CHAPEL HILL TRANSIT
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CHAPEL HILL TRANSIT PUBLIC TRANSIT COMMITTEE

NOTICE OF COMMITTEE MEETING AND AGENDA

MAY 19, 2015 – 11:00 A.M. to 1:00 P.M.

CHAPEL HILL TRANSIT – FIRST FLOOR CONFERENCE ROOM

MEETING SUMMARY OF A REGULAR MEETING OF THE PUBLIC TRANSIT COMMITTEE
1ST FLOOR TRAINING ROOM, CHAPEL HILL TRANSIT

Tuesday, April 28, 2015 at 11:00 AM

Present: Jim Ward, Chapel Hill Town Council
Damon Seils, Carrboro Alderman
Bethany Chaney, Carrboro Alderman
Cheryl Stout, UNC Public Safety
Than Austin, UNC Transportation Planner
Julie Eckenrode, Assistant to Carrboro Town Manager

Absent: Ed Harrison, Chapel Hill Town Council, Meredith Weiss, UNC Finance and Administration

Staff present: Brian Litchfield, Transit Director, Roger Chapin, Assistant Transit Director, Operations, Rick Shreve, Budget Manager, Mila Vega, Transportation Planner, Nick Pittman, Operations Manager, Bergen Watterson, Carrboro Transportation Planner

Guests: Lee Storrow – Chapel Hill Town Council, Eric Hyman, Transportation and Connectivity Advisory Board, Molly DeMarco, Devin Ross, Admoa Adsare, Martin Trimble, Rebecca Ogus, Rev. Lisa Fishback – HS Route – Church of the Advocate, Orange County Justice United, Habitat Homeowners Association

1. The Meeting Summary of March 24, 2015 was received and approved.

2. **Employee Recognition** – Brian recognized recent new hires at CHT – Fixed Route – Reginald Simmons, Rodney Simmons, Maintenance Parts Clerks – Ronnie Stroud and Robby Eubanks. He also announced the recent promotion of Mark Agosto to Assistant Maintenance Manager.

   Brian also announced the resignation of Nick Pittman, effective May 15th. Nick has accepted a position as Assistant Transit Director at ECU. Brian and Jim expressed their appreciation to Nick for a job well done. Nick thanked everyone for the time and experienced he gained while working at CHT.

   Jim Ward asked to reverse items 4a & 4b on the agenda to accommodate guests who were here to comment on the Service Requests. The Committee agreed and the items were reversed.

3. **Consent Items**

   A. March Financial Reports – Rick reviewed this report for the Partners.

4. **Discussion Items**

   A. Service Requests – Brian reviewed the item for the Partners. A request was received to extend the T route beyond East Chapel Hill High School. Staff has considered this change

prior to receiving the request and agreed it is a reasonable request. However, it would require reducing times or adding a bus and driver for peak times. The cost would run approximately $120,000/yr and it is not possible to make this change this year or next year. A response will be sent to the Town Council and Town Manager who will respond to the person who made the request. Cheryl Stout recommended keeping a running total on service requests received so that information can be provided when considering new services.

Brian reviewed a request that was received to increase the frequency and span of service on the HS route. Staff felt the request was worth staff time to study if the Partners were interested in pursuing. Jim Ward asked the representatives for the HS route if they would like to make some comments regarding the request. This group was advocating for affordable and available transportation to work for residents and for the development of the community. CHT Staff is willing to work with these groups to develop some options. Brian suggested a 30-60 day timeline for next steps and working with the advocacy groups with an update for Partners in August. It was noted that any changes need to consider current riders. The Partners asked staff to provide further information on cost, ridership, etc. Jim asked staff to investigate how the County might be involved with funding for the HS route.

A request was made for a bus shelter to be installed at Purefoy & Rogers Road. Staff will work with Carrboro to get one in place.

Bethany Chaney asked about a sponsorship program for bus shelters to help increase revenue. Brian will put this on a future agenda for discussion.

Brian reviewed a request for service to Lake Hogan Farms. He suggested considering this at a later time. Bethany Chaney suggested looking at options that might help with EZ Rider service and Brian said he would put this on an agenda in the next couple of months.

B. <u>FY 2015-16 Budget Development</u> – Brian reviewed the budget development for the Partners and introduced the discussion regarding the NU route. He presented 3 options(these do not include weekends) for funding proposals.
Option A – Full partnership paying the cost of the route
Option B – UNC pays for 33 minutes of each hour and the partners 17 minutes
Option C – UNC pays for peak running time and the partners cover off peak
Bethany Chaney would like further investigation into options before making any recommendations and that the current cost sharing model needs to be looked at before making any changes. Cheryl Stout said that UNC would consider Option B on a temporary basis while working on getting back to the original agreement.

Staff will provide more information on Option B with weekend service, but not including summer or winter break service, as a temporary measure to get to Option A. It was also suggested to return the route to express service but that would mean adding trippers to pick up passengers left behind. Staff will provide accurate budget numbers to the Partners in the next couple of days for their consideration.

Brian reviewed funding available for capital expenses for 20-22 new buses next year. Brian said that the conversation with Partners regarding leasing buses will continue after the FY 16 budget is adopted. Jim Ward would like UNC to make this a part of their new 5 year plan.

Brian reported that he has spoken with the Chatham County Manager regarding the future of the Pittsboro route. The Chatham County Commissioners would like Brian to give them a presentation about the service in early May. UNC expressed a desire to terminate funding at the end of this fiscal year. There was discussion about this and the Partners agreed that they would like to end funding with a willingness to help Chatham County with a strategy to continue the service. Brian will let the County Manager know that the Partners have decided to end funding. Jim Ward will contact the Chapel Hill and Carrboro Mayors to enlist their help in taking with the Pittsboro Mayor about the end of the service. There were questions about TTA's role in funding this service.

5. **Information Items**

   A. Long Range Financial Sustainability Study – Provided for the Partner's information.

   B. Obey Creek Development Update – Provided for the Partner's information.

   C. Safety/Risk Management Initiatives Update - Provided for the Partner's information.

   D. March Performance Report – Provided for the Partners information.

6. **Departmental Monthly Report**

   A. Operations - Provided for the Partners.

   B. Director – Provided for the Partners.

7. **Future Meeting Items**

8. **Partner Items**

9. **Next meeting –** May 19, 2015

10. Adjourn

The Partners set a next meeting date for May 19, 2015

CONSENT ITEM May 19, 2015

3A. April Financial Report

Staff Resource: Rick Shreve, Budget Manager

- The April Financial Report will be provided to the Partners during the May 19, 2015 meeting.

DISCUSSION ITEM May 19, 2015

4A. FY2015-16 Chapel Hill Transit Budget Development
Action: 1. Receive information/presentation and provide staff with feedback.

Staff Resource: Rick Shreve, Budget Manager
Brian Litchfield, Director

Presentation

- A presentation updating the Partners on the development of the FY2015-16 budget will be made at the Partners meeting. The recommended Chapel Hill Transit budget for FY2015-16 is $20,863,015 (very similar to our current year budget) and was part of the Chapel Hill Town Manager's recommended budget that was presented to Council on May 11, 2015. The recommended budget includes a cost sharing of a portion of the NU route hours (which to date has been a UNC funded route) and does not include funding for the PX route, which can be amended back in, should Chatham County and the Town of Pittsboro pay for the service. These late changes led to some adjustments to the likely split of Chapel Hill Transit Partner contributions for FY15-16:

Total Share per partner		FY14-15 Contribution	FY15-16 Increase	FY16 Increase %
Chapel Hill	4,561,186	4,356,348	204,838	4.70%
UNC	7,844,040	7,765,808	153,232	1.97%
Carrboro	1,540,288	1,472,520	67,768	4.60%
Total	13,945,513	13,594,676	425,837	3.13%

- This split is slightly different than what appeared in the Chapel Hill Town Manager's recommended budget, as the adjustments noted above were made well after staff provided information for the recommended budget. However, the split above will be the likely split for FY15-16.
- We have entered into two fuel contracts for next year: 75,000 gallons of gasoline at $1.8887 per gallon and 300,000 gallons of ULSD at $2.0006 per gallon (we'll need to purchase an additional 300,000 of ULSD and we are continuing to monitor prices). We have accounted for the anticipated fuel savings in our budget projections.

Pittsboro Express Update

- As requested during the April Partners Meeting the Chapel Hill Mayor contacted the Chatham County Board of Commissioners and Town of Pittsboro Board of Commissioners notifying them that the Partners would not be able to fund the Pittsboro Express (PX) route for FY2015-16 and for the route to continue they would need to fund the service.
- I have had phone conversations with Mayor Terry and Commission Chair Crawford and both have expressed an interest in working with their respective Boards to potentially identify funding for the route. We have been asked by the Chatham County Manager to attend a May 18, 2015 Public Hearing on the FY2015-16 Chatham County budget to

discuss PX funding with the Board. Mayor Terry has agreed to attend the Public Hearing as well.

Next Steps

- Staff will provide an update on the PX route based on feedback received during the May 18, 2015 Public Hearing in Chatham County.
- Staff will provide a budget update at the June, 2015 Partners Meeting.

Upcoming Town of Chapel Hill Budget Process Dates

- May 13: Budget Work Session.
- May 18: Public Hearing on Recommended Budget and Budget work session.
- June 1: Budget work session (if needed).
- June 3: Budget work session (if needed).
- June 8: Adoption of FY2015-16 budget.

Action

- Partners Committee receive information/presentation and provide staff with feedback.

DISCUSSION ITEM May 19, 2015

4B. Chapel Hill Transit Public Transit Committee Future Meeting Schedule
Action: 1. Approve schedule as presented.

Staff Resource: Brian Litchfield, Director

- During the February 25, 2014 meeting, the Public Transit Committee (Partners) adopted a meeting schedule through June 2015 (generally the fourth Tuesday of each month, unless otherwise noted). Staff is recommending the adoption of a similar schedule through June 2016. If approved the schedule will be posted on the Partners' webpage and the Town's meeting calendar.

Chapel Hill Transit Public Transit Committee Meeting Schedule		
Date	**Time**	**Location**
July – No Meeting	No Meeting	CHT - 1st Floor Conference Room
August 24, 2015	11:00 A.M. – 1:00 P.M.	CHT - 1st Floor Conference Room
September 22, 2015	11:00 A.M. – 1:00 P.M.	CHT - 1st Floor Conference Room
October 27, 2015	11:00 A.M. – 1:00 P.M.	CHT - 1st Floor Conference Room
November	No Meeting	CHT - 1st Floor Conference Room
December	No Meeting	CHT - 1st Floor Conference Room
January 26, 2016	11:00 A.M. – 1:00 P.M.	CHT - 1st Floor Conference Room
February 23, 2016	11:00 A.M. – 1:00 P.M.	CHT - 1st Floor Conference Room
March 22, 2016	11:00 A.M. – 1:00 P.M.	CHT - 1st Floor Conference Room
April 26, 2016	11:00 A.M. – 1:00 PM	CHT - 1st Floor Conference Room
May 24, 2016	11:00 A.M. – 1:00 P.M.	CHT - 1st Floor Conference Room
June 28, 2016	11:00 A.M. – 1:00 P.M.	CHT - 1st Floor Conference Room

Recommendation

- Staff recommends approval of the schedule through June 28, 2016, as presented.

INFORMATION ITEM May 19, 2015

5A. Long Range Financial Sustainability Plan Update

Staff Resource: Rick Shreve, Budget Manager
Brian Litchfield, Director

Overview

- Bethany Whitaker our Project Manager for the Long Range Financial Sustainability Plan has left Nelson\Nygaard for another career opportunity (one requiring less travel so she can spend more time with her family). As a result, we have interviewed and identified a new project manager, Thomas Wittmann (brief resume attached). Thomas was unable to attend the May Partners meeting; however, we'd like to introduce him to the Partners at the June meeting along with a presentation on the Capital Plan. Thomas is working closely with the project team, including meeting with Brian in Atlanta last week while they were there for conferences. We believe Thomas' experience and knowledge of the area (NC State graduate and his wife is a Carolina graduate) will make him a good fit for us as Project Manager.

Next Steps

- June Partners Meeting will include a presentation from the consultant team on the Capital Plan.

Attachments

- Thomas Wittmann Resume
- Draft of Vehicle Size/Fuel Types white paper (to be provided at meeting).

Thomas Wittmann, P.E.

Principal

Thomas Wittmann has more than 20 years of experience in transportation planning, specializing in transit operations and capital planning. He has worked with large urban systems throughout the country. His transit operations experience includes comprehensive operational analyses, transportation development plans, optimization studies, and management performance reviews. Thomas's transit capital facilities experience includes park-and-ride feasibility studies, park-and-ride operations plans, transit center planning, and ridership forecasts.

EDUCATION

MS, Civil Engineering, Transportation, North Carolina State University, 1994
BA, Physics, University of Chicago, 1991

EXPERIENCE

Nelson\Nygaard Consulting Associates Inc.
Principal, 2011–Present

- **UTA Network Planning, Salt Lake City, UT.** Thomas led the bus service planning component of the planning effort to identify the next high capacity transit corridors in the Salt Lake City urbanized area. Ten new "Bus Plus" corridors were identified. As part of this contract, Thomas has also helped UTA identify their core service network, and assist in service reduction strategies.
- **New Orleans COA, New Orleans, LA.** Thomas was the project manager for this study. Some goals of the study were to address chronic capacity issues on RTA routes as well as integrate the new Loyola streetcar into the overall network. The study resulted in multiple regional recommendations outlining opportunities for RTA and JeT to better coordinate their services. Routes in New Orleans East were restructured to better serve redeveloped commercial areas.
- **SORTA Comprehensive Operational Analysis, Cincinnati, OH.** Thomas was the project manager of the current service analysis to examine both short and long term opportunities for improving transit in Southwest Ohio. Recommendations include shifting from a downtown orientation to more of a grid-type network. BRT corridors were also developed, and integration of downtown Cincinnati routes with the under-construction streetcar route was also completed.
- **Miami-Dade Transit Service Evaluation, Miami, FL.** Thomas is the service planning lead for restructuring MDT's service to be more "grid-like." The planning emphasis has been to leverage existing rail corridors and to develop a "Frequent Transit Network" that encompasses fixed-guideway BRT, in-street BRT, and frequent service routes on arterials. A network that reduces costs, yet increases ridership has been developed.
- **Big Blue Bus Expo Line Integration Plan, Santa Monica, CA.** Thomas is leading an effort to realign Big Blue Bus service to feed into and complement the new Expo Line that is being extended from Culver City to downtown Santa Monica. The plan included market research, public outreach, and multiple iterations of changes to respond to public comment. The resultant plan improves frequency on the highest ridership routes and creates a grid of north/south service to feed the Expo Line.
- **Georgia Regional Transit Authority Comprehensive Operational Analysis, Atlanta, GA.** Thomas is managing this study that will improve system efficiency and effectiveness, as well as provide a roadmap for future growth for GRTA. Recommendations include simplifying the service network and adding suburb to suburb express service.
- **Fargo-Moorhead Transit Development Plan, Fargo, ND.** Thomas led an effort to address the impacts of tremendous ridership growth on the MATBUS system. New service on North Dakota State

University's campus was recommended to provide high-frequency connections between campus and a large student residential area. Also, a transit core route was developed through campus.

