

DIN 01613

Basis of Estimate and Opinion of Probable Project Cost

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.



Basis of Estimate and Opinion of Probable Project Cost

Table of Contents

Executive Summary	1
1. Project Overview	1
1.1 Description of the Proposed D-O LRT	1
1.2 Project Alternatives	1
1.3 Capital Cost Estimate – General Assumptions.....	1
1.4 Cost Estimate Work Breakdown Structure	2
2. Comparison of Alignment and Station Alternatives	4
3. Discussion and Comparison of ROMF Sites	10
4. Contingency.....	11
5. Estimate Accuracy	15
6. Discussion of Work Elements.....	16
7. Estimate Pricing	21
8. Market Conditions/Conclusion	22

List of Tables

Table ES-1: Total Estimated Project Costs for Alignment Alternatives.....	3
Table ES-2: Comparison of ROMF Alternatives.....	3
Table 2-1: Total Project Length of Each Alternative	4
Table 2-2: Total Estimated Project Costs for Alignment Alternatives	5
Table 2-3: Cost Differentiation Items for Little Creek Alternatives¹.....	6
Table 2-4: Cost Differentiation Items for New Hope Creek Alternatives¹	8
Table 3-1: Comparison of ROMF sites	10
Table 4-1: Project Allocated Contingencies	11
Table 6-1: Professional Services Costs.....	20

List of Figures

Figure ES-1: Project Overview	ES-2
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Appendix

Appendix A Opinion of Probable Cost.....	A-1
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Basis of Estimate and Opinion of Probable Project Cost

List of Acronyms and Abbreviations

Acronym/Abbreviation	Definition
DEIS	Draft Environmental Impact Statement
D-O	Durham-Orange
D-O LRT	Durham-Orange Light Rail Transit
FTA	Federal Transit Administration
I-40	Interstate 40
LPA	Locally Preferred Alternative
NC	North Carolina
NCDOT	North Carolina Department of Transportation
NCRR	North Carolina Railroad
NHC	New Hope Creek
ROMF	rail operations maintenance facility
ROW	right-of-way
SCC	standard cost category
UNC	University of North Carolina
US	United States
VA	Veteran Affairs



Basis of Estimate and Opinion of Probable Project Cost

Executive Summary

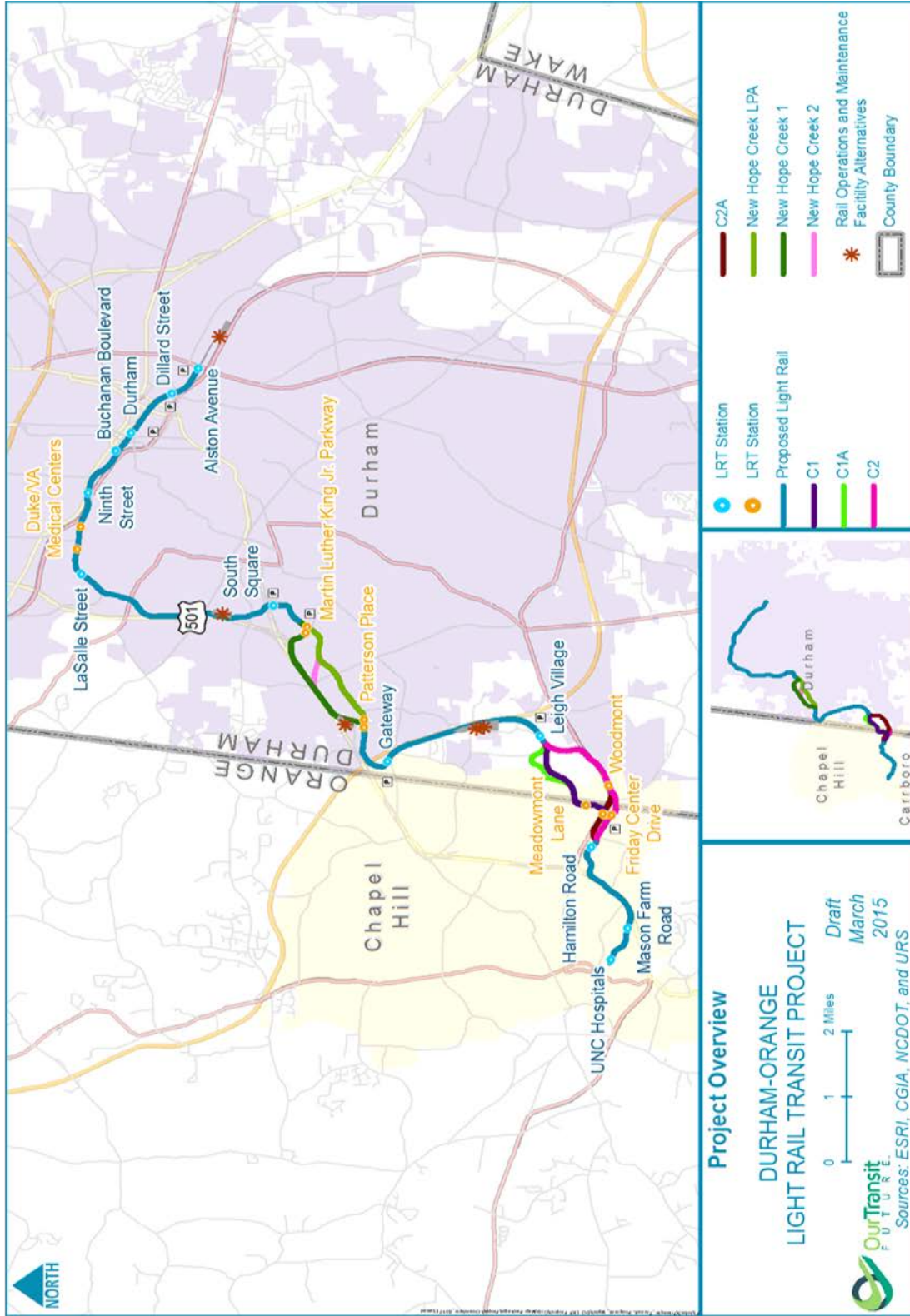
This report contains the opinion of probable capital cost as appendix A, and supporting explanations for the Durham-Orange Light Rail Transit (D-O LRT) Project. This information has been developed for the Draft Environmental Impact Statement (DEIS) for the project. As shown in Figure ES 1, the DEIS is evaluating various alignment, station, and rail operations and maintenance facility (ROMF) alternatives.

This report describes the Light Rail Alternatives, the 12 distinct combinations of alignment alternatives, and the five alternative sites for the ROMF for which an engineering opinion of probable costs was developed. It is not anticipated that the selection of the station alternatives will substantially affect the project's capital cost. It also describes the methodology used to estimate the project costs, the assumptions and contingencies for known scope issues which have project risk and cost implications, and the expected accuracy of the estimates. The cost estimates are based upon the latest version of the *Basis for Engineering Design* drawings dated February 2015, Rev-5 for inclusion in the DEIS. Costs presented in this estimate are in 2015 dollars with no future escalation applied.

Federal Transit Administration (FTA) guidelines for itemized cost breakdown were used in developing a bottoms-up estimate and to cover the identifiable elements of the project based upon preliminary engineering drawings.

The summary of estimated costs for each alternative combination is depicted in the Alternatives Cost Summary generally by Standard Cost Categories (SCC) included in the appendix. The total estimated project cost of each of the 12 alternatives ranges from \$1.535 billion to \$1.618 billion, not including the level of confidence factor noted below. The four lowest cost alternatives vary by only \$25 million (1.6 percent of lowest). The two lowest cost alternatives vary by only \$5 million (0.33 percent of the lowest cost). Given the expected accuracies of an estimate based upon 15 percent plans, it is recommended that, in addition to a contingency, a variance be placed on each alternative's total estimated project cost. After comparing the level of design and the cost estimating detail, it was concluded that the resulting estimate should have a level of confidence of plus or minus five percent, independent of any assumed contingency. Table ES-1 shows the total estimated project costs for the 12 alternatives with a range of -5.0 percent to +5.0 percent of the total estimated project cost.

Figure ES-1: Project Overview





Basis of Estimate and Opinion of Probable Project Cost

Table ES-1: Total Estimated Project Costs for Alignment Alternatives

Alternative	Low Range	High Range	Delta above Apparent Low	Comment
C2A/NHC LPA	\$1,458,000	\$1,612,000	\$	Apparent Lowest Cost Alternative
C2/NHC LPA	\$1,463,000	\$1,617,000	\$5,000	
C2A/NHC 2	\$1,468,000	\$1,622,000	\$10,000	
C2/NHC 2	\$1,473,000	\$1,628,000	\$15,000	
C2A/NHC 1	\$1,493,000	\$1,651,000	\$37,000	
C1A/NHC LPA	\$1,498,000	\$1,656,000	\$42,000	
C2/NHC 1	\$1,499,000	\$1,657,000	\$43,000	
C1/NHC LPA	\$1,502,000	\$1,660,000	\$46,000	
C1A/NHC 2	\$1,508,000	\$1,666,000	\$52,000	
C1/NHC 2	\$1,511,000	\$1,671,000	\$56,000	
C1A/NHC 1	\$1,533,000	\$1,695,000	\$79,000	
C1/NHC 1	\$1,537,000	\$1,699,000	\$83,000	

Note: Costs are in thousands (\$1000) 2015 dollars and include contingency but no escalation

Assumptions: Variance between low and high is plus or minus 5% of the total project cost in the appendix A.
The total cost of the ROMF based upon Farrington Road is included in this table. The variance in cost for the ROMF alternative sites is addressed in Table ES-2

Table ES-2 shows a comparison of the capital costs of the ROMF alternatives.

Table ES-2: Comparison of ROMF Alternatives

ROMF Sites	Heavy Repair Maintenance Building, All Equipment, Maintenance Vehicles, and Yard	ROW and Relocation Costs	Lead Track Delta	Environmental Impacts	Total	Total Delta Costs
Leigh Village*	\$73,881,000	\$2,760,000	-	\$2,000,000	\$78,641,000	\$1,400,000
Farrington Road	\$73,881,000	\$2,360,000	-	\$1,000,000	\$77,241,000	-
Patterson Place**	\$73,881,000	\$6,760,000	\$17,990,000	-	\$98,631,000	\$21,390,000
Cornwallis Road***	\$73,881,000	\$5,140,000	\$13,260,000	\$100,000	\$92,381,000	\$15,140,000
Alston Avenue****	\$73,881,000	\$37,100,000	\$4,480,000	\$5,000,000	\$120,461,000	\$43,220,000

Note: Total estimated cost for the Farrington Road Alternative is included in each of the alternatives shown in Table ES-2.

* The environmental impact is an estimate on the cost associated with historic district and buildings assuming the building could be relocated; however, since an avoidance alternative exists, this alternative would likely be unacceptable.

** Patterson Place Yard lead track is on aerial structure transition for 1000 feet.

*** Cornwallis Road Yard lead track is on aerial structure for 700 feet with extensive earthwork and retaining walls.

**** Includes approx. 3000' lead track and bridge plus acquisition and relocation costs for an existing industry which requires rail service.



Basis of Estimate and Opinion of Probable Project Cost

1. Project Overview

Through the Alternatives Analysis process completed in April 2012 prior to preliminary design, which included extensive public outreach, a Locally Preferred Alternative (LPA) was selected to address the purpose and need of the Durham-Orange (D-O) Corridor. The proposed project is a 17.1 mile double-track light rail line with 17 proposed stations that will greatly expand transit service in Durham and Orange Counties. The proposed D-O LRT Project extends from its western terminus at the University of North Carolina at Chapel Hill (UNC) at the UNC Hospitals Station to the eastern terminus in Durham at the Alston Avenue Station. The proposed D-O LRT Project improves public transportation access to a range of educational, medical, employment, and other important activity centers in the D-O Corridor including: UNC; UNC Hospitals; the William and Ida Friday Center for Continuing Education; Duke University; Durham Veterans Affairs (VA) Medical Center and Duke University Medical Center; downtown and east Durham; North Carolina Central University; and Durham Technical Community College.

1.1 Description of the Proposed D-O LRT

The proposed D-O LRT alignment generally follows North Carolina (NC) Highway 54 (NC 54), Interstate 40 (I-40), United States (US) 15-501, and runs parallel to North Carolina Railroad (NCR) Corridor in downtown Durham and east Durham. The proposed alignment begins in Chapel Hill at UNC Hospitals, parallels Fordham Boulevard, proceeds eastward adjacent to NC 54, travels north along I-40, parallels US 15-501 before it turns east towards Duke University and runs within Erwin Road, and then follows the NCR Corridor that parallels NC Highway 147 (NC 147) through downtown Durham, before reaching its eastern terminus in Durham near Alston Avenue. A total of 17 stations are planned, and up to 5,100 parking spaces along the D-O LRT alignment will be provided. In addition, a rail operations and maintenance facility (ROMF) will be constructed to accommodate the D-O LRT fleet.

1.2 Project Alternatives

Consistent with the September 2012 Scoping Report, and as described herein, the Draft Environmental Impact Statement (DEIS) will examine the potential environmental impacts of the Light Rail Alternatives in comparison to the No-Build Alternative. The following list of Light Rail Alternatives inclusive of alignment, station, and ROMF siting alternatives:

- Crossing of Little Creek between the Hamilton Road Station and the Leigh Village Station (i.e., Alternatives C1, C1A, C2, C2A and associated station locations)
- Crossing of New Hope Creek (NHC) and Sandy Creek between Patterson Place and South Square (i.e., NHC LPA, NHC 1, and NHC 2 Alternatives and associated station locations)
- 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)

1.3 Capital Cost Estimate – General Assumptions

This report provides an approximation of total project capital cost excluding finance costs. All estimated costs are in mid-year 2015 dollars with no escalation applied. This estimate is based upon the latest version of the *Basis for Engineering Design*, February 2015, Rev-5 for inclusion in the DEIS.



Basis of Estimate and Opinion of Probable Project Cost

Detailed cost estimates have been developed for Standard Cost Categories (SCC) 10-50 construction and SCC category 60 right-of-way (ROW). SCC category 70 vehicle costs are priced from historical unit price data. SCC category 80 professional fees are estimated as a percentage of construction costs.

All costs in this estimate are based upon a conventional Design-Bid-Build project delivery method for one complete project. If Design-Build, Public Private Partnership or some other method of procurement is used, this estimate would need to be re-evaluated to account for the method of procurement. Likewise, if the project is separated into various work packages, separate contracts or segments, this estimate would need to be re-evaluated for cost and project schedule assumptions.

Detailed capital cost estimates are included in appendix A. Each detailed alternative estimate includes a Federal Transit Administration (FTA) SCC Main Build worksheet. To further facilitate evaluation, the cost estimate summary includes a comparison report organized generally by FTA SCC with side-by-side comparison of the capital cost estimates for the 12 combinations of alternatives.

1.4 Cost Estimate Work Breakdown Structure

To provide an outline or framework for organizing and tracking costs, the twelve estimates for the combination of alternatives identify major components following FTA guidelines. These guidelines organize costs into the following SCC:

Construction Costs:

- **10 GUIDEWAY & TRACK ELEMENTS**
 - 10.02 Guideway: At grade semi-exclusive (allows cross traffic)
 - 10.04 Guideway: Aerial structure
 - 10.05 Guideway: Built up fill
 - 10.08 Guideway: Retained cut or fill
 - 10.09 Track: Direct fixation
 - 10.10 Track: Embedded
 - 10.11 Track: Ballasted
 - 10.12 Track: Special (switches, turnouts)
 - 10.13 Track: Vibration and noise dampening
- **20 STATIONS, STOPS, TERMINALS, INTERMODAL**
 - 20.01 At-grade station, stop, shelter, mall, terminal, platform
 - 20.02 Aerial station, stop, shelter, mall, terminal, platform
 - 20.06 Automobile parking multi-story structure
 - 20.07 Elevators, escalators
- **30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS**
 - 30.01 Administration building: Office, sales, storage, revenue counting
 - 30.03 Heavy maintenance facility
 - 30.04 Storage or maintenance-of-way building
 - 30.05 Yard and yard track
- **40 SITEWORK & SPECIAL CONDITIONS**
 - 40.01 Demolition, clearing, earthwork
 - 40.02 Site utilities, utility relocation
 - 40.03 Hazardous material, contaminated soil removal/mitigation, ground water treatments
 - 40.04 Environmental mitigation: e.g., wetlands, historical/archeologic, parks
 - 40.05 Site structures including retaining walls, sound walls
 - 40.06 Pedestrian/bike access and accommodation, landscaping
 - 40.07 Automobile, bus, van access ways including roads, parking lots



Basis of Estimate and Opinion of Probable Project Cost

40.08 Temporary facilities and other indirect costs during construction

- **50 SYSTEMS**

50.01 Train control and signals

50.02 Traffic signals and crossing protection

50.03 Traction power supply: substations

50.04 Traction power distribution: catenary and third rail

50.05 Communications

50.06 Fare collection

Other Non-Construction Costs:

- **60 RIGHT OF WAY, LAND, EXISTING IMPROVEMENTS**

60.01 Purchase or lease of real estate

60.02 Relocation of existing households and businesses

- **70 VEHICLES**

70.01 Light rail

70.06 Non-revenue vehicles

70.07 Spare parts

- **80 PROFESSIONAL SERVICES**

80.01 Project development

80.02 Engineering

80.03 Project management for design and construction

80.04 Construction administration and management

80.05 Professional liability and other non-construction insurance

80.06 Legal, permits, review fees by other agencies, cities, etc.

80.07 Surveys, testing, investigation, inspection

80.08 Startup

- **90 Unallocated contingency**

- **100 Finance charges**



Basis of Estimate and Opinion of Probable Project Cost

2. Comparison of Alignment and Station Alternatives

This section documents the differences between the 12 combinations of alignment alternatives identified in the DEIS. The five ROMF alternative sites will be discussed separately in section 3. There are four alternatives for crossing Little Creek called C1, C1A, C2, and C2A. In addition, there are three alternatives for crossing NHC called NHC 1, NHC 2, and NHC LPA. The combination of the four alternatives crossing Little Creek and the three NHC alternatives creates the 12 combinations of alignment alternatives. It is noted that there are alternative locations for the Duke/VA Medical Centers Station, but the difference in the length of the alignment is less than one foot and the station plan for each station alternative is identical; so, for cost estimating purposes one common estimate was developed for both station alternatives.

