

# Baseline Alternative Definition

Durham-Orange Light Rail Transit Project

**Triangle Regional** Transit Program  
*our transit future*



**September 2012**

## TABLE OF CONTENTS

LIST OF TABLES .....	i
LIST OF FIGURES.....	i
<b>1. Introduction .....</b>	<b>1-1</b>
<b>2. No-Build Alternative.....</b>	<b>2-1</b>
<b>3. Baseline Alternative .....</b>	<b>3-1</b>
3.1. PREMIUM BUS SERVICE ALIGNMENT .....	3-1
3.2. PREMIUM BUS SERVICE STOP LOCATIONS .....	3-2
3.3. PREMIUM BUS SERVICE PLAN .....	3-3
3.4. SUPPORTING BUS SERVICE.....	3-4
3.4.1. Elimination of Competing Bus Service .....	3-5
3.4.2. Modifications to the Background Bus Network .....	3-5
3.4.3. Introduction of New Feeder Routes.....	3-6
3.5. STATION BUS CONNECTIONS.....	3-8

### LIST OF TABLES

Table 3.1: Baseline Alternative Proposed Service Frequencies .....	3-4
Table 3.2: Supporting Bus Network Connections at Stations .....	3-9

### LIST OF FIGURES

Figure 1.1: Durham-Orange Adopted Preliminary Locally Preferred Alternative.....	1-2
Figure 3.1: Baseline Alignment and Stop Locations.....	3-2
Figure 3.2: Proposed Baseline Alternative Bus Route Patterns .....	3-4
Figure 3.3: Baseline Bus Service.....	3-8

## 1. Introduction

The Durham-Orange (D-O) Light Rail Transit Project is one of three priority corridors that had been selected for further consideration in the Raleigh-Durham-Chapel Hill area. An Alternatives Analysis (AA) was recently completed for this particular corridor, with light rail transit (LRT) selected as the Locally Preferred Alternative (LPA). The proposed LRT alignment is just over 17 miles in length, with end-of-line stations at Alston Avenue as the end-of-line station in Durham (east of downtown Durham) and the UNC Hospitals as the end-of-line station in Chapel Hill. There are a total of 17 stations that include stops in downtown Durham, Duke Medical Center and the South Square shopping area. Figure 1-1 illustrates the D-O LPA's proposed LRT alignment and station locations.

A transit project must meet several requirements to be eligible for funding through FTA's New Starts Program. One of those requirements is the definition of a "Baseline" Alternative. This alternative is used as a means to identify incremental costs and benefits of the selected LPA. A TSM Alternative was previously defined in this project's AA. This paper presents refinement of the AA's TSM Alternative in a manner that meets FTA's requirements for a Baseline Alternative.