PREVIOUS EXPERIENCE

Perteet, Inc.
Owner & Transit Division Manager, 2003-2010

- **Pace Northshore Restructuring Study–Chicago and Arlington Heights, Illinois.** Thomas was the project manager for the Northshore Restructuring Study for Pace. The initial study area encompassed the municipalities of Evanston, Skokie, Wilmette, and Lincolnwood and it grew to include coordination with three different service providers and a dozen municipalities, including Chicago. The project focused on restructuring Pace service to address the changing transportation patterns in the North Shore and surrounding area. Community Connections (small vehicles), Bus Rapid Transit, serving both commuter and El stations, transit signal priority, and other capital improvements are all elements of the project. The goal of the study was to improve and maximize usage of all transit service in the area, make service faster, more effective, and more efficient while enhancing the image of transit as an alternative to the automobile. Meeting with the public and the affected municipalities was vital to the project success.
- **Capital Metro COA, Austin, TX.** Led a multi-firm team that restructured service. Non-downtown service was optimized and integration with the University of Texas routes was promoted. Ridership has increased since initial changes occurred.
- **CATA COA, Lansing, MI.** Thomas led a team that developed long- and short-range recommendations for CATA and its services on Michigan State University's campus. On-campus route alignments were simplified as a result of the study, and the amount of intra-campus transferring was reduced.
- **SMTD COA, Springfield, IL.** Thomas led a team that simplified routes, created cross-town services, and expanded service to new growth areas. Additional service to the local University and new retail establishments were prioritized. Ridership was up 3 percent after four months.
- **Kalamazoo Metro Transit COA, Kalamazoo, MI.** Thomas was the project manager for a study that created more direct routes, reduced transferring, and created multiple focal points of service.
- **C-TRAN Service Design/Transit Facility Design, Vancouver, WA.** Thomas led a restructuring process that met several goals, including improving efficiency and effectiveness of the service and shifting the focus of service from the downtown Vancouver transit center to two outlying transit centers. Ridership jumped by more than 30 percent after the plan was implemented.
- **South Cook/Will County Restructuring Study PACE–South Cook/Will County, Illinois.** Thomas was the service planning Project Manager for the South Cook–Will County Restructuring Study. The goals of the study were multiple–address on-time performance issues, reduce service duplication with Metro and Chicago Transit Authority routes, determine unmet needs within the area, and provide a short, mid, and long-term blueprint for needs within the area. Near term recommendations included creating limited stop service, setting the stage for arterial BRT service, streamlining existing routes, and serving new growth areas with a combination of fixed-route and demand response service. The project concluded in November 2007, and the initial recommendations were implemented in 2009.
- **Naperville Market Analysis for Circulator Study–Naperville, Illinois.** Thomas led the transit market analysis for Naperville, Illinois. The purpose of the study was to show the largest potential markets, or combination of markets, suitable for circulator service in the City of Naperville. The market analysis examined several different market segments, including Metra connections for Naperville residents, employee trip patterns, the transportation disadvantaged, medical transportation, and shoppers. This analysis utilized ridership data from Pace and Metra, as well as journey to work data, to help determine where potential demand exists in and around Naperville. In addition, the transit propensity of the Naperville market was calculated and mapped to determine where there is a need for more local service.

INFORMATION ITEM May 19, 2015

5B. North-South Corridor Study Update

Staff Resource: Mila Vega, Service Planner

Background

The study is moving forward on schedule. Currently, it is in the Detailed Evaluation of Alternatives phase. The project team is working on developing cost estimates and ridership projections for the alternatives that were carried forward. Several methodology memos were developed to describe the approach used to generate these numbers.

The consultant team is working on developing conceptual runningway options for the corridor. The corridor is broken out into segments. The team developed the same set of runningway configurations for each segment (mixed traffic, center-running lanes and side-running lanes). Moving forward, each configuration will be evaluated in more detail to determine which options work in a given segment. The project team also began to discuss these concepts with NCDOT.

The project team is planning to increase its public outreach efforts. A targeted neighborhood meeting is planned for the South Columbia section of the corridor (in the vicinity of Merritt's store). It will include local residents and businesses and involve a walk through the area and discussion of conceptual runningway options.

The team also plans to present to the Downtown Partnership Board at the June 11, 2015 meeting. Additional outreach opportunities will be identified throughout the Summer/Fall period.

Next Steps

Receive and review travel time information, estimated costs and ridership projections.

Attachment

- Methodology Memos
- Conceptual Runningway Configurations

Chapel Hill transit

Operating & Maintenance Cost Methodology

Technical Memorandum

Draft April 6, 2015

Table of Contents

List of Tables

1. Introduction

The North-South Corridor Study has been undertaken to evaluate potential transit improvements that can better address the travel markets along the Martin Luther King Jr. Boulevard and US 15-501 in the Town of Chapel Hill. This Technical Memorandum presents the methodology proposed to estimate the annual operating and maintenance (O&M) costs for the alternatives being considered in this Transit Study.

This Technical Memorandum begins with a general description of the project and the proposed alternatives for context, provides an overview of the O&M costing process, and presents the cost models developed for background bus and Bus Rapid Transit (BRT) service, which is the transit mode proposed for the project.

1.1 Project Description

The North-South Corridor is a heavily travelled corridor that connects major destinations within Chapel Hill, such as UNC Chapel Hill, Downtown Chapel Hill, and UNC Hospitals, with growing northern and southern areas of the town. The corridor's northern edge begins in the vicinity of Eubanks Road and follows Martin Luther King Jr. Boulevard then continues through downtown Chapel Hill on Columbia Street before reaching Southern Village at the southern end of the corridor along US 15-501.

There are park-and-ride lot locations within the corridor that are well-utilized. This includes the Eubanks Road lot that has easy access to I-40 for those commuting into Chapel Hill from the north, and the Southern Village park-and-ride lot at the southern end of the corridor. UNC park-and-ride facilities in the corridor include the RR lot on Estes Drive and the lot at 725 Martin Luther King, Jr. Boulevard.

Chapel Hill Transit (CHT) provides bus service along this corridor as well as several routes that operate in portions of the corridor, resulting in high bus volumes that build from both ends of the corridor towards UNC Hospitals. Plans for future development on both ends of the corridor support the need for transit improvements.

1.2 Proposed Project Alternatives

The North-South Corridor Study is evaluating a No-Build Alternative and a BRT Build Alternative with three alignment options. The alternatives are described in detail in the project's *Service Plans Technical Memorandum*.

No-Build Alternative

Evaluation of the study's Build Alternatives requires definition of a No-Build Alternative for comparison. The No-Build scenario assumes implementation of the proposed Durham-Orange Light Rail Transit (LRT) project and associated bus route changes as part of the background bus network. CHT's bus route modifications include various alignment modifications in the central Chapel Hill area and in the vicinity of the UNC Hospitals and selected route modifications and extensions to connect with proposed LRT stations. The No-Build Alternative also assumes expanded weekend bus service.

BRT Alternative

Three BRT alignment configurations are being considered:

- BRT in Mixed Traffic,
- BRT in Dedicated Side Lane, and
- BRT in Dedicated Center Lane.

Two northern end-of-line locations are also under consideration: the existing Eubanks Road park-and-ride lot and a potential new end-of-line park-and-ride lot located on Martin Luther King, Jr. Boulevard, north of I-40. Proposed BRT service plans are the same for all three alignment configurations and the two northern end-of-line alternatives. Background bus service, however, varies slightly depending on the alternative.

2. Operating and Maintenance Costing Overview

Operating and maintenance cost estimates are important in an FTA-involved planning process as an evaluation measure of cost effectiveness. The proposed O&M cost methodology is in compliance with FTA costing requirements and thereby consistent with the Durham-Orange Light Rail Transit Project methodology.

An O&M cost model estimates the annual cost to operate, maintain, and administer a transit system for a given set of service and facility characteristics. O&M costs are expressed as the annual total of employee earnings and fringe benefits, contract services, materials and supplies, utilities, and other expenses incurred in the operation and maintenance of a transit system.

In general, the steps of the O&M cost estimating process are:

- Develop methodology for estimating costs.
- Develop appropriate cost model(s) to evaluate alternatives.
- Calibrate the model(s) for current year operations.
- Generate operating plans and statistics for each study alternative.
- Estimate the annual O&M cost for each study alternative.

This memorandum documents the first three steps as they have been applied to the North-South Corridor Study. The operating plans and cost estimates referred to in the last two steps will be documented separately, after completion and review of ridership forecasts, to determine any additional adjustments that would be appropriate to the proposed service plans. Capital cost estimates, for construction and equipment purchases, are not part of the O&M cost estimating process.

The FTA believes a fully-allocated cost model is the best approach to O&M costing because it is: a) able to reflect cost differences by mode and service type; b) structured based on actual operating experience; and c) sensitive to future changes in cost factors. The FTA has issued guidelines that specify the following for calculating O&M costs:

- Estimate labor and materials needed to provide a specific level of service and then apply current unit costs to the estimated future labor and non-labor items.
- Calculate costs based on operating characteristics by mode.
- Model each reported labor and non-labor expense separately to ensure that equations are mutually exclusive and cover all operating costs.
- Model expense items as variable, so that cost estimates will change with projected changes in service.

A cost allocation model assumes that each expense incurred by a transit system is driven by a key supply variable such as revenue hours, revenue miles, or the number of vehicles operated during peak periods. Combining recent actual O&M costs with the quantity of relevant supply variables establishes unit costs and productivity ratios that can then be applied to a different set of service indicators (such as projected future expansions or service reductions). The result is an estimated annual O&M cost that is specific for a test scenario.

2.1 General Model Structure

The structure of the North-South Corridor Study's O&M cost models is consistent with the spreadsheet table exhibits presented in Chapter 4, Operating and Maintenance Costs, of the FTA's *Procedures and*

Technical Methods for Transit Project Planning (Draft Version 3). A model's data and calculations progress from the base year expense items and amounts on the left side of the spreadsheet, through the assignment of driving variables, to productivity and inflation, and end with the estimated incremental cost of a study alternative on the right side of the spreadsheet.

Line Items and Calibration Expenses

The first few columns of a cost model spreadsheet list O&M line item expenses, a recent annual cost for each item, and a column for noting whether a line item's existing unit cost is adjusted in the model or a new unit cost has been added. The ability to adjust a current annual expense or add a new one enables a cost model to factor into future projections certain changes an agency is in the process of implementing such as new compressed natural gas (CNG) buses to replace an aging diesel fleet or a vehicle maintenance campaign that will effectively make an older fleet perform as it were years younger.

Calibration Unit Costs

As pointed out in the FTA guidelines, O&M costs are related to (or 'driven' by) different supply variables. Supply variables can be considered causal because as they increase, so do the related expense items, and vice versa. The second section of a spreadsheet model is for the supply variable unit cost rates; one column is designated for each variable used as a driver for estimating the cost of a project alternative. Usually, unit rates are calculated by dividing the actual annual expense for the line item by the value of the relevant supply variable.

Productivity Ratios

Line item productivity ratios are calculated in the third section of the model with columns that display the resource variable used in the calculation (may be the line item's supply variable or something else related to the supply variable, such as work hours for salary and wage expenses), the value of the resource variable, and the factor that results from dividing the resource value by the supply value.

Estimated Cost of a Test Scenario

For each line item expense, the last columns in the spreadsheet contain the base year resource unit cost (supply variable unit cost divided by resource/supply factor), an inflation factor, and the model estimates of resource unit cost and annual cost. The North-South Corridor project models are based on actual 2013 expenses, inflated to represent 2015 dollars for the study alternatives.

2.2 Project O&M Cost Models

Two models were developed for this project in order to estimate O&M costs for the CHT background bus network and BRT as a new mode for the agency.

Background Bus Model

CHT currently operates bus service in the study corridor and the project Build variations reflect various modifications to bus service. The background bus model has been developed with actual operating expenses, system characteristics, and service statistics as reported to the National Transit Database (NTD) for the 2013 report year. The demand response mode has not been modeled because these operations in the project corridor are not expected to change from one study alternative to another.

BRT Model

A separate BRT model was developed to capture all service-related expenses of the study's Build options as well as some costs that would be unique to the mode (e.g., BRT facilities). The BRT cost model is based on the background bus model.

CHT currently operates bus service in the study corridor and the project Build variations reflect various modifications to bus service. The background bus model has been developed with actual operating expenses, system characteristics, and service statistics as reported to the National Transit Database (NTD) for the 2013 report year. The demand response mode has not been modeled because these operations in the project corridor are not expected to change from one study alternative to another.

Both models are described in the following sections of this document.

3. Background Bus O&M Cost Model

Chapel Hill Transit's background bus model is based on the agency's 2013 NTD report. Consistent with FTA guidelines, costs have been identified by function with one or more variables assigned to each line item. Corresponding service statistics were also obtained from CHT's 2013 NTD submittal.

