6 p.m. in June 2014.

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 North via Fayetteville Road: 10% of site trips;
- To/From the South via Fayetteville Road: 10% of site trips;
- To/From the West via NC 54: 5% of site trips;
- To/From the North via Barbee Road: 30% of site trips;
- To/From the South via Barbee Road: 10% of site trips;
- To/From the North via NC 55: 20% of site trips;
- To/From the South via NC 55: 5% of site trips; and
- To/From the East via NC 54: 10% of site trips.

Approved Developments and Background Growth

A uniform annual compounded growth rate of 4% was utilized to determine the background traffic projections. In addition to the growth rate, the TIA used traffic volume projections from the following approved development:

- Maddy Residential (Z1400007): This development is located adjacent to the west side of the proposed NC 54 Residential development. The Maddy Residential development includes 175 proposed apartments and will provide cross-access to the NC 54 Residential development. Additionally, the Maddy Residential development proposes one full-access driveway connection to Barbee Road and one full-access driveway connection to NC 54 aligned with the Meadows at Southpoint development (Z1300020) on the south side of NC 54.

TIP Roadway Improvements

NCDOT TIP Project U-5324 will improve NC 54 from I-40 (west of NC 751) to NC 55 to a multi-lane divided facility with bicycle, pedestrian and transit amenities. This project is currently unfunded through 2018.

Capacity Analysis

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

- Existing (2014) conditions;
- No-Build (2017) conditions (2014 existing + background growth);
- Build (2017) conditions (2014 existing + background growth + site traffic); and
- Build (2017) with improvements conditions (2014 existing + background growth + site traffic + improvements).

This development is 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

Fayetteville Road and NC 54

The following table summarizes the Levels of Service at this existing signalized intersection:

Scenario	a.m. LOS	p.m. LOS
Existing (2014)	D	F
No-Build (2017)	E	F
Build (2017)	E	F

The intersection currently operates at a LOS D during the a.m. peak-hour and a LOS F in the p.m. peak-hour. With the existing lane configuration and signal phasing, the intersection will operate at a LOS E in the a.m. peak-hour and a LOS F in the p.m. peak-hour for the Build (2017) condition. No improvements were recommended for this intersection. Although this does not meet City of Durham’s requirement of a LOS D or better, the proposed development will not increase the traffic volumes by 10% or more on any approach in the peak-hour. Since the site impact is less than 10% on all intersection approaches, the city’s published TIA guidelines did not require this intersection to be included in the study. However, NCDOT required the intersection to be included in the TIA, therefore the required improvements for this intersection were determined by NCDOT.

NC 54 and Barbee Road

The following table summarizes the Levels of Service at this existing signalized intersection:

Scenario	a.m. LOS	p.m. LOS
Existing (2014)	B	C
No-Build (2017)	C	C
Build (2017)	C	C

The intersection currently operates at a LOS B during the a.m. peak-hour and a LOS C in the p.m. peak-hour. With the additional site traffic, the delays will increase slightly, but the intersection will remain at an acceptable LOS C for both peak hours. No roadway improvements are required to address the site traffic impacts.

NC 54 and Revere Road

The following table summarizes the Levels of Service at this existing signalized intersection:

Scenario	a.m. LOS	p.m. LOS
Existing (2014)	B	B
No-Build (2017)	B	B
Build (2017)	B	B

The intersection currently operates at a LOS B during both the a.m. and p.m. peak-hour. With the additional site traffic, the delays will increase slightly, but the intersection will remain at an acceptable LOS B for both peak hours. No roadway improvements are required to address the site traffic impacts.

NC 54 and NC 55

The following table summarizes the Levels of Service at this existing signalized intersection:

Scenario	a.m. LOS	p.m. LOS
Existing (2014)	E	F
No-Build (2017)	E	F
Build (2017)	E	F

The intersection currently operates at a LOS E during the a.m. peak-hour and a LOS F in the p.m. peak-hour. With the additional site traffic, the delays will increase slightly, but the intersection will remain at a LOS E in the a.m. peak-hour and a LOS F in the p.m. peak-hour for the Build (2017) condition. No improvements were recommended for this intersection. Although this does not meet City of Durham’s requirement of a LOS D or better, the proposed development will not increase the traffic volumes by 10% or more on any approach in the peak-hour. Since the site impact is less than 10% on all intersection approaches, the city’s published TIA guidelines did not require this intersection to be included in the study. However, NCDOT required the intersection to be included in the TIA, therefore the required improvements for this intersection were determined by NCDOT.

