

**CITY OF DURHAM | NORTH CAROLINA**

**Date:**           **October 16, 2013**

**To:**               **Amy Wolff, Durham City County Planning Department**  
**From:**           **Bill Judge P.E., City of Durham Department of Transportation**  
**Subject:**       **The Corners at Brier Creek (Z1200019) 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 proposed Corners at Brier Creek development includes: 495 apartments, 165 townhomes, 326,000 square-feet of retail, a 60,000 square-foot supermarket, a 15,000 square-foot pharmacy with drive-thru, 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 with drive-thrus. The development is expected to generate 32,052 daily trips with 1,412 a.m. peak-hour trips (675 entering and 737 exiting) and 3,130 p.m. peak-hour trips (1,638 entering and 1,492 exiting).

The proposed development is located in both Durham and Wake Counties on the east side of US 70 and north side of T.W. Alexander Drive. The applicant's expected completion year is 2016, and the TIA analysis year is 2017. The Corners at Brier Creek TIA was prepared by Kimley-Horn and Associates, Inc. in September 2012 with TIA Addendums in December 2012, May 2013, and September 2013. The TIA and Addendums were also reviewed by NCDOT and the City of Raleigh. The NCDOT review summary and recommendations are attached.

### **Study Area**

The study area includes the following intersections:

- US 70 and Page Road Extension;
- US 70 and T.W. Alexander Drive;
- US 70 and Brier Creek Parkway;
- Leesville Road and Andrews Chapel Road;
- Leesville Road and Carpenter Pond Road;
- T.W. Alexander Drive and ACC Boulevard;
- Andrews Chapel Road and Del Webb Arbors Drive;
- T.W. Alexander Drive and Loop Road / Alexander Place Driveway;
- Loop Road and Tract 2 East (right-in/right-out) Driveway;
- Loop Road and Tract 1 Driveway;
- Loop Road and Tract 2 West (right-in/right-out) Driveway / Tract 1 (right-in/right-out) Driveway;
- Loop Road and Connector Road;
- Loop Road and "70 Vest" (right-in/right-out) Driveways;
- US 70 and Loop Road;
- ACC Boulevard Extension and Connector Road / Tract 3 Driveway;

- Andrews Chapel Road / Tract 3 Driveway and Cozart Road; and
- T.W. Alexander Drive and Tract 1 (right-in/right-out) Driveway.

**Traffic Data Collection**

The A.M. and P.M. peak hour intersection turning movement counts were taken between the hours of 7:00 am to 9:00 am and 4:00 pm to 6:00 pm during October 2011, January 2012, and March 2012.

**Trip Generation**

Trip generation numbers are based on the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 8<sup>th</sup> Edition, 2008*. The TIA used the following ITE trip generation uses for the proposed development:

USE	SIZE	ITE CODE
Apartments	495 units	220
Townhouse/Condominium	220 units	230
General Retail	326,000 square-feet	820
Supermarket	60,000 square-feet	850
Pharmacy with Drive-Thru	15,000 square-feet	881
Drive-In Bank	4 lanes	912
High-Turnover Sit-Down Restaurant(s)	16,000 square-feet	932
Fast-Food Restaurants with Drive-Thru	8,000 square-feet	934

These proposed uses would generate 32,052 daily trips of which 1,412 trips would occur during the a.m. peak-hour and 3,130 trips would occur during the p.m. peak-hour. Due to the mixed use nature of the project, some of the trips will be captured internally. Based on ITE guidelines related to internal capture for mixed use developments, the site trips were reduced accordingly. In addition, the a.m. and p.m. peak hour trips for the retail uses were adjusted utilizing published ITE rates to account for pass-by trips. The final adjusted external trips for the proposed site resulted in 15,275 daily trips, with 1,219 occurring during the a.m. peak hour and 1,590 occurring during the p.m. peak hour.

