



**LYNX Blue Line Extension
(Northeast Corridor)**

Light Rail Project

Contract #: 08-477

WBS #: 5.05

Operations and Maintenance Quantities and Costs

LRT

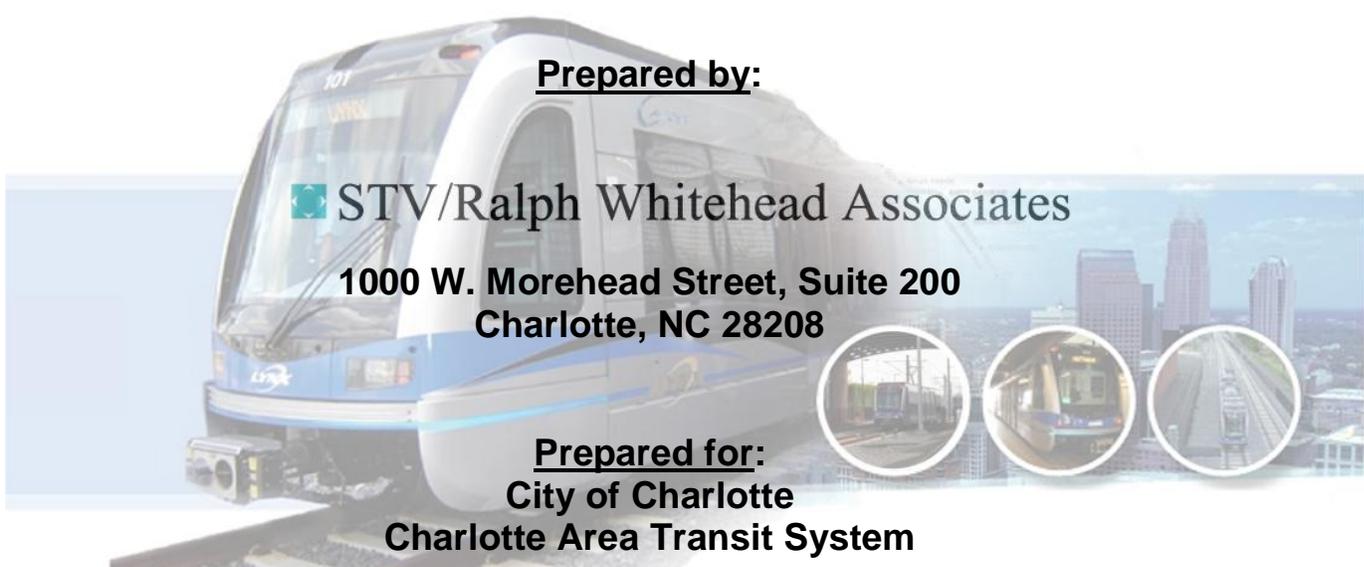
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Prepared for:

**City of Charlotte
Charlotte Area Transit System**



Rev. 02

**Project #: 2513745
May 24, 2011**

LYNX Blue Line Extension (Northeast Corridor)
Summary: Light Rail Operations and Maintenance Quantities and Costs

	2010	2016		2035	
	<i>Reported</i>	<i>Opening Year Model</i>		<i>Future Year Model</i>	
	<i>South Corridor</i>	<i>NB / Baseline</i>	<i>Build</i>	<i>NB / Baseline</i>	<i>Build</i>
Peak Headway	10 min	7.5 min	7.5 min	10 min	10 min
Peak Period Train Consist	2 cars	2 cars	2 cars	3 cars	3 cars
Annual Revenue Train Hours	27,875	35,371	59,150	32,347	53,102
Annual Revenue Car Hours	43,427	56,856	95,567	61,392	100,103
Annual Revenue Train Miles	518,481	566,583	1,125,887	510,095	1,013,636
Annual Revenue Car Miles	807,745	920,840	1,829,849	977,328	1,942,100
Track Miles	9.6	9.6	19	9.6	19
Total number of cars in peak service	N/A	18	30	21	33
Total number of cars in fleet	16	21	35	25	38
Total number of trains in peak service	N/A	9	15	7	11
Total number of Stations	15	15	26	15	26
Total sq footage of maintenance facilities	90,000	90,000	94,800	90,000	94,800
Number of Parking Structures	1	1	3	1	3
Total Annual LRT O&M Costs (2010\$)	<i>N/A</i>	\$15,687,172	\$27,787,426	\$16,456,651	\$28,351,513

Note: FY2010 operating quantities are reported by CATS Rail Ops. All quantities for other years are estimated based on planned service levels.

