



6.0 FINANCIAL ANALYSIS

This chapter presents the capital cost for design and construction, as well as the annual operating and maintenance (O&M) costs and farebox revenues, for the TSM, HRT, and BRT alternatives. This chapter also discusses the proposed funding sources and the actions needed to financially build and operate the alternatives.

The cost of a transportation investment falls into two categories: capital costs, and operating and maintenance (O&M) costs. Capital costs are the start-up costs for the project, including the costs of guideway construction, stations, vehicles, and any system facilities necessary before the project can begin operation. Operating and maintenance costs are the costs associated with the regular running of a new transportation facility including supporting operations such as feeder buses, or other improvements needed. Costs such as labor, vehicle maintenance, and overall facility maintenance are included in this category.

6.1 Capital Costs

6.1.1 Approach

Capital cost estimates have been developed in accordance with FTA guidelines. The guidelines call for cost estimates to be prepared and reported using the latest revision of FTA's Standard Cost Categories. In the estimates, cost components for the various alternatives are developed and summarized into the Standard Cost Categories. These cost categories form the basis for the format and structure that is used for the capital cost detail and summary sheets developed for this project. The Capital and O&M Cost Methodology Report (Task 6.6.1, August 11, 2008) provides a more detailed discussion on the methodology used to estimate capital costs.

The current FTA Standard Cost Categories consist of the following:

- Guideway
- Stations
- Support Facilities
- Sitework and Special Conditions
- Systems
- Right-of-Way, Land, Existing Improvements
- Vehicles
- Professional Services
- Contingency
- Finance Charges

Each of the alternatives under consideration has a set of conceptual engineering drawings, typical sections, station locations, and written descriptions that provide the needed definition for each of the major cost components. These planning documents form the basis for the identification of the various infrastructure elements used to prepare the capital cost estimates. These facility elements

can be classified into one of two broad groups, either typical or non-typical facilities. Typical facility costs are developed for elements that can be defined by a typical cross-section and applied over a given length of alignment or based on a conceptual scope of work developed as appropriate for a specific typical facility. The typical facility composite unit cost is developed by combining the costs for all of the individual construction elements applicable to a given typical section or facility and creating a representative composite unit cost. Typical sections or facilities have been developed for each of the alternatives.

Non-typical facility costs are developed based on conceptual engineering and design related to the unique facility under consideration. For non-typical facilities, elements necessary for overall system operation, but whose costs cannot be allocated to a specific geographic segment of the system (e.g., vehicles, maintenance and storage facility); these costs are included at the summary level. After details are prepared for both typical and non-typical facilities and the cost data are developed, they are put into a format summarizing overall alternative cost, as well as identifying the cost of various alignment segments.

6.1.2 Contingency

Contingency, in the statistical sense, is the estimated percentage by which a calculated value may differ from its true or final value. The contingency allowance is used to account for those items of work (and their corresponding costs) that may not be readily apparent or cannot be quantified at the current level of design, such as unknown project scope items or a potential project change resulting from public or political issues, or environmental or technical requirements. For the purposes of this study, contingency is divided into two major categories, allocated and unallocated.

Allocated contingency was based on the level of design information available for individual items of work, as well as the relative difficulty in establishing unit prices for these items. The allocated contingency allowance, in the range of five percent to 35 percent, will be allocated according to FTA construction or procurement cost categories. The exact percentage selected for each cost category is based on professional judgment and experience related to the cost variability typically seen for items of work within a particular cost category.

Unallocated contingency is similar to allocated contingency in that it is primarily applied as an allowance for unknowns and uncertainties due to the level of project development completed. The major difference is that allocated contingencies are intended to address uncertainties in the estimated construction, right-of-way, and vehicle costs that typically occur as the amount of engineering and design information advances, while unallocated contingencies are typically much broader in nature and often address changes in the project scope and schedule. Unallocated contingency is calculated as 10 percent for all cost categories.

6.1.3 Professional Services

This cost category includes allowances for Preliminary Engineering, Final Design, project and construction management, agency program management, project insurance, surveys and testing, and start-up costs. These allowances are computed by applying a percentage to the total construction cost estimated for each cost category (excluding right-of-way and vehicle costs). Right-of-way and vehicle costs typically are calculated to include the management and administration costs associated with these activities and are therefore excluded from the calculation of professional services.