The overall difference from the longest route (C1A/NHC 1 at 17.45 miles) to the shortest (C1/NHC LPA at 16.87 miles) would be 0.58 miles shorter or 3.32 percent of the length of the longest (C1A/NHC 1) route (see Table 2-1).

Table 2-1: Total Project Length of Each Alternative

Total Alignments	Total Length	
	Feet	Miles
C1/NHC LPA/Trent	89,090	16.87
C1A/ NHC LPA/Trent	90,465	17.13
C2/ NHC LPA/Trent	89,942	17.03
C2A/ NHC LPA/Trent	89,776	17.00
C1/NHC 1/Trent	90,744	17.19
C1A/NHC 1/Trent	92,119	17.45
C2/NHC 1/Trent	91,596	17.35
C2A/NHC 1/Trent	91,430	17.32
C1/NHC 2/Trent	90,123	17.07
C1A/NHC 2/Trent	91,498	17.33
C2/NHC 2/Trent	90,975	17.23
C2A/NHC 2/Trent	90,809	17.20

The estimated capital cost of each combination of alternatives is presented in Table 2-2 with a range applied to the total project cost of each as shown in the appendix A. The primary cost differences among the 12 combinations of alternatives can be attributed to the following major elements: 1) guideway length; 2) length of aerial structures; 3) aerial vs. at-grade stations; 4) amount of mitigation required; 5) impacts to utilities; and 6) right-of-way. The comparisons between each of the major elements for all of the alternatives are detailed in Table 2-3 and Table 2-4.



Basis of Estimate and Opinion of Probable Project Cost

Table 2-2: Total Estimated Project Costs for Alignment Alternatives

Alternative	Low Range	High Range	Delta above Apparent Low	Comment
C2A/NHC LPA	\$1,458,000	\$1,612,000	\$	Apparent Lowest Cost Alternative
C2/NHC LPA	\$1,463,000	\$1,617,000	\$5,000	
C2A/NHC 2	\$1,468,000	\$1,622,000	\$10,000	
C2/NHC 2	\$1,473,000	\$1,628,000	\$15,000	
C2A/NHC 1	\$1,493,000	\$1,651,000	\$37,000	
C1A/NHC LPA	\$1,498,000	\$1,656,000	\$42,000	
C2/NHC 1	\$1,499,000	\$1,657,000	\$43,000	
C1/NHC LPA	\$1,502,000	\$1,660,000	\$46,000	
C1A/NHC 2	\$1,508,000	\$1,666,000	\$52,000	
C1/NHC 2	\$1,511,000	\$1,671,000	\$56,000	
C1A/NHC 1	\$1,533,000	\$1,695,000	\$79,000	
C1/NHC 1	\$1,537,000	\$1,699,000	\$83,000	

Note: Costs are in thousands (\$1000) 2015 dollars and include contingency but no escalation

Assumptions: Variance between Low and High is plus or minus 5% of the Total Project Cost in the appendix A.
The total cost of the ROMF based upon Farrington Road is included in this table. The variance in cost for the ROMF alternative sites is addressed in Table 3-1

Table 2-3 identifies specific cost estimate items where there are significant cost differences between the three Little Creek alternatives. It does not include items with minor differences so the totals are for comparison only.

Table 2-3: Cost Differentiation Items for Little Creek Alternatives¹

Item	C1	C1A	C2	C2A
FINLEY GOLF COURSE				
3rd hole reconfiguration	\$440,000	\$440,000	\$440,000	\$0
Golf course protection wall	\$1,450,000	\$1,450,000	\$1,450,000	\$0
FRIDAY CENTER STATION				
Station (aerial vs. at grade)	\$9,800,000	\$9,800,000	\$2,600,000	\$2,600,000
Parking lot reconfiguration	\$1,620,000	\$1,620,000	\$3,400,000	\$1,620,000
AERIAL STRUCTURES				
Over wetlands and Little Creek	\$23,370,000	\$9,210,000	\$0	\$0
Guideway (aerial at Friday Center Station and over NC 54)	\$23,940,000	\$23,940,000	\$0	\$0
Over NC 54 and Little Creek	\$0	\$0	\$18,330,000	\$18,330,000
RIGHT-OF-WAY	\$6,330,000	\$11,990,000	\$4,840,000	\$780,000
TOTAL WITH ALLOCATED CONTINGENCIES	\$66,950,000	\$58,450,000	\$31,060,000	\$23,330,000

¹ All costs include unallocated contingency.

- **Finley Golf Course**

- 3rd hole reconfiguration - Alternative C2A closely follows the right-of-way along both NC 54. By connecting with NC 54 further west, than the other alternatives, it avoids causing impacts to the Finley Golf Course’s third hole. The other three alternatives C1, C1A, and C2 would go near the 3rd tee and would incur additional costs of approximately \$440,000 due to reconstruction of the golf course. Golf course protection wall – The same three alternatives would also require approximately \$1.45 million as an allowance for future discussions with UNC regarding the type, height, and length of an errant golf ball protective wall along the third hole.
- All four alternatives for crossing Little Creek would have a common cost of approximately \$1.35 million to re-work holes 16, 17, and 18; therefore this cost is not included in the comparison.

- **Friday Center Station**

- Stations - Alternatives C1 and C1A would require an aerial station costing approximately \$9.8 million. While alternatives C2 and C2A, Friday Center Station would be at grade and cost approximately \$2.6 million.
- Parking lot reconfiguration – Parking for Alternative C2 would bisect the parking lot, requiring a new layout of the parking stalls. This new layout would require changing the surface grading and drainage so it is estimated as all new parking at a cost of approximately \$3.4 million. The other three alternatives could utilize the existing parking lot with fewer modifications at a cost of approximately \$1.6 million.

- **Aerial Structures**
 - Floodplain aerial structures - Alternatives C1 and C1A would deviate from C2 and C2A and cross over NC 54. The C1 and C1A alternatives would go over floodplain associated with Little Creek via aerial structures. The Little Creek floodplain aerial structure for alternative C1 would be 1,990 feet long and cost approximately \$23.4 million. For Alternative C1A, the aerial structure crossing the Little Creek flood plain would be 700 feet long and cost approximately \$9.2 million. Wetland and stream mitigation costs for the Little Creek crossing are expected to be minimal since all alternatives include aerial structures across sensitive areas.
 - C1 and C1A would cross over NC 54. Included in the aerial structure would be an aerial Friday Center Station. The C1 and C1A alternatives would include a 2,400 foot long aerial structure in this area costing approximately \$23.9 million, including the Friday Center Station.
 - C2 and C2A guideway over NC 54 – Both alternatives would cross over NC 54 and the floodplain for Little Creek on a single aerial structure that would be 1,915 feet long and cost approximately \$18.3 million.
- **Right-of-Way:** Right-of-way required for the C1 Alternative would be approximately \$6.3 million; C1A would cost approximately \$12.0 million; C2 would cost approximately \$4.8 million; and C2A would cost approximately \$0.8 million. The C1 and C1A Alternatives' costs are higher because they would require the acquisition of more private property along Meadowmont Lane. The C2 and C2A costs are lower because they would be able to use the existing NC 54 right-of-way.

Table 2-4 identifies specific cost estimate items where there are significant cost differences between the three New Hope Creek alternatives. It does not include items with minor differences so the totals are for comparison only.

Table 2-4: Cost Differentiation Items for New Hope Creek Alternatives¹

Item	NHC 1	NHC 2	NHC LPA
Aerial structures			
Aerial structures over floodplains	\$38,790,000	\$49,680,000	\$42,940,000
Martin Luther King Jr. Parkway crossing (aerial vs. at-grade)	\$20,590,000	\$1,810,000	\$1,810,000
Guideway			
Embedded track	\$1,250,000	\$2,710,000	\$2,920,000
Martin Luther King Jr Station			
Pedestrian bridge	\$4,190,000	\$0	\$0
Environmental			
Hazardous materials allowance	\$6,600,000	\$6,600,000	\$6,000,000
Utilities			
Telecommunications(including fiber)	\$11,880,000	\$8,410,000	\$11,880,000
Electric (relocate overhead power)	\$2,480,000	\$0	\$2,480,000
Right-of-way	\$12,820,000	\$7,730,000	\$7,150,000
Total Cost with Allocated Contingencies	\$98,600,000	\$76,940,000	\$75,180,000

¹ All costs include allocated contingency.

- **Aerial Structures**
 - Floodplains – Alternatives NHC 1 and NHC 2 turn north from Patterson Place Station and are within the right-of-way along US 15-501 while crossing floodplain associated with NHC. For Alternative NHC 1 the aerial structures over the floodplain would be 3,250 feet and for Alternative NHC 2 the structure would be 4,750 feet. Alternative NHC LPA would leave the Patterson Place Station heading more easterly and the two aerial structures over the floodplains would total 3,595 feet.
 - Martin Luther King Jr. Parkway Structure – Alternative NHC 1 would extend further to the east before merging onto University Drive and would have an aerial structure 2,150 feet long over Martin Luther King Jr. Parkway whereas alternatives NHC 2 and NHC LPA would enter University Drive at Snow Crest Trail and would be at grade crossing Martin Luther King Jr. Parkway. The cost of this structure required for alternative NHC 1 would be approximately \$20.6 million compared to an equivalent at-grade guideway construction of approximately \$1.8 million.
- **Guideway:** Embedded track – Because alternatives NHC 2 and NHC LPA merge onto University Drive sooner there would be more embedded track in these alternatives, than NHC 1. For Alternative NHC 1 the embedded track length would be approximately 1,200 feet compared to 2,600 feet for Alternative NHC 2 and 2,800 for Alternative NHC LPA.
- **Martin Luther King Jr. Parkway Pedestrian Bridge:** Alternative NHC 1 includes a pedestrian bridge crossing over Martin Luther King Jr. Parkway. In alternatives NHC 2 and NHC LPA, the station would be in the center of University Drive creating a pedestrian refuge for pedestrian crossing University Drive.
- **Environmental:** Hazardous materials remediation – Alternatives NHC 1 and NHC 2 each would have two additional sites rated as high risk for potential hazardous materials contamination. At an estimated remediation cost of \$300,000 per site, this would add a total of an additional \$600,000 to the NHC 1 and NHC 2 alternatives.
- **Utilities**
 - Communications – Alternative NHC 2 would have approximately \$3.5 million less impact to existing copper and fiber optic telecommunication lines than Alternatives NHC 1 and NHC LPA.
 - Power – Alternative NHC 2 would have approximately \$2.5 million less impact to existing power lines than the alternatives NHC LPA and NHC 1, both of which would require substantial costs in relocating overhead power lines to avoid conflict with the light rail overhead power system.
- **Right-of-Way:** Right-of-way required for NHC 1 would be approximately \$12.8 million, NHC 2 would be \$7.7 million, and NHC LPA is \$7.2 million. The higher costs for NHC 1 and NHC 2 are primarily because of impacts along US 15-501 and the Garrett Road area.



Basis of Estimate and Opinion of Probable Project Cost

3. Discussion and Comparison of ROMF Sites

The ROMF alternatives were estimated in detail using the Farrington Road Yard facility and applying that same building facility and yard cost for all alternative sites with expected variances factored into the total costs for the other sites. Note the total cost for the Farrington Road site is included in Table 2-2. Variable costs for each site include right-of-way and relocations, lead track, and environmental impacts. These factors are summarized in Table 3-1, with the rightmost column indicating the respective sites' variances from the Farrington Road site total cost.

Table 3-1: Comparison of ROMF sites

ROMF Sites	Heavy Repair Maintenance Building, All Equipment, Maintenance Vehicles, and Yard	ROW and Relocation Costs	Lead Track Delta	Environmental Impacts	Total	Total Delta Costs
Leigh Village *	\$73,881,000	\$2,760,000	-	\$2,000,000	\$78,641,000	\$1,400,000
Farrington Road	\$73,881,000	\$2,360,000	-	\$1,000,000	\$77,241,000	-
Patterson Place **	\$73,881,000	\$6,760,000	\$17,990,000	-	\$98,631,000	\$21,390,000
Cornwallis Road ***	\$73,881,000	\$5,140,000	\$13,260,000	\$100,000	\$92,381,000	\$15,140,000
Alston Avenue ****	\$73,881,000	\$37,100,000	\$4,480,000	\$5,000,000	\$120,461,000	\$43,220,000

Note: Total estimated cost for the Farrington Road Alternative is included in each of the alternatives shown in Table 3-1.

* The environmental impact is an estimate on the cost associated with historic district and buildings assuming the building could be relocated; however, since an avoidance alternative exists, this alternative would likely be unacceptable

** Patterson Place Yard Lead is on aerial structure transition for 1000 feet.

*** Cornwallis Road Yard Lead is on aerial structure for 700 feet with extensive earthwork and retaining walls.

**** Includes approx. 3000' lead track and bridge plus acquisition and relocation costs for an existing industry which requires rail service.

4. Contingency

For this cost estimate, allocated contingency is applied to each FTA SCC by the line item percentage method. To determine the appropriate contingency amount, the following steps were used:

- Cost estimators reviewed the scope of each component of the project with the planner, engineer, architect, or other responsible person for that particular component in relation to the appropriate level of engineering information available.
- Risk items were identified by work breakdown structure element and identified as to the probability of occurrence and potential cost impact.
- Risks were identified as either accounted for in the cost estimate or accounted for in the allocated contingency.
- The above factors were considered by the project team to arrive at a consensus allocated contingency percentage for each line item.

Table 4-1 summarizes the project risks, probabilities, potential cost impacts, and allocated contingency factor used in addressing each risk for the cost estimate:

Table 4-1: Project Allocated Contingencies

Work Element		Cont. % Used	Noted Risks
10 Guideway and Track Elements (route miles)			
10.02	Guideway: At-grade semi-exclusive (allows cross-traffic)	25%	Undercutting unsuitable material not in estimate. Changes possible to alignment ROW, utility or political issues.
10.04	Guideway: Aerial structure	30%	More Geotechnical info could significantly change foundation type or depths.
10.05	Guideway: Built-up fill	25%	Fairly well defined. Possible minor changes to alignment.
10.08	Guideway: Retained cut or fill	25%	Fairly well defined. Possible minor changes to alignment.
10.09	Track: Direct fixation	30%	Partially detailed in estimate. Track is estimated by linear foot unit price. Material fluctuations.
10.10	Track: Embedded	30%	Partially detailed in estimate. Material fluctuations.
10.11	Track: Ballasted	30%	Partially detailed in estimate. Material fluctuations.
10.12	Track: Special (switches, turnouts)	30%	Not detailed in estimate yet. Material fluctuations.
10.13	Track: Vibration and noise dampening	30%	Not detailed in estimate. Still an allowance item. Material fluctuations.

Work Element		Cont. % Used	Noted Risks
20 Stations, Stops, Terminals, Intermodal (number)			
20.01	At-grade station, stop, shelter, mall, terminal, platform	30%	Possible changes to finish materials. Size of platforms is set.
20.02	Aerial station, stop, shelter, mall, terminal, platform	30%	Possible changes to finish materials. Size of platforms is set.
20.06	Automobile parking multi-story structure	25%	Structure is pretty well defined. Added finishes may be subject to changes.
20.07	Elevators, escalators	30%	Glass enclosure system to be further defined.
30 Support Facilities: Yards, Shops, Admin. Buildings			
30.01	Administration building: Office, sales, storage, revenue counting	30%	Programming still being adjusted with large cost and risk differences between the five sites due to ROW, lead track and environmental impacts. Functions and how maintenance will be done could also change.
30.03	Heavy maintenance facility	30%	Programming could still be adjusted based on how maintenance functions will be done.
30.04	Storage or maintenance of way building	30%	Programming could still be adjusted based on how maintenance functions will be done.
30.05	Yard and yard track	30%	Programming could still be adjusted based on how much lead track or site work is required for the different alternative sites.
40 Sitework and Special Conditions			
40.01	Demolition, clearing, earthwork	35%	Demo and clearing have not been fully itemized. Priced on a \$/acre basis which can vary depending on the alternative chosen.
40.02	Site utilities, utility relocation	45%	Unknown underground utilities are frequently uncovered. Can cause delays to schedule both before and during construction.
40.03	Hazardous material, contaminated soil removal/mitigation, ground water treatments	50%	Types of material encountered can vary, causing different types of remediation methods. Can cause schedule delays.
40.04	Environmental mitigation, e.g., wetlands, historic/archaeologic, parks	30%	Permitting issues can cause schedule delays.
40.05	Site structures including retaining walls, sound walls	30%	Guideway retaining walls are included in SCC 10 elements. This item is an undefined allowance for minor site retaining and noise walls if needed.