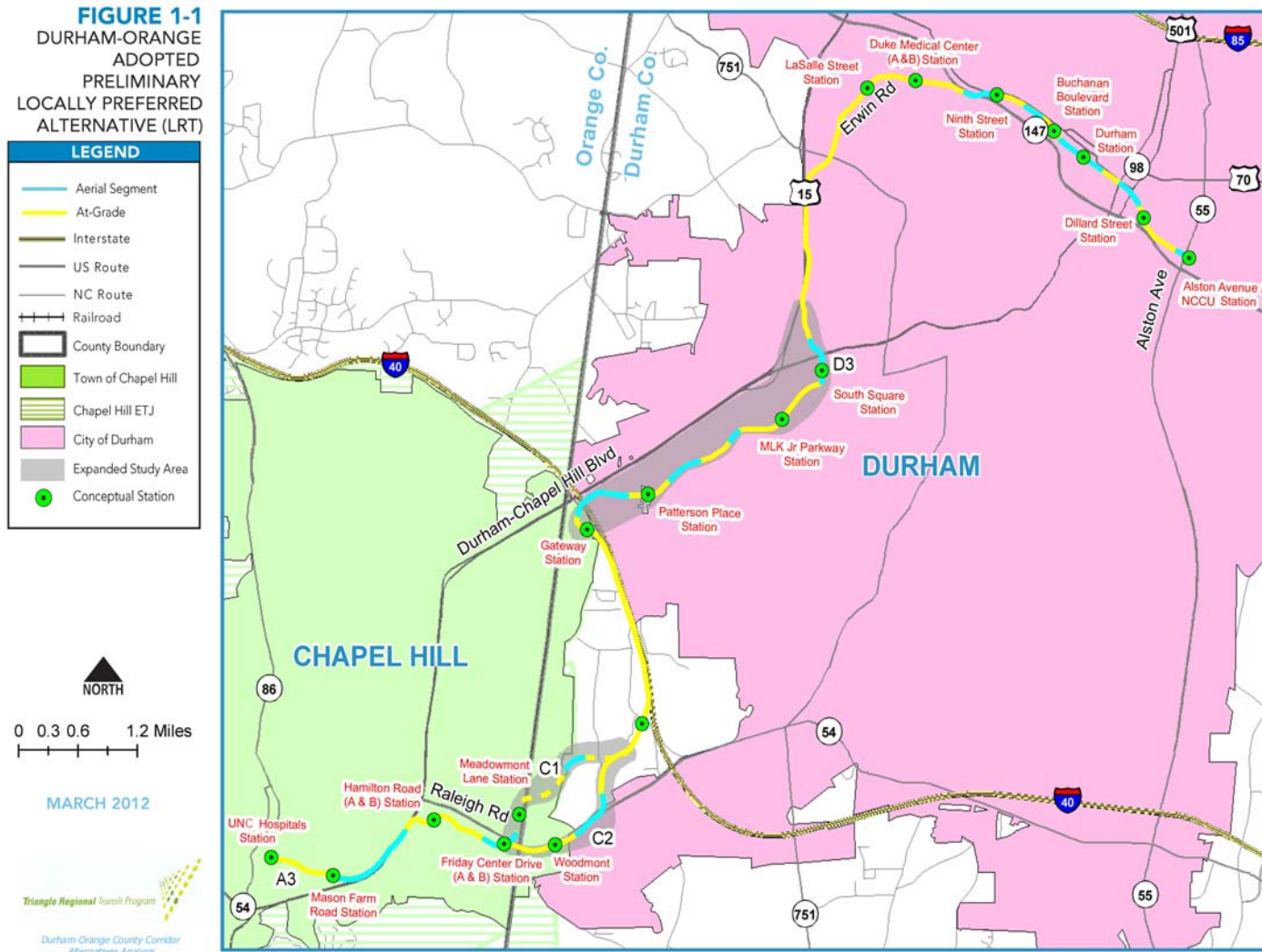
FTA guidance states that the New Starts Baseline Alternative should represent the "best that can be done" to improve transit service in the corridor without major capital investment in new infrastructure. At a minimum, the New Starts baseline must include in the project corridor all reasonable cost-effective transit improvements short of the major capital investment often required for a New Starts project.<sup>1</sup> Thus, for the D-O project, a Baseline Alternative has been defined that is intended to serve the same travel markets that will be served by the LRT project, but in a manner that uses buses and existing roadways.

This paper begins with a brief description of this project's No-Build Alternative. The No-Build network is the basis on which both the Baseline and LRT Alternatives have been defined. The proposed Baseline Alternative is then presented. It is important to note that a detailed Transit Operations Plans Report has been prepared, which provides detailed descriptions of all corridor transit routes and operating requirements for the No-Build, Baseline and Build Alternatives.

---

<sup>1</sup> FTA New Starts Baseline Alternative Review and Approval Procedures, FTA web site

Figure 1.1 Durham-Orange Adopted Preliminary Locally Preferred Alternative



## 2. No-Build Alternative

FTA's guidance for the No-Build Alternative indicates that the transit and highway networks in this alternative can be defined in either of the following ways:

1. An alternative that incorporates "planned" improvements that are included in the fiscally constrained long-range plan for which need, commitment, financing, and public and political support are identified and are reasonably expected to be implemented.
2. A conservative definition that adds only "committed" improvements – typically those in the annual element of the Transportation Improvement Program or local capital programs – together with minor transit service expansions and/or adjustments that reflect a continuation of existing service policies into newly developed areas.<sup>2</sup>

For the D-O project, the No-Build Alternative definition begins with the first approach. The 2035 Long Range Transportation Plan (LRTP) was adopted by the Durham-Chapel Hill-Carrboro and Capital Area Metropolitan Planning Organizations in April 2009. The LRTP assumes significant expansion of the region's transit network with revenues from the planned sales tax referendum and includes the D-O Corridor project in its transit network. The following modifications were required to the LRTP transit network for modification as this project's No-Build Alternative:

