

URS DIN 01567 Rev 2

Operations and Maintenance Cost Results

Durham-Orange Light Rail Transit Project



July 24, 2015

The NEPA Preferred Alternative for the D-O LRT Project would generally follow NC 54, I-40, US 15-501, and the North Carolina Railroad (NCRR) Corridor in downtown Durham and east Durham. The alignment would begin at UNC Hospitals, parallel Fordham Boulevard, proceed east on NC 54, travel north on I-40, parallel US 15-501 before it turns east toward the Duke University campus along Erwin Road, and then follow the NCRR Corridor parallel to NC 147 through downtown Durham, before reaching its eastern terminus near Alston Avenue. The alignment would consist of at-grade alignment, fill and cut sections, and elevated structures. In two sections of the alignment, Little Creek and New Hope Creek, multiple Light Rail Alternatives are evaluated in the DEIS.

This technical report contains information for all alternatives analyzed in the DEIS. However, pursuant to MAP 21, the Moving Ahead for Progress in the 21st Century Act (P.L. 112-141), a NEPA Preferred Alternative has been developed, which recommends C2A in the Little Creek section of the alignment, NHC 2 in the New Hope Creek section of the alignment, the Trent/Flowers Drive station, and the Farrington Road Rail Operations and Maintenance Facility.



Operations and Maintenance Cost Results

Table of Contents

- 1. Introduction 1-1**
 - 1.1 Description of Study Corridor 1-1
 - 1.2 Alternatives Considered..... 1-1
 - 1.2.1 No-Build Alternative 1-1
 - 1.2.2 Light Rail Alternatives 1-2
 - 1.3 Purpose of This Report..... 1-2
- 2. Project Alternatives 2-1**
 - 2.1 No-Build Alternative 2-1
 - 2.2 Light Rail Alternatives..... 2-2
 - 2.3 Supporting Background Bus Service for Light Rail Alternatives..... 2-2
- 3. Operations and Maintenance Cost Models 3-1**
- 4. Operations and Maintenance Cost Estimates 4-1**
- APPENDIX A – Triangle Transit Incremental Cost (Over Existing) of Each Alternative Including LRT ServiceA-1**
- APPENDIX B - Durham Area Transit Authority Incremental Cost (Over Existing) of Each AlternativeB-1**
- APPENDIX C – Chapel Hill Transit Incremental Cost (Over Existing) of Each AlternativeC-1**

List of Tables

- Table 4-1: Summary of Incremental Operating Statistics and O&M Costs 4-2**

List of Acronyms and Abbreviations

Acronym/Abbreviation	Definition
AA	alternatives analysis
CAMPO	Capital Area Metropolitan Planning Organization
CHT	Chapel Hill Transit
CPI	consumer price index
CPI-U	consumer price index for all urban consumers
DATA	Durham Area Transit Authority
DBBS	Designing Better Bus Service
DCHC	Durham/Chapel Hill/Carrboro
DEIS	Draft Environmental Impact Statement
D-O	Durham-Orange
D-O LRT	Durham-Orange Light Rail Transit
DTCC	Durham Technical Community College
DUMC	Duke University Medical Center
FTA	Federal Transit Administration
I-40	Interstate 40
LPA	locally preferred alternative
LRT	light rail transit
MPO	metropolitan planning organization
MTP	metropolitan transportation plan
NC	North Carolina
NCCU	North Carolina Central University
NCRR	North Carolina Railroad
NHC	New Hope Creek
O&M	operations and maintenance
ROMF	rail operations and maintenance facility
UNC	University of North Carolina
US	United States
VA	Veteran Affairs



Operations and Maintenance Cost Results

1. Introduction

Triangle Transit, in cooperation with the Federal Transit Administration (FTA), has prepared a Draft Environmental Impact Statement (DEIS) to evaluate a potential high-capacity transit improvement in the Triangle region, within the Durham-Orange (D-O) Corridor, between Chapel Hill and Durham.

This report describes the bus and rail operations plans and the associated operating costs for the alternatives that have been defined for this project. The report begins with a brief description of existing transit services in the project study area, and how the existing services are modified to become the No-Build network. This No-Build network is the basis on which the other project alternatives have been defined.

This report also includes a description of the proposed supporting background bus service for the Light Rail Alternatives. The supporting background bus services are identical for all of the Light Rail Alternatives.

A list of data used in the model for the No-Build network and the Light Rail Alternatives is also included in this report. The report ends with tabular data describing the operations and costs of the No-Build and Light Rail Alternatives project alternatives.

1.1 Description of Study Corridor

The D-O Corridor is located within the Triangle region. It extends roughly 17 miles from southwest Chapel Hill to east Durham, and includes several educational, medical, and other key activity centers which generate a large number of trips each day. The land uses in the D-O Corridor are supported by a network of major highways including NC 54, I-40, US 15-501, Erwin Road, and NC 147. Additional detail regarding the study corridor is included in the *Durham-Orange Light Rail Transit Project DEIS*, chapters 1 and 2.

1.2 Alternatives Considered

- No-Build Alternative
- Light Rail Alternatives

In addition to the Light Rail Alternatives, the DEIS considers a No-Build Alternative comprised of the existing and programmed transportation network improvements without the planned rail improvements and associated bus network modifications. Additional detail regarding the alternatives considered is included in the *Durham-Orange Light Rail Transit Project DEIS*, chapter 2.

1.2.1 No-Build Alternative

The No-Build Alternative includes the existing and planned transportation programs and projects scheduled to be built and implemented before forecast year 2040 and contained in the 2040 Metropolitan Transportation Plan (MTP), excluding only the proposed Light Rail Alternatives, rail transit improvements and related bus transit modifications that would be associated with the proposed D-O LRT Project.

1.2.2 Light Rail Alternatives

Through the Alternatives Analysis and Scoping process, a majority of the proposed D-O LRT Project alignment was identified. However, there are a few areas where different alternatives were retained for further evaluation. As a result, multiple alignments crossing Little Creek and New Hope Creek are evaluated in the DEIS.

- Four potential crossings of Little Creek between Hamilton Road and the proposed Leigh Village Station (Alternatives C1, C1A, C2, and C2A)
- Three potential crossings of New Hope Creek and Sandy Creek between Patterson Place and South Square (Alternatives NHC LPA, NHC 1, and NHC 2)
- Station alternatives at Duke/VA Medical Centers (i.e., Duke Eye Center and Trent/Flowers Drive)
- Five proposed locations for the ROMF (i.e., Leigh Village ROMF, Farrington Road ROMF, Patterson Place ROMF, Cornwallis Road ROMF, and Alston Avenue ROMF)

The Light Rail Alternatives would generally follow North Carolina (NC) Highway 54 (NC 54), Interstate 40 (I-40), United States (US) 15-501, and the North Carolina Railroad (NCR) Corridor in downtown Durham and east Durham. The alignment would begin in Chapel Hill at UNC Hospitals, parallel Fordham Boulevard, proceed eastward adjacent to NC 54, travel north along I-40, parallel US 15-501 before it would turn east toward Duke University and run within Erwin Road, and then follow the NCR Corridor that parallels NC Highway 147 (NC 147) through downtown Durham, before reaching its eastern terminus in Durham near Alston Avenue. The alignment would consist of at-grade alignment, fill and cut sections, and elevated structures. A total of 17 stations are planned, and up to 5,100 parking spaces would be provided along the Light Rail Alternatives. In addition, a rail operations and maintenance facility (ROMF) would be constructed to accommodate the D-O LRT fleet (initially 17 vehicles, with the ability to accommodate up to 26 vehicles without needing expansion).

Bus routes would be modified to feed into the D-O LRT stations, and headways would be adjusted to provide more frequent bus service and minimize transfer waiting times. These services would also connect light rail passengers with other area transportation hubs, including park-and-ride lots and transfer centers.

1.3 Purpose of This Report

This report presents estimated annual operations and maintenance (O&M) costs for the proposed D-O LRT Project alternatives. This report follows the project's *Operations and Maintenance Cost Methodology Report* which presents a detailed description of the process used to develop the cost models.

As noted by the Federal Transit Administration (FTA) in *Procedures and Technical Methods for Transit Project Planning (Draft)*, dated November 2006, estimating O&M costs is an important part of planning New Starts projects for three reasons:

- Cost-effectiveness measures: The projection of annual O&M costs is a critical input to the determination of the New Starts measures of cost effectiveness.
- Environmental benefits measure: The projection of annual O&M costs is a critical input to the determination of the New Starts measures of environmental benefits.



Operations and Maintenance Cost Results

- Financial planning: Annual O&M cost projections are vital to the development of financial plans that cover multiple years of construction and operation of New Starts projects.

The FTA requires the use of a resource-driven, fully-allocated cost model for O&M projections in a New Starts project. Resource-driven models connect specific expenses to specific service or system characteristics. Once expense items are assigned their driving variable(s), resource-driven models produce cost estimates accordingly. For example, after mathematically connecting bus operator wages/salaries to annual revenue bus-hours, a model would estimate the future annual cost of this expense item based on a study alternative's revenue bus-hours of service.

Transit operations affected by the D-O LRT Project alternatives include Triangle Transit, Durham Area Transit Authority (DATA) and Chapel Hill Transit (CHT).

This report continues with a brief description of the project alternatives in section 2 and a summary of the methodology used to estimate O&M costs in section 3. Section 4 of this report presents annual O&M cost estimates for the project alternatives.

2. Project Alternatives

The D-O LRT Light Rail Alternatives for the current phase of the project is being compared to a No-Build Alternative. Full descriptions of the service plans for each alternative are provided in the project's *Transit Operating Plan* dated April 2015. Brief highlights of the operating plan assumptions for each alternative are provided below.

2.1 No-Build Alternative

A No-Build Alternative establishes a reference point for the environmental impacts of the alternatives and the financial condition of the transit operator(s).

For the D-O LRT Project, the definition of the No-Build Alternative began with incorporating planned improvements from the region's long-range plan. The 2040 Metropolitan Transportation Plan (MTP) was adopted by the Durham-Chapel Hill-Carrboro (DCHC) Metropolitan Planning Organization (MPO) and Capital Area Metropolitan Planning Organization (CAMPO). The MTP assumes significant expansion of the region's transit network with revenues from the planned sales tax referendum and vehicle registration fees; the MTP also includes the D-O LRT Project in its transit network. The following modifications were made to the MTP transit network to define the appropriate No-Build Alternative in the context of a New Starts project:

- The D-O LRT line was removed from the 2040 MTP network.
- Triangle Transit Routes 400A and 400B were included in the No-Build network. These proposed routes are similar to the existing Routes 400 and 405 that presently operate in the D-O LRT Corridor (from downtown Durham to downtown Chapel Hill). They were not included in the 2040 MTP network because LRT was assumed in this corridor.
- Existing Triangle Transit Routes 700 and the DRX were added back into the No-Build network. Both routes were excluded from the 2040 MTP network because the network assumed commuter rail in this corridor.
- Triangle Transit recently began operating a short-turn pattern for Route 800. The new pattern was added to the 2040 network.
- After consultation with Triangle Transit and CHT service planning staff, several more Triangle Transit routes were eliminated from the 2040 MTP network including the Butner-Durham Express, the New Hope-RTP Express and Triangle Transit Circulators; Research Triangle, Southport, and Purple.
- The Bull City Connector was added into the No-Build Alternative. This is an existing local route that operates in Durham and was not included in the 2040 MTP network because it operates parallel to the MTP's D-O LRT line.
- The 2040 MTP network assumed several new feeder routes associated with the D-O LRT line. Since this No-Build network does not include this LRT line, these feeder routes were removed.
- Service improvements identified in Scenario 3 of DATA's *Designing Better Bus Service* (DBBS) study were also assumed in the 2040 No-Build network. This plan was developed by DATA in May of 2012 with service recommendations based across four fronts: Safety, Service Quality,

Operations and Maintenance Cost Results

Fiscal Responsibility, and Community Benefits. DATA has already implemented many of the service improvements identified in Scenarios 1 and 2 of the DBBS project.

2.2 Light Rail Alternatives

The Light Rail Alternatives consist of LRT service from UNC Hospitals in Chapel Hill to Alston Avenue in Durham. Summarizing the alignment, it begins near the Dogwood Parking Deck on the southern side of the UNC campus and proceeds to Friday Center, Leigh Village, South Square, Duke Medical Center, Durham Station, and terminates just west of Alston Avenue along Pettigrew Street on the south side of the railroad tracks. The proposed LRT alignment includes 17 stations and eight of the sites include park-and-ride facilities.

Operating hours for the new LRT service are proposed to be from 5:30 a.m. to midnight on weekdays and Saturdays, and 6:30 a.m. to midnight on Sundays. Proposed service frequencies on weekdays would be 10 minutes during peak periods, 20 minutes during the midday and 30 minutes in the evening. Saturday service would operate every 20 minutes until 7:00 p.m., when the frequency would be reduced to every half hour. Sunday service would operate at 30-minute intervals before 9:00 a.m. and after 7:00 p.m., with 20-minute service during the day.

It was determined that a mix of one and two-car trains would be sufficient to accommodate projected ridership and remain below a 2.0 load factor (i.e., one standing passenger for every seated passenger in the a.m. peak hour).

2.3 Supporting Background Bus Service for Light Rail Alternatives

With the introduction of new premium bus or LRT service in the D-O LRT Corridor, several changes would be made to existing Triangle Transit, DATA, and CHT routes in the corridor. These changes can be categorized as the following:

- Elimination of duplicative bus service: Two Triangle Transit routes (Routes 400A, 400B), four CHT routes (Routes DX, FCX, HU, and S) and one DATA route (Bull City Connector) are eliminated from the transit network.
- Changes to the background bus network: Several DATA, CHT, and Triangle Transit route alignments are modified to include connections to nearby stations.
- Introduction of new feeder bus routes: New feeder routes are proposed along the alignment to improve connectivity to the LRT service.

As noted at the beginning of this section, the project's *Transit Operating Plan* documents proposed changes to the local bus networks.



Operations and Maintenance Cost Results

3. Operations and Maintenance Cost Models

Per FTA guidance, detailed descriptions of the project's O&M spreadsheet cost models were provided separately in the *Operations and Maintenance Cost Methodology Report*. In that report, it was noted that resource build-up spreadsheet cost models were developed for the D-O LRT Project based on 2012 actual expenditures for Triangle Transit, DATA, and CHT and also for the LRT systems selected as peers for the Light Rail Alternatives of this project.

Input variables determine all costs for each service provider. The D-O LRT O&M cost models require the following bus and light rail input:

Triangle Transit Bus Input Variables

- Annual revenue Triangle Transit bus-hours
- Annual revenue contractor bus-hours
- Annual revenue Triangle Transit bus-miles
- Annual revenue contractor bus-miles
- Number of bus garages
- Number of regional transit centers
- Number of peak buses

DATA Bus Input Variables

- Annual revenue bus-hours
- Annual revenue bus-miles
- Number of bus garages
- Number of regional transit centers
- Number of peak buses

CHT Bus Input Variables

- Annual revenue bus-hours
- Annual revenue bus-miles
- Number of bus garages
- Number of peak buses

LRT Input Variables

- Annual revenue train-hours
- Annual revenue car-miles
- Number of yards
- Directional route miles
- Number of passenger stations
- Number of peak cars

The cost model spreadsheets also incorporate a factor to allow costs to be inflated or deflated as necessary.

4. Operations and Maintenance Cost Estimates

This section identifies annual O&M cost estimates for the D-O LRT Project alternatives. Annual O&M costs have been developed for the No-Build and Light Rail Alternatives using the cost models referenced briefly in section 3 of this report and fully described in this project's *Operations and Maintenance Cost Methodology Report*. O&M costs depicted in this section are based on actual 2012 expenses for bus and light rail, inflated to 2015 dollars using the consumer price index (CPI) of the U.S. Department of Labor, Bureau of Labor Statistics, as follows:

- Local bus costs were inflated with the consumer price index for all urban consumers (CPI-U) for the south region, using data for the two most recent annual periods (2012 to 2013, and 2013 to 2014) and then applying the average annual rate for this two-year period as a proxy for an additional 12 months of inflation so that project O&M cost estimates will represent 2015 dollars.
- Light rail costs were inflated with the CPI-U for the U.S. city average, using data for 2012 to 2013, and then from 2013 to 2014. As was done for the existing local transit providers, the average annual rate for this two-year period was used as a proxy for an additional full year of inflation so that project LRT O&M cost estimates will represent 2015 dollars.

Key supply variables (model input) for the No-Build and Light Rail Alternatives are based on the project's operating plans and O&M cost model methodology referenced above. The LRT service plan assumes 11 trains in peak period operation, with three trains operating as 2-car trains and the other eight trains operating as single-car trains. All model inputs for the study alternatives reflect the incremental change in service for the D-O LRT portion of regional transit, rather than system-wide service. Table 4.1 shows the alternatives' incremental statistics and costs over existing transit in the corridor.

- The No-Build Alternative, with its service improvements, is anticipated to add \$8.1 million to the annual O&M cost of existing service in the study corridor.
- Light Rail Alternatives will add between \$16.2 (Alternative C1-NHC LPA) and \$16.38 (Alternative C1A-NHC 1) million to the annual O&M cost of transit over the No-Build.

Because the study corridor affects multiple transit operations, Table 4.1 summarizes the incremental change in operating statistics and O&M costs by transit agency and alternative.

The appendices include printouts of the model runs for each of the transit operators, to show the incremental cost (over existing) for each project alternative, by operator.



