



CITY OF DURHAM | NORTH CAROLINA

Date: January 15, 2015

To: Amy Wolff, Durham City County Planning Department
From: Bill Judge P.E., City of Durham Department of Transportation
Subject: Brier Creek Assemblage (Z1400006) Traffic Impact Analysis

The City-County Unified Development Ordinance requires that a Traffic Impact Analysis (TIA) be prepared for development plan submittals estimated to generate 150 or more vehicle trips during the peak hour. The Brier Creek Assemblage development proposes 270 single-family homes and 230 townhomes in both Durham and Wake Counties on the east side of Del Webb Arbors Drive and south side of Andrews Chapel Road. The development is expected to generate 3,921 daily trips with 300 a.m. peak-hour trips (235 entering and 65 exiting) and 376 p.m. peak-hour trips (241 entering and 135 exiting).

The applicant's expected project completion year is 2022, and the TIA analysis year is 2023. The Brier Creek Assemblage TIA was prepared by A. Morton Thomas and Associates, Inc. in March 2014 with an Addendum in August 2014. The TIA was also reviewed by NCDOT.

Study Area

The study area includes the following intersections:

- ACC Boulevard and Brier Creek Parkway;
- Carpenter Pond Road and Leesville Road;
- Andrews Chapel Road and Leesville Road;
- Andrews Chapel Road and Del Webb Arbors Drive;
- Andrews Chapel Road and Northern Site Driveway;
- Andrews Chapel Road and Brier Creek Parkway; and
- Del Webb Arbors Drive and Western Site Driveway.

Traffic Data Collection

The a.m. and p.m. peak hour intersection turning movement counts were taken from 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. during February 2014.

Trip Generation

Trip generation numbers are based on the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 9th Edition*, 2012. By utilizing Land Use Codes 210 (single-family) and 230 (townhomes), the site is expected to generate 300 a.m. peak-hour trips and 376 p.m. peak-hour trips.

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 Carpenter Pond Road: 5% of site trips;
- To/From the east via Leesville Road: 5% of site trips;
- To/From the west via Leesville Road: 5% of site trips;
- To/From the east via ACC Boulevard: 10% of site trips;
- To/From the south via Del Webb Arbors Drive: 15% of site trips; and
- To/From the south via Brier Creek Parkway: 60% of site trips.

Approved Development

For background traffic growth rate, variable rates between 0% and 3% were applied to the existing traffic counts depending on traffic volumes at specific intersections. For those intersections where traffic growth, due to new approved developments, exceeded a 3% annual growth rate, no additional growth rate was applied for background traffic. For those intersections where traffic growth, due to approved developments, came just below a 3% annual growth rate, a variable growth rate was applied as needed to ensure that total growth rate would equal or exceed 3% per year as required by the City of Durham TIA guidelines. The TIA used traffic volume projections from the following approved developments:

- Sierra Residential Development Phases 1 and 2: 1,050 single-family units and 150 townhomes located on the north side of Leesville Road east of Doc Nichols Road. This development was previously called Doc Nichols Development and Sauternes;
- Del Webb: 1,020 senior detached housing units and 255 senior attached housing units. This development was previously called Leesville Road Active Adult Community;
- Brier Creek Townes: 220 townhomes, 35,000 square-feet of retail, and a 55,000 square-foot supermarket proposed on Del Webb Arbors Drive south of Andrews Chapel Road and north of T.W. Alexander Drive;
- Alexander Place Phases 13, 16, and 17: Proposed development located within the City of Raleigh jurisdiction near ACC Boulevard and T.W. Alexander Drive;
- The Corners at Brier Creek: Proposed mixed use development on the north side of US 70 west of TW Alexander Drive with 495 apartments, 165 townhomes, 326,000 square-feet of retail, a 60,000 square-foot supermarket, a 15,000 square-foot pharmacy, a bank with four drive-up windows, 16,000 square-feet of high turnover (sit-down) restaurants, and 8,000 square-feet of fast-food restaurants; and
- Triangle Surgical Center: Proposed development located within the City of Raleigh jurisdiction near ACC Boulevard and Brier Creek Parkway.