3.1 Key Supply Variables

Following collection of financial and service data, preparation of the spreadsheet cost model began with the selection of key driving variables for the existing bus system. Variables selected were:

- **Annual Revenue Bus-Hours**: The hours that vehicles travel while in revenue service over an entire fiscal year. Revenue bus-hours include layover and schedule recovery but exclude time for deadheading, operator training, and maintenance testing.
- **Annual Revenue Bus-Miles:** The miles that vehicles travel while in revenue service over an entire fiscal year. Revenue bus-miles include layover and schedule recovery but exclude miles for deadheading, operator training, and maintenance testing. Since the CHT fleet currently includes a few articulated buses (artics) and these vehicles are assumed for the BRT Alternative, the model divides total annual revenue bus-miles by type, between artics and regular buses.
- **Peak Buses:** The maximum number of passenger service vehicles actually operated simultaneously on an average weekday. In some cases, peak buses may be used as a supply variable when the model needs to base a line item expense on overall bus system size.
- **Maintenance Facilities:** The number of garages from which buses are dispatched into service. These facilities also serve as general purpose maintenance facilities for inspecting, servicing, maintenance, and repair work on buses. For a bus system with one garage, it is assumed to function as a heavy maintenance facility as well.
- **Park-and-Ride Lots:** These passenger facilities of CHT were included as a cost model supply variable in the event an additional site, or expansion of an existing lot, will be assumed for a Build Alternative option.

Table 3-1 shows the key supply variables and values used to represent the model's calibration (FY 2013 base year) inputs. In addition to data obtained directly from the NTD, park-and-ride lots were identified from CHT's system map. It is important to note that the split in annual revenue bus-miles between articulated buses and regular buses is not known. For purposes of this O&M cost model development, the split in revenue bus-miles is based on the ratio of articulated vs. standard buses in CHT's current fleet.

Table 3-1: Chapel Hill Transit Supply Variable Inputs

Supply Variable Inputs	2013 Calibration
Annual Revenue Bus-Hours	155,354
Annual Revenue Bus-Miles (Artics)	88,839
Annual Revenue Bus-Miles (Regular Buses)	1,670,173
Total Annual Revenue Bus-Miles (All Buses)	1,759,012
Peak Buses	75
Maintenance Facilities	1
Park-and-Ride Lots	8

3.2 Line Item Expenses

After selecting the key supply variables, the next step in cost model development is to record CHT's bus expenses as a series of line items. The NTD report format categorizes operating expenses within the four functional areas of Vehicle Operations, Vehicle Maintenance, Non-Vehicle Maintenance, and General Administration. For each functional area, line item expenses are further classified as salaries/wages, fringe benefits, services, materials/supplies, utilities, casualty and liability, taxes/fees, and miscellaneous.

When the list of line items was established, each was assigned a key supply variable as its most relevant cost driver and a few expenses that were strongly influenced by more than one of the model's supply variables were split between them. Split line items include:

- **Vehicle Operations:** Non-Operator Salaries & Wages are 70 percent driven by revenue bus-hours and 30 percent driven by maintenance facilities. This split is proposed to reflect that some vehicle operations-related staff are supervisory in nature, and are unlikely to vary in proportion to changes in revenue bus-hours. Fuel & Lube, Tires & Tube line items are driven by revenue bus-miles but are split by vehicle type (artic vs. standard bus). Articulated buses are estimated to have costs that are 25 percent higher than standard buses for these cost items (due to vehicles' extra weight and axles). This assumption is consistent with fleet experience of other agencies.
- **Vehicle Maintenance**: The model assumes Materials & Supplies are driven by revenue vehicle-miles, with articulated vehicles having a unit cost that is 25 percent more than regular buses.
- **Non-Vehicle Maintenance:** CHT staff provided information regarding Professional & Technical Services that enabled ITS-related equipment expenses to be modeled separately by peak buses, total bus-miles, and park-and-ride lots. The remainder of the line item cost was assumed to be for facilities maintenance of park-and-ride lots (75 percent) and maintenance facilities (25 percent).

In addition to the supply variables listed in Table 3-1, from which line item unit costs are derived, the model also incorporates resource variables specifically to provide labor productivity and fuel consumption ratios.

- NTD-reported employee work hours are included as a resource variable for estimating salaries and wages by functional area for the project alternatives. For Vehicle Operations, NTD does not subdivide total work hours reported by operator and non-operator classifications, so this model

maintains the same ratio of operator and non-operator work hours as was used for the 2012 CHT cost model that was developed for the Durham-Orange Light Rail Transit Project (95% of Vehicle Operations work hours related to operators). Fringe benefit cost estimates pivot off labor work hours.

- CHT's background bus cost model incorporates gallons of fuel as a resource variable for estimating future consumption.

For all other line items, the model calculates productivity using supply variable inputs.

Table 3-2 summarizes the dollar impact that each of the background bus model's key supply variables has on the calibration (FY 2013 base year) system. The unit costs in this table reflect the dollar amount the model will adjust for each added or deleted unit of a supply variable – in other words, the incremental change from the calibration system. For example, for each CHT peak bus added, the model will increase its estimate by $26,472; for each revenue bus-hour deleted the model will subtract $46.66 from its estimate, and so forth.

Table 3-2: Chapel Hill Transit Bus Cost Model: Supply Variable Impacts for the 2013 Calibration Bus System (in 2013 dollars)

Key Supply Variable	Share of Total O&M Cost		Unit Cost
	Dollar Amount	Percentage	
Annual Revenue Bus-Hours	$7,249,383	49.9%	$46.66
Annual Revenue Bus-Miles (Artics)	$161,354	1.1%	$1.82
Annual Revenue Bus-Miles (Regular Buses)	$2,426,765	16.7%	$1.45
Total Annual Revenue Bus-Miles (All Buses)	$1,499,098	10.3%	$0.85
Peak Buses	$1,985,395	13.7%	$26,472
Maintenance Facilities	$758,089	5.2%	$758,089
Park-and-Ride Lots	$460,336	3.2%	$57,542
Total	**$14,540,420**	**100.0%**	

Table 3-3 presents the Chapel Hill Transit background bus O&M cost model for the 2013 calibration (base year), created with the supply variables shown in Table 3-2.

Model results will be inflated to 2015 dollars using the Bureau of Labor Statistics Consumer Price Index, specifically the CPU-U, South Region, for 2013 to 2014, doubled to estimate an additional full year of inflation at the same rate.

Table 3-3: Chapel Hill Transit Background Bus Line Item Detail

Chapel Hill Transit
North-South Corridor Study
O&M Cost Models
BACKGROUND BUS LINE ITEM DETAIL

Calibration

Inflation Factor: 1.012

Expense Line Item	2013 Bus Expenses	Existing Unit Cost Adjusted	New Unit Cost Added	Bus Supply Variable Unit Cost Rate ($2013)							Productivity Ratio			Base Year Resource Unit Cost	Inflation Factor	Results in: 2015$	
				Revenue Bus-Hours	Revenue Bus-Miles			Peak Buses	Maint. Facilities	Park-Ride Lots	Resource Variable	Resource Value	Resource/ Supply			Resource Unit Cost	Estimated Annual Cost
					Articulated	Regular	Total										
VEHICLE OPERATIONS																	
OPERATORS' SALARIES & WAGES	*$4,069,540*			$26.20							Work Hours	262,945	1.69	$15.48	1.012	$15.66	$4,118,608
OTHER SALARIES & WAGES - Rev-Hours Driven (70%)	*$235,218*			$1.51							Work Hours	9,687	0.06	$24.28	1.012	$24.57	$238,054
OTHER SALARIES & WAGES - Garage Driven (30%)	*$100,808*								$100,808		Work Hours	4,152	4152	$24.28	1.012	$24.57	$102,023
FRINGE BENEFITS - Rev-Hours Driven	*$2,944,626*			$18.95							Work Hours	272,632	1.75	$10.80	1.012	$10.93	$2,980,130
FRINGE BENEFITS - Garage Driven	*$68,956*								$68,956		Work Hours	4,152	4152	$16.61	1.012	$16.81	$69,788
FUEL & LUBRICANTS - Regular Buses	*$1,662,787*	*x*				$1.00					Gallons	497,661	0.30	$3.34	1.012	$3.38	$1,682,836
FUEL & LUBRICANTS - Articulated Buses	*$110,558*		*x*		$1.24						Gallons	33,089	0.37	$3.34	1.012	$3.38	$111,891
TIRES & TUBES - Regular Buses	*$94,882*	*x*				$0.06					Regular Miles	1,670,173	1.00	$0.06	1.012	$0.06	$96,026
TIRES & TUBES - Articulated Buses	*$6,309*		*x*		$0.07						Artic Miles	88,839	1.00	$0.07	1.012	$0.07	$6,385
OTHER MATERIALS & SUPPLIES	*$108,076*								$108,076		Garages	1	1.00	$108,076	1.012	$109,379	$109,379
MISCELLANEOUS EXPENSES	*$15,724*								$15,724		Garages	1	1.00	$15,724	1.012	$15,914	$15,914
VEHICLE MAINTENANCE																	
SALARIES & WAGES	*$745,045*						$0.42				Work Hours	48,688	0.03	$15.30	1.012	$15.49	$754,028
FRINGE BENEFITS	*$443,187*						$0.25				Work Hours	48,688	0.03	$9.10	1.012	$9.21	$448,531
FUEL & LUBRICANTS (Non-Revenue Vehicles)	*$51,955*							$693			Peak Buses	75	1.00	$693	1.012	$701	$52,581
TIRES & TUBES (Non-Revenue Vehicles)	*$2,732*							$36.43			Peak Buses	75	1.00	$36.43	1.012	$36.87	$2,765
OTHER MATERIALS & SUPPLIES - Regular Buses	*$669,095*	*x*				$0.40					Regular Miles	1,670,173	1.00	$0.40	1.012	$0.41	$677,163
OTHER MATERIALS & SUPPLIES - Articulated Buses	*$44,488*		*x*		$0.50						Artic Miles	88,839	1.00	$0.50	1.012	$0.51	$45,024
MISCELLANEOUS EXPENSES	*$26,873*								$26,873		Garages	1	1.00	$26,873	1.012	$27,197	$27,197
NON-VEHICLE MAINTENANCE																	
SALARIES & WAGES	*$41,263*								$41,263		Work Hours	1,523	1523	$27.09	1.012	$27.42	$41,761
FRINGE BENEFITS	*$29,413*								$29,413		Work Hours	1,523	1523	$19.31	1.012	$19.55	$29,768
PROF & TECH SERVICES -ITS Trackers	*$82,814*							$1,104			Peak Buses	75	1.00	$1,104	1.012	$1,118	$83,813
PROF & TECH SERVICES -ITS Signs, Bus Routes	*$10,980*						$0.01				Revenue Miles	1,759,012	1.00	$0.01	1.012	$0.01	$11,112
PROF & TECH SERVICES -ITS Signs, Park-Rides	*$7,320*									$915	Park-Rides	8	1.00	$915	1.012	$926	$7,408
PROF & TECH SERVICES -Garage Maintenance	*$151,005*								$151,005		Garages	1	1.00	$151,005	1.012	$152,826	$152,826
PROF & TECH SERVICES - Park-Ride Maintenance	*$453,016*									$56,627	Park-Rides	8	1.00	$56,627	1.012	$57,310	$458,478
MATERIALS & SUPPLIES	*$6,320*								$6,320		Garages	1	1.00	$6,320	1.012	$6,396	$6,396
MISCELLANEOUS EXPENSES	*$3,551*								$3,551		Garages	1	1.00	$3,551	1.012	$3,594	$3,594
GENERAL ADMINISTRATION																	
SALARIES & WAGES	*$640,172*							$8,536			Work Hours	24,367	325	$26.27	1.012	$26.59	$647,891
FRINGE BENEFITS	*$338,454*							$4,513			Work Hours	24,367	325	$13.89	1.012	$14.06	$342,535
PROFESSIONAL & TECHNICAL SERVICES	*$813,558*							$10,847			Peak Buses	75	1.00	$10,847	1.012	$10,978	$823,367
MATERIALS & SUPPLIES	*$23,462*								$23,462		Garages	1	1.00	$23,462	1.012	$23,745	$23,745
UTILITIES	*$182,638*								$182,638		Garages	1	1.00	$182,638	1.012	$184,840	$184,840
CASUALTY & LIABILITY	*$299,886*						$0.17				Revenue Miles	1,759,012	1.00	$0.17	1.012	$0.17	$303,502
MISCELLANEOUS EXPENSES	*$55,710*							$743			Peak Buses	75	1.00	$743	1.012	$752	$56,382
TOTALS	***$14,540,420***			**$46.66**	**$1.82**	**$1.45**	**$0.85**	**$26,472**	**$758,089**	**$57,542**							**$14,715,738**
2013 Resource Variable Values				**155,354**	**88,839**	**1,670,173**	**1,759,012**	**75**	**1**	**8**						Rev Hours	155,354
Notes:																Artic Rev Miles	88,839
1. NTD Fringe Benefit Rate for Vehicle Ops =	68.4%															Reg Rev Miles	1,670,173
2. NTD Fringe Benefit Rate for Vehicle Maint =	59.5%															Total Rev Miles	1,759,012
3. NTD Fringe Benefit Rate for Non-Vehicle Maint =	71.3%															Peak Buses	75
4. NTD Fringe Benefit Rate for General Admin =	52.9%															Maint Facilities	1
5. Select artic unit costs have been factored up by:	1.25	This factor is intended to account for higher-than-regular bus costs for fuel & lube, tires & tubes, and vehicle maintenance repair/maintenance supplies.														Park-Ride Lots	8

4. Bus Rapid Transit O&M Cost Model

The BRT cost model will be used to estimate the additional annual cost to operate and maintain the North-South Corridor Study's Build options. It is based on CHT's background bus model, using many of the same unit costs but adding line item expenses that would be incurred with BRT operations.