**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 northwest via US 70: 20% of site trips;
- To/From the southeast via US 70: 20% of site trips;
- To/From the west via T.W. Alexander Drive: 20% of site trips;
- To/From the east via Leesville Road: 8% of site trips;
- To/From the east via ACC Boulevard: 7% of site trips;
- To/From the west via Leesville Road: 5% of site trips;
- To/From the north via Carpenter Pond Road: 5% of site trips;
- To/From the south via Page Road Extension: 5% of site trips;
- To/From the south via Brier Creek Parkway: 5% of site trips; and
- To/From the north via Del Webb Arbors Drive: 5% 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 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 the 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; and
- Alexander Place Phases 13, 16, and 17: Proposed development located within the City of Raleigh jurisdiction near ACC Boulevard and T.W. Alexander Drive.

### **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;
- 2) NCDOT TIP U-4721 will construct the Northern Durham Parkway from US 70 to US 501 (N. Roxboro Street). This project is currently unfunded; and
- 3) The adopted Capital Area Metropolitan Planning Organization (CAMPO) US 70 Corridor Study (March 1992) proposes a controlled access cloverleaf off-ramp from northbound US 70 to T.W. Alexander Drive.

To address potential conflicts with the future interchange at T.W. Alexander Drive and US 70, Kimley-Horn and Associates, Inc. prepared a functional design in July 2013 for a square-loop type interchange at this intersection. The functional design was reviewed by NCDOT and determined to be an acceptable alternative for the previously planned controlled access cloverleaf off-ramp.

### **Capacity Analysis**

Capacity analyses were performed using Synchro 7.0 for the AM and PM peak hours for the following scenarios:

- Existing (2012) conditions;
- No-Build (2017) conditions (2012 Existing + Background Growth + Approved Development Traffic);
- Build (2017) conditions (2012 No-Build + Site Traffic); and
- Build (2017) with Improvements conditions (2012 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

US 70 and Page Road Extension

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

Scenario	AM LOS	PM LOS
Existing (2012)	A	C
No-Build (2017)	B	C
Build (2017)	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.

US 70 and T.W. Alexander Drive

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

Scenario	AM LOS	PM LOS
Existing (2012)	D	D
No-Build (2017)	D	E
Build (2017) with improvements	D	D

At this intersection, the TIA considered US 70 as an east-west roadway and T.W. Alexander Drive a north-south roadway. The TIA recommended the following improvements to accommodate site traffic for the Build (2017) with improvements condition:

- Construct a second southbound left-turn lane on T.W. Alexander Drive to provide dual left-turns with a minimum of 325 feet of storage in each lane plus appropriate tapers;
- Revise the northbound approach of T.W. Alexander Drive to provide a single exclusive left-turn lane, two exclusive through lanes, and a free-flow right-turn lane;
- Revise the northbound departure lanes on T.W. Alexander Drive to provide two exclusive northbound through lanes to receive the northbound through lanes;
- Construct an additional eastbound departure lane on US 70 to provide an additional through lane for a minimum of 1,200 feet plus appropriate tapers to receive the free-flow northbound right-turn lane; and

- Upgrade the traffic signal to accommodate the additional lanes and adjust the signal timing accordingly.

With the recommended improvements the intersection will operate at an acceptable LOS D in both the a.m. and p.m. peak-hour for the Build (2017) with improvements condition.

US 70 and Brier Creek Parkway (City of Raleigh)

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

Scenario	AM LOS	PM LOS
Existing (2012)	D	F
No-Build (2017)	D	F
Build (2017)	D	F

With the existing lane configuration and signal phasing, the intersection will operate at a LOS D 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, this intersection is located within the City of Raleigh’s jurisdiction, therefore the required improvements for this intersection were determined by the City of Raleigh and NCDOT.

Leesville Road and Andrews Chapel Road

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

Scenario	AM LOS	PM LOS
Existing (2012)	B*	B*
No-Build (2017)	B*	C*
Build (2017)	C*	E*
Build (2017) with improvements	C*	C*

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

The intersection will operate at an unacceptable LOS E in the p.m. peak-hour with the existing lane configuration and proposed site traffic for the Build (2017) condition. The TIA recommended the following improvement to accommodate site traffic for the Build (2017) with improvements condition:

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

With the improvement listed above the intersection will operate at an acceptable LOS C in both the a.m. and p.m. peak-hour for the Build (2017) with improvements condition.