Basis of Estimate and Opinion of Probable Project Cost

Work Element		Cont. % Used	Noted Risks
40.06	Pedestrian / bike access and accommodation, landscaping	35%	Nature of this work is it is done in numerous locations and small quantities.
40.07	Automobile, bus, van access-ways including roads, parking lots	25%	Roadway limits are well defined but pavement sections and some drainage items are not detailed.
40.08	Temporary facilities and other indirect costs during construction	30%	Allowance of 1.0% of project.
50 Systems			
50.01	Train control and signals	30%	Initial system configuration established, but details not yet developed.
50.02	Traffic signals and crossing protection	20%	Location and configuration of traffic signals fairly well defined
50.03	Traction power supply: substations	20%	Number and location of substations and power source fairly well defined
50.04	Traction power distribution: catenary and third rail	20%	Number of poles and overhead catenary system wire runs fairly well defined
50.05	Communications	40%	Technology, interfaces and extent of system not yet established
50.06	Fare collection system and equipment	30%	Technology and interface with bus system not yet determined
Construction Subtotal (10 - 50)			
60 Row, Land, Existing Improvements			
60.01	Purchase or lease of real estate	30%	Detailed estimate by parcel, but ROW often is subject to delays and cost overruns. Cost of ROW from UNC, Duke University and NCCR are not yet defined. Easements are not yet defined.
60.02	Relocation of existing households and businesses	30%	Can be difficult to determine until final negotiations.
70 Vehicles (number)			
70.01	Light Rail	10%	No. of LRV set. Pricing based on other LRT project purchases.
70.06	Non-revenue vehicles	10%	Pricing based on other LRT project purchases.
70.07	Spare parts	10%	Pricing based on other LRT project purchases.



Basis of Estimate and Opinion of Probable Project Cost

Work Element		Cont. % Used	Noted Risks
80 Professional Services (applies to Cats. 10-50)			
80.01	Project development	10%	Estimated as a percentage of costs above.
80.02	Engineering	10%	Estimated as a percentage of costs above.
80.03	Project management for design and construction	10%	Estimated as a percentage of costs above.
80.04	Construction administration and management	10%	Estimated as a percentage of costs above.
80.05	Professional liability and other non-construction insurance	10%	Estimated as a percentage of costs above.
80.06	Legal; permits; review fees by other agencies, cities, etc.	10%	Estimated as a percentage of costs above.
80.07	Surveys, testing, investigation, inspection	10%	Estimated as a percentage of costs above.
80.08	Start up	10%	Estimated as a percentage of costs above.
90 Unallocated Contingency			
90 Unallocated Contingency		6%	Still undefined phasing, bid packages, project delivery method, insurance requirements, etc.



Basis of Estimate and Opinion of Probable Project Cost

5. Estimate Accuracy

The plans and information utilized to prepare this cost estimate are preliminary in nature. Many parts of the plans are advanced to near the “Preliminary Engineering” level of completion, thus affording the opportunity to obtain better engineering type quantity take-offs and scope. This applies to the guideway, aerial structures, local roads, stations, and the ROMF. It does not apply to track work, utilities, mitigation, systems, and vehicles. Given the expected accuracies of an estimate based upon 15 percent plans, it is recommended that, in addition to a contingency, a variance be placed on each alternative’s total estimated project cost. After comparing the level of design and the cost estimating detail it was concluded that the resulting estimate should have a level of confidence of plus or minus five percent, independent of any assumed contingency. The final cost of the project could vary more than the five percent presented in this report.

6. Discussion of Work Elements

The quantities and methods described above were applied to the C2A/NHC LPA/Trent combination of alternatives. Many of those quantities and costs were then applied parametrically to the other combinations on a linear foot or other unit price basis.

10 Guideway and Track Elements- To estimate the guideway costs, the C2A/NHC LPA/Trent combination of alternatives was estimated based on engineering quantities for erosion control, excavation items, embankment, retaining walls, ballast curbs, cable troughs, guideway system-wide drainage, grassing, etc. Unit prices are then calculated in \$/LF for the various FTA guideway line items for these typical sections:

- 10.02 - at grade to 5 feet of fill
- 10.05 – 5 feet to 20 feet of fill
- 10.05 – 20 feet or higher fill
- 10.08 - retained fill from 5 feet to 20 feet
- 10.08 - retained fill 20 feet or higher.

Note that all of the excavation for the entire alignment is allocated in the SCC 10.02.

Costs differences are accounted for in each alternate by parametrically applying the same ratio of typical sections and \$/Linear Foot (LF) unit prices to the differing lengths of guideway.

10.04 Aerial structures – Aerial structures for the guideway are estimated from preliminary plans for the piers, beams, deck and railings. General assumptions for the structures are as follows:

- Foundation types and quantities are approximated from preliminary geotechnical information.
- All concrete reinforcing steel is assumed to be tack welded for corrosion control from the foundations up to the superstructure.
- Structures include a cast in place cable tray trough curb, wall, walkway cover and handrails.
- Structures costs include abutment walls and transition slabs.
- Structure costs include bridge drainage piping and downspouts to grade.
- On longer bridges, costs include emergency egress stair towers.
- Costs include a dry-stand pipe fire control system.

10.9-10.13 Track work – Three typical sections are estimated for the following inclusive from the compacted subgrade up:

- 10.09 Direct fixation – includes plinths, fasteners & clips, rails and shims.
- 10.10 Embedded track – includes sub-grade, sub-base, track slab, plates and clips, fasteners, rails, and boots.
- 10.11 Ballasted track – includes sub-grade, sub-ballast, ballast, geotextile, ties, plates and clips, rails and shims.
- 10.12 Special track work – includes crossovers, emergency guardrail, pre-curved running rail, and pre-curved restraining rail.
- 10.13 Vibration and noise dampening – Costs for resilient clips are included as standard in the trackwork items and is considered standard practice nowadays for noise reduction purposes.

20.01-20.02 Stations, Stops, Terminals, Intermodal – Passenger stations are estimated by type, side platform, split-side platform, center platform, or aerial as a typical station per location. Each station-specific cost includes site specific quantities for the other various elements such as bus bays, crosswalks, drop off/pick up lanes, other pavement, sidewalks, and site furnishings.



Basis of Estimate and Opinion of Probable Project Cost

The UNC Hospitals Station includes special considerations for the end of the line operator break room, restroom, and communications room.

The Ninth Street Station is considered an aerial station even though it is on retained fill. It is elevated with additional retaining walls and structural requirements and includes elevators and stairs.

20.06 Automobile parking multi-story structure – The Alston Avenue Station parking garage is based on a typical garage cost per square foot and includes added considerations for the end of the line operator break room, restroom, and communications room. Costs also include considerations for an upgraded façade to provide a community themed appearance. Demolition of existing buildings on the site is included in 40.01.

At-grade parking facilities were modeled from the Leigh Village station parking lot which was estimated in detail to derive a unit price per parking space to include all site development, drainage, paving and parking equipment. This unit price was applied to all other at-grade parking except Friday Center Station where some of the existing parking lot was available to be re-used with some minimal overlay and re-striping in all alternatives except C2. Demolition of existing buildings on existing the sites is included in 40.01.

20.07 Elevators, escalators – Elevator costs are high weight capacity hydraulic type and priced to include glass elevator shafts and elevator cabs for public safety.

30.01-30.04 Administration/office building, heavy maintenance, storage, or maintenance of way facility – This facility is estimated as one building of 73,155 SF and the various functions broken out by programmed square feet of operations and administrative (12,148 square feet [sf]), light rail heavy maintenance (39,723 sf), and maintenance of way (21,284 sf). Table 3-1 reflects the costs of building including typical building systems from foundations, pits, and trenches to roof and interior construction and finishes estimated in a typical uniform systems type of estimate. Costs also include all equipment from the space programming document as well as traction power equipment for the yard but exclude the traction power sub-station for the yard. That sub-station is included in the work breakdown structure (WBS) section 50 Systems costs.

30.05 Yard and yard track – The yard track and site work costs are based on the conceptual layout for the single site. Table 3-1 reflects the costs of site development, drainage, utilities, parking and paving, fencing, lighting, track work and turnouts. Costs also include miscellaneous site items for scrap metal bins, trash compactor/recycling, central instrument house, sand dispensing system, and hazardous materials storage shed. Yard costs do not include the overhead contact system or poles for the yard tracks which are included in the SCC 50 Systems costs. Table 3-1 also reflects costs for right-of-way associated with each of the ROMF alternatives, which would be included in SCC 60.01.

40.01 Demolition, clearing, earthwork– This work element includes typical clearing and grubbing for the guideway along the ROW priced per acre, rough and final grading per square yard, and building demolition for the substantial buildings or structures. The per acre unit price for clearing does include removal costs for the miscellaneous items encountered such as sidewalks, curbs, signs, pads, etc.

40.02 Site utilities, utility relocation – Utilities costs are broken into three components, Communication-Gas-Power transmission, Public Water-Sewer, and Storm Drainage. Most utilities were estimated for the C2A/LPA/Trent combination of alternatives and adds or deducts were quantified for the other different combinations.

Communications-Gas-Power

- Communications costs include cabinets, conduits, duct banks, and relocations of cable television to power poles.
- Gas relocation costs include all pipe, casings, fittings, valves and accessories on a \$/LF basis. Bore depths are assumed to be 10 feet under tracks.
- Power costs include overhead and underground duct banks, and conduits; a \$1.8 million allowance for relocating 4 large transmission towers; and a \$20 million allowance for the special 44kV liquid gas filled underground transmission circuit along Erwin Road. These two large allowance costs were provided by Duke Energy as budget placeholders.
- Private utility relocation plans and construction are assumed to be performed by the utility owners. Conceptual utility relocation plans were developed as a basis for establishing an allowance for private utilities and for unknown utility relocations that may occur.

Public Water-Sewer

- Water costs assume ductile iron pipe and include all pipe, encasement, fittings, valves, accessories, and corrosion protection.
- Sanitary sewer costs assume all ductile iron pipe and unit prices include all pipe, encasement, fittings, manholes, and accessories.
- Costs do not include the large diameter water main anticipated to be completed by the City of Durham along Pettigrew Street.
- Costs assume necessary relocation of public utilities as a cost to the project.
- Costs include removal and/or sealing abandoned systems.

Drainage:

Storm drainage for UNC to Cameron Boulevard was estimated from preliminary plans and pipe sizes. From Cameron Boulevard to Alston Avenue were modeled on a cost per mile based on data developed for the segment from UNC to Cameron Boulevard. Estimates were adjusted to include additional costs anticipated for these segments. Drainage costs for the guideway are included in the guideway cost per linear foot for each typical section. Costs include removal and/or sealing abandoned pipes.

40.03 Hazardous material, contaminated soil removal/mitigation, ground water treatments – There were 12 high risk sites identified along the alternative alignments, and 37-42 sites requiring additional testing but expected to cause no cost impact. The cost for the 12 sites was a total of \$6.0 million common to all alignment alternatives. In addition, there are two sites each in Alternatives NHC 1 and NHC 2 adding another \$600,000. The alternative ROMF sites include three high risk sites for potential hazardous materials contamination; one at Cornwallis Road and two at Alston Avenue.

40.04 Environmental mitigation – These costs include streams, wetlands, ponds, buffers, and best management practices. All impacts were quantified for each alternative and priced including impacts from parking and the ROMF site. Also included is the mitigation to the golf courses as it is considered a one-time effort for restoring lands.

40.05 Site structures including retaining walls and sound walls – The cost of retaining walls for the guideway are included in the section 10 Guideway and Track Elements. No sound walls are included or anticipated to be required at this time. A \$500,000 allowance is included in case any minor retaining walls or sound walls are required or to expand access into the community.

40.06 Pedestrian / bike access and accommodation, landscaping – Costs include the pedestrian bridges at the UNC Hospitals Station and at the Martin Luther King Jr. Parkway stations (occurs in alternative

NHC-1 only), special ramps, walks and stairs at the Dean Smith Center, pedestrian underpasses at the UNC golf course and 2 immediately north of the Duke golf course, and extension of the pedestrian tunnel west of the Friday Center station. Local sidewalks around the passenger stations are included as part of the station cost.

40.07 Automobile, bus, van access ways including roads, parking lots – This cost element includes all local road construction, whether construction of a new road or reconstruction or widening of an existing road. Road costs are developed from typical sections and provide for complete functioning of the road except for drainage costs, which are included with utilities in SCC 40.02, and traffic signals, which are included in SCC 50.02.

40.08 Temporary facilities – Costs for temporary facilities have been considered within the work items where needed, predominately in the guideway and roadway items.

An allowance of 1.0 percent was applied to cover Art in Public Places based on the following definition as worded in the Art in Public Places design criteria:

“The Triangle Transit budget for art is calculated as one percent of capital construction costs, excluding the cost of aerial structures, the rail operations and maintenance facilities, parking garages and electrical systems components (traction power, supply and distribution, communication and signaling). Professional Services, ROW and vehicles are not considered construction items.”

50.01-50.06 Systems – Costs were estimated based on the following:

- **50.01 Train control and signals:** includes signal house design and construction, block and track circuit design and construction, spare parts, and testing & acceptance
- **50.02 Traffic signals and crossing protection:** includes highway crossing warning systems design and construction, roadway traffic signals, and interconnections to the LRT train signals and controls.
- **50.03 Traction power supply/substations:** includes 19 pre-packaged traction power substations, associated site improvements, main feeder duct bank and cables, spare parts, testing and acceptance.
- **50.04 Traction power distribution:** includes poles and foundations, down-guys, head-spans, switches, contact and messenger wires, spares and testing & acceptance.
- **50.05 Communications:** includes closed circuit television cameras, variable message signs, public address systems, passenger assist telephones at stations and park-and-ride lots, supervisory control and data acquisition hardware and software, mainline duct bank and fiber optic cable, conduit and cabling at the stations, carrier transmission system, operations control center equipment, spares, testing and acceptance.
- **50.06 Fare collection:** includes ticket vending machines, two per station, off-platform ticket vending machines at park-and-ride lots, and operating software.

60.01-60.02 Right-of-way, land, existing improvements – Costs were derived from a parcel by parcel evaluation of the preliminary right-of-way lines inclusive of easements for construction. Based on a full or partial taking a cost factor was applied to the assessed value to arrive at a reasonable cost budget. In establishing cost factors, other agencies, including NCDOT real estate representatives, were contacted to establish industry norms. As a result, the following factors were assumed: market value was assumed equal to the 2009 assessed value plus 15 percent; acquisition and relocation cost was assumed to be 35 percent of the market value; legal and condemnation costs were assumed to be 20 percent of the market value. Overall right-of-way costs also included a rough estimate of easements that may be required for utilities and construction based on preliminary utility requirements.



Basis of Estimate and Opinion of Probable Project Cost

70.01-70.07 Vehicles - Costs assume 17 new light rail vehicles at \$4.5 million per vehicle based on other recent light rail projects. Costs also include 10 non-revenue vehicles and \$400,000 per rail vehicle for spare parts.

80.01-80.08 Professional Services – Costs for each line are a percentage of the construction subtotal for categories 10-50 (FTA worksheet row 52) as follows:

Table 6-1: Professional Services Costs

Item	Description	%
80.01	Project development	5.0%
80.02	Engineering	7.0%
80.03	Project management for design and construction	2.5%
80.04	Construction administration and management	7.0%
80.05	Professional liability and other non-construction insurance	1.0%
80.06	Legal; permits; review fees by other agencies, cities, etc.	2.0%
80.07	Surveys, testing, investigation, inspection	2.0%
80.08	Start up	1.0%



Basis of Estimate and Opinion of Probable Project Cost

7. Estimate Pricing

For this cost estimate, the heavy civil work item pricing is predominantly historical data from recent Charlotte, N.C. light rail projects' bids, NCDOT bids, and RSMeans cost data, all escalated to present day cost by 3.0 percent annually from the date of the data in necessary.

Some components are priced from material quotes from recent past projects for portions of the architectural work. These items include the elevator glass, station canopies, and parking garage exterior screening. The Alston Avenue station parking garage base unit price is a blended average from RSMeans cost data and financial studies of comparable parking structures conducted by Carl Walker Parking Consultant's

The cost estimate was prepared using Microsoft Excel based on unit price type estimating format with linked spreadsheet files for the various FTA SCCs. The unit prices presented herein all include contractor's markups for labor burdens, taxes, field overheads, overhead, profit, bonds and insurance. The only exceptions are the rail work in SCC 10.09, 10.10 and 10.11. These items are broken down into crews and material, but have all appropriate contractors' markups applied. The SCC 10.12 costs for special track are estimated based on the Charlotte light rail projects' historical bids.



Basis of Estimate and Opinion of Probable Project Cost

8. Market Conditions/Conclusion

The construction market in general has experienced extremely low inflationary pressures over the past few years beginning in 2009. The market for residential construction has increased to a stronger position recently and traditionally the highway and heavy construction will follow. The Architectural Billings index has shown strength, and contractor profit margins are increasing as well. We expect slightly stronger construction industry growth going forward for the near future causing upward price pressure especially on labor and on select materials. These pressures are somewhat offset by the current low oil and fuel prices; factors that can change quickly. Many construction industry reports predict strong growth for the last half of 2015 and early 2016.

The estimate provided herein is an “Opinion of Probable Capital Costs” for implementation of the project. Attempts have been made to identify all major cost elements with reasonable quantities and current market prices. Major risks associated with limited scope have been identified and allowances made for their anticipated impacts, either within the cost estimate or with allocated contingency. Additionally, a range of plus or minus five percent has been applied to the respective total cost of each alternative which reflects the level of confidence of the estimate based upon 2015 market conditions. The costs stated within this report are subject to escalation due to inflation and construction market conditions.