TIP Roadway Improvements

The following roadway improvement projects are proposed in the area:

- 1) NCDOT TIP project U-4720 will provide improvements to the US 70 corridor from Lynn Road to the Wake County Line. This project is currently unfunded; and
- 2) NCDOT TIP project U-5518C will construct an interchange at US 70 and Brier Creek Parkway. This project had been previously scheduled for construction in 2017, but is now subject to reprioritization.

Capacity Analysis

Capacity analyses were performed using Synchro 7.0 for the a.m. and p.m. peak hours for the following scenarios:

- Existing (2014) conditions;
- No-Build (2023) conditions (2014 Existing + Background Growth + Approved Development Traffic);
- Build (2023) conditions (2014 No-Build + Site Traffic); and
- Build (2023) with Improvements conditions (2014 Build + 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

ACC Boulevard and Brier Creek Parkway (City of Raleigh)

The following table summarizes the Level of Service (LOS) for this signalized intersection.

Scenario	a.m. LOS	p.m. LOS
Existing (2014)	B	C
No-Build (2023)	C	C
Build (2023)	C	C

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

Carpenter Pond Road and Leesville Road

The following table summarizes the Level of Service (LOS) for this unsignalized intersection.

Scenario	a.m. LOS	p.m. LOS
Existing (2014)	B*	B*
No-Build (2023)	C*	C*
Build (2023)	C*	C*
Build (2023) with Improvements	B*	B*

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

The intersection will operate at acceptable levels of service for all scenarios and traffic conditions. To address capacity and safety concerns at the intersection of Andrews Chapel Road and Leesville Road, the TIA recommended the construction of a westbound left-turn lane on Leesville Road at Andrews Chapel Road. Due to the close proximity of the two intersections, the following TIA recommended improvement is required at this intersection:

- Construct an exclusive eastbound left-turn with a minimum of 100 feet of storage (plus appropriate taper) on Leesville Road at Carpenter Pond Road, with a two-way left-turn lane between the eastbound left-turn lane at Carpenter Pond Road and the westbound left-turn lane at Andrews Chapel Road.

Andrews Chapel Road and Leesville Road

The following table summarizes the Level of Service (LOS) for this unsignalized intersection.

Scenario	a.m. LOS	p.m. LOS
Existing (2014)	B*	B*
No-Build (2023)	C*	E*
Build (2023)	C*	F*
Build (2023) with improvements	B	C

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

The intersection will operate at an unacceptable LOS F in the p.m. peak-hour with the existing lane configuration and proposed site traffic for the Build (2023) condition. The following improvement is currently required of the Corners at Brier Creek development and is also required of this development:

- Construct a second northbound lane on Andrews Chapel Road to provide an exclusive left-turn lane with a minimum of 100 feet of storage plus appropriate tapers.

The TIA recommended the following additional required improvements to accommodate site traffic for the Build (2023) with improvements condition:

- Construct an exclusive westbound left-turn with a minimum of 200 feet of storage (plus appropriate taper) on Leesville Road at Andrews Chapel Road, with a two-way left-turn lane between the eastbound left-turn lane at Carpenter Pond Road and the westbound left-turn lane at Andrews Chapel Road; and
- Install a traffic signal with steel poles and mast arms (subject to MUTCD warrants and approval by NCDOT).

With the improvements listed above the intersection will operate at an acceptable LOS C or better for the Build (2023) with improvements condition.

Andrews Chapel Road and Del Webb Arbors Drive

The following table summarizes the Level of Service (LOS) for this unsignalized intersection.

