



**Locally Preferred Alternative Report**  
**FINAL May 27, 2016**



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## 1. Executive Summary

The North-South Corridor Locally Preferred Alternative (LPA) is a combination mixed traffic / dedicated lane BRT route that will connect the Eubanks Road park-and-ride with Southern Village park-and-ride along Martin Luther King, Jr. Boulevard, South Columbia Street, and US 15-501, as shown in Figure 1-1. The route features direction connections to the University of North Carolina (UNC) Hospitals campus and the planned Durham-Orange light rail (D-O LRT).

Based on feedback from the public, three versions of the same alternative have been identified as the LPA. The variations are related to dedicated lane configuration (use of curb or center dedicated lanes, either newly-constructed or conversion of an existing lane to transit-only), and occur north of Hillsborough Street. Carrying these variations into the engineering and environmental clearance process will enable the community to better understand the benefits and impacts of each, and will help to inform the detailed design and decision-making process.

The service will operate more frequently, for more days per week than the current Route NS service. This improved service level will accommodate demand from UNC students and encourage local residents to consider transit as an attractive daily alternative to driving.

The LPA reflects the outcomes of technical analyses and input heard from community participants, and is responsive to the five corridor transportation needs defined in the project Purpose and Need Statement (available under separate cover):

- Chapel Hill Transit ridership has increased more than 20 percent between 2005 and 2012, and buses often operate at capacity during weekday peak house on multiple routes.
- Chapel Hill is comparatively young, but its fastest-growing demographic is over age 65.
- Major development opportunities at the northern and southern ends of the corridor will fundamentally reshape mobility patterns and needs within the corridor.
- Multi-modal transportation investments are necessary to accommodate anticipated increased in travel demand resulting from planning development within the corridor.
- Chapel Hill – and the surrounding region – has demonstrated a commitment to sustainable growth strategies in their adopted plans and policies.

The key outcomes of the alternative development and evaluation process were:

- **Use higher-capacity buses.** Using larger buses while maintaining 7.5-minute peak headways will provide additional capacity to meet current demand while accommodating continued ridership growth in the corridor.

### The Locally Preferred Alternative

**Length:** 8.2 miles

**Number of Stations:** 16

**Frequency of Service:**

Every 7.5 minutes (peak)

Every 10 – 20 minutes (off-peak)

**Number of BRT Vehicles:** 12

**Capital Costs:** \$96.8M - \$105.9M

**Annual Operating Cost:**

\$3.4M

**Average Daily Ridership:**

8,575 (+43% over existing corridor ridership)

**Station-Area Population Density:**

2,297 people per sq. mi. (average)

**Station-Area Job Density:**

8,195 jobs per sq. mi. (average)

**Key Station Area Demographics:**

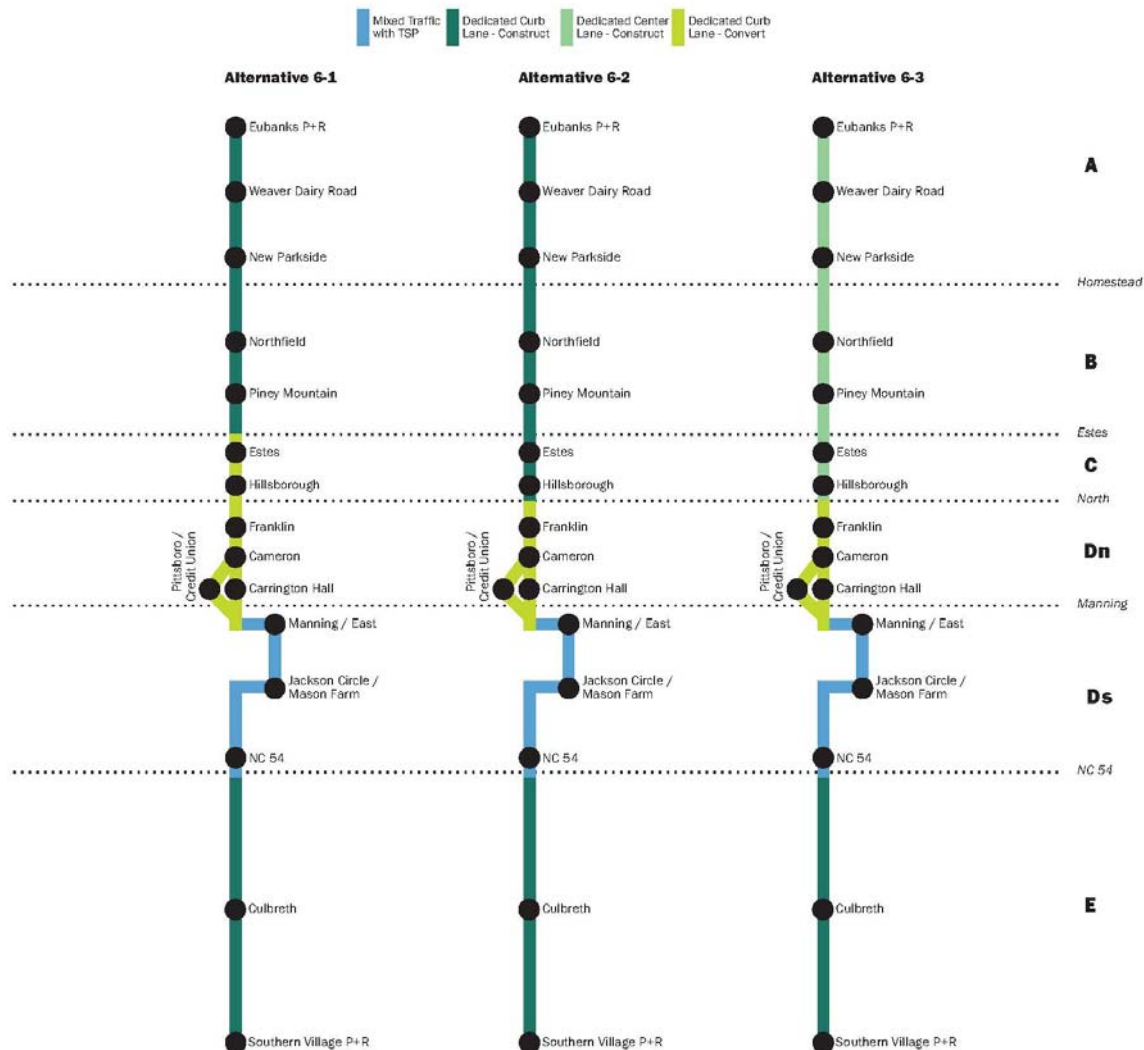
Zero-Car Households: 688 (11%)

Residents below the Poverty Line: 5,594 (23%)

Residents of Color: 7,035 (29%)

- **Optimize station locations.** By reducing the number of stations and integrating dedicated lanes / transit-signal priority, the LPA will offer measurable time savings for transit trips in the corridor.
- **Provide a direction connection to UNC Hospitals and the planned D-O LRT.** Feedback from members of the public, project committees, and elected officials was overwhelmingly in support of making a direct connection to the UNC Hospitals campus and the planned D-O LRT. This connection provides direct access to a major regional employer and activity center, and will facilitate regional transit network connectivity.
- **Target use of dedicated lanes.** In certain segments of the corridor, dedicated lanes were not found to be cost-effective (not a significant ridership gain for significantly higher capital costs), or were found to result in significant, negative traffic impacts. Mixed traffic operations in these segments will generate ridership and economic development benefits while minimizing or avoiding negative impacts.

Figure 1-1: The Locally Preferred Alternative



## 2. Introduction

### 2.1 Project Overview

The North-South Corridor Study is an 30-month project that is being led by Chapel Hill Transit (CHT) in coordination with the Chapel Hill Transit Partners, which includes the Town of Chapel Hill (ToCH), the Town of Carrboro (ToC) and the University of North Carolina - Chapel Hill (UNC).

The project, which is being funded through a combination of federal (Federal Transit Administration [FTA]) and local funds, will identify and evaluate a series of transit investment alternatives for implementation within the study corridor (see Figure 1-1), which runs along the Martin Luther King, Jr. Boulevard (Historic Airport Road/NC Hwy 86), South Columbia Street, and US 15-501 South. This corridor, which is approximately 7.3 miles long, has its northern terminus at Eubanks Road and Martin Luther King, Jr. Boulevard and its southern terminus at US 15-501 near the Southern Village mixed-use development.

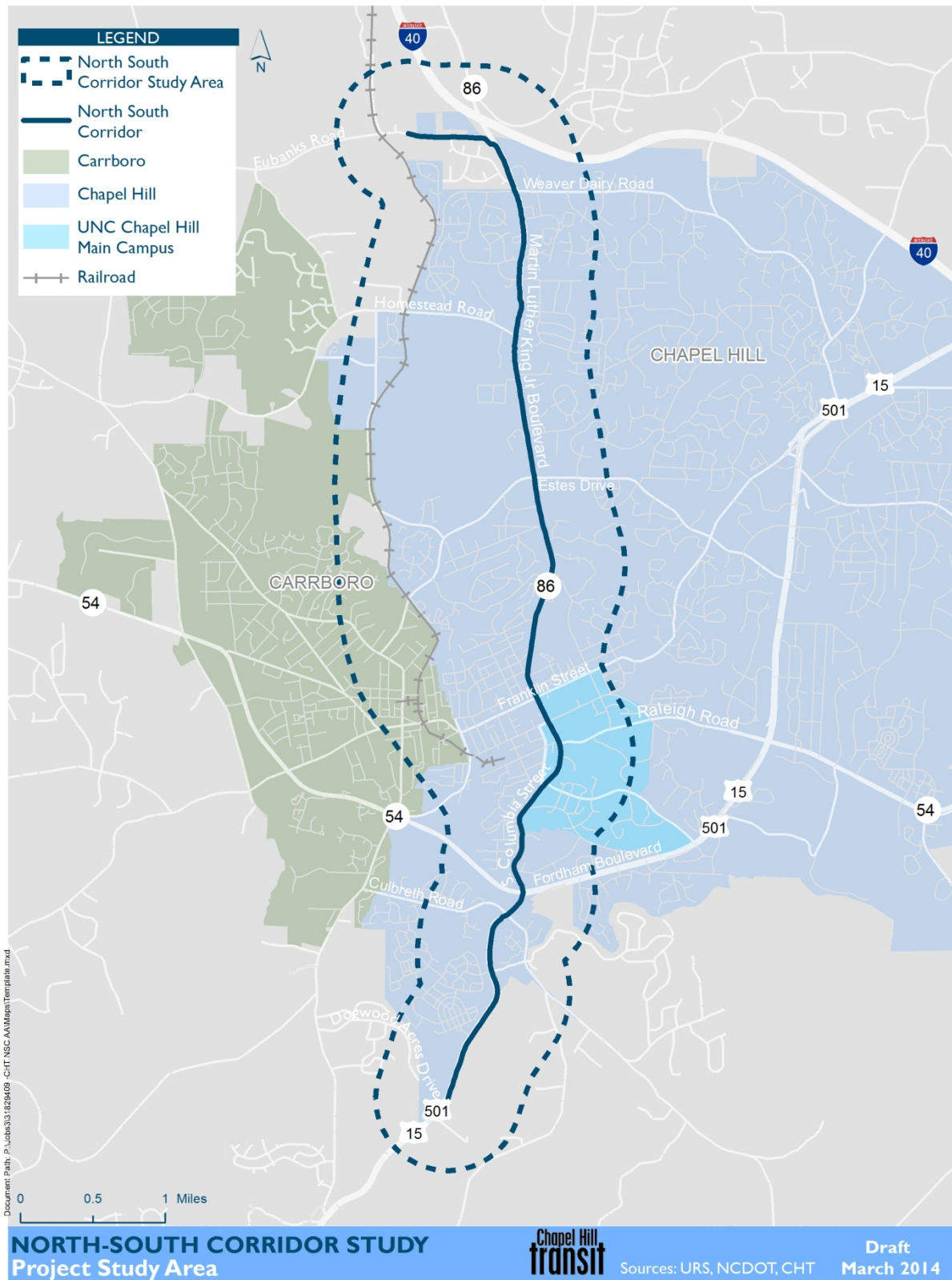
The study will expand on previous planning work to identify a locally-preferred transit investment alternative that facilitates safe, efficient and expanded levels of mobility within the increasingly busy study corridor, and to improve connectivity between the corridor and the Research Triangle region. Additional reasons for this study include improving connections with other local and regional transit routes (including the planned Durham-Orange Light Rail line), supporting future development within the corridor, increasing transit mode share and ridership to the UNC campus/hospital, and improving multi-modal connectivity options between the new Carolina North campus on the northern end of the study corridor, Southern Village at the southern end of the corridor, and the rest of the study corridor.