Basis of Estimate and Opinion of Probable Project Cost

Appendix A: Opinion of Probable Capital Cost

**DURHAM-ORANGE LIGHT RAIL TRANSIT
ALTERNATIVES COST SUMMARY BY SCC**

UPDATE(Mar2015)

All costs in 2015 dollars and include Allocated Contingency

COST ELEMENT	C1 NHC-1	C1 NHC-2	C1 NHC-LPA	C1A NHC-1	C1A NHC-2	C1A NHC-LPA	C2 NHC-1	C2 NHC-2	C2 NHC-LPA	C2A NHC-1	C2A NHC-2	C2A NHC-LPA
10 GUIDEWAY & TRACK ELEMENTS (route miles)	\$438,195	\$428,009	\$419,895	\$426,992	\$416,806	\$408,692	\$412,901	\$402,714	\$394,601	\$413,901	\$403,714	\$395,601
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)	\$47,108	\$48,846	\$49,273	\$48,289	\$50,026	\$50,453	\$50,131	\$51,869	\$52,296	\$49,234	\$50,971	\$51,398
10.04 Guideway: Aerial structure	\$262,901	\$253,205	\$246,469	\$248,737	\$239,041	\$232,305	\$233,925	\$224,229	\$217,493	\$233,925	\$224,229	\$217,493
10.05 Guideway: Built-up fill	\$8,665	\$8,586	\$8,711	\$9,605	\$9,526	\$9,651	\$7,512	\$7,434	\$7,559	\$7,635	\$7,556	\$7,681
10.08 Guideway: Retained cut or fill	\$40,178	\$38,064	\$37,172	\$40,647	\$38,534	\$37,641	\$42,409	\$40,295	\$39,403	\$44,299	\$42,185	\$41,293
10.09 Track: Direct fixation	\$22,958	\$22,325	\$21,199	\$21,701	\$21,067	\$19,941	\$20,545	\$19,912	\$18,786	\$20,545	\$19,912	\$18,786
10.10 Track: Embedded	\$18,270	\$19,691	\$19,893	\$18,270	\$19,691	\$19,893	\$18,294	\$19,716	\$19,917	\$18,294	\$19,716	\$19,917
10.11 Track: Ballasted	\$28,435	\$27,653	\$27,611	\$29,970	\$29,188	\$29,145	\$30,345	\$29,563	\$29,520	\$30,242	\$29,460	\$29,417
10.12 Track: Special (switches, turnouts)	\$9,024	\$8,986	\$8,923	\$9,108	\$9,070	\$9,007	\$9,076	\$9,039	\$8,976	\$9,066	\$9,028	\$8,965
10.13 Track: Vibration and noise dampening	\$657	\$653	\$645	\$667	\$662	\$655	\$663	\$659	\$651	\$662	\$657	\$650
20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)	\$126,101	\$125,938	\$126,352	\$126,101	\$125,938	\$126,352	\$119,098	\$118,935	\$119,349	\$117,321	\$117,158	\$117,572
20.01 At-grade station, stop, shelter, mall, terminal, platform	\$42,496	\$42,333	\$42,747	\$42,496	\$42,333	\$42,747	\$45,193	\$45,030	\$45,444	\$45,197	\$45,034	\$45,448
20.02 Aerial station, stop, shelter, mall, terminal, platform	\$23,732	\$23,732	\$23,732	\$23,732	\$23,732	\$23,732	\$13,936	\$13,936	\$13,936	\$13,936	\$13,936	\$13,936
20.06 Automobile parking multi-story structure	\$52,289	\$52,289	\$52,289	\$52,289	\$52,289	\$52,289	\$54,071	\$54,071	\$54,071	\$52,289	\$52,289	\$52,289
20.07 Elevators, escalators	\$7,584	\$7,584	\$7,584	\$7,584	\$7,584	\$7,584	\$5,899	\$5,899	\$5,899	\$5,899	\$5,899	\$5,899
		\$0										
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS	\$73,881	\$73,881	\$73,881	\$73,881	\$73,881	\$73,881	\$73,881	\$73,881	\$73,881	\$73,881	\$73,881	\$73,881
30.01 Administration Building: Office, sales, storage, revenue counting	\$9,132	\$9,132	\$9,132	\$9,132	\$9,132	\$9,132	\$9,132	\$9,132	\$9,132	\$9,132	\$9,132	\$9,132
30.02 Light Maintenance Facility	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
30.03 Heavy Maintenance Facility	\$32,755	\$32,755	\$32,755	\$32,755	\$32,755	\$32,755	\$32,755	\$32,755	\$32,755	\$32,755	\$32,755	\$32,755
30.04 Storage or Maintenance of Way Building	\$15,999	\$15,999	\$15,999	\$15,999	\$15,999	\$15,999	\$15,999	\$15,999	\$15,999	\$15,999	\$15,999	\$15,999
30.05 Yard and Yard Track	\$15,996	\$15,996	\$15,996	\$15,996	\$15,996	\$15,996	\$15,996	\$15,996	\$15,996	\$15,996	\$15,996	\$15,996

**DURHAM-ORANGE LIGHT RAIL TRANSIT
ALTERNATIVES COST SUMMARY BY SCC**

UPDATE(Mar2015)

All costs in 2015 dollars and include Allocated Contingency

COST ELEMENT	C1 NHC-1	C1 NHC-2	C1 NHC-LPA	C1A NHC-1	C1A NHC-2	C1A NHC-LPA	C2 NHC-1	C2 NHC-2	C2 NHC-LPA	C2A NHC-1	C2A NHC-2	C2A NHC-LPA
40 SITEWORK & SPECIAL CONDITIONS	\$180,987	\$179,487	\$181,011	\$181,784	\$180,284	\$181,808	\$181,859	\$180,359	\$181,883	\$181,150	\$179,651	\$181,174
40.01 Demolition, Clearing, Earthwork	\$4,717	\$4,692	\$4,694	\$4,831	\$4,807	\$4,808	\$4,823	\$4,798	\$4,799	\$4,825	\$4,800	\$4,801
40.02 Site Utilities, Utility Relocation	\$93,991	\$90,517	\$94,996	\$94,189	\$90,715	\$95,193	\$94,101	\$90,627	\$95,105	\$94,696	\$91,222	\$95,700
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments	\$6,600	\$6,600	\$6,000	\$6,600	\$6,600	\$6,000	\$6,600	\$6,600	\$6,000	\$6,600	\$6,600	\$6,000
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks	\$6,600	\$6,799	\$6,825	\$6,601	\$6,799	\$6,826	\$6,689	\$6,888	\$6,914	\$4,755	\$4,954	\$4,980
40.05 Site structures including retaining walls, sound walls	\$650	\$650	\$650	\$650	\$650	\$650	\$650	\$650	\$650	\$650	\$650	\$650
40.06 Pedestrian / bike access and accommodation, landscaping	\$7,132	\$7,132	\$5,008	\$7,132	\$7,132	\$5,008	\$7,132	\$7,132	\$5,008	\$7,132	\$7,132	\$5,008
40.07 Automobile, bus, van accessways including roads, parking lots	\$57,045	\$58,864	\$58,601	\$57,491	\$59,310	\$59,047	\$57,653	\$59,472	\$59,209	\$58,278	\$60,097	\$59,834
40.08 Temporary Facilities and other indirect costs during construction	\$4,252	\$4,233	\$4,237	\$4,290	\$4,271	\$4,276	\$4,212	\$4,193	\$4,197	\$4,215	\$4,196	\$4,201
50 SYSTEMS	\$210,725	\$207,941	\$206,905	\$212,962	\$210,178	\$209,142	\$212,540	\$209,755	\$208,719	\$212,760	\$209,975	\$208,939
50.01 Train control and signals	\$43,064	\$41,779	\$41,301	\$43,702	\$42,417	\$41,938	\$43,459	\$42,175	\$41,696	\$43,382	\$42,098	\$41,619
50.02 Traffic signals and crossing protection	\$21,365	\$22,616	\$23,084	\$21,599	\$22,850	\$23,318	\$21,938	\$23,189	\$23,657	\$22,400	\$23,651	\$24,119
50.03 Traction power supply: substations	\$45,493	\$45,493	\$45,493	\$45,493	\$45,493	\$45,493	\$45,493	\$45,493	\$45,493	\$45,493	\$45,493	\$45,493
50.04 Traction power distribution: catenary and third rail	\$30,960	\$30,037	\$29,692	\$31,419	\$30,495	\$30,151	\$31,244	\$30,321	\$29,977	\$31,189	\$30,266	\$29,921
50.05 Communications	\$61,263	\$59,436	\$58,754	\$62,170	\$60,343	\$59,661	\$61,825	\$59,998	\$59,316	\$61,716	\$59,888	\$59,207
50.06 Fare collection system and equipment	\$8,580	\$8,580	\$8,580	\$8,580	\$8,580	\$8,580	\$8,580	\$8,580	\$8,580	\$8,580	\$8,580	\$8,580
Construction Subtotal (10 - 50)	\$1,029,890	\$1,015,256	\$1,008,044	\$1,021,721	\$1,007,088	\$999,875	\$1,000,278	\$985,645	\$978,432	\$999,013	\$984,380	\$977,167

**DURHAM-ORANGE LIGHT RAIL TRANSIT
ALTERNATIVES COST SUMMARY BY SCC**

UPDATE(Mar2015)

All costs in 2015 dollars and include Allocated Contingency

COST ELEMENT	C1			C1A			C2			C2A		
	NHC-1	NHC-2	NHC-LPA	NHC-1	NHC-2	NHC-LPA	NHC-1	NHC-2	NHC-LPA	NHC-1	NHC-2	NHC-LPA
60 ROW, LAND, EXISTING IMPROVEMENTS	\$163,150	\$155,455	\$154,879	\$168,804	\$161,110	\$160,534	\$161,076	\$153,381	\$152,805	\$157,594	\$149,900	\$149,324
60.01 Purchase or lease of real estate	\$127,162	\$121,165	\$120,716	\$131,570	\$125,572	\$125,123	\$125,546	\$119,549	\$119,100	\$122,832	\$116,835	\$116,386
60.02 Relocation of existing households and businesses	\$35,987	\$34,290	\$34,163	\$37,235	\$35,537	\$35,410	\$35,530	\$33,833	\$33,706	\$34,762	\$33,065	\$32,938
70 VEHICLES (number)	\$92,400	\$92,400	\$92,400	\$92,400	\$92,400	\$92,400	\$92,400	\$92,400	\$92,400	\$92,400	\$92,400	\$92,400
70.01 Light Rail	\$84,150	\$84,150	\$84,150	\$84,150	\$84,150	\$84,150	\$84,150	\$84,150	\$84,150	\$84,150	\$84,150	\$84,150
70.02 Heavy Rail	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
70.03 Commuter Rail	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
70.04 Bus	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
70.05 Other	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
70.06 Non-revenue vehicles	\$770	\$770	\$770	\$770	\$770	\$770	\$770	\$770	\$770	\$770	\$770	\$770
70.07 Spare parts	\$7,480	\$7,480	\$7,480	\$7,480	\$7,480	\$7,480	\$7,480	\$7,480	\$7,480	\$7,480	\$7,480	\$7,480
80 PROFESSIONAL SERVICES (applies to Cats.)	\$240,862	\$237,553	\$235,860	\$238,984	\$235,676	\$233,982	\$234,037	\$230,728	\$229,035	\$233,744	\$230,435	\$228,741
80.01 Project Development	\$43,793	\$43,192	\$42,884	\$43,452	\$42,850	\$42,542	\$42,552	\$41,951	\$41,643	\$42,499	\$41,897	\$41,589
80.02 Engineering	\$61,310	\$60,468	\$60,037	\$60,832	\$59,990	\$59,559	\$59,573	\$58,731	\$58,300	\$59,498	\$58,656	\$58,225
80.03 Project Management for Design and Construction	\$21,897	\$21,596	\$21,442	\$21,726	\$21,425	\$21,271	\$21,276	\$20,975	\$20,821	\$21,249	\$20,949	\$20,795
80.04 Construction Administration & Management	\$61,310	\$60,468	\$60,037	\$60,832	\$59,990	\$59,559	\$59,573	\$58,731	\$58,300	\$59,498	\$58,656	\$58,225
80.05 Professional Liability and other Non-Construction Insurance	\$8,759	\$8,638	\$8,577	\$8,690	\$8,570	\$8,508	\$8,510	\$8,390	\$8,329	\$8,500	\$8,379	\$8,318
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.	\$17,517	\$17,277	\$17,153	\$17,381	\$17,140	\$17,017	\$17,021	\$16,780	\$16,657	\$17,000	\$16,759	\$16,636
80.07 Surveys, Testing, Investigation, Inspection	\$17,517	\$17,277	\$17,153	\$17,381	\$17,140	\$17,017	\$17,021	\$16,780	\$16,657	\$17,000	\$16,759	\$16,636
80.08 Start up	\$8,759	\$8,638	\$8,577	\$8,690	\$8,570	\$8,508	\$8,510	\$8,390	\$8,329	\$8,500	\$8,379	\$8,318
Subtotal (10 - 80)	\$1,526,301	\$1,500,665	\$1,491,183	\$1,521,909	\$1,496,273	\$1,486,791	\$1,487,791	\$1,462,154	\$1,452,672	\$1,482,751	\$1,457,114	\$1,447,633
90 UNALLOCATED CONTINGENCY	\$91,578	\$90,040	\$89,471	\$91,315	\$89,776	\$89,207	\$89,267	\$87,729	\$87,160	\$88,965	\$87,427	\$86,858
Subtotal (10 - 90)	\$1,617,879	\$1,590,705	\$1,580,654	\$1,613,224	\$1,586,049	\$1,575,999	\$1,577,058	\$1,549,883	\$1,539,833	\$1,571,716	\$1,544,541	\$1,534,491
100 FINANCE CHARGES	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Project Cost (10 - 100)	\$1,617,879	\$1,590,705	\$1,580,654	\$1,613,224	\$1,586,049	\$1,575,999	\$1,577,058	\$1,549,883	\$1,539,833	\$1,571,716	\$1,544,541	\$1,534,491

MAIN WORKSHEET - BUILD ALTERNATIVE

(Rev-Mar2015)

TRIANGLE TRANSIT AUTHORITY
ALTERNATE - C1-NHC-1
EIS (Preliminary Estimate)

Today's Date **3/27/15**
Yr of Base Year \$ **2015**
Yr of Revenue Ops **2020**

	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost	YOE Dollars Total (X000)
10 GUIDEWAY & TRACK ELEMENTS (route miles)	17.19	340,025	98,170	438,195	\$25,497	43%	27%	0
10.01 Guideway: At-grade exclusive right-of-way				0				0
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)	8.21	37,686	9,422	47,108	\$5,741			0
10.03 Guideway: At-grade in mixed traffic				0				0
10.04 Guideway: Aerial structure	4.46	202,232	60,669	262,901	\$58,944			0
10.05 Guideway: Built-up fill	1.73	6,932	1,733	8,665	\$5,010			0
10.06 Guideway: Underground cut & cover			0	0				0
10.07 Guideway: Underground tunnel			0	0				0
10.08 Guideway: Retained cut or fill	2.79	32,142	8,036	40,178	\$14,398			0
10.09 Track: Direct fixation		17,660	5,298	22,958				0
10.10 Track: Embedded		14,054	4,216	18,270				0
10.11 Track: Ballasted		21,873	6,562	28,435				0
10.12 Track: Special (switches, turnouts)		6,941	2,082	9,024				0
10.13 Track: Vibration and noise dampening		505	152	657				0
20 STATIONS, STOPS, TERMINALS, INTERMODAL (numb)	17	98,610	27,491	126,101	\$7,418	12%	8%	0
20.01 At-grade station, stop, shelter, mall, terminal, platform	14	32,689	9,807	42,496	\$3,035			0
20.02 Aerial station, stop, shelter, mall, terminal, platform	3	18,255	5,477	23,732	\$7,911			0
20.03 Underground station, stop, shelter, mall, terminal, platform			0	0				0
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.			0	0				0
20.05 Joint development			0	0				0
20.06 Automobile parking multi-story structure		41,831	10,458	52,289				0
20.07 Elevators, escalators		5,834	1,750	7,584				0
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDG	17.19	56,832	17,049	73,881	\$4,299	7%	5%	0
30.01 Administration Building: Office, sales, storage, revenue counting		7,024	2,107	9,132				0
30.02 Light Maintenance Facility			0	0				0
30.03 Heavy Maintenance Facility		25,196	7,559	32,755				0
30.04 Storage or Maintenance of Way Building		12,307	3,692	15,999				0
30.05 Yard and Yard Track		12,305	3,691	15,996				0
40 SITEWORK & SPECIAL CONDITIONS	17.19	135,770	45,217	180,987	\$10,531	18%	11%	0
40.01 Demolition, Clearing, Earthwork		3,494	1,223	4,717				0
40.02 Site Utilities, Utility Relocation		68,110	25,882	93,991				0
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments		4,400	2,200	6,600				0
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks		5,077	1,523	6,600				0
40.05 Site structures including retaining walls, sound walls		500	150	650				0
40.06 Pedestrian / bike access and accommodation, landscaping		5,283	1,849	7,132				0
40.07 Automobile, bus, van accessways including roads, parking lots		45,636	11,409	57,045				0
40.08 Temporary Facilities and other indirect costs during construction		3,271	981	4,252				0
50 SYSTEMS	17.19	165,001	45,725	210,725	\$12,261	20%	13%	0
50.01 Train control and signals		33,126	9,938	43,064				0
50.02 Traffic signals and crossing protection		17,804	3,561	21,365				0
50.03 Traction power supply: substations		37,911	7,582	45,493				0
50.04 Traction power distribution: catenary and third rail		25,800	5,160	30,960				0
50.05 Communications		43,759	17,504	61,263				0
50.06 Fare collection system and equipment		6,600	1,980	8,580				0
50.07 Central Control			0	0				0
Construction Subtotal (10 - 50)	17.19	796,238	233,652	1,029,890	\$59,925	100%	64%	0
60 ROW, LAND, EXISTING IMPROVEMENTS	17.19	125,500	37,650	163,150	\$9,493		10%	0
60.01 Purchase or lease of real estate		97,817	29,345	127,162				0
60.02 Relocation of existing households and businesses		27,683	8,305	35,987				0
70 VEHICLES (number)	44	84,000	8,400	92,400	\$2,100		6%	0
70.01 Light Rail	17	76,500	7,650	84,150	\$4,950			0
70.02 Heavy Rail				0				0
70.03 Commuter Rail				0				0
70.04 Bus				0				0
70.05 Other				0				0
70.06 Non-revenue vehicles	10	700	70	770	\$77			0
70.07 Spare parts	17	6,800	680	7,480	\$440			0
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	17.19	218,965	21,897	240,862	\$14,015	23%	15%	0
80.01 Project Development		39,812	3,981	43,793				0
80.02 Engineering		55,737	5,574	61,310				0
80.03 Project Management for Design and Construction		19,906	1,991	21,897				0
80.04 Construction Administration & Management		55,737	5,574	61,310				0
80.05 Professional Liability and other Non-Construction Insurance		7,962	796	8,759				0
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		15,925	1,592	17,517				0
80.07 Surveys, Testing, Investigation, Inspection		15,925	1,592	17,517				0
80.08 Start up		7,962	796	8,759				0
Subtotal (10 - 80)	17.19	1,224,703	301,598	1,526,301	\$88,809		94%	0
90 UNALLOCATED CONTINGENCY				91,578			6%	0
Subtotal (10 - 90)	17.19			1,617,879	\$94,138		100%	0
100 FINANCE CHARGES				0			0%	0
Total Project Cost (10 - 100)	17.19			1,617,879	\$94,138		100%	0
Allocated Contingency as % of Base Yr Dollars w/o Contingency				24.63%				
Unallocated Contingency as % of Base Yr Dollars w/o Contingency				7.48%				
Total Contingency as % of Base Yr Dollars w/o Contingency				32.10%				
Unallocated Contingency as % of Subtotal (10 - 80)				6.00%				
YOE Construction Cost per Mile (X000)								\$0
YOE Total Project Cost per Mile Not Including Vehicles (X000)								\$0
YOE Total Project Cost per Mile (X000)								\$0

