CHAPTER 8.0 - FINANCIAL ANALYSIS

8.1 CAPITAL FUNDING STRATEGY

8.1.1 Capital Cost Estimate

Capital costs were developed for the Build Alternative to the same level using the same assumptions.

8.1.2 Methodology

Capital cost estimates for the Build Alternatives were developed by the Metropolitan Transit Authority of Harris County, Texas (METRO) using the Federal Transit Administration (FTA) standardized cost categories spreadsheets. The capital cost estimates were based on METRO's experience and supplemented with national cost data when applicable. Each spreadsheet defined the elements to be estimated (i.e., guideway/track, stations, transit centers, Park & Ride lots, roadway improvements, right-of-way, and vehicles). METRO specified the unit cost and estimated quantities for each element to develop the cost estimate.

8.1.3 Capital Cost Estimates

Cost estimates are in 2007 dollars. Table 8-1 present the cost estimates for the Transportation System Management (TSM)/Baseline Alternative. Tables 8-2 and 8-3 present the cost estimates for the University Corridor Build Alternatives. These cost estimates would be refined during Preliminary Engineering (PE) with a goal of substantially reducing the capital cost when more detailed plans are developed.

Table 8-1
Cost Estimates for TSM/Baseline Alternative

Standard Cost Category	2007 Dollars TSM/Baseline Alternative
• Guideway & Track Elements	$0
• Stations, Stops, Terminals, Intermodal	$2,025,000
• Support Facilities: Yards, Shops, Buildings	$0
• Sitework & Special Conditions	$1,633,000
• Systems	$5,130,000
• Right-of-Way, Land Existing Improvements	$4,533,000
• Vehicles	$6,547,000
• Professional Services	$3,159,000
• Unallocated Contingency	$935,000
Total Cost (2007 Dollars)	$23,962,000
Total Length in Miles	9.0
Cost per Mile (2007 dollars)	$2,662,444

Table 8-2
Cost Estimates for Segment I and II – Hillcroft Transit Center to Main Street

Standard Cost Category	2007 Dollars	
	LRT	BRT-Convertible
Richmond/Westpark (Cummins)		
• Guideway & Track Elements	$64,578,000	$59,315,000
• Stations, Stops, Terminals, Intermodal	$33,304,000	$18,304,000
• Support Facilities: Yards, Shops, Buildings	$20,981,000	$0
• Sitework & Special Conditions	$59,241,000	$36,549,000
• Systems	$86,809,000	$34,693,000
• Right-of-Way, Land Existing Improvements	$47,578,000	$30,578,000
• Vehicles	$84,000,000	$46,200,000
• Professional Services	$88,636,000	$49,761,000
• Unallocated Contingency	$48,513,000	$27,540,000
Total Cost (2007 Dollars)	$533,640,000	$302,940,000
Total Length in Miles	6.5	6.5
Cost per Mile (2007 dollars)	$82,098,462	$46,606,154
Richmond/Westpark (Greenway Plaza)		
• Guideway & Track Elements	$77,438,000	$72,983,000
• Stations, Stops, Terminals, Intermodal	$38,954,000	$23,954,000
• Support Facilities: Yards, Shops, Buildings	$20,981,000	$0
• Sitework & Special Conditions	$57,933,000	$35,334,000
• Systems	$82,656,000	$34,025,000
• Right-of-Way, Land Existing Improvements	$60,379,000	$43,379,000
• Vehicles	$84,000,000	$46,200,000
• Professional Services	$92,812,000	$55,340,000
• Unallocated Contingency	$51,515,000	$31,121,000
Total Cost (2007 Dollars)	$566,668,000	$342,336,000
Total Length in Miles	6.92	6.92
Cost per Mile (2007 dollars)	$81,888,439	$49,470,520
Richmond/U.S. 59/Westpark		
• Guideway & Track Elements	$102,313,000	$103,473,000
• Stations, Stops, Terminals, Intermodal	$33,463,000	$18,463,000
• Support Facilities: Yards, Shops, Buildings	$20,981,000	$0
• Sitework & Special Conditions	$75,240,000	$52,667,000
• Systems	$82,868,000	$29,672,000
• Right-of-Way, Land Existing Improvements	$57,043,000	$40,043,000
• Vehicles	$84,000,000	$46,200,000
• Professional Services	$104,621,000	$67,493,000
• Unallocated Contingency	$56,053,000	$35,801,000
Total Cost (2007 Dollars)	$616,582,000	$393,812,000
Total Length in Miles	7.12	7.12
Cost per Mile (2007 dollars)	$86,598,596	$55,310,674