1. The D-O LRT line was removed from the 2035 LRTP network;
2. Existing Triangle Transit Routes 400 and 405 were added to the No-Build network. These are two existing regional routes that presently operate in the D-O corridor (from Downtown Durham to Downtown Chapel Hill) that are not presently included in the 2035 LRTP network (for the LRTP network had assumed rail in this corridor);
3. Existing DATA Route "Bull City Connector" was added into the No-Build Alternative. This is an existing local route that operates in Durham that is not presently included in the 2035 LRTP network (for the LRTP network had assumed rail in this corridor);
4. There were several feeder routes in the 2035 LRTP network that provided supplemental service to the LRTP network's D-O LRT Line. Since the No-Build network does not include this LRT line, these feeder routes were removed;
5. The 2035 LRTP network assumed significant expansion of bus service throughout the region through improved service frequencies and new bus routes. The level of service expansion assumed in the network is greater than current anticipated revenues from the planned sales tax and vehicle registration fees referendum. The No Build network provides a level of service that is consistent with the Durham County Bus and Rail Transit Investment Plan, adopted June 2011 and the Draft Bus and Rail Investment Plan in Orange County, the transit expansion plans for each county. Thus, service growth assumptions have been adjusted to better match anticipated revenues from the planned sales tax and vehicle registration fees.

A detailed description of route improvements is provided in this project's *Transit Operations Plans Report*.

---

<sup>2</sup> FTA New Starts Baseline Alternative Review and Approval Procedures, FTA web site

It is important to note that the DCHC and Capital Area MPO's are in the process of updating their Long-Range Transportation Plan to 2040, with adoption anticipated in 2013. Transit network growth assumptions will be updated with the new LRTP and are likely to assume a less robust transit network than the 2035 network. Thus, this project's definition of the No-Build Alternative should be revisited at that time.

### 3. Baseline Alternative

As noted earlier, the Baseline Alternative is to reflect the “best that can be done” to improve transit service in the corridor without a major capital investment in new infrastructure. For this project, the Baseline Alternative reflects significant expansion of limited bus service in the corridor with stops at the same locations as proposed LRT stations, with the addition of several new “feeder” routes to enhance connectivity to/from the corridor’s new premium transit service.

Following are descriptions of each element of this project’s proposed Baseline Alternative.