Leesville Road and Carpenter Pond Road

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

Scenario	AM LOS	PM LOS
Existing (2012)	B*	A*
No-Build (2017)	B*	B*
Build (2017)	B*	B*

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

T.W. Alexander Drive and ACC Boulevard (City of Raleigh)

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

Scenario	AM LOS	PM LOS
Existing (2012)	A*	A*
No-Build (2017)	A	A
Build (2017)	B	A

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

The TIA recommended the following improvement to accommodate site traffic for the Build (2017) with improvements condition:

- Install a traffic signal (subject to MUTCD warrants and approval by City of Raleigh and NCDOT).

With the recommended improvement the intersection will operate at an acceptable LOS B or better for both the a.m. and p.m. peak-hour for the Build (2017) with improvements condition. Although this meets the City of Durham’s requirement of a LOS D or better, this intersection is located within the City of Raleigh’s jurisdiction, therefore the required improvements for this intersection were determined by the City of Raleigh and NCDOT.

Andrews Chapel Road and Del Webb Arbors Drive

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

Scenario	AM LOS	PM LOS
No-Build (2017)	B*	B*
Build (2017)	C*	C*

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

Proposed Loop Road

To accommodate site traffic for the Build (2017) with improvements condition, the TIA recommended a Loop Road be constructed in the northwest quadrant of the US 70 and T.W. Alexander Drive intersection. This Loop Road will be designed as a future four-lane divided roadway between US 70 and T.W. Alexander Drive. To accommodate site traffic, the TIA recommended the Loop Road be constructed with two through lanes from US 70 to T.W. Alexander Drive, a raised median per NCDOT standards, and one through lane from T.W. Alexander Drive to US 70. Additionally, bicycle lanes and sidewalks will be required along both sides of the roadway.

T.W. Alexander Drive and Loop Road / Alexander Place Driveway (City of Raleigh)

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

Scenario	AM LOS	PM LOS
No-Build (2017)	B*	C*
Build (2017) with improvements	C	C

At this intersection, the TIA considered T.W. Alexander Drive as a north-south roadway and the Loop Road as an east-west roadway. The TIA recommended the following improvements to accommodate site traffic for the Build (2017) with improvements condition:

- Construct an exclusive southbound right-turn lane on T.W. Alexander Drive with a minimum of 50 feet of storage plus appropriate tapers;
- Construct three eastbound lanes on the Loop Road to provide an exclusive left-turn lane with 100 feet of storage, a shared left-turn/through lane, and an exclusive right-turn lane; and
- Install a traffic signal (subject to MUTCD warrants and approval by NCDOT).

With the improvements listed above, the intersection will operate at an acceptable LOS C in both the a.m. and p.m. peak-hour for the Build (2017) with improvements condition.

Loop Road and Tract 2 East (right-in/right-out) Driveway

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

Scenario	AM LOS	PM LOS
Build (2017) with improvements	A*	B*

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

At this intersection, the TIA considered the Loop Road as an east-west roadway. The TIA recommended the following improvements to accommodate site traffic for the Build (2017) with improvements condition:

- Construct an exclusive westbound right-turn lane on the Loop Road with a minimum of 50 feet of storage and appropriate taper; and
- Construct the Tract 2 (right-in/right-out) Driveway with one southbound lane (an exclusive right-turn lane) and one northbound lane.

With the improvements listed above, the intersection will operate at an acceptable LOS B or better in both peak-hours for the Build (2017) with improvements condition.

Loop Road and Tract 1 Driveway

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

Scenario	AM LOS	PM LOS
Build (2017) with Improvements	A	B

At this intersection, the TIA considered the Loop Road as an east-west roadway. The TIA recommended the following improvements to accommodate site traffic for the Build (2017) with improvements condition:

- Construct an exclusive westbound left-turn lane on the Loop Road with a minimum of 175 feet of storage and appropriate tapers;

- Construct an exclusive eastbound right-turn lane on the Loop Road with a minimum of 100 feet of storage and appropriate taper;
- Construct the Tract 1 Driveway with one southbound lane and two northbound lanes (an exclusive northbound left-turn lane and an exclusive northbound right-turn lane); 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 B or better in both peak-hours for the Build (2017) with improvements condition.