Operations and Maintenance Cost Results

Table 4-1: Summary of Incremental Operating Statistics and O&M Costs

Operator	Mode	Key Supply Variable	Unit Cost	No-Build	C1-NHC LPA	C1A-NHC LPA	C2-NHC LPA	C2A-NHC LPA	C1-NHC 1	C1A-NHC 1	C2-NHC 1	C2A-NHC 1	C1-NHC 2	C1A-NHC 2	C2-NHC 2	C2A-NHC 2		
Triangle Transit	Bus	Ann. Rev. TT Bus-Hours	\$51.53	23,545	-6,695	-6,695	-6,695	-6,695	-6,695	-6,695	-6,695	-6,695	-6,695	-6,695	-6,695	-6,695		
		Ann. Rev. Contr'd. Bus-Hours	\$67.48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Ann. Rev. TT Bus-Miles	\$1.83	416,769	-30,334	-30,334	-30,334	-30,334	-30,334	-30,334	-30,334	-30,334	-30,334	-30,334	-30,334	-30,334	-30,334	
		Ann. Rev. Contr'd. Bus-Miles	\$0.99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Maintenance Garages	\$426,354	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Regional Transit Centers	\$132,487	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Peak Buses	\$52,050	11	1	1	1	1	1	1	1	1	1	1	1	1	1	
		Total Cost			\$2,548,500	-\$348,400	-\$348,400	-\$348,400	-\$348,400	-\$348,400	-\$348,400	-\$348,400	-\$348,400	-\$348,400	-\$348,400	-\$348,400	-\$348,400	
	LRT	Ann. Rev. Train-Hours	\$91.51	0	48,300	48,300	48,300	48,300	48,300	48,300	48,300	48,300	48,300	48,300	48,300	48,300	48,300	
		Ann. Rev. Car-Miles	\$3.12	0	937,700	952,300	947,800	946,100	955,100	969,600	963,500	963,500	963,500	951,200	965,100	960,600	959,100	
		Yards	\$1,155,486	0	1	1	1	1	1	1	1	1	1	1	1	1	1	
		Directional Route-Miles	\$71,745	0	33.52	34.04	33.88	33.82	34.14	34.66	34.50	34.44	34.44	34.00	34.50	34.34	34.28	
		Stations	\$150,873	0	17	17	17	17	17	17	17	17	17	17	17	17	17	
		Peak LRVs	\$310,743	0	14	14	14	14	14	14	14	14	14	14	14	14	14	
		Total Cost			\$0	\$17,822,900	\$17,905,800	\$17,880,200	\$17,870,600	\$17,921,700	\$18,004,200	\$17,978,700	\$17,969,400	\$17,969,400	\$17,899,500	\$17,978,700	\$17,953,200	\$17,944,200
		Total Triangle Transit Cost			\$2,548,500	\$17,474,500	\$17,557,400	\$17,531,800	\$17,522,200	\$17,573,300	\$17,655,800	\$17,630,300	\$17,621,000	\$17,551,100	\$17,630,300	\$17,604,800	\$17,595,800	
	DATA	Bus	Ann. Rev. Bus-Hours	\$43.15	36,889	61,135	61,135	61,135	61,135	61,135	61,135	61,135	61,135	61,135	61,135	61,135	61,135	
Ann. Rev. Bus-Miles			\$1.72	462,378	759,152	759,152	759,152	759,152	759,152	759,152	759,152	759,152	759,152	759,152	759,152	759,152		
Maintenance Garages			\$818,227	0	0	0	0	0	0	0	0	0	0	0	0	0		
Regional Transit Centers			\$70,468	0	0	0	0	0	0	0	0	0	0	0	0	0		
Peak Buses			\$104,869	7	11	11	11	11	11	11	11	11	11	11	11	11		
Total Cost					\$3,122,200	\$5,099,100	\$5,099,100	\$5,099,100	\$5,099,100	\$5,099,100	\$5,099,100	\$5,099,100	\$5,099,100	\$5,099,100	\$5,099,100	\$5,099,100	\$5,099,100	
CHT	Bus	Ann. Rev. Bus-Hours	\$49.71	27,731	22,233	22,233	22,233	22,233	22,233	22,233	22,233	22,233	22,233	22,233	22,233	22,233		
		Ann. Rev. Bus-Miles	\$2.49	359,061	258,974	258,974	258,974	258,974	258,974	258,974	258,974	258,974	258,974	258,974	258,974	258,974		
		Maintenance Garages	\$1,307,492	0	0	0	0	0	0	0	0	0	0	0	0	0		
		Regional Transit Centers	\$0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		Peak Buses	\$22,416	7	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1		
		Total Cost			\$2,428,900	\$1,727,200	\$1,727,200	\$1,727,200	\$1,727,200	\$1,727,200	\$1,727,200	\$1,727,200	\$1,727,200	\$1,727,200	\$1,727,200	\$1,727,200	\$1,727,200	
TOTAL ADDITIONAL O&M COSTS	Alternative Change from No-Build		\$8,099,600	\$24,300,800	\$24,383,700	\$24,358,100	\$24,348,500	\$24,399,600	\$24,482,100	\$24,456,600	\$24,447,300	\$24,377,400	\$24,456,600	\$24,431,100	\$24,422,100			

Notes: Costs are in 2015 dollars

Costs shown for the above alternatives are applicable for both the Duke Eye Center and Trent/Flowers Drive Station alternatives.



Operations and Maintenance Cost Results

Appendices



Operations and Maintenance Cost Results

APPENDIX A – Triangle Transit Incremental Cost (Over Existing) of Each Alternative Including LRT Service



Operations and Maintenance Cost Results

Appendix A Table 1

Durham-Orange County Corridor
Triangle Regional Transit Program
O&M Cost Models

TRIANGLE TRANSIT AUTHORITY BUS LINE ITEM DETAIL

																No-Build		
																Inflation Factor: 1.049		
Expense Line Item	2012 Bus Expenses	Existing Unit Cost Adjusted	New Unit Cost Added	Bus Supply Variable Unit Cost Rate (\$2012)						Productivity Ratio			Base Year Resource Unit Cost	Results in: 2015\$				
				TTA Revenue Bus-Hours	Contracted Bus-Hours	TTA Revenue Bus-Miles	Contracted Bus-Miles	Garages	Regional Transit Ctrs	Peak Buses	Resource Variable	Resource Value		Resource/Supply	Inflation Factor	Resource Unit Cost	Estimated Annual Cost	
VEHICLE OPERATIONS																		
OPERATORS' SALARIES & WAGES	\$3,246,438			\$33.28								Work Hours	147,985	1.517	\$21.94	1.049	\$23.02	\$822,016
OTHER SALARIES & WAGES - Rev-Hours Driven (70%)	\$346,191			\$3.55								Work Hours	9,007	0.092	\$38.44	1.049	\$40.32	\$87,658
OTHER SALARIES & WAGES - Garage Driven (30%)	\$148,368							\$148,368				Work Hours	3,860	3.860	\$38.44	1.049	\$40.32	\$0
FRINGE BENEFITS - Rev-Hours Driven	\$1,198,909			\$12.29								Work Hours	156,992	1.609	\$7.64	1.049	\$8.01	\$303,570
FRINGE BENEFITS - Garage Driven	\$49,512							\$49,512				Work Hours	3,860	3.860	\$12.83	1.049	\$13	\$0
PROFESSIONAL & TECH SVCS - Peak Buses Driven	\$90,395									\$1,532		Peak Buses	59	1.000	\$1,532	1.049	\$1,607	\$17,681
PROFESSIONAL & TECH SVCS - Contract-Hours Driven	\$654,983				\$64.32							Contracted Hours	10,183	1.000	\$64.32	1.049	\$67.48	\$0
FUEL & LUBRICANTS	\$1,679,008					\$0.85						Gallons	525,241	0.266	\$3.20	1.049	\$3.35	\$371,103
TIRES & TUBES	\$99,712					\$0.05						Revenue Miles	1,978,235	1.000	\$0.05	1.049	\$0.05	\$22,039
OTHER MATERIALS & SUPPLIES	\$7,760							\$7,760				Garages	1	1.000	\$7,760	1.049	\$8,141	\$0
MISCELLANEOUS EXPENSES	\$55,794							\$55,794				Garages	1	1.000	\$55,794	1.049	\$58,534	\$0
VEHICLE MAINTENANCE																		
SALARIES & WAGES - Mechanics	\$775,992					\$0.39						Work Hours	28,548	0.014	\$27.18	1.049	\$28.52	\$171,514
FRINGE BENEFITS	\$258,189					\$0.13						Work Hours	28,548	0.014	\$9.04	1.049	\$9.49	\$57,066
PROFESSIONAL & TECH SVCS - TTA Rev-Miles Driven	\$120,566					\$0.06						Revenue Miles	1,978,235	1.000	\$0.06	1.049	\$0.06	\$26,648
PROFESSIONAL & TECH SVCS - Contract-Miles Driven	\$215,573						\$0.94					Contracted Miles	228,833	22.472	\$0.00	1.049	\$0.00	\$0
FUEL & LUBRICANTS	\$0									\$0.00		Peak Buses	59	1.000	\$0.00	1.049	\$0	\$0
TIRES & TUBES	\$3,084									\$52.27		Peak Buses	59	1.000	\$52.27	1.049	\$54.84	\$603
OTHER MATERIALS & SUPPLIES	\$481,098					\$0.24						Revenue Miles	1,978,235	1.000	\$0.24	1.049	\$0.26	\$106,335
CASUALTY & LIABILITY	\$36,036					\$0.02						Revenue Miles	1,978,235	1.000	\$0.02	1.049	\$0.02	\$7,965
MISCELLANEOUS EXPENSES	\$30,928							\$30,928				Garages	1	1.000	\$30,928	1.049	\$32,447	\$0
NON-VEHICLE MAINTENANCE																		
SALARIES & WAGES	\$0							\$0				Garages	1	1.000	\$0.00	1.049	\$0.00	\$0
FRINGE BENEFITS	\$0							\$0				Garages	1	1.000	\$0.00	1.049	\$0.00	\$0
PROFESSIONAL & TECH SERVICES	\$126,284								\$126,284			Transit Centers	1	1.000	\$126,284	1.049	\$132,487	\$0
GENERAL ADMINISTRATION																		
SALARIES & WAGES	\$1,278,335									\$21,667		Work Hours	30,553	517.8	\$41.84	1.049	\$43.89	\$250,040
FRINGE BENEFITS	\$423,262									\$7,174		Work Hours	30,553	517.8	\$13.85	1.049	\$14.53	\$82,789
PROFESSIONAL & TECHNICAL SERVICES	\$256,950									\$4,355		Peak Buses	59	1.000	\$4,355	1.049	\$4,569	\$50,259
MATERIALS & SUPPLIES	\$34,556							\$34,556				Garages	1	1.000	\$34,556	1.049	\$36,253	\$0
UTILITIES	\$79,475							\$79,475				Garages	1	1.000	\$79,475	1.049	\$83,379	\$0
CASUALTY & LIABILITY	\$733,957									\$12,440		Peak Buses	59	1.000	\$12,440	1.049	\$13,051	\$143,561
MISCELLANEOUS EXPENSES	\$141,215									\$2,393		Peak Buses	59	1.000	\$2,393	1.049	\$2,511	\$27,621
TOTALS	\$12,572,570				\$49.12	\$64.32	\$1.74	\$0.94	\$406,393	\$126,284	\$49,614							\$2,548,467
2012 Resource Variable Values																TT Rev Hours	23,545	
Notes:																Contract Hours	0	
1. NTD Fringe Benefit Rate for Vehicle Ops = 33.4%																TT Rev Miles	416,769	
2. NTD Fringe Benefit Rate for Vehicle Maint = 33.1%																Contract Miles	0	
3. NTD Fringe Benefit Rate for General Admin = 33.1%																Garages	0	
																Transit Centers	0	
																Peak Buses	11	



Operations and Maintenance Cost Results

Appendix A Table 2

Durham-Orange County Corridor
Triangle Regional Transit Program
O&M Cost Models

TRIANGLE TRANSIT AUTHORITY BUS LINE ITEM DETAIL

																	Build	
																	Inflation Factor: 1.049	
Expense Line Item	2012 Bus Expenses	Existing Unit Cost Adjusted	New Unit Cost Added	Bus Supply Variable Unit Cost Rate (\$2012)						Productivity Ratio			Base Year Resource Unit Cost	Inflation Factor	Results in: 2015			
				TTA Revenue Bus-Hours	Contracted Bus-Hours	TTA Revenue Bus-Miles	Contracted Bus-Miles	Garages	Regional Transit Ctrs	Peak Buses	Resource Variable	Resource Value			Resource/Supply	Resource Unit Cost	Estimated Annual Cost	
VEHICLE OPERATIONS																		
OPERATORS' SALARIES & WAGES	\$3,246,438			\$33.28								Work Hours	147,985	1.517	\$21.94	1.049	\$23.02	(\$233,740)
OTHER SALARIES & WAGES - Rev-Hours Driven (70%)	\$346,191			\$3.55								Work Hours	9,007	0.092	\$38.44	1.049	\$40.32	(\$24,925)
OTHER SALARIES & WAGES - Garage Driven (30%)	\$148,368							\$148,368				Work Hours	3,860	3.860	\$38.44	1.049	\$40.32	\$0
FRINGE BENEFITS - Rev-Hours Driven	\$1,198,909			\$12.29								Work Hours	156,992	1.609	\$7.64	1.049	\$8.01	(\$86,320)
FRINGE BENEFITS - Garage Driven	\$49,512							\$49,512				Work Hours	3,860	3.860	\$12.83	1.049	\$13	\$0
PROFESSIONAL & TECH SVCS - Peak Buses Driven	\$90,395									\$1,532		Peak Buses	59	1.000	\$1,532	1.049	\$1,607	\$1,607
PROFESSIONAL & TECH SVCS - Contract-Hours Driven	\$654,983				\$64.32							Contracted Hours	10,183	1.000	\$64.32	1.049	\$67.48	\$0
FUEL & LUBRICANTS	\$1,679,008					\$0.85						Gallons	525,241	0.266	\$3.20	1.049	\$3.35	(\$27,010)
TIRES & TUBES	\$99,712					\$0.05						Revenue Miles	1,978,235	1.000	\$0.05	1.049	\$0.05	(\$1,604)
OTHER MATERIALS & SUPPLIES	\$7,760							\$7,760				Garages	1	1.000	\$7,760	1.049	\$8,141	\$0
MISCELLANEOUS EXPENSES	\$55,794							\$55,794				Garages	1	1.000	\$55,794	1.049	\$58,534	\$0
VEHICLE MAINTENANCE																		
SALARIES & WAGES - Mechanics	\$775,992					\$0.39						Work Hours	28,548	0.014	\$27.18	1.049	\$28.52	(\$12,483)
FRINGE BENEFITS	\$258,189					\$0.13						Work Hours	28,548	0.014	\$9.04	1.049	\$9.49	(\$4,153)
PROFESSIONAL & TECH SVCS - TTA Rev-Miles Driven	\$120,566					\$0.06						Revenue Miles	1,978,235	1.000	\$0.06	1.049	\$0.06	(\$1,940)
PROFESSIONAL & TECH SVCS - Contract-Miles Driven	\$215,573						\$0.94					Contracted Miles	228,833	22.472	\$0.00	1.049	\$0.00	\$0
FUEL & LUBRICANTS	\$0									\$0.00		Peak Buses	59	1.000	\$0.00	1.049	\$0	\$0
TIRES & TUBES	\$3,084									\$52.27		Peak Buses	59	1.000	\$52.27	1.049	\$54.84	\$55
OTHER MATERIALS & SUPPLIES	\$481,098					\$0.24						Revenue Miles	1,978,235	1.000	\$0.24	1.049	\$0.26	(\$7,739)
CASUALTY & LIABILITY	\$36,036					\$0.02						Revenue Miles	1,978,235	1.000	\$0.02	1.049	\$0.02	(\$580)
MISCELLANEOUS EXPENSES	\$30,928							\$30,928				Garages	1	1.000	\$30,928	1.049	\$32,447	\$0
NON-VEHICLE MAINTENANCE																		
SALARIES & WAGES	\$0							\$0				Garages	1	1.000	\$0.00	1.049	\$0.00	\$0
FRINGE BENEFITS	\$0							\$0				Garages	1	1.000	\$0.00	1.049	\$0.00	\$0
PROFESSIONAL & TECH SERVICES	\$126,284								\$126,284			Transit Centers	1	1.000	\$126,284	1.049	\$132,487	\$0
GENERAL ADMINISTRATION																		
SALARIES & WAGES	\$1,278,335									\$21,667		Work Hours	30,553	517.8	\$41.84	1.049	\$43.89	\$22,731
FRINGE BENEFITS	\$423,262									\$7,174		Work Hours	30,553	517.8	\$13.85	1.049	\$14.53	\$7,526
PROFESSIONAL & TECHNICAL SERVICES	\$256,950									\$4,355		Peak Buses	59	1.000	\$4,355	1.049	\$4,569	\$4,569
MATERIALS & SUPPLIES	\$34,556							\$34,556				Garages	1	1.000	\$34,556	1.049	\$36,253	\$0
UTILITIES	\$79,475							\$79,475				Garages	1	1.000	\$79,475	1.049	\$83,379	\$0
CASUALTY & LIABILITY	\$733,957									\$12,440		Peak Buses	59	1.000	\$12,440	1.049	\$13,051	\$13,051
MISCELLANEOUS EXPENSES	\$141,215									\$2,393		Peak Buses	59	1.000	\$2,393	1.049	\$2,511	\$2,511
TOTALS	\$12,572,570				\$49.12	\$64.32	\$1.74	\$0.94	\$406,393	\$126,284	\$49,614							(\$348,444)
2012 Resource Variable Values																		
Notes:																	TT Rev Hours	(6,695)
1. NTD Fringe Benefit Rate for Vehicle Ops = 33.4%																	Contract Hours	0
2. NTD Fringe Benefit Rate for Vehicle Maint = 33.1%																	TT Rev Miles	(30,334)
3. NTD Fringe Benefit Rate for General Admin = 33.1%																	Contract Miles	0
																	Garages	0
																	Transit Centers	0
																	Peak Buses	1