Barbee Road and Maddry Site Drive (Z1400007)

The following table summarizes the Levels of Service at this proposed unsignalized intersection:

Scenario	a.m. LOS	p.m. LOS
No-Build (2017)	B*	B*
Build (2017)	B*	C*

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

The Maddry Site Drive will be constructed with the development of the adjacent Maddry Residential development (Z1400007). The intersection will operate at an acceptable LOS C or better for both peak-hours for the Build (2017) condition with the following improvements which are text commitments of the adjacent Maddry development:

- Construct a southbound left-turn lane with a minimum of 100 feet of storage plus appropriate taper on Barbee Road at the Maddry Site Drive; and
- Construct a cross-access connection between the Maddry development and the NC 54 Residential development.

NC 54 and Site Drive 1 (eastern site driveway, temporary right-in/right-out access)

The following table summarizes the Levels of Service at this proposed unsignalized intersection:

Scenario	a.m. LOS	p.m. LOS
Build (2017) with Improvements	B*	B*

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

The TIA recommended Site Drive 1 be constructed as a temporary right-in/right-out connection to NC 54 with one ingress and one egress lane. This temporary access will be removed upon the connection of the cross-access to the adjacent parcel to either the east or the west. Additionally, the temporary access to NC 54 is proposed for conformance with UDO Section 12.2.4.A.2, which would have otherwise limited the development to 90 units until such time as the second point of access to the external roadway network was provided. The intersection will operate at an acceptable LOS B for both peak-hours for the Build (2017) condition with the following improvements:

- Construct Site Drive 1 with one ingress and one egress lane;
- Construct a westbound right-turn lane with a minimum of 100 feet of storage plus appropriate taper on NC 54 at Site Drive 1; and
- Remove Site Drive 1 upon the completion of a cross-access connection from the NC 54 Residential development to the adjacent parcel to either the east or west.

NC 54 and Site Drive 2 (western site driveway)

The following table summarizes the Levels of Service at this proposed unsignalized intersection:

Scenario	a.m. LOS	p.m. LOS
Build (2017) with Improvements	C*	D*

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

The intersection will operate at an acceptable LOS D or better for both peak-hours for the Build (2017) condition with the following improvements:

- Construct Site Drive 2 with one ingress and one egress lane;
- Construct an eastbound left-turn lane with a minimum of 100 feet of storage plus appropriate taper on NC 54 at Site Drive 2;
- Construct a two-way left-turn lane on NC 54 from Site Drive 2 to the proposed Meadows at Southpoint and/or Maddry Residential Site Drive to the west; and
- Construct a westbound right-turn lane with a minimum of 100 feet of storage plus appropriate taper on NC 54 at Site Drive 2.

Summary of required improvements:

NC 54 and Site Drive 1 (eastern site driveway, temporary right-in/right-out access)

1. Construct Site Drive 1 with one ingress and one egress lane.
2. Construct a westbound right-turn lane with adequate storage and appropriate taper on NC 54 at Site Drive 1.
3. Remove Site Drive 1 upon the completion of a cross-access connection from the NC 54 Residential development to the adjacent parcel to either the east or west.

NC 54 and Site Drive 2 (western site driveway)

1. Construct Site Drive 2 with one ingress and one egress lane.
2. Construct an eastbound left-turn lane with adequate storage and appropriate tapers on NC 54 at Site Drive 2.
3. Construct a two-way left-turn lane on NC 54 from Site Drive 2 to the proposed Meadows at Southpoint and/or Maddry Residential Site Drive to the west.
4. Construct a westbound right-turn lane with adequate storage appropriate taper on NC 54 at Site Drive 2.