2016 Base H7.5 (2-car)

Cost Item	Unit Of Service	Type	Productivity Ratio	Employees (FTEs)	Unit Cost ¹	Annual Cost
Vehicle Operations						
Rail Operators	35,371 Annual Revenue Train Hours	L	0.0010 Employees/Rev. Train Hr	35.5	\$ 62,561.47 /Employee	\$2,222,784.85
Rail Operations Supervisors	35,371 Annual Revenue Train Hours	L	0.0006 Employees/Rev. Train Hr	21.6	\$ 72,190.64 /Employee	\$1,557,264.15
Propulsion Power	920,840 Annual Revenue Car Miles	U	-		\$ 0.63 /Rev. Car Mile	\$577,085.05
Subtotal						\$4,357,134.05
Vehicle Maintenance						
Rail Car Electro Mechanics	21 Total number of cars in fleet	L	0.9375 Employees/Total cars	19.7	\$ 74,467.70 /Employee	\$1,466,082.79
Rail Car Servicers	21 Total number of cars in fleet	L	0.2500 Employees/Total cars	5.3	\$ 42,886.41 /Employee	\$225,153.66
Rail Shop Machinists	21 Total number of cars in fleet	L	0.1250 Employees/Total cars	2.6	\$ 74,467.70 /Employee	\$195,477.71
Rail Car Maintenance Supervisors	21 Total number of cars in fleet	L	0.2500 Employees/Total cars	5.3	\$ 87,122.67 /Employee	\$457,394.00
Materials and Supplies ²	920,840 Annual Revenue Car Miles	M	-		\$ 0.66 /Rev. Car Mile	\$606,123.72
Subtotal						\$2,950,232
Maintenance of Way (MOW)						
MOW Technicians ³	9.6 Track Miles	L	1.1458 Employees / Trk Mile	11.0	\$ 74,467.70 /Employee	\$819,145
Rail MOW Supervisors	9.6 Track Miles	L	0.5208 Employees / Trk Mile	5.0	\$ 87,122.67 /Employee	\$435,613
Track Maintainers	9.6 Track Miles	L	0.3125 Employees / Trk Mile	3.0	\$ 67,807.32 /Employee	\$203,422
Track Laborers	9.6 Track Miles	L	0.3125 Employees / Trk Mile	3.0	\$ 35,782.10 /Employee	\$107,346
Materials, Supplies and Contracted Services ⁴	9.6 Track Miles	M	-		\$ 23,954.62 /Trk Mile	\$229,964
Subtotal						\$1,795,491
Warranty & Parts						
Warranty & Parts Manager	1 Fixed	L	1.0000 Employee	1.0	\$ 79,042.84 /Employee	\$79,043
Warranty & Parts Specialist	1 Fixed	L	1.0000 Employee	1.0	\$ 74,197.48 /Employee	\$74,197
Stores Clerk	21 Total number of cars in fleet	L	0.1250 Employees/Total cars	2.6	\$ 44,649.74 /Employee	\$117,206
Receiving Clerk	21 Total number of cars in fleet	L	0.0625 Employees/Total cars	1.3	\$ 47,021.06 /Employee	\$61,715
Subtotal						\$332,161
Facility Maintenance						
Station, Line, and PNR Maintenance Materials, Supplies and Contracted Services ⁵	15 Stations		-		\$ 60,000.00 /Station ⁶	\$900,000
Light Rail Maintenance and Storage Facility ⁷	90,000 Maint. Facility Sq Footage		-		\$ 5.17 /SF	\$465,000
Subtotal						\$1,365,000
Other						
Casualty and Insurance ⁸	56,856 Annual Revenue Car Hours		-		\$ 41.16 /Rev. Car Hr	\$2,340,053
General Administration and Technology	21 Total number of cars in fleet		-		\$ 14,554.85 /Car	\$305,652
Subtotal						\$2,645,705
Revenue Collection⁹						
Salary and Fringe	21 Total number of cars in fleet	L	-		\$ 13,711.90 /Car	\$287,950
General Administration	21 Total number of cars in fleet		-		\$ 2,838.98 /Car	\$59,619
Insurance	21 Total number of cars in fleet		-		\$ 344.80 /Car	\$7,241
Subtotal						\$354,809
Transit Security and Safety¹⁰						
Line Security and Safety	9.6 Track Miles		-		\$ 157,220.02 /Trk Mile	\$1,509,312
Parking Garage Security and Safety	1 Number of Parking Structures		-		\$ 377,328.04 /Parking Str	\$377,328
Subtotal						\$1,886,640
Grand Total						\$15,687,172

L = Labor M = Material U=Utilities

¹ - All unit costs per employee reflect FY 2010 market rate salaries plus a fringe factor of 0.38 for Non Exempt positions and 0.29 for Exempt positions.

² - Materials and Supplies includes budget item costs for Shop Maint. & Repair equip, tools, uniforms/protective clothing, haz mat disposal, cleaning supplies

³ MOW technicians include electronic technicians, train control technicians, traction power technicians as these positions appear in the CATS LRT org chart

⁴ - Materials and Supplies includes budget item costs for Emergency Repairs (standby contract for repair of OCS & track, Time and material for actual repairs to OCS & track, Track Grinding (post revenue), Track (realignment geometry check), materials (crossing gates, mast assemblies, lighting assemblies); ROW Materials (ballast, ties, rails, asphalt, substation breakers, surplus track material), Traction Power, Train Control (ATP Equipment LRV & Wayside), Track, Systems, and add'l Parts,

⁵ Station, Line, and PNR Maintenance Materials, Supplies and Contracted Services includes costs associated with graffiti removal, Misc. HVAC, utilities (water and electricity costs), contracted services (landscape management) costs, janitorial services at the Charlotte Transit Center, Misc. Repairs/Services (Shelters & Stops), and Misc. supplies (Shelters & Stops), as shown in CATS facilities line item budget.