4.1 Key Supply Variables

Supply variables used in the BRT spreadsheet model are:

- **BRT Annual Revenue Bus-Hours**: The hours that vehicles travel while in revenue service over an entire fiscal year. Revenue bus-hours include layover and schedule recovery but exclude time for deadheading, operator training, and maintenance testing.
- **BRT Annual Revenue Bus-Miles:** The miles that vehicles travel while in revenue service over an entire fiscal year. Revenue bus-miles include layover and schedule recovery but exclude miles for deadheading, operator training, and maintenance testing.
- **BRT Peak Buses:** The maximum number of BRT service vehicles operated simultaneously on an average weekday.
- **BRT Stations:** Bus passenger facilities in the BRT alternatives that include features typically not included at standard bus stops, such as corridor-specific passenger shelters, enhanced and possibly lighted signage and ITS features (e.g., next bus arrival real time information). This project's BRT stations are assumed to be located at ends-of-line and possibly in other locations, yet to be determined.
- **BRT Stops:** Bus passenger facilities in the BRT alternatives with more features than a standard bus stop but smaller and with fewer amenities than a BRT station.
- **TSP Signalized Intersections:** The number of intersections in the study corridor that are anticipated to provide Transit Signal Prioritization (TSP) for BRT service.
- **Maintenance Facility Expansion:** A factor that represents enhancements planned to the existing facility, if any, in order to accommodate the additional requirements for servicing, inspecting, maintaining, repairing, and storing a BRT fleet.
- **Park-and-Ride Lot Expansion:** A factor that represents enhancements planned for existing park-and-ride lots, if any, in order to accommodate the additional requirements of BRT passengers and service.

4.2 Line Item Expenses

BRT operations typically include features, not present in existing bus service, that result in new O&M costs for an agency. For CHT, some typical BRT characteristics already are part of the North-South Corridor project's background bus network:

Vehicle Type: CHT's existing bus fleet includes some articulated buses so, while the Build Alternative assumes additional artics, these would not be a new vehicle type to maintain. However, artics are longer, heavier vehicles than regular buses with comparatively higher annual expense for maintenance/repair, parts and consumables (e.g., fuel, tires). The project's BRT cost model recognizes this O&M costing difference and incorporates 25% higher unit costs for specific line items.

Bus Stop/Station Maintenance will require additional CHT staff to periodically clean and maintain the sites. Unit costs used in other BRT studies (that were not planning to convert BRT stations to future LRT stations) ranged from an extra $2,000 to $4,500 in maintenance labor costs per station platform, with

the higher cost used for stations in the median of a roadway, or other special site conditions. It is anticipated that a majority of the BRT stops in the North-South Corridor Study will be curb lane stops without extensive furnishings and with moderate passenger activity; therefore, the model uses $2,000 as the unit cost per BRT stop. For ends-of-line, the model will assume BRT stations, with a little larger passenger facility footprint and a few extra amenities and a corresponding unit cost of $4,500 for maintenance and janitorial attention.

ASP/Wireless Equipment Maintenance: CHT already uses real time informational signs at most park-and-ride lots and major passenger transfer sites elsewhere in the transit system, so ITS equipment would not be a new maintenance cost for the agency. However, there would be additional installations and required maintenance for BRT stations and stops. The model uses CHT's existing average annual cost per ITS sign ($915) for the BRT stations and stops in the Build options.

CHT's entire existing fleet is equipped with APS/Wireless trackers and the model uses a prorated cost per BRT peak vehicle to account for the same equipment and warranties that would also apply to new BRT buses.

TSP Equipment Maintenance is another element considered as a BRT-specific O&M cost and it is possible that select intersections in the study corridor will assume installation of transit signal prioritization. Unit costs used in other studies for on-going TSP maintenance range from $2,600 to $4,500 per signalized intersection. CHT staff provided an annual unit cost of $2,800 for this project.

A few other BRT-specific costs, typical in many studies, do not apply to the North-South Corridor Study and have not been incorporated in the cost model.

- Dedicated Right-of-Way Maintenance
- Exclusive Bus Lane Maintenance
- Fare Vending Equipment Maintenance
- Fare Enforcement (Transit Police)

Table 4-1 presents the proposed BRT O&M cost spreadsheet model. Note that this model reflects many of the same unit costs that are in the Background Bus model, but includes additional line items that specifically address BRT operations.

Table 4-1: Chapel Hill Transit BRT Line Item Detail

Chapel Hill Transit
North-South Corridor Study
O&M Cost Models
BRT LINE ITEM DETAIL

Calibration

CHT Inflation Factor: 1.012

Expense Line Item	Existing Bus Unit Cost	New Unit Cost Added	Supply Variable Unit Cost Rate ($2013) BRT Rev-Hours	BRT Rev-Miles	BRT Peak Buses	BRT Stations	BRT Stops	Intersections with TSP	Park-Ride Lots	Maint. Facilities	Productivity Ratio Resource Variable	Resource Value	Resource/ Supply	Base Year Resource Unit Cost	Inflation Factor	Results in: Resource Unit Cost	Results in: 2015$ Estimated Annual Cost
VEHICLE OPERATIONS																	
OPERATORS' SALARIES & WAGES	x		$26.20								BRT Bus-Hours	n/a	1.69	$15.48	1.012	$15.66	$0
OTHER SALARIES & WAGES - Rev-Hours Driven	x		$1.51								BRT Bus-Hours	n/a	0.06	$24.28	1.012	$24.57	$0
OTHER SALARIES & WAGES - Garage Driven	x									$100,808	BRT Garage	n/a	4152	$24.28	1.012	$24.57	$0
FRINGE BENEFITS - Rev-Hours Driven	x		$18.95								BRT Bus-Hours	n/a	1.75	$10.80	1.012	$10.93	$0
FRINGE BENEFITS - Garage Driven	x									$68,956	BRT Garage	n/a	4152	$16.61	1.012	$16.81	$0
FUEL & LUBRICANTS - Articulated Buses		x		$1.24							BRT Bus-Miles	n/a	0.37	$3.34	1.012	$3.38	$0
TIRES & TUBES - Articulated Buses		x		$0.07							BRT Bus-Miles	n/a	1.00	$0.07	1.012	$0.07	$0
OTHER MATERIALS & SUPPLIES	x									$108,076	BRT Garage	n/a	1.00	$108,076	1.012	$109,379	$0
MISCELLANEOUS EXPENSES	x									$15,724	BRT Garage	n/a	1.00	$15,724	1.012	$15,914	$0
VEHICLE MAINTENANCE																	
SALARIES & WAGES	x			$0.42							BRT Bus-Miles	n/a	0.03	$15.30	1.012	$15.49	$0
FRINGE BENEFITS	x			$0.25							BRT Bus-Miles	n/a	0.03	$9.10	1.012	$9.21	$0
FUEL & LUBRICANTS (Non-Revenue Vehicles)	x				$693						BRT Peak Buses	n/a	1.00	$693	1.012	$701	$0
TIRES & TUBES (Non-Revenue Vehicles)	x				$36.43						BRT Peak Buses	n/a	1.00	$36.43	1.012	$36.87	$0
OTHER MATERIALS & SUPPLIES - Articulated Buses		x		$0.50							BRT Bus-Miles	n/a	1.00	$0.50	1.012	$0.51	$0
MISCELLANEOUS EXPENSES	x									$26,873	BRT Garage	n/a	1.00	$26,873	1.012	$27,197	$0
NON-VEHICLE MAINTENANCE																	
SALARIES & WAGES	x									$41,263	BRT Garage	n/a	1,523	$27.09	1.012	$27.42	$0
FRINGE BENEFITS	x									$29,413	BRT Garage	n/a	1,523	$19.31	1.012	$19.55	$0
PROF & TECH SERVICES - ITS Trackers	x				$1,104						BRT Peak Buses	n/a	1.00	$1,104	1.012	$1,118	$0
PROF & TECH SERVICES - ITS Signs, Park-Rides	x								$915		BRT Park-Rides	n/a	1.00	$915	1.012	$926	$0
PROF & TECH SERVICES -Garage Maintenance	x									$151,005	BRT Garage	n/a	1.00	$151,005	1.012	$152,826	$0
PROF & TECH SERVICES - Park-Ride Maintenance	x								$56,627		BRT Park-Rides	n/a	1.00	$56,627	1.012	$57,310	$0
MATERIALS & SUPPLIES	x									$6,320	BRT Garage	n/a	1.00	$6,320	1.012	$6,396	$0
MISCELLANEOUS EXPENSES	x									$3,551	BRT Garage	n/a	1.00	$3,551	1.012	$3,594	$0
GENERAL ADMINISTRATION																	
SALARIES & WAGES	x				$8,536						BRT Peak Buses	n/a	325	$26.27	1.012	$26.59	$0
FRINGE BENEFITS	x				$4,513						BRT Peak Buses	n/a	325	$13.89	1.012	$14.06	$0
PROFESSIONAL & TECHNICAL SERVICES	x				$10,847						BRT Peak Buses	n/a	1.00	$10,847	1.012	$10,978	$0
MATERIALS & SUPPLIES	x									$23,462	BRT Garage	n/a	1.00	$23,462	1.012	$23,745	$0
UTILITIES	x									$182,638	BRT Garage	n/a	1.00	$182,638	1.012	$184,840	$0
CASUALTY & LIABILITY	x			$0.17							BRT Bus-Miles	n/a	1.00	$0.17	1.012	$0.17	$0
MISCELLANEOUS EXPENSES	x				$743						BRT Peak Buses	n/a	1.00	$743	1.012	$752	$0
BRT-SPECIFIC O&M COSTS																	
PROF & TECH SERVICES - ITS Signs, Stations & Stops	x					$915	$915				BRT Sta + Stops	n/a	n/a	$915	1.012	$926	$0
STOP MAINTENANCE		x					$2,000				BRT Stops	n/a	n/a	$2,000	1.000	$2,000	$0
STATION MAINTENANCE		x				$4,500					BRT Stations	n/a	n/a	$4,500	1.000	$4,500	$0
TSP MAINTENANCE		x						$2,800			TSP Intersect'ns	n/a	n/a	$2,800	1.000	$2,800	$0
TOTALS			**$46.66**	**$2.66**	**$26,472**	**$5,415**	**$2,915**	**$2,800**	**$57,542**	**$758,089**							**$0**

Notes:
1. Existing unit costs are copied from the CHT background bus O&M cost model.
2. New unit costs are derived from other sources, described in the Methodology Report. These unit costs are already in 2015 dollars so are not re-inflated above.
3. Some BRT costs, often included in studies , not applicable to this project (e.g., fare enforcement, exclusive bus lane maintenance, fare vending equipment).

BRT Rev-Hours	0
BRT Rev-Miles	0
BRT Peak Buses	0
BRT Stations	0
BRT Stops	0
TSP Intersect'ns	0
BRT Park-Rides	0
BRT Garages	0.0

Chapel Hill transit

Travel Forecasting Methodology

DRAFT February 27, 2015

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1. Introduction

MAP-21 has restructured the steps in the Federal Transit Administration (FTA) Capital Investment Grant Program process to allow New Starts, Small Starts, and Core Capacity projects to move more expeditiously through the program. This evolution of requirements leads to streamlined options for travel demand forecasting in support of alternatives analyses and NEPA and informs our the recommended approach outlined below.

2. Forecasting Approach

For the North-South Corridor Study, Cambridge Systematics (CS) recommends a multiple-tool approach will be used to performing the forecasting work covering the FTA Capital Investment Grant Program, inclusive of applicable NEPA requirements. This approach makes use of the FTA Simplified Trips-on-Project Software (STOPS) for core ridership forecasts, supplemented by using existing Triangle Regional Model (TRM) components, including applicable special generator models (e.g., to address university trips).

2.1 Simplified Trips-on-Project Software (STOPS)

FTA has developed a simplified method to quantify the measures used by FTA to evaluate and rate projects. STOPS produces all of the reporting needed by project sponsors to review ridership forecasts in detail and to support grant applications to the FTA Small Starts program. When using STOPS, the FTA review of forecasts can be focused on the inputs, assumptions, and forecasts produced rather than on the modeling tool being used. Once STOPS is configured and calibrated to address the subject project corridor forecasting, multiple alternative build scenarios may be readily tested.

STOPS is relatively straightforward to run and has been tested in several dozen applications. It does require substantial care in proper setup and assembly of inputs. STOPS will be used to generate ridership forecasts for the build options under consideration. Furthermore, the focus will being on performing analysis for “current” conditions first and address required horizon year forecasting (if any) using a smaller set of refined alternatives.

2.2 Triangle Regional Model (TRM)

This STOPS application will use several files that are associated with the TRM as input. These include required highway travel time inputs (“skims”) and key socioeconomic data and forecasts.

In addition, NEPA analysis for the project can rely on usage of the TRM as part of the overall planning process, including review of traffic impacts that may be associated with build alternatives. For transit projects, typical traffic impacts include those caused by the introduction of park-and-ride and other station facilities as well as potential “disruption” to no-build traffic operations. These potential impacts may be studied through the use of a representative build scenario in the TRM and supplemental traffic analysis rather than nuanced treatment of a multitude of transit options in the TRM.

The use of the adopted regional forecasting tool is generally preferred for developing traffic impact (and related) analysis inputs for NEPA requirements due in part to the significant case law available to support the use. The TRM, for example, can be used to form a basis for traffic analysis inputs for level of

service analysis at intersections involving park-and-ride lots. Output from a STOPS run can also be used to help inform these traffic analysis (e.g., travel demand at the stations).

2.3 Special Market Models

STOPS considers routine weekday travel by residents. Since university travel can be considered a significant special market in the vicinity of the North-South Corridor project, it is recommended to consider using the university-related trip tables and information from the TRM to arrive at refined project forecasts.

In this application framework, FTA will review the routine STOPS forecasts and consider the additive potential of the university-related trip forecast. In applying this framework, it will be important to confirm that the university-related trip special generator model that is used in support of the forecasting (i.e., a component of the TRM) is well-supported by actual observed data.

2.4 Other Considerations

Existing transit ridership data applicable to services in the study area should be assembled and reviewed for potential to provide support to the ridership forecasting effort. FTA prefers to pivot off of existing data as much as possible, including when setting up the STOPS application. To the extent there is data available for university-related trips in particular, these should be reviewed for potential to inform and/or validate the degree of university-related trip making anticipated on the project.