Following a multi-phase, iterative alternative development and evaluation process that is supported by extensive public engagement activities, the Chapel Hill Transit Partners recommended the LPA to the Chapel Hill Town Council for adoption in April 2016. The LPA is the transit investment alternative that best meets the purpose and need for the project and is competitive for funding through the FTA's New/Small Starts capital funding program. The Town Council will submit the LPA to the Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHC MPO) for adoption and integration into its *2040 Metropolitan Transportation Plan*.

The study is scheduled for completion in Spring 2016.



Figure 2-1: The North-South Study Corridor

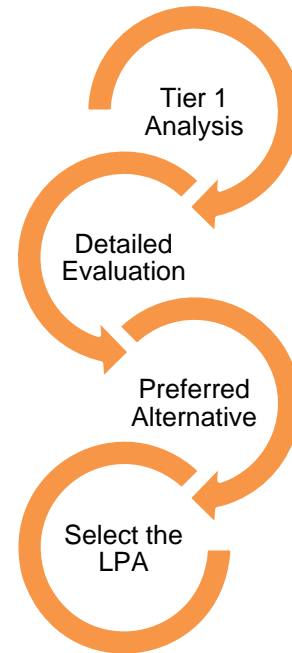


## 2.2 Project Process

The North-South Corridor Study followed a three-step method in order to evaluate the different transit modes and alignment options and identify a preferred alternative.

- The first step (“Tier 1 Analysis”) entailed the assessment of each mode and alignment relative to overall implementation viability.
- The second step (“Detailed Evaluation”) assessed the modes and alignments that passed the Tier 1 Analysis.
- The alternative(s) that fared best against the detailed criteria in the Detailed Evaluation step was identified as the Preferred Alternative(s) and was further refined in the third step (“Refine LPA/Small Starts Analysis”). The Locally Preferred Alternative (LPA) was identified at the conclusion of the third step.

The evaluation criteria associated with each step were a combination of quantitative and qualitative performance measures. The Tier 1 Analysis phase applied fewer and broader measures, including information from previous corridor studies. The Detailed Evaluation phase applied more and finer performance measures, and the third step evaluated the Preferred Alternative(s) against federal criteria to determine the Locally Preferred Alternative (LPA).

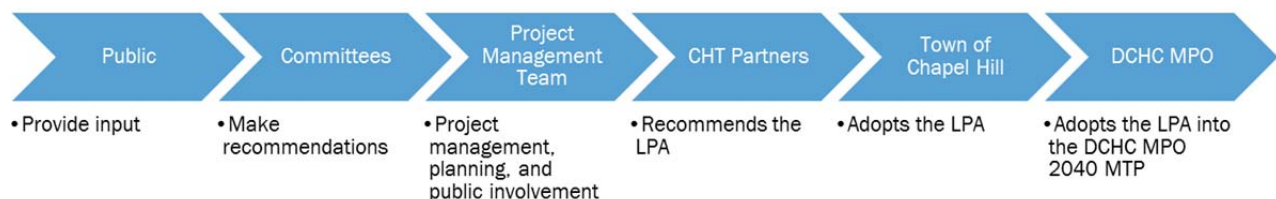


## 2.3 Project Decision-Making

The project was led by Chapel Hill Transit and was supported by two committees who provided technical guidance and policy oversight: the project Technical Committee and the Policy Committee. These committees worked with Chapel Hill Transit and community stakeholders to develop a Locally Preferred Alternative that is responsive to local need for transportation investment within the North-South corridor while being competitive for federal capital funding.

The LPA was recommended by the Technical and Policy Committees, who then recommended it to the Chapel Hill Transit Partners in March 2016. The Chapel Hill Transit Partners then recommended the LPA to the Chapel Town Council in April 2016. The Chapel Hill Town Council then approved the LPA in April 2016 before recommending its inclusion in the Durham-Chapel Hill-Carrboro MPO 2040 Metropolitan Transportation Plan.

Figure 2-2: Project Decision-Making Process



## 2.4 Summary of Stakeholder Involvement

Public involvement for the North-South Corridor Study was varied and thorough, providing opportunities for face-to-face interaction, on-line forums and social media exchanges. Each phase leading to the definition and evaluation of alternatives offered various tools and techniques to gather input and feedback as the study progressed. Essential to the success of the public involvement process has been a nimble approach, flexing to the needs of the stakeholders. An online engagement platform and project website was used to provide 24-hour access, offering continuous opportunities to offer input and provide feedback about such topics as mode choice, alignment preferences, service needs, and lane configurations. Other forms of engagement included public outreach sessions, neighborhood meetings and walking tours, and business association meetings. The following provides a summary of the three rounds of public outreach sessions.

### 2.4.1 Public Outreach Sessions: March 2014

Two project open houses were held to introduce the project to corridor stakeholder and members of the general public, and to solicit feedback on the draft Purpose and Need Report. Additionally, participants were asked to provide high-level input regarding existing corridor conditions and potential mode and alignment preferences.

1. March 26, 2014: 11:30 – 1:30 PM on UNC Campus at Stone Cultural Center
2. March 26, 2014: 4:30 – 7:00 PM at the Chapel Hill Public Library

A total of 20 attendees came to the two open houses. Attendees provided comments related to:

- Improved connections to the northern and southern edges of the corridor and UNC's main campus,
- Complementary improvements to east-west transit routes,
- Use of dedicated lanes/right-of-way, and
- Integration of bicycles.

### 2.4.2 Public Outreach Sessions: October 2014

Three public open houses were held in October 2014. The purpose of the meetings were to increase understanding of BRT as a mode, present the results of the Tier 1 evaluation, and gauge public sentiment about BRT design elements, alignments, and proposed station locations.

1. October 21, 2014: 11:00 AM – 2:00 PM at Carolina Student Union
2. October 22, 2014: 4:00 – 7:00 PM at Town of Chapel Hill Town Hall
3. October 23, 2014: 11 AM – 2:00 PM at UNC Children's Hospital

More than 125 participants attended the open houses; participants completed 45 comment cards and 40 BRT budget exercises. 70 percent of attendees liked BRT in dedicated curb lanes, and many indicated a preference for direct connections to the UNC Hospitals campus and future D-O LRT station. Results from the BRT budget exercise shows that respondents were in favor of investments in runningway design and technology, including transit signal priority.

### 2.4.3 Public Outreach Sessions: January/February 2016

The six alternatives that were recommended for further consideration (see Figure 7-4) were shared with members of the public at a series of five public outreach sessions along the study corridor during January and February 2016:

1. January 20, 2016: 11:00 – 1:00 PM at UNC Children’s Hospital
2. January 20, 2016: 4:00 – 6:00 PM in the Southern Village retail area
3. January 21, 2016: 11:00 – 1:00 PM on UNC campus at Carolina Union
4. February 23, 2016: 11:30 - 1:30 PM at Town of Chapel Hill Town Hall
5. February 23, 2016: 4:00 - 6:00 PM at the Chapel Hill Public Library.

103 people attended the sessions. After reviewing the characteristics of the six alternatives (including capital and O&M costs, ridership, and travel time), 40 respondents indicated a preference for a specific alternative (see Figure 7-4). Two respondents listed “Alternative 3 or 6.” Alternative 3 was the public’s favorite, with Alternative 6 as a second choice.

**Table 2-1: January/February 2016 Public Outreach Sessions: Preferred Alternatives**

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	No Build Alternative
# of responses (40)	3	4	15	1	4	11	2
percent of responses collected	8%	11%	39%	3%	11%	29%	5%

## 3. Project Purpose and Need

### 3.1 Project Purpose and Need

The **purpose of the North-South Corridor Study** is to identify and implement the transit investment strategy that will accommodate anticipated growth in travel demand within the corridor, support mobility options that match emerging demographic trends and preferences within the corridor, leverage the existing transportation infrastructure to improve connectivity within the corridor, and encourage sustainable development patterns that reduce reliance on single-occupant vehicles.

**Project needs** are summarized below.

- **Project Need #1: Chapel Hill Transit ridership has increased by more than 20 percent between 2005 and 2012, and buses often operate at capacity during weekday peak hours on multiple routes.** Demand is straining capacity, which is reducing operational efficiency and resulting in schedule slippage and bus stacking. Investment in transit system capacity will ensure that existing rider demand is accommodated and future rider demand is supported.
- **Project Need #2: Chapel Hill is comparatively young, but its fastest-growing demographic is over age 65.** In 2010, the median age of Chapel Hill residents was 25.6; the median age of US residents was 37.2. From 1970 to 2012, the over-65 age group increased the most relative to all other age groups (from 4.5 percent to 9.4 percent). Academic research and industry experience

has found that both of these demographic groups are increasingly choosing transit for either lifestyle/environmental/economic reasons (Millennials) or mobility reasons (senior citizens).

- Project Need #3: Major development opportunities at the northern and southern ends of the corridor will fundamentally reshape mobility patterns and needs within the corridor.** The adopted 2020 Chapel Hill Comprehensive Plan designates several development focus areas along the corridor. The Town has approved several new developments within the corridor, including Carolina North, and is reviewing several others for approval. This level of development will expand the number of key activity generators within the study corridor and result in increased travel demand as more people seek to access them.
- Project Need #4: Multi-modal transportation investments are necessary to accommodate anticipated increases in travel demand resulting from planned development within the corridor.** Recent technical analyses completed as part of the Carolina North development have forecast that – in the absence of mitigation measures - corridor roadways will reach unacceptable levels of congestion by 2030. The scale of roadway expansion required to mitigate this congestion is unlikely to be financially feasible, environmentally sensitive, or aligned with Chapel Hill’s vision for growth.
- Project Need #5: Chapel Hill – and the surrounding region – has demonstrated a commitment to sustainable growth strategies in their adopted plans and policies.** Chapel Hill’s 2020 Comprehensive Plan calls for a transportation system that accommodates transportation needs and demands while mitigating congestion, promoting air quality, supporting affordable housing goals, sustainability and energy conservation. Transit service also plays a critical role in increasing access to services. High-capacity transit system investment that leverages existing transportation facilities while reducing reliance on single-occupant vehicles will be necessary to achieve these goals.

### 3.2 Goals and Objectives

The following six goals and related objectives have been established for the North-South Corridor Study. These were utilized for the development of evaluation criteria used in comparing the alternatives for the corridor.