6.1.4 Capital Costs Assumptions

Key assumptions affecting the capital cost estimates are discussed below.

The capital costs presented represent the additional capital improvements needed to build and operate each alternative over the No Build.

The capital cost estimates were prepared with all costs expressed in 2008 dollars. Cost estimates were developed by identifying quantities from the Conceptual Engineering Drawings (Task 6.2, October 31, 2008).

The tunnel cost on a route foot basis was validated by the consultant team with a similar project just constructed in the Seattle area.

No Build: As part of the Metro Long Range Transportation Plan, a number of maintenance and operations improvements have been identified to support the operating scenarios presented. For the Purple and Red Metro Rail lines to provide the operations assumed in the No Build and TSM Alternatives, a complete re-evaluation of the Red/Purple Line operations was under taken by Metro staff. The improvements included in the Metro Long Range Transportation Plan are:

- Improvements to the North Hollywood Terminal by the addition of one cross-over and two 6-car tail tracks and one 6-car half-pocket track
- Division 20 Major Improvements (Red Line Yard) to establish a mainline turnaround including consideration of two mainline tracks east of the Red Yard Line to facilitate rapid and efficient turn around of the Red Line train sets and to allow Union Station to operate as a “through” station for operations.
- Complete the analysis of the potential track needs for inter-city and Metro rail transit projects on the West Bank of the Los Angeles River adjacent to the Red Line Yard.
- Upgrade of the train control system, communications system, and traction power system to support 2 to 2.5 minutes headways throughout the Purple/Red Lines.
- Add the ventilation systems to support the operating headways between the Hollywood/Highland station and the North Hollywood Station, including the construction of a new ventilation shaft between the Hollywood/Highland station and the Universal City station.

The estimated cost of these improvements is approximately \$450 million in 2008 dollars. Note that because this cost is a part of the No Build Alternative and will be incurred regardless of which build alternative is selected, it is not included in the cost estimates for the Build alternatives.

Build Alternatives: For the BRT Alternative, it is assumed that the use of roadway rights-of-way controlled by local jurisdictions would be granted to the project at no cost, except for construction of new facilities and replacement or repair of existing facilities and utilities.

Procurement: The capital cost estimates assume traditional design-bid-build procurements, construction, and equipping for implementing the Build alternatives, although other means of project implementation could be used, such as design-build.

6.1.5 Capital Cost Estimates

Table 6-1 summarizes the capital costs for the TSM and each Build Alternative. Table 6-1 shows the increasing cost of the alternatives. HRT alternatives have higher capital costs than BRT alternatives due to the tunnels, continuous track, power, and signal systems required for HRT.

For the HRT alternatives the overall cost per mile varies between \$475 million and \$513 million per mile; a range of about 8 percent. The HRT alternatives that include a West Hollywood alignment in addition to a Wilshire alignment have higher capital costs per mile due to the increased ratio of stations per mile, the additional costs associated with a transfer station at Hollywood/Highland, and the greater cost of a connector structure at La Cienega and Wilshire where the two lines meet.

6.2 Operating and Maintenance Costs

6.2.1 Approach

Estimating operating and maintenance costs for an Alternatives Analysis involves two major steps: 1) development of operating plans and estimation of operating statistics for the transit mode included in each alternative, and 2) development of operating and maintenance cost models and their application to the operating statistics obtained in Step 1 to estimate the operating and maintenance costs for the new service. The operating statistics (e.g., vehicle hours, vehicle miles) are derived from the final operating plan for each service alternative after the equilibration step in the travel demand process. Equilibration is the step whereby the supply of transit service (number of vehicles operating and passenger carrying capacity provided in a given period) is balanced with the demand (number of passengers to be carried in a given period) as estimated using travel demand models. The final operating plan describes the level of service to be provided as part of each alternative, including peak and off-peak service for weekdays and weekends.

