



CITY OF DURHAM | NORTH CAROLINA

**Date:** August 28, 2015

**To:** Amy Wolff, Durham City County Planning Department  
**From:** Bill Judge PE, City of Durham Department of Transportation  
**Subject:** Triangle Business Park Lot 3 (Z1500022) 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 Triangle Business Park Lot 3 development includes 86,000 square-feet of retail and a 6,000 square-foot of high-turnover (sit-down) restaurant. The development is expected to generate 6,920 daily trips with 207 a.m. peak-hour trips (124 entering and 83 exiting) and 601 p.m. peak-hour trips (295 entering and 306 exiting). The proposed development is located on the south side of T.W. Alexander Drive, west of Stirrup Creek Drive. The applicant proposes one full access driveway to T.W. Alexander Drive and one full access driveway to Stirrup Creek Drive. The expected completion year is 2020, and the TIA analysis year is 2021. The Triangle Business Park Lot 3 development TIA was prepared by VHB Engineering NC, P.C. in June 2015.

#### **Study Area**

The study area includes the following intersections:

- S. Miami Boulevard and T.W. Alexander Drive;
- S. Miami Boulevard and Stirrup Creek Drive;
- T.W. Alexander Drive and Stirrup Creek Drive;
- Stirrup Creek Drive and Site Access #1 / Proposed Lot 4 Site Driveway; and
- T.W. Alexander Drive and Site Access #2 / Existing Lincoln Park West Site Driveway.

#### **Trip Generation**

Trip generation numbers are based on the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 9<sup>th</sup> Edition*, 2012. By utilizing Land Use Codes 820 (shopping center) and 932 (high-turnover sit-down restaurant), the site is expected to generate 207 a.m. peak-hour trips and 601 p.m. peak-hour trips. The p.m. peak-hour trips were adjusted utilizing published ITE rates to account for pass-by trips. The final adjusted external trips for the proposed site resulted in 391 trips (190 entering and 201 exiting) occurring during the p.m. peak hour.

#### **Traffic Data Collection**

The peak-hour intersection turning movement counts were taken from 7-9 a.m. and 4-6 p.m. in April 2015.

### **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 East via T.W. Alexander Drive: 35% of site trips;
- To/From the West via T.W. Alexander Drive: 20% of site trips;
- To/From the North via S. Miami Boulevard: 2% of site trips;
- To/From the North via Presidential Drive: 2% of site trips;
- To/From the West via Stirrup Creek Drive: 1% of site trips; and
- To/From the South via S. Miami Boulevard: 40% 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:

- 1002 Twin Creeks Court: This development has recently submitted a site plan to construct 105,500 square-feet of warehousing and 10,000 square-feet of office on the south side of Twin Creeks Court.
- Triangle Business Park Lot 4: This development has recently submitted a development plan (Z1500021) to construct 150,000 square-feet of warehousing and 75,000 square-feet of office on the east side of Stirrup Creek Drive, south of T.W. Alexander Drive.

### **TIP Roadway Improvements**

There are no significant scheduled transportation improvement projects in the study area vicinity.

### **Capacity Analysis**

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

- Existing (2015) conditions;
- No-Build (2021) conditions (2015 existing + background growth);
- Build (2021) conditions (2015 existing + background growth + site traffic); and
- Build (2021) with improvements conditions (2015 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

S. Miami Boulevard and T.W. Alexander Drive

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

Scenario	a.m. LOS	p.m. LOS
Existing (2015)	D	E
No-Build (2021)	E	F
Build (2021)	E	F
Build (2021) with Improvements	E	E

The intersection currently operates at a LOS D during the a.m. peak-hour and a LOS E 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 p.m. peak-hour for the Build (2021) condition. The TIA recommended the following improvements to accommodate site traffic for the Build (2021) with improvements condition:

- Restripe the eastbound exclusive right-turn lane to a shared through/right-turn lane; and
- Widen the east leg of the intersection to provide a third eastbound departure lane from T.W. Alexander Drive to Stirrup Creek Drive. The third eastbound lane will terminate as an exclusive eastbound right-turn lane at the Stirrup Creek Drive intersection.

With the recommended improvement the intersection will operate at a LOS E for both the a.m. and p.m. peak-hour for the Build (2021) with improvements condition. 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.