Operations and Maintenance Cost Results

Appendix A Table 3

**Durham-Orange County Corridor
Triangle Regional Transit Program
O&M Cost Models
LIGHT RAIL LINE ITEM DETAIL**

C1-NHC LPA

Expense Line Item	Light Rail Supply Variable Unit Cost Rate (2012\$)						Productivity Ratio			Base Year Resource Unit Cost	Inflation Factor: 1.047		
	Revenue Train-Hours	Revenue Car-Miles	Yards	Revenue Route-Mi	Stations	Peak Cars	Resource Variable	Resource Value	Resource/Supply		Inflation Factor	Results in: 2015\$ Resource Unit Cost	Estimated Annual Cost
VEHICLE OPERATIONS													
VO Operator Salaries & Wages	\$41.17						Train-Hours	Work Hours	1.586	\$25.96	1.047	\$27.17	\$2,081,327
VO Other Salaries & Wages (Train-Hr)	\$12.19						Train-Hours	Work Hours	0.416	\$29.28	1.047	\$30.65	\$616,456
VO Other Salaries & Wages (Peak Cars)						\$32,559	Peak Cars	Work Hours	1138	\$28.60	1.047	\$29.94	\$477,094
VO Fringe Benefits (Train-Hr)	\$17.81						Train-Hours	Work Hours	2.002	\$8.89	1.047	\$9.31	\$900,287
VO Fringe Benefits (Peak Car)						\$10,865	Peak Cars	Work Hours	1,138	\$9.54	1.047	\$9.99	\$159,213
VO Prof/Tech Services (Train-Hr)	\$16						Train-Hours	87,461	1.000	\$15.53	1.047	\$16.26	\$785,266
VO Prof/Tech Services (Stations)					\$29,227		Stations	22	1.000	\$29,227	1.047	\$30,591	\$520,049
VO Other Matl & Supplies	\$0.67						Train-Hours	87,461	1.000	\$0.67	1.047	\$0.70	\$33,650
VO Utilities (Car-Mi)		\$0.37					Car-Miles	2,572,416	1.000	\$0.37	1.047	\$0.39	\$364,519
VO Utilities (Peak Cars)						\$27,773	Peak Cars	33	1.000	\$27,773	1.047	\$29,069	\$406,965
VO Miscellaneous	\$0.06						Train-Hours	87,461	1.000	\$0.06	1.047	\$0.07	\$3,175
VEHICLE MAINTENANCE													
VM Salaries & Wages		\$1.35					Car-Miles	Work Hours	0.053	\$25.57	1.047	\$26.77	\$1,327,478
VM Fringe Benefits		\$0.448					Car-Miles	Work Hours	0.053	\$8.47	1.047	\$8.86	\$439,533
VM Prof/Tech Services		\$0.31					Car-Miles	2,572,416	1.000	\$0.31	1.047	\$0.32	\$302,018
VM Fuel & Lubricants						\$3,211	Peak Cars	33	1.000	\$3,211	1.047	\$3,361	\$47,051
VM Tires & Tubes						\$147	Peak Cars	33	1.000	\$147	1.047	\$154	\$2,155
VM Other Matl & Supplies (Car-Miles)		\$0.34					Car-Miles	2,572,416	1.000	\$0.34	1.047	\$0.35	\$331,905
VM Other Matl & Supplies (Peak Cars)						\$24,987	Peak Cars	33	1.000	\$24,987	1.047	\$26,153	\$366,146
VM Miscellaneous						\$4,119	Peak Cars	33	1.000	\$4,119	1.047	\$4,310.96	\$60,353
NON-VEHICLE MAINTENANCE													
NVM Salaries & Wages (Route-Mi)				\$36,531			Route-Mi	Work Hours	1,395	\$26.18	1.047	\$27.40	\$1,281,642
NVM Salaries & Wages (Stations)					\$45,251		Stations	Work Hours	1,721	\$26.30	1.047	\$27.52	\$805,162
NVM Salaries & Wages (Yards)			\$406,114				Yards	Work Hours	15,727	\$25.82	1.047	\$27.03	\$425,064
Fringe Benefits (Route-Mi Driven)				\$12,095			Route-Mi	Work Hours	1,395	\$8.67	1.047	\$9.07	\$424,357
NVM Fringe Benefits (Stations Driven)					\$14,983		Stations	Work Hours	1,721	\$8.71	1.047	\$9.11	\$266,593
NVM Fringe Benefits (Yard Driven)			\$134,466				Yards	Work Hours	15,727	\$8.55	1.047	\$8.95	\$140,740
NVM Prof/Tech Services (Route-Mi)				\$12,152			Route-Mi	37	1.000	\$12,152	1.047	\$12,719	\$426,351
NVM Prof/Tech Services (Stations)					\$16,978		Stations	22	1.000	\$16,978	1.047	\$17,770	\$302,097
NVM Prof/Tech Services (Yards)			\$150,340				Yards	1	1.000	\$150,340	1.047	\$157,355	\$157,355
NVM Matl & Supplies (Route-Mi)				\$7,441			Route-Mi	37	1.000	\$7,441	1.047	\$7,789	\$261,072
NVM Matl & Supplies (Stations)					\$8,928		Stations	22	1.000	\$8,928	1.047	\$9,345	\$158,862
NVM Matl & Supplies (Yards)			\$82,257				Yards	1	1.000	\$82,257	1.047	\$86,095	\$86,095
NVM Miscellaneous				\$327			Route-Mi	37	1.000	\$327	1.047	\$342	\$11,461
GENERAL ADMINISTRATION													
GA Salaries & Wages						\$88,290	Peak Cars	Work Hours	1,735	\$50.90	1.047	\$53.28	\$1,293,735
GA Fringe Benefits						\$29,233	Peak Cars	Work Hours	1,735	\$16.85	1.047	\$17.64	\$428,361
GA Prof/Tech Services						\$56,328	Peak Cars	33	1.000	\$56,328	1.047	\$58,957	\$825,394
GA Matl & Supplies						\$4,307	Peak Cars	33	1.000	\$4,307	1.047	\$4,508	\$63,110
GA Utilities (Stations)					\$18,174		Stations	22	1.000	\$18,174	1.047	\$19,022	\$323,380
GA Utilities (Yards)			\$330,797				Yards	1	1.000	\$330,797	1.047	\$346,232	\$346,232
GA Casualty & Liability (Stations)					\$10,605		Stations	22	1.000	\$10,605	1.047	\$11,100	\$188,700
GA Casualty & Liability (Car-Mi)		\$0.16					Car-Miles	2,572,416	1.000	\$0.16	1.047	\$0.17	\$161,658
GA Taxes & Fees						\$45.09	Peak Cars	33	1.000	\$45	1.047	\$47.19	\$660,65
GA Miscellaneous						\$15,025	Peak Cars	33	1.000	\$15,025	1.047	\$15,726	\$220,158
TOTALS	\$87.43	\$2.98	\$1,103,974	\$68,546	\$144,147	\$296,889							\$17,822,882
2012 Resource Variable Values	87,461	2,572,416	1.4	37.3	22	33							
Triangle Transit agency fringe benefit rates used:												Rev Train-Hrs	48,300
Vehicle Operations = 33.37%												Rev Car-Miles	937,700
Vehicle Maintenance = 33.11%												Peak Cars	14
Non-Vehicle Maintenance = 33.11%												Track Miles	33.5
General Administration = 33.11%												Stations	17
												Yards	1.0



Operations and Maintenance Cost Results

Appendix A Table 4

Durham-Orange County Corridor
Triangle Regional Transit Program
O&M Cost Models
LIGHT RAIL LINE ITEM DETAIL

C1A-NHC LPA

Expense Line Item	Light Rail Supply Variable Unit Cost Rate (2012\$)						Productivity Ratio			Base Year	Inflation Factor: 1.047		
	Revenue Train-Hours	Revenue Car-Miles	Yards	Revenue Route-Mi	Stations	Peak Cars	Resource Variable	Resource Value	Resource/Supply	Resource Unit Cost	Inflation Factor	Results in: 2015\$ Resource Unit Cost	Estimated Annual Cost
VEHICLE OPERATIONS													
VO Operator Salaries & Wages	\$41.17						Train-Hours	Work Hours	1.586	\$25.96	1.047	\$27.17	\$2,081,327
VO Other Salaries & Wages (Train-Hr)	\$12.19						Train-Hours	Work Hours	0.416	\$29.28	1.047	\$30.65	\$616,456
VO Other Salaries & Wages (Peak Cars)						\$32,559	Peak Cars	Work Hours	1138	\$28.60	1.047	\$29.94	\$477,094
VO Fringe Benefits (Train-Hr)	\$17.81						Train-Hours	Work Hours	2.002	\$8.89	1.047	\$9.31	\$900,287
VO Fringe Benefits (Peak Car)						\$10,865	Peak Cars	Work Hours	1,138	\$9.54	1.047	\$9.99	\$159,213
VO Prof/Tech Services (Train-Hr)	\$16						Train-Hours	Work Hours	87,461	\$15.53	1.047	\$16.26	\$785,266
VO Prof/Tech Services (Stations)					\$29,227		Stations		22	\$29,227	1.047	\$30,591	\$520,049
VO Other Matl & Supplies	\$0.67						Train-Hours	Work Hours	87,461	\$0.67	1.047	\$0.70	\$33,650
VO Utilities (Car-Mi)		\$0.37					Car-Miles	2,572,416	1,000	\$0.37	1.047	\$0.39	\$370,195
VO Utilities (Peak Cars)						\$27,773	Peak Cars	33	1,000	\$27,773	1.047	\$29,069	\$406,965
VO Miscellaneous	\$0.06						Train-Hours	87,461	1,000	\$0.06	1.047	\$0.07	\$3,175
VEHICLE MAINTENANCE													
VM Salaries & Wages		\$1.35					Car-Miles	Work Hours	0.053	\$25.57	1.047	\$26.77	\$1,348,147
VM Fringe Benefits		\$0.448					Car-Miles	Work Hours	0.053	\$8.47	1.047	\$8.86	\$446,377
VM Prof/Tech Services		\$0.31					Car-Miles	2,572,416	1,000	\$0.31	1.047	\$0.32	\$306,721
VM Fuel & Lubricants						\$3,211	Peak Cars	33	1,000	\$3,211	1.047	\$3,361	\$47,051
VM Tires & Tubes						\$147	Peak Cars	33	1,000	\$147	1.047	\$154	\$2,155
VM Other Matl & Supplies (Car-Miles)		\$0.34					Car-Miles	2,572,416	1,000	\$0.34	1.047	\$0.35	\$337,073
VM Other Matl & Supplies (Peak Cars)						\$24,987	Peak Cars	33	1,000	\$24,987	1.047	\$26,153	\$366,146
VM Miscellaneous						\$4,119	Peak Cars	33	1,000	\$4,119	1.047	\$4,310.96	\$60,353
NON-VEHICLE MAINTENANCE													
NVM Salaries & Wages (Route-Mi)				\$36,531			Route-Mi	Work Hours	1,395	\$26.18	1.047	\$27.40	\$1,301,524
NVM Salaries & Wages (Stations)					\$45,251		Stations	Work Hours	1,721	\$26.30	1.047	\$27.52	\$805,162
NVM Salaries & Wages (Yards)			\$406,114				Yards	Work Hours	15,727	\$25.82	1.047	\$27.03	\$425,064
Fringe Benefits (Route-Mi Driven)				\$12,095			Route-Mi	Work Hours	1,395	\$8.67	1.047	\$9.07	\$430,940
NVM Fringe Benefits (Stations Driven)					\$14,983		Stations	Work Hours	1,721	\$8.71	1.047	\$9.11	\$266,593
NVM Fringe Benefits (Yard Driven)			\$134,466				Yards	Work Hours	15,727	\$8.55	1.047	\$8.95	\$140,740
NVM Prof/Tech Services (Route-Mi)				\$12,152			Route-Mi	37	1,000	\$12,152	1.047	\$12,719	\$432,965
NVM Prof/Tech Services (Stations)					\$16,978		Stations	22	1,000	\$16,978	1.047	\$17,770	\$302,097
NVM Prof/Tech Services (Yards)			\$150,340				Yards	1	1,000	\$150,340	1.047	\$157,355	\$157,355
NVM Matl & Supplies (Route-Mi)				\$7,441			Route-Mi	37	1,000	\$7,441	1.047	\$7,789	\$265,122
NVM Matl & Supplies (Stations)					\$8,928		Stations	22	1,000	\$8,928	1.047	\$9,345	\$158,862
NVM Matl & Supplies (Yards)			\$82,257				Yards	1	1,000	\$82,257	1.047	\$86,095	\$86,095
NVM Miscellaneous				\$327			Route-Mi	37	1,000	\$327	1.047	\$342	\$11,639
GENERAL ADMINISTRATION													
GA Salaries & Wages						\$88,290	Peak Cars	Work Hours	1,735	\$50.90	1.047	\$53.28	\$1,293,735
GA Fringe Benefits						\$29,233	Peak Cars	Work Hours	1,735	\$16.85	1.047	\$17.64	\$428,361
GA Prof/Tech Services						\$56,328	Peak Cars	33	1,000	\$56,328	1.047	\$58,957	\$825,394
GA Matl & Supplies						\$4,307	Peak Cars	33	1,000	\$4,307	1.047	\$4,508	\$63,110
GA Utilities (Stations)					\$18,174		Stations	22	1,000	\$18,174	1.047	\$19,022	\$323,380
GA Utilities (Yards)			\$330,797				Yards	1	1,000	\$330,797	1.047	\$346,232	\$346,232
GA Casualty & Liability (Stations)					\$10,605		Stations	22	1,000	\$10,605	1.047	\$11,100	\$188,700
GA Casualty & Liability (Car-Mi)		\$0.16					Car-Miles	2,572,416	1,000	\$0.16	1.047	\$0.17	\$164,175
GA Taxes & Fees						\$45.09	Peak Cars	33	1,000	\$45	1.047	\$47.19	\$660.65
GA Miscellaneous						\$15,025	Peak Cars	33	1,000	\$15,025	1.047	\$15,726	\$220,158
TOTALS	\$87.43	\$2.98	\$1,103,974	\$68,546	\$144,147	\$296,889							\$17,905,764
2012 Resource Variable Values	87,461	2,572,416	1.4	37.3	22	33							
Triangle Transit agency fringe benefit rates used:												Rev Train-Hrs	48,300
Vehicle Operations = 33.37%												Rev Car-Miles	952,300
Vehicle Maintenance = 33.11%												Peak Cars	14
Non-Vehicle Maintenance = 33.11%												Track Miles	34.0
General Administration = 33.11%												Stations	17
												Yards	1.0



Operations and Maintenance Cost Results

Appendix A Table 5

**Durham-Orange County Corridor
Triangle Regional Transit Program
O&M Cost Models
LIGHT RAIL LINE ITEM DETAIL**

C2-NHC LPA

Expense Line Item	Light Rail Supply Variable Unit Cost Rate (2012\$)						Productivity Ratio			Base Year Resource Unit Cost	Inflation Factor: 1.047		
	Revenue Train-Hours	Revenue Car-Miles	Yards	Revenue Route-Mi	Stations	Peak Cars	Resource Variable	Resource Value	Resource/ Supply		Inflation Factor	Results in: Resource Unit Cost	2015\$ Estimated Annual Cost
VEHICLE OPERATIONS													
VO Operator Salaries & Wages	\$41.17						Train-Hours	Work Hours	1.586	\$25.96	1.047	\$27.17	\$2,081,327
VO Other Salaries & Wages (Train-Hr)	\$12.19						Train-Hours	Work Hours	0.416	\$29.28	1.047	\$30.65	\$616,456
VO Other Salaries & Wages (Peak Cars)						\$32,559	Peak Cars	Work Hours	1.138	\$28.60	1.047	\$29.94	\$477,094
VO Fringe Benefits (Train-Hr)	\$17.81						Train-Hours	Work Hours	2.002	\$8.89	1.047	\$9.31	\$900,287
VO Fringe Benefits (Peak Car)						\$10,865	Peak Cars	Work Hours	1.138	\$9.54	1.047	\$9.99	\$159,213
VO Prof/Tech Services (Train-Hr)	\$16						Train-Hours	87,461	1.000	\$15.53	1.047	\$16.26	\$785,266
VO Prof/Tech Services (Stations)					\$29,227		Stations	22	1.000	\$29,227	1.047	\$30,591	\$520,049
VO Other Matl & Supplies	\$0.67						Train-Hours	87,461	1.000	\$0.67	1.047	\$0.70	\$33,650
VO Utilities (Car-Mi)		\$0.37					Car-Miles	2,572,416	1.000	\$0.37	1.047	\$0.39	\$368,446
VO Utilities (Peak Cars)						\$27,773	Peak Cars	33	1.000	\$27,773	1.047	\$29,069	\$406,965
VO Miscellaneous	\$0.06						Train-Hours	87,461	1.000	\$0.06	1.047	\$0.07	\$3,175
VEHICLE MAINTENANCE													
VM Salaries & Wages		\$1.35					Car-Miles	Work Hours	0.053	\$25.57	1.047	\$26.77	\$1,341,776
VM Fringe Benefits		\$0.448					Car-Miles	Work Hours	0.053	\$8.47	1.047	\$8.86	\$444,268
VM Prof/Tech Services		\$0.31					Car-Miles	2,572,416	1.000	\$0.31	1.047	\$0.32	\$305,272
VM Fuel & Lubricants						\$3,211	Peak Cars	33	1.000	\$3,211	1.047	\$3,361	\$47,051
VM Tires & Tubes						\$147	Peak Cars	33	1.000	\$147	1.047	\$154	\$2,155
VM Other Matl & Supplies (Car-Miles)		\$0.34					Car-Miles	2,572,416	1.000	\$0.34	1.047	\$0.35	\$335,480
VM Other Matl & Supplies (Peak Cars)						\$24,987	Peak Cars	33	1.000	\$24,987	1.047	\$26,153	\$366,146
VM Miscellaneous						\$4,119	Peak Cars	33	1.000	\$4,119	1.047	\$4,310.96	\$60,353
NON-VEHICLE MAINTENANCE													
NVM Salaries & Wages (Route-Mi)				\$36,531			Route-Mi	Work Hours	1,395	\$26.18	1.047	\$27.40	\$1,295,406
NVM Salaries & Wages (Stations)					\$45,251		Stations	Work Hours	1,721	\$26.30	1.047	\$27.52	\$805,162
NVM Salaries & Wages (Yards)			\$406,114				Yards	Work Hours	15,727	\$25.82	1.047	\$27.03	\$425,064
Fringe Benefits (Route-Mi Driven)				\$12,095			Route-Mi	Work Hours	1,395	\$8.67	1.047	\$9.07	\$428,914
NVM Fringe Benefits (Stations Driven)					\$14,983		Stations	Work Hours	1,721	\$8.71	1.047	\$9.11	\$266,593
NVM Fringe Benefits (Yard Driven)			\$134,466				Yards	Work Hours	15,727	\$8.55	1.047	\$8.95	\$140,740
NVM Prof/Tech Services (Route-Mi)				\$12,152			Route-Mi	37	1.000	\$12,152	1.047	\$12,719	\$430,930
NVM Prof/Tech Services (Stations)					\$16,978		Stations	22	1.000	\$16,978	1.047	\$17,770	\$302,097
NVM Prof/Tech Services (Yards)			\$150,340				Yards	1	1.000	\$150,340	1.047	\$157,355	\$157,355
NVM Matl & Supplies (Route-Mi)				\$7,441			Route-Mi	37	1.000	\$7,441	1.047	\$7,789	\$263,876
NVM Matl & Supplies (Stations)					\$8,928		Stations	22	1.000	\$8,928	1.047	\$9,345	\$158,862
NVM Matl & Supplies (Yards)			\$82,257				Yards	1	1.000	\$82,257	1.047	\$86,095	\$86,095
NVM Miscellaneous				\$327			Route-Mi	37	1.000	\$327	1.047	\$342	\$11,584
GENERAL ADMINISTRATION													
GA Salaries & Wages						\$88,290	Peak Cars	Work Hours	1,735	\$50.90	1.047	\$53.28	\$1,293,735
GA Fringe Benefits						\$29,233	Peak Cars	Work Hours	1,735	\$16.85	1.047	\$17.64	\$428,361
GA Prof/Tech Services						\$56,328	Peak Cars	33	1.000	\$56,328	1.047	\$58,957	\$825,394
GA Matl & Supplies						\$4,307	Peak Cars	33	1.000	\$4,307	1.047	\$4,508	\$63,110
GA Utilities (Stations)					\$18,174		Stations	22	1.000	\$18,174	1.047	\$19,022	\$323,380
GA Utilities (Yards)			\$330,797				Yards	1	1.000	\$330,797	1.047	\$346,232	\$346,232
GA Casualty & Liability (Stations)					\$10,605		Stations	22	1.000	\$10,605	1.047	\$11,100	\$188,700
GA Casualty & Liability (Car-Mi)		\$0.16					Car-Miles	2,572,416	1.000	\$0.16	1.047	\$0.17	\$163,399
GA Taxes & Fees						\$45.09	Peak Cars	33	1.000	\$45	1.047	\$47.19	\$660.65
GA Miscellaneous						\$15,025	Peak Cars	33	1.000	\$15,025	1.047	\$15,726	\$220,158
TOTALS	\$87.43	\$2.98	\$1,103,974	\$68,546	\$144,147	\$296,889							\$17,880,238
2012 Resource Variable Values	87,461	2,572,416	1.4	37.3	22	33							
Triangle Transit agency fringe benefit rates used:												Rev Train-Hrs	48,300
Vehicle Operations = 33.37%												Rev Car-Miles	947,800
Vehicle Maintenance = 33.11%												Peak Cars	14
Non-Vehicle Maintenance = 33.11%												Track Miles	33.9
General Administration = 33.11%												Stations	17
												Yards	1.0