⁶ Per direction of CATS facilities department, the annual cost per station is assumed to be \$60,000/year. This cost is an average annualized cost and includes utilities (water and electric) landscaping and surface maintenance. This cost does not include salary and fringe.

⁷ - Based on South Boulevard Light Rail Facility costs associated with Gregory Pest Control, Metro Fire and Safety, Tarheel Sweeping, Joffee Window Cleaning, ISS Janitorial, Allied Waste Svcs, Coyne Textile Svcs, Duke Power, Piedmont Natural Gas, City of Charlotte Water, Vehicle Fuel, MISC Repairs/Services (Shelters & Stops), MISC supplies (Shelters & Stops), Building services - Material & Supplies, and Landscape Management - Contracts. Per direction of CATS facilities department, the FY 2010 annual cost was \$465,000 for the 90,000 SF facility.

⁸ Casualty and insurance includes costs for insurance premiums and insurance administration.

⁹ Revenue collection costs were derived from a separate cost center in the CATS FY10 Line Item Budget and represents costs associated with revenue collection on the transit system. Per direction of CATS, the total Revenue Collection unit costs have been multiplied by 41.25% to represent the share of revenue collection costs applicable only to rail operations in the Opening Year.

¹⁰ Transit Security and Safety costs were derived from a separate cost center in the CATS FY10 Line Item Budget and represents costs associated with providing security on the transit system. Per direction of CATS, the total Transit Security and Safety unit costs have been multiplied by 40% to represent the share of security and safety costs applicable only to rail operations.

2016 Build H7.5 (2-car)

Cost Item	Unit Of Service	Type	Productivity Ratio	Employees (FTEs)	Unit Cost ¹	Annual Cost
Vehicle Operations						
Rail Operators	59,150 Annual Revenue Train Hours	L	0.0010 Employees/Rev. Train Hr	59.4	\$ 62,561.47 /Employee	\$3,717,105.09
Rail Operations Supervisors	59,150 Annual Revenue Train Hours	L	0.0006 Employees/Rev. Train Hr	36.1	\$ 72,190.64 /Employee	\$2,604,172.19
Propulsion Power	1,829,849 Annual Revenue Car Miles	U	-		\$ 0.63 /Rev. Car Mile	\$1,146,755.74
Subtotal						\$7,468,033.01
Vehicle Maintenance						
Rail Car Electro Mechanics	35 Total number of cars in fleet	L	0.9375 Employees/Total cars	32.8	\$ 74,467.70 /Employee	\$2,443,471.32
Rail Car Servicers	35 Total number of cars in fleet	L	0.2500 Employees/Total cars	8.8	\$ 42,886.41 /Employee	\$375,256.11
Rail Shop Machinists	35 Total number of cars in fleet	L	0.1250 Employees/Total cars	4.4	\$ 74,467.70 /Employee	\$325,796.18
Rail Car Maintenance Supervisors	35 Total number of cars in fleet	L	0.2500 Employees/Total cars	8.8	\$ 87,122.67 /Employee	\$762,323.33
Materials and Supplies ²	1,829,849 Annual Revenue Car Miles	M	-		\$ 0.66 /Rev. Car Mile	\$1,204,459.98
Subtotal						\$5,111,307
Maintenance of Way (MOW)						
MOW Technicians ³	19.0 Track Miles	L	1.1458 Employees / Trk Mile	21.8	\$ 74,467.70 /Employee	\$1,621,224
Rail MOW Supervisors	19.0 Track Miles	L	0.5208 Employees / Trk Mile	9.9	\$ 87,122.67 /Employee	\$862,151
Track Maintainers	19.0 Track Miles	L	0.3125 Employees / Trk Mile	5.9	\$ 67,807.32 /Employee	\$402,606
Track Laborers	19.0 Track Miles	L	0.3125 Employees / Trk Mile	5.9	\$ 35,782.10 /Employee	\$212,456
Materials, Supplies and Contracted Services ⁴	19.0 Track Miles	M	-		\$ 23,954.62 /Trk Mile	\$455,138
Subtotal						\$3,553,575
Warranty & Parts						
Warranty & Parts Manager	1 Fixed	L	1.0000 Employee	1.0	\$ 79,042.84 /Employee	\$79,043
Warranty & Parts Specialist	1 Fixed	L	1.0000 Employee	1.0	\$ 74,197.48 /Employee	\$74,197
Stores Clerk	35 Total number of cars in fleet	L	0.1250 Employees/Total cars	4.4	\$ 44,649.74 /Employee	\$195,343
Receiving Clerk	35 Total number of cars in fleet	L	0.0625 Employees/Total cars	2.2	\$ 47,021.06 /Employee	\$102,859
Subtotal						\$451,441
Facility Maintenance						
Station, Line, and PNR Maintenance Materials, Supplies and Contracted Services ⁵	26 Stations		-		\$ 60,000.00 /Station ⁶	\$1,560,000
Light Rail Maintenance and Storage Facility ⁷	94,800 Maint. Facility Sq Footage		-		\$ 5.17 /SF	\$489,800
Subtotal						\$2,049,800
Other						
Casualty and Insurance ⁸	95,567 Annual Revenue Car Hours		-		\$ 41.16 /Rev. Car Hr	\$3,933,337
General Administration and Technology	35 Total number of cars in fleet		-		\$ 14,554.85 /Car	\$509,420
Subtotal						\$4,442,756
Revenue Collection⁹						
Salary and Fringe	35 Total number of cars in fleet	L	-		\$ 13,711.90 /Car	\$479,916
General Administration	35 Total number of cars in fleet		-		\$ 2,838.98 /Car	\$99,364
Insurance	35 Total number of cars in fleet		-		\$ 344.80 /Car	\$12,068
Subtotal						\$591,349
Transit Security and Safety¹⁰						
Line Security and Safety	19 Track Miles		-		\$ 157,220.02 /Trk Mile	\$2,987,180
Parking Garage Security and Safety	3 Number of Parking Structures		-		\$ 377,328.04 /Parking Str	\$1,131,984
Subtotal						\$4,119,164
Grand Total						\$27,787,426