MAIN WORKSHEET - BUILD ALTERNATIVE

(Rev-Mar2015)

TRIANGLE TRANSIT AUTHORITY
ALTERNATE - C1-NHC-2
EIS (Preliminary Estimate)

Today's Date **3/27/15**
Yr of Base Year \$ **2015**
Yr of Revenue Ops **2020**

	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost	YOE Dollars Total (X000)
10 GUIDEWAY & TRACK ELEMENTS (route miles)	17.07	332,176	95,833	428,009	\$25,076	42%	27%	0
10.01 Guideway: At-grade exclusive right-of-way				0				0
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)	8.40	39,076	9,769	48,846	\$5,816			0
10.03 Guideway: At-grade in mixed traffic			0	0				0
10.04 Guideway: Aerial structure	4.34	194,773	58,432	253,205	\$58,382			0
10.05 Guideway: Built-up fill	1.71	6,869	1,717	8,586	\$5,011			0
10.06 Guideway: Underground cut & cover			0	0				0
10.07 Guideway: Underground tunnel			0	0				0
10.08 Guideway: Retained cut or fill	2.62	30,451	7,613	38,064	\$14,528			0
10.09 Track: Direct fixation		17,173	5,152	22,325				0
10.10 Track: Embedded		15,147	4,544	19,691				0
10.11 Track: Ballasted		21,272	6,382	27,653				0
10.12 Track: Special (switches, turnouts)		6,912	2,074	8,986				0
10.13 Track: Vibration and noise dampening		502	151	653				0
20 STATIONS, STOPS, TERMINALS, INTERMODAL (numb)	17	98,484	27,454	125,938	\$7,408	12%	8%	0
20.01 At-grade station, stop, shelter, mall, terminal, platform	14	32,564	9,769	42,333	\$3,024			0
20.02 Aerial station, stop, shelter, mall, terminal, platform	3	18,255	5,477	23,732	\$7,911			0
20.03 Underground station, stop, shelter, mall, terminal, platform			0	0				0
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.			0	0				0
20.05 Joint development			0	0				0
20.06 Automobile parking multi-story structure		41,831	10,458	52,289				0
20.07 Elevators, escalators		5,834	1,750	7,584				0
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDG	17.07	56,832	17,049	73,881	\$4,328	7%	5%	0
30.01 Administration Building: Office, sales, storage, revenue counting		7,024	2,107	9,132				0
30.02 Light Maintenance Facility			0	0				0
30.03 Heavy Maintenance Facility		25,196	7,559	32,755				0
30.04 Storage or Maintenance of Way Building		12,307	3,692	15,999				0
30.05 Yard and Yard Track		12,305	3,691	15,996				0
40 SITEWORK & SPECIAL CONDITIONS	17.07	134,828	44,659	179,487	\$10,516	18%	11%	0
40.01 Demolition, Clearing, Earthwork		3,476	1,216	4,692				0
40.02 Site Utilities, Utility Relocation		65,592	24,925	90,517				0
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments		4,400	2,200	6,600				0
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks		5,230	1,569	6,799				0
40.05 Site structures including retaining walls, sound walls		500	150	650				0
40.06 Pedestrian / bike access and accommodation, landscaping		5,283	1,849	7,132				0
40.07 Automobile, bus, van accessways including roads, parking lots		47,091	11,773	58,864				0
40.08 Temporary Facilities and other indirect costs during construction		3,256	977	4,233				0
50 SYSTEMS	17.07	162,980	44,961	207,941	\$12,183	20%	13%	0
50.01 Train control and signals		32,138	9,641	41,779				0
50.02 Traffic signals and crossing protection		18,847	3,769	22,616				0
50.03 Traction power supply: substations		37,911	7,582	45,493				0
50.04 Traction power distribution: catenary and third rail		25,031	5,006	30,037				0
50.05 Communications		42,454	16,982	59,436				0
50.06 Fare collection system and equipment		6,600	1,980	8,580				0
50.07 Central Control			0	0				0
Construction Subtotal (10 - 50)	17.07	785,300	229,956	1,015,256	\$59,481	100%	64%	0
60 ROW, LAND, EXISTING IMPROVEMENTS	17.07	119,581	35,874	155,455	\$9,108		10%	0
60.01 Purchase or lease of real estate		93,204	27,961	121,165				0
60.02 Relocation of existing households and businesses		26,377	7,913	34,290				0
70 VEHICLES (number)	44	84,000	8,400	92,400	\$2,100		6%	0
70.01 Light Rail	17	76,500	7,650	84,150	\$4,950			0
70.02 Heavy Rail			0	0				0
70.03 Commuter Rail			0	0				0
70.04 Bus			0	0				0
70.05 Other			0	0				0
70.06 Non-revenue vehicles	10	700	70	770	\$77			0
70.07 Spare parts	17	6,800	680	7,480	\$440			0
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	17.07	215,958	21,596	237,553	\$13,918	23%	15%	0
80.01 Project Development		39,265	3,927	43,192				0
80.02 Engineering		54,971	5,497	60,468				0
80.03 Project Management for Design and Construction		19,633	1,963	21,596				0
80.04 Construction Administration & Management		54,971	5,497	60,468				0
80.05 Professional Liability and other Non-Construction Insurance		7,853	785	8,638				0
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		15,706	1,571	17,277				0
80.07 Surveys, Testing, Investigation, Inspection		15,706	1,571	17,277				0
80.08 Start up		7,853	785	8,638				0
Subtotal (10 - 80)	17.07	1,204,839	295,826	1,500,665	\$87,919		94%	0
90 UNALLOCATED CONTINGENCY				90,040			6%	0
Subtotal (10 - 90)	17.07			1,590,705	\$93,194		100%	0
100 FINANCE CHARGES				0			0%	0
Total Project Cost (10 - 100)	17.07			1,590,705	\$93,194		100%	0
Allocated Contingency as % of Base Yr Dollars w/o Contingency				24.55%				
Unallocated Contingency as % of Base Yr Dollars w/o Contingency				7.47%				
Total Contingency as % of Base Yr Dollars w/o Contingency				32.03%				
Unallocated Contingency as % of Subtotal (10 - 80)				6.00%				
YOE Construction Cost per Mile (X000)								\$0
YOE Total Project Cost per Mile Not Including Vehicles (X000)								\$0
YOE Total Project Cost per Mile (X000)								\$0

MAIN WORKSHEET - BUILD ALTERNATIVE

(Rev-Mar2015)

TRIANGLE TRANSIT AUTHORITY
ALTERNATE - C1-NHC-LPA
EIS (Preliminary Estimate)

Today's Date **3/27/15**
Yr of Base Year \$ **2015**
Yr of Revenue Ops **2020**

	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost	YOE Dollars Total (X000)
10 GUIDEWAY & TRACK ELEMENTS (route miles)	16.87	325,924	93,971	419,895	\$24,886	42%	27%	0
10.01 Guideway: At-grade exclusive right-of-way				0				0
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)	8.47	39,418	9,855	49,273	\$5,819			0
10.03 Guideway: At-grade in mixed traffic			0	0				0
10.04 Guideway: Aerial structure	4.12	189,592	56,878	246,469	\$59,847			0
10.05 Guideway: Built-up fill	1.74	6,969	1,742	8,711	\$5,008			0
10.06 Guideway: Underground cut & cover			0	0				0
10.07 Guideway: Underground tunnel			0	0				0
10.08 Guideway: Retained cut or fill	2.55	29,737	7,434	37,172	\$14,588			0
10.09 Track: Direct fixation		16,307	4,892	21,199				0
10.10 Track: Embedded		15,302	4,591	19,893				0
10.11 Track: Ballasted		21,239	6,372	27,611				0
10.12 Track: Special (switches, turnouts)		6,864	2,059	8,923				0
10.13 Track: Vibration and noise dampening		496	149	645				0
20 STATIONS, STOPS, TERMINALS, INTERMODAL (numb)	17	98,803	27,549	126,352	\$7,432	13%	8%	0
20.01 At-grade station, stop, shelter, mall, terminal, platform	14	32,882	9,865	42,747	\$3,053			0
20.02 Aerial station, stop, shelter, mall, terminal, platform	3	18,255	5,477	23,732	\$7,911			0
20.03 Underground station, stop, shelter, mall, terminal, platform			0	0				0
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.			0	0				0
20.05 Joint development			0	0				0
20.06 Automobile parking multi-story structure		41,831	10,458	52,289				0
20.07 Elevators, escalators		5,834	1,750	7,584				0
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDG	16.87	56,832	17,049	73,881	\$4,379	7%	5%	0
30.01 Administration Building: Office, sales, storage, revenue counting		7,024	2,107	9,132				0
30.02 Light Maintenance Facility			0	0				0
30.03 Heavy Maintenance Facility		25,196	7,559	32,755				0
30.04 Storage or Maintenance of Way Building		12,307	3,692	15,999				0
30.05 Yard and Yard Track		12,305	3,691	15,996				0
40 SITEWORK & SPECIAL CONDITIONS	16.87	135,915	45,097	181,011	\$10,728	18%	11%	0
40.01 Demolition, Clearing, Earthwork		3,477	1,217	4,694				0
40.02 Site Utilities, Utility Relocation		68,837	26,158	94,996				0
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments		4,000	2,000	6,000				0
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks		5,250	1,575	6,825				0
40.05 Site structures including retaining walls, sound walls		500	150	650				0
40.06 Pedestrian / bike access and accommodation, landscaping		3,710	1,298	5,008				0
40.07 Automobile, bus, van accessways including roads, parking lots		46,881	11,720	58,601				0
40.08 Temporary Facilities and other indirect costs during construction		3,260	978	4,237				0
50 SYSTEMS	16.87	162,228	44,676	206,905	\$12,262	21%	13%	0
50.01 Train control and signals		31,770	9,531	41,301				0
50.02 Traffic signals and crossing protection		19,237	3,847	23,084				0
50.03 Traction power supply: substations		37,911	7,582	45,493				0
50.04 Traction power distribution: catenary and third rail		24,744	4,949	29,692				0
50.05 Communications		41,967	16,787	58,754				0
50.06 Fare collection system and equipment		6,600	1,980	8,580				0
50.07 Central Control			0	0				0
Construction Subtotal (10 - 50)	16.87	779,701	228,343	1,008,044	\$59,743	100%	64%	0
60 ROW, LAND, EXISTING IMPROVEMENTS	16.87	119,138	35,741	154,879	\$9,179		10%	0
60.01 Purchase or lease of real estate		92,859	27,858	120,716				0
60.02 Relocation of existing households and businesses		26,279	7,884	34,163				0
70 VEHICLES (number)	44	84,000	8,400	92,400	\$2,100		6%	0
70.01 Light Rail	17	76,500	7,650	84,150	\$4,950			0
70.02 Heavy Rail				0				0
70.03 Commuter Rail				0				0
70.04 Bus				0				0
70.05 Other				0				0
70.06 Non-revenue vehicles	10	700	70	770	\$77			0
70.07 Spare parts	17	6,800	680	7,480	\$440			0
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	16.87	214,418	21,442	235,860	\$13,978	23%	15%	0
80.01 Project Development		38,985	3,899	42,884				0
80.02 Engineering		54,579	5,458	60,037				0
80.03 Project Management for Design and Construction		19,493	1,949	21,442				0
80.04 Construction Administration & Management		54,579	5,458	60,037				0
80.05 Professional Liability and other Non-Construction Insurance		7,797	780	8,577				0
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		15,594	1,559	17,153				0
80.07 Surveys, Testing, Investigation, Inspection		15,594	1,559	17,153				0
80.08 Start up		7,797	780	8,577				0
Subtotal (10 - 80)	16.87	1,197,257	293,926	1,491,183	\$88,377		94%	0
90 UNALLOCATED CONTINGENCY				89,471			6%	0
Subtotal (10 - 90)	16.87			1,580,654	\$93,679		100%	0
100 FINANCE CHARGES				0			0%	0
Total Project Cost (10 - 100)	16.87			1,580,654	\$93,679		100%	0
Allocated Contingency as % of Base Yr Dollars w/o Contingency				24.55%				
Unallocated Contingency as % of Base Yr Dollars w/o Contingency				7.47%				
Total Contingency as % of Base Yr Dollars w/o Contingency				32.02%				
Unallocated Contingency as % of Subtotal (10 - 80)				6.00%				
YOE Construction Cost per Mile (X000)								\$0
YOE Total Project Cost per Mile Not Including Vehicles (X000)								\$0
YOE Total Project Cost per Mile (X000)								\$0

MAIN WORKSHEET - BUILD ALTERNATIVE

(Rev-Mar2015)

TRIANGLE TRANSIT AUTHORITY
ALTERNATE - C1A-NHC-1
EIS (Preliminary Estimate)