2.5 Application Strategy

The most plausible forecasts show the evolution of ridership from existing conditions to ultimate horizon year project conditions in easily-understood increments. Thus, the recommended application strategy for any preferred alternative involves moving from existing conditions to a horizon year forecast in incremental stages. Working in the existing conditions removes the uncertainty that is introduced in the forecast by potential changes in background networks and socioeconomic conditions and potentially allows for a clearer understanding of the benefit of the proposed project, particularly to existing travelers.

It is usually not necessary to run all alternatives through all stages of evaluation. Similarly, it is usually not necessary to perform traffic impact analysis for every combination of improvements. Therefore, we recommend selecting a subset of alternatives will be selected to perform horizon year forecasting and performing the traffic impact analysis will be performed in a fashion that considers critical concerns (e.g., using representative build alternative(s) with the TRM).

Similarly, the effort required to represent transit service changes in STOPS is greater than with typical travel demand forecasting software. (STOPS uses General Transit Feed Specification [GTFS] format files as inputs, but these are most-typically generated using transit service scheduling software). As a result, when working with STOPS, some simplifications are often will be made in representing ancillary changes to the background transit network.

We will produce the following output using the STOPS approach:

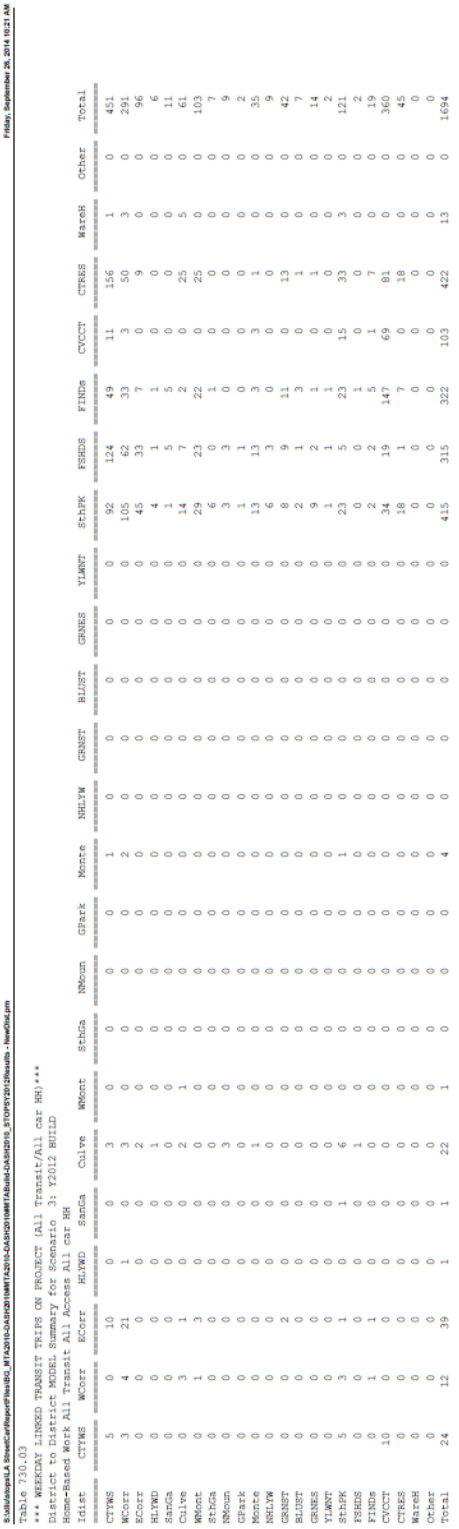
- Average weekday boardings by station by alternative;

- Forecast trips on the project by trip purpose, household auto-ownership, and production-end access mode;
- Key markets using the project and their characteristics, including district-to-district summaries such as major production and attraction districts; and
- Changes in Personal Miles of Travel (PMT).

Table 1 provides an example of STOPS raw tabular output, showing district-to-district project trips. Table 2 provides an example trips on project summary based on output from STOPS. Table 3 provides an example ridership summary to be compiled based on output from STOPS.

The above summaries are recommended will be used for general technical reporting. STOPS raw reporting provides information on individual bus route end-to-end ridership, but this information should generally be viewed only in relative terms and only for diagnostic purposes. Corridor ridership (i.e., ridership of bus route families) is generally more reliable than individual route ridership, due in part to necessary simplifications of operations and customer behavior that occur in models.

Table 1: Sample STOPS Output – District-to-District Project Trips



S:\Alts\Alt1LA Street\Car\Report\Res\BG_MTA2015-DASH2015MITA2015-DASH2015MITABuild-DASH2015_STOPS\Y2012Results - NewDist.prn

Friday, September 26, 2014 10:21 AM

Table 730.03

*** WEEKDAY LINKED TRANSIT TRIPS ON PROJECT (All transit/All car HH)***

District to District MODEL Summary for Scenario 3: Y2012 BUILD

Home-Based Work All Transit All Access All car HH

Idist	CTYWS	WCorr	ECorr	HLYWD	SanGa	Culve	WMont	SthGa	NMoun	GPark	Monte	NHLYW	GRNST	BLUST	GRNES	YLWNT	SthPK	FSHDS	FINDs	CVCCT	CTRES	WareH	Other	Total
CTYWS	5	0	10	0	0	3	0	0	0	0	1	0	0	0	0	0	92	124	49	11	156	1	0	451
WCorr	3	4	21	1	0	3	0	0	0	0	2	0	0	0	0	0	105	62	33	3	50	3	0	291
ECorr	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	45	33	7	0	9	0	0	96
HLYWD	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	4	1	1	0	0	0	0	6
SanGa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	5	0	0	0	0	11
Culve	0	3	1	0	0	2	1	0	0	0	0	0	0	0	0	0	14	7	2	0	25	5	0	61
WMont	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	29	23	22	0	25	0	0	103
SthGa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	1	0	0	0	0	7
NMoun	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	9
GPark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2
Monte	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	13	13	3	3	1	0	0	35
NHLYW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	3	0	0	0	0	0	9
GRNST	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	8	9	11	0	13	0	0	42
BLUST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	3	0	1	0	0	7
GRNES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	2	1	0	1	0	0	14
YLWNT	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	1	0	0	0	0	2
SthPK	5	3	1	0	0	6	0	0	0	0	5	0	0	0	0	0	23	5	23	15	33	3	0	121
FSHDS	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2
FINDs	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	5	1	7	0	0	19
CVCCT	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	19	147	69	81	0	0	360
CTRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	1	7	0	18	0	0	45
WareH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	24	12	39	1	1	22	1	0	0	0	4	0	0	0	0	0	415	315	322	103	422	13	0	1694

Table 2: Sample STOPS Output Summary – Project Trips by Purpose, Access Mode, and Automobile Ownership

	0 Auto	1 Auto	2+ Autos	Total
HBW				
Walk Access				
KNR Access				
PNR Access				
All Access				
HBO				
Walk Access				
KNR Access				
PNR Access				
All Access				
NHB				
Walk Access				
KNR Access				
PNR Access				
All Access				
All Trip Purpose				
Walk Access				
KNR Access				
PNR Access				
All Access				

Table 3: Summary of Boardings

	2040 Average Weekday Boardings						
	No Build	Service Plan 1		Service Plan 2		Service Plan 3	
		BRT in Mixed Traffic	BRT in Dedicated Lane	BRT in Mixed Traffic	BRT in Dedicated Lane	BRT in Mixed Traffic	BRT in Dedicated Lane
Station A							
Station B							
Station C							
Station D							
Station E							
Station F							
Station G							
Total – BRT							
Transit Dependent							
Other Corridor Routes							
PMT							

Chapel Hill transit

Capital Cost Methodology

DRAFT January 2, 2015

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1. Introduction

This memorandum presents the methodology for developing order-of-magnitude capital cost estimates for the detailed alternatives. Estimating capital costs is a critical component of the Federal Transit Administration's (FTA) Capital Investment Program - Small Starts.

Capital costs are the one-time expenditure required to build the system, including infrastructure costs and soft costs. Infrastructure costs typically include costs associated with the guideway, stations, structures, signalization and communication systems, support facilities, vehicles, and right-of-way acquisition. Soft costs for items such as engineering, construction services, project management, surveys, testing, insurance, legal, permits and owner's costs are also included as part of the overall capital cost. Contingencies are applied to the capital cost to account for uncertainty in both the estimating process and the scope of the project.

This report provides the key components needed to develop cost estimates as alternatives are developed and analyzed. These components include capital cost estimate organization, methodology, assumptions, basis of unit prices, and the basis for cost estimation by alternative.

2. Approach

The North-South Corridor Study will use FTA's Standard Cost Categories (SCC) format to estimate capital costs. Use of this format at this stage simplifies the process of estimating capital costs prior to entering FTA's project development process, and helps ensure that the estimation process is one that has been vetted. For example, FTA provides specific unit costs for some line items for purposes of facilitating comparison of projects nationwide. This project will use the most recently released version of the FTA's SCC workbook, Revision 16, dated June, 2014. Following is a summary of the major categories in the SCC format (these categories are defined in detail later in this document).

- SCC 10 – Guideway and Track Elements (track not used for this project)
- SCC 20 – Stations, Stops, Terminal, Intermodal, parking structure
- SCC 30 – Support Facilities: Yards, Shops, Administration Buildings
- SCC 40 – Sitework and Special Conditions
- SCC 50 – Systems
- SCC 60 – Right-of-Way, Land, Existing Improvements
- SCC 70 – Vehicles
- SCC 80 – Professional Services
- SCC 90 – Contingency
- SCC 100 – Finance Charges

While the SCC structure is straightforward, it is relatively detailed. Since the North-South Corridor Study is still in the planning stage, some costs will be developed for categories (such as Systems) rather than line items. Additionally, the SCC structure accounts for a range of cost drivers including Professional Service or "soft costs", right-of-way acquisition and contingency. It also provides outputs in base year (2015) costs and escalated year of opening (2020) costs based on an inflation factor, assumed to be three percent a year for purposes of this study.

2.1 Methodology

The FTA SCC organization for capital cost estimates was developed for application to many different types of transit improvements, and on project phases ranging from planning to final design and construction. The capital cost elements for the North-South Corridor Study are organized into the FTA SCC format as indicated in Table 2-1. Note that not all of the items included in the description would be addressed in this planning study, but would be in subsequent phases.

The level of detail of the capital cost estimates for this study corresponds with the expected level of definition, engineering and environmental analysis that will be developed for the alternatives. The level of estimating detail typically increases as the project progresses through the various phases of development during study of alternatives, environmental review, advanced concept design, preliminary design and eventually final design. The level of contingency associated with estimates at each phase decreases as the level of design detail increases.

Table 2-1: FTA SCC Capital Cost Estimate Organization

SCC		Description
10	Guideway	Guideway grading and drainage; retaining walls, bridges and tunnels; trackwork (this applies to rail projects and will not be used for this project); busway construction
20	Stations/Stops	Construction of station/stop platforms, enclosures, canopies and fixtures; elevators; escalators and stairs; parking structure
30	Support Facilities	Operations, maintenance, and storage facilities
40	Sitework and Special Conditions	Demolition, clearing, and excavation; utilities and utility relocation; hazardous soil and water remediation; environmental mitigation; reconstruction of roadways; intersections and non-guideway structures; pedestrian and bicycle accommodations, sidewalks and trails; landscaping, fencing and lighting, park-and-ride facilities
50	Systems	Train control signals; roadway grade crossing protection; traction power substations; overhead catenary system; communications systems; central control hardware and software; automated fare collection systems; roadway traffic signals
60	Right-of-Way	Acquisition of right-of-way or easements for guideway, stations, and other facilities; relocation of existing households and businesses
70	Vehicles	Modern streetcar vehicles, enhanced bus or standard buses, and non-revenue vehicles, spare parts
80	Professional Services	Preliminary engineering; final design; project management for design and construction; construction administration and management; insurance; legal, permits review fees; surveys, testing, investigation, inspection; agency force account work
90	Contingency	Overall project contingency and reserves
100	Finance Charges	Estimated expenses for local financing of project activities prior to federal funding commitment

The alternatives will each be divided into five segments, and capital costs will be developed for each segment. The costs for the segments will then be combined into a total capital cost for each alternative. The segments from north to south are:

- Segment A: North of Homestead Road
  - A1: Eubanks Road park-and-ride to Homestead Road
  - A2: New park-and-ride north of I-40 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 park-and-ride