**Table 3-1: North-South Corridor Study Goals and Objectives**

Goal	Objectives
Increase the efficiency, attractiveness and utilization of transit for all users	<ul style="list-style-type: none"> <li>Provide reliable, frequent service that improves the experience of existing customers</li> <li>Provide capacity for future growth</li> <li>Provide improved passenger amenities and infrastructure</li> <li>Ensure safe and comfortable transit services and facilities for all users</li> </ul>
Improve multi-modal connectivity between the northern and southern portions of the study corridor	<ul style="list-style-type: none"> <li>Provide frequent, high-capacity, one-seat transit connections between key study corridor activity generators</li> <li>Improve pedestrian and non-motorized access to corridor stations</li> <li>Ensure sufficient park-and-ride access to the system</li> </ul>

Goal	Objectives
Enhance connectivity of the corridor to the regional transportation network	<ul style="list-style-type: none"> <li>• Support regional planning efforts for a more balanced, multi-modal transportation network in the region</li> <li>• Coordinate with existing and planned transit services</li> <li>• Ensure connectivity to services connecting travelers to destinations within and beyond the study corridor</li> <li>• Provide for acceptable traffic operations and parking options in the corridor</li> <li>• Enhance connections to non-motorized transportation</li> </ul>
Support land use and development patterns that reflect the vision for growth contained in local and regional plans and policies	<ul style="list-style-type: none"> <li>• Support the economic development and revitalization efforts of local communities</li> <li>• Support regional economic development through enhanced access to employment concentrations</li> <li>• Support institutional and key stakeholder planning efforts, particularly strategic growth planning for UNC Chapel Hill</li> <li>• Support local and regional goals for compact, mixed-use development along the corridor</li> </ul>
Contribute to regional equity, sustainability and quality of life	<ul style="list-style-type: none"> <li>• Promote a more efficient and sustainable transportation system that reduces energy usage, pollution and costs of living</li> <li>• Increase mobility and accessibility for transit-dependent populations</li> <li>• Provide opportunities for place making and enhanced character in corridor communities</li> </ul>
Develop and select an implementable and community-supported project	<ul style="list-style-type: none"> <li>• Define and select transit improvements with strong public, stakeholder and agency support</li> <li>• Define and select transit improvements that are cost-effective and financially feasible, both in the short- and long-term</li> <li>• Define and select transit improvements that are competitive for Federal Transit Administration funding</li> </ul>

### 3.3 Evaluation Criteria

The table below presents the evaluation criteria used during the alternatives evaluation. Note that each successive step links to the overall goals established for the study, and builds upon the criteria from the previous step, ensuring a consistent rating throughout.

**Table 3-2: Potential Evaluation Criteria**

Project Goals	Tier 1 Analysis	Detailed Evaluation
Increase the efficiency, attractiveness and utilization of transit for all users	Ridership capacity	<p>Ridership</p> <p>Number of passengers per service-hour</p> <p>Estimated vehicle hours travelled (VHT)</p> <p>Ability to provide appropriate transit capacity</p>



Project Goals	Tier 1 Analysis	Detailed Evaluation
Improve multi-modal connectivity between the northern and southern portions of the study corridor	Multi-modal connectivity	Connections between activity centers Access provided to the community
Enhance connectivity of the corridor to the regional transportation network	Multi-modal connectivity	Potential right-of-way impacts Bicycle and pedestrian safety Parking and traffic impacts
Support land use and development patterns that reflect the vision for growth contained in local and regional plans and policies	Land use / economic development	Compatibility with local and regional plans Land use and economic development opportunities
Contribute to regional equity, sustainability and quality of life	Environmental impacts	Consistent with existing community character Environmental impacts/benefits
Develop and select an implementable and community-supported project	Capital cost Community support	Capital and operating and maintenance costs Cost effectiveness Community support

*\*consistent with FTA New Starts/Small Starts criteria*

## 4. The Tier 1 Analysis

The Tier 1 Analysis was structured to efficiently identify the alternatives that do not meet the project purpose and need or goals and objectives, and to remove them from further consideration in future phases of the project. This initial level of screening focused on two areas:

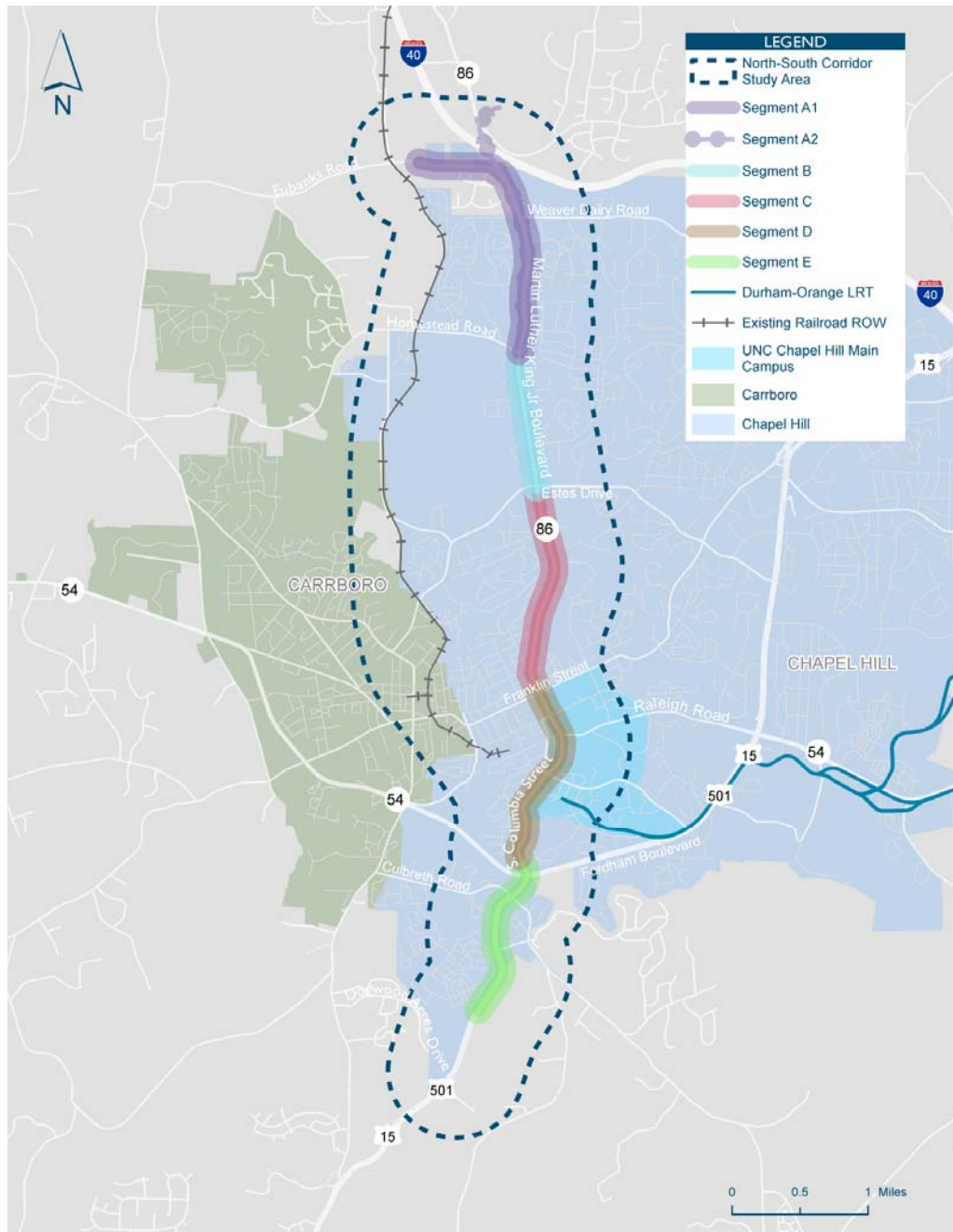
- Transit modes
  - No Build (existing system), BRT Low, BRT High, Streetcar, Light Rail, Commuter Rail
- Alignments
  - Segments A1/2 through E and Rail ROW 1 and 2, as shown in Table 4-1 and Figure 4-1.

**Table 4-1: Chapel Hill Tier 1 Corridor Segment Boundaries**

Corridor Segment	Boundaries
Segment A1	Existing Eubanks P&R to Homestead Road along Martin Luther King, Jr. Boulevard
Segment A2	Relocated P&R (east of I-40) to Homestead Road along Martin Luther King, Jr. Boulevard
Segment B	Homestead Road to Estes Drive on Martin Luther King, Jr. Boulevard
Segment C	Estes Drive to Franklin Street to Martin Luther King, Jr. Boulevard

Corridor Segment	Boundaries
Segment D	Franklin Street to Fordham Boulevard along Columbia Street
Segment E	Fordham Boulevard to Dogwood Acres Drive on US 15-501
Rail ROW 1	Eubanks Road P&R to Franklin Street
Rail ROW 2	Franklin Street to Durham-Orange LRT end-of-line station

**Figure 4-1: Tier 1 Corridor Segments**





The analysis followed a two-step process: first, transit modes were subjected to evaluation; second, the alignments were subjected to evaluation.

This initial screening relied on readily available information and focused on high-level, qualitative assessment of modal and alignment options as a means to evaluate a comparatively large number of alternatives. In cases where there is not sufficient information to defer modes or alignments from further consideration, those options were recommended for continuation into the Detailed Definition and Evaluation phase of the project.

A series of evaluation criteria were developed to assess each alternative’s ability to meet the stated project purpose and need, and its ability to ultimately be competitive for federal funding. Each of the modal and alignment options were evaluated against the criteria and rated as “pass” or “not pass.”

The performance of the alternatives against each evaluation criteria was then aggregated, and an overall assessment of “pass” or “defer” was assigned to each alternative. An alternative that received one or more “not pass” rankings was assigned an overall assessment of “defer.” An overall assessment of “defer” means that the mode or alignment does not meet the stated purpose and need for the North-South Corridor Study and will not be carried forwarded into more detailed definition and evaluation project phases, but may meet the needs of future studies conducted in the area and region.

#### 4.1 Tier 1 Evaluation of Modes Results

Table 4-2 summarizes the results of the initial screening of modes. Modes with one or more “not pass” rating were removed from further definition and evaluation in subsequent phases of the study. As shown in Table 4-3, the No Build, BRT Low, and BRT High were recommended for more detailed definition and evaluation in subsequent project phases.

**Table 4-2: Summary Results of the Initial Screening of Modes**

	Ridership Capacity	Consistency with Local Plans and Policies	Economic Development	Environmental Impacts	Capital Costs	Community Support
No Build	Pass	Pass	Pass	Pass	Pass	Pass
BRT Low	Pass	Pass	Pass	Pass	Pass	Pass
BRT High	Pass	Pass	Pass	Pass	Pass	Pass
Streetcar	Pass	Pass	Pass	Not Pass	Not Pass	Pass
LRT	Pass	Pass	Pass	Not Pass	Not Pass	Pass
Commuter rail	Pass	Not Pass	Pass	Pass	Not Pass	Not Pass

**Table 4-3: Modes for Detailed Definition and Evaluation of Alternatives**



Modes	Overall Assessment
No Build	Pass
BRT Low	Pass
BRT High	Pass
Streetcar	Defer
LRT	Defer
Commuter Rail	Defer


The deferment of Streetcar, Light Rail and Commuter Rail from further consideration as part of the North-South Corridor Study is not intended to indicate that these modes should not be considered and recommended as investments in other corridors throughout the region. Their deferment reflects that these modes are not a good match to the North-South Corridor's stated purpose and need. As the Durham-Orange Light Rail Project becomes operational and as corridor and regional conditions change, these modes may – in future years - become appropriate for detailed consideration within the North-South Corridor.

## 4.2 Modes Recommended for Detailed Definition and Evaluation

The results of the Tier 1 Analysis recommended that the modes shown in Table 4-4 be carried into the Tier 2 Detailed Definition and Evaluation of Alternatives.