Scenario	a.m. LOS	p.m. LOS
Existing (2014)	B*	A*
No-Build (2023)	D*	D*
Build (2023)	E*	D*

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

The intersection will operate at acceptable levels of service for the Existing (2014) and No-Build (2023) condition. The eastbound approach will operate at a LOS E in the a.m. peak-hour and a LOS D in the p.m. peak-hour for the Build (2023) condition. A LOS E or F is typical at many unsignalized intersections and driveways during the peak hours since nearly all of the anticipated delay is confined to the side street approach. Given the low peak-hour traffic volumes, a traffic signal is not warranted or appropriate at this intersection.

Andrews Chapel Road and Northern Site Driveway (Site Access Point #4)

The following table summarizes the Level of Service (LOS) for this unsignalized intersection.

Scenario	a.m. LOS	p.m. LOS
Build (2023)	B*	B*

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

The intersection will operate at an acceptable LOS B in both peak-hours for the Build (2023) with condition. To improve safety and mobility along Andrews Chapel Road, the following improvement is required at this intersection:

- Construct an exclusive southbound left-turn with a minimum of 100 feet of storage (plus appropriate taper) on Andrews Chapel Road at the Northern Site Driveway.

Andrews Chapel Road and Brier Creek Parkway

The following table summarizes the Level of Service (LOS) for this unsignalized intersection.

Scenario	a.m. LOS	p.m. LOS
Build (2023)	B*	B*

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

The intersection will operate at an acceptable LOS B in both peak-hours for the Build (2023) with condition. To improve safety and mobility along Andrews Chapel Road and Brier Creek Parkway, the following improvement is required at this intersection:

- Construct a single-lane roundabout.

Del Webb Arbors Drive and Western Site Driveway

The following table summarizes the Level of Service (LOS) for this unsignalized intersection.

Scenario	a.m. LOS	p.m. LOS
Build (2023)	B*	B*

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

The intersection will operate at an acceptable LOS B in both peak-hours for the Build (2023) with condition. No roadway improvements are required to address the site traffic impacts.

Summary of improvements required of this development

Carpenter Pond Road and Leesville Road

1. Construct an exclusive eastbound left-turn with adequate storage and appropriate tapers on Leesville Road at Carpenter Pond Road, with a two-way left-turn lane between the eastbound left-turn lane at Carpenter Pond Road and the westbound left-turn lane at Andrews Chapel Road.

Andrews Chapel Road and Leesville Road

1. Construct an exclusive westbound left-turn with adequate storage and appropriate tapers on Leesville Road at Andrews Chapel Road, with a two-way left-turn lane between the eastbound left-turn lane at Carpenter Pond Road and the westbound left-turn lane at Andrews Chapel Road.
2. Install a traffic signal with steel poles and mast arms (subject to MUTCD warrants and approval by NCDOT).

Andrews Chapel Road and Northern Site Driveway (Site Access Point #4)

1. Construct an exclusive southbound left-turn with adequate storage and appropriate tapers on Andrews Chapel Road at the Northern Site Driveway.

Andrews Chapel Road and Brier Creek Parkway

1. Construct a single-lane roundabout.

Brier Creek Parkway

1. Construct Brier Creek Parkway to NCDOT Standards as a five-lane section roadway from Site Access Point #9 to Internal Access Point A.
2. Construct Brier Creek Parkway to NCDOT Standards as a three-lane roadway from Internal Access Point A to Internal Access Point C.
3. Construct Brier Creek Parkway to NCDOT Standards as a two-lane roadway from Internal Access Point C to Site Access Point #3.
4. Construct exclusive left-turn lanes with adequate storage and appropriate tapers on Brier Creek Parkway at Internal Access Points A, B, and C.
5. Construct exclusive right-turn lanes with adequate storage and appropriate tapers on Brier Creek Parkway at Internal Access Points B, and C.

Summary of improvements required of other approved developments which may also be required of this development

Andrews Chapel Road and Leesville Road

1. Construct a second northbound lane on Andrews Chapel Road to provide an exclusive left-turn lane with adequate storage and appropriate tapers.