Figure 2-1 – Segment A1: Eubanks Road park-and-ride to Homestead Road

Figure 2-2 – Segment A2: New park-and-ride north of I-40 to Homestead Road

Figure 2-3 – Segment B: Homestead Road to Estes Drive

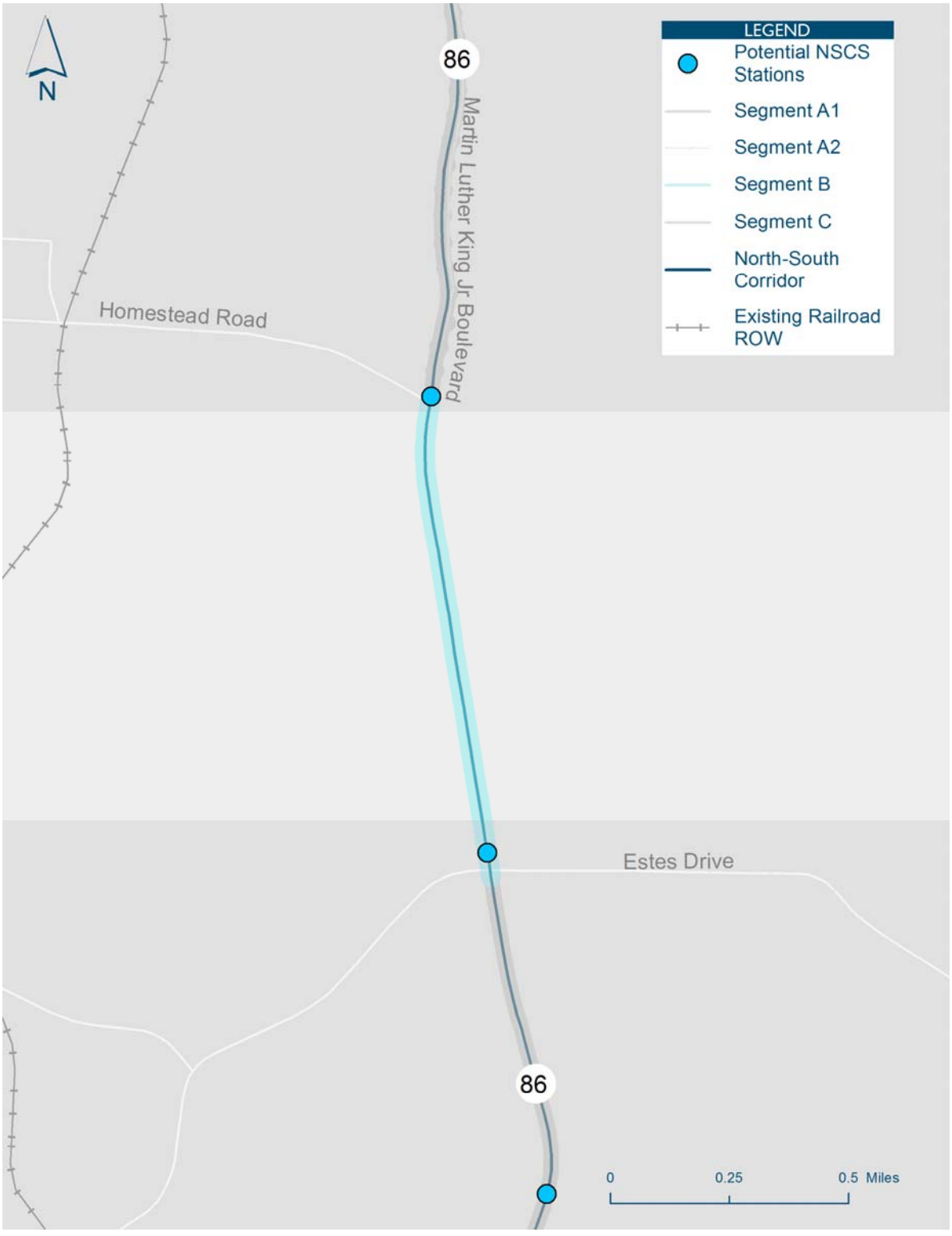


Figure 2-4 – Segment C: Estes Drive to North Street

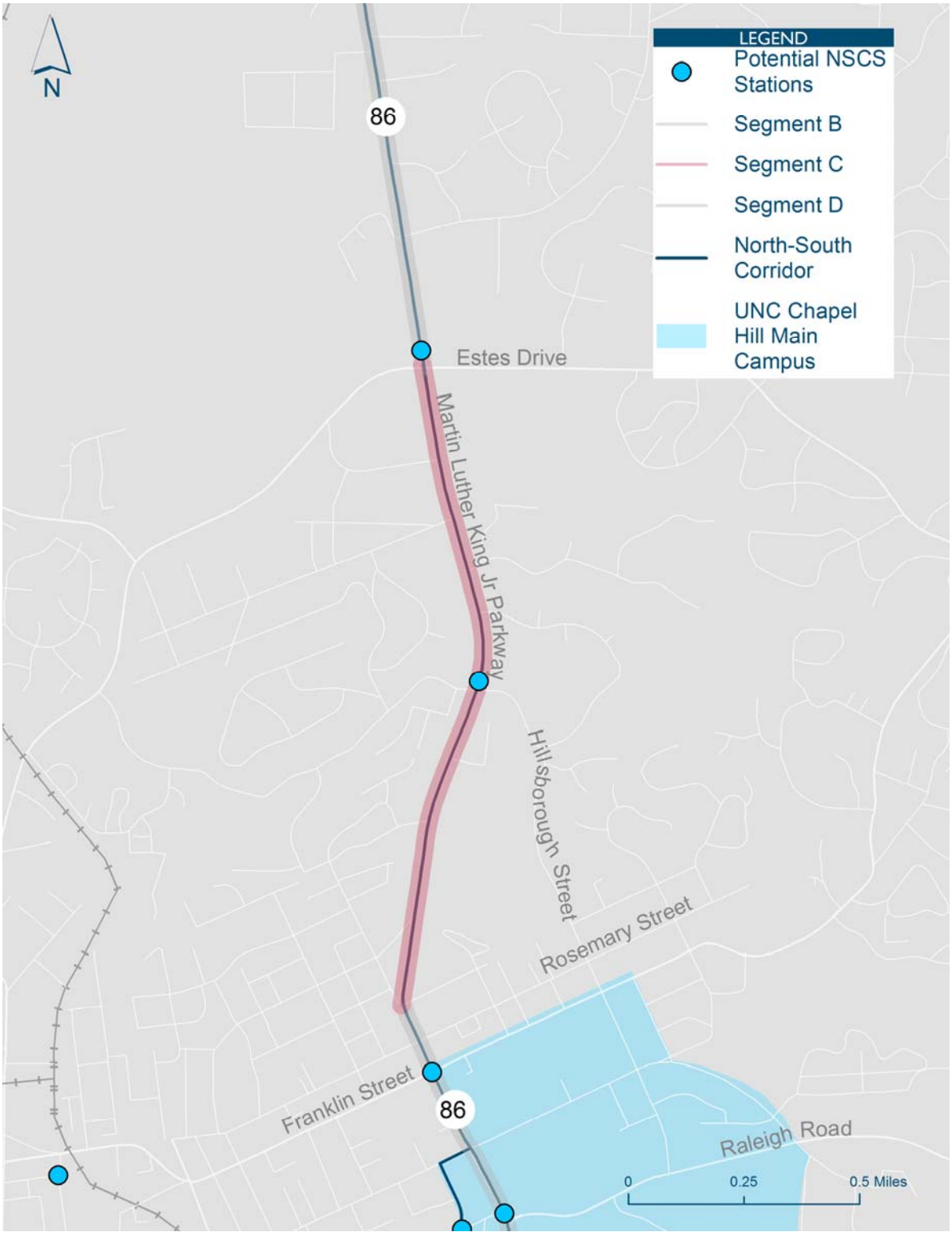


Figure 2-5 – Segment D: North Street to Purefoy Road

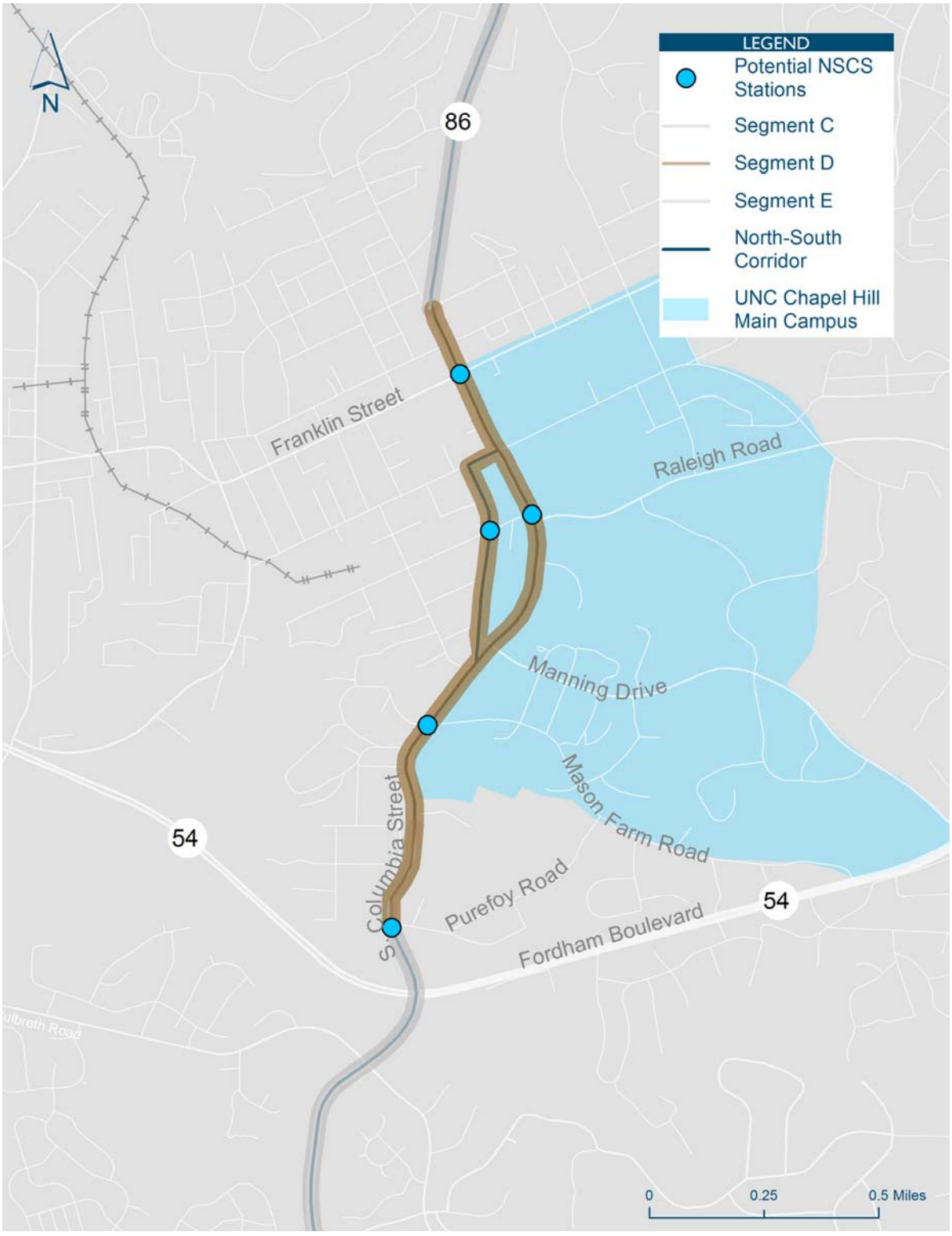
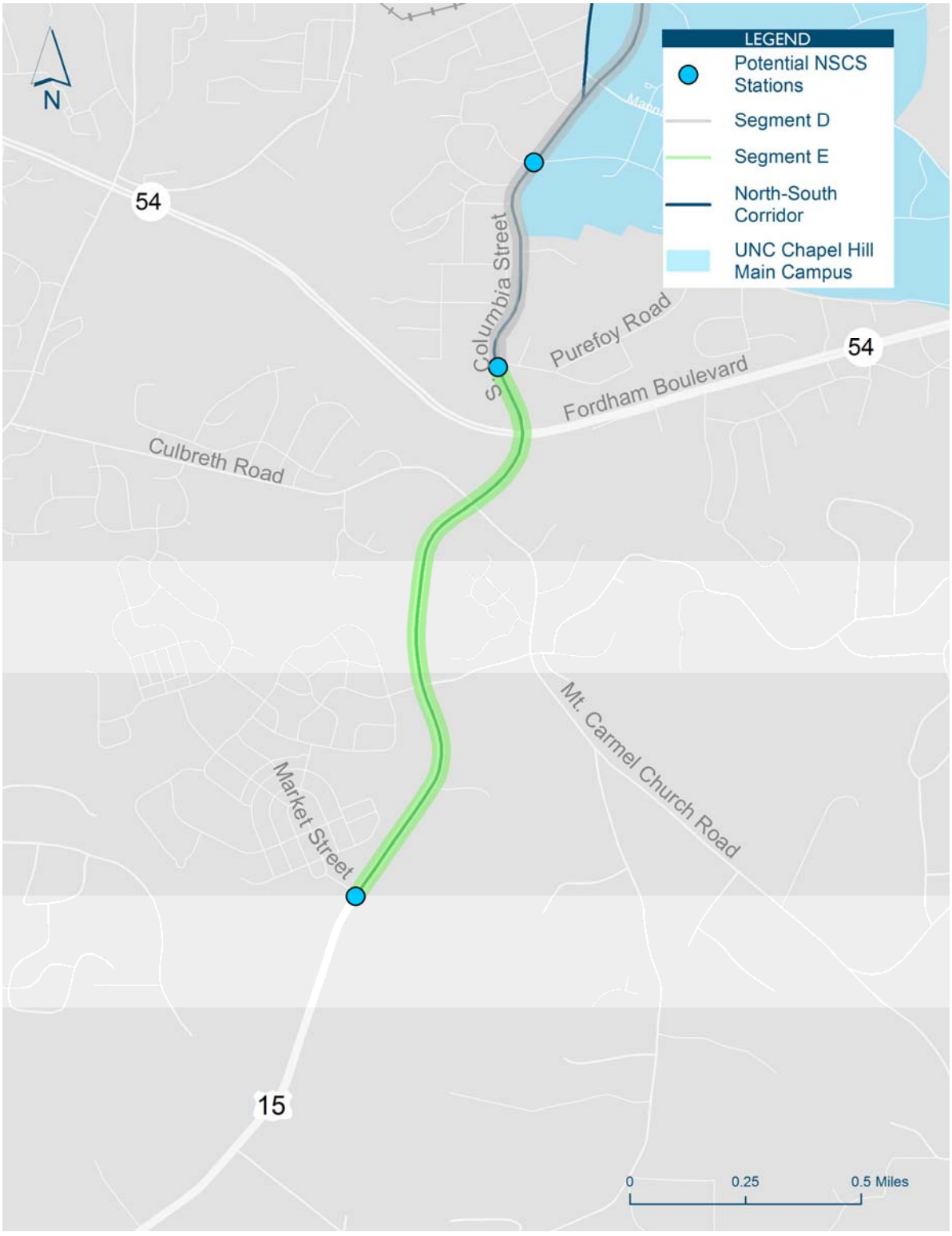


Figure 2-6 – Segment E: Purefoy Road to Southern Village park-and-ride



2.2 Assumptions

The capital cost estimates will be based upon a number of important assumptions derived from various sources. These assumptions include capital cost parameters applied at certain steps during the process, unit prices for the various capital cost items, and specific quantity, location, and design information taken from each of the alternatives.