Source: METRO, April 2007

Table 8-3
Cost Estimates for Segment III – Main Street to UH or Eastwood Transit Center

Standard Cost Category	2007 Dollars	
	LRT	BRT-Convertible
Alabama (U.S. 59/Alabama/UH)		
• Guideway & Track Elements	$21,389,000	$20,664,000
• Stations, Stops, Terminals, Intermodal	$9,152,000	$9,152,000
• Support Facilities: Yards, Shops, Buildings	$0	$0
• Sitework & Special Conditions	$23,497,000	$23,061,000
• Systems	$35,819,000	$13,567,000
• Right-of-Way, Land Existing Improvements	$9,430,000	$9,430,000
• Vehicles	$35,000,000	$19,800,000
• Professional Services	$30,364,000	$22,173,000
• Unallocated Contingency	$16,465,000	$11,785,000
Total Cost (2007 Dollars)	$181,116,000	$129,632,000
Total Length in Miles	2.3	2.3
Cost per Mile (2007 dollars)	$78,746,087	$56,361,739
Wheeler (Ennis/Elgin/Eastwood Transit Center)		
• Guideway & Track Elements	$30,359,000	$32,321,000
• Stations, Stops, Terminals, Intermodal	$12,813,000	$12,813,000
• Support Facilities: Yards, Shops, Buildings	$0	$0
• Sitework & Special Conditions	$26,412,000	$25,937,000
• Systems	$44,320,000	$20,074,000
• Right-of-Way, Land Existing Improvements	$12,462,000	$12,462,000
• Vehicles	$35,000,000	$19,800,000
• Professional Services	$38,059,000	$30,077,000
• Unallocated Contingency	$19,943,000	$15,349,000
Total Cost (2007 Dollars)	$219,368,000	$168,833,000
Total Length in Miles	3.3	3.3
Cost per Mile (2007 dollars)	$66,475,151	$51,161,515
Wheeler (Ennis/Alabama/UH)		
• Guideway & Track Elements	$22,880,000	$22,077,000
• Stations, Stops, Terminals, Intermodal	$10,983,000	$10,982,000
• Support Facilities: Yards, Shops, Buildings	$0	$0
• Sitework & Special Conditions	$21,244,000	$20,890,000
• Systems	$31,760,000	$14,754,000
• Right-of-Way, Land Existing Improvements	$13,293,000	$13,293,000
• Vehicles	$35,000,000	$19,800,000
• Professional Services	$29,407,000	$22,896,000
• Unallocated Contingency	$16,457,000	$12,469,000
Total Cost (2007 Dollars)	$181,024,000	$137,161,000
Total Length in Miles	2.3	2.3
Cost per Mile (2007 dollars)	$78,706,087	$59,635,217

Source: METRO, April 2007

8.1.4 Capital Funding Strategy

METRO has prepared a comprehensive financial plan for METRO Solutions consistent with FTA requirements. That financial plan includes the elements of METRO Solutions through 2030 as directed by FTA for funding considerations. The comprehensive financial plan demonstrates the financial feasibility of the entire plan. This financial summary presented in this section demonstrates the financial implications of the entire METRO Solutions plan, particularly the projects designated for implementation through 2012.

The Light Rail Transit (LRT) information has been presented as the most conservative approach to assessing the financial feasibility of the Build Alternatives. Table 8-4 summarizes the uses and sources of funds proposed for the METRO Solutions plan, which includes the University Corridor project and the rail and bus systems that would be in operation over the Fiscal Year (FY) 2006 to FY 2030 period. The table indicates the total estimated capital costs and revenues as well as total operations and maintenance costs and revenues.