Operations and Maintenance Cost Results

Appendix A Table 6

Durham-Orange County Corridor
Triangle Regional Transit Program
O&M Cost Models
LIGHT RAIL LINE ITEM DETAIL

C2A-NHC LPA

Expense Line Item	Light Rail Supply Variable Unit Cost Rate (2012\$)						Productivity Ratio			Base Year Resource Unit Cost	Inflation Factor: 1.047		
	Revenue Train-Hours	Revenue Car-Miles	Yards	Revenue Route-Mi	Stations	Peak Cars	Resource Variable	Resource Value	Resource/Supply		Inflation Factor	Results in: 2015\$ Resource Unit Cost	Estimated Annual Cost
	VEHICLE OPERATIONS												
VO Operator Salaries & Wages	\$41.17						Train-Hours	Work Hours	1,586	\$25.96	1.047	\$27.17	\$2,081,327
VO Other Salaries & Wages (Train-Hr)	\$12.19						Train-Hours	Work Hours	0,416	\$29.28	1.047	\$30.65	\$616,456
VO Other Salaries & Wages (Peak Cars)						\$32,559	Peak Cars	Work Hours	1,138	\$28.60	1.047	\$29.94	\$477,094
VO Fringe Benefits (Train-Hr)	\$17.81						Train-Hours	Work Hours	2,002	\$8.89	1.047	\$9.31	\$900,287
VO Fringe Benefits (Peak Car)						\$10,865	Peak Cars	Work Hours	1,138	\$9.54	1.047	\$9.99	\$159,213
VO Prof/Tech Services (Train-Hr)	\$16						Train-Hours	Work Hours	87,461	1,000	1.047	\$16.26	\$785,266
VO Prof/Tech Services (Stations)					\$29,227		Stations	Work Hours	22	1,000	1.047	\$30,591	\$520,049
VO Other Matl & Supplies	\$0.67						Train-Hours	Work Hours	87,461	1,000	1.047	\$0.70	\$33,650
VO Utilities (Car-Mi)		\$0.37					Car-Miles	Work Hours	2,572,416	1,000	1.047	\$0.39	\$367,785
VO Utilities (Peak Cars)						\$27,773	Peak Cars	Work Hours	33	1,000	1.047	\$29,069	\$406,965
VO Miscellaneous	\$0.06						Train-Hours	Work Hours	87,461	1,000	1.047	\$0.07	\$3,175
VEHICLE MAINTENANCE													
VM Salaries & Wages		\$1.35					Car-Miles	Work Hours	0,053	\$25.57	1.047	\$26.77	\$1,339,370
VM Fringe Benefits		\$0.448					Car-Miles	Work Hours	0,053	\$8.47	1.047	\$8.86	\$443,471
VM Prof/Tech Services		\$0.31					Car-Miles	Work Hours	2,572,416	1,000	1.047	\$0.32	\$304,724
VM Fuel & Lubricants						\$3,211	Peak Cars	Work Hours	33	1,000	1.047	\$3.361	\$47,051
VM Tires & Tubes						\$147	Peak Cars	Work Hours	33	1,000	1.047	\$154	\$2,155
VM Other Matl & Supplies (Car-Miles)		\$0.34					Car-Miles	Work Hours	2,572,416	1,000	1.047	\$0.35	\$334,879
VM Other Matl & Supplies (Peak Cars)						\$24,987	Peak Cars	Work Hours	33	1,000	1.047	\$26,153	\$366,146
VM Miscellaneous						\$4,119	Peak Cars	Work Hours	33	1,000	1.047	\$4,310.96	\$60,353
NON-VEHICLE MAINTENANCE													
NVM Salaries & Wages (Route-Mi)				\$36,531			Route-Mi	Work Hours	1,395	\$26.18	1.047	\$27.40	\$1,293,112
NVM Salaries & Wages (Stations)					\$45,251		Stations	Work Hours	1,721	\$26.30	1.047	\$27.52	\$805,162
NVM Salaries & Wages (Yards)			\$406,114				Yards	Work Hours	15,727	\$25.82	1.047	\$27.03	\$425,064
Fringe Benefits (Route-Mi Driven)				\$12,095			Route-Mi	Work Hours	1,395	\$8.67	1.047	\$9.07	\$428,155
NVM Fringe Benefits (Stations Driven)					\$14,983		Stations	Work Hours	1,721	\$8.71	1.047	\$9.11	\$266,593
NVM Fringe Benefits (Yard Driven)			\$134,466				Yards	Work Hours	15,727	\$8.55	1.047	\$8.95	\$140,740
NVM Prof/Tech Services (Route-Mi)				\$12,152			Route-Mi	Work Hours	37	1,000	1.047	\$12,719	\$430,167
NVM Prof/Tech Services (Stations)					\$16,978		Stations	Work Hours	22	1,000	1.047	\$17,770	\$302,097
NVM Prof/Tech Services (Yards)			\$150,340				Yards	Work Hours	1	1,000	1.047	\$157,355	\$157,355
NVM Matl & Supplies (Route-Mi)				\$7,441			Route-Mi	Work Hours	37	1,000	1.047	\$7,789	\$263,409
NVM Matl & Supplies (Stations)					\$8,928		Stations	Work Hours	22	1,000	1.047	\$9,345	\$158,862
NVM Matl & Supplies (Yards)			\$82,257				Yards	Work Hours	1	1,000	1.047	\$86,095	\$86,095
NVM Miscellaneous				\$327			Route-Mi	Work Hours	37	1,000	1.047	\$342	\$11,564
GENERAL ADMINISTRATION													
GA Salaries & Wages						\$88,290	Peak Cars	Work Hours	1,735	\$50.90	1.047	\$53.28	\$1,293,735
GA Fringe Benefits						\$29,233	Peak Cars	Work Hours	1,735	\$16.85	1.047	\$17.64	\$428,361
GA Prof/Tech Services						\$56,328	Peak Cars	Work Hours	33	1,000	1.047	\$58,957	\$825,394
GA Matl & Supplies						\$4,307	Peak Cars	Work Hours	33	1,000	1.047	\$4,508	\$63,110
GA Utilities (Stations)					\$18,174		Stations	Work Hours	22	1,000	1.047	\$19,022	\$323,380
GA Utilities (Yards)			\$330,797				Yards	Work Hours	1	1,000	1.047	\$346,232	\$346,232
GA Casualty & Liability (Stations)					\$10,605		Stations	Work Hours	22	1,000	1.047	\$11,100	\$188,700
GA Casualty & Liability (Car-Mi)		\$0.16					Car-Miles	Work Hours	2,572,416	1,000	1.047	\$0.17	\$163,106
GA Taxes & Fees						\$45,09	Peak Cars	Work Hours	33	1,000	1.047	\$47.19	\$660,65
GA Miscellaneous						\$15,025	Peak Cars	Work Hours	33	1,000	1.047	\$15,726	\$220,158
TOTALS	\$87.43	\$2.98	\$1,103,974	\$68,546	\$144,147	\$296,889							\$1,870,626
2012 Resource Variable Values	87,461	2,572,416	1.4	37.3	22	33							
Triangle Transit agency fringe benefit rates used:												Rev Train-Hrs	48,300
Vehicle Operations = 33.37%												Rev Car-Miles	946,100
Vehicle Maintenance = 33.11%												Peak Cars	14
Non-Vehicle Maintenance = 33.11%												Track Miles	33.8
General Administration = 33.11%												Stations	17
												Yards	1.0



Operations and Maintenance Cost Results

Appendix A Table 7

**Durham-Orange County Corridor
Triangle Regional Transit Program
O&M Cost Models
LIGHT RAIL LINE ITEM DETAIL**

C1-NHC 1

Expense Line Item	Light Rail Supply Variable Unit Cost Rate (2012\$)						Productivity Ratio			Base Year Resource Unit Cost	Inflation Factor: 1.047		
	Revenue Train-Hours	Revenue Car-Miles	Yards	Revenue Route-Mi	Stations	Peak Cars	Resource Variable	Resource Value	Resource/ Supply		Inflation Factor	Results in: Resource Unit Cost	Estimated Annual Cost
VEHICLE OPERATIONS													
VO Operator Salaries & Wages	\$41.17						Train-Hours	Work Hours	1.586	\$25.96	1.047	\$27.17	\$2,081,327
VO Other Salaries & Wages (Train-Hr)	\$12.19						Train-Hours	Work Hours	0.416	\$29.28	1.047	\$30.65	\$616,456
VO Other Salaries & Wages (Peak Cars)						\$32,559	Peak Cars	Work Hours	1.138	\$28.60	1.047	\$29.94	\$477,094
VO Fringe Benefits (Train-Hr)	\$17.81						Train-Hours	Work Hours	2.002	\$8.89	1.047	\$9.31	\$900,287
VO Fringe Benefits (Peak Car)						\$10,865	Peak Cars	Work Hours	1.138	\$9.54	1.047	\$9.99	\$159,213
VO Prof/Tech Services (Train-Hr)	\$16						Train-Hours	87,461	1.000	\$15.53	1.047	\$16.26	\$785,266
VO Prof/Tech Services (Stations)					\$29,227		Stations	22	1.000	\$29,227	1.047	\$30,591	\$520,049
VO Other Matl & Supplies	\$0.67						Train-Hours	87,461	1.000	\$0.67	1.047	\$0.70	\$33,650
VO Utilities (Car-Mi)		\$0.37					Car-Miles	2,572,416	1.000	\$0.37	1.047	\$0.39	\$371,283
VO Utilities (Peak Cars)						\$27,773	Peak Cars	33	1.000	\$27,773	1.047	\$29,069	\$406,965
VO Miscellaneous	\$0.06						Train-Hours	87,461	1.000	\$0.06	1.047	\$0.07	\$3,175
VEHICLE MAINTENANCE													
VM Salaries & Wages		\$1.35					Car-Miles	Work Hours	0.053	\$25.57	1.047	\$26.77	\$1,352,111
VM Fringe Benefits		\$0.448					Car-Miles	Work Hours	0.053	\$8.47	1.047	\$8.86	\$447,689
VM Prof/Tech Services		\$0.31					Car-Miles	2,572,416	1.000	\$0.31	1.047	\$0.32	\$307,623
VM Fuel & Lubricants						\$3,211	Peak Cars	33	1.000	\$3,211	1.047	\$3,361	\$47,051
VM Tires & Tubes						\$147	Peak Cars	33	1.000	\$147	1.047	\$154	\$2,155
VM Other Matl & Supplies (Car-Miles)		\$0.34					Car-Miles	2,572,416	1.000	\$0.34	1.047	\$0.35	\$338,064
VM Other Matl & Supplies (Peak Cars)						\$24,987	Peak Cars	33	1.000	\$24,987	1.047	\$26,153	\$366,146
VM Miscellaneous						\$4,119	Peak Cars	33	1.000	\$4,119	1.047	\$4,310.96	\$60,353
NON-VEHICLE MAINTENANCE													
NVM Salaries & Wages (Route-Mi)				\$36,531			Route-Mi	Work Hours	1,395	\$26.18	1.047	\$27.40	\$1,305,347
NVM Salaries & Wages (Stations)					\$45,251		Stations	Work Hours	1,721	\$26.30	1.047	\$27.52	\$805,162
NVM Salaries & Wages (Yards)			\$406,114				Yards	Work Hours	15,727	\$25.82	1.047	\$27.03	\$425,064
Fringe Benefits (Route-Mi Driven)				\$12,095			Route-Mi	Work Hours	1,395	\$8.67	1.047	\$9.07	\$432,206
NVM Fringe Benefits (Stations Driven)					\$14,983		Stations	Work Hours	1,721	\$8.71	1.047	\$9.11	\$266,593
NVM Fringe Benefits (Yard Driven)			\$134,466				Yards	Work Hours	15,727	\$8.55	1.047	\$8.95	\$140,740
NVM Prof/Tech Services (Route-Mi)				\$12,152			Route-Mi	37	1.000	\$12,152	1.047	\$12,719	\$434,237
NVM Prof/Tech Services (Stations)					\$16,978		Stations	22	1.000	\$16,978	1.047	\$17,770	\$302,097
NVM Prof/Tech Services (Yards)			\$150,340				Yards	1	1.000	\$150,340	1.047	\$157,355	\$157,355
NVM Matl & Supplies (Route-Mi)				\$7,441			Route-Mi	37	1.000	\$7,441	1.047	\$7,789	\$265,901
NVM Matl & Supplies (Stations)					\$8,928		Stations	22	1.000	\$8,928	1.047	\$9,345	\$158,862
NVM Matl & Supplies (Yards)			\$82,257				Yards	1	1.000	\$82,257	1.047	\$86,095	\$86,095
NVM Miscellaneous				\$327			Route-Mi	37	1.000	\$327	1.047	\$342	\$11,673
GENERAL ADMINISTRATION													
GA Salaries & Wages						\$88,290	Peak Cars	Work Hours	1,735	\$50.90	1.047	\$53.28	\$1,293,735
GA Fringe Benefits						\$29,233	Peak Cars	Work Hours	1,735	\$16.85	1.047	\$17.64	\$428,361
GA Prof/Tech Services						\$56,328	Peak Cars	33	1.000	\$56,328	1.047	\$58,957	\$825,394
GA Matl & Supplies						\$4,307	Peak Cars	33	1.000	\$4,307	1.047	\$4,508	\$63,110
GA Utilities (Stations)					\$18,174		Stations	22	1.000	\$18,174	1.047	\$19,022	\$323,380
GA Utilities (Yards)			\$330,797				Yards	1	1.000	\$330,797	1.047	\$346,232	\$346,232
GA Casualty & Liability (Stations)					\$10,605		Stations	22	1.000	\$10,605	1.047	\$11,100	\$188,700
GA Casualty & Liability (Car-Mi)		\$0.16					Car-Miles	2,572,416	1.000	\$0.16	1.047	\$0.17	\$164,658
GA Taxes & Fees						\$45.09	Peak Cars	33	1.000	\$45	1.047	\$47.19	\$660.65
GA Miscellaneous						\$15,025	Peak Cars	33	1.000	\$15,025	1.047	\$15,726	\$220,158
TOTALS	\$87.43	\$2.98	\$1,103,974	\$68,546	\$144,147	\$296,889							\$17,921,679
2012 Resource Variable Values	87,461	2,572,416	1.4	37.3	22	33							
Triangle Transit agency fringe benefit rates used:												Rev Train-Hrs	48,300
Vehicle Operations = 33.37%												Rev Car-Miles	955,100
Vehicle Maintenance = 33.11%												Peak Cars	14
Non-Vehicle Maintenance = 33.11%												Track Miles	34.1
General Administration = 33.11%												Stations	17
												Yards	1.0



Operations and Maintenance Cost Results

Appendix A Table 8

Durham-Orange County Corridor
Triangle Regional Transit Program
O&M Cost Models
LIGHT RAIL LINE ITEM DETAIL