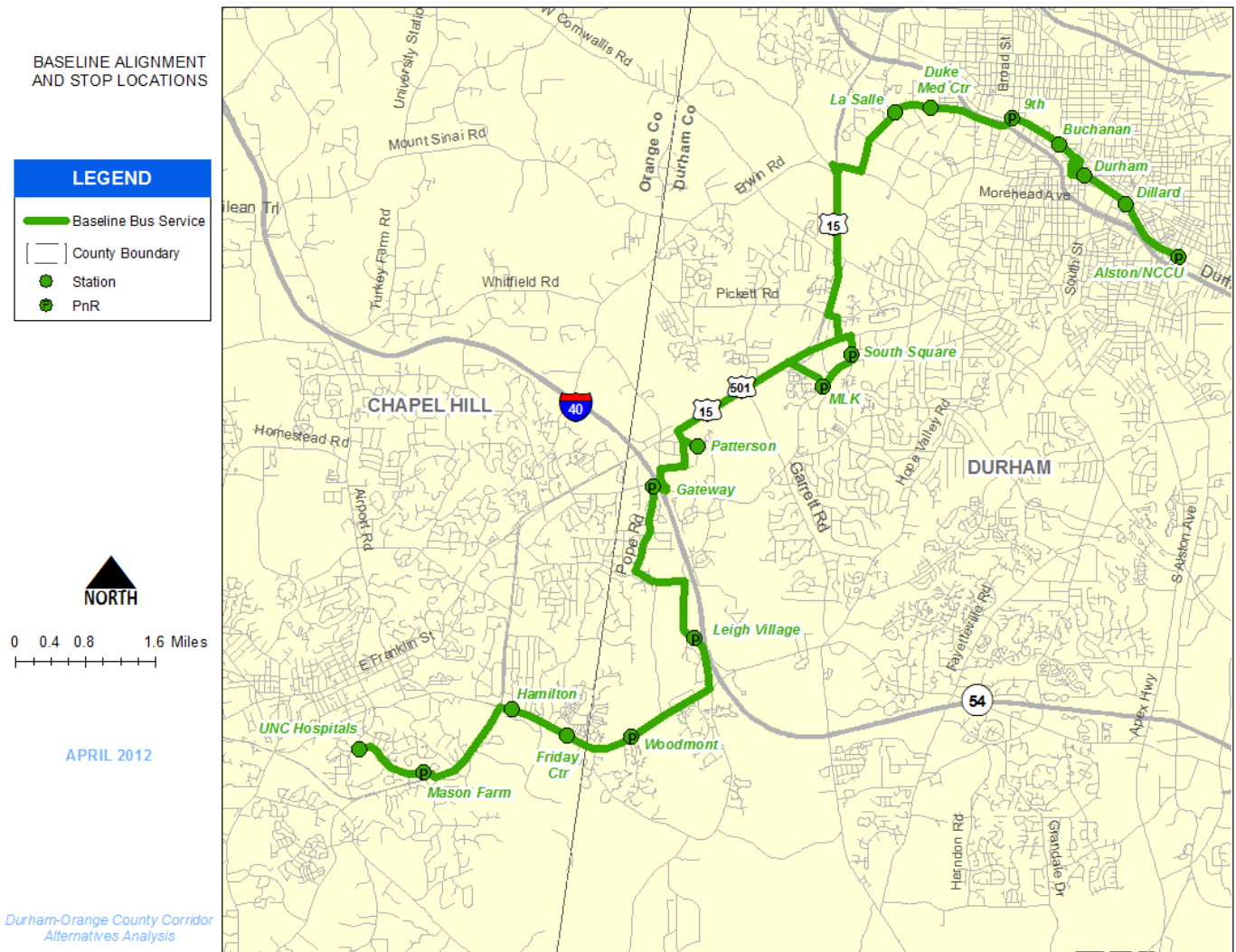
#### 3.1. Premium Bus Service Alignment

The major service improvement introduced in the Baseline Alternative is new limited stop bus service that operates from Alston Avenue in Durham to the UNC Hospitals in Chapel Hill. This service would use existing roads, generally following the same alignment as proposed for LRT in the LPA. There would be a total of 17 bus “stations” at locations close in proximity to proposed LRT stations. Hybrid buses (40’ standard-sized buses) will be used for the premium bus service. Beginning at Alston Station in Durham, the proposed Baseline Alternative’s alignment is as follows:

*The Baseline Alignment follows Pettigrew Street with stops at Dillard Street and existing Durham Station (DATA’s primary transit facility) in downtown Durham. An on-street stop is assumed on Pettigrew Street adjacent to the Durham Station transit facility. From this location, the alignment follows Duke Street (Gregson Street would be used for the southbound direction) and Main Street, with stops at Buchanan Boulevard/Main Street and Ninth Street/Main Street. The alignment then follows Erwin Road with stops at Duke Medical Center and LaSalle Street. The Baseline Alignment then follows Cameron Boulevard and US 15 to South Square. The alignment accesses the South Square and MLK Jr. Parkway Stops via Durham-Chapel Hill Blvd. and Academy Road and University Drive. Southbound buses must backtrack to Academy Blvd. and Durham-Chapel Hill Blvd. to continue south towards Chapel Hill. A stop is proposed at Patterson Place. The alignment then follows Danzier Drive and Mt. Moriah Road to Old Chapel Hill Road and the proposed Gateway stop. The alignment then follows Pope Road, Ephesus Church Road and Farrington Road to the Leigh Village stop. The remaining alignment follows Raleigh Road and Fordham Blvd. (NC 54) and Mason Farm Road to UNC Hospitals, with stops along the way at Woodmont, Friday Center Drive and Mason Farm Road.*

Figure 3-1 illustrates the proposed Baseline Alternative premium bus service route alignment. Measures such as queue jumper lanes and transit signal prioritization are included to maximize bus speeds as much as possible in general traffic.

Figure 3.1 Baseline Alignment and Stop Locations



### 3.2. Premium Bus Service Stop Locations

The Baseline Alternative’s proposed premium bus service includes stops at locations similar to those proposed in the LRT Alternative, thus providing comparable service to the same travel markets that are being served by LRT. Those stops are at:

- |                     |                     |
|---------------------|---------------------|
| Alston Avenue/NCCU* | Dillard Street      |
| Durham Station      | Buchanan Blvd.      |
| Ninth Street*       | Duke Medical Center |
| LaSalle Street      | South Square*       |
| MLK Jr. Parkway*    | Patterson Place     |
| Gateway Station*    | Leigh Village*      |
| Woodmont*           | Friday Center Drive |
| Hamilton Road       | Mason Farm Road*    |
| UNC                 |                     |

(Note: Stations with “\*” indicate stops with park-and-ride facilities)



Amenities at each stop are anticipated to be consistent with those proposed in the LRT Alternative. Baseline bus stops with park-and-ride lots are at the same locations where park-and-ride lots are proposed in the LRT Alternative. Baseline bus stops will also include bus bays for connecting feeder bus routes, and will include kiss-and-ride drop-off spaces. Off vehicle boarding collection is also assumed (same as in the Build Alternative), thus ticket vending machines (TVMs) are to be included at each Baseline stop location.