**Table 4-4: Modes for Detailed Definition and Evaluation**

Mode	Typical Characteristics	Example Service
No Build	<ul style="list-style-type: none"> <li>Mixed traffic operations</li> <li>Frequent (10 minute) peak service; 30- to 60-minute service off-peak</li> <li>Single (40-foot) and articulated (60-foot) low-floor, diesel buses</li> <li>Stops spacing varies between ¼-mile and a half-mile</li> <li>Stations vary between shelters and concrete pads</li> </ul>	<p>Chapel Hill, NC</p> 
BRT Low	<p>Substantial corridor-based investment that emulates rail fixed guideway service, including:</p> <ul style="list-style-type: none"> <li>Defined stations</li> <li>Traffic signal priority for transit vehicles</li> <li>Frequent bidirectional service for a substantial part of weekday and weekend days</li> <li>At the discretion of the FTA, any other features that support the transit investment (the majority of which does not operate in a separated right-of-way during peak periods)</li> <li>Typical corridor length of five to 20 miles</li> </ul>	<p>Kansas City, MO MAX</p> 

Mode	Typical Characteristics	Example Service
BRT High	<ul style="list-style-type: none"> <li>• Exclusive bus lanes</li> <li>• Level boarding at high quality stations</li> <li>• 60-foot buses that have multiple doors, sleek styling, and onboard visual/automated next stop announcements</li> <li>• Wide stop spacing (typically one mile) and frequent, seven-day-a-week service</li> <li>• Branded service through use of a distinct name, logo, color scheme, bus wrap, and set of visual identifiers</li> <li>• Off-board fare payment</li> <li>• Signal priority</li> <li>• “Real time” bus arrival information available at stations and through web/mobile apps on desktop computer or smartphone</li> <li>• Typical corridor length of five to 20 miles</li> </ul>	<p>Cleveland, OH HealthLine</p> 

### 4.3 Tier 1 Evaluation of Alignments Results

Table 4-5 summarizes the results of the initial screening of alignments. Alignments with one or more “not pass” overall ratings were removed from further definition and evaluation in subsequent phases of the study. As shown in Table 4-6, the Segments A1, A2, B, C, D, and E were recommended for more detailed definition and evaluation in subsequent project phases.

**Table 4-5: Summary Results of the Initial Screening of Alignments**

	Land Use	Multi-Modal and Regional Connectivity	Environmental Impacts	Community Support
Segment A1	Pass	Pass	Pass	Pass
Segment A2	Pass	Pass	Pass	Pass
Segment B	Pass	Pass	Pass	Pass
Segment C	Pass	Pass	Pass	Pass
Segment D	Pass	Pass	Pass	Pass
Segment E	Pass	Pass	Pass	Pass
Rail ROW 1	Pass	Not Pass	Pass	Pass
Rail ROW 2	Not Pass	Pass	Not Pass	Pass

**Table 4-6: Alignments for Detailed Definition and Evaluation of Alternatives**

Segment	Overall Assessment
Segment A1	Pass
Segment A2	Pass
Segment B	Pass
Segment C	Pass
Segment D	Pass
Segment E	Pass
Rail ROW 1	Defer
Rail ROW 2	Defer

While east-west transit connections between Chapel Hill and Carrboro are an important element of the region's transportation network, it was determined that investment in the Rail ROW 2 segment would not meet the stated Purpose and Need for transit investment in the North-South Corridor, whose travel market is north-south oriented. This determination does not preclude or minimize the need for additional investment in east-west transit connections between Carrboro and Chapel Hill, which may be considered in future projects.

#### 4.4 Alignments Recommended for Detailed Definition and Evaluation

The results of the Tier 1 Analysis recommended that the following segments be carried into the Tier 2 Detailed Definition and Evaluation of Alternatives:

- Segment A (northern terminus to Homestead Road)
  - A1 (Eubank Road Park-and-Ride Lot to Homestead Road)
  - A2 (Potential Park-and-Ride Lot to Homestead Road)
- Segment B (Homestead Road to Estes Drive)
- Segment C (Estes Drive to North Street)
- Segment D (North Street to Purefoy Road)
- Segment E (Purefoy Road to Southern Village)

## 5. Detailed Definition of Alternatives

The key physical and service elements of the transit alternatives that advanced through the Tier 1 screening of the Chapel Hill North-South Corridor Study were refined and documented in the Detailed Definition of Alternatives report, which is summarized below and available under separate cover. The key characteristics used to define each detailed alternative included:

- Service plan
- Stop spacing
- Stop facilities
- Runningway
- Transit vehicles
- Technology and customer information
- Identity and branding
- Maintenance facility

The detailed alternatives are summarized below.

### 5.1 Detailed Mode Alternatives

The detailed mode alternatives, shown in Figures 5-1 through 5-4, included the No Build, BRT in Mixed Traffic, BRT in a Dedicated Side Lane, and BRT in a Dedicated Center Lane.

**Figure 5-1: The No Build Alternative**



*Chapel Hill Transit, Chapel Hill, NC*

The No Build Alternative assumes implementation of the Durham-Orange Light Rail Transit (LRT) project as part of the background transit service network. Bus service changes assumed in the Durham-Orange LRT project are also assumed in this project. The No-Build Alternative also assumes expansion of weekend Chapel Hill Transit (CHT) service by this project's horizon year (2040). This No Build assumes some expansion of Saturday service, and assumes Sunday service levels match proposed Saturday service levels.

Figure 5-2: BRT in Mixed Traffic



*Silver Line, Boston, MA*

The BRT in Mixed Traffic Alternative includes substantial changes to the service plan, vehicles and technology used within the North-South Corridor, but – like the current CHT service and the No Build Alternative – will operate in mixed traffic throughout the corridor.

Figure 5-3: BRT in a Dedicated Side Lane



*Select Bus Service, New York, NY*

The BRT in Dedicated Side Lane would include the service, vehicular, and technology improvements of the BRT in Mixed Traffic Alternative, but would operate in a curbside lane that is exclusively dedicated to transit service either at peak hour or 24 hours a day, seven days a week. Dedicated lane operations will offer many operational benefits, including reduced travel times, improved service reliability and reduced bus stacking.

Figure 5-4: BRT in a Dedicated Center Lane



*Proposed Ashland Avenue BRT, Chicago, IL*

Like the BRT in Dedicated Side Lane Alternative, the BRT in Dedicated Center Lane Alternative will operate in a lane that is exclusively dedicated to transit service either at peak hour or 24 hours a day, seven hours a week – but the BRT in Dedicated Center Lane Alternative will operate in a center-running (rather than side-running) lane.



## 5.2 Detailed Alignment Alternatives

As discussed in Section 4.2 of this report, the alignment options that were studied during the initial screening phase and recommended for detailed development:

- Segment A (northern terminus to Homestead Road)
  - A1 (Eubank Road Park-and-Ride Lot to Homestead Road)
  - A2 (Potential Park-and-Ride Lot to Homestead Road)
- Segment B (Homestead Road to Estes Drive)
- Segment C (Estes Drive to North Street)
- Segment D (North Street to Purefoy Road)
- Segment E (Purefoy Road to Southern Village)

For purposes of the detailed definition and evaluation phase, it was assumed that each mode alternative will maintain consistent runningway operations for the length of the corridor. For instance, the BRT in a Dedicated Side Lane will operate in a bus-only lane constructed along the curb from Segment A through Segment E. It is also assumed that dedicated lane operations could be either curb- or center-running, and those lanes could either be converted from existing traffic use or newly constructed.

The characteristics of each detailed alternative are summarized in Table 5-1 below.

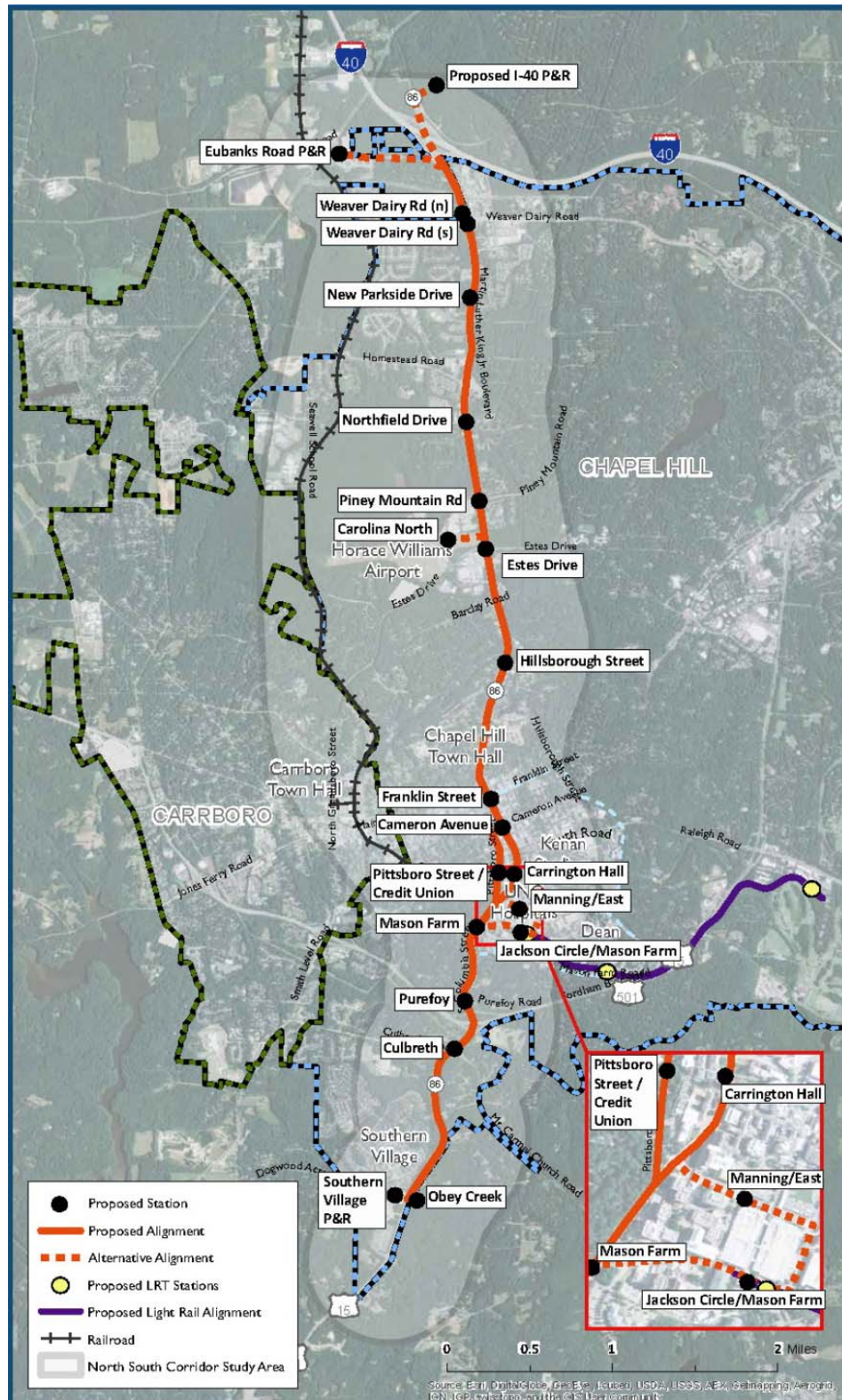
**Table 5-1: Summary of Detailed Alternatives**

	No Build	BRT in Mixed Traffic	BRT in Dedicated Side Lane	BRT in Dedicated Center Lane
Service Plan	Same as existing bus routes / services	Substantial increase in service levels throughout the week (i.e., more frequent weekday service and weekend service)		
Stop Spacing	No changes to existing stop location or spacing	Station locations altered to maximize ridership activity and community development impact. Fewer overall stations for rapid transit line. Stations generally spaced 1/2 mile to 1 mile apart. Underlying local bus service is present.		
Stop Facilities	No changes from existing	Station shelters and associated facilities to include level boarding, customer information, seating, and other features.		
Runningway	Operates in mixed traffic		Operates in dedicated side-running lane throughout corridor. A new dedicated lane could be constructed, or an existing traffic lane could be converted to transit-only use.	Operates in dedicated center-running lane throughout corridor. A new dedicated lane could be constructed, or an existing traffic lane could be converted to transit-only use.
Transit Vehicles	Uses existing 40-foot bus vehicles	Uses 40- or 60-foot articulated buses with right-door loading		Uses 40- or 60-foot articulated buses with right- and/or left-door loading
Technology/Customer Info	Uses existing technology and customer info	Integration of next-bus variable message signs at stations, online/mobile customer information, and traffic-signal priority for bus vehicles in the corridor		
Identity and Branding	No modifications to service branding	Unique identity and branding elements integrated into vehicles, stations and associated service materials		
Maintenance Facility	Utilizes existing maintenance facility			

As shown in Figure 5-5, a series of station locations for detailed evaluation were also identified through coordination with members of the Project Management Team, the project committees, and the public.