C1A-NHC 1

Expense Line Item	Light Rail Supply Variable Unit Cost Rate (2012\$)						Productivity Ratio			Base Year Resource Unit Cost	Inflation Factor: 1.047		
	Revenue Train-Hours	Revenue Car-Miles	Yards	Revenue Route-Mi	Stations	Peak Cars	Resource Variable	Resource Value	Resource/ Supply		Inflation Factor	Results in: Resource Unit Cost	Estimated Annual Cost
VEHICLE OPERATIONS													
VO Operator Salaries & Wages	\$41.17						Train-Hours	Work Hours	1.586	\$25.96	1.047	\$27.17	\$2,081,327
VO Other Salaries & Wages (Train-Hr)	\$12.19						Train-Hours	Work Hours	0.416	\$29.28	1.047	\$30.65	\$616,456
VO Other Salaries & Wages (Peak Cars)						\$32,559	Peak Cars	Work Hours	1.138	\$28.60	1.047	\$29.94	\$477,094
VO Fringe Benefits (Train-Hr)	\$17.81						Train-Hours	Work Hours	2.002	\$8.89	1.047	\$9.31	\$900,287
VO Fringe Benefits (Peak Car)						\$10,865	Peak Cars	Work Hours	1.138	\$9.54	1.047	\$9.99	\$159,213
VO Prof/Tech Services (Train-Hr)	\$16						Train-Hours	87,461	1.000	\$15.53	1.047	\$16.26	\$785,266
VO Prof/Tech Services (Stations)				\$29,227			Stations	22	1.000	\$29,227	1.047	\$30,591	\$520,049
VO Other Matl & Supplies	\$0.67						Train-Hours	87,461	1.000	\$0.67	1.047	\$0.70	\$33,650
VO Utilities (Car-Mi)		\$0.37					Car-Miles	2,572,416	1.000	\$0.37	1.047	\$0.39	\$376,920
VO Utilities (Peak Cars)						\$27,773	Peak Cars	33	1.000	\$27,773	1.047	\$29,069	\$406,965
VO Miscellaneous	\$0.06						Train-Hours	87,461	1.000	\$0.06	1.047	\$0.07	\$3,175
VEHICLE MAINTENANCE													
VM Salaries & Wages		\$1.35					Car-Miles	Work Hours	0.053	\$25.57	1.047	\$26.77	\$1,372,638
VM Fringe Benefits		\$0.448					Car-Miles	Work Hours	0.053	\$8.47	1.047	\$8.86	\$454,486
VM Prof/Tech Services		\$0.31					Car-Miles	2,572,416	1.000	\$0.31	1.047	\$0.32	\$312,293
VM Fuel & Lubricants						\$3,211	Peak Cars	33	1.000	\$3,211	1.047	\$3,361	\$47,051
VM Tires & Tubes						\$147	Peak Cars	33	1.000	\$147	1.047	\$154	\$2,155
VM Other Matl & Supplies (Car-Miles)		\$0.34					Car-Miles	2,572,416	1.000	\$0.34	1.047	\$0.35	\$343,197
VM Other Matl & Supplies (Peak Cars)						\$24,987	Peak Cars	33	1.000	\$24,987	1.047	\$26,153	\$366,146
VM Miscellaneous						\$4,119	Peak Cars	33	1.000	\$4,119	1.047	\$4,310.96	\$60,353
NON-VEHICLE MAINTENANCE													
NVM Salaries & Wages (Route-Mi)				\$36,531			Route-Mi	Work Hours	1,395	\$26.18	1.047	\$27.40	\$1,325,230
NVM Salaries & Wages (Stations)					\$45,251		Stations	Work Hours	1,721	\$26.30	1.047	\$27.52	\$805,162
NVM Salaries & Wages (Yards)			\$406,114				Yards	Work Hours	15,727	\$25.82	1.047	\$27.03	\$425,064
Fringe Benefits (Route-Mi Driven)				\$12,095			Route-Mi	Work Hours	1,395	\$8.67	1.047	\$9.07	\$438,789
NVM Fringe Benefits (Stations Driven)					\$14,983		Stations	Work Hours	1,721	\$8.71	1.047	\$9.11	\$266,593
NVM Fringe Benefits (Yard Driven)			\$134,466				Yards	Work Hours	15,727	\$8.55	1.047	\$8.95	\$140,740
NVM Prof/Tech Services (Route-Mi)				\$12,152			Route-Mi	37	1.000	\$12,152	1.047	\$12,719	\$440,851
NVM Prof/Tech Services (Stations)					\$16,978		Stations	22	1.000	\$16,978	1.047	\$17,770	\$302,097
NVM Prof/Tech Services (Yards)			\$150,340				Yards	1	1.000	\$150,340	1.047	\$157,355	\$157,355
NVM Matl & Supplies (Route-Mi)				\$7,441			Route-Mi	37	1.000	\$7,441	1.047	\$7,789	\$269,951
NVM Matl & Supplies (Stations)					\$8,928		Stations	22	1.000	\$8,928	1.047	\$9,345	\$158,862
NVM Matl & Supplies (Yards)			\$82,257				Yards	1	1.000	\$82,257	1.047	\$86,095	\$86,095
NVM Miscellaneous				\$327			Route-Mi	37	1.000	\$327	1.047	\$342	\$11,851
GENERAL ADMINISTRATION													
GA Salaries & Wages						\$88,290	Peak Cars	Work Hours	1,735	\$50.90	1.047	\$53.28	\$1,293,735
GA Fringe Benefits						\$29,233	Peak Cars	Work Hours	1,735	\$16.85	1.047	\$17.64	\$428,361
GA Prof/Tech Services						\$56,328	Peak Cars	33	1.000	\$56,328	1.047	\$58,957	\$825,394
GA Matl & Supplies						\$4,307	Peak Cars	33	1.000	\$4,307	1.047	\$4,508	\$63,110
GA Utilities (Stations)					\$18,174		Stations	22	1.000	\$18,174	1.047	\$19,022	\$323,380
GA Utilities (Yards)			\$330,797				Yards	1	1.000	\$330,797	1.047	\$346,232	\$346,232
GA Casualty & Liability (Stations)					\$10,605		Stations	22	1.000	\$10,605	1.047	\$11,100	\$188,700
GA Casualty & Liability (Car-Mi)		\$0.16					Car-Miles	2,572,416	1.000	\$0.16	1.047	\$0.17	\$167,158
GA Taxes & Fees						\$45.09	Peak Cars	33	1.000	\$45	1.047	\$47.19	\$660.65
GA Miscellaneous						\$15,025	Peak Cars	33	1.000	\$15,025	1.047	\$15,726	\$220,158
TOTALS	\$87.43	\$2.98	\$1,103,974	\$68,546	\$144,147	\$296,889							\$18,004,249
2012 Resource Variable Values	87,461	2,572,416	1.4	37.3	22	33							
Triangle Transit agency fringe benefit rates used:												Rev Train-Hrs	48,300
Vehicle Operations = 33.37%												Rev Car-Miles	969,600
Vehicle Maintenance = 33.11%												Peak Cars	14
Non-Vehicle Maintenance = 33.11%												Track Miles	34.7
General Administration = 33.11%												Stations	17
												Yards	1.0



Operations and Maintenance Cost Results

Appendix A Table 9

Durham-Orange County Corridor
Triangle Regional Transit Program
O&M Cost Models
LIGHT RAIL LINE ITEM DETAIL

C2-NHC 1

Expense Line Item	Light Rail Supply Variable Unit Cost Rate (2012\$)						Productivity Ratio			Base Year Resource Unit Cost	Inflation Factor: 1.047		
	Revenue Train-Hours	Revenue Car-Miles	Yards	Revenue Route-Mi	Stations	Peak Cars	Resource Variable	Resource Value	Resource/Supply		Inflation Factor	Results in: 2015\$ Resource Unit Cost	Estimated Annual Cost
VEHICLE OPERATIONS													
VO Operator Salaries & Wages	\$41.17						Train-Hours	Work Hours	1,586	\$25.96	1.047	\$27.17	\$2,081,327
VO Other Salaries & Wages (Train-Hr)	\$12.19						Train-Hours	Work Hours	0,416	\$29.28	1.047	\$30.65	\$616,456
VO Other Salaries & Wages (Peak Cars)						\$32,559	Peak Cars	Work Hours	1,138	\$28.60	1.047	\$29.94	\$477,094
VO Fringe Benefits (Train-Hr)	\$17.81						Train-Hours	Work Hours	2,002	\$8.89	1.047	\$9.31	\$900,287
VO Fringe Benefits (Peak Car)						\$10,865	Peak Cars	Work Hours	1,138	\$9.54	1.047	\$9.99	\$159,213
VO Prof/Tech Services (Train-Hr)	\$16						Train-Hours	Work Hours	87,461	1,000	1.047	\$16.26	\$785,266
VO Prof/Tech Services (Stations)					\$29,227		Stations	Work Hours	22	1,000	1.047	\$30,591	\$520,049
VO Other Matl & Supplies	\$0.67						Train-Hours	Work Hours	87,461	1,000	1.047	\$0.70	\$33,650
VO Utilities (Car-Mi)		\$0.37					Car-Miles	Work Hours	2,572,416	1,000	1.047	\$0.39	\$375,171
VO Utilities (Peak Cars)						\$27,773	Peak Cars	Work Hours	33	1,000	1.047	\$29,069	\$406,965
VO Miscellaneous	\$0.06						Train-Hours	Work Hours	87,461	1,000	1.047	\$0.07	\$3,175
VEHICLE MAINTENANCE													
VM Salaries & Wages		\$1.35					Car-Miles	Work Hours	0,053	\$25.57	1.047	\$26.77	\$1,366,267
VM Fringe Benefits		\$0.448					Car-Miles	Work Hours	0,053	\$8.47	1.047	\$8.86	\$452,377
VM Prof/Tech Services		\$0.31					Car-Miles	Work Hours	2,572,416	1,000	1.047	\$0.32	\$310,844
VM Fuel & Lubricants						\$3,211	Peak Cars	Work Hours	33	1,000	1.047	\$3.361	\$47,051
VM Tires & Tubes						\$147	Peak Cars	Work Hours	33	1,000	1.047	\$154	\$2,155
VM Other Matl & Supplies (Car-Miles)		\$0.34					Car-Miles	Work Hours	2,572,416	1,000	1.047	\$0.35	\$341,604
VM Other Matl & Supplies (Peak Cars)						\$24,987	Peak Cars	Work Hours	33	1,000	1.047	\$26,153	\$366,146
VM Miscellaneous						\$4,119	Peak Cars	Work Hours	33	1,000	1.047	\$4,310.96	\$60,353
NON-VEHICLE MAINTENANCE													
NVM Salaries & Wages (Route-Mi)				\$36,531			Route-Mi	Work Hours	1,395	\$26.18	1.047	\$27.40	\$1,319,112
NVM Salaries & Wages (Stations)					\$45,251		Stations	Work Hours	1,721	\$26.30	1.047	\$27.52	\$805,162
NVM Salaries & Wages (Yards)			\$406,114				Yards	Work Hours	15,727	\$25.82	1.047	\$27.03	\$425,064
Fringe Benefits (Route-Mi Driven)				\$12,095			Route-Mi	Work Hours	1,395	\$8.67	1.047	\$9.07	\$436,763
NVM Fringe Benefits (Stations Driven)					\$14,983		Stations	Work Hours	1,721	\$8.71	1.047	\$9.11	\$266,593
NVM Fringe Benefits (Yard Driven)			\$134,466				Yards	Work Hours	15,727	\$8.55	1.047	\$8.95	\$140,740
NVM Prof/Tech Services (Route-Mi)				\$12,152			Route-Mi	Work Hours	37	1,000	1.047	\$12,719	\$438,816
NVM Prof/Tech Services (Stations)					\$16,978		Stations	Work Hours	22	1,000	1.047	\$17,770	\$302,097
NVM Prof/Tech Services (Yards)			\$150,340				Yards	Work Hours	1	1,000	1.047	\$157,355	\$157,355
NVM Matl & Supplies (Route-Mi)				\$7,441			Route-Mi	Work Hours	37	1,000	1.047	\$7,789	\$268,705
NVM Matl & Supplies (Stations)					\$8,928		Stations	Work Hours	22	1,000	1.047	\$9,345	\$158,862
NVM Matl & Supplies (Yards)			\$82,257				Yards	Work Hours	1	1,000	1.047	\$86,095	\$86,095
NVM Miscellaneous				\$327			Route-Mi	Work Hours	37	1,000	1.047	\$342	\$11,796
GENERAL ADMINISTRATION													
GA Salaries & Wages						\$88,290	Peak Cars	Work Hours	1,735	\$50.90	1.047	\$53.28	\$1,293,735
GA Fringe Benefits						\$29,233	Peak Cars	Work Hours	1,735	\$16.85	1.047	\$17.64	\$428,361
GA Prof/Tech Services						\$56,328	Peak Cars	Work Hours	33	1,000	1.047	\$58,957	\$825,394
GA Matl & Supplies						\$4,307	Peak Cars	Work Hours	33	1,000	1.047	\$4,508	\$63,110
GA Utilities (Stations)					\$18,174		Stations	Work Hours	22	1,000	1.047	\$19,022	\$323,380
GA Utilities (Yards)			\$330,797				Yards	Work Hours	1	1,000	1.047	\$346,232	\$346,232
GA Casualty & Liability (Stations)					\$10,605		Stations	Work Hours	22	1,000	1.047	\$11,100	\$188,700
GA Casualty & Liability (Car-Mi)		\$0.16					Car-Miles	Work Hours	2,572,416	1,000	1.047	\$0.17	\$166,382
GA Taxes & Fees						\$45,09	Peak Cars	Work Hours	33	1,000	1.047	\$47.19	\$660,65
GA Miscellaneous						\$15,025	Peak Cars	Work Hours	33	1,000	1.047	\$15,726	\$220,158
TOTALS	\$87.43	\$2.98	\$1,103,974	\$68,546	\$144,147	\$296,889							\$1,978,723
2012 Resource Variable Values	87,461	2,572,416	1.4	37.3	22	33							
Triangle Transit agency fringe benefit rates used:												Rev Train-Hrs	48,300
Vehicle Operations = 33.37%												Rev Car-Miles	965,100
Vehicle Maintenance = 33.11%												Peak Cars	14
Non-Vehicle Maintenance = 33.11%												Track Miles	34.5
General Administration = 33.11%												Stations	17
												Yards	1.0



Operations and Maintenance Cost Results

Appendix A Table 10

Durham-Orange County Corridor
Triangle Regional Transit Program
O&M Cost Models
LIGHT RAIL LINE ITEM DETAIL

C2A-NHC 1

Expense Line Item	Light Rail Supply Variable Unit Cost Rate (2012\$)						Productivity Ratio			Base Year Resource Unit Cost	Inflation Factor: 1.047		
	Revenue Train-Hours	Revenue Car-Miles	Yards	Revenue Route-Mi	Stations	Peak Cars	Resource Variable	Resource Value	Resource/Supply		Inflation Factor	Results in: 2015\$ Resource Unit Cost	Estimated Annual Cost
	VEHICLE OPERATIONS												
VO Operator Salaries & Wages	\$41.17						Train-Hours	Work Hours	1,586	\$25.96	1.047	\$27.17	\$2,081,327
VO Other Salaries & Wages (Train-Hr)	\$12.19						Train-Hours	Work Hours	0,416	\$29.28	1.047	\$30.65	\$616,456
VO Other Salaries & Wages (Peak Cars)						\$32,559	Peak Cars	Work Hours	1,138	\$28.60	1.047	\$29.94	\$477,094
VO Fringe Benefits (Train-Hr)	\$17.81						Train-Hours	Work Hours	2,002	\$8.89	1.047	\$9.31	\$900,287
VO Fringe Benefits (Peak Car)						\$10,865	Peak Cars	Work Hours	1,138	\$9.54	1.047	\$9.99	\$159,213
VO Prof/Tech Services (Train-Hr)	\$16						Train-Hours	Work Hours	87,461	1,000	1.047	\$16.26	\$785,266
VO Prof/Tech Services (Stations)					\$29,227		Stations	Work Hours	22	1,000	1.047	\$30,591	\$520,049
VO Other Matl & Supplies	\$0.67						Train-Hours	Work Hours	87,461	1,000	1.047	\$0.70	\$33,650
VO Utilities (Car-Mi)		\$0.37					Car-Miles	Work Hours	2,572,416	1,000	1.047	\$0.39	\$374,549
VO Utilities (Peak Cars)						\$27,773	Peak Cars	Work Hours	33	1,000	1.047	\$29,069	\$406,965
VO Miscellaneous	\$0.06						Train-Hours	Work Hours	87,461	1,000	1.047	\$0.07	\$3,175
VEHICLE MAINTENANCE													
VM Salaries & Wages		\$1.35					Car-Miles	Work Hours	0,053	\$25.57	1.047	\$26.77	\$1,364,002
VM Fringe Benefits		\$0.448					Car-Miles	Work Hours	0,053	\$8.47	1.047	\$8.86	\$451,627
VM Prof/Tech Services		\$0.31					Car-Miles	Work Hours	2,572,416	1,000	1.047	\$0.32	\$310,328
VM Fuel & Lubricants						\$3,211	Peak Cars	Work Hours	33	1,000	1.047	\$3.361	\$47,051
VM Tires & Tubes						\$147	Peak Cars	Work Hours	33	1,000	1.047	\$154	\$2,155
VM Other Matl & Supplies (Car-Miles)		\$0.34					Car-Miles	Work Hours	2,572,416	1,000	1.047	\$0.35	\$341,038
VM Other Matl & Supplies (Peak Cars)						\$24,987	Peak Cars	Work Hours	33	1,000	1.047	\$26,153	\$366,146
VM Miscellaneous						\$4,119	Peak Cars	Work Hours	33	1,000	1.047	\$4,310.96	\$60,353
NON-VEHICLE MAINTENANCE													
NVM Salaries & Wages (Route-Mi)				\$36,531			Route-Mi	Work Hours	1,395	\$26.18	1.047	\$27.40	\$1,316,818
NVM Salaries & Wages (Stations)					\$45,251		Stations	Work Hours	1,721	\$26.30	1.047	\$27.52	\$805,162
NVM Salaries & Wages (Yards)			\$406,114				Yards	Work Hours	15,727	\$25.82	1.047	\$27.03	\$425,064
Fringe Benefits (Route-Mi Driven)				\$12,095			Route-Mi	Work Hours	1,395	\$8.67	1.047	\$9.07	\$436,004
NVM Fringe Benefits (Stations Driven)					\$14,983		Stations	Work Hours	1,721	\$8.71	1.047	\$9.11	\$266,593
NVM Fringe Benefits (Yard Driven)			\$134,466				Yards	Work Hours	15,727	\$8.55	1.047	\$8.95	\$140,740
NVM Prof/Tech Services (Route-Mi)				\$12,152			Route-Mi	Work Hours	37	1,000	1.047	\$12,719	\$438,053
NVM Prof/Tech Services (Stations)					\$16,978		Stations	Work Hours	22	1,000	1.047	\$17,770	\$302,097
NVM Prof/Tech Services (Yards)			\$150,340				Yards	Work Hours	1	1,000	1.047	\$157,355	\$157,355
NVM Matl & Supplies (Route-Mi)				\$7,441			Route-Mi	Work Hours	37	1,000	1.047	\$7,789	\$268,238
NVM Matl & Supplies (Stations)					\$8,928		Stations	Work Hours	22	1,000	1.047	\$9,345	\$158,862
NVM Matl & Supplies (Yards)			\$82,257				Yards	Work Hours	1	1,000	1.047	\$86,095	\$86,095
NVM Miscellaneous				\$327			Route-Mi	Work Hours	37	1,000	1.047	\$342	\$11,776
GENERAL ADMINISTRATION													
GA Salaries & Wages						\$88,290	Peak Cars	Work Hours	1,735	\$50.90	1.047	\$53.28	\$1,293,735
GA Fringe Benefits						\$29,233	Peak Cars	Work Hours	1,735	\$16.85	1.047	\$17.64	\$428,361
GA Prof/Tech Services						\$56,328	Peak Cars	Work Hours	33	1,000	1.047	\$58,957	\$825,394
GA Matl & Supplies						\$4,307	Peak Cars	Work Hours	33	1,000	1.047	\$4,508	\$63,110
GA Utilities (Stations)					\$18,174		Stations	Work Hours	22	1,000	1.047	\$19,022	\$323,380
GA Utilities (Yards)			\$330,797				Yards	Work Hours	1	1,000	1.047	\$346,232	\$346,232
GA Casualty & Liability (Stations)					\$10,605		Stations	Work Hours	22	1,000	1.047	\$11,100	\$188,700
GA Casualty & Liability (Car-Mi)		\$0.16					Car-Miles	Work Hours	2,572,416	1,000	1.047	\$0.17	\$166,106
GA Taxes & Fees						\$45,029	Peak Cars	Work Hours	33	1,000	1.047	\$47.19	\$660,65
GA Miscellaneous						\$15,025	Peak Cars	Work Hours	33	1,000	1.047	\$15,726	\$220,158
TOTALS	\$87.43	\$2.98	\$1,103,974	\$68,546	\$144,147	\$296,889							\$17,969,424
2012 Resource Variable Values	87,461	2,572,416	1.4	37.3	22	33							
Triangle Transit agency fringe benefit rates used:												Rev Train-Hrs	48,300
Vehicle Operations = 33.37%												Rev Car-Miles	963,500
Vehicle Maintenance = 33.11%												Peak Cars	14
Non-Vehicle Maintenance = 33.11%												Track Miles	34.4
General Administration = 33.11%												Stations	17
												Yards	1.0