L = Labor M = Material U=Utilities

¹ - All unit costs per employee reflect FY 2010 market rate salaries plus a fringe factor of 0.38 for Non Exempt positions and 0.29 for Exempt positions.

² - Materials and Supplies includes budget item costs for Shop Maint. & Repair equip, tools, uniforms/protective clothing, haz mat disposal, cleaning supplies

³ - MOW technicians include electronic technicians, train control technicians, traction power technicians as these positions appear in the CATS LRT org chart

⁴ - Materials and Supplies includes budget item costs for Emergency Repairs (standby contract for repair of OCS & track, Time and material for actual repairs to OCS & track, Track Grinding (post revenue), Track (realignment geometry check), materials (crossing gates, mast assemblies, lighting assemblies); ROW Materials (ballast, ties, rails, asphalt, substation breakers, surplus track material), Traction Power, Train Control (ATP Equipment LRV & Wayside), Track, Systems, and add'l Parts,

⁵ - Station, Line, and PNR Maintenance Materials, Supplies and Contracted Services includes costs associated with graffiti removal, Misc. HVAC, utilities (water and electricity costs), contracted services (landscape management) costs, janitorial services at the Charlotte Transit Center, Misc. Repairs/Services (Shelters & Stops), and Misc. supplies (Shelters & Stops), as shown in CATS facilities line item budget.

⁶ - Per direction of CATS facilities department, the annual cost per station is assumed to be \$60,000/year. This cost is an average annualized cost and includes utilities (water and electric) landscaping and surface maintenance. This cost does not include salary and fringe.

⁷ - Based on South Boulevard Light Rail Facility costs associated with Gregory Pest Control, Metro Fire and Safety, Tarheel Sweeping, Joffee Window Cleaning, ISS Janitorial, Allied Waste Svcs, Coyne Textile Svcs, Duke Power, Piedmont Natural Gas, City of Charlotte Water, Vehicle Fuel, MISC Repairs/Services (Shelters & Stops), MISC supplies (Shelters & Stops), Building services - Material & Supplies, and Landscape Management - Contracts. Per direction of CATS facilities department, the FY 2010 annual cost was \$465,000 for the 90,000 SF facility.

⁸ - Casualty and insurance includes costs for insurance premiums and insurance administration.

⁹ - Revenue collection costs were derived from a separate cost center in the CATS FY10 Line Item Budget and represents costs associated with revenue collection on the transit system. Per direction of CATS, the total Revenue Collection unit costs have been multiplied by 41.25% to represent the share of revenue collection costs applicable only to rail operations in the Opening Year.

¹⁰ - Transit Security and Safety costs were derived from a separate cost center in the CATS FY10 Line Item Budget and represents costs associated with providing security on the transit system. Per direction of CATS, the total Transit Security and Safety unit costs have been multiplied by 40% to represent the share of security and safety costs applicable only to rail operations.