As shown in Table 8-4, the total cost of the Phase 2 METRO Solutions, system-wide non-METRO Solutions bus and rail program, and METRO's non-transit programs is estimated to be $26 billion, Year of Expenditure Dollars, over the FY 2006 to FY 2030 period. Of this total, $10.6 billion are capital costs and debt service payments (collectively referred to as capital), and $15.4 billion are for operations and maintenance costs.

Table 8-4
Proposed Sources and Uses of Funds FY 2006 to 2030
(Year of Expenditure Dollars)

Source/Use	Amount
Beginning Balance	$114,050,000
Sources	
Sales Tax Receipts	$23,095,942,000
Farebox Revenue	$2,930,439,000
Miscellaneous & Operating Grants	$66,751,000
External Interest Income	$2,475,307,000
Internal Interest Income (Expense)	$0
State & County Grants	$0
Federal Grants, Formula/CMAQ/Miscellaneous	$2,815,058,000
Federal Grants, Discretionary	$83,104,000
METRO Solutions - Federal Grants - Bus & Rail	$1,082,578,000
Bond Proceeds-Net	$640,000,000
Commercial Paper Proceeds	$709,400,000
Interfund Inflow (Outflow)	$0
Balance Sheet Adjustment	$0
Total Sources	$33,898,579,000
Total Funds Available	$34,012,629,000
Uses	
Operating Expenses – Transit	$14,963,653,000
Operating Expenses - Traffic Management	$435,599,000
Capital Costs	$0
General Mobility 25% Fund Projects	$1,411,516,000
Regional Bus Plan	$48,076,000
Transitways & Related Facilities	$90,947,000
Buses, Support Facilities & Equipment, Land	$4,180,271,000
Advanced Transit Plan	$144,747,000
METRO Solutions Bus & Rail Capital	$2,849,740,000
METRO Solutions Contingency	$0
Commercial Paper Interest Cost	$156,677,000
Excess Balance Used To Pay Down Commercial Paper	$709,400,000
Short-term Notes	$0
Principal Paid	$0
Interest/Fees Paid	$0
Bond Debt Service	$965,520,000
Total Uses	$25,956,146,000
Ending Balance	$8,056,483,000

Source: METRO Cash Flow Model #696-111, Sources and Uses of Funds, Office of Management & Budget, November 5, 2006.

8.1.5 Funding Secured to Date

The revenues required to fund the bus and LRT components of the Build Alternatives are forecasted to be available from Federal and local sources. Over and above this level, METRO would have an additional $8.1 billion ending balance in 2030 that would be available for the other future elements of the METRO Solutions plan beyond Phase 2.

These other available and unexpended revenues accrue annually and are comprised of the following: an annual cash balance plus the excess of annual revenues over expenses.

The revenues used for capital are derived from local and Federal sources. Local sources include bond proceeds. Federal sources include FTA Section 5309 New Starts funds. METRO would request FTA to participate as a shared capital expense partner, using Section 5309 New Starts program monies to fund the locally preferred alternative selected.

In 1978, voters approved a one percent sales tax dedicated to transit. In November 2003, voters in the METRO service area demonstrated their commitment to the METRO Solutions plan, including the University Corridor project, with majority approval of plan. With voter approval, authorization was given for the issuance of up to $640 million in bonds to fund the overall plan through 2012. The local sales tax and the new local funding provided by the bonding authorization would enable METRO to implement and operate the plan through 2012.

8.1.6 Capital Financing Approach

METRO's financial plan for the University Corridor project reflects a partnership between METRO and FTA. The most expensive alternative is financially feasible; therefore, any Build Alternative selected is financially feasible. This financial analysis confirms the ability of METRO to fund the capital and operating costs of its existing and expanded bus services and any of the Build Alternatives for the University Corridor through a 50 percent/50 percent shared capital expense responsibility. In this financial partnership, FTA's contribution would be 50 percent of the overall capital costs.