Today's Date **3/27/15**
Yr of Base Year \$ **2015**
Yr of Revenue Ops **2020**

	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost	YOE Dollars Total (X000)
10 GUIDEWAY & TRACK ELEMENTS (route miles)	17.45	331,488	95,505	426,992	\$24,474	42%	26%	0
10.01 Guideway: At-grade exclusive right-of-way				0				0
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)	8.48	38,631	9,658	48,289	\$5,695			0
10.03 Guideway: At-grade in mixed traffic			0	0				0
10.04 Guideway: Aerial structure	4.22	191,336	57,401	248,737	\$59,001			0
10.05 Guideway: Built-up fill	1.92	7,684	1,921	9,605	\$4,995			0
10.06 Guideway: Underground cut & cover			0	0				0
10.07 Guideway: Underground tunnel			0	0				0
10.08 Guideway: Retained cut or fill	2.83	32,518	8,129	40,647	\$14,371			0
10.09 Track: Direct fixation		16,693	5,008	21,701				0
10.10 Track: Embedded		14,054	4,216	18,270				0
10.11 Track: Ballasted		23,054	6,916	29,970				0
10.12 Track: Special (switches, turnouts)		7,006	2,102	9,108				0
10.13 Track: Vibration and noise dampening		513	154	667				0
20 STATIONS, STOPS, TERMINALS, INTERMODAL (numb)	17	98,610	27,491	126,101	\$7,418	12%	8%	0
20.01 At-grade station, stop, shelter, mall, terminal, platform	14	32,689	9,807	42,496	\$3,035			0
20.02 Aerial station, stop, shelter, mall, terminal, platform	3	18,255	5,477	23,732	\$7,911			0
20.03 Underground station, stop, shelter, mall, terminal, platform			0	0				0
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.			0	0				0
20.05 Joint development			0	0				0
20.06 Automobile parking multi-story structure		41,831	10,458	52,289				0
20.07 Elevators, escalators		5,834	1,750	7,584				0
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDG	17.45	56,832	17,049	73,881	\$4,235	7%	5%	0
30.01 Administration Building: Office, sales, storage, revenue counting		7,024	2,107	9,132				0
30.02 Light Maintenance Facility			0	0				0
30.03 Heavy Maintenance Facility		25,196	7,559	32,755				0
30.04 Storage or Maintenance of Way Building		12,307	3,692	15,999				0
30.05 Yard and Yard Track		12,305	3,691	15,996				0
40 SITEWORK & SPECIAL CONDITIONS	17.45	136,385	45,399	181,784	\$10,419	18%	11%	0
40.01 Demolition, Clearing, Earthwork		3,579	1,253	4,831				0
40.02 Site Utilities, Utility Relocation		68,253	25,936	94,189				0
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments		4,400	2,200	6,600				0
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks		5,077	1,523	6,601				0
40.05 Site structures including retaining walls, sound walls		500	150	650				0
40.06 Pedestrian / bike access and accommodation, landscaping		5,283	1,849	7,132				0
40.07 Automobile, bus, van accessways including roads, parking lots		45,993	11,498	57,491				0
40.08 Temporary Facilities and other indirect costs during construction		3,300	990	4,290				0
50 SYSTEMS	17.45	166,716	46,246	212,962	\$12,206	21%	13%	0
50.01 Train control and signals		33,617	10,085	43,702				0
50.02 Traffic signals and crossing protection		17,999	3,600	21,599				0
50.03 Traction power supply: substations		37,911	7,582	45,493				0
50.04 Traction power distribution: catenary and third rail		26,182	5,236	31,419				0
50.05 Communications		44,407	17,763	62,170				0
50.06 Fare collection system and equipment		6,600	1,980	8,580				0
50.07 Central Control			0	0				0
Construction Subtotal (10 - 50)	17.45	790,030	231,691	1,021,721	\$58,562	100%	63%	0
60 ROW, LAND, EXISTING IMPROVEMENTS	17.45	129,850	38,955	168,804	\$9,675		10%	0
60.01 Purchase or lease of real estate		101,207	30,362	131,570				0
60.02 Relocation of existing households and businesses		28,642	8,593	37,235				0
70 VEHICLES (number)	44	84,000	8,400	92,400	\$2,100		6%	0
70.01 Light Rail	17	76,500	7,650	84,150	\$4,950			0
70.02 Heavy Rail				0				0
70.03 Commuter Rail				0				0
70.04 Bus				0				0
70.05 Other				0				0
70.06 Non-revenue vehicles	10	700	70	770	\$77			0
70.07 Spare parts	17	6,800	680	7,480	\$440			0
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	17.45	217,258	21,726	238,984	\$13,698	23%	15%	0
80.01 Project Development		39,502	3,950	43,452				0
80.02 Engineering		55,302	5,530	60,832				0
80.03 Project Management for Design and Construction		19,751	1,975	21,726				0
80.04 Construction Administration & Management		55,302	5,530	60,832				0
80.05 Professional Liability and other Non-Construction Insurance		7,900	790	8,690				0
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		15,801	1,580	17,381				0
80.07 Surveys, Testing, Investigation, Inspection		15,801	1,580	17,381				0
80.08 Start up		7,900	790	8,690				0
Subtotal (10 - 80)	17.45	1,221,138	300,772	1,521,909	\$87,231		94%	0
90 UNALLOCATED CONTINGENCY				91,315			6%	0
Subtotal (10 - 90)	17.45			1,613,224	\$92,465		100%	0
100 FINANCE CHARGES				0			0%	0
Total Project Cost (10 - 100)	17.45			1,613,224	\$92,465		100%	0
Allocated Contingency as % of Base Yr Dollars w/o Contingency				24.63%				
Unallocated Contingency as % of Base Yr Dollars w/o Contingency				7.48%				
Total Contingency as % of Base Yr Dollars w/o Contingency				32.11%				
Unallocated Contingency as % of Subtotal (10 - 80)				6.00%				
YOE Construction Cost per Mile (X000)								\$0
YOE Total Project Cost per Mile Not Including Vehicles (X000)								\$0
YOE Total Project Cost per Mile (X000)								\$0

MAIN WORKSHEET - BUILD ALTERNATIVE

(Rev-Mar2015)

TRIANGLE TRANSIT AUTHORITY
ALTERNATE - C1A-NHC-2
EIS (Preliminary Estimate)

Today's Date **3/27/15**
Yr of Base Year \$ **2015**
Yr of Revenue Ops **2020**

	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost	YOE Dollars Total (X000)
10 GUIDEWAY & TRACK ELEMENTS (route miles)	17.33	323,638	93,168	416,806	\$24,052	41%	26%	0
10.01 Guideway: At-grade exclusive right-of-way				0				0
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)	8.67	40,021	10,005	50,026	\$5,769			0
10.03 Guideway: At-grade in mixed traffic			0	0				0
10.04 Guideway: Aerial structure	4.09	183,878	55,163	239,041	\$58,406			0
10.05 Guideway: Built-up fill	1.91	7,621	1,905	9,526	\$4,996			0
10.06 Guideway: Underground cut & cover			0	0				0
10.07 Guideway: Underground tunnel			0	0				0
10.08 Guideway: Retained cut or fill	2.66	30,827	7,707	38,534	\$14,498			0
10.09 Track: Direct fixation		16,205	4,862	21,067				0
10.10 Track: Embedded		15,147	4,544	19,691				0
10.11 Track: Ballasted		22,453	6,736	29,188				0
10.12 Track: Special (switches, turnouts)		6,977	2,093	9,070				0
10.13 Track: Vibration and noise dampening		510	153	662				0
20 STATIONS, STOPS, TERMINALS, INTERMODAL (numb)	17	98,484	27,454	125,938	\$7,408	13%	8%	0
20.01 At-grade station, stop, shelter, mall, terminal, platform	14	32,564	9,769	42,333	\$3,024			0
20.02 Aerial station, stop, shelter, mall, terminal, platform	3	18,255	5,477	23,732	\$7,911			0
20.03 Underground station, stop, shelter, mall, terminal, platform			0	0				0
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.			0	0				0
20.05 Joint development			0	0				0
20.06 Automobile parking multi-story structure		41,831	10,458	52,289				0
20.07 Elevators, escalators		5,834	1,750	7,584				0
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDG	17.33	56,832	17,049	73,881	\$4,263	7%	5%	0
30.01 Administration Building: Office, sales, storage, revenue counting		7,024	2,107	9,132				0
30.02 Light Maintenance Facility			0	0				0
30.03 Heavy Maintenance Facility		25,196	7,559	32,755				0
30.04 Storage or Maintenance of Way Building		12,307	3,692	15,999				0
30.05 Yard and Yard Track		12,305	3,691	15,996				0
40 SITEWORK & SPECIAL CONDITIONS	17.33	135,443	44,841	180,284	\$10,404	18%	11%	0
40.01 Demolition, Clearing, Earthwork		3,560	1,246	4,807				0
40.02 Site Utilities, Utility Relocation		65,735	24,979	90,715				0
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments		4,400	2,200	6,600				0
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks		5,230	1,569	6,799				0
40.05 Site structures including retaining walls, sound walls		500	150	650				0
40.06 Pedestrian / bike access and accommodation, landscaping		5,283	1,849	7,132				0
40.07 Automobile, bus, van accessways including roads, parking lots		47,448	11,862	59,310				0
40.08 Temporary Facilities and other indirect costs during construction		3,286	986	4,271				0
50 SYSTEMS	17.33	164,696	45,482	210,178	\$12,129	21%	13%	0
50.01 Train control and signals		32,629	9,789	42,417				0
50.02 Traffic signals and crossing protection		19,042	3,808	22,850				0
50.03 Traction power supply: substations		37,911	7,582	45,493				0
50.04 Traction power distribution: catenary and third rail		25,413	5,083	30,495				0
50.05 Communications		43,102	17,241	60,343				0
50.06 Fare collection system and equipment		6,600	1,980	8,580				0
50.07 Central Control			0	0				0
Construction Subtotal (10 - 50)	17.33	779,093	227,995	1,007,088	\$58,115	100%	63%	0
60 ROW, LAND, EXISTING IMPROVEMENTS	17.33	123,931	37,179	161,110	\$9,297		10%	0
60.01 Purchase or lease of real estate		96,594	28,978	125,572				0
60.02 Relocation of existing households and businesses		27,337	8,201	35,537				0
70 VEHICLES (number)	44	84,000	8,400	92,400	\$2,100		6%	0
70.01 Light Rail	17	76,500	7,650	84,150	\$4,950			0
70.02 Heavy Rail			0	0				0
70.03 Commuter Rail			0	0				0
70.04 Bus			0	0				0
70.05 Other			0	0				0
70.06 Non-revenue vehicles	10	700	70	770	\$77			0
70.07 Spare parts	17	6,800	680	7,480	\$440			0
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	17.33	214,250	21,425	235,676	\$13,600	23%	15%	0
80.01 Project Development		38,955	3,895	42,850				0
80.02 Engineering		54,536	5,454	59,990				0
80.03 Project Management for Design and Construction		19,477	1,948	21,425				0
80.04 Construction Administration & Management		54,536	5,454	59,990				0
80.05 Professional Liability and other Non-Construction Insurance		7,791	779	8,570				0
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		15,582	1,558	17,140				0
80.07 Surveys, Testing, Investigation, Inspection		15,582	1,558	17,140				0
80.08 Start up		7,791	779	8,570				0
Subtotal (10 - 80)	17.33	1,201,274	294,999	1,496,273	\$86,344		94%	0
90 UNALLOCATED CONTINGENCY				89,776			6%	0
Subtotal (10 - 90)	17.33			1,586,049	\$91,525		100%	0
100 FINANCE CHARGES				0			0%	0
Total Project Cost (10 - 100)	17.33			1,586,049	\$91,525		100%	0
Allocated Contingency as % of Base Yr Dollars w/o Contingency				24.56%				
Unallocated Contingency as % of Base Yr Dollars w/o Contingency				7.47%				
Total Contingency as % of Base Yr Dollars w/o Contingency				32.03%				
Unallocated Contingency as % of Subtotal (10 - 80)				6.00%				
YOE Construction Cost per Mile (X000)								\$0
YOE Total Project Cost per Mile Not Including Vehicles (X000)								\$0
YOE Total Project Cost per Mile (X000)								\$0

MAIN WORKSHEET - BUILD ALTERNATIVE

(Rev-Mar2015)

TRIANGLE TRANSIT AUTHORITY
ALTERNATE - C1A-NHC-LPA
EIS (Preliminary Estimate)

Today's Date **3/27/15**
Yr of Base Year \$ **2015**
Yr of Revenue Ops **2020**

	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost	YOE Dollars Total (X000)
10 GUIDEWAY & TRACK ELEMENTS (route miles)	17.13	317,386	91,306	408,692	\$23,853	41%	26%	0
10.01 Guideway: At-grade exclusive right-of-way				0				0
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)	8.74	40,363	10,091	50,453	\$5,772			0
10.03 Guideway: At-grade in mixed traffic			0	0				0
10.04 Guideway: Aerial structure	3.87	178,696	53,609	232,305	\$59,965			0
10.05 Guideway: Built-up fill	1.93	7,721	1,930	9,651	\$4,993			0
10.06 Guideway: Underground cut & cover			0	0				0
10.07 Guideway: Underground tunnel			0	0				0
10.08 Guideway: Retained cut or fill	2.59	30,113	7,528	37,641	\$14,556			0
10.09 Track: Direct fixation			15,339	4,602	19,941			0
10.10 Track: Embedded			15,302	4,591	19,893			0
10.11 Track: Ballasted			22,419	6,726	29,145			0
10.12 Track: Special (switches, turnouts)			6,928	2,078	9,007			0
10.13 Track: Vibration and noise dampening			504	151	655			0
20 STATIONS, STOPS, TERMINALS, INTERMODAL (numb)	17	98,803	27,549	126,352	\$7,432	13%	8%	0
20.01 At-grade station, stop, shelter, mall, terminal, platform	14	32,882	9,865	42,747	\$3,053			0
20.02 Aerial station, stop, shelter, mall, terminal, platform	3	18,255	5,477	23,732	\$7,911			0
20.03 Underground station, stop, shelter, mall, terminal, platform			0	0				0
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.			0	0				0
20.05 Joint development			0	0				0
20.06 Automobile parking multi-story structure		41,831	10,458	52,289				0
20.07 Elevators, escalators		5,834	1,750	7,584				0
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDG	17.13	56,832	17,049	73,881	\$4,312	7%	5%	0
30.01 Administration Building: Office, sales, storage, revenue counting		7,024	2,107	9,132				0
30.02 Light Maintenance Facility			0	0				0
30.03 Heavy Maintenance Facility		25,196	7,559	32,755				0
30.04 Storage or Maintenance of Way Building		12,307	3,692	15,999				0
30.05 Yard and Yard Track		12,305	3,691	15,996				0
40 SITEWORK & SPECIAL CONDITIONS	17.13	136,529	45,279	181,808	\$10,611	18%	12%	0
40.01 Demolition, Clearing, Earthwork		3,561	1,247	4,808				0
40.02 Site Utilities, Utility Relocation		68,981	26,213	95,193				0
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments		4,000	2,000	6,000				0
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks		5,250	1,575	6,826				0
40.05 Site structures including retaining walls, sound walls		500	150	650				0
40.06 Pedestrian / bike access and accommodation, landscaping		3,710	1,298	5,008				0
40.07 Automobile, bus, van accessways including roads, parking lots		47,238	11,809	59,047				0
40.08 Temporary Facilities and other indirect costs during construction		3,289	987	4,276				0
50 SYSTEMS	17.13	163,944	45,198	209,142	\$12,207	21%	13%	0
50.01 Train control and signals		32,260	9,678	41,938				0
50.02 Traffic signals and crossing protection		19,432	3,886	23,318				0
50.03 Traction power supply: substations		37,911	7,582	45,493				0
50.04 Traction power distribution: catenary and third rail		25,126	5,025	30,151				0
50.05 Communications		42,615	17,046	59,661				0
50.06 Fare collection system and equipment		6,600	1,980	8,580				0
50.07 Central Control			0	0				0
Construction Subtotal (10 - 50)	17.13	773,494	226,382	999,875	\$58,358	100%	63%	0
60 ROW, LAND, EXISTING IMPROVEMENTS	17.13	123,488	37,046	160,534	\$9,370		10%	0
60.01 Purchase or lease of real estate		96,249	28,875	125,123				0
60.02 Relocation of existing households and businesses		27,239	8,172	35,410				0
70 VEHICLES (number)	44	84,000	8,400	92,400	\$2,100		6%	0
70.01 Light Rail	17	76,500	7,650	84,150	\$4,950			0
70.02 Heavy Rail				0				0
70.03 Commuter Rail				0				0
70.04 Bus				0				0
70.05 Other				0				0
70.06 Non-revenue vehicles	10	700	70	770	\$77			0
70.07 Spare parts	17	6,800	680	7,480	\$440			0
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	17.13	212,711	21,271	233,982	\$13,656	23%	15%	0
80.01 Project Development		38,675	3,867	42,542				0
80.02 Engineering		54,145	5,414	59,559				0
80.03 Project Management for Design and Construction		19,337	1,934	21,271				0
80.04 Construction Administration & Management		54,145	5,414	59,559				0
80.05 Professional Liability and other Non-Construction Insurance		7,735	773	8,508				0
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		15,470	1,547	17,017				0
80.07 Surveys, Testing, Investigation, Inspection		15,470	1,547	17,017				0
80.08 Start up		7,735	773	8,508				0
Subtotal (10 - 80)	17.13	1,193,692	293,099	1,486,791	\$86,777		94%	0
90 UNALLOCATED CONTINGENCY				89,207			6%	0
Subtotal (10 - 90)	17.13			1,575,999	\$91,983		100%	0
100 FINANCE CHARGES				0			0%	0
Total Project Cost (10 - 100)	17.13			1,575,999	\$91,983		100%	0
Allocated Contingency as % of Base Yr Dollars w/o Contingency				24.55%				
Unallocated Contingency as % of Base Yr Dollars w/o Contingency				7.47%				
Total Contingency as % of Base Yr Dollars w/o Contingency				32.03%				
Unallocated Contingency as % of Subtotal (10 - 80)				6.00%				
YOE Construction Cost per Mile (X000)								\$0
YOE Total Project Cost per Mile Not Including Vehicles (X000)								\$0
YOE Total Project Cost per Mile (X000)								\$0

MAIN WORKSHEET - BUILD ALTERNATIVE

(Rev-Mar2015)

TRIANGLE TRANSIT AUTHORITY
ALTERNATE - C2-NHC-1
EIS (Preliminary Estimate)