2.2.1 Parameters

Capital cost parameters are necessary assumptions that are not related to the specific location or design features of the corridor or the alternatives under considerations. The North-South Corridor Study capital cost estimates are based upon the following parameters:

- Base Year – Year 2015
- Contingencies (SCC 90) – Contingencies are intended to compensate for unforeseen items if work, quantity fluctuations, and variances in unit costs that develop as the project progresses through the various stages of study and design development. The following contingencies have been applied to the capital cost estimates:
    - Infrastructure Costs (SCC 10, 20, 30, 40 and 50): 30 percent
    - Right-of-Way (SCC 60): 50 percent
    - Vehicles (SCC 70): 5 percent
    - Professional Services (SCC 80): 0 percent

2.2.2 Unit Prices

Unit prices for the various capital cost elements have been developed with the Project Management Team and are based in whole or in part on unit prices for other bus rapid transit projects (The Amp, Nashville, TN; Laker Line, Grand Rapids, MI; Red Line, Dakota County, MN; and Michigan/Grand River Avenue BRT, Lansing, MI) and local transportation projects (NCDOT 2013 Average Bid Price). Unit costs are presented in detail in the Appendix.

SCC 10 – Guideway

This category includes the running way that where BRT vehicles operate.

SCC 20 – Stations

This category includes construction costs for transit stop platforms, ramps, platform fixtures, canopies, parking structure, and passenger amenities.

SCC 30 – Support Facilities

This category includes the capital cost of operations, maintenance, and storage facilities for each alternative.

SCC 40 – Sitework and Special Conditions

This category includes estimated costs for all other construction activities that are not accounted for in SCCs 20 and 30, such as:

- Utility relocation allowance (linear foot)

- Roadway reconstruction or widening by the (lane-foot)
- Streetscaping/landscaping (linear foot)

SCC 50 – Systems

This category includes capital costs for traffic signals; communications systems; central control hardware and software; and automated fare collection. Typical systems unit cost line items include:

- Traffic signals (each)
- Communications allowance (linear foot)
- Ticket vending machine (each)

SCC 60 – Right-of-Way

This category includes allowances for acquisition of right-of-way needed for transit stop platforms, roadway widening and park-and-ride lots. Right-of-Way unit cost per acre will be based on Orange County data and recent NCDOT roadway projects.

SCC 70 – Vehicles

This category includes buses, as well as an allowance for other service vehicles to support operations and maintenance. Typical vehicle unit cost line items include:

- 40-foot hybrid-electric bus (each)
- 40-foot natural gas bus (each)
- 60-foot hybrid-electric bus (each)
- 60-foot natural gas bus (each)

SCC 80 – Professional Services

This category includes various professional services. The costs in this category are generated by applying assumed percentage rates to the infrastructure categories (SCC 10, 20, 30, 40 and 50) as described in the Table 2-2.

Table 2-2: Professional Services

Description	Percent
Project Development	14%
Project Management for Design and Construction	10%
Construction Administration & Management	2%
Professional Liability and other Non-Construction Insurance	1%
Legal; Permits; Review Fees by other agencies, cities, etc.	1%
Surveys, Testing, Investigation, Inspection	1%
Start Up	1%
Total:	30%

Appendix A – Capital Costs Master Costs

Master Unit Cost Table

Chapel Hill Transit
North-South Corridor Study

Today's Date **12/31/14**
Yr of Base Year $ 2015
Yr of Revenue Ops TBD

Description	Unit	2015 Unit Cost ($)	Comments
10 GUIDEWAY & TRACK ELEMENTS (route miles)			
10.02 Guideway: BRT Bituminous Rdwy Reconstruction	Lane Ft	$ 165	Source: 2013 NCDOT Avg. Unit Prices (3" Surface, 4" Interm, 4.5" Base, 6" ABC, roadway grading); Assume 24' widt
10.02 Guideway: BRT Concrete Pavement Rdwy	Lane Ft	$ 310	Source: 2013 NCDOT Avg. Unit Prices (10" PCC, 12" ABC, roadway grading), Assume 24' width
10.02 Guideway: BRT Mill and Resurface	Lane Ft	$ 25	Source: 2013 NCDOT Avg. Unit Prices (3" Mill and Resurface); Assume 24' width
10.02 Guideway: BRT Concrete Pavement at Stations	SY	$ 120	Source: 2013 NCDOT Avg. Unit Prices (10" PCC 12" ABC, roadway grading & misc.); Variable width/length; Bus pad and station approach paveme
20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)			
20.01 BRT Station - Side Loading Platform	EA	$ 275,000	Source: Silver Line Budget Status Report, 12/31/2013. 12'x80' platform with ramps, shelter, trash, seating
20.01 BRT Station - Split Intersection Platform	EA	$ 275,000	Median stations across intersection; 12'x80' with 1 ramp, shelter, trash, seating; passenger service one directio
20.01 BRT Station - Center Loading Platform	EA	$ 400,000	Assumes larger station (20'x80') to service passengers going in both directions. Same amenities as curbsid
20.06 Structured Parking - per space	Pkg Space	$ 20,000	Source: URS Grand Rapids
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS			
30.02 Light Maintenance Facility	Veh	$ 250,000	Cost per vehicle
40 SITEWORK & SPECIAL CONDITIONS			
40.01 Sitework for Stations	EA	$ 25,000	Includes removal of sidewalks and curb and gutter, minor grading
40.02 Utility Relocation Allowance - Low	LF	$ 25	Minor/Spot construction with few utilities
40.02 Utility Relocation Allowance - Medium	LF	$ 50	Suburban roadway construction
40.02 Utility Relocation Allowance - High	LF	$ 100	Downtown roadway construction
40.02 Utility Relocation for Stations	EA	$ 10,000	From Silver Line; relocation of public utilities from station footprint
40.02 Street Lighting Modification Allowance	LF	$ 25	Source: Crystal City streetcar concept
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks	LS	1%	1% of SCC 40 subtotal (.01-.02,.4-.07)
40.05 Widen Bridge	SFT	$ 100	Source: Cost analysis of recent NCDOT PDEA projects
40.05 Retaining walls	SFT	$ 50	Source: NCDOT 2013 Avg. Unit Prices (Segmental Gravity Retaining Wall)
40.06 ADA upgrade allowance per intersection	EA	$ 10,000	Source: NCDOT 2013 Avg. Unit Prices (Concrete Curb Ramp), Assume 2 curb ramps at each corner, landings between each pair; detectable warni
40.06 New or Reconstructed sidewalk	LF	$ 17	Source: NCDOT 2013 Avg. Unit Prices (4" Concrete Sidewalk), Assume 5' width
40.07 Concrete Curb and Gutter	LF	$ 15	Source: NCDOT 2013 Avg. Unit Prices (2'-6" Concrete Curb and Gutter)
40.07 Roadway Reconstruction - Full Depth Asphalt	Lane Ft	$ 85	Source: 2013 NCDOT Avg. Unit Prices (3" ACSC, 4" ACIC, 4.5" ACBC, 6" ABC, roadway grading & misc.), Assume 12' widt
40.07 Roadway Rehabilitation - Full Depth Asphalt	Lane Ft	$ 65	Source: 2013 NCDOT Avg. Unit Prices (3" ACSC, 4" ACIC, 4.5" ACBC), Assume 8' width
40.07 Roadway Rehabilitation - Mill & Overlay	Lane Ft	$ 15	Source: 2013 NCDOT Avg. Unit Prices (1.5" ACSC, Mill Full Depth & misc.), Assume 12' width
40.07 Minor Intersection Widening	EA	$ 4,000	Source: NCDOT 2013 Avg. Unit Prices, Assume mill and resurface 100' feet of 2 lane side road on either side of intersectio
40.07 Major Intersection Widening	EA	$ 10,000	Source: NCDOT 2013 Avg. Unit Prices, Assume reconstruction of intersecting 5-lane Y-line (both sides) for widened -L- (curb & gutter, pavement reconstruction)
40.07 Minor Intersection Rehabilitation	EA	$ 1,000	Source: NCDOT 2013 Avg. Unit Prices, Assume reconstruction of 2-lane intersecting Y-line (both sides) for widened -L- (curb & gutter, pavement reconstruction)
40.07 Major Intersection Rehabilitation	EA	$ 2,500	Source: NCDOT 2013 Avg. Unit Prices, Assume mill and resurface 50'+/- feet of intersecting 5 lane Y-line (both sides of intersectio
40.07 Driveway Reconstruction for Widening	EA	$ 1,200	Source: NCDOT 2013 Avg. Unit Prices, Assume replace 16' concrete driveway for a distance of 15'+/- from EOF
40.07 Drainage for Widening	LF	$ 75	Source: Cost analysis of recent NCDOT Project; Assumes replacement of curb inlets and connection to existing underground drainage system; limited new pipes
40.07 Pavement Markings	Lane Ft	$ 1	Source: NCDOT 2013 Avg. Unit Prices (Thermo), includes all new PM plus intersections (crosswalks, stop bars, characters, symbol
40.07 Roadway Signing for Widening	LF	$ 1	Source: NCDOT 2013 Avg. Unit Prices, Assume replacing existing signs removed due to widening/reflectivity (1 sign every 200-300
40.07 Surface parking lot	Pkg Space	$ 5,000	Laker Line BRT, Grand Rapids MI, 2014. Assume land acquisition, grading, drainage, aggregate base, asphalt surface, minor curb and gutter, striping, signage and lighting
40.08 MOT/TMP during construction (% of direct costs)	LS	5%	5% of SCC 40 subtotal (.01-.07)
40.08 Construction - Contractor indirects (mobilization, etc; % of direct costs)	LS	5%	5% of SCC 10 through 60 subtotal
50 SYSTEMS			
50.02 Traffic signal - New	EA	$ 150,000	Source: Cost analysis of recent NCDOT Project, Assume 4-way intersection, 5 lane/2-lane road, pedestrian signals, poles, span wire, new cabinet and controls
50.02 Traffic signal - Modify existing	EA	$ 50,000	Source: Cost analysis of recent NCDOT Project, Assume relocation of ex. signal heads, replacement/addition of two signal heads, additional span wire, possible cabinet upgrad
50.02 TSP equipment on bus	Veh	$ 4,000	Source: Dakota County Cedar Avenue Transitway Transit Signal Priority Assessment and Implementation. January 2012 – December 201
50.02 TSP upgrade for traffic signal	EA	$ 4,000	Source: Dakota County Cedar Avenue Transitway Transit Signal Priority Assessment and Implementation. January 2012 – December 201
50.05 Communications - Fiber Optic	LF	$ 53	Source: Silver Line Budget Status Report, 12/31/2013
50.05 Communications - Cellular	EA	$ 800	Source: Metro Transit, Minneapolis. There is an additional monthly fee of approximately $3
50.05 AVL/Next Bus	EA	$ 6,600	Source: Silver Line Budget Status Report, 12/31/2013
50.06 Fare collection system and equipment	EA	$ 120,000	Source: Silver Line Budget Status Report, 12/31/2013
50.07 Central Control	LS	$ 150,000	Source: Dakota County Cedar Avenue Transitway Transit Signal Priority Assessment and Implementation. January 2012 – December 201
60 ROW, LAND, EXISTING IMPROVEMENTS			
60.01 Purchase or lease of real estate	LS	$ 250,000	NCDOT Division 7 ROW
60.01 Purchase ROW strip	SFT	$ 25	NCDOT Division 7 ROW; sample costs from U-0624
60.01 Purchase ROW full take	LS	$ 400,000	Assumes purchasing entire property and residence/business
60.02 Relocation of existing households and businesses	EA	$ 50,000	Variable per relocation
70 VEHICLES (number)			
70.04 40' Hybrid-Electric Bus	EA	$ 680,000	Source: The Rapid
70.04 60' Hybrid-Electric Bus	EA	$ 1,200,000	Source: The Rapid / CATA
70.04 40' Compressed Natural Gas (CNG) Bus	EA	$ 530,000	Source: The Rapid
70.04 60' Compressed Natural Gas (CNG) Bus	EA	$ 860,000	Source: The Rapid
70.06 Non-revenue vehicles	EA		Not estimated at this time
70.07 Spare parts	Veh	$ 100,000	Source: Laker Line / CATA
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)		**30%**	
80.01 Project Development		14%	
80.02 Project Management for Design and Construction		10%	
80.03 Construction Administration & Management		2%	
80.04 Professional Liability and other Non-Construction Insurance		1%	
80.05 Legal; Permits; Review Fees by other agencies, cities, etc.		1%	
80.06 Surveys, Testing, Investigation, Inspection		1%	
80.07 Start up		1%	
90 UNALLOCATED CONTINGENCY			
Construction (SCCs 10-50)		30%	
Right-of-Way		50%	
Vehicles		5%	
100 FINANCE CHARGES			**TBD during NEPA/PD/Grant Agreement**

INFORMATION ITEM May 19, 2015

5C. Procurement Updates

Staff Resource: Buck Marks, Procurement Specialist

Procurement Manual

- Overview: The Federal Transit Administration (FTA) conducted a Triennial Review of Chapel Hill Transit on August 25-27, 2014. As part of the review we had a finding in the area of Procurement that required Chapel Hill Transit to develop and implement updated procurement policies and procedures that are consistent with FTA requirements (4220.1F).

- Update: In mid-February, Transit hired a Consultant (SG) that specializes in procurement system development and training to assist in developing a comprehensive Procurement Manual. The firm began work in late February.

- Transit staff has participated in extensive, remote working sessions with the Consultant to fast-track the first task, completion of an FTA-compliant procurement policy. Transit expects to submit the procurement policy to FTA the week of May 18, 2015. The Consultant and Transit project team have carefully mapped all of the FTA requirements to the procurement policy ensuring that all applicable rules have been addressed. Transit procurement staff has been implementing these requirements since last fall for all federally funded projects, and the completed policy will formalize those efforts.

- The FTA policy task is just the first step in creating a comprehensive Procurement Manual. Subsequent tasks will incorporate Town and State procurement requirements for non-federally funded purchases and integrate them with the FTA requirements.

- The Consultant and Transit project team are planning a kick-off workshop with the Town's Business Management Department (BMD) and senior Transit managers and division staff. This workshop will tackle a variety of important issues related to coordination between Transit and BMD. It will involve working sessions with division managers and staff to introduce procurement concepts essential for an effective procurement system. The working sessions will also be used by the Consultant to get information about current practices and as a key ingredient for understanding how the procedural tools can best be designed.