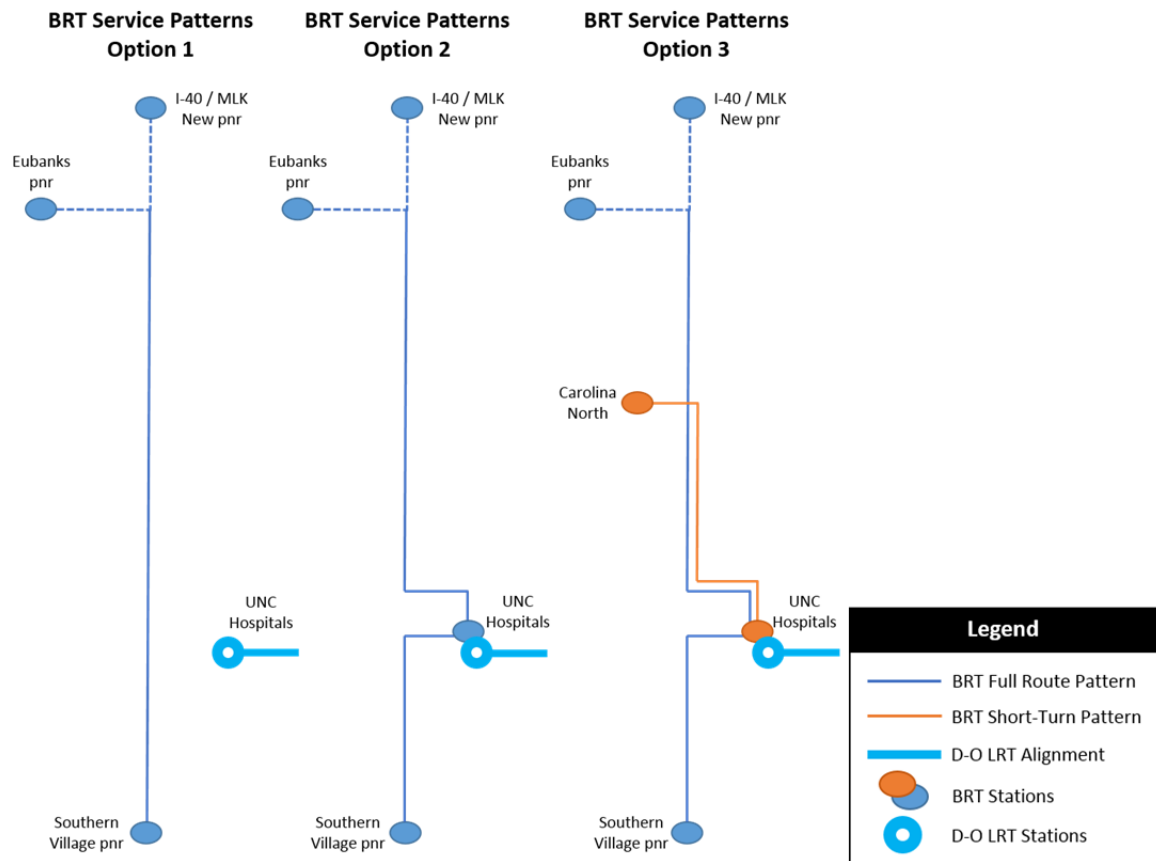
Figure 5-5: Station Locations for Detailed Evaluation



Three service plans were developed for consideration along the North-South Corridor, as shown in Figure 5-6:

- **Service Plan Option 1** would operate a single BRT route pattern that operates from the northern end-of-line (either Eubanks Road park-and-ride lot or I-40/Martin Luther King, Jr. Boulevard park-and-ride lot) to the Southern Village park-and-ride lot. BRT buses would remain on the proposed BRT corridor (Martin Luther King, Jr. Boulevard, Columbia/Pittsboro Streets and US 15-501), with no direct connection into the UNC Hospitals campus.
- **Service Plan Option 2** also consists of a single BRT route pattern that would operate the service pattern described above, but will provide direct connection to the future UNC Hospitals Light Rail Transit (LRT) Station via Mason Farm Road and Manning Drive.
- **Service Plan Option 3** consists of two BRT route patterns – a full-length and a short-turn pattern. The full-length pattern would operate the same service pattern described in Option 2. The short-turn pattern would operate from UNC Hospitals Station to Carolina North, with buses deviating off of the corridor to a turnaround location within Carolina North.

Figure 5-6: Tier 2 Service Plan Options



## 6. Detailed Evaluation of Alternatives

A combination of quantitative and qualitative evaluation criteria were used to assess the degree to which each of the detailed alternatives meets project goals, as stated in the project Purpose and Need Statement.

For purposes of the detailed evaluation, the alternatives were divided into three elements: service plan options, service plan options combined with configurations (the combination of modes and runningways within a segment), and configurations by segment.

This three-part evaluation process facilitated a “mix-and-match” approach to the corridor, which means that different design elements could – based on their performance - be combined together to create the best-performing alternative along the length of the corridor.

The Detailed Evaluation of Alternatives Report (available under separate cover) presents details of each alternative’s performance against these criteria; detail of the evaluation methodology and outcomes is included in the tech memo appendices to that report. The detailed evaluation criteria and summary results are shown in Tables 6-1 through 6-13 below.

**Table 6-1: Summary Results: Evaluation by Service Plan Options**

	Criteria Category / Metric	No Build	Service Plan 1	Service Plan 2	Service Plan 3
Goal 4	<b>Station area population and employment densities</b>				
	2010 population in proposed station areas	20,201	19,501	20,034	20,183
	2040 population in proposed station areas	39,937	36,445	39,799	40,578
	2010 employment in proposed station areas	31,822	30,825	31,768	32,012
	2040 employment in proposed station areas	47,311	39,874	47,142	41,670
Goal 5	<b>Households below poverty, minority populations, and zero-car households access to the transit network</b>				
	station area population below poverty	5,593	5,211	5,543	5,674
	percent of station area population that is below poverty	28%	27%	28%	28%
	minority station area population	6,513	5,949	6,445	6,572
	percent of station area population that is minority	32%	31%	32%	33%
	zero-car households in station areas	956	863	950	969
	percent of station area population that is zero-car	12%	9%	12%	12%
	<b>Cultural/historic impacts</b>				
Goal 2	number of proximate cultural/historic resources	--	27	27	27
	<b>Connectivity to the transit network</b>				
	number of station area transit transfer opportunities	--	120	103	129

Table 6-2: Summary Results: Evaluation by Configuration and Service Plans: Service Plan Option 1

Chapel Hill North-South Corridor Study: Summary of Detailed Evaluation of Alternatives - Configurations by Service Plan Options																											
	Criteria Category / Metric	No Build	Service Plan Option 1																								
			Mixed Traffic								Dedicated Lane																
											Dedicated Curbside Lane								Dediated Median Lane								
			No Traffic Signal Priority				With Traffic Signal Priority				Convert				Construct				Convert				Construct				
			2013		2040		2013		2040		2013		2040		2013		2040		2013		2040		2013		2040		
Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B		
Goal 1	Ridership projections																										
	total ridership	n/a	6,526	6,578	9,359	9,452	6,846	6,890	9,815	9,895	10,229	10,200	14,341	14,345	ridership the same for all dedicated lane configurations												
	other corridor routes	n/a	6,464	6,464	8,674	8,672	6,230	6,246	8,337	8,420	5,262	5,278	7,125	7,145	ridership the same for all dedicated lane configurations												
	new systemwide transit trips compared to the No Build	n/a	2,049	2,057	3,001	3,029	2,116	2,131	3,092	3,134	3,550	3,577	5,125	5,164	ridership the same for all dedicated lane configurations												
	ridership by transit dependents	n/a	232	246	442	459	249	251	487	491	452	449	763	760	ridership the same for all dedicated lane configurations												
Goal 2	Safety impacts (2013)																										
	reduced number of vehicular crashes compared to the No Build		--	--	--	--	--	--	--	--	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01		
Goal 4	Development Potential																										
	potential to catalyze development within station areas	Low	Medium-low								Medium				Medium				Medium				Medium				
	Environmental impacts (2013)																										
	change in transportation energy usage (btu per year)	n/a	12,097	11,701	7,030	6,562	11,610	11,202	6,465	5,951	8,109	7,817	2,794	2,327	8,109	7,817	2,794	2,327	8,109	7,817	2,794	2,327	8,109	7,817	2,794	2,327	
	carbon monoxide impacts (kg per year)	n/a	-890	-1,599	-2,517	-3,253	-1,971	-2,707	-3,546	-4,366	-9,738	-10,217	-10,232	-10,967	-9,738	-10,217	-10,232	-10,967	-9,738	-10,217	-10,232	-10,967	-9,738	-10,217	-10,232	-10,967	
	mono-nitrogen oxides (kg per year)	n/a	3,568	3,509	345	328	3,510	3,449	325	306	3,088	3,041	195	178	3,088	3,041	195	178	3,088	3,041	195	178	3,088	3,041	195	178	
	volatile organic compounds (kg per year)	n/a	194	167	-15	-30	155	128	-36	-53	-123	-141	-173	-188	-123	-141	-173	-188	-123	-141	-173	-188	-123	-141	-173	-188	
	particulate matter (2.5) (kg per year)	n/a	206	204	7	7	205	204	6	6	201	199	--	-1	201	199	--	-1	201	199	--	-1	201	199	--	-1	
	greenhouse gases (carbon dioxide equivalents) (tons per year)	n/a	984	955	582	548	950	920	542	505	703	682	283	250	703	682	283	250	703	682	283	250	703	682	283	250	
	change in annual VMT automobile	n/a	-203,574	-245,014	-347,837	-418,803	-268,065	-311,059	-448,070	-527,324	-731,157	-758,870	-1,099,714	-1,170,680	-731,157	-758,870	-1,099,714	-1,170,680	-731,157	-758,870	-1,099,714	-1,170,680	-731,157	-758,870	-1,099,714	-1,170,680	
	change in annual VMT diesel bus	n/a	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	
	change in annual VMT hybrid bus	n/a	519,245	516,745	519,245	516,745	519,245	516,745	519,245	516,745	519,245	516,745	519,245	516,745	519,245	516,745	519,245	516,745	519,245	516,745	519,245	516,745	519,245	516,745	519,245	516,745	
Goal 6	Operations and maintenance cost (systemwide costs)		\$500,896	\$3,185,779	\$3,348,297	--	--	\$3,216,075	\$3,263,043	--	--	\$3,023,208	\$3,196,926	--	--	\$3,023,208	\$3,196,926	--	--	\$3,023,208	\$3,196,926	--	--	\$3,023,208	\$3,196,926	--	--
	Capital costs (2015 dollars)		--	\$48.1 M	\$57.7 M	--	--	\$48.5 M	\$54.6 M	--	--	\$86.7 M	\$90.9 M	--	--	\$114.2 M	\$122.8 M	--	--	\$88.3 M	\$92.6 M	--	--	\$114.2 M	\$122.8 M	--	--

Table 6-3: Summary Results: Evaluation by Configuration and Service Plans: Service Plan Option 2

