



CITY OF DURHAM | NORTH CAROLINA

**Date:** July 17, 2014

**To:** Amy Wolff, Durham City County Planning Department  
**From:** Bill Judge PE, City of Durham Department of Transportation  
**Subject:** Southwest Durham Drive Auto Dealership (Z1400030) Traffic Impact Analysis

The Unified Development Ordinance (UDO) requires a Traffic Impact Analysis (TIA) for proposed developments estimated to generate 150 or more peak-hour vehicle trips. The proposed development, Southwest Durham Drive Auto Dealership, includes 50,000 square-foot floor area for proposed auto sales. The proposed development is expected to generate 112 a.m. peak-hour trips (63 entering and 49 exiting), 134 p.m. peak-hour trips (60 entering and 74 exiting), and 149 Saturday peak-hour trips (76 entering and 73 exiting). Although the proposed development is under the UDO 150 peak-hour threshold for the requirement of a TIA, the applicant prepared and submitted a TIA for review by the City as the TIA was an NCDOT requirement. Since a TIA was not required under the UDO requirements, the proposed mitigation measures were determined by NCDOT requirements.

The proposed development is located on the north side of Southwest Durham Drive, east of Durham-Chapel Hill Boulevard (US 15-501). The TIA analyzed one proposed external access points. The proposed site access will connect to the north side of Southwest Durham Drive opposite Witherspoon Boulevard. The expected completion year is 2016, and the TIA analysis year is 2017. The TIA was prepared by John Davenport Engineering, Inc. in May 2014.

### **Study Area**

The study area includes the following intersections:

- Durham-Chapel Hill Boulevard (US 15-501) and Southwest Durham Drive;
- Durham-Chapel Hill Boulevard (US 15-501) and Witherspoon Boulevard / Site Access;
- Durham-Chapel Hill Boulevard (US 15-501) and Mt. Moriah Road;
- Durham-Chapel Hill Boulevard (US 15-501) and I-40 Westbound Ramp; and
- Durham-Chapel Hill Boulevard (US 15-501) and I-40 Eastbound Ramp.

### **Trip Generation**

Trip generation numbers are based on the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 9<sup>th</sup> Edition, 2012*. The proposed development is expected to generate 112 a.m. peak-hour trips (63 entering and 49 exiting), 134 p.m. peak-hour trips (60 entering and 74 exiting), and 149 Saturday peak-hour trips (76 entering and 73 exiting).

### **Traffic Data Collection**

The weekday 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. in March 2014. The Saturday peak-hour intersection turning movement counts were taken from 11:00 a.m. to 2:00 p.m. in May 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 Durham-Chapel Hill Boulevard (US 15-501): 35% of site trips;
- To/From the South via Durham-Chapel Hill Boulevard (US 15-501): 30% of site trips;
- To/From the West via I-40: 15% of site trips;
- To/From the East via I-40: 15% of site trips; and
- To/From the East via Southwest Durham Drive: 5% of site trips.

### **Approved Developments and Background Growth**

A uniform annual compounded growth rate of 3% was utilized to determine the background traffic projections. In addition to the growth rate, the TIA used traffic volume projections from the following approved developments:

- Patterson Place Apartments: 322 apartment units on the east side of Southwest Durham Drive north of Old Chapel Hill Road. The TIA assumed 100% of this development would be constructed by the 2017 build-out year; and
- Gateway Terrace: 36,000 square-feet of shopping center and 9,000 square-feet of fast-food restaurants on the south side of Southwest Durham Drive across from the site. The TIA assumed 100% of this development would be constructed by the 2017 build-out year.

### **TIP Roadway Improvements**

The following roadway improvement project is proposed in the area:

- The adopted US 15-501 Corridor Transportation Master Plan proposes a controlled access interchange at US 15-501 and Southwest Durham Drive. The proposed ramps for the interchange included in the adopted plan would have significant impact on the proposed development; and
- The proposed parcel would be impacted by one of the five potential Rail Operations Maintenance Facilities under consideration by Triangle Transit for the Durham-Orange Light Rail Transit Project. The preferred location of the Rail Operations and Maintenance Facility is expected to be determined at the conclusion of the EIS process in spring 2016.

To address potential conflicts with the future interchange at US 15-501 and Southwest Durham Drive, John Davenport Engineering, Inc. prepared an alternative functional design for a compressed diamond type interchange at this intersection.