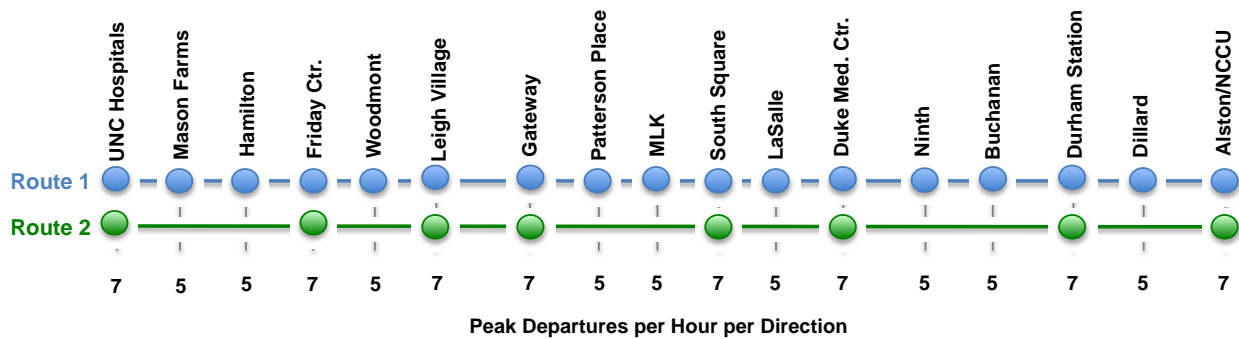
### 3.3. Premium Bus Service Plan

Operating hours for the new premium bus service are the same as proposed for LRT service and are generally from 5:30 a.m. to 12:00 midnight on weekdays and Saturdays, and 7:00 a.m. to 12:00 midnight on Sundays. Bus service frequencies are the same as proposed in the LRT Build Alternative, with the exception of the peak periods. Bus travel times in the Baseline Alternative are estimated to be significantly slower than LRT travel times, particularly in the peak periods. To compensate for these slower times, a limited stop bus service pattern is proposed in the peak periods, in addition to an all-stop bus service pattern. Proposed stops for this limited stop route pattern are at:

- Alston Avenue/NCCU
- Durham Station
- Duke Medical Center
- South Square Station
- Gateway Station
- Leigh Village
- Friday Center
- UNC Hospitals

Figure 3-2 illustrates the proposed bus stop service patterns for the Baseline Alternative's premium bus route service. Table 3-1 identifies proposed service frequencies.

Figure 3.2 Proposed Baseline Alternative Bus Route Patterns



**Baseline Service Frequencies**

Route 1 – 12/20

Route 2 – 30/--

Table 3.1 Baseline Alternative Proposed Service Frequencies

Day of Week	Service Pattern	5:30-9:00 a.m.	9:00 a.m.-3:30 p.m.	3:30-7:00 p.m.	7:00 p.m.-Midnight
Weekdays	All-Stop	12 min.	20 min.	12 min.	30 min.
	Limited Stop	30 min.	n/a	30 min.	n/a
Saturdays	All-Stop	20 min.	20 min.	20 min.	30 min.
Sundays	All-Stop	30 min.	20 min.	20 min.	30 min.

### 3.4. Supporting Bus Service

Existing bus service in the D-O Corridor is presently provided by the following public transit service providers:

- Triangle Transit – provides regional bus service in the corridor (e.g. Routes 400 and 405) and throughout the Raleigh-Durham-Chapel Hill region.
- Durham Area Transit Authority (DATA) – provides local bus service throughout the City of Durham.
- Chapel Hill Transit – provides free local bus service within the Town of Chapel Hill (including the University of North Carolina) and the town of Carrboro.
- Duke Transit – provides more localized circulator bus service on and between the Duke East and West Campuses and the immediate vicinity.

With the introduction of new premium bus service in the D-O Corridor, several changes have been proposed for Triangle Transit, DATA and CHT routes in the corridor. These changes can be categorized as follows:

- Elimination of Competing Bus Service
- Modifications to the Background Bus Network
- Introduction of New Feeder Bus Routes

Proposed changes to the bus network for the Baseline Alternative are the same changes proposed in the L RTP Build Alternative and are described in the following paragraphs. Figure 6-1 illustrates the eleven proposed new feeder bus routes for this alternative, which are described in the following sections.