Operations and Maintenance Cost Results

Appendix A Table 11

Durham-Orange County Corridor
Triangle Regional Transit Program
O&M Cost Models
LIGHT RAIL LINE ITEM DETAIL

C1-NHC 2

Expense Line Item	Light Rail Supply Variable Unit Cost Rate (2012\$)					Productivity Ratio			Base Year Resource Unit Cost	Inflation Factor: 1.047			
	Revenue Train-Hours	Revenue Car-Miles	Yards	Revenue Route-Mi	Stations	Peak Cars	Resource Variable	Resource Value		Resource/Supply	Results in: 2015\$	Resource Unit Cost	Estimated Annual Cost
VEHICLE OPERATIONS													
VO Operator Salaries & Wages	\$41.17						Train-Hours	Work Hours	1,586	\$25.96	1.047	\$27.17	\$2,081,327
VO Other Salaries & Wages (Train-Hr)	\$12.19						Train-Hours	Work Hours	0,416	\$29.28	1.047	\$30.65	\$616,456
VO Other Salaries & Wages (Peak Cars)						\$32,559	Peak Cars	Work Hours	1,138	\$28.60	1.047	\$29.94	\$477,094
VO Fringe Benefits (Train-Hr)	\$17.81						Train-Hours	Work Hours	2,002	\$8.89	1.047	\$9.31	\$900,287
VO Fringe Benefits (Peak Car)						\$10,865	Peak Cars	Work Hours	1,138	\$9.54	1.047	\$9.99	\$159,213
VO Prof/Tech Services (Train-Hr)	\$16						Train-Hours	87,461	1,000	\$15.53	1.047	\$16.26	\$785,266
VO Prof/Tech Services (Stations)					\$29,227		Stations	22	1,000	\$29,227	1.047	\$30,591	\$520,049
VO Other Matl & Supplies	\$0.67						Train-Hours	87,461	1,000	\$0.67	1.047	\$0.70	\$33,650
VO Utilities (Car-Mi)		\$0.37					Car-Miles	2,572,416	1,000	\$0.37	1.047	\$0.39	\$369,767
VO Utilities (Peak Cars)						\$27,773	Peak Cars	33	1,000	\$27,773	1.047	\$29,069	\$406,965
VO Miscellaneous	\$0.06						Train-Hours	87,461	1,000	\$0.06	1.047	\$0.07	\$3,175
VEHICLE MAINTENANCE													
VM Salaries & Wages		\$1.35					Car-Miles	Work Hours	0,053	\$25.57	1.047	\$26.77	\$1,346,589
VM Fringe Benefits		\$0.448					Car-Miles	Work Hours	0,053	\$8.47	1.047	\$8.86	\$445,861
VM Prof/Tech Services		\$0.31					Car-Miles	2,572,416	1,000	\$0.31	1.047	\$0.32	\$306,367
VM Fuel & Lubricants						\$3,211	Peak Cars	33	1,000	\$3,211	1.047	\$3,361	\$47,051
VM Tires & Tubes						\$147	Peak Cars	33	1,000	\$147	1.047	\$154	\$2,155
VM Other Matl & Supplies (Car-Miles)		\$0.34					Car-Miles	2,572,416	1,000	\$0.34	1.047	\$0.35	\$336,684
VM Other Matl & Supplies (Peak Cars)						\$24,987	Peak Cars	33	1,000	\$24,987	1.047	\$26,153	\$366,146
VM Miscellaneous						\$4,119	Peak Cars	33	1,000	\$4,119	1.047	\$4,310.96	\$60,353
NON-VEHICLE MAINTENANCE													
NVM Salaries & Wages (Route-Mi)				\$36,531			Route-Mi	Work Hours	1,395	\$26.18	1.047	\$27.40	\$1,299,994
NVM Salaries & Wages (Stations)					\$45,251		Stations	Work Hours	1,721	\$26.30	1.047	\$27.52	\$805,162
NVM Salaries & Wages (Yards)			\$406,114				Yards	Work Hours	15,727	\$25.82	1.047	\$27.03	\$425,064
Fringe Benefits (Route-Mi Driven)				\$12,095			Route-Mi	Work Hours	1,395	\$8.67	1.047	\$9.07	\$430,434
NVM Fringe Benefits (Stations Driven)					\$14,983		Stations	Work Hours	1,721	\$8.71	1.047	\$9.11	\$266,593
NVM Fringe Benefits (Yard Driven)			\$134,466				Yards	Work Hours	15,727	\$8.55	1.047	\$8.95	\$140,740
NVM Prof/Tech Services (Route-Mi)				\$12,152			Route-Mi	37	1,000	\$12,152	1.047	\$12,719	\$432,457
NVM Prof/Tech Services (Stations)					\$16,978		Stations	22	1,000	\$16,978	1.047	\$17,770	\$302,097
NVM Prof/Tech Services (Yards)			\$150,340				Yards	1	1,000	\$150,340	1.047	\$157,355	\$157,355
NVM Matl & Supplies (Route-Mi)				\$7,441			Route-Mi	37	1,000	\$7,441	1.047	\$7,789	\$264,811
NVM Matl & Supplies (Stations)					\$8,928		Stations	22	1,000	\$8,928	1.047	\$9,345	\$158,862
NVM Matl & Supplies (Yards)			\$82,257				Yards	1	1,000	\$82,257	1.047	\$86,095	\$86,095
NVM Miscellaneous				\$327			Route-Mi	37	1,000	\$327	1.047	\$342	\$11,625
GENERAL ADMINISTRATION													
GA Salaries & Wages						\$88,290	Peak Cars	Work Hours	1,735	\$50.90	1.047	\$53.28	\$1,293,735
GA Fringe Benefits						\$29,233	Peak Cars	Work Hours	1,735	\$16.85	1.047	\$17.64	\$428,361
GA Prof/Tech Services						\$56,328	Peak Cars	33	1,000	\$56,328	1.047	\$58,957	\$825,394
GA Matl & Supplies						\$4,307	Peak Cars	33	1,000	\$4,307	1.047	\$4,508	\$63,110
GA Utilities (Stations)					\$18,174		Stations	22	1,000	\$18,174	1.047	\$19,022	\$323,380
GA Utilities (Yards)			\$330,797				Yards	1	1,000	\$330,797	1.047	\$346,232	\$346,232
GA Casualty & Liability (Stations)					\$10,605		Stations	22	1,000	\$10,605	1.047	\$11,100	\$188,700
GA Casualty & Liability (Car-Mi)		\$0.16					Car-Miles	2,572,416	1,000	\$0.16	1.047	\$0.17	\$163,986
GA Taxes & Fees						\$45,029	Peak Cars	33	1,000	\$45	1.047	\$47.19	\$660,65
GA Miscellaneous						\$15,025	Peak Cars	33	1,000	\$15,025	1.047	\$15,726	\$220,158
TOTALS	\$87.43	\$2.98	\$1,103,974	\$68,546	\$144,147	\$296,889							\$17,899,461
2012 Resource Variable Values	87,461	2,572,416	1.4	37.3	22	33							
Triangle Transit agency fringe benefit rates used:												Rev Train-Hrs	48,300
Vehicle Operations = 33.37%												Rev Car-Miles	951,200
Vehicle Maintenance = 33.11%												Peak Cars	14
Non-Vehicle Maintenance = 33.11%												Track Miles	34.0
General Administration = 33.11%												Stations	17
												Yards	1.0



Operations and Maintenance Cost Results

Appendix A Table 12

Durham-Orange County Corridor
Triangle Regional Transit Program
O&M Cost Models
LIGHT RAIL LINE ITEM DETAIL

C1A-NHC 2

Expense Line Item	Light Rail Supply Variable Unit Cost Rate (2012\$)						Productivity Ratio			Base Year Resource Unit Cost	Inflation Factor: 1.047		
	Revenue Train-Hours	Revenue Car-Miles	Yards	Revenue Route-Mi	Stations	Peak Cars	Resource Variable	Resource Value	Resource/Supply		Inflation Factor	Results in: 2015\$ Resource Unit Cost	Estimated Annual Cost
	VEHICLE OPERATIONS												
VO Operator Salaries & Wages	\$41.17						Train-Hours	Work Hours	1,586	\$25.96	1.047	\$27.17	\$2,081,327
VO Other Salaries & Wages (Train-Hr)	\$12.19						Train-Hours	Work Hours	0,416	\$29.28	1.047	\$30.65	\$616,456
VO Other Salaries & Wages (Peak Cars)						\$32,559	Peak Cars	Work Hours	1,138	\$28.60	1.047	\$29.94	\$477,094
VO Fringe Benefits (Train-Hr)	\$17.81						Train-Hours	Work Hours	2,002	\$8.89	1.047	\$9.31	\$900,287
VO Fringe Benefits (Peak Car)						\$10,865	Peak Cars	Work Hours	1,138	\$9.54	1.047	\$9.99	\$159,213
VO Prof/Tech Services (Train-Hr)	\$16						Train-Hours	Work Hours	87,461	1,000	1.047	\$16.26	\$785,266
VO Prof/Tech Services (Stations)					\$29,227		Stations	Work Hours	22	1,000	1.047	\$30.591	\$520,049
VO Other Matl & Supplies	\$0.67						Train-Hours	Work Hours	87,461	1,000	1.047	\$0.70	\$33,650
VO Utilities (Car-Mi)		\$0.37					Car-Miles	Work Hours	2,572,416	1,000	1.047	\$0.39	\$375,171
VO Utilities (Peak Cars)						\$27,773	Peak Cars	Work Hours	33	1,000	1.047	\$29,069	\$406,965
VO Miscellaneous	\$0.06						Train-Hours	Work Hours	87,461	1,000	1.047	\$0.07	\$3,175
VEHICLE MAINTENANCE													
VM Salaries & Wages		\$1.35					Car-Miles	Work Hours	0,053	\$25.57	1.047	\$26.77	\$1,366,267
VM Fringe Benefits		\$0.448					Car-Miles	Work Hours	0,053	\$8.47	1.047	\$8.86	\$452,377
VM Prof/Tech Services		\$0.31					Car-Miles	Work Hours	2,572,416	1,000	1.047	\$0.32	\$310,844
VM Fuel & Lubricants						\$3,211	Peak Cars	Work Hours	33	1,000	1.047	\$3.361	\$47,051
VM Tires & Tubes						\$147	Peak Cars	Work Hours	33	1,000	1.047	\$154	\$2,155
VM Other Matl & Supplies (Car-Miles)		\$0.34					Car-Miles	Work Hours	2,572,416	1,000	1.047	\$0.35	\$341,604
VM Other Matl & Supplies (Peak Cars)						\$24,987	Peak Cars	Work Hours	33	1,000	1.047	\$26.153	\$366,146
VM Miscellaneous						\$4,119	Peak Cars	Work Hours	33	1,000	1.047	\$4,310.96	\$60,353
NON-VEHICLE MAINTENANCE													
NVM Salaries & Wages (Route-Mi)				\$36,531			Route-Mi	Work Hours	1,395	\$26.18	1.047	\$27.40	\$1,319,112
NVM Salaries & Wages (Stations)					\$45,251		Stations	Work Hours	1,721	\$26.30	1.047	\$27.52	\$805,162
NVM Salaries & Wages (Yards)			\$406,114				Yards	Work Hours	15,727	\$25.82	1.047	\$27.03	\$425,064
Fringe Benefits (Route-Mi Driven)				\$12,095			Route-Mi	Work Hours	1,395	\$8.67	1.047	\$9.07	\$436,763
NVM Fringe Benefits (Stations Driven)					\$14,983		Stations	Work Hours	1,721	\$8.71	1.047	\$9.11	\$266,593
NVM Fringe Benefits (Yard Driven)			\$134,466				Yards	Work Hours	15,727	\$8.55	1.047	\$8.95	\$140,740
NVM Prof/Tech Services (Route-Mi)				\$12,152			Route-Mi	Work Hours	37	1,000	1.047	\$12,719	\$438,816
NVM Prof/Tech Services (Stations)					\$16,978		Stations	Work Hours	22	1,000	1.047	\$17,770	\$302,097
NVM Prof/Tech Services (Yards)			\$150,340				Yards	Work Hours	1	1,000	1.047	\$157,355	\$157,355
NVM Matl & Supplies (Route-Mi)				\$7,441			Route-Mi	Work Hours	37	1,000	1.047	\$7,789	\$268,705
NVM Matl & Supplies (Stations)					\$8,928		Stations	Work Hours	22	1,000	1.047	\$9,345	\$158,862
NVM Matl & Supplies (Yards)			\$82,257				Yards	Work Hours	1	1,000	1.047	\$86,095	\$86,095
NVM Miscellaneous				\$327			Route-Mi	Work Hours	37	1,000	1.047	\$342	\$11,796
GENERAL ADMINISTRATION													
GA Salaries & Wages						\$88,290	Peak Cars	Work Hours	1,735	\$50.90	1.047	\$53.28	\$1,293,735
GA Fringe Benefits						\$29,233	Peak Cars	Work Hours	1,735	\$16.85	1.047	\$17.64	\$428,361
GA Prof/Tech Services						\$56,328	Peak Cars	Work Hours	33	1,000	1.047	\$58,957	\$825,394
GA Matl & Supplies						\$4,307	Peak Cars	Work Hours	33	1,000	1.047	\$4,508	\$63,110
GA Utilities (Stations)					\$18,174		Stations	Work Hours	22	1,000	1.047	\$19,022	\$323,380
GA Utilities (Yards)			\$330,797				Yards	Work Hours	1	1,000	1.047	\$346,232	\$346,232
GA Casualty & Liability (Stations)					\$10,605		Stations	Work Hours	22	1,000	1.047	\$11,100	\$188,700
GA Casualty & Liability (Car-Mi)		\$0.16					Car-Miles	Work Hours	2,572,416	1,000	1.047	\$0.17	\$166,382
GA Taxes & Fees						\$45,029	Peak Cars	Work Hours	33	1,000	1.047	\$47.19	\$660,65
GA Miscellaneous						\$15,025	Peak Cars	Work Hours	33	1,000	1.047	\$15,726	\$220,158
TOTALS	\$87.43	\$2.98	\$1,103,974	\$68,546	\$144,147	\$296,889							\$17,978,723
2012 Resource Variable Values	87,461	2,572,416	1.4	37.3	22	33							
Triangle Transit agency fringe benefit rates used:												Rev Train-Hrs	48,300
Vehicle Operations = 33.37%												Rev Car-Miles	965,100
Vehicle Maintenance = 33.11%												Peak Cars	14
Non-Vehicle Maintenance = 33.11%												Track Miles	34.5
General Administration = 33.11%												Stations	17
												Yards	1.0



Operations and Maintenance Cost Results

Appendix A Table 13

Durham-Orange County Corridor
Triangle Regional Transit Program
O&M Cost Models
LIGHT RAIL LINE ITEM DETAIL