Chapel Hill North-South Corridor Study: Summary of Detailed Evaluation of Alternatives - Configurations by Service Plan Options																											
	Criteria Category / Metric	No Build	Service Plan Option 2																								
			Mixed Traffic								Dedicated Lane																
											Dedicated Curbside Lane								Dediated Median Lane								
			No Traffic Signal Priority		With Traffic Signal Priority		Convert				Construct				Convert		Construct		Convert		Construct						
			2013	2040	2013	2040	2013	2040	2013	2040	2013	2040	2013	2040	2013	2040	2013	2040	2013	2040	2013	2040	2013	2040	2013	2040	
Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B		
Goal 1	Ridership projections																										
	total ridership	n/a	6,115	6,311	8,884	9,163	6,436	6,741	9,319	9,705	10,334	10,413	14,483	14,716	ridership the same for all dedicated lane configurations												
	other corridor routes	n/a	6,413	6,633	8,529	8,660	6,321	6,442	8,418	8,408	5,234	5,501	7,084	7,219	ridership the same for all dedicated lane configurations												
	new systemwide transit trips compared to the No Build	n/a	1,844	1,606	2,726	2,364	2,043	1,826	2,996	2,671	3,586	3,513	5,153	5,006	ridership the same for all dedicated lane configurations												
	ridership by transit dependents	n/a	254	332	494	613	254	332	500	610	480	561	809	955	ridership the same for all dedicated lane configurations												
Goal 2	Safety impacts																										
	reduced number of vehicular crashes compared to the No Build		--	--	--	--	--	--	--	--	--	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	
Goal 4	Development Potential																										
	potential to catalyze development within station areas	Low	Medium								Medium-high				Medium-high				Medium-high				Medium-high				
	Environmental impacts																										
	change in transportation energy usage (btu per year)	n/a	13,597	14,438	8,524	9,257	12,876	13,841	7,679	8,637	10,157	10,541	4,706	5,061	10,157	10,541	4,706	5,061	10,157	10,541	4,706	5,061	10,157	10,541	4,706	5,061	
	carbon monoxide impacts (kg per year)	n/a	-82	1,961	-1,530	-74	-1,681	637	-3,069	-1,203	-7,714	-6,686	-8,485	-7,716	-7,714	-6,686	-8,485	-7,716	-7,714	-6,686	-8,485	-7,716	-7,714	-6,686	-8,485	-7,716	
	mono-nitrogen oxides (kg per year)	n/a	3,923	4,012	405	430	3,836	3,940	375	408	3,509	3,543	269	281	3,509	3,543	269	281	3,509	3,543	269	281	3,509	3,543	269	281	
	volatile organic compounds (kg per year)	n/a	242	314	9	39	185	267	-22	16	-31	5	-133	-118	-31	5	-133	-118	-31	5	-133	-118	-31	5	-133	-118	
	particulate matter (2.5) (kg per year)	n/a	224	224	9	11	223	223	8	10	219	219	3	3	219	219	3	3	219	219	3	3	219	219	3	3	
	greenhouse gases (carbon dioxide equivalents) (tons per year)	n/a	1,101	1,160	697	748	1,051	1,118	637	704	859	885	428	452	859	885	428	452	859	885	428	452	859	885	428	452	
	change in annual VMT automobile	n/a	-168,350	-45,584	-262,108	-119,399	-263,662	-124,579	-412,069	-229,474	-623,413	-561,253	-939,911	-864,283	-623,413	-561,253	-939,911	-864,283	-623,413	-561,253	-939,911	-864,283	-623,413	-561,253	-939,911	-864,283	
change in annual VMT diesel bus	n/a	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311		
change in annual VMT hybrid bus	n/a	556,445	553,845	556,445	553,845	556,445	553,845	556,445	553,845	556,445	553,845	556,445	553,845	556,445	553,845	556,445	553,845	556,445	553,845	556,445	553,845	556,445	553,845	556,445	553,845		
Goal 6	Operations and maintenance cost (systemwide costs)		\$500,896	\$3,795,290	\$3,768,284	--	--	\$3,425,769	\$3,537,738	--	--	\$3,364,289	\$3,368,484	--	--	\$3,364,289	\$3,368,484	--	--	\$3,364,289	\$3,368,484	--	--	\$3,364,289	\$3,368,484	--	--
	Capital costs (2015 dollars)		--	\$55.5 M	\$61.6 M	--	--	\$53.8 M	\$59.9 M	--	--	\$84.7 M	\$87.1 M	--	--	\$128.7 M	\$134.4 M	--	--	\$97.6 M	\$100.1 M	--	--	\$127 M	\$133.8 M	--	--

Table 6-4: Summary Results: Evaluation by Configuration and Service Plans: Service Plan Option 3

Chapel Hill North-South Corridor Study: Summary of Detailed Evaluation of Alternatives - Configurations by Service Plan Options																											
	Criteria Category / Metric	No Build	Service Plan Option 3																								
			Mixed Traffic								Dedicated Lane																
											Dedicated Curbside Lane								Dediated Median Lane								
			No Traffic Signal Priority				With Traffic Signal Priority				Convert				Construct				Convert				Construct				
			2013		2040		2013		2040		2013		2040		2013		2040		2013		2040		2013		2040		
Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B	Option A	Option B		
Goal 1	Ridership projections																										
	total ridership		5,788	6,300	8,376	9,109	6,303	6,311	9,080	9,142	10,209	10,226	14,316	14,441	ridership the same for all dedicated lane configurations												
	other corridor routes		6,613	6,621	8,860	8,701	6,271	6,618	8,386	8,659	5,234	5,523	7,086	6,678	ridership the same for all dedicated lane configurations												
	new systemwide transit trips compared to the No Build		1,741	1,577	2,576	2,332	1,887	1,680	2,773	2,494	3,531	3,414	5,073	4,873	ridership the same for all dedicated lane configurations												
	ridership by transit dependents		242	333	457	614	271	334	513	614	476	537	798	916	ridership the same for all dedicated lane configurations												
Goal 2	Safety impacts																										
	reduced number of vehicular crashes compared to the No Build	n/a	--	--	--	--	--	--	--	--	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	
Goal 4	Development Potential																										
	potential to catalyze development within station areas	Low	Medium-high								High				High				High				High				
	Environmental impacts																										
	change in transportation energy usage (btu per year)	n/a	13,804	14,404	8,728	8,970	13,383	14,218	8,266	9,284	10,413	10,616	4,974	5,183	10,413	10,616	4,974	5,183	10,413	10,616	4,974	5,183	10,413	10,616	4,974	5,183	
	carbon monoxide impacts (kg per year)	n/a	174	1,655	-1,298	-755	760	1,243	-2,141	-183	-7,349	-6,749	-8,136	-7,653	-7,349	-6,749	-8,136	-7,653	-7,349	-6,749	-8,136	-7,653	-7,349	-6,749	-8,136	-7,653	
	mono-nitrogen oxides (kg per year)	n/a	3,962	4,024	413	421	3,911	4,001	396	432	3,554	3,568	279	286	3,554	3,568	279	286	3,554	3,568	279	286	3,554	3,568	279	286	
	volatile organic compounds (kg per year)	n/a	253	305	14	25	220	290	-3	37	-16	4	-126	-116	-16	4	-126	-116	-16	4	-126	-116	-16	4	-126	-116	
	particulate matter (2.5) (kg per year)	n/a	226	225	10	10	225	225	9	11	221	220	3	3	221	220	3	3	221	220	3	3	221	220	3	3	
	greenhouse gases (carbon dioxide equivalents) (tons per year)	n/a	1,117	1,158	712	729	1,087	1,145	679	751	878	892	448	462	878	892	448	462	878	892	448	462	878	892	448	462	
	change in annual VMT automobile	n/a	-154,105	-65,009	-240,352	-131,054	-209,790	-89,614	-322,455	-186,739	-602,693	-566,174	-906,759	-859,103	-602,693	-566,174	-906,759	-859,103	-602,693	-566,174	-906,759	-859,103	-602,693	-566,174	-906,759	-859,103	
	change in annual VMT diesel bus	n/a	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	-86,311	
	change in annual VMT hybrid bus	n/a	559,445	557,245	559,445	557,245	559,445	557,245	559,445	557,245	559,445	557,245	559,445	557,245	559,445	557,245	559,445	557,245	559,445	557,245	559,445	557,245	559,445	557,245	559,445	557,245	
Goal	Operations and maintenance cost (systemwide costs)		\$500,896	\$4,152,085	\$4,146,157	--	--	\$3,913,951	\$3,919,224	--	--	\$3,721,084	\$3,759,415	--	--	\$3,721,084	\$3,759,415	--	--	\$3,721,084	\$3,759,415	--	--	\$3,721,084	\$3,759,415	--	--
6	Capital costs (2015 dollars)		--	\$59.8 M	\$65.9 M	--	--	\$58.1 M	\$64.2 M	--	--	\$90.8 M	\$93.2 M	--	--	\$134.8 M	\$140.5 M	--	--	\$103.7 M	\$106.2 M	--	--	\$133.1 M	\$139.9 M	--	--

Table 6-5: Summary Results: Evaluation of Segment and Configuration: Segment A1

Segment A1													
	Criteria Category / Metric	No Build		Mixed Traffic	Dedicated Curbside Lane				Dedicated Median Lane				
					Convert		Construct		Convert		Construct		
Goal 2	Bicycle and pedestrian mobility impacts												
			0	1	2		2		1		1		
		impacts on existing bike and ped facilities* compliance with bike and ped plans	no	yes	yes		yes		yes		yes		
Goal 3	Traffic impacts (LOS Impacts)		AM	PM	--	AM	PM	AM	PM	AM	PM	AM	PM
		NC 86 (Martin Luther King Jr Blvd) at I-40 WB Off Ramp	D	D	--	D	D	D	D	D	E	D	D
		NC 86 (Martin Luther King Jr Blvd) at I-40 EB Off Ramp	E	C	--	D	C	D	C	D	C	D	C
		NC 86 (Martin Luther King Jr Blvd) at SR 1727 (Eubanks Rd)	F	F	--	F	F	F	F	F	F	F	F
		NC 86 (Martin Luther King Jr Blvd) at Weaver Dairy Rd / Ext	D	F	--	F	F	D	F	F	F	D	F
	Parking impacts												
		number of on-street parking spaces removed	NA	0	0		0		0		0		



Table 6-6: Summary Results: Evaluation of Segment and Configuration: Segment A2

Segment A2													
	Criteria Category / Metric		No Build		Mixed Traffic	Dedicated Curbside Lane				Dedicated Median Lane			
						Convert		Construct		Convert		Construct	
Goal 2	Bicycle and pedestrian mobility impacts												
		impacts on existing bike and ped facilities*	0		1	2		2		1		1	
		compliance with bike and ped plans	no		yes	yes		yes		yes		yes	
Goal 3	Traffic impacts *Same as Segment A1		AM	PM	--	AM	PM	AM	PM	AM	PM	AM	PM
		NC 86 (Martin Luther King Jr Blvd) at I-40 WB Off Ramp	D	D	--	F	F	D	D	F	F	D	D
		NC 86 (Martin Luther King Jr Blvd) at I-40 EB Off Ramp	E	C	--	F	F	D	C	F	F	D	C
		NC 86 (Martin Luther King Jr Blvd) at SR 1727 (Eubanks Rd)	F	F	--	F	F	F	E	F	F	F	F
		NC 86 (Martin Luther King Jr Blvd) at Weaver Dairy Rd / Ext	D	F	--	F	F	D	F	F	F	D	F
	Parking impacts												
		number of on-street parking spaces removed	NA		0	0		0		0		0	

\*0 = no impact, 1 = some positive impact, 2 = significant positive impact

Table 6-7: Summary Results: Evaluation of Segment and Configuration: Segment B

Segment B													
	Criteria Category / Metric		No Build		Mixed Traffic	Dedicated Curbside Lane				Dedicated Median Lane			
						Convert		Construct		Convert		Construct	
Goal 2	Bicycle and pedestrian mobility impacts												
		impacts on existing bike and ped facilities*	0		1	2		2	1		1		
		compliance with bike and ped plans	no		yes	yes		yes	yes		yes		
Goal 3	Traffic impacts		AM	PM	--	AM	PM	AM	PM	AM	PM	AM	PM
		LOS impacts	D	C	--	F	F	D	C	F	F	D	C
	Parking impacts												
		number of on-street parking spaces removed	NA		0	0		0	0		0		0