### **3.4.1. Elimination of Competing Bus Service**

- ***Triangle Routes 400 and 405:*** With the introduction of new premium bus service in the D-O Corridor, existing Routes 400 and 405 are to be removed from the transit network in the Baseline Alternative. Route 400 presently operates at 30-minute peak/60-minute midday service on weekdays and at 60-minute service frequencies on Saturdays. Route 405 presently operates at 30-minute frequencies in the peak periods only.
- ***DATA Bull City Connector:*** This route operates primarily along Main Street in Durham, parallel to the proposed LRT line and along the same alignment assumed for the Baseline Alternative. Therefore, this route is to be removed from the Baseline Alternative. The Bull City Connector presently operates at 15-minute service frequencies on weekdays and at 20-minute service frequencies on weekday evenings and Saturdays.
- ***CHT Routes FCX, HU and S:*** These routes operate between the Friday Center and the UNC campus/UNC Hospitals. With the introduction of premium bus service and the relocation of the existing Friday Center's park-and-ride lot to Leigh Village, these routes are to be removed from the Baseline Alternative. Route FCX (Friday Center Express) presently operates at 5-10 minute frequencies in the peak periods and 30-minute frequencies in the midday. Route HU presently operates at about 15-minute frequencies in the peak periods and 40-minute frequencies in the midday and evening periods. Route S presently operates at about 10-minute frequencies in the peak periods and 35-minute frequencies in the midday period. All three routes operate only on weekdays.

### **3.4.2. Modifications to the Background Bus Network**

- ***Triangle Transit Routes 500/550:*** These are new routes in the 2035 L RTP network that provide similar service to existing Triangle Transit Route CRX. In the Baseline Alternative, these routes are proposed to begin/end at the Leigh Village Station.
- ***Other Triangle Transit Routes:*** Minor route modifications are proposed to several other Triangle Transit routes to provide connectivity to nearby Baseline premium bus service stations.
- ***DATA Routes 2 and 13:*** These route alignments are modified to provide service to/from the nearby Alston Station.
- ***DATA Route 5 and 10:*** These routes are modified slightly to provide service to/from the nearby South Square and MLK Stations. A branch pattern of Route 10 is also extended to connect to the nearby Gateway Station.
- ***Other DATA Routes:*** Minor route modifications are proposed to several other DATA routes to provide connectivity to nearby Baseline premium bus service stations.
- ***CHT Routes CL, D, T:*** These routes are extended to the proposed Gateway Station near Old Durham Road and I-40. Route D's frequencies are also improved.

- **Other CHT Routes:** Minor route modifications are proposed to several other CHT routes to provide connectivity to nearby Baseline premium bus service stations.

### 3.4.3. Introduction of New Feeder Routes

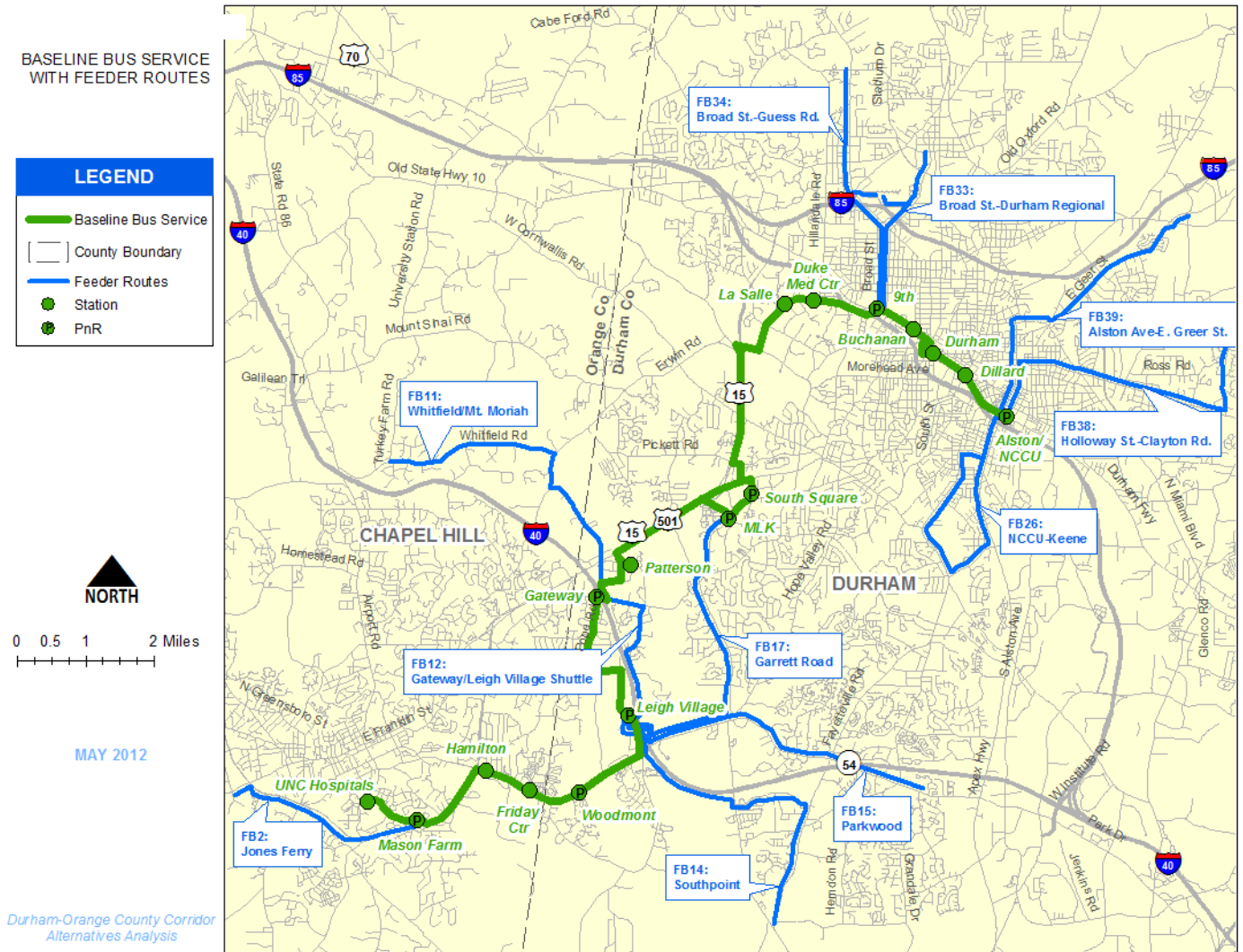
The background bus network that is being used for this project provides fairly strong connectivity to both the proposed Baseline and LRT stations. However, upon closer examination, there were still some areas where modified additional bus service was needed. Thus, both the Baseline and Build Alternatives include 11 new feeder routes to improve connectivity. The new feeder routes are described below and illustrated in Figure 3-3.