2035 Base H10 (3-car)

Cost Item	Unit Of Service	Type	Productivity Ratio	Employees (FTEs)	Unit Cost ¹	Annual Cost
Vehicle Operations						
Rail Operators	32,347 Annual Revenue Train Hours	L	0.0010 Employees/Rev. Train Hr	32.5	\$ 62,561.47 /Employee	\$2,032,750.60
Rail Operations Supervisors	32,347 Annual Revenue Train Hours	L	0.0006 Employees/Rev. Train Hr	19.7	\$ 72,190.64 /Employee	\$1,424,127.77
Propulsion Power	977,328 Annual Revenue Car Miles	U	-		\$ 0.63 /Rev. Car Mile	\$612,485.96
Subtotal						\$4,069,364.33
Vehicle Maintenance						
Rail Car Electro Mechanics	25 Total number of cars in fleet	L	0.9375 Employees/Total cars	23.4	\$ 74,467.70 /Employee	\$1,745,336.65
Rail Car Servicers	25 Total number of cars in fleet	L	0.2500 Employees/Total cars	6.3	\$ 42,886.41 /Employee	\$268,040.08
Rail Shop Machinists	25 Total number of cars in fleet	L	0.1250 Employees/Total cars	3.1	\$ 74,467.70 /Employee	\$232,711.55
Rail Car Maintenance Supervisors	25 Total number of cars in fleet	L	0.2500 Employees/Total cars	6.3	\$ 87,122.67 /Employee	\$544,516.67
Materials and Supplies ²	977,328 Annual Revenue Car Miles	M	-		\$ 0.66 /Rev. Car Mile	\$643,305.98
Subtotal						\$3,433,911
Maintenance of Way (MOW)						
MOW Technicians ³	9.6 Track Miles	L	1.1458 Employees / Trk Mile	11.0	\$ 74,467.70 /Employee	\$819,145
Rail MOW Supervisors	9.6 Track Miles	L	0.5208 Employees / Trk Mile	5.0	\$ 87,122.67 /Employee	\$435,613
Track Maintainers	9.6 Track Miles	L	0.3125 Employees / Trk Mile	3.0	\$ 67,807.32 /Employee	\$203,422
Track Laborers	9.6 Track Miles	L	0.3125 Employees / Trk Mile	3.0	\$ 35,782.10 /Employee	\$107,346
Materials, Supplies and Contracted Services ⁴	9.6 Track Miles	M	-		\$ 23,954.62 /Trk Mile	\$229,964
Subtotal						\$1,795,491
Warranty & Parts						
Warranty & Parts Manager	25 Total number of cars in fleet	L	0.0625 Employees/Total cars	1.6	\$ 79,042.84 /Employee	\$123,504
Warranty & Parts Specialist	25 Total number of cars in fleet	L	0.0625 Employees/Total cars	1.6	\$ 74,197.48 /Employee	\$115,934
Stores Clerk	25 Total number of cars in fleet	L	0.1250 Employees/Total cars	3.1	\$ 44,649.74 /Employee	\$139,530
Receiving Clerk	25 Total number of cars in fleet	L	0.0625 Employees/Total cars	1.6	\$ 47,021.06 /Employee	\$73,470
Subtotal						\$452,439
Facility Maintenance						
Station, Line, and PNR Maintenance Materials, Supplies and Contracted Services ⁵	15 Stations		-		\$ 60,000.00 /Station ⁶	\$900,000
Light Rail Maintenance and Storage Facility ⁷	90,000 Maint. Facility Sq Footage		-		\$ 5.17 /SF	\$465,000
Subtotal						\$1,365,000
Other						
Casualty and Insurance ⁸	61,392 Annual Revenue Car Hours		-		\$ 41.16 /Rev. Car Hr	\$2,526,745
General Administration and Technology	25 Total number of cars in fleet		-		\$ 14,554.85 /Car	\$363,871
Subtotal						\$2,890,616
Revenue Collection⁹						
Salary and Fringe	25 Total number of cars in fleet	L	-		\$ 18,282.53 /Car	\$457,063
General Administration	25 Total number of cars in fleet		-		\$ 3,785.31 /Car	\$94,633
Insurance	25 Total number of cars in fleet		-		\$ 459.73 /Car	\$11,493
Subtotal						\$563,189
Transit Security and Safety¹⁰						
Line Security and Safety	9.6 Track Miles		-		\$ 157,220.02 /Trk Mile	\$1,509,312
Parking Garage Security and Safety	1 Number of Parking Structures		-		\$ 377,328.04 /Parking Str	\$377,328
Subtotal						\$1,886,640
Grand Total						\$16,456,651

L = Labor M = Material U=Utilities

¹ - All unit costs per employee reflect FY 2010 market rate salaries plus a fringe factor of 0.38 for Non Exempt positions and 0.29 for Exempt positions.

² - Materials and Supplies includes budget item costs for Shop Maint. & Repair equip, tools, uniforms/protective clothing, haz mat disposal, cleaning supplies

³ - MOW technicians include electronic technicians, train control technicians, traction power technicians as these positions appear in the CATS LRT org chart

⁴ - Materials and Supplies includes budget item costs for Emergency Repairs (standby contract for repair of OCS & track, Time and material for actual repairs to OCS & track, Track Grinding (post revenue), Track (realignment geometry check), materials (crossing gates, mast assemblies, lighting assemblies); ROW Materials (ballast, ties, rails, asphalt, substation breakers, surplus track material), Traction Power, Train Control (ATP Equipment LRV & Wayside), Track, Systems, and add'l Parts,

⁵ - Station, Line, and PNR Maintenance Materials, Supplies and Contracted Services includes costs associated with graffiti removal, Misc. HVAC, utilities (water and electricity costs), contracted services (landscape management) costs, janitorial services at the Charlotte Transit Center, Misc. Repairs/Services (Shelters & Stops), and Misc. supplies (Shelters & Stops), as shown in CATS facilities line item budget.