Loop Road and Tract 2 West (right-in/right-out) Driveway / Tract 1 (right-in/right-out) Driveway

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

Scenario	AM LOS	PM LOS
Build (2017) with improvements	A*	B*

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

At this intersection, the TIA considered the Loop Road as an east-west roadway. The TIA recommended the following improvements to accommodate site traffic for the Build (2017) with improvements condition:

- Construct an exclusive westbound right-turn lane on the Loop Road with a minimum of 50 feet of storage and appropriate taper;
- Construct the Tract 1 (right-in/right-out) Driveway with one northbound lane (an exclusive right-turn lane) and one southbound lane; and
- Construct the Tract 2 West (right-in/right-out) Driveway with one southbound lane (an exclusive right-turn lane) and one northbound lane.

With the improvements listed above, the intersection will operate at an acceptable LOS B or better in both peak-hours for the Build (2017) with improvements condition.

Proposed Connector Road

To accommodate site traffic for the Build (2017) with improvements condition, the TIA recommended a north-south Connector Road be constructed within the site to connect the proposed Loop Road and ACC Boulevard Extension. The TIA recommended the Connector Road be constructed to City of Durham standards with one northbound through lane and one southbound through lane. Additionally, bicycle lanes and sidewalks will be required along both sides of the roadway.

Loop Road and Connector Road

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

Scenario	AM LOS	PM LOS
Build (2017) with improvements	B	C

At this intersection, the TIA considered the Connector Road as a north-south roadway and the Loop Road as an east-west roadway. The TIA recommended the following improvements to accommodate site traffic for the Build (2017) with improvements condition:

- Construct three southbound lanes on the Connector Road to provide dual left-turn lanes each with a minimum of 150 feet of storage and an exclusive right-turn lane with a minimum of 100 feet of storage;

- Construct an exclusive westbound right-turn lane on the Loop Road with a minimum of 100 feet of storage and appropriate taper; and
- Construct exclusive dual eastbound left-turn lanes on the Loop Road each with a minimum of 200 feet of storage and appropriate tapers;
- Construct an additional northbound departure lane on the Collector Road to provide an adequate storage and appropriate tapers to receive the dual eastbound left-turn lanes; 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 in both peak-hours for the Build (2017) with improvements condition.

Loop Road and “70 Vest” (right-in/right-out) Driveways

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

Scenario	AM LOS	PM LOS
Build (2017) with improvements	A*	B*

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

At this intersection, the TIA considered the Loop Road as an east-west roadway. The following improvements are required to accommodate site traffic for the Build (2017) with improvements condition:

- Construct an exclusive westbound right-turn lane on the Loop Road with a minimum of 50 feet of storage and appropriate taper;
- Construct the northern leg of the “70 Vest” (right-in/right-out) Driveway with one southbound lane (an exclusive right-turn lane) and one northbound lane; and
- Construct the southern leg of the “70 Vest” (right-in/right-out) Driveway with one northbound lane (an exclusive right-turn lane) and one southbound lane.

With the improvements listed above, the intersection will operate at an acceptable LOS B or better in both peak-hours for the Build (2017) with improvements condition.

US 70 and Loop Road

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

Scenario	AM LOS	PM LOS
Build (2017) with improvements	B*	B*

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

At this intersection, the TIA considered US 70 as a north-south roadway and the Loop Road as an east-west roadway. The TIA recommended the following improvements to accommodate site traffic for the Build (2017) with improvements condition:

- Construct an exclusive southbound left-turn lane on US 70 with a minimum of 200 feet of storage plus appropriate tapers;
- Construct an exclusive northbound right-turn lane on US 70 with a minimum of 100 feet of storage plus appropriate tapers; and
- Modify the existing median on US 70 to permit southbound left-turns from US 70 onto the Loop Road while prohibiting left-turns from the Loop Road onto US 70.

With the improvements listed above, the intersection will operate at an acceptable LOS B in both the a.m and p.m. peak hour for the Build (2017) with improvements condition.

Proposed ACC Boulevard Extension

Per the adopted Wake-Durham Comprehensive Street System Plan and Durham-Chapel Hill-Carrboro Urban Area Thoroughfare Plan, an east-west street will be constructed within the site to accommodate a future westward extension of ACC Boulevard. The roadway (ACC Boulevard Extension) will be constructed to City of Durham standards with one through lane in each direction and auxiliary left-turn lane lanes at all proposed intersection or driveway connections. Additionally, bicycle lanes and sidewalks will be required along both sides of the roadway.