Today's Date **3/27/15**
Yr of Base Year \$ **2015**
Yr of Revenue Ops **2020**

	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost	YOE Dollars Total (X000)
10 GUIDEWAY & TRACK ELEMENTS (route miles)	17.35	320,694	92,206	412,901	\$23,801	41%	26%	0
10.01 Guideway: At-grade exclusive right-of-way				0				0
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)	8.91	40,105	10,026	50,131	\$5,630			0
10.03 Guideway: At-grade in mixed traffic			0	0				0
10.04 Guideway: Aerial structure	3.99	179,942	53,983	233,925	\$58,607			0
10.05 Guideway: Built-up fill	1.48	6,010	1,502	7,512	\$5,073			0
10.06 Guideway: Underground cut & cover			0	0				0
10.07 Guideway: Underground tunnel			0	0				0
10.08 Guideway: Retained cut or fill	2.97	33,927	8,482	42,409	\$14,277			0
10.09 Track: Direct fixation		15,804	4,741	20,545				0
10.10 Track: Embedded		14,073	4,222	18,294				0
10.11 Track: Ballasted		23,342	7,003	30,345				0
10.12 Track: Special (switches, turnouts)		6,982	2,095	9,076				0
10.13 Track: Vibration and noise dampening		510	153	663				0
20 STATIONS, STOPS, TERMINALS, INTERMODAL (numb)	17	93,277	25,820	119,098	\$7,006	12%	8%	0
20.01 At-grade station, stop, shelter, mall, terminal, platform	15	34,764	10,429	45,193	\$3,013			0
20.02 Aerial station, stop, shelter, mall, terminal, platform	2	10,720	3,216	13,936	\$6,968			0
20.03 Underground station, stop, shelter, mall, terminal, platform			0	0				0
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.			0	0				0
20.05 Joint development			0	0				0
20.06 Automobile parking multi-story structure		43,256	10,814	54,071				0
20.07 Elevators, escalators		4,538	1,361	5,899				0
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDG	17.35	56,832	17,049	73,881	\$4,259	7%	5%	0
30.01 Administration Building: Office, sales, storage, revenue counting		7,024	2,107	9,132				0
30.02 Light Maintenance Facility			0	0				0
30.03 Heavy Maintenance Facility		25,196	7,559	32,755				0
30.04 Storage or Maintenance of Way Building		12,307	3,692	15,999				0
30.05 Yard and Yard Track		12,305	3,691	15,996				0
40 SITEWORK & SPECIAL CONDITIONS	17.35	136,452	45,407	181,859	\$10,483	18%	12%	0
40.01 Demolition, Clearing, Earthwork		3,572	1,250	4,823				0
40.02 Site Utilities, Utility Relocation		68,189	25,912	94,101				0
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments		4,400	2,200	6,600				0
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks		5,145	1,544	6,689				0
40.05 Site structures including retaining walls, sound walls		500	150	650				0
40.06 Pedestrian / bike access and accommodation, landscaping		5,283	1,849	7,132				0
40.07 Automobile, bus, van accessways including roads, parking lots		46,122	11,531	57,653				0
40.08 Temporary Facilities and other indirect costs during construction		3,240	972	4,212				0
50 SYSTEMS	17.35	166,420	46,119	212,540	\$12,252	21%	13%	0
50.01 Train control and signals		33,430	10,029	43,459				0
50.02 Traffic signals and crossing protection		18,282	3,656	21,938				0
50.03 Traction power supply: substations		37,911	7,582	45,493				0
50.04 Traction power distribution: catenary and third rail		26,037	5,207	31,244				0
50.05 Communications		44,161	17,664	61,825				0
50.06 Fare collection system and equipment		6,600	1,980	8,580				0
50.07 Central Control			0	0				0
Construction Subtotal (10 - 50)	17.35	773,675	226,603	1,000,278	\$57,660	100%	63%	0
60 ROW, LAND, EXISTING IMPROVEMENTS	17.35	123,905	37,171	161,076	\$9,285		10%	0
60.01 Purchase or lease of real estate		96,574	28,972	125,546				0
60.02 Relocation of existing households and businesses		27,331	8,199	35,530				0
70 VEHICLES (number)	44	84,000	8,400	92,400	\$2,100		6%	0
70.01 Light Rail	17	76,500	7,650	84,150	\$4,950			0
70.02 Heavy Rail			0	0				0
70.03 Commuter Rail			0	0				0
70.04 Bus			0	0				0
70.05 Other			0	0				0
70.06 Non-revenue vehicles	10	700	70	770	\$77			0
70.07 Spare parts	17	6,800	680	7,480	\$440			0
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	17.35	212,761	21,276	234,037	\$13,491	23%	15%	0
80.01 Project Development		38,684	3,868	42,552				0
80.02 Engineering		54,157	5,416	59,573				0
80.03 Project Management for Design and Construction		19,342	1,934	21,276				0
80.04 Construction Administration & Management		54,157	5,416	59,573				0
80.05 Professional Liability and other Non-Construction Insurance		7,737	774	8,510				0
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		15,474	1,547	17,021				0
80.07 Surveys, Testing, Investigation, Inspection		15,474	1,547	17,021				0
80.08 Start up		7,737	774	8,510				0
Subtotal (10 - 80)	17.35	1,194,341	293,450	1,487,791	\$85,763		94%	0
90 UNALLOCATED CONTINGENCY				89,267			6%	0
Subtotal (10 - 90)	17.35			1,577,058	\$90,909		100%	0
100 FINANCE CHARGES				0			0%	0
Total Project Cost (10 - 100)	17.35			1,577,058	\$90,909		100%	0
Allocated Contingency as % of Base Yr Dollars w/o Contingency				24.57%				
Unallocated Contingency as % of Base Yr Dollars w/o Contingency				7.47%				
Total Contingency as % of Base Yr Dollars w/o Contingency				32.04%				
Unallocated Contingency as % of Subtotal (10 - 80)				6.00%				
YOE Construction Cost per Mile (X000)								\$0
YOE Total Project Cost per Mile Not Including Vehicles (X000)								\$0
YOE Total Project Cost per Mile (X000)								\$0

MAIN WORKSHEET - BUILD ALTERNATIVE

(Rev-Mar2015)

TRIANGLE TRANSIT AUTHORITY
ALTERNATE - C2-NHC-2
EIS (Preliminary Estimate)

Today's Date **3/27/15**
Yr of Base Year \$ **2015**
Yr of Revenue Ops **2020**

	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost	YOE Dollars Total (X000)
10 GUIDEWAY & TRACK ELEMENTS (route miles)	17.23	312,845	89,870	402,714	\$23,373	41%	26%	0
10.01 Guideway: At-grade exclusive right-of-way				0				0
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)	9.10	41,495	10,374	51,869	\$5,702			0
10.03 Guideway: At-grade in mixed traffic			0	0				0
10.04 Guideway: Aerial structure	3.87	172,484	51,745	224,229	\$57,966			0
10.05 Guideway: Built-up fill	1.46	5,947	1,487	7,434	\$5,075			0
10.06 Guideway: Underground cut & cover			0	0				0
10.07 Guideway: Underground tunnel			0	0				0
10.08 Guideway: Retained cut or fill	2.80	32,236	8,059	40,295	\$14,391			0
10.09 Track: Direct fixation		15,317	4,595	19,912				0
10.10 Track: Embedded		15,166	4,550	19,716				0
10.11 Track: Ballasted		22,741	6,822	29,563				0
10.12 Track: Special (switches, turnouts)		6,953	2,086	9,039				0
10.13 Track: Vibration and noise dampening		507	152	659				0
20 STATIONS, STOPS, TERMINALS, INTERMODAL (numb)	17	93,152	25,783	118,935	\$6,996	12%	8%	0
20.01 At-grade station, stop, shelter, mall, terminal, platform	15	34,638	10,391	45,030	\$3,002			0
20.02 Aerial station, stop, shelter, mall, terminal, platform	2	10,720	3,216	13,936	\$6,968			0
20.03 Underground station, stop, shelter, mall, terminal, platform			0	0				0
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.			0	0				0
20.05 Joint development			0	0				0
20.06 Automobile parking multi-story structure		43,256	10,814	54,071				0
20.07 Elevators, escalators		4,538	1,361	5,899				0
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDG	17.23	56,832	17,049	73,881	\$4,288	7%	5%	0
30.01 Administration Building: Office, sales, storage, revenue counting		7,024	2,107	9,132				0
30.02 Light Maintenance Facility			0	0				0
30.03 Heavy Maintenance Facility		25,196	7,559	32,755				0
30.04 Storage or Maintenance of Way Building		12,307	3,692	15,999				0
30.05 Yard and Yard Track		12,305	3,691	15,996				0
40 SITEWORK & SPECIAL CONDITIONS	17.23	135,510	44,850	180,359	\$10,468	18%	12%	0
40.01 Demolition, Clearing, Earthwork		3,554	1,244	4,798				0
40.02 Site Utilities, Utility Relocation		65,671	24,955	90,627				0
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments		4,400	2,200	6,600				0
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks		5,298	1,589	6,888				0
40.05 Site structures including retaining walls, sound walls		500	150	650				0
40.06 Pedestrian / bike access and accommodation, landscaping		5,283	1,849	7,132				0
40.07 Automobile, bus, van accessways including roads, parking lots		47,578	11,894	59,472				0
40.08 Temporary Facilities and other indirect costs during construction		3,225	968	4,193				0
50 SYSTEMS	17.23	164,400	45,355	209,755	\$12,174	21%	14%	0
50.01 Train control and signals		32,442	9,733	42,175				0
50.02 Traffic signals and crossing protection		19,324	3,865	23,189				0
50.03 Traction power supply: substations		37,911	7,582	45,493				0
50.04 Traction power distribution: catenary and third rail		25,267	5,053	30,321				0
50.05 Communications		42,855	17,142	59,998				0
50.06 Fare collection system and equipment		6,600	1,980	8,580				0
50.07 Central Control			0	0				0
Construction Subtotal (10 - 50)	17.23	762,738	222,907	985,645	\$57,205	100%	64%	0
60 ROW, LAND, EXISTING IMPROVEMENTS	17.23	117,986	35,396	153,381	\$8,902		10%	0
60.01 Purchase or lease of real estate		91,960	27,588	119,549				0
60.02 Relocation of existing households and businesses		26,025	7,808	33,833				0
70 VEHICLES (number)	44	84,000	8,400	92,400	\$2,100		6%	0
70.01 Light Rail	17	76,500	7,650	84,150	\$4,950			0
70.02 Heavy Rail			0	0				0
70.03 Commuter Rail			0	0				0
70.04 Bus			0	0				0
70.05 Other			0	0				0
70.06 Non-revenue vehicles	10	700	70	770	\$77			0
70.07 Spare parts	17	6,800	680	7,480	\$440			0
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	17.23	209,753	20,975	230,728	\$13,391	23%	15%	0
80.01 Project Development		38,137	3,814	41,951				0
80.02 Engineering		53,392	5,339	58,731				0
80.03 Project Management for Design and Construction		19,068	1,907	20,975				0
80.04 Construction Administration & Management		53,392	5,339	58,731				0
80.05 Professional Liability and other Non-Construction Insurance		7,627	763	8,390				0
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		15,255	1,525	16,780				0
80.07 Surveys, Testing, Investigation, Inspection		15,255	1,525	16,780				0
80.08 Start up		7,627	763	8,390				0
Subtotal (10 - 80)	17.23	1,174,476	287,678	1,462,154	\$84,861		94%	0
90 UNALLOCATED CONTINGENCY				87,729			6%	0
Subtotal (10 - 90)	17.23			1,549,883	\$89,952		100%	0
100 FINANCE CHARGES				0			0%	0
Total Project Cost (10 - 100)	17.23			1,549,883	\$89,952		100%	0
Allocated Contingency as % of Base Yr Dollars w/o Contingency				24.49%				
Unallocated Contingency as % of Base Yr Dollars w/o Contingency				7.47%				
Total Contingency as % of Base Yr Dollars w/o Contingency				31.96%				
Unallocated Contingency as % of Subtotal (10 - 80)				6.00%				
YOE Construction Cost per Mile (X000)								\$0
YOE Total Project Cost per Mile Not Including Vehicles (X000)								\$0
YOE Total Project Cost per Mile (X000)								\$0

MAIN WORKSHEET - BUILD ALTERNATIVE

(Rev-Mar2015)

TRIANGLE TRANSIT AUTHORITY
ALTERNATE - C2-NHC-LPA
EIS (Preliminary Estimate)

Today's Date **3/27/15**
Yr of Base Year \$ **2015**
Yr of Revenue Ops **2020**

	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost	YOE Dollars Total (X000)
10 GUIDEWAY & TRACK ELEMENTS (route miles)	17.03	306,593	88,008	394,601	\$23,165	40%	26%	0
10.01 Guideway: At-grade exclusive right-of-way				0				0
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)	9.17	41,837	10,459	52,296	\$5,705			0
10.03 Guideway: At-grade in mixed traffic			0	0				0
10.04 Guideway: Aerial structure	3.65	167,302	50,191	217,493	\$59,594			0
10.05 Guideway: Built-up fill	1.49	6,047	1,512	7,559	\$5,070			0
10.06 Guideway: Underground cut & cover			0	0				0
10.07 Guideway: Underground tunnel			0	0				0
10.08 Guideway: Retained cut or fill	2.73	31,522	7,881	39,403	\$14,444			0
10.09 Track: Direct fixation		14,451	4,335	18,786				0
10.10 Track: Embedded		15,321	4,596	19,917				0
10.11 Track: Ballasted		22,708	6,812	29,520				0
10.12 Track: Special (switches, turnouts)		6,904	2,071	8,976				0
10.13 Track: Vibration and noise dampening		501	150	651				0
20 STATIONS, STOPS, TERMINALS, INTERMODAL (numb)	17	93,470	25,878	119,349	\$7,021	12%	8%	0
20.01 At-grade station, stop, shelter, mall, terminal, platform	15	34,957	10,487	45,444	\$3,030			0
20.02 Aerial station, stop, shelter, mall, terminal, platform	2	10,720	3,216	13,936	\$6,968			0
20.03 Underground station, stop, shelter, mall, terminal, platform			0	0				0
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.			0	0				0
20.05 Joint development			0	0				0
20.06 Automobile parking multi-story structure		43,256	10,814	54,071				0
20.07 Elevators, escalators		4,538	1,361	5,899				0
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDG	17.03	56,832	17,049	73,881	\$4,337	8%	5%	0
30.01 Administration Building: Office, sales, storage, revenue counting		7,024	2,107	9,132				0
30.02 Light Maintenance Facility			0	0				0
30.03 Heavy Maintenance Facility		25,196	7,559	32,755				0
30.04 Storage or Maintenance of Way Building		12,307	3,692	15,999				0
30.05 Yard and Yard Track		12,305	3,691	15,996				0
40 SITEWORK & SPECIAL CONDITIONS	17.03	136,596	45,287	181,883	\$10,677	19%	12%	0
40.01 Demolition, Clearing, Earthwork		3,555	1,244	4,799				0
40.02 Site Utilities, Utility Relocation		68,917	26,188	95,105				0
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments		4,000	2,000	6,000				0
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks		5,318	1,596	6,914				0
40.05 Site structures including retaining walls, sound walls		500	150	650				0
40.06 Pedestrian / bike access and accommodation, landscaping		3,710	1,298	5,008				0
40.07 Automobile, bus, van accessways including roads, parking lots		47,367	11,842	59,209				0
40.08 Temporary Facilities and other indirect costs during construction		3,229	969	4,197				0
50 SYSTEMS	17.03	163,648	45,071	208,719	\$12,253	21%	14%	0
50.01 Train control and signals		32,074	9,622	41,696				0
50.02 Traffic signals and crossing protection		19,714	3,943	23,657				0
50.03 Traction power supply: substations		37,911	7,582	45,493				0
50.04 Traction power distribution: catenary and third rail		24,980	4,996	29,977				0
50.05 Communications		42,369	16,948	59,316				0
50.06 Fare collection system and equipment		6,600	1,980	8,580				0
50.07 Central Control			0	0				0
Construction Subtotal (10 - 50)	17.03	757,139	221,293	978,432	\$57,438	100%	64%	0
60 ROW, LAND, EXISTING IMPROVEMENTS	17.03	117,543	35,263	152,805	\$8,970		10%	0
60.01 Purchase or lease of real estate		91,615	27,485	119,100				0
60.02 Relocation of existing households and businesses		25,927	7,778	33,706				0
70 VEHICLES (number)	44	84,000	8,400	92,400	\$2,100		6%	0
70.01 Light Rail	17	76,500	7,650	84,150	\$4,950			0
70.02 Heavy Rail			0	0				0
70.03 Commuter Rail			0	0				0
70.04 Bus			0	0				0
70.05 Other			0	0				0
70.06 Non-revenue vehicles	10	700	70	770	\$77			0
70.07 Spare parts	17	6,800	680	7,480	\$440			0
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	17.03	208,213	20,821	229,035	\$13,445	23%	15%	0
80.01 Project Development		37,857	3,786	41,643				0
80.02 Engineering		53,000	5,300	58,300				0
80.03 Project Management for Design and Construction		18,928	1,893	20,821				0
80.04 Construction Administration & Management		53,000	5,300	58,300				0
80.05 Professional Liability and other Non-Construction Insurance		7,571	757	8,329				0
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		15,143	1,514	16,657				0
80.07 Surveys, Testing, Investigation, Inspection		15,143	1,514	16,657				0
80.08 Start up		7,571	757	8,329				0
Subtotal (10 - 80)	17.03	1,166,895	285,777	1,452,672	\$85,278		94%	0
90 UNALLOCATED CONTINGENCY				87,160			6%	0
Subtotal (10 - 90)	17.03			1,539,833	\$90,395		100%	0
100 FINANCE CHARGES				0			0%	0
Total Project Cost (10 - 100)	17.03			1,539,833	\$90,395		100%	0
Allocated Contingency as % of Base Yr Dollars w/o Contingency				24.49%				
Unallocated Contingency as % of Base Yr Dollars w/o Contingency				7.47%				
Total Contingency as % of Base Yr Dollars w/o Contingency				31.96%				
Unallocated Contingency as % of Subtotal (10 - 80)				6.00%				
YOE Construction Cost per Mile (X000)								\$0
YOE Total Project Cost per Mile Not Including Vehicles (X000)								\$0
YOE Total Project Cost per Mile (X000)								\$0

MAIN WORKSHEET - BUILD ALTERNATIVE

(Rev-Mar2015)

TRIANGLE TRANSIT AUTHORITY
ALTERNATE - C2A-NHC-1
EIS (Preliminary Estimate)