⁶ - Per direction of CATS facilities department, the annual cost per station is assumed to be \$60,000/year. This cost is an average annualized cost and includes utilities (water and electric) landscaping and surface maintenance. This cost does not include salary and fringe.

⁷ - Based on South Boulevard Light Rail Facility costs associated with Gregory Pest Control, Metro Fire and Safety, Tarheel Sweeping, Joffee Window Cleaning, ISS Janitorial, Allied Waste Svcs, Coyne Textile Svcs, Duke Power, Piedmont Natural Gas, City of Charlotte Water, Vehicle Fuel, MISC Repairs/Services (Shelters & Stops), MISC supplies (Shelters & Stops), Building services - Material & Supplies, and Landscape Management - Contracts. Per direction of CATS facilities department, the FY 2010 annual cost was \$465,000 for the 90,000 SF facility.

⁸ - Casualty and insurance includes costs for insurance premiums and insurance administration.

⁹ - Revenue collection costs were derived from a separate cost center in the CATS FY10 Line Item Budget and represents costs associated with revenue collection on the transit system. Per direction of CATS, the total Revenue Collection unit costs have been multiplied by 55% to represent the share of revenue collection costs applicable only to rail operations in a future year.

¹⁰ - Transit Security and Safety costs were derived from a separate cost center in the CATS FY10 Line Item Budget and represents costs associated with providing security on the transit system. Per direction of CATS, the total Transit Security and Safety unit costs have been multiplied by 40% to represent the share of security and safety costs applicable only to rail operations.

2035 Build H10 (3-car)

Cost Item	Unit Of Service	Type	Productivity Ratio	Employees (FTEs)	Unit Cost ¹	Annual Cost
Vehicle Operations						
Rail Operators	53,102 Annual Revenue Train Hours	L	0.0010 Employees/Rev. Train Hr	53.3	\$ 62,561.47 /Employee	\$3,337,036.59
Rail Operations Supervisors	53,102 Annual Revenue Train Hours	L	0.0006 Employees/Rev. Train Hr	32.4	\$ 72,190.64 /Employee	\$2,337,899.43
Propulsion Power	1,942,100 Annual Revenue Car Miles	U	-		\$ 0.63 /Rev. Car Mile	\$1,217,102.71
Subtotal						\$6,892,038.74
Vehicle Maintenance						
Rail Car Electro Mechanics	38 Total number of cars in fleet	L	0.9375 Employees/Total cars	35.6	\$ 74,467.70 /Employee	\$2,652,911.71
Rail Car Servicers	38 Total number of cars in fleet	L	0.2500 Employees/Total cars	9.5	\$ 42,886.41 /Employee	\$407,420.91
Rail Shop Machinists	38 Total number of cars in fleet	L	0.1250 Employees/Total cars	4.8	\$ 74,467.70 /Employee	\$353,721.56
Rail Car Maintenance Supervisors	38 Total number of cars in fleet	L	0.2500 Employees/Total cars	9.5	\$ 87,122.67 /Employee	\$827,665.33
Materials and Supplies ²	1,942,100 Annual Revenue Car Miles	M	-		\$ 0.66 /Rev. Car Mile	\$1,278,346.79
Subtotal						\$5,520,066
Maintenance of Way (MOW)						
MOW Technicians ³	19.0 Track Miles	L	1.1458 Employees / Trk Mile	21.8	\$ 74,467.70 /Employee	\$1,621,224
Rail MOW Supervisors	19.0 Track Miles	L	0.5208 Employees / Trk Mile	9.9	\$ 87,122.67 /Employee	\$862,151
Track Maintainers	19.0 Track Miles	L	0.3125 Employees / Trk Mile	5.9	\$ 67,807.32 /Employee	\$402,606
Track Laborers	19.0 Track Miles	L	0.3125 Employees / Trk Mile	5.9	\$ 35,782.10 /Employee	\$212,456
Materials, Supplies and Contracted Services ⁴	19.0 Track Miles	M	-		\$ 23,954.62 /Trk Mile	\$455,138
Subtotal						\$3,553,575
Warranty & Parts						
Warranty & Parts Manager	38 Total number of cars in fleet	L	0.0625 Employees/Total cars	2.4	\$ 79,042.84 /Employee	\$187,727
Warranty & Parts Specialist	38 Total number of cars in fleet	L	0.0625 Employees/Total cars	2.4	\$ 74,197.48 /Employee	\$176,219
Stores Clerk	38 Total number of cars in fleet	L	0.1250 Employees/Total cars	4.8	\$ 44,649.74 /Employee	\$212,086
Receiving Clerk	38 Total number of cars in fleet	L	0.0625 Employees/Total cars	2.4	\$ 47,021.06 /Employee	\$111,675
Subtotal						\$687,707
Facility Maintenance						
Station, Line, and PNR Maintenance Materials, Supplies and Contracted Services ⁵	26 Stations		-		\$ 60,000.00 /Station ⁶	\$1,560,000
Light Rail Maintenance and Storage Facility ⁷	94,800 Maint. Facility Sq Footage		-		\$ 5.17 /SF	\$489,800
Subtotal						\$2,049,800
Other						
Casualty and Insurance ⁸	100,103 Annual Revenue Car Hours		-		\$ 41.16 /Rev. Car Hr	\$4,120,029
General Administration and Technology	38 Total number of cars in fleet		-		\$ 14,554.85 /Car	\$553,084
Subtotal						\$4,673,113
Revenue Collection⁹						
Salary and Fringe	38 Total number of cars in fleet	L	-		\$ 18,282.53 /Car	\$694,736
General Administration	38 Total number of cars in fleet		-		\$ 3,785.31 /Car	\$143,842
Insurance	38 Total number of cars in fleet		-		\$ 459.73 /Car	\$17,470
Subtotal						\$856,048
Transit Security and Safety¹⁰						
Line Security and Safety	19 Track Miles		-		\$ 157,220.02 /Trk Mile	\$2,987,180
Parking Garage Security and Safety	3 Number of Parking Structures		-		\$ 377,328.04 /Parking Str	\$1,131,984
Subtotal						\$4,119,164
Grand Total						\$28,351,513