- **New Feeder Bus (FB) Route 2: Jones Ferry** – This is a proposed new feeder bus route that operates between the Mason Farm Station and Jones Ferry Road. This route would use Highway 54 to travel between these two locations. Proposed frequencies are 30-minutes in the peak periods and 60-minutes in the midday. For purposes of this study, this route is assumed to be operated by CHT.
- **New Feeder Bus (FB) 11 Route: Whitefield/Mt. Moriah** – This is a proposed new feeder bus route that operates from the Gateway Station to Mt. Moriah Road/New Hope Commons and Whitfield Road. Proposed frequencies are 30-minutes in the peak periods and 60-minutes in the midday. For purposes of this study, this route is assumed to be operated by CHT.
- **New Feeder Bus (FB) Route 12: Gateway/Leigh Village Shuttle** – This is a proposed new feeder bus route that operates between Gateway and Leigh Village Stations via Old Durham Road and Farrington Road. Proposed frequencies are 20-minutes in the peak periods and 40-minutes in the midday. For purposes of this study, this route is assumed to be operated by CHT.
- **New Feeder Bus (FB) Route 14: Southpoint** – This is a proposed new feeder bus route that operates between Southpoint and Leigh Village Station via Old Durham Road and Farrington Road. Proposed frequencies are 20-minutes in the peak periods and 40-minutes in the midday. For purposes of this study, this route is assumed to be operated by DATA.
- **New Feeder Bus (FB) Route 15: Parkwood** – This is a proposed new feeder bus route that operates from Leigh Village to the Parkwood area via Highway 54. Proposed frequencies are 30-minutes in the peak periods and 60-minutes in the midday. For purposes of this study, this route is assumed to be operated by DATA.
- **New Feeder Bus (FB) Route 17: Garrett Road** – This is a proposed new feeder bus route that would operate primarily along Garrett Road and Hope Valley Road between the South Square and MLK Stations, and Leigh Village. Proposed service frequencies are 30-minutes in the peak periods, 60-minutes in the midday period, with 60-minute Saturday service. For purposes of this study, this route is assumed to be operated by DATA.
- **New Feeder Bus (FB) Route 26: NCCU-Keene** – This is a proposed new feeder bus route that would operate along Alston Avenue, providing service between North Carolina Central University (NCCU) and the Alston Avenue Station. Proposed service frequencies are 30-minutes in the peak and midday periods. For purposes of this study, this route is assumed to be operated by DATA.
- **New Feeder Bus (FB) Route 33: Broad Street-Durham Regional** – This route is a proposed new feeder bus route that would operate from the Ninth Street Station to Durham Regional Hospital via Broad Street, and includes a deviation to the North Pointe Shopping Center. Proposed

frequencies are 30-minutes in the peak periods and 60-minutes in the midday, with 60-minute Saturday service. For purposes of this study, this route is assumed to be operated by DATA.