\*0 = no impact, 1 = some positive impact, 2 = significant positive impact

Table 6-8: Summary Results: Evaluation of Segment and Configuration: Segment C

Segment C													
	Criteria Category / Metric		No Build		Mixed Traffic	Dedicated Curbside Lane				Dedicated Median Lane			
						Convert		Construct		Convert		Construct	
Goal 2	Bicycle and pedestrian mobility impacts												
	impacts on existing bike and ped facilities*		0	1	2		2		1		1		
	compliance with bike and ped plans		no	yes	yes		yes		yes		yes		
Goal 3	Traffic impacts		AM	PM	--	AM	PM	AM	PM	AM	PM	AM	PM
	LOS impacts		F	F	--	F	F	F	F	F	F	F	F
	Parking impacts												
	number of on-street parking spaces removed			NA	0	0		0		0		0	

\*0 = no impact, 1 = some positive impact, 2 = significant positive impact

Table 6-9: Summary Results: Evaluation of Segment and Configuration: Segment D

Segment D													
	Criteria Category / Metric	No Build		Mixed Traffic	Dedicated Curbside Lane				Dedicated Median Lane				
					Convert		Construct		Convert		Construct		
Goal 2	Bicycle and pedestrian mobility impacts												
		impacts on existing bike and ped facilities*	0	1	2	2	1	1					
		compliance with bike and ped plans	no	yes	yes	yes	yes	yes					
Goal 3	Traffic impacts	AM	PM	--	AM	PM	AM	PM	AM	PM	AM	PM	
		NC 86 (N Columbia St) at E / W Rosemary St	C	D	--	D	E	D	E	D	E	D	E
		NC 86 (N / S Columbia St) at E / W Franklin St	D	D	--	D	E	D	E	D	F	D	F
		NC 86 (S Columbia St) at E / W Cameron Ave	E	D	--	E	E	E	E	F	F	E	E
		NC 86 (W Cameron St) at NC 86 (Pittsboro St)	C	C	--	E	E	E	D	E	E	E	D
		NC 86 (Columbia St) at McCauley St / South Rd	D	D	--	C	D	D	D	C	E	C	E
		NC 86 (Columbia St) at Manning Dr	D	D	--	D	D	D	D	D	D	D	D
		NC 86 (Columbia St) at Westwood Dr / Mason Farm Rd	C	D	--	C	D	C	D	C	D	C	D
		Parking impacts											
		number of on-street parking spaces removed	NA	0	13	13	5	5					

\*0 = no impact, 1 = some positive impact, 2 = significant positive impact

Table 6-10: Summary Results: Evaluation of Segment and Configuration: Segment E

Segment E												
	Criteria Category / Metric	No Build		Mixed Traffic	Dedicated Curbside Lane				Dedicated Median Lane			
					Convert		Construct		Convert		Construct	
Goal 2	Bicycle and pedestrian mobility impacts											
	impacts on existing bike and ped facilities*	0		1	2		2		1		1	
	compliance with bike and ped plans	no		yes	yes		yes		yes		yes	
Goal 3	Traffic impacts	AM	PM	--	AM	PM	AM	PM	AM	PM	AM	PM
	NC 86 (Columbia St) at NC 54 WB Off Ramp	C	F	--	F	F	C	F	F	F	C	F
	US 15 / 501 at NC 54 EB Off Ramp	C	D	--	F	F	C	D	F	F	C	D
	US 15 / 501 at SR 1008 (Mt Carmel Church Rd) / Culbreth Rd	F	D	--	F	F	F	D	F	F	F	D
	US 15 / 501 at Market St	C	D	--	F	F	C	D	F	D	C	D
	Parking impacts											
	number of on-street parking spaces removed	NA		0	0		0		0		0	

\*0 = no impact, 1 = some positive impact, 2 = significant positive impact

## 7. Identifying the Preferred Alternatives

Following the development of the detailed technical analysis that is summarized above, the Technical and Policy Committees, the Chapel Hill Transit Partners, elected officials from the Towns of Chapel Hill and Carrboro, and members of the public reviewed the results and identified a Preferred Alternative (with two variations) to take into Tier 3 of the study. The process of identifying and refining the preferred alternatives is described below.

### 7.1 The Technical Committee: September 2015

Using a spreadsheet-based tool that helped to combine capital and O&M costs, travel time, and traffic impacts in real-time, the Technical Committee – during its September 2015 meeting – designed a series of three alternatives that combined different service plans and runningway types as a means to achieve the project Purpose and Need.

It was apparent from the technical analysis the greatest number of riders, and the greatest travel time savings, could be achieved by operating in converted transit-only lanes through downtown Chapel Hill. It was acknowledged that Columbia Street could not be widened through the downtown. The Committee also wanted to suggest further evaluation of Service Options 1 and 2; it was determined that Service Option 3 (which included the short-turn service between UNC's main campus and Carolina North) should be removed from further consideration, but could be added as the Carolina North development moves forward in the future.

**Figure 7-1: Initial Recommendations of the Technical Committee: September 2015**



Note: blue = mixed traffic with TSP;  
dark green = dedicated curb lane – construct;  
light green = dedicated center lane – construct;  
yellow = dedicated curb lane - convert



## **7.2 The Technical and Policy Committees: October 2015**

The three alternatives that were initially recommended for further study by the Technical Committee at their September 2015 meeting were then taken to the Policy Committee for review at the joint Technical and Policy Committee meeting in October 2015. The Policy Committee added three alternatives to the original three alternatives (for a total of six alternatives) for further evaluation. The three new alternatives (shown in Figure 7-2 as alternatives 3, 4, and 6) reflected the Policy Committee's desire to further consider alternatives that included a higher level of capital investment in addition to the initial three alternatives. The Committees also wanted to add additional alternatives that serve the UNC Hospitals campus as a means to serve a major activity and employment generator and facilitate direct connections to the planned Durham-Orange light rail project.

## **7.3 Chapel Hill Transit Partners: October 2015**

The six alternatives initially recommended for further consideration by the Technical and Policy Committees at their October 2015 meeting were then taken for review to the Chapel Hill Transit Partners. After review of the alternatives, the Partners recommended a few modifications, including:

- Modifying the northern end of alternative 4 (segments A and B) from constructing a dedicated lane to converting a general traffic lane to a dedicated lane
- Modifying segment Dn of alternative 4 from mixed traffic to converting a lane to dedicated transit use
- Modifying alternative 6 to feature mixed traffic operations through the UNC Hospitals portion of the alignment (segment Dn) due to right-of-way and operational constraints

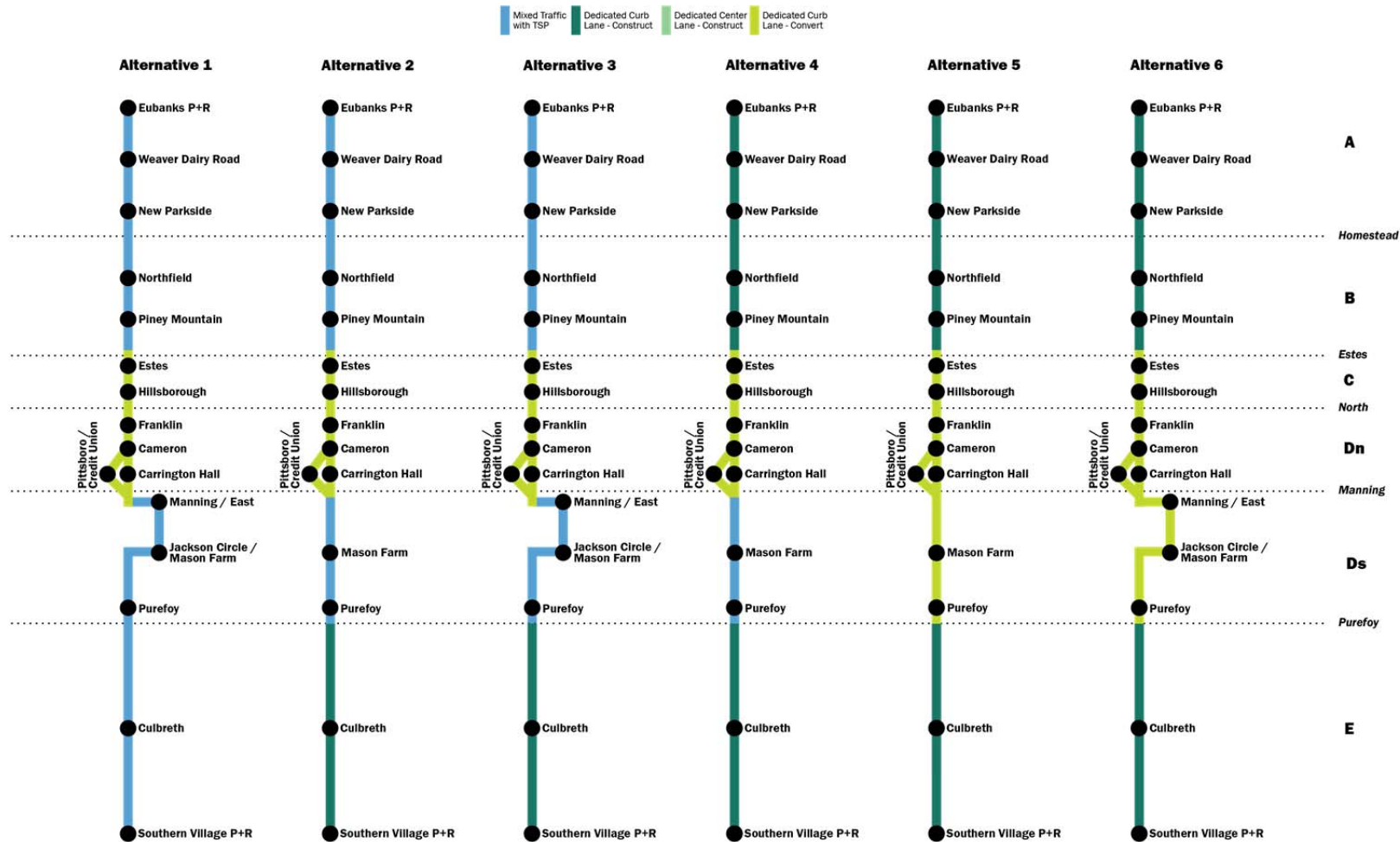
It should be noted that – following the modifications listed above – the names of alternatives 3 and 4 were switched in order to be consistent with previous project naming protocols. See Figure 7-3.

## **7.4 Chapel Hill Town Council and Carrboro Board of Alderman: November 2015**

The alternatives recommended for further consideration by the Chapel Hill Transit Partners at their October 2015 meeting were then taken to the Chapel Hill Town Council on November 9, 2015 and the Carrboro Board of Aldermen on November 10, 2015. Both legislative bodies were generally supportive of the transit investment but had some concerns and questions, including property value impacts, provision of park-and-ride facilities, coordination with feeder service, and environmental impacts.

In response to public feedback at the meeting, the Chapel Hill Town Council provided the direction to shift the Ds/E segment boundary and station location from Purefoy Road to NC 54 as means to mitigate impacts that may accrue to the residents and small businesses in the area around the proposed Purefoy stop. See Figure 7-4.