C2-NHC 2

Expense Line Item	Light Rail Supply Variable Unit Cost Rate (2012\$)						Productivity Ratio			Base Year Resource Unit Cost	Inflation Factor: 1.047		
	Revenue Train-Hours	Revenue Car-Miles	Yards	Revenue Route-Mi	Stations	Peak Cars	Resource Variable	Resource Value	Resource/Supply		Inflation Factor	Results in: 2015\$ Resource Unit Cost	Estimated Annual Cost
	VEHICLE OPERATIONS												
VO Operator Salaries & Wages	\$41.17						Train-Hours	Work Hours	1,586	\$25.96	1.047	\$27.17	\$2,081,327
VO Other Salaries & Wages (Train-Hr)	\$12.19						Train-Hours	Work Hours	0,416	\$29.28	1.047	\$30.65	\$616,456
VO Other Salaries & Wages (Peak Cars)						\$32,559	Peak Cars	Work Hours	1,138	\$28.60	1.047	\$29.94	\$477,094
VO Fringe Benefits (Train-Hr)	\$17.81						Train-Hours	Work Hours	2,002	\$8.89	1.047	\$9.31	\$900,287
VO Fringe Benefits (Peak Car)						\$10,865	Peak Cars	Work Hours	1,138	\$9.54	1.047	\$9.99	\$159,213
VO Prof/Tech Services (Train-Hr)	\$16						Train-Hours	Stations	87,461	1,000	1.047	\$16.26	\$785,266
VO Prof/Tech Services (Stations)					\$29,227		Stations	Work Hours	22	1,000	1.047	\$30,591	\$520,049
VO Other Matl & Supplies	\$0.67						Train-Hours	Car-Miles	87,461	1,000	1.047	\$0.70	\$33,650
VO Utilities (Car-Mi)		\$0.37					Car-Miles	Work Hours	2,572,416	1,000	1.047	\$0.39	\$373,421
VO Utilities (Peak Cars)						\$27,773	Peak Cars	Work Hours	33	1,000	1.047	\$29,069	\$406,965
VO Miscellaneous	\$0.06						Train-Hours	Work Hours	87,461	1,000	1.047	\$0.07	\$3,175
VEHICLE MAINTENANCE													
VM Salaries & Wages		\$1.35					Car-Miles	Work Hours	0,053	\$25.57	1.047	\$26.77	\$1,359,897
VM Fringe Benefits		\$0.448					Car-Miles	Work Hours	0,053	\$8.47	1.047	\$8.86	\$450,267
VM Prof/Tech Services		\$0.31					Car-Miles	Work Hours	2,572,416	1,000	1.047	\$0.32	\$309,394
VM Fuel & Lubricants						\$3,211	Peak Cars	Work Hours	33	1,000	1.047	\$3.361	\$47,051
VM Tires & Tubes						\$147	Peak Cars	Work Hours	33	1,000	1.047	\$154	\$2,155
VM Other Matl & Supplies (Car-Miles)		\$0.34					Car-Miles	Work Hours	2,572,416	1,000	1.047	\$0.35	\$340,011
VM Other Matl & Supplies (Peak Cars)						\$24,987	Peak Cars	Work Hours	33	1,000	1.047	\$26,153	\$366,146
VM Miscellaneous						\$4,119	Peak Cars	Work Hours	33	1,000	1.047	\$4,310.96	\$60,353
NON-VEHICLE MAINTENANCE													
NVM Salaries & Wages (Route-Mi)				\$36,531			Route-Mi	Work Hours	1,395	\$26.18	1.047	\$27.40	\$1,312,994
NVM Salaries & Wages (Stations)					\$45,251		Stations	Work Hours	1,721	\$26.30	1.047	\$27.52	\$805,162
NVM Salaries & Wages (Yards)			\$406,114				Yards	Work Hours	15,727	\$25.82	1.047	\$27.03	\$425,064
Fringe Benefits (Route-Mi Driven)				\$12,095			Route-Mi	Work Hours	1,395	\$8.67	1.047	\$9.07	\$434,738
NVM Fringe Benefits (Stations Driven)					\$14,983		Stations	Work Hours	1,721	\$8.71	1.047	\$9.11	\$266,593
NVM Fringe Benefits (Yard Driven)			\$134,466				Yards	Work Hours	15,727	\$8.55	1.047	\$8.95	\$140,740
NVM Prof/Tech Services (Route-Mi)				\$12,152			Route-Mi	Work Hours	37	1,000	1.047	\$12,719	\$436,781
NVM Prof/Tech Services (Stations)					\$16,978		Stations	Work Hours	22	1,000	1.047	\$17,770	\$302,097
NVM Prof/Tech Services (Yards)			\$150,340				Yards	Work Hours	1	1,000	1.047	\$157,355	\$157,355
NVM Matl & Supplies (Route-Mi)				\$7,441			Route-Mi	Work Hours	37	1,000	1.047	\$7,789	\$267,459
NVM Matl & Supplies (Stations)					\$8,928		Stations	Work Hours	22	1,000	1.047	\$9,345	\$158,862
NVM Matl & Supplies (Yards)			\$82,257				Yards	Work Hours	1	1,000	1.047	\$86,095	\$86,095
NVM Miscellaneous				\$327			Route-Mi	Work Hours	37	1,000	1.047	\$342	\$11,742
GENERAL ADMINISTRATION													
GA Salaries & Wages						\$88,290	Peak Cars	Work Hours	1,735	\$50.90	1.047	\$53.28	\$1,293,735
GA Fringe Benefits						\$29,233	Peak Cars	Work Hours	1,735	\$16.85	1.047	\$17.64	\$428,361
GA Prof/Tech Services						\$56,328	Peak Cars	Work Hours	33	1,000	1.047	\$58,957	\$825,394
GA Matl & Supplies						\$4,307	Peak Cars	Work Hours	33	1,000	1.047	\$4,508	\$63,110
GA Utilities (Stations)					\$18,174		Stations	Work Hours	22	1,000	1.047	\$19,022	\$323,380
GA Utilities (Yards)			\$330,797				Yards	Work Hours	1	1,000	1.047	\$346,232	\$346,232
GA Casualty & Liability (Stations)					\$10,605		Stations	Work Hours	22	1,000	1.047	\$11,100	\$188,700
GA Casualty & Liability (Car-Mi)		\$0.16					Car-Miles	Work Hours	2,572,416	1,000	1.047	\$0.17	\$165,606
GA Taxes & Fees						\$45,029	Peak Cars	Work Hours	33	1,000	1.047	\$47.19	\$660,65
GA Miscellaneous						\$15,025	Peak Cars	Work Hours	33	1,000	1.047	\$15,726	\$220,158
TOTALS	\$87.43	\$2.98	\$1,103,974	\$68,546	\$144,147	\$296,889							\$17,953,197
2012 Resource Variable Values	87,461	2,572,416	1.4	37.3	22	33							
Triangle Transit agency fringe benefit rates used:												Rev Train-Hrs	48,300
Vehicle Operations = 33.37%												Rev Car-Miles	960,600
Vehicle Maintenance = 33.11%												Peak Cars	14
Non-Vehicle Maintenance = 33.11%												Track Miles	34.3
General Administration = 33.11%												Stations	17
												Yards	1.0



Operations and Maintenance Cost Results

Appendix A Table 14

Durham-Orange County Corridor
Triangle Regional Transit Program
O&M Cost Models
LIGHT RAIL LINE ITEM DETAIL

C2A-NHC 2

Expense Line Item	Light Rail Supply Variable Unit Cost Rate (2012\$)						Productivity Ratio			Base Year Resource Unit Cost	Inflation Factor	Inflation Factor: 1.047	
	Revenue Train-Hours	Revenue Car-Miles	Yards	Revenue Route-Mi	Stations	Peak Cars	Resource Variable	Resource Value	Resource/Supply			Results in: 2015\$	Estimated Annual Cost
VEHICLE OPERATIONS													
VO Operator Salaries & Wages	\$41.17						Train-Hours	Work Hours	1.586	\$25.96	1.047	\$27.17	\$2,081,327
VO Other Salaries & Wages (Train-Hr)	\$12.19						Train-Hours	Work Hours	0.416	\$29.28	1.047	\$30.65	\$616,456
VO Other Salaries & Wages (Peak Cars)						\$32,559	Peak Cars	Work Hours	1138	\$28.60	1.047	\$29.94	\$477,094
VO Fringe Benefits (Train-Hr)	\$17.81						Train-Hours	Work Hours	2.002	\$8.89	1.047	\$9.31	\$900,287
VO Fringe Benefits (Peak Car)						\$10,865	Peak Cars	Work Hours	1,138	\$9.54	1.047	\$9.99	\$159,213
VO Prof/Tech Services (Train-Hr)	\$16						Train-Hours	87,461	1.000	\$15.53	1.047	\$16.26	\$785,266
VO Prof/Tech Services (Stations)					\$29,227		Stations	22	1.000	\$29,227	1.047	\$30,591	\$520,049
VO Other Matl & Supplies	\$0.67						Train-Hours	87,461	1.000	\$0.67	1.047	\$0.70	\$33,650
VO Utilities (Car-Mi)		\$0.37					Car-Miles	2,572,416	1.000	\$0.37	1.047	\$0.39	\$372,838
VO Utilities (Peak Cars)						\$27,773	Peak Cars	33	1.000	\$27,773	1.047	\$29,069	\$406,965
VO Miscellaneous	\$0.06						Train-Hours	87,461	1.000	\$0.06	1.047	\$0.07	\$3,175
VEHICLE MAINTENANCE													
VM Salaries & Wages		\$1.35					Car-Miles	Work Hours	0.053	\$25.57	1.047	\$26.77	\$1,357,773
VM Fringe Benefits		\$0.448					Car-Miles	Work Hours	0.053	\$8.47	1.047	\$8.86	\$449,564
VM Prof/Tech Services		\$0.31					Car-Miles	2,572,416	1.000	\$0.31	1.047	\$0.32	\$308,911
VM Fuel & Lubricants						\$3,211	Peak Cars	33	1.000	\$3,211	1.047	\$3,361	\$47,051
VM Tires & Tubes						\$147	Peak Cars	33	1.000	\$147	1.047	\$154	\$2,155
VM Other Matl & Supplies (Car-Miles)		\$0.34					Car-Miles	2,572,416	1.000	\$0.34	1.047	\$0.35	\$339,480
VM Other Matl & Supplies (Peak Cars)						\$24,987	Peak Cars	33	1.000	\$24,987	1.047	\$26,153	\$366,146
VM Miscellaneous						\$4,119	Peak Cars	33	1.000	\$4,119	1.047	\$4,310.96	\$60,353
NON-VEHICLE MAINTENANCE													
NVM Salaries & Wages (Route-Mi)				\$36,531			Route-Mi	Work Hours	1,395	\$26.18	1.047	\$27.40	\$1,310,700
NVM Salaries & Wages (Stations)					\$45,251		Stations	Work Hours	1,721	\$26.30	1.047	\$27.52	\$805,162
NVM Salaries & Wages (Yards)			\$406,114				Yards	Work Hours	15,727	\$25.82	1.047	\$27.03	\$425,064
Fringe Benefits (Route-Mi Driven)				\$12,095			Route-Mi	Work Hours	1,395	\$8.67	1.047	\$9.07	\$433,978
NVM Fringe Benefits (Stations Driven)					\$14,983		Stations	Work Hours	1,721	\$8.71	1.047	\$9.11	\$266,593
NVM Fringe Benefits (Yard Driven)			\$134,466				Yards	Work Hours	15,727	\$8.55	1.047	\$8.95	\$140,740
NVM Prof/Tech Services (Route-Mi)				\$12,152			Route-Mi	37	1.000	\$12,152	1.047	\$12,719	\$436,018
NVM Prof/Tech Services (Stations)					\$16,978		Stations	22	1.000	\$16,978	1.047	\$17,770	\$302,097
NVM Prof/Tech Services (Yards)			\$150,340				Yards	1	1.000	\$150,340	1.047	\$157,355	\$157,355
NVM Matl & Supplies (Route-Mi)				\$7,441			Route-Mi	37	1.000	\$7,441	1.047	\$7,789	\$266,992
NVM Matl & Supplies (Stations)					\$8,928		Stations	22	1.000	\$8,928	1.047	\$9,345	\$158,862
NVM Matl & Supplies (Yards)			\$82,257				Yards	1	1.000	\$82,257	1.047	\$86,095	\$86,095
NVM Miscellaneous				\$327			Route-Mi	37	1.000	\$327	1.047	\$342	\$11,721
GENERAL ADMINISTRATION													
GA Salaries & Wages						\$88,290	Peak Cars	Work Hours	1,735	\$50.90	1.047	\$53.28	\$1,293,735
GA Fringe Benefits						\$29,233	Peak Cars	Work Hours	1,735	\$16.85	1.047	\$17.64	\$428,361
GA Prof/Tech Services						\$56,328	Peak Cars	33	1.000	\$56,328	1.047	\$58,957	\$825,394
GA Matl & Supplies						\$4,307	Peak Cars	33	1.000	\$4,307	1.047	\$4,508	\$63,110
GA Utilities (Stations)					\$18,174		Stations	22	1.000	\$18,174	1.047	\$19,022	\$323,380
GA Utilities (Yards)			\$330,797				Yards	1	1.000	\$330,797	1.047	\$346,232	\$346,232
GA Casualty & Liability (Stations)					\$10,605		Stations	22	1.000	\$10,605	1.047	\$11,100	\$188,700
GA Casualty & Liability (Car-Mi)		\$0.16					Car-Miles	2,572,416	1.000	\$0.16	1.047	\$0.17	\$165,348
GA Taxes & Fees						\$45.09	Peak Cars	33	1.000	\$45	1.047	\$47.19	\$660,65
GA Miscellaneous						\$15,025	Peak Cars	33	1.000	\$15,025	1.047	\$15,726	\$220,158
TOTALS	\$87.43	\$2.98	\$1,103,974	\$68,546	\$144,147	\$296,889							\$17,944,210
2012 Resource Variable Values	87,461	2,572,416	1.4	37.3	22	33							
Triangle Transit agency fringe benefit rates used:												Rev Train-Hrs	48,300
Vehicle Operations = 33.37%												Rev Car-Miles	959,100
Vehicle Maintenance = 33.11%												Peak Cars	14
Non-Vehicle Maintenance = 33.11%												Track Miles	34.3
General Administration = 33.11%												Stations	17
												Yards	1.0



Operations and Maintenance Cost Results

APPENDIX B - Durham Area Transit Authority Incremental Cost (Over Existing) of Each Alternative



Operations and Maintenance Cost Results

Appendix B Table 1

Durham-Orange County Corridor
Triangle Regional Transit Program
O&M Cost Models

DURHAM AREA TRANSIT AUTHORITY BUS LINE ITEM DETAIL

No-Build

Expense Line Item	2012 Estim. Bus Expenses	Existing Unit Cost Adjusted	New Unit Cost Added	Bus Supply Variable Unit Cost Rate (\$2012)					Productivity Ratio			Base Year Resource Unit Cost	Inflation Factor	Inflation Factor: 1.049 Results in: 2015\$		
				Revenue Bus-Hours	Revenue Bus-Miles	Garages	Transit Ctrs	Peak Buses	Resource Variable	Resource Value	Resource/Supply			Resource Unit Cost	Estimated Annual Cost	
VEHICLE OPERATIONS - PURCHASED TRANSP.																
OPERATORS' SALARIES & WAGES	\$4,876,800			\$25.59					Work Hours	220,480	1.157	\$22.12	1.049	\$23.21	\$990,477	
FRINGE BENEFITS	\$2,960,971			\$15.54					Work Hours	220,480	1.157	\$13.43	1.049	\$14.09	\$601,373	
PROFESSIONAL & TECHNICAL SERVICES	\$391,359							\$10,299	Peak Buses	38	1.000	\$10,299	1.049	\$10,805	\$75,633	
FUEL & LUBRICANTS	\$1,935,584			\$0.72					Revenue Miles	2,694,208	1.000	\$0.718	1.049	\$0.754	\$348,499	
TIRES & TUBES	\$215,608			\$0.08					Revenue Miles	2,694,208	1.000	\$0.080	1.049	\$0.084	\$38,820	
MISCELLANEOUS EXPENSES	\$30,110					\$30,110			Garages	1	1.000	\$30,110	1.049	\$31,588	\$0	
VEHICLE MAINTENANCE - PURCHASED TRANSP.																
SALARIES & WAGES	\$917,510			\$0.34					Work Hours	39,520	0.015	\$23.22	1.049	\$24.36	\$165,197	
FRINGE BENEFITS	\$445,559			\$0.17					Work Hours	39,520	0.015	\$11.27	1.049	\$11.83	\$80,222	
PROFESSIONAL & TECHNICAL SERVICES	\$189,673			\$0.07					Revenue Miles	2,694,208	1.000	\$0.070	1.049	\$0.074	\$34,150	
FUEL & LUBRICANTS	\$69,387							\$1,826	Peak Buses	38	1.000	\$1,826	1.049	\$1,916	\$13,410	
TIRES & TUBES	\$3,006							\$79.10	Peak Buses	38	1.000	\$79	1.049	\$82.98	\$581	
OTHER MATERIALS & SUPPLIES	\$708,604			\$0.26					Revenue Miles	2,694,208	1.000	\$0.263	1.049	\$0.276	\$127,583	
CASUALTY & LIABILITY	\$10,134			\$0.004					Revenue Miles	2,694,208	1.000	\$0.004	1.049	\$0.004	\$1,825	
NON-VEHICLE MAINTENANCE - PURCHASED TRANSP.																
SALARIES & WAGES - Garage Driven (75%)	\$142,273					\$142,273			Work Hours	18,720	18,720	\$7.60	1.049	\$7.97	\$0	
SALARIES & WAGES - Passenger Facility Driven (25%)	\$47,424						\$47,424		Work Hours	6,240	6,240	\$7.60	1.049	\$7.97	\$0	
FRINGE BENEFITS - Garage Driven	\$59,232					\$59,232			Work Hours	18,720	18,720	\$3.16	1.049	\$3.32	\$0	
FRINGE BENEFITS - Passenger Facility Driven	\$19,744						\$19,744		Work Hours	6,240	6,240	\$3.16	1.049	\$3.32	\$0	
PROFESSIONAL & TECH SERVICES	\$58,193					\$58,193			Garages	1	1.000	\$58,193	1.049	\$61,051	\$0	
MATERIALS & SUPPLIES	\$24,570					\$24,570			Garages	1	1.000	\$24,570	1.049	\$25,777	\$0	
MISCELLANEOUS EXPENSES	\$214,694					\$214,694			Garages	1	1.000	\$214,694	1.049	\$225,239	\$0	
GENERAL ADMINISTRATION - PURCHASED TRANSP.																
SALARIES & WAGES	\$646,945							\$17,025	Work Hours	11,900	313	\$54.37	1.049	\$57.04	\$125,028	
FRINGE BENEFITS	\$213,696							\$5,624	Work Hours	11,900	313	\$17.96	1.049	\$18.84	\$41,299	
PROF & TECHNICAL SERVICES - Garage Driven	\$66,422					\$66,422			Garages	1	1.000	\$66,422	1.049	\$69,684	\$0	
PROF & TECHNICAL SERVICES - Pk Bus Driven	\$614,093							\$16,160	Peak Buses	38	1.000	\$16,160	1.049	\$16,954	\$118,679	
MATERIALS & SUPPLIES	\$50,249					\$50,249			Garages	1	1.000	\$50,249	1.049	\$52,717	\$0	
UTILITIES	\$116,761					\$116,761			Garages	1	1.000	\$116,761	1.049	\$122,496	\$0	
CASUALTY & LIABILITY	\$893,113							\$23,503	Peak Buses	38	1.000	\$23,503	1.049	\$24,657	\$172,602	
TAXES & FEES	\$55,863							\$1,470	Peak Buses	38	1.000	\$1,470	1.049	\$1,542	\$10,796	
MISCELLANEOUS EXPENSES	\$287,295							\$7,560	Peak Buses	38	1.000	\$7,560	1.049	\$7,932	\$55,522	
GENERAL ADMINISTRATION - DIRECTLY OPERATED																
SALARIES & WAGES	\$483,893							\$12,734	Work Hours	8,900	234	\$54.37	1.049	\$57.04	\$93,516	
FRINGE BENEFITS	\$139,821							\$3,680	Work Hours	8,900	234	\$15.71	1.049	\$16.48	\$27,022	
UTILITIES	\$17,416					\$17,416			Garages	1	1.000	\$17,416	1.049	\$18,271	\$0	
TOTALS	\$16,906,003			\$41.13	\$1.64	\$779,920	\$67,168	\$99,960							\$3,122,233	
2012 Resource Variable Values				190,551	2,694,208	1	1	38								
Notes:														Revenue Hours	36,889	
														Revenue Miles	462,378	
														Garages	0	
														Transit Centers	0	
														Peak Buses	7	
1. NTD Fringe Benefit Rate for Vehicle Ops =	60.7%															
2. NTD Fringe Benefit Rate for Vehicle Maint =	48.6%															
3. NTD Fringe Benefit Rate for Non-Veh Maint =	41.6%															
4. NTD Fringe Benefit Rate for General Admin =	33.0%															
5. 2012 line item costs based on 2011 ratios applied to 2012 NTD totals by functional area.																