- **New Feeder Bus (FB) Route 34: Broad Street-Guess Road** – This route is a proposed new feeder bus route that would operate from the Ninth Street Station to Willowdale Shopping Center via Broad Street and Guess Road, and includes a deviation to the North Pointe Shopping Center. Proposed frequencies are 30-minutes in the peak periods and 60-minutes in the midday, with 60-minute Saturday service. For purposes of this study, this route is assumed to be operated by DATA.
- **New Feeder Bus (FB) Route 38: Holloway Street-Clayton Road** – This is a proposed new feeder bus route that would operate from the Alston Avenue Station to Holloway Street and Clayton Road. Proposed frequencies are 30-minutes in the peak periods and 60-minutes in the midday, with 60-minute Saturday service. For purposes of this study, this route is assumed to be operated by DATA.
- **New Feeder Bus (FB) Route 39: Alston Avenue-East Greer Street**– This is a proposed new feeder bus route that would operate from the Alston Avenue Station to the Walmart at I-85 and Glenn School Road via Alston Avenue and East Greer Street. Proposed frequencies are 30-minutes in the peak periods and 60-minutes in the midday, with 60-minute Saturday service. For purposes of this study, this route is assumed to be operated by DATA.

Figure 3.3 Baseline Bus Service



### 3.5. Station Bus Connections

As noted in the prior sections, many existing bus routes will connect to Baseline bus stations with little or no changes to route alignments. Table 3-2 presents anticipated station bus route activity (bus routes and weekday service frequencies) that result from the supporting bus network that has been proposed for this project (both existing routes and proposed new feeder routes).

Table 3.2 Supporting Bus Network Connections at Stations

Station	Route Name	Service Freq. (min.)		Other Stations Served
		peak	off-peak	
<b>Alston</b>	DATA Route 2	30	30	Durham
	DATA Route 13	30	60	
	New DATA Feeder Bus 26	30	30	
	New DATA Feeder Bus 38	30	60	
	New DATA Feeder Bus 39	30	60	
<b>Dillard</b>	DATA Route 5	15	30	Durham, South Sq, MLK
<b>Durham</b>	<i>Multiple DATA routes</i>	n/a	n/a	
	Triangle Route 700	30	60	
	Triangle Route DRX	15	n/a	
	New Triangle Route PDX	30	n/a	
	New Triangle Route BDX	30	n/a	
<b>Buchanan</b>	DATA Route 11	30	30	Durham
<b>Ninth St.</b>	New DATA Feeder Bus 33	30	60	
	New DATA Feeder Bus 34	30	60	
<b>Duke Med Ctr</b>	DATA Route 6	15	30	LaSalle, Durham
	New DATA Route 25	30	60	
	New DATA Route 30	30	60	
	New Triangle Route BurDx	30	n/a	
	Triangle Route DRX	15	n/a	Durham
	<i>Multiple DUKE Transit Routes</i>	n/a	n/a	
<b>LaSalle</b>	DATA Route 6	15	30	Duke, Durham
<b>South Sq</b>	DATA Route 5	15	30	Durham, Dillard, MLK
	DATA Route 10	15	30	Durham, MLK, Patterson, Gateway
<b>MLK</b>	DATA Route 5	15	30	South Sq, Dillard, Durham
	DATA Route 10	15	30	Gateway, Patterson, South Sq., Durham
	New DATA Feeder Bus 17	30	60	Leigh Village
<b>Patterson</b>	DATA Route 10	30	60	Gateway, MLK, S. Square, Durham
<b>Gateway</b>	CHT Route D	10	30	UNC Hosp.
	CHT Route CL	30	n/a	UNC Hosp.
	CHT Route T	30	35	UNC Hosp.
	New CHT Feeder Bus 11	30	60	
	New CHT Feeder Bus 12	20	40	Leigh Village
	DATA Route 10	30	60	Durham, South Sq., MLK, Patterson
<b>Leigh Village</b>	New DATA Feeder Bus 14	20	40	
	New DATA Feeder Bus 15	30	60	
	New DATA Feeder Bus 17	30	60	MLK
	New CHT Feeder Bus 12	20	40	Gateway
	New Triangle Routes 500/550	15	30	
<b>Meadowmont</b>	CHT Route V	30	40	Friday Ctr., UNC Hosp.
<b>Friday Center</b>	CHT Route V	30	40	Medowmont, UNC Hosp.
<b>Hamilton</b>	CHT Route G	30	60	UNC Hosp.
<b>Mason Farm</b>	New CHT Feeder Bus 2	30	60	
<b>UNC</b>	<i>Multiple CHT Routes</i>	n/a	n/a	
	TT CRX	15	n/a	
	TT 420	20	60	
	TT 800	30	60	
	TT 805	30	60	