Today's Date **3/27/15**
Yr of Base Year \$ **2015**
Yr of Revenue Ops **2020**

	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost	YOE Dollars Total (X000)
10 GUIDEWAY & TRACK ELEMENTS (route miles)	17.32	321,498	92,403	413,901	\$23,902	41%	26%	0
10.01 Guideway: At-grade exclusive right-of-way				0				0
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)	8.70	39,387	9,847	49,234	\$5,662			0
10.03 Guideway: At-grade in mixed traffic			0	0				0
10.04 Guideway: Aerial structure	3.99	179,942	53,983	233,925	\$58,607			0
10.05 Guideway: Built-up fill	1.51	6,108	1,527	7,635	\$5,066			0
10.06 Guideway: Underground cut & cover			0	0				0
10.07 Guideway: Underground tunnel			0	0				0
10.08 Guideway: Retained cut or fill	3.12	35,439	8,860	44,299	\$14,185			0
10.09 Track: Direct fixation		15,804	4,741	20,545				0
10.10 Track: Embedded		14,073	4,222	18,294				0
10.11 Track: Ballasted		23,263	6,979	30,242				0
10.12 Track: Special (switches, turnouts)		6,973	2,092	9,066				0
10.13 Track: Vibration and noise dampening		509	153	662				0
20 STATIONS, STOPS, TERMINALS, INTERMODAL (numb)	17	91,856	25,465	117,321	\$6,901	12%	7%	0
20.01 At-grade station, stop, shelter, mall, terminal, platform	15	34,767	10,430	45,197	\$3,013			0
20.02 Aerial station, stop, shelter, mall, terminal, platform	2	10,720	3,216	13,936	\$6,968			0
20.03 Underground station, stop, shelter, mall, terminal, platform			0	0				0
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.			0	0				0
20.05 Joint development			0	0				0
20.06 Automobile parking multi-story structure		41,831	10,458	52,289				0
20.07 Elevators, escalators		4,538	1,361	5,899				0
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDG	17.32	56,832	17,049	73,881	\$4,267	7%	5%	0
30.01 Administration Building: Office, sales, storage, revenue counting		7,024	2,107	9,132				0
30.02 Light Maintenance Facility			0	0				0
30.03 Heavy Maintenance Facility		25,196	7,559	32,755				0
30.04 Storage or Maintenance of Way Building		12,307	3,692	15,999				0
30.05 Yard and Yard Track		12,305	3,691	15,996				0
40 SITEWORK & SPECIAL CONDITIONS	17.32	135,899	45,251	181,150	\$10,461	18%	12%	0
40.01 Demolition, Clearing, Earthwork		3,574	1,251	4,825				0
40.02 Site Utilities, Utility Relocation		68,620	26,076	94,696				0
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments		4,400	2,200	6,600				0
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks		3,658	1,097	4,755				0
40.05 Site structures including retaining walls, sound walls		500	150	650				0
40.06 Pedestrian / bike access and accommodation, landscaping		5,283	1,849	7,132				0
40.07 Automobile, bus, van accessways including roads, parking lots		46,622	11,656	58,278				0
40.08 Temporary Facilities and other indirect costs during construction		3,242	973	4,215				0
50 SYSTEMS	17.32	166,622	46,138	212,760	\$12,287	21%	14%	0
50.01 Train control and signals		33,371	10,011	43,382				0
50.02 Traffic signals and crossing protection		18,666	3,733	22,400				0
50.03 Traction power supply: substations		37,911	7,582	45,493				0
50.04 Traction power distribution: catenary and third rail		25,991	5,198	31,189				0
50.05 Communications		44,083	17,633	61,716				0
50.06 Fare collection system and equipment		6,600	1,980	8,580				0
50.07 Central Control			0	0				0
Construction Subtotal (10 - 50)	17.32	772,706	226,306	999,013	\$57,692	100%	64%	0
60 ROW, LAND, EXISTING IMPROVEMENTS	17.32	121,226	36,368	157,594	\$9,101		10%	0
60.01 Purchase or lease of real estate		94,486	28,346	122,832				0
60.02 Relocation of existing households and businesses		26,740	8,022	34,762				0
70 VEHICLES (number)	44	84,000	8,400	92,400	\$2,100		6%	0
70.01 Light Rail	17	76,500	7,650	84,150	\$4,950			0
70.02 Heavy Rail				0				0
70.03 Commuter Rail				0				0
70.04 Bus				0				0
70.05 Other				0				0
70.06 Non-revenue vehicles	10	700	70	770	\$77			0
70.07 Spare parts	17	6,800	680	7,480	\$440			0
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	17.32	212,494	21,249	233,744	\$13,498	23%	15%	0
80.01 Project Development		38,635	3,864	42,499				0
80.02 Engineering		54,089	5,409	59,498				0
80.03 Project Management for Design and Construction		19,318	1,932	21,249				0
80.04 Construction Administration & Management		54,089	5,409	59,498				0
80.05 Professional Liability and other Non-Construction Insurance		7,727	773	8,500				0
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		15,454	1,545	17,000				0
80.07 Surveys, Testing, Investigation, Inspection		15,454	1,545	17,000				0
80.08 Start up		7,727	773	8,500				0
Subtotal (10 - 80)	17.32	1,190,427	292,324	1,482,751	\$85,627		94%	0
90 UNALLOCATED CONTINGENCY				88,965			6%	0
Subtotal (10 - 90)	17.32			1,571,716	\$90,765		100%	0
100 FINANCE CHARGES				0			0%	0
Total Project Cost (10 - 100)	17.32			1,571,716	\$90,765		100%	0
Allocated Contingency as % of Base Yr Dollars w/o Contingency				24.56%				
Unallocated Contingency as % of Base Yr Dollars w/o Contingency				7.47%				
Total Contingency as % of Base Yr Dollars w/o Contingency				32.03%				
Unallocated Contingency as % of Subtotal (10 - 80)				6.00%				
YOE Construction Cost per Mile (X000)								\$0
YOE Total Project Cost per Mile Not Including Vehicles (X000)								\$0
YOE Total Project Cost per Mile (X000)								\$0

MAIN WORKSHEET - BUILD ALTERNATIVE

(Rev-Mar2015)

TRIANGLE TRANSIT AUTHORITY
ALTERNATE - C2A-NHC-2
EIS (Preliminary Estimate)

Today's Date 3/27/15
Yr of Base Year \$ 2015
Yr of Revenue Ops 2020

	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost	YOE Dollars Total (X000)
10 GUIDEWAY & TRACK ELEMENTS (route miles)	17.20	313,648	90,066	403,714	\$23,474	41%	26%	0
10.01 Guideway: At-grade exclusive right-of-way				0				0
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)	8.89	40,777	10,194	50,971	\$5,736			0
10.03 Guideway: At-grade in mixed traffic			0	0				0
10.04 Guideway: Aerial structure	3.87	172,484	51,745	224,229	\$57,966			0
10.05 Guideway: Built-up fill	1.49	6,045	1,511	7,556	\$5,068			0
10.06 Guideway: Underground cut & cover			0	0				0
10.07 Guideway: Underground tunnel			0	0				0
10.08 Guideway: Retained cut or fill	2.95	33,748	8,437	42,185	\$14,288			0
10.09 Track: Direct fixation		15,317	4,595	19,912				0
10.10 Track: Embedded		15,166	4,550	19,716				0
10.11 Track: Ballasted		22,662	6,799	29,460				0
10.12 Track: Special (switches, turnouts)		6,944	2,083	9,028				0
10.13 Track: Vibration and noise dampening		506	152	657				0
20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)	17	91,730	25,428	117,158	\$6,892	12%	8%	0
20.01 At-grade station, stop, shelter, mall, terminal, platform	15	34,642	10,393	45,034	\$3,002			0
20.02 Aerial station, stop, shelter, mall, terminal, platform	2	10,720	3,216	13,936	\$6,968			0
20.03 Underground station, stop, shelter, mall, terminal, platform			0	0				0
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.			0	0				0
20.05 Joint development			0	0				0
20.06 Automobile parking multi-story structure		41,831	10,458	52,289				0
20.07 Elevators, escalators		4,538	1,361	5,899				0
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDG (number)	17.20	56,832	17,049	73,881	\$4,296	8%	5%	0
30.01 Administration Building: Office, sales, storage, revenue counting		7,024	2,107	9,132				0
30.02 Light Maintenance Facility			0	0				0
30.03 Heavy Maintenance Facility		25,196	7,559	32,755				0
30.04 Storage or Maintenance of Way Building		12,307	3,692	15,999				0
30.05 Yard and Yard Track		12,305	3,691	15,996				0
40 SITEWORK & SPECIAL CONDITIONS	17.20	134,957	44,693	179,651	\$10,446	18%	12%	0
40.01 Demolition, Clearing, Earthwork		3,556	1,244	4,800				0
40.02 Site Utilities, Utility Relocation		66,103	25,119	91,222				0
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments		4,400	2,200	6,600				0
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks		3,810	1,143	4,954				0
40.05 Site structures including retaining walls, sound walls		500	150	650				0
40.06 Pedestrian / bike access and accommodation, landscaping		5,283	1,849	7,132				0
40.07 Automobile, bus, van accessways including roads, parking lots		48,078	12,019	60,097				0
40.08 Temporary Facilities and other indirect costs during construction		3,228	968	4,196				0
50 SYSTEMS	17.20	164,601	45,374	209,975	\$12,209	21%	14%	0
50.01 Train control and signals		32,383	9,715	42,098				0
50.02 Traffic signals and crossing protection		19,709	3,942	23,651				0
50.03 Traction power supply: substations		37,911	7,582	45,493				0
50.04 Traction power distribution: catenary and third rail		25,221	5,044	30,266				0
50.05 Communications		42,777	17,111	59,888				0
50.06 Fare collection system and equipment		6,600	1,980	8,580				0
50.07 Central Control			0	0				0
Construction Subtotal (10 - 50)	17.20	761,769	222,611	984,380	\$57,236	100%	64%	0
60 ROW, LAND, EXISTING IMPROVEMENTS	17.20	115,307	34,592	149,900	\$8,716		10%	0
60.01 Purchase or lease of real estate		89,873	26,962	116,835				0
60.02 Relocation of existing households and businesses		25,434	7,630	33,065				0
70 VEHICLES (number)	44	84,000	8,400	92,400	\$2,100		6%	0
70.01 Light Rail	17	76,500	7,650	84,150	\$4,950			0
70.02 Heavy Rail				0				0
70.03 Commuter Rail				0				0
70.04 Bus				0				0
70.05 Other				0				0
70.06 Non-revenue vehicles	10	700	70	770	\$77			0
70.07 Spare parts	17	6,800	680	7,480	\$440			0
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	17.20	209,487	20,949	230,435	\$13,398	23%	15%	0
80.01 Project Development		38,088	3,809	41,897				0
80.02 Engineering		53,324	5,332	58,656				0
80.03 Project Management for Design and Construction		19,044	1,904	20,949				0
80.04 Construction Administration & Management		53,324	5,332	58,656				0
80.05 Professional Liability and other Non-Construction Insurance		7,618	762	8,379				0
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		15,235	1,524	16,759				0
80.07 Surveys, Testing, Investigation, Inspection		15,235	1,524	16,759				0
80.08 Start up		7,618	762	8,379				0
Subtotal (10 - 80)	17.20	1,170,563	286,551	1,457,114	\$84,722		94%	0
90 UNALLOCATED CONTINGENCY				87,427			6%	0
Subtotal (10 - 90)	17.20			1,544,541	\$89,806		100%	0
100 FINANCE CHARGES				0			0%	0
Total Project Cost (10 - 100)	17.20			1,544,541	\$89,806		100%	0
Allocated Contingency as % of Base Yr Dollars w/o Contingency				24.48%				
Unallocated Contingency as % of Base Yr Dollars w/o Contingency				7.47%				
Total Contingency as % of Base Yr Dollars w/o Contingency				31.95%				
Unallocated Contingency as % of Subtotal (10 - 80)				6.00%				
YOE Construction Cost per Mile (X000)								\$0
YOE Total Project Cost per Mile Not Including Vehicles (X000)								\$0
YOE Total Project Cost per Mile (X000)								\$0

MAIN WORKSHEET - BUILD ALTERNATIVE

(Rev-Mar2015)

TRIANGLE TRANSIT AUTHORITY
ALTERNATE - C2A-NHC-LPA
EIS (Preliminary Estimate)

Today's Date 3/27/15
Yr of Base Year \$ 2015
Yr of Revenue Ops 2020

	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost	YOE Dollars Total (X000)
10 GUIDEWAY & TRACK ELEMENTS (route miles)	17.00	307,397	88,204	395,601	\$23,266	40%	26%	0
10.01 Guideway: At-grade exclusive right-of-way				0				0
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)	8.96	41,119	10,280	51,398	\$5,739			0
10.03 Guideway: At-grade in mixed traffic			0	0				0
10.04 Guideway: Aerial structure	3.65	167,302	50,191	217,493	\$59,594			0
10.05 Guideway: Built-up fill	1.52	6,145	1,536	7,681	\$5,063			0
10.06 Guideway: Underground cut & cover			0	0				0
10.07 Guideway: Underground tunnel			0	0				0
10.08 Guideway: Retained cut or fill	2.88	33,034	8,259	41,293	\$14,335			0
10.09 Track: Direct fixation		14,451	4,335	18,786				0
10.10 Track: Embedded		15,321	4,596	19,917				0
10.11 Track: Ballasted		22,629	6,789	29,417				0
10.12 Track: Special (switches, turnouts)		6,896	2,069	8,965				0
10.13 Track: Vibration and noise dampening		500	150	650				0
20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)	17	92,049	25,523	117,572	\$6,916	12%	8%	0
20.01 At-grade station, stop, shelter, mall, terminal, platform	15	34,960	10,488	45,448	\$3,030			0
20.02 Aerial station, stop, shelter, mall, terminal, platform	2	10,720	3,216	13,936	\$6,968			0
20.03 Underground station, stop, shelter, mall, terminal, platform			0	0				0
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.			0	0				0
20.05 Joint development			0	0				0
20.06 Automobile parking multi-story structure		41,831	10,458	52,289				0
20.07 Elevators, escalators		4,538	1,361	5,899				0
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDG (number)	17.00	56,832	17,049	73,881	\$4,345	8%	5%	0
30.01 Administration Building: Office, sales, storage, revenue counting		7,024	2,107	9,132				0
30.02 Light Maintenance Facility			0	0				0
30.03 Heavy Maintenance Facility		25,196	7,559	32,755				0
30.04 Storage or Maintenance of Way Building		12,307	3,692	15,999				0
30.05 Yard and Yard Track		12,305	3,691	15,996				0
40 SITEWORK & SPECIAL CONDITIONS	17.00	136,043	45,131	181,174	\$10,655	19%	12%	0
40.01 Demolition, Clearing, Earthwork		3,557	1,245	4,801				0
40.02 Site Utilities, Utility Relocation		69,348	26,352	95,700				0
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments		4,000	2,000	6,000				0
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks		3,831	1,149	4,980				0
40.05 Site structures including retaining walls, sound walls		500	150	650				0
40.06 Pedestrian / bike access and accommodation, landscaping		3,710	1,298	5,008				0
40.07 Automobile, bus, van accessways including roads, parking lots		47,867	11,967	59,834				0
40.08 Temporary Facilities and other indirect costs during construction		3,231	969	4,201				0
50 SYSTEMS	17.00	163,850	45,090	208,939	\$12,288	21%	14%	0
50.01 Train control and signals		32,015	9,604	41,619				0
50.02 Traffic signals and crossing protection		20,099	4,020	24,119				0
50.03 Traction power supply: substations		37,911	7,582	45,493				0
50.04 Traction power distribution: catenary and third rail		24,934	4,987	29,921				0
50.05 Communications		42,291	16,916	59,207				0
50.06 Fare collection system and equipment		6,600	1,980	8,580				0
50.07 Central Control			0	0				0
Construction Subtotal (10 - 50)	17.00	756,170	220,997	977,167	\$57,470	100%	64%	0
60 ROW, LAND, EXISTING IMPROVEMENTS	17.00	114,865	34,459	149,324	\$8,782		10%	0
60.01 Purchase or lease of real estate		89,528	26,858	116,386				0
60.02 Relocation of existing households and businesses		25,337	7,601	32,938				0
70 VEHICLES (number)	44	84,000	8,400	92,400	\$2,100		6%	0
70.01 Light Rail	17	76,500	7,650	84,150	\$4,950			0
70.02 Heavy Rail				0				0
70.03 Commuter Rail				0				0
70.04 Bus				0				0
70.05 Other				0				0
70.06 Non-revenue vehicles	10	700	70	770	\$77			0
70.07 Spare parts	17	6,800	680	7,480	\$440			0
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	17.00	207,947	20,795	228,741	\$13,453	23%	15%	0
80.01 Project Development		37,809	3,781	41,589				0
80.02 Engineering		52,932	5,293	58,225				0
80.03 Project Management for Design and Construction		18,904	1,890	20,795				0
80.04 Construction Administration & Management		52,932	5,293	58,225				0
80.05 Professional Liability and other Non-Construction Insurance		7,562	756	8,318				0
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		15,123	1,512	16,636				0
80.07 Surveys, Testing, Investigation, Inspection		15,123	1,512	16,636				0
80.08 Start up		7,562	756	8,318				0
Subtotal (10 - 80)	17.00	1,162,982	284,651	1,447,633	\$85,140		94%	0
90 UNALLOCATED CONTINGENCY				86,858			6%	0
Subtotal (10 - 90)	17.00			1,534,491	\$90,248		100%	0
100 FINANCE CHARGES				0			0%	0
Total Project Cost (10 - 100)	17.00			1,534,491	\$90,248		100%	0
Allocated Contingency as % of Base Yr Dollars w/o Contingency				24.48%				
Unallocated Contingency as % of Base Yr Dollars w/o Contingency				7.47%				
Total Contingency as % of Base Yr Dollars w/o Contingency				31.94%				
Unallocated Contingency as % of Subtotal (10 - 80)				6.00%				
YOE Construction Cost per Mile (X000)								\$0
YOE Total Project Cost per Mile Not Including Vehicles (X000)								\$0
YOE Total Project Cost per Mile (X000)								\$0