8.2 OPERATING FUNDING STRATEGY

8.2.1 Operating and Maintenance Costs

Operating and maintenance (O&M) costs for the Build Alternatives were estimated using a fully allocated cost methodology, in accordance with standard industry practice. METRO uses a cost allocation methodology, rather than a cost build-up methodology, for estimating its system-wide operations and maintenance costs. This methodology uses actual METRO operating experience as the foundation for the estimates. The methodology is described in more detail in the following sections.

8.2.1.1 Bus O&M Costs

METRO has several systems that collect financial data and operating statistics. The agency uses the information to measure operating performance each month, to prepare the annual operating budget, and to support short and long-range planning activities. METRO categorizes operating costs as either transit or traffic management. Transit O&M costs include the cost to operate its fixed-route bus service, its specialized services such as METROLift and METROVan, and light rail service. Traffic management O&M costs include the cost to operate such non-transit functions as incident management on freeways.

METRO has a Cost Allocation Model in which actual operating expenditures and service levels are tracked by three major categories: Operations, Maintenance, and General Administration. The Cost Allocation Model also allocates expenditures across many transit modes, such as METRO-operated local service or contractor-operated Park & Ride service. This tracking method provides METRO the current cost of providing each service type and allows the cost estimation for future levels of service.

Historical unit costs can be derived from METRO's Cost Allocation Model over nine transit modes (METRO Local, METRO Express, METRO Park & Ride, contract local, contract Park & Ride, METROLift, special events, charter, and METRORail). With a few exceptions, operation costs are allocated on scheduled vehicle hours, maintenance costs on scheduled vehicle miles, and general and administrative expenses on the number of vehicles during peak service. The costs for each mode are then summed and divided by revenue hours to derive a single factor. Fully allocated bus cost factors based on METRO's financial and operating data from FY 2004 were inflated to FY 2007 constant dollars using the latest inflation estimates. The costs are presented in Table 8-5.

Table 8-5
Bus Cost Factors (2007 Dollars)

Transit Mode	Operating Cost per Revenue Hour
METRO Local	$87.15
Contract Local	$79.30
METRO Express	$105.35
METRO Park & Ride	$136.71
Contract Park & Ride	$100.87
METROLift	$45.92
Special Events	$56.43
Charters	$48.60

Source: METRO Cost Allocation Model (2004 Actuals). Cost factors expressed in 2007 dollars

For purposes of the University Corridor fixed guideway, the change in bus costs from the implementation of the University Corridor project is estimated using only the variable portion of cost factors in Table 8-5 multiplied by the change in bus hours estimated for the years 2007 to 2030. Only variable costs were used because the changes in bus service in any given year and overall are comparatively small. Variable costs include operator wages and benefits, contracted bus operations costs, bus maintenance, and fuel; administrative costs were excluded.

Future operating cost was estimated as a cost factor multiplied by a service factor multiplied by an inflation index. The inflation index is the Houston area Consumer Price Index (CPI) as drawn from *METRO Forecasts of Economic Growth, Inflation, and Interest Rates: June 15, 2005*. The determination of which service would be contracted in the future is unknown; therefore, the composite cost for METRO-operated and contract-operated services for local and Park & Ride were used. The factors that were used for the estimation of changes in the bus O&M costs for the University Corridor project financial analysis are listed in Table 8-6.

Table 8-6
Variable Bus O&M Cost Factors (2007 Dollars)

Transit Service Type	Variable Cost/Revenue Hour
Local	$63.07
Express	$78.44
Park & Ride	$99.36

Source: METRO Cost Allocation Model (2004 Actuals).
Cost factors expressed in 2007 dollars.

8.2.1.2 LRT O&M Costs

The estimation of fixed guideway factors is similar to traditional bus service. Service factors are highly influenced by the alignment definition (i.e., directional route miles, number of stations, yard/shop/operations facilities), in addition to the travel demand forecasts (i.e., peak vehicles required, vehicle miles, vehicle hours). METRO Solutions rail service O&M costs were estimated using a five-factor model – the summation of operating cost/revenue train hour, operating cost/revenue car mile, operating cost/peak vehicle, operating cost/station, and operating cost/guideway mile. The cost factors for one-car trains (based on the METRORail Red Line) are presented in Table 8-7.