- The completed Procurement Manual will include detailed procedures for following FTA, State, Town, and Transit procurement requirements. The procedures will be captured in a wide variety of job aides for use by any Transit staff person directly involved in procurement activities. Those tools will assist staff in following policies and procedures as applicable to every procurement conducted. Of equal importance will be the internal control tools that will allow procurement staff to monitor whether procedures are being implemented and followed correctly.

- The project is scheduled to be completed at the end of June. However, given the current date and a potential project budget balance, the project could be extended into FY2015-16 to allow the Consultant to provide more training and implementation assistance than had been previously expected.

Regional Bus Procurement

- Chapel Hill Transit has taken on the lead role in coordinating preparation of the solicitation documents. This is due to changes in staffing at GoTriangle (TTA), including the retirement of their Procurement Manager. This is now the primary focus of Transit's procurement staff. In this new role, Transit is developing a punch list for coordinating and completing the tasks that remain outstanding, including recommending assignment of specific tasks to the other parties and setting target completion dates.
- After months of careful negotiation between GoTriangle, GoDurham, and Town of Chapel Hill, the Interlocal Agreement (ILA) was officially signed by all parties on May 4, 2015. Transit staff will be responsible for ensuring the ILA's provisions and responsibilities are correctly reflected in the IFB solicitation package.
- GoTriangle, GoDurham and Chapel Hill Transit are very close to completing the 150-page technical specifications. Transit expects the parties will get this completed by May 22, 2015.
- The parties are about 90% finished with General Contract Provisions portion of the IFB and will send it back to TTA by COB Monday, May 18. Transit staff worked with the Town Attorney and BMD's Purchasing and Contracts Manager to complete its edits and obtain concurrence. This is a central component of the solicitation package and key to any contract ToCH may execute as a result of the solicitation process. Once GoTriangle and the Town have agreed on the language, it will be sent to Durham's Attorney. The estimated completion date is June 5 for all parties agreeing with the contract provisions.
- Transit is taking the lead on completing the rest of the solicitation package, including the Sections on *Solicitation, Offer and Award*; *Quality Assurance Provisions,* and; *Warranty Provision.* A critical part of this task is getting the package reviewed as needed by the Town's Attorney and Purchasing and Contracts Manager. Part of that process is ensuring that all parts of the solicitation package are consistent with one another. Transit expects to have its work done by June 17, 2015, which assumes that the parties can assist with some of the subtasks required. A significant part of this task includes reviewing with GoTriangle and GoDurham to address any remaining concerns.
- Once all of these components are completed around June 17, Transit, in coordination with GoTriangle, will send the complete IFB package to Durham's purchasing department to prepare for solicitation, since Durham has accepted responsibility for administering the actual IFB process. We would estimate/hope that Durham could complete its work by June 24, 2015 and that the IFB would be advertised several days later.

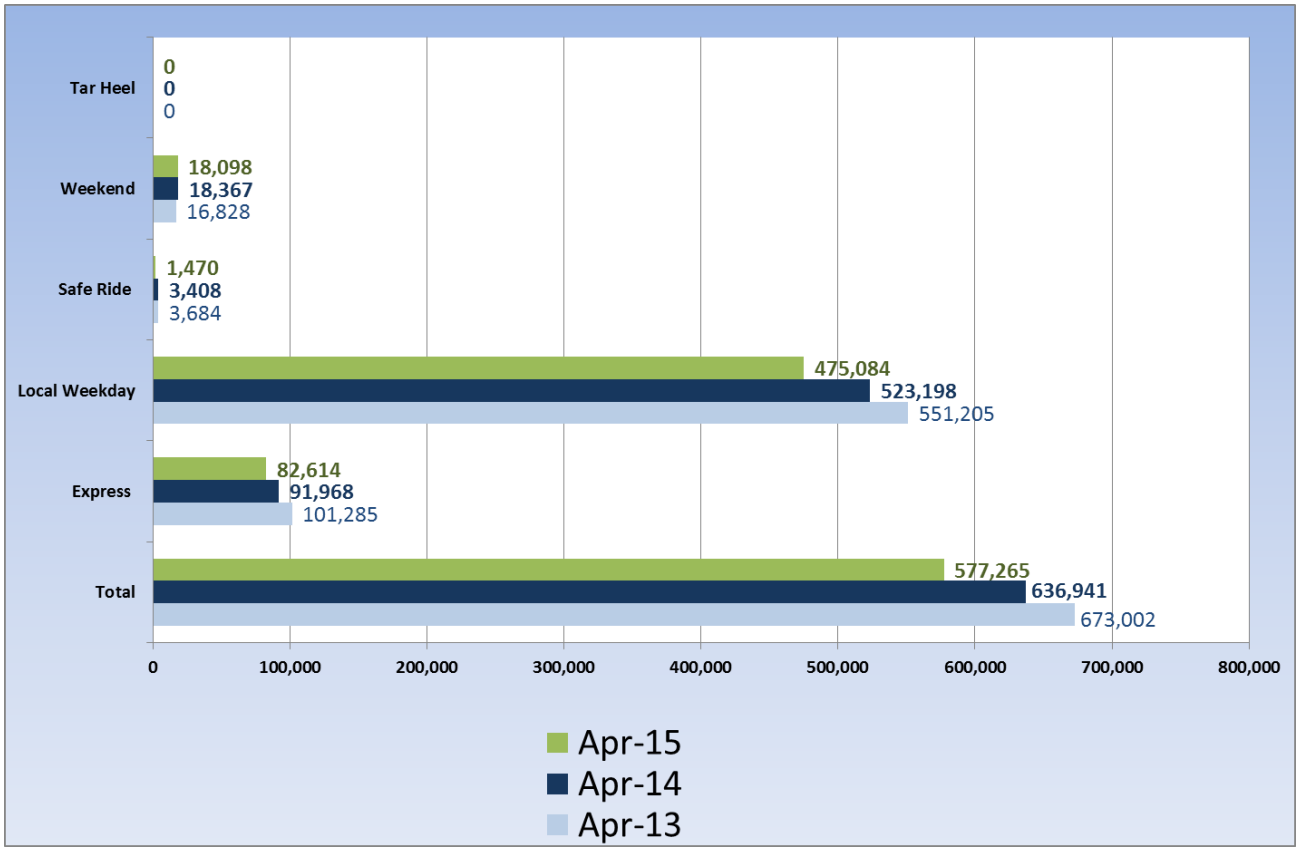
CONSENT ITEM May 19, 2015

5D. April Performance Report

Staff Resource: Mila Vega

April 2015 Ridership and Service Days

	Apr-13	Apr-14	Apr-15
Total	673,002	636,941	577,265
Express	101,285	91,968	82,614
Local Weekday	551,205	523,198	475,084
Safe Ride	3,684	3,408	1,470
Weekend	16,828	18,367	18,098
Tar Heel	0	0	0



	Apr-13	Apr-14	Apr-15	FY12-13	FY13-14	FY14-15
Weekday Service Days	22	21	21	207	208	206
Safe Ride Service Days	12	12	11	88	91	88
Saturday Service Days	4	5	5	48	47	48
Sunday Service Days	4	4	4	34	32	33
Tarheel Express Service Days	0	0	0	25	27	25
FCX	40,370	43,491	38,133	361,183	430,606	388,895
HU	11,486	8,568	7,094	113,136	98,447	79,833
JFX	17,468	10,941	10,277	174,972	112,776	104,067
CPX	15,133	11,865	10,277	132,672	117,041	109,316
CCX	13,068	11,613	9,943	114,213	102,266	97,921
DX	2,134	1,974	2,081	26,667	21,938	19,675
PX	1,626	3,516	4,810	21,050	35,156	33,519
A	33,110	30,768	27,776	255,059	277,522	257,403
CL	4,246	3,423	2,760	37,518	39,162	29,585
CM	15,048	15,582	13,784	129,982	135,624	125,688
CW	15,048	18,816	17,972	165,833	190,761	179,610
D	41,676	37,752	37,265	380,855	396,947	366,600
F	21,296	18,774	18,439	192,876	192,719	179,529
G	19,844	21,440	17,883	164,391	198,641	179,185
HS	3,256	3,843	3,355	28,489	35,635	29,580
J	87,384	82,614	75,643	782,937	777,790	746,375
N	14,146	14,238	13,840	114,466	129,166	129,573
NS	77,552	71,185	68,966	705,983	706,725	719,281
NU	37,092	37,023	31,306	274,572	288,857	276,336
RU	45,147	41,278	40,220	302,251	320,205	347,447
S	45,518	36,561	31,597	413,588	336,226	322,854
T	26,426	24,045	19,066	231,985	220,829	185,758
U	50,798	53,613	44,820	405,298	439,452	433,971
V	13,618	12,243	10,392	121,781	120,717	108,063
SAFE G	396	348	245	3,055	4,366	1,901
SAFE J	1,032	972	536	7,793	8,378	4,235
SAFE T	2,256	2,088	689	12,377	17,134	9,729
Weekday Fixed Route Total	**656,174**	**618,574**	**559,167**	**5,674,983**	**5,755,085**	**5,465,927**
Change from previous year (%) weekday		-6%	-10%		1%	-5%
CM	268	694	683	3,699	5,855	4,873
CW	732	1,328	1,740	8,924	11,171	13,165
D	1,324	1,741	1,698	15,483	14,076	13,321
NU (sat)	2,676	2,343	1,701	20,223	14,890	15,295
T	1,340	2,007	1,423	14,683	15,610	13,858
U (sat)	3,284	4,508	3,598	25,940	27,220	25,052
FG	800	885	1,215	8,812	7,924	8,791
JN	908	1,068	1,073	9,869	9,582	9,461
NU (sun)	2,752	2,505	2,316	20,441	15,995	19,367
U (sun)	2,744	1,290	2,652	21,015	15,524	20,243
Weekend Fixed Route Total	**16,828**	**18,367**	**18,098**	**149,091**	**137,845**	**143,425**
Change from previous year (%) weekend		9%	-1%			4%
Total Fixed Route Passenger Trips	**673,002**	**636,941**	**577,265**	**5,824,074**	**5,892,931**	**5,609,352**
Change from previous year (%)		**-5%**	**-9%**		**1%**	**-5%**
Tar Heel Express/Special Service	0	0	0	142,339	143,949	130,843
All Service Categories Ridership	**673,002**	**636,941**	**577,265**	**5,966,413**	**6,036,880**	**5,740,195**
Change from previous year (%)		**-5%**	**-9%**		**1%**	**-5%**

MONTHLY REPORT May 19, 2015

6A. Operations

Staff Resource: Tyffany Neal, Operations Manager - Demand Response
Nick Pittman, Operations Manager - Fixed Route

Memorial Day Holiday

- Chapel Hill Transit services will not operate on Monday, May 25, 2015, in observance of the Memorial Day holiday. Chapel Hill Transit services will resume on Tuesday, May 26, 2015.
- Notices have been posted on vehicles, along with a press release and social media messages.

UNC Commencement Shuttles

- Chapel Hill Transit staff worked with the Department of Public Safety to provide shuttle service for the Commencement Ceremony at Kenan Stadium on Sunday, May 10, 2015, providing over 6,000 rides.

Summer Break Schedule

- Chapel Hill Transit started our summer break schedule on Saturday, May 9, 2015. During this time, the weekday NU route ends at 8:29 p.m. and the Safe Rides and Saturday/Sunday U and NU routes do not operate. EZ Rider services end at 6:23 p.m. on Saturdays. The regular service schedule will resume on Saturday, August 14, 2015.

Fourth of July Holiday

- Chapel Hill Transit services will operate the following schedule in observance of the Fourth of July holiday:
    - Friday, July 3rd – Saturday Routes: CM, CW, D, FG, JN and T (No U or NU routes and EZ Rider will operate from 8:15 a.m. – 6:52 p.m.)
    - Saturday, July 4th – No Service
    - Sunday, July 5th – EZ Rider Premium Service
- Chapel Hill Transit's Administrative Offices will be closed on Friday, July 3rd.

Demand Response – Tyffany Neal

- Demand Response's On-Time Performance (OTP) for the month of April 2015 – 90.43%; April 2014 – 92.98%; April 2013 – 93.06%.
- Demand Response's Cancellations for the month of April 2015 – 24.29%; April 2014 – 24.7%; April 2013 – 20.57%.
- Demand Response had zero (0) Missed Trips in April 2015 – 0%; one (1) Missed Trip in April 2014 – 0%; five (5) Missed Trips in April 2013 – 0.01%.
  Demand Response had zero (0) preventable accidents in April 2015. Currently, Demand Response has been preventable accident-free for 154 days.

Fixed Route – Nick Pittman

- Fixed Route currently has 6 new operators in new hire training. They are expected to graduate our new hire training program in May. Fixed Route has its next training class scheduled to begin on May 18th.
- During April's Operations Safety meetings, staff discussed employee attendance standards. Awards were also handed out for operators with perfect attendance for the month of March
- Fixed Route's On-Time Performance (OTP) for the month of February 2015 – 82%.

MONTHLY REPORT May 19, 2015

6B. Director

Staff Resource: Brian Litchfield

- The May Director's Report will be provided at the meeting on May 19, 2015.

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CHAPEL HILL TRANSIT PUBLIC TRANSIT COMMITTEE

FUTURE MEETING ITEMS

May 19, 2015

June 16, 2015 11:00 a.m.

Action Items	Informational Items
	AA Study Update
	Financial Sustainability Study Update
	FY 15-16 Budget

July, 2015 11:00 a.m.
No Meeting

August 25, 2015 11:00 a.m.

Actions Items	Informational Items
	AA Study Update
	Financial Sustainability Study Update

Key Meetings/Dates

MPO Board – June 10, 2015, 9-11AM, Committee Room, Durham City Hall

TCC Meeting – May 27, 2015, 9-11AM, Committee Room, Durham City Hall

TCC Meeting – June 24, 2015, 9-11AM, Committee Room, Durham City Hall

APTA Transit Initiatives & Communities Conference – June 1-3, 2015, Grand Rapids, MI

NCPTA Annual Conference and Roadeo – June 5-10, 2015, Embassy Suites, Concord, NC

APTA Transit Board Members & Board Support Seminar - July 18-21, 2015, Denver, CO