ACC Boulevard Extension and Connector Road / Tract 3 Driveway

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

Scenario	AM LOS	PM LOS
Build (2017) with improvements	A*	B*

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

At this intersection, the TIA considered the Connector Road as a north-south roadway and ACC Boulevard Extension as an east-west roadway. The TIA recommended the following improvements to accommodate site traffic for the Build (2017) with improvements condition:

- Construct an exclusive westbound left-turn lane on ACC Boulevard Extension with a minimum of 100 feet of storage plus appropriate tapers;
- Construct an exclusive eastbound left-turn lane on ACC Boulevard Extension with a minimum of 100 feet of storage plus appropriate tapers;
- Construct an exclusive northbound left-turn lane on the Connector Road with a minimum of 100 feet of storage plus appropriate tapers; and
- Construct the proposed Tract 3 Driveway to provide two southbound lanes (a through/right-turn lane and an exclusive left-turn lane with 50 feet of storage) and one northbound lane.

With the improvements listed above, the intersection will operate at an acceptable LOS B or better for the Build (2017) with improvements condition. No additional improvements are proposed or required.

Andrews Chapel Road / Tract 3 Driveway and Cozart Road

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

Scenario	AM LOS	PM LOS
Build (2017) with improvements [volume/capacity ratio]	A [WB - 0.093]	A [WB - 0.204]

The TIA recommended the following improvements to accommodate site traffic for the Build (2017) with improvements condition:

- Construct a single-lane roundabout; and
- Construct the western leg of the proposed Tract 3 Driveway to provide one eastbound lane and one westbound lane.

With the improvements listed above, the intersection will operate at an acceptable LOS A in both the AM and PM peak hour for the Build (2017) with improvements condition.

T.W. Alexander Drive and Tract 1 (right-in/right-out) Driveway

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

Scenario	AM LOS	PM LOS
Build (2017) with improvements	B*	B*

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

At this intersection, the TIA considered T.W. Alexander Drive as a north-south roadway. The TIA recommended the following improvement to accommodate site traffic for the Build (2017) with improvements condition:

- Construct the Tract 1 (right-in/right-out) Driveway with one eastbound lane (an exclusive right-turn lane) and one westbound lane.

With the improvement listed above, the intersection will operate at an acceptable LOS B or better in both peak-hours for the Build (2017) with improvements condition.

**Summary of improvements required of this development**

US 70 and T.W. Alexander Drive

1. Construct a second southbound left-turn lane on T.W. Alexander Drive to provide dual left-turn lanes with adequate storage and appropriate tapers.
2. Revise the northbound approach of T.W. Alexander Drive to provide a single exclusive left-turn lane, two through lanes, and a free-flow right-turn lane.
3. Revise the northbound departure lanes on T.W. Alexander to provide two exclusive northbound through lanes.
4. Construct an additional eastbound departure lane on US 70 to provide an additional through lane per NCDOT standards to receive the free-flow northbound right-turn lane.
5. Upgrade the traffic signal to accommodate the additional lanes and adjust the signal timing accordingly.

Leesville Road and Andrews Chapel Road

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

Loop Road

1. Construct the Loop Road to NCDOT standards with two through lanes from US 70 to T.W. Alexander Drive, a raised median, one through lane from T.W. Alexander Drive to US 70, bicycle lanes, and sidewalks along both sides of the roadway.

T.W. Alexander Drive and Loop Road / Alexander Place Driveway

1. Construct an exclusive southbound right-turn lane on T.W. Alexander Drive with adequate storage and appropriate taper.
2. Construct the Loop Road to provide one westbound through lane and three eastbound lanes (an exclusive left-turn lane, a shared left-turn/through lane, and an exclusive right-turn lane).
3. Install a traffic signal (subject to MUTCD warrants and approval by NCDOT).

#### Loop Road and Tract 2 East (right-in/right-out) Driveway

1. Construct an exclusive westbound right-turn lane on the Loop Road with adequate storage and appropriate taper.
2. Construct the Tract 2 (right-in/right-out) Driveway with one southbound lane (an exclusive right-turn lane) and one northbound lane.