S. Miami Boulevard and Stirrup Creek 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>
Existing (2015)	<b>B</b>	<b>B</b>
No-Build (2021)	<b>B</b>	<b>C</b>
Build (2021)	<b>B</b>	<b>C</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 C or better for both peak hours. No roadway improvements are required to address the site traffic impacts.

T.W Alexander Drive and Stirrup Creek Drive

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>
Existing (2015)	<b>F*</b>	<b>F*</b>
No-Build (2021)	<b>F*</b>	<b>F*</b>
Build (2021)	<b>F*</b>	<b>F*</b>
Build (2021) with Improvements	<b>C</b>	<b>D</b>

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

The unsignalized intersection currently operates at a LOS F during both the a.m. and p.m. peak-hour. With the additional background and site traffic, the delays will increase slightly, and the unsignalized intersection will continue to operate at a LOS F for both peak hours for the Build (2021) conditions. The TIA recommended the following improvement (which is also a requirement of the Triangle Business Park Lot 4 development) to accommodate site traffic for the Build (2021) with improvements condition:

- Install a traffic signal with steel poles and mast arms (subject to MUTCD warrants and approval by NCDOT).

With the recommended improvement the intersection will operate at an acceptable LOS D or better for both peak hours for the Build (2021) with improvements condition.

Stirrup Creek Drive and Site Access #1 / Proposed Lot 4 Site Driveway

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

Scenario	a.m. LOS	p.m. LOS
Existing (2015)	A*	A*
No-Build (2021)	A*	A*
Build (2021)	B*	B*
Build (2021) with Improvements	B*	B*

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

The unsignalized intersection currently operates at a LOS A during both the a.m. and p.m. peak-hour. With the additional background and site traffic, the delays will increase slightly, and the unsignalized intersection will operate at a LOS B for both peak hours for the Build (2021) conditions. The TIA recommended the following improvement to accommodate site traffic for the Build (2021) with improvements condition:

- Construct Site Access #1 with one westbound lane and one eastbound lane.

With the recommended improvement the intersection will operate at an acceptable LOS B for both the a.m. and p.m. peak-hour for the Build (2021) with improvements condition.

T.W. Alexander Drive and Site Access #2 / Existing Lincoln Park West Site Driveway

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

Scenario	a.m. LOS	p.m. LOS
Existing (2015)	D*	C*
No-Build (2021)	F*	E*
Build (2021)	F*	F*
Build (2021) with Improvements	C*	F*

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

The unsignalized intersection currently operates at a LOS D during the a.m. peak-hour and a LOS C during the p.m. peak-hour. With the additional background and site traffic, the delays will increase slightly, and the unsignalized intersection will operate at a LOS F or better for both peak hours for the Build (2021) conditions. The TIA recommended the following improvement to accommodate site traffic for the Build (2021) with improvements condition:

- Construct Site Access #2 with two northbound lanes (an exclusive left-turn lane and a shared through/right-turn lane) and one southbound lane.

With the recommended improvement the intersection will operate at a LOS C in the a.m. peak-hour and a LOS F in the p.m. peak-hour for the Build (2021) with improvements condition. Although a LOS F is undesirable at signalized intersections, LOS F is typical at many unsignalized intersections and driveways during the peak hours until such time a traffic signal is warranted since nearly all of the anticipated delay is confined to the side street approach. Given the intersection spacing from S. Miami Boulevard and Stirrup Creek Drive, a traffic signal is not warranted or appropriate at this intersection. No other roadway improvements are required to address site traffic impacts.

**Summary of required improvements:**

S. Miami Boulevard and T.W. Alexander Drive

1. Restripe the eastbound exclusive right-turn lane to a shared through/right-turn lane.
2. Widen the east leg of the intersection to provide a third eastbound departure lane from T.W. Alexander Drive to Stirrup Creek Drive. The third eastbound lane will terminate as an exclusive eastbound right-turn lane at the Stirrup Creek Drive intersection.

T.W. Alexander Drive and Stirrup Creek Drive

1. Install a traffic signal with steel poles and mast arms (subject to MUTCD warrants and approval by NCDOT).

Stirrup Creek Drive and Site Access #1 / Proposed Lot 4 Site Driveway

1. Construct Site Access #1 with one westbound lane and one eastbound lane.

T.W. Alexander Drive and Site Access #2 / Existing Lincoln Park West Site Driveway

1. Construct Site Access #2 with two northbound lanes (an exclusive left-turn lane and a shared through/right-turn lane) and one southbound lane.