Figure 7-2: Initial Recommendations of the Technical and Policy Committees, October 2015



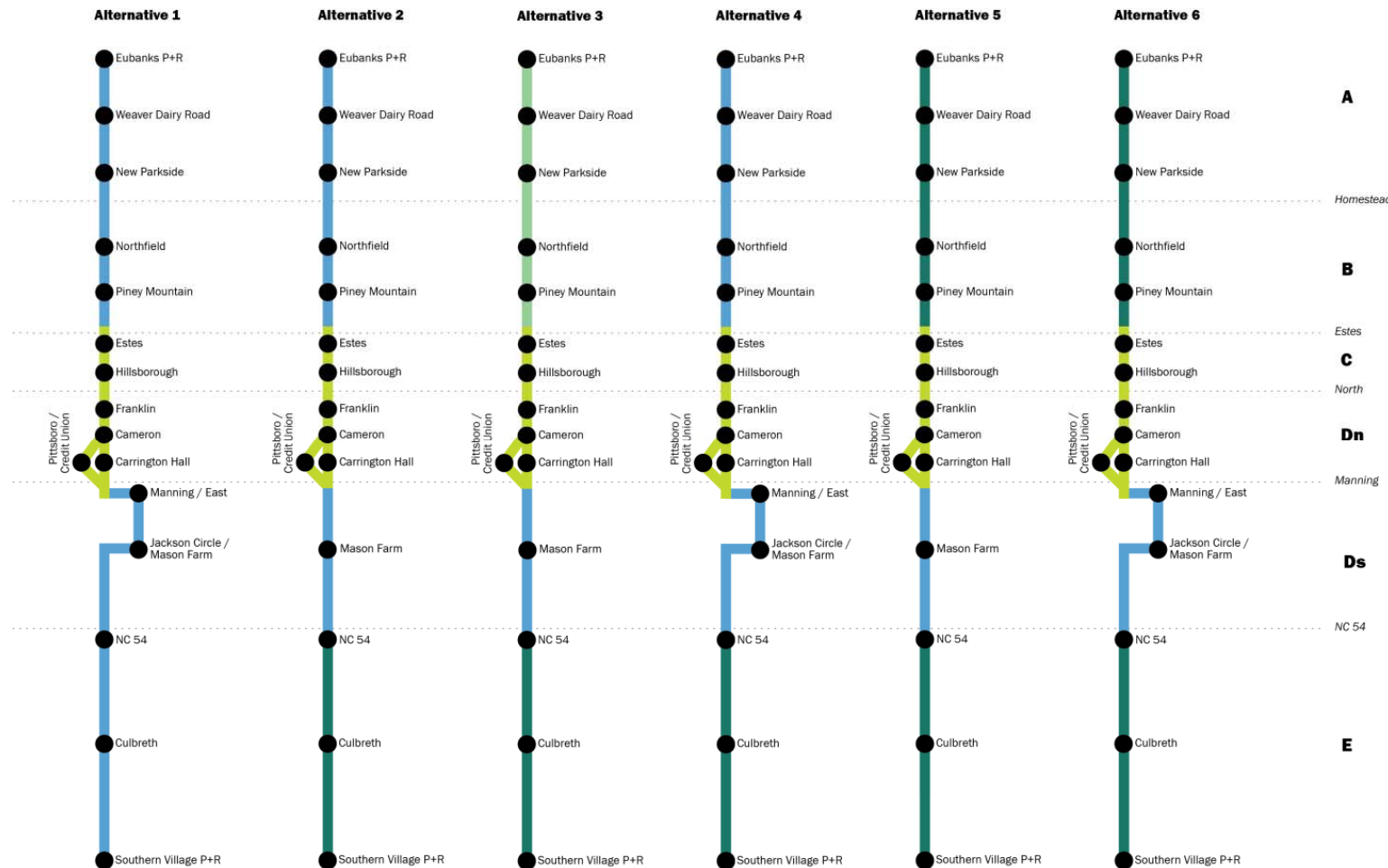
Note: blue = mixed traffic with TSP; dark green = dedicated curb lane – construct; light green = dedicated center lane – construct; yellow = dedicated curb lane - convert

Figure 7-3: Suggested Alternatives for Further Considerations, Recommended by the Chapel Hill Transit Partners, October 2015



Note: blue = mixed traffic with TSP; dark green = dedicated curb lane – construct; light green = dedicated center lane – construct; yellow = dedicated curb lane - convert

**Figure 7-4: Suggested Alternatives for Further Consideration, Recommended by the Chapel Hill Town Council and Carrboro Board of Aldermen, November 2015**



Note: blue = mixed traffic with TSP; dark green = dedicated curb lane – construct; light green = dedicated center lane – construct; yellow = dedicated curb lane - convert

## 7.5 Technical and Policy Committees: March 2016

A combined Technical and Policy Committee meeting was held in March 2016 to review input received during the January/February 2016 public outreach session and review refined technical information. The consensus was that one preferred alternative (alternative 6 with two variations) be carried forward for final refinement during Tier 3 of the study. The preferred alternatives, which became the Locally Preferred Alternative, are described in more detail in Section 8 of this report.

## 8. The Locally Preferred Alternative

### 8.1 Findings

Based on this detailed evaluation of alternatives, an LPA has emerged that is a combination of modes, segments and configurations within the North-South Corridor that is responsive to the need for transportation investment within the corridor (as defined in the Purpose and Need Statement) and which will be competitive for federal funding.

The preferred alternative (see Figure 8-1) is BRT operating in a combination of mixed traffic and dedicated transit lanes between an end-of-line station at the Eubanks Road park-and-ride lot and an end-of-line station at Southern Village park-and-ride lot. Based on the iterative alternative design process described in Section 7 of this report, the LPA (and its variations) best balance ridership, cost travel times, traffic impacts, and community support in meeting the stated goals and objectives of the project.

- **Alternative 6-1** would operate in dedicated curb lanes that are newly constructed in Segments A and B (between Eubanks park-and-ride and Estes). Between Estes and Manning Drive, the BRT would operate in a dedicated curb lane that is converted from existing traffic. South of Manning, through the UNC Hospitals campus, the BRT would operate in mixed traffic with transit signal priority through Purefoy to NC 54. South of NC 54, the BRT would operate in a dedicated curbside lane that is newly constructed.
- **Alternative 6-2** would be identical to Alternative 6-1, with the exception of segment C, which would operate as a dedicated curb lane that is newly constructed.
- **Alternative 6-3** would operate in a dedicated center-running lane that would be newly constructed between Eubanks park-and-ride through Hillsborough. South of Hillsborough, the BRT would operate identically to Alternatives 6-1 and 6-2.

#### The Locally Preferred Alternative

Length: 8.2 miles

Number of Stations: 16

Frequency of Service:

Every 7.5 minutes (peak)

Every 10 – 20 minutes (off-peak)

Number of BRT Vehicles: 12

Capital Costs: \$96.8M - \$105.9M

Annual Operating Cost:

\$3.4M

Average Daily Ridership:

8,575 (+43% over existing corridor ridership)

Station-Area Population Density:

2,297 people per sq. mi. (average)

Station-Area Job Density:

8,195 jobs per sq. mi. (average)

Key Station Area Demographics:

Zero-Car Households: 688 (11%)

Residents below the Poverty Line: 5,594 (23%)

Residents of Color: 7,035 (29%)

Figure 8-1: The Locally Preferred Alternative, April 2016



Note: blue = mixed traffic with TSP; dark green = dedicated curb lane – construct; light green = dedicated center lane – construct; yellow = dedicated curb lane - convert



Preliminary stop locations, which may be modified during the refinement of the preferred alternative and the environmental clearance process, are:

- Eubanks Road park-and-ride lot
- Weaver Dairy Road
- New Parkside
- Northfield
- Piney Mountain
- Estes
- Hillsborough
- Franklin
- Cameron
- Pittsboro / Credit Union
- Carrington Hall
- Manning / East
- Jackson Circle / Mason Farm
- NC 54
- Culbreth
- Southern Village park-and-ride

Three renderings of conceptual stations / runningway configurations are shown in Figures 8-2 through 8-4. These designs will continue to be refined during detailed engineering and environmental review.

**Figure 8-2: Dedicated Center Lane – Convert a Lane**





Figure 8-3: Dedicated Center Lane – Construct a Lane



Figure 8-4: Dedicated Curb Lane – Convert a Lane



The BRT service will operate more frequently, for more days per week than the current Route NS service. This improved service level will accommodate demand from UNC students and encourage local residents to consider transit as an attractive daily alternative to driving.

The LPA reflects the outcomes of technical analyses and input heard from community participants, and is responsive to the five corridor transportation needs defined in the project Purpose and Need Statement (available under separate cover):

- Chapel Hill Transit ridership has increased more than 20 percent between 2005 and 2012, and buses often operate at capacity during weekday peak hours on multiple routes.
- Chapel Hill is comparatively young, but its fastest-growing demographic is over age 65.
- Major development opportunities at the northern and southern ends of the corridor will fundamentally reshape mobility patterns and needs within the corridor.
- Multi-modal transportation investments are necessary to accommodate anticipated increased travel demand resulting from planning development within the corridor.
- Chapel Hill – and the surrounding region – has demonstrated a commitment to sustainable growth strategies in their adopted plans and policies.

The key outcomes of the alternative development and evaluation process were:

- **Use higher-capacity buses.** Using larger buses while maintaining 7.5-minute peak headways will provide additional capacity to meet current demand while accommodating continued ridership growth in the corridor.
- **Optimize station locations.** By reducing the number of stations and integrating dedicated lanes / transit-signal priority, the LPA will offer measurable time savings for transit trips in the corridor.
- **Provide a direct connection to UNC Hospitals and the planned D-O LRT.** Feedback from members of the public, project committees, and elected officials was overwhelmingly in support of making a direct connection to the UNC Hospitals campus and the planned D-O LRT. This connection provides direct access to a major regional employer and activity center, and will facilitate regional transit network connectivity.
- **Target use of dedicated lanes.** In certain segments of the corridor, dedicated lanes were not found to be cost-effective (not a significant ridership gain for significantly higher capital costs), or were found to result in significant, negative traffic impacts. Mixed traffic operations in these segments will generate ridership and economic development benefits while minimizing or avoiding negative impacts.

## 8.2 Next Steps

### 8.2.1 Approval and Adoption of the LPA

At a joint project committee meeting on March 7, 2016, the Technical and Policy Committees recommended the LPA to the Chapel Hill Transit Partners, who (following their approval) recommended it to the Chapel Hill Town Council. The Chapel Hill Town Council approved the LPA on April 27, 2016, and has requested that that DCHC MPO adopt it into the region's fiscally-constrained 2040 Metropolitan Transportation Plan.

### **8.2.2 National Environmental Policy Act**

Chapel Hill Transit has begun preliminary work to ensure the compliance with the National Environmental Policy Act (NEPA). The first step in this process will be to work with the FTA to make a Class of Action (COA) Determination. At this time it is anticipated that the COA for this project will either be a Categorical Exclusion (CE) or an Environmental Assessment (EA). The COA will depend upon the final LPA and the potential impacts of the LPA. Chapel Hill Transit anticipates receiving a COA determination in Spring 2017.

The COA will affect the estimated time required to complete the appropriate NEPA documentation. A CE would likely take approximately six months to complete, wrapping up in the summer of 2017. However, an EA is anticipated to take longer, approximately one year, and would be completed in the winter of 2017/2018.

### **8.2.3 Request to Entry into Small Starts**

It is anticipated that the North-South Corridor Study project will be funded through a portion of the FTA's Capital Investment Program, commonly known as Small Starts. This requires Chapel Hill Transit to request entry into the Small Starts Project Development program from the FTA. This can be done either during or following the completion of the NEPA process. Chapel Hill Transit anticipates applying to enter Small Starts in time to be included in the President's FY 2019 budget; the deadline for this is expected to be in September 2017.

### **8.2.4 Project Development**

Following the completion of the NEPA process, Chapel Hill Transit will conduct final engineering and vehicle procurement during the Small Starts Project Development phase. The final design will be developed from the Preliminary Engineering completed for NEPA. The Project Development phase prepares the final plans, specifications and bid package for construction of the project.

### **8.2.5 Grant Agreement/Construction**

Chapel Hill Transit will work with the FTA to develop a Grant Agreement, with the grant expected in the winter of 2018/2019. A Grant Agreement is the means by which the FTA provides funds for the capital costs of Small Starts projects. It will identify the maximum federal share and capital cost for the project.

Upon receipt of the Grant Agreement, Chapel Hill Transit will begin the construction of the North-South Corridor BRT in approximately the late winter/early spring of 2019. Construction is anticipated to take two construction seasons, or approximately 18 months. Following construction the North-South Corridor BRT would open for revenue service in 2020.

### **8.2.6 Project Funding**

The funding for the North-South Corridor BRT project will likely require a combination of federal and state funding. These funding sources will likely include FTA Small Starts funds and matching funds from the Orange County Bus and Rail Investment Plan and the State of North Carolina. However, throughout the NEPA and Project Development phases, Chapel Hill Transit will continue to explore additional funding sources.