Operations and Maintenance Cost Results

Appendix B Table 2

Durham-Orange County Corridor
Triangle Regional Transit Program
O&M Cost Models

DURHAM AREA TRANSIT AUTHORITY BUS LINE ITEM DETAIL

Build

Expense Line Item	2012 Estim. Bus Expenses	Existing Unit Cost Adjusted	New Unit Cost Added	Bus Supply Variable Unit Cost Rate (\$2012)					Productivity Ratio			Base Year Resource Unit Cost	Inflation Factor	Inflation Factor: 1.049		
				Revenue Bus-Hours	Revenue Bus-Miles	Garages	Transit Ctrs	Peak Buses	Resource Variable	Resource Value	Resource/ Supply			Results in: 2015\$		
														Resource Unit Cost	Estimated Annual Cost	
VEHICLE OPERATIONS - PURCHASED TRANSP.																
OPERATORS' SALARIES & WAGES	\$4,876,800				\$25.59					Work Hours	220,480	1.157	\$22.12	1.049	\$23.21	\$1,641,488
FRINGE BENEFITS	\$2,960,971				\$15.54					Work Hours	220,480	1.157	\$13.43	1.049	\$14.09	\$996,637
PROFESSIONAL & TECHNICAL SERVICES	\$391,359							\$10,299		Peak Buses	38	1.000	\$10,299	1.049	\$10,805	\$118,852
FUEL & LUBRICANTS	\$1,935,584				\$0.72					Revenue Miles	2,694,208	1.000	\$0.718	1.049	\$0.754	\$572,181
TIRES & TUBES	\$215,608				\$0.08					Revenue Miles	2,694,208	1.000	\$0.080	1.049	\$0.084	\$63,736
MISCELLANEOUS EXPENSES	\$30,110						\$30,110			Garages	1	1.000	\$30,110	1.049	\$31,588	\$0
VEHICLE MAINTENANCE - PURCHASED TRANSP.																
SALARIES & WAGES	\$917,510				\$0.34					Work Hours	39,520	0.015	\$23.22	1.049	\$24.36	\$271,227
FRINGE BENEFITS	\$445,559				\$0.17					Work Hours	39,520	0.015	\$11.27	1.049	\$11.83	\$131,712
PROFESSIONAL & TECHNICAL SERVICES	\$189,673				\$0.07					Revenue Miles	2,694,208	1.000	\$0.070	1.049	\$0.074	\$56,069
FUEL & LUBRICANTS	\$69,387							\$1,826		Peak Buses	38	1.000	\$1,826	1.049	\$1,916	\$21,072
TIRES & TUBES	\$3,006							\$79.10		Peak Buses	38	1.000	\$79	1.049	\$82.98	\$913
OTHER MATERIALS & SUPPLIES	\$708,604				\$0.26					Revenue Miles	2,694,208	1.000	\$0.263	1.049	\$0.276	\$209,472
CASUALTY & LIABILITY	\$10,134				\$0.004					Revenue Miles	2,694,208	1.000	\$0.004	1.049	\$0.004	\$2,996
NON-VEHICLE MAINTENANCE - PURCHASED TRANSP.																
SALARIES & WAGES - Garage Driven (75%)	\$142,273						\$142,273			Work Hours	18,720	18,720	\$7.60	1.049	\$7.97	\$0
SALARIES & WAGES - Passenger Facility Driven (25%)	\$47,424							\$47,424		Work Hours	6,240	6,240	\$7.60	1.049	\$7.97	\$0
FRINGE BENEFITS - Garage Driven	\$59,232						\$59,232			Work Hours	18,720	18,720	\$3.16	1.049	\$3.32	\$0
FRINGE BENEFITS - Passenger Facility Driven	\$19,744							\$19,744		Work Hours	6,240	6,240	\$3.16	1.049	\$3.32	\$0
PROFESSIONAL & TECH SERVICES	\$58,193						\$58,193			Garages	1	1.000	\$58,193	1.049	\$61,051	\$0
MATERIALS & SUPPLIES	\$24,570						\$24,570			Garages	1	1.000	\$24,570	1.049	\$25,777	\$0
MISCELLANEOUS EXPENSES	\$214,694						\$214,694			Garages	1	1.000	\$214,694	1.049	\$225,239	\$0
GENERAL ADMINISTRATION - PURCHASED TRANSP.																
SALARIES & WAGES	\$646,945							\$17,025		Work Hours	11,900	313	\$54.37	1.049	\$57.04	\$196,472
FRINGE BENEFITS	\$213,696							\$5,624		Work Hours	11,900	313	\$17.96	1.049	\$18.84	\$64,898
PROF & TECHNICAL SERVICES - Garage Driven	\$66,422						\$66,422			Garages	1	1.000	\$66,422	1.049	\$69,684	\$0
PROF & TECHNICAL SERVICES - Pk Bus Driven	\$614,093							\$16,160		Peak Buses	38	1.000	\$16,160	1.049	\$16,954	\$186,495
MATERIALS & SUPPLIES	\$50,249						\$50,249			Garages	1	1.000	\$50,249	1.049	\$52,717	\$0
UTILITIES	\$116,761						\$116,761			Garages	1	1.000	\$116,761	1.049	\$122,496	\$0
CASUALTY & LIABILITY	\$893,113							\$23,503		Peak Buses	38	1.000	\$23,503	1.049	\$24,657	\$271,231
TAXES & FEES	\$55,863							\$1,470		Peak Buses	38	1.000	\$1,470	1.049	\$1,542	\$16,965
MISCELLANEOUS EXPENSES	\$287,295							\$7,560		Peak Buses	38	1.000	\$7,560	1.049	\$7,932	\$87,249
GENERAL ADMINISTRATION - DIRECTLY OPERATED																
SALARIES & WAGES	\$483,893							\$12,734		Work Hours	8,900	234	\$54.37	1.049	\$57.04	\$146,954
FRINGE BENEFITS	\$139,821							\$3,680		Work Hours	8,900	234	\$15.71	1.049	\$16.48	\$42,462
UTILITIES	\$17,416						\$17,416			Garages	1	1.000	\$17,416	1.049	\$18,271	\$0
TOTALS	\$16,906,003				\$41.13	\$1.64	\$779,920	\$67,168	\$99,960							\$5,099,082
2012 Resource Variable Values																
														Revenue Hours	61,135	
														Revenue Miles	759,152	
														Garages	0	
														Transit Centers	0	
														Peak Buses	11	
Notes:																
1. NTD Fringe Benefit Rate for Vehicle Ops = 60.7%																
2. NTD Fringe Benefit Rate for Vehicle Maint = 48.6%																
3. NTD Fringe Benefit Rate for Non-Veh Maint = 41.6%																
4. NTD Fringe Benefit Rate for General Admin = 33.0%																
5. 2012 line item costs based on 2011 ratios applied to 2012 NTD totals by functional area.																



Operations and Maintenance Cost Results

APPENDIX C – Chapel Hill Transit Incremental Cost (Over Existing) of Each Alternative



Operations and Maintenance Cost Results

Appendix C Table 1

**Durham-Orange County Corridor
Triangle Regional Transit Program
O&M Cost Models
CHAPEL HILL TRANSIT BUS LINE ITEM DETAIL**

													No-Build	
Expense Line Item	2012 Bus Expenses	Existing Unit Cost Adjusted	New Unit Cost Added	Bus Supply Variable Unit Cost Rate (\$2012)				Productivity Ratio			Base Year Resource Unit Cost	Inflation Factor: 1.049		
				Revenue Bus-Hours	Revenue Bus-Miles	Garages	Peak Buses	Resource Variable	Resource Value	Resource/Supply		Inflation Factor	Results in: 2015\$ Resource Unit Cost	Estimated Annual Cost
VEHICLE OPERATIONS														
OPERATORS' SALARIES & WAGES	\$4,196,294			\$26.60				Work Hours	273,394	1.73	\$15.35	1.049	\$16.10	\$773,814
OTHER SALARIES & WAGES - Rev-Hours Driven (70%)	\$238,768			\$1.51				Work Hours	9,569	0.06	\$24.95	1.049	\$26.18	\$44,030
OTHER SALARIES & WAGES - Oper Garage Driven (30%)	\$102,329					\$102,329		Work Hours	4,101	4.101	\$24.95	1.049	\$26.18	\$0
FRINGE BENEFITS - Rev-Hours Driven	\$3,039,852			\$19.27				Work Hours	282,963	1.79	\$10.74	1.049	\$11.27	\$560,561
FRINGE BENEFITS - Oper Garage Driven	\$70,138					\$70,138		Work Hours	4,101	4.101	\$17.10	1.049	\$17.94	\$0
FUEL & LUBRICANTS	\$1,696,001			\$0.94				Gallons	499,763	0.28	\$3.39	1.049	\$3.56	\$355,023
TIRES & TUBES	\$14,356			\$0.01				Revenue Miles	1,799,539	1.00	\$0.01	1.049	\$0.01	\$3,005
OTHER MATERIALS & SUPPLIES	\$68,572					\$68,572		Garages	1	1.00	\$68,572	1.049	\$71,940	\$0
MISCELLANEOUS EXPENSES	\$52,080					\$52,080		Garages	1	1.00	\$52,080	1.049	\$54,638	\$0
VEHICLE MAINTENANCE														
SALARIES & WAGES	\$951,167			\$0.53				Work Hours	54,118	0.03	\$17.58	1.049	\$18.44	\$199,108
FRINGE BENEFITS	\$570,020			\$0.32				Work Hours	54,118	0.03	\$10.53	1.049	\$11.05	\$119,322
FUEL & LUBRICANTS	\$45,831						\$627.82	Peak Buses	73	1.00	\$628	1.049	\$659	\$4,611
TIRES & TUBES	\$0						\$0.00	Peak Buses	73	1.00	\$0.00	1.049	\$0.00	\$0
OTHER MATERIALS & SUPPLIES	\$745,440			\$0.41				Revenue Miles	1,799,539	1.00	\$0.41	1.049	\$0.43	\$156,043
MISCELLANEOUS EXPENSES	\$15,343					\$15,343		Garages	1	1.00	\$15,343	1.049	\$16,097	\$0
NON-VEHICLE MAINTENANCE														
SALARIES & WAGES	\$59,134					\$59,134		Work Hours	3,310	3.310	\$17.87	1.049	\$18.74	\$0
FRINGE BENEFITS	\$46,405					\$46,405		Work Hours	3,310	3.310	\$14.02	1.049	\$14.71	\$0
PROF & TECH SERVICES	\$591,975					\$591,975		Garages	1	1.00	\$591,975	1.049	\$621,051	\$0
MATERIALS & SUPPLIES	\$13,417					\$13,417		Garages	1	1.00	\$13,417	1.049	\$14,076	\$0
MISCELLANEOUS EXPENSES	\$7,350					\$7,350		Garages	1	1.00	\$7,350	1.049	\$7,711	\$0
GENERAL ADMINISTRATION														
SALARIES & WAGES	\$439,892						\$6,026	Work Hours	20,970	287.26	\$20.98	1.049	\$22.01	\$44,253
FRINGE BENEFITS	\$198,083						\$2,713	Work Hours	20,970	287.26	\$9.45	1.049	\$9.91	\$19,927
PROFESSIONAL & TECHNICAL SERVICES	\$819,817						\$11,230	Peak Buses	73	1.00	\$11,230	1.049	\$11,782	\$82,474
MATERIALS & SUPPLIES	\$15,991					\$15,991		Garages	1	1.00	\$15,991	1.049	\$16,776	\$0
UTILITIES	\$203,545					\$203,545		Garages	1	1.00	\$203,545	1.049	\$213,543	\$0
CASUALTY & LIABILITY	\$291,700			\$0.16				Revenue Miles	1,799,539	1.00	\$0.16	1.049	\$0.17	\$61,061
MISCELLANEOUS EXPENSES	\$56,119						\$769	Peak Buses	73	1.00	\$769	1.049	\$807	\$5,646
TOTALS	\$14,549,619			\$47.38	\$2.37	\$1,246,279	\$21,366							\$2,428,878
2012 Resource Variable Values													Revenue Hours	27,731
Notes:													Revenue Miles	359,061
1. NTD Fringe Benefit Rate for Vehicle Ops = 68.5%													Garages	0
2. NTD Fringe Benefit Rate for Vehicle Maint = 59.9%													Transit Centers	0
3. NTD Fringe Benefit Rate for Non-Vehicle Maint = 78.5%													Peak Buses	7
4. NTD Fringe Benefit Rate for General Admin = 45.0%														



Operations and Maintenance Cost Results

Appendix C Table 2

Durham-Orange County Corridor
Triangle Regional Transit Program
O&M Cost Models

CHAPEL HILL TRANSIT BUS LINE ITEM DETAIL

Build

Expense Line Item	2012 Bus Expenses	Existing Unit Cost Adjusted	New Unit Cost Added	Bus Supply Variable Unit Cost Rate (\$2012)				Productivity Ratio			Base Year Resource Unit Cost	Inflation Factor: 1.049		
				Revenue Bus-Hours	Revenue Bus-Miles	Garages	Peak Buses	Resource Variable	Resource Value	Resource/Supply		Inflation Factor	Results in: 2015\$	
													Resource Unit Cost	Estimated Annual Cost
VEHICLE OPERATIONS														
OPERATORS' SALARIES & WAGES	\$4,196,294			\$26.60				Work Hours	273,394	1.73	\$15.35	1.049	\$16.10	\$620,396
OTHER SALARIES & WAGES - Rev-Hours Driven (70%)	\$238,768			\$1.51				Work Hours	9,569	0.06	\$24.95	1.049	\$26.18	\$35,300
OTHER SALARIES & WAGES - Oper Garage Driven (30%)	\$102,329					\$102,329		Work Hours	4,101	4.101	\$24.95	1.049	\$26.18	\$0
FRINGE BENEFITS - Rev-Hours Driven	\$3,039,852			\$19.27				Work Hours	282,963	1.79	\$10.74	1.049	\$11.27	\$449,423
FRINGE BENEFITS - Oper Garage Driven	\$70,138					\$70,138		Work Hours	4,101	4.101	\$17.10	1.049	\$17.94	\$0
FUEL & LUBRICANTS	\$1,696,001			\$0.94				Gallons	499,763	0.28	\$3.39	1.049	\$3.56	\$256,062
TIRES & TUBES	\$14,356			\$0.01				Revenue Miles	1,799,539	1.00	\$0.01	1.049	\$0.01	\$2,167
OTHER MATERIALS & SUPPLIES	\$68,572					\$68,572		Garages	1	1.00	\$68,572	1.049	\$71,940	\$0
MISCELLANEOUS EXPENSES	\$52,080					\$52,080		Garages	1	1.00	\$52,080	1.049	\$54,638	\$0
VEHICLE MAINTENANCE														
SALARIES & WAGES	\$951,167			\$0.53				Work Hours	54,118	0.03	\$17.58	1.049	\$18.44	\$143,607
FRINGE BENEFITS	\$570,020			\$0.32				Work Hours	54,118	0.03	\$10.53	1.049	\$11.05	\$86,062
FUEL & LUBRICANTS	\$45,831						\$627.82	Peak Buses	73	1.00	\$628	1.049	\$659	(\$659)
TIRES & TUBES	\$0						\$0.00	Peak Buses	73	1.00	\$0.00	1.049	\$0.00	\$0
OTHER MATERIALS & SUPPLIES	\$745,440			\$0.41				Revenue Miles	1,799,539	1.00	\$0.41	1.049	\$0.43	\$112,546
MISCELLANEOUS EXPENSES	\$15,343					\$15,343		Garages	1	1.00	\$15,343	1.049	\$16,097	\$0
NON-VEHICLE MAINTENANCE														
SALARIES & WAGES	\$59,134					\$59,134		Work Hours	3,310	3.310	\$17.87	1.049	\$18.74	\$0
FRINGE BENEFITS	\$46,405					\$46,405		Work Hours	3,310	3.310	\$14.02	1.049	\$14.71	\$0
PROF & TECH SERVICES	\$591,975					\$591,975		Garages	1	1.00	\$591,975	1.049	\$621,051	\$0
MATERIALS & SUPPLIES	\$13,417					\$13,417		Garages	1	1.00	\$13,417	1.049	\$14,076	\$0
MISCELLANEOUS EXPENSES	\$7,350					\$7,350		Garages	1	1.00	\$7,350	1.049	\$7,711	\$0
GENERAL ADMINISTRATION														
SALARIES & WAGES	\$439,892						\$6,026	Work Hours	20,970	287.26	\$20.98	1.049	\$22.01	(\$6,322)
FRINGE BENEFITS	\$198,083						\$2,713	Work Hours	20,970	287.26	\$9.45	1.049	\$9.91	(\$2,847)
PROFESSIONAL & TECHNICAL SERVICES	\$819,817						\$11,230	Peak Buses	73	1.00	\$11,230	1.049	\$11,782	(\$11,782)
MATERIALS & SUPPLIES	\$15,991					\$15,991		Garages	1	1.00	\$15,991	1.049	\$16,776	\$0
UTILITIES	\$203,545					\$203,545		Garages	1	1.00	\$203,545	1.049	\$213,543	\$0
CASUALTY & LIABILITY	\$291,700			\$0.16				Revenue Miles	1,799,539	1.00	\$0.16	1.049	\$0.17	\$44,041
MISCELLANEOUS EXPENSES	\$56,119						\$769	Peak Buses	73	1.00	\$769	1.049	\$807	(\$807)
TOTALS	\$14,549,619			\$47.38	\$2.37	\$1,246,279	\$21,366							\$1,727,189
2012 Resource Variable Values												Revenue Hours	22,233	
Notes:												Revenue Miles	258,974	
1. NTD Fringe Benefit Rate for Vehicle Ops = 68.5%												Garages	0	
2. NTD Fringe Benefit Rate for Vehicle Maint = 59.9%												Transit Centers	0	
3. NTD Fringe Benefit Rate for Non-Vehicle Maint = 78.5%												Peak Buses	(1)	
4. NTD Fringe Benefit Rate for General Admin = 45.0%														