### **Capacity Analysis**

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

- Existing (2014) conditions;
- No-Build (2017) conditions (2014 Existing + Background growth traffic);

- Build (2017) conditions (2014 Existing + Background growth traffic + Site traffic); and
- Build (2017) with Improvements conditions (2017 Build + Improvements).

This development and project study area 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:

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

Durham-Chapel Hill Boulevard (US 15-501) and Southwest Durham Drive

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

<b>Scenario</b>	<b>a.m. LOS</b>	<b>p.m. LOS</b>	<b>Saturday LOS</b>
Existing (2014)	<b>C</b>	<b>C</b>	<b>B</b>
No-Build (2017)	<b>C</b>	<b>C</b>	<b>D</b>
Build (2017)	<b>C</b>	<b>C</b>	<b>D</b>

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

Southwest Durham Drive and Witherspoon Boulevard / Site Access

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

<b>Scenario</b>	<b>a.m. LOS</b>	<b>p.m. LOS</b>	<b>Saturday LOS</b>
Existing (2014)	<b>B*</b>	<b>C*</b>	<b>B*</b>
No-Build (2017)	<b>C*</b>	<b>F*</b>	<b>F*</b>
Build (2017)	<b>F*</b>	<b>F*</b>	<b>F*</b>
Build (2017) with Improvements	<b>C</b>	<b>C</b>	<b>D</b>

\* Unsignalized operation, with LOS reported for the worst approach

The intersection currently operates at a LOS C or better during the a.m. peak hour, p.m. peak hour, and Saturday peak hour. With the additional site traffic, the delays will increase and the intersection will operate at a LOS F for all three peak hours. To address site impacts and LOS concerns, the TIA recommended the following required improvements:

- Construct an eastbound left-turn lane with a minimum of 150 feet of storage plus appropriate tapers on Southwest Durham Drive at the proposed Site Access;
- Revise the existing exclusive northbound right-turn lane on Witherspoon Boulevard to a shared through/right-turn lane;
- Construct the proposed Site Access with one ingress lane and two egress lanes (an exclusive southbound left-turn lane and a southbound shared through/right-turn lane); and
- Install a traffic signal with steel poles and mast arms (subject to MUTCD warrants and approval by NCDOT).

Durham-Chapel Hill Boulevard (US 15-501) and Mt. Moriah Road

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

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

The intersection currently operates at a LOS D during the a.m. and Saturday peak hours and a LOS E during the p.m. peak hour. With the additional site traffic, the delays will increase slightly, but the intersection will remain at a LOS E or better for all peak hours. 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 do 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.

Durham-Chapel Hill Boulevard (US 15-501) and I-40 Westbound Ramp

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

Scenario	Saturday LOS
Existing (2014)	D
No-Build (2017)	D
Build (2017)	D

The intersection currently operates at a LOS D during the Saturday peak hour. With the additional site traffic, the delays will increase slightly, but the intersection will remain at an acceptable LOS D for the Saturday peak hour. Since the site impact is less than 10% on all intersection approaches, the City’s published TIA guidelines do not require this intersection to be included in the study. However, NCDOT required the Saturday peak hour for this intersection to be included in the TIA. No roadway improvements are required to address the site traffic impacts.

Durham-Chapel Hill Boulevard (US 15-501) and I-40 Eastbound Ramp

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

Scenario	Saturday LOS
Existing (2014)	D
No-Build (2017)	D
Build (2017)	D

The intersection currently operates at a LOS D during the Saturday peak hour. With the additional site traffic, the delays will increase slightly, but the intersection will remain at an acceptable LOS D for the Saturday peak hour. Since the site impact is less than 10% on all intersection approaches, the City’s published TIA guidelines do not require this intersection to be included in the study. However, NCDOT required the Saturday peak hour for this intersection to be included in the TIA. No roadway improvements are required to address the site traffic impacts.

**Summary of Required Improvements:**

Southwest Durham Drive and Witherspoon Boulevard / Site Access

1. Construct an eastbound left-turn lane with adequate storage and appropriate tapers on Southwest Durham Drive at the proposed Site Access.
2. Revise the existing exclusive northbound right-turn lane on Witherspoon Boulevard to a shared through/right-turn lane.
3. Construct the proposed Site Access with one ingress lane and two egress lanes (an exclusive southbound left-turn lane and a southbound shared through/right-turn lane).
4. Install a traffic signal with steel poles and mast arms (subject to MUTCD warrants and NCDOT approval).