L = Labor M = Material U=Utilities

¹ - All unit costs per employee reflect FY 2010 market rate salaries plus a fringe factor of 0.38 for Non Exempt positions and 0.29 for Exempt positions.

² - Materials and Supplies includes budget item costs for Shop Maint. & Repair equip, tools, uniforms/protective clothing, haz mat disposal, cleaning supplies

³ MOW technicians include electronic technicians, train control technicians, traction power technicians as these positions appear in the CATS LRT org chart

⁴ Materials and Supplies includes budget item costs for Emergency Repairs (standby contract for repair of OCS & track, Time and material for actual repairs to OCS & track, Track Grinding (post revenue), Track (realignment geometry check), materials (crossing gates, mast assemblies, lighting assemblies); ROW Materials (ballast, ties, rails, asphalt, substation breakers, surplus track material), Traction Power, Train Control (ATP Equipment LRV & Wayside), Track, Systems, and add'l Parts,

⁵ Station, Line, and PNR Maintenance Materials, Supplies and Contracted Services includes costs associated with graffiti removal, Misc. HVAC, utilities (water and electricity costs), contracted services (landscape management) costs, janitorial services at the Charlotte Transit Center, Misc. Repairs/Services (Shelters & Stops), and Misc. supplies (Shelters & Stops), as shown in CATS facilities line item budget.

⁶ Per direction of CATS facilities department, the annual cost per station is assumed to be \$60,000/year. This cost is an average annualized cost and includes utilities (water and electric) landscaping and surface maintenance. This cost does not include salary and fringe.

⁷ - Based on South Boulevard Light Rail Facility costs associated with Gregory Pest Control, Metro Fire and Safety, Tarheel Sweeping, Joffie Window Cleaning, ISS Janitorial, Allied Waste Svcs, Coyne Textile Svcs, Duke Power, Piedmont Natural Gas, City of Charlotte Water, Vehicle Fuel, MISC Repairs/Services (Shelters & Stops), MISC supplies (Shelters & Stops), Building services - Material & Supplies, and Landscape Management - Contracts. Per direction of CATS facilities department, the FY 2010 annual cost was \$465,000 for the 90,000 SF facility.

⁸ Casualty and insurance includes costs for insurance premiums and insurance administration.

⁹ Revenue collection costs were derived from a separate cost center in the CATS FY10 Line Item Budget and represents costs associated with revenue collection on the transit system. Per direction of CATS, the total Revenue Collection unit costs have been multiplied by 55% to represent the share of revenue collection costs applicable only to rail operations in a future year.

¹⁰ Transit Security and Safety costs were derived from a separate cost center in the CATS FY10 Line Item Budget and represents costs associated with providing security on the transit system. Per direction of CATS, the total Transit Security and Safety unit costs have been multiplied by 40% to represent the share of security and safety costs applicable only to rail operations.