#### Loop Road and Tract 1 Driveway

1. Construct an exclusive westbound left-turn lane on the Loop Road with adequate storage and appropriate tapers.
2. Construct an exclusive eastbound right-turn lane on the Loop Road with adequate storage and appropriate taper.
3. Construct the Tract 1 Driveway with two northbound lanes (an exclusive left-turn lane and an exclusive right-turn lane) and one southbound lane.
4. Install a traffic signal with steel poles and mast arms (subject to MUTCD warrants and approval by NCDOT).

#### Loop Road and Tract 2 West (right-in/right-out) Driveway / Tract 1 (right-in/right-out) Driveway

1. Construct an exclusive westbound right-turn lane on the Loop Road with adequate storage and appropriate taper.
2. Construct the Tract 1 (right-in/right-out) Driveway with one northbound lane (an exclusive right-turn lane) and one southbound lane.
3. Construct the Tract 2 West (right-in/right-out) Driveway with one southbound lane (an exclusive right-turn lane) and one northbound lane.

#### Connector Road

1. Construct the Connector Road to City of Durham standards from the Loop Road to ACC Boulevard Extension with one northbound through lane, one southbound through lane, bicycle lanes, and sidewalks along both sides of the roadway.

#### Loop Road and Connector Road

1. Construct three southbound lanes on the Connector Road to provide dual left-turn lanes with adequate storage and appropriate tapers and an exclusive right-turn lane with adequate storage and taper.
2. Construct an exclusive westbound right-turn lane on the Loop Road with adequate storage and appropriate taper.
3. Construct exclusive dual eastbound left-turn lanes on the Loop Road each with adequate storage and appropriate tapers.
4. Construct an additional northbound departure lane on the Collector Road to provide an adequate storage and appropriate tapers to receive the dual eastbound left-turn lanes.
5. Install a traffic signal with steel poles and mast arms (subject to MUTCD warrants and approval by NCDOT).

#### Loop Road and "70 Vest" (right-in/right-out) Driveways

1. Construct an exclusive westbound right-turn lane on the Loop Road with adequate storage and appropriate taper.

2. Construct the northern leg of the "70 Vest" (right-in/right-out) Driveway with one southbound lane (an exclusive right-turn lane) and one northbound lane.
3. Construct the southern leg of the "70 Vest" (right-in/right-out) Driveway with one northbound lane (an exclusive right-turn lane) and one southbound lane.

#### US 70 and Loop Road

1. Construct an exclusive southbound left-turn lane on US 70 with adequate storage and appropriate tapers.
2. Construct an exclusive northbound right-turn lane on US 70 with adequate storage and appropriate tapers.
3. Modify the existing median on US 70 to permit southbound left-turns from US 70 onto the Loop Road while prohibiting left-turns from the Loop Road onto US 70.

#### ACC Boulevard Extension

1. Construct ACC Boulevard Extension to City of Durham standards with one through lane in each direction, bicycle lanes, and sidewalks along both sides of the roadway.

#### ACC Boulevard Extension and Connector Road / Tract 3 Driveway

1. Construct an exclusive eastbound left-turn lane on ACC Boulevard Extension with adequate storage and appropriate tapers.
2. Construct an exclusive westbound left-turn lane on ACC Boulevard Extension with adequate storage and appropriate tapers.
3. Construct an exclusive northbound left-turn lane on the Connector Road with adequate storage and appropriate tapers.
4. Construct the proposed Tract 3 Driveway to provide two southbound lanes (a through lane and an exclusive left-turn lane) and one northbound lane.

#### Andrews Chapel Road / Tract 3 Driveway and Cozart Road

1. Construct a single-lane roundabout.
2. Construct the Tract 3 Driveway to provide one eastbound lane and one westbound lane.

#### T.W. Alexander Drive and Tract 1 (right-in/right-out) Driveway

1. Construct the Tract 1 (right-in/right-out) Driveway with one eastbound lane (an exclusive right-turn lane) and one westbound lane.

#### **Summary of improvements required by others which may also be required of this development:**

##### T.W. Alexander Drive and ACC Boulevard (City of Raleigh)

1. Install a traffic signal when warranted (subject to MUTCD warrants and approval by City of Raleigh and NCDOT).