Table 8-7
LRT Build Alternative O&M Cost Factors (2007 Dollars)

O&M Cost Factors	LRT (one-car trains)
Cost/Revenue Train Hour	$57.46
Cost/Revenue Car Mile	$6.17
Cost/Peak Vehicle	$19,699
Cost/Station	$118,332
Cost/Guideway Mile	$315,968

Source: METRO Cost Allocation Model

These factors were based on the METRORail Red Line budget for FY 2004 and are inflated to FY 2007 dollars. While these five factors were used for estimating the O&M costs associated with the full METRO Solutions plan, the University Corridor O&M costs are estimated with only four factors to be consistent with the variable cost estimate for bus service. The costs associated with the peak vehicle factor (rail administration and planning) should be considered fixed with the addition of only one more light rail line to the system. METRO anticipates adding some additional rail service without proportionately increasing its rail administrative overhead costs. Input variables for application of this model were obtained from the alignment definition (directional route miles, and number of stations), and from the travel demand forecasts (peak vehicles required, vehicle miles, and train hours).

8.2.1.3 BRT-Convertible O&M Costs

Bus Rapid Transit (BRT)-Convertible O&M costs are estimated as a hybrid of the bus and LRT service, reflective of its service characteristics. The BRT-Convertible service is operated with buses and provides two-directional, all-day service; similar to the service profile of bus service. The BRT vehicles are, however, larger and more complex to maintain than buses. In addition, the BRT service has stations similar to the LRT service. Therefore, the BRT-Convertible O&M costs are the sum of its operating costs (which is estimated at two-thirds of the local O&M cost per hour component from bus service multiplied by the number of BRT hours operated), and its station maintenance costs (estimated at 75 percent

of the cost per station for the LRT service multiplied by the number of BRT stations built). The cost factors for BRT-Convertible Build Alternative are presented in Table 8-8.

Table 8-8
BRT-Convertible O&M Cost Factors (2007 Dollars)

O&M Cost Factors	Cost
Cost/Revenue Hour	$669.32
Cost/Station	$88,749
Cost/Guideway Mile	$315,968

Source: METRO Cost Allocation Model
Notes: Cost/revenue hour is based on FY 2004 actual costs for local bus service
Cost/station and cost/guideway mile are based on FY 2004 actual costs for LRT

8.2.2 O&M Costs by Alternative

O&M costs for the LRT and BRT-Convertible alternatives were developed based on the cost factors previously described. Theses costs are presented in Table 8-9.

Table 8-9
O&M Cost for BRT-Convertible and LRT Alternatives (2007 Dollars)

Alignment	LRT		BRT-Convertible	
	Total System	Project Specific	Total System	Project Specific
Combination #1	$416,646,159	$7,371,488	$412,117,081	$2,842,410
Combination #2	$421,001,645	$9,951,997	$413,889,742	$4,615,071
Combination #3	$417,401,973	$8,127,302	$412,481,274	$3,206,604
Combination #4	$419,054,185	$8,004,537	$412,481,271	$3,206,601
Combination #5	$421,584,306	$10,534,658	$414,187,303	$4,912,632
Combination #6	$419,763,986	$8,714,338	$412,737,483	$3,462,812
Combination #7	$417,936,532	$6,886,884	$411,628,550	$2,353,879
Combination #8	$420,464,863	$7,182,489	$413,334,581	$4,059,910
Combination #9	$416,834,556	$7,559,885	$411,917,504	$2,642,833

Source: METRO, March 2007. Based on 3/30/2007 system wide travel demand forecasts.
Note: Project specific O&M costs are computed as the difference in total system wide O&M costs for the No Build alternative compared to the total system wide O&M costs for each Build alternative.

Based on the O&M factors presented for the Build Alternatives, the annual operating costs for the BRT-Convertible Build Alternatives are less expensive than for the LRT (one-car train) Build Alternatives. The BRT-Convertible Build Alternatives range from $2.4 million in annual O&M costs (2007 dollars) to $5.0 million. The LRT alternatives range from $6.9 million to $10.5 million.