LYNX Blue Line Extension (Northeast Corridor)
Summary: Light Rail Operations and Maintenance Quantities and Costs

2035 Baseline Service Quantity Calculations (10-min peak headways, 3-car consists)													
	Hours	Headway	Cycle Time	# of Round Trips	Consist	Trn Miles	Annual Trn Miles	Veh Miles	Annual Veh Miles	Train Hours	Annual Train Hours	Veh Hours	Annual Veh Hours
AM Peak (6a-9a)	3	10	70	18	3	336	84,732	1,009	254,197	21.0	5,292	63.0	15,876
Base (5a-6a, 9a-3:30p, 6:30p-7p)	8	15	75	32	1.5	598	150,636	897	225,953	40.0	10,080	60.0	15,120
PM Peak (3:30p-6:30p)	3	10	70	18	3	336	84,732	1,009	254,197	21.0	5,292	63.0	15,876
Evening (7p-12p)	5	20	80	15	1	280	70,610	280	70,610	20.0	5,040	20.0	5,040
Late Night (12p-1a)	1	30	90	2	1	37	9,415	37	9,415	3.0	756	3.0	756
Saturday Early (6a-7a)	1	30	60	2	1	37	2,279	37	2,279	2.0	122	2.0	122
Saturday Base (7a-10a, 5p-9p)	7	20	60	21	1.5	392	23,929	588	35,894	21.0	1,281	31.5	1,922
Saturday Midday (10a-5p)	7	15	60	28	2	523	31,905	1,046	63,811	28.0	1,708	56.0	3,416
Saturday Late (9p-1a)	4	30	60	8	2	149	9,116	299	18,232	8.0	488	16.0	976
Sunday Early (7a-9a)	2	30	60	4	1	75	3,885	75	3,885	4.0	208	4.0	208
Sunday Base (9a-11a, 5p-7p)	4	20	60	12	1	224	11,656	224	11,656	12.0	624	12.0	624
Sunday Midday (11a-5p)	6	20	60	18	1	336	17,484	336	17,484	18.0	936	18.0	936
Sunday Late (7p-12a)	5	30	60	10	1	187	9,714	187	9,714	10.0	520	10.0	520
					Total		510,095		977,328		32,347		61,392
Days/Yr													
Weekday Subtotal	252			85		1,588	400,126	3,232	814,373	105	26,460	209	52,668
Saturday Subtotal	61			51		953	58,113	1,672	101,983	51	3,111	90	5,460
Sunday Subtotal	52			34		635	33,026	635	33,026	34	1,768	34	1,768
Overall Total	365						491,265		949,383		31,339		59,896

Service Annualization Factor 294 298

Note: A Base consist of 1.5 cars represents the average consist size for the period; either 1-car or 2-car trains will be operated throughout the period based on expected daily demand.

LYNX Blue Line Extension (Northeast Corridor)
Summary: Light Rail Operations and Maintenance Quantities and Costs

2035 Build Service Quantity Calculations (10-min peak headways)													
	Hours	Headway	Cycle Time	# of Round Trips	Consist	Trn Miles	Annual Trn Miles	Veh Miles	Annual Veh Miles	Train Hours	Annual Train Hours	Veh Hours	Annual Veh Hours
AM Peak (6a-9a)	3	10	110	18	3	668	168,376	2,004	505,129	33.0	8,316	99.0	24,948
Base (5a-6a, 9a-3:30p, 6:30p-7p)	8	15	120	32	1.5	1,188	299,336	1,782	449,004	64.0	16,128	96.0	24,192
PM Peak (3:30p-6:30p)	3	10	110	18	3	668	168,376	2,004	505,129	33.0	8,316	99.0	24,948
Evening (7p-12p)	5	20	120	15	1	557	140,314	557	140,314	30.0	7,560	30.0	7,560
Late Night (12p-1a)	1	30	120	2	1	74	18,708	74	18,708	4.0	1,008	4.0	1,008
Saturday Early (6a-7a)	1	30	120	2	1	74	4,529	74	4,529	4.0	244	4.0	244
Saturday Base (7a-10a, 5p-9p)	7	20	120	21	1.5	780	47,551	1,169	71,326	42.0	2,562	63.0	3,843
Saturday Midday (10a-5p)	7	15	120	28	2	1,039	63,401	2,079	126,802	56.0	3,416	112.0	6,832
Saturday Late (9p-1a)	4	30	120	8	2	297	18,115	594	36,229	16.0	976	32.0	1,952
Sunday Early (7a-9a)	2	30	120	4	1	148	7,721	148	7,721	8.0	416	8.0	416
Sunday Base (9a-11a, 5p-7p)	4	20	120	12	1	445	23,163	445	23,163	24.0	1,248	24.0	1,248
Sunday Midday (11a-5p)	6	20	120	18	1	668	34,744	668	34,744	36.0	1,872	36.0	1,872
Sunday Late (7p-12a)	5	30	120	10	1	371	19,302	371	19,302	20.0	1,040	20.0	1,040
Total							1,013,636		1,942,100		53,102		100,103
Days/Yr													
Weekday Subtotal	252			85		3,155	795,110	6,422	1,618,284	164	41,328	328	82,656
Saturday Subtotal	61			51		1,893	115,480	3,322	202,657	102	6,222	179	10,919
Sunday Subtotal	52			34		1,262	65,628	1,262	65,628	68	3,536	68	3,536
Overall Total	365						976,219		1,886,568		51,086		97,111
							<i>Service Annualization Factor</i>		<i>294</i>		<i>312</i>		

Note: A Base consist of 1.5 cars represents the average consist size for the period; either 1-car or 2-car trains will be operated throughout the period based on expected daily demand.