The estimating approach used for this study conforms to the FTA's most recently issued technical guidelines for transit alternatives analysis (*Procedures and Technical Methods for Transit Project Planning: Review Draft*, September 1986 and updates), to the extent possible at this stage of the planning process. In particular, the transit cost models use the resource buildup approach methodology recommended by FTA, and the cost models and fully allocated models. This means that they test the effects of system changes (such as expansions of the rail or bus system) on costs of all areas of the agency's operation and are capable of testing different levels of costs for many individual elements of the operation, including the wages and salaries of operators and maintenance personnel, costs for fringe benefits and fuel. The models, which are derived principally using National Transit Data, follow FTA's recommended approach of separating and classifying individual expense categories.

Public transportation in the corridor is provided by a variety of transit agencies, including Metro, Santa Monica Big Blue Bus, Culver City, Antelope Valley, LADOT, Santa Clarita, and West Hollywood.

The resulting operating and maintenance cost estimates were validated by comparing them to actual expenditures using recent Metro bus and light rail operation statistics. The O&M cost methodology and O&M cost estimates are found in the following two Metro documents: Capital & O&M Cost Methodology Reports (Task 6.6.1, August 11, 2008) and Operating and Maintenance Cost Estimate

Table 6-1. Capital Cost Estimates (2008 Dollars)

Cost Category Code	Cost Element	2008 Dollars (in Millions)						
		TSM	HRT ALT-1	HRT ALT-11 A	HRT ALT-11 B	HRT ALT-14	HRT ALT-16	BRT ALT-17
	Route Miles	N.A.	12.76	17.80	17.40	14.30	18.65	31.87
	No. of Stations	N.A.	11	16	16	13	17	28
10	Guideway	\$0.0	\$1,245.5	\$1,702.3	\$1,660.5	\$1,383.0	\$1,790.8	\$247.2
20	Stations	\$0.0	\$1,274.3	\$2,002.1	\$2,000.4	\$1,503.6	\$2,031.6	\$50.2
30	Support Facilities	\$45.0	\$120.3	\$268.1	\$257.8	\$158.1	\$295.6	\$13.2
40	Sitework & Special Conditions	\$0.0	\$468.0	\$697.0	\$689.2	\$541.9	\$726.5	\$209.4
50	Systems	\$0.0	\$208.8	\$294.6	\$289.7	\$237.3	\$309.9	\$201.0
60	ROW, Land, Existing Improvements	\$0.0	\$408.8	\$503.3	\$503.3	\$471.8	\$524.3	\$0.0
70	Vehicles	\$62.4	\$691.2	\$1,128.2	\$1,097.7	\$803.0	\$1,209.5	\$24.9
80	Professional Services	\$14.9	\$1,094.6	\$1,638.2	\$1,616.2	\$1,261.9	\$1,701.0	\$237.9
90	Unallocated Contingency	\$12.2	\$551.1	\$823.4	\$811.5	\$636.1	\$858.9	\$98.4
100	Finance Charges	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
TOTAL Project Alternative Costs		\$134.4	\$6,062.5	\$9,057.2	\$8,926.4	\$6,996.7	\$9,448.1	\$1,082.3
Average Cost (\$M) per Mile		N.A.	\$475.2	\$508.9	\$513.2	\$489.4	\$506.6	\$34.0

Report (Task 6.6.3, September 22, 2008). These reports document the development of the operating and maintenance cost models and estimates, including documentation of the data sources.

The HRT and BRT Alternatives involve three elements affecting operating and maintenance costs: the costs of operating and maintaining the line haul HRT or BRT services, including vehicles; the cost of operating and maintaining the HRT or BRT facilities, including guideways, stations, and other physical components; and the changes in operating and maintenance costs from the adjustment of the local bus services along and across the corridor to reflect shifting ridership demand.

6.2.2 Operating and Maintenance Cost Assumptions

Metro is responsible for operation and maintenance of the Westside Transit Corridor Extension services and associated costs. Metro is also responsible for much of the additional bus service that comprises the bulk of the additional service operated under the TSM alternative.

Metro, LADOT, Santa Monica Big Blue Bus, and other transit operators in the corridor and surrounding regions will continue to be responsible for operations and maintenance of their bus and rail transit services and facilities, recognizing that some adjustments to service levels and routing (in the case of bus services) may result from implementation of the project.

The operating and maintenance cost estimates assume the current practice of operating and maintaining transit services would continue, although other means of operating and maintaining the services and facilities could be used.

The O&M costs reflect the expected operations planned in 2030 but are estimated in 2008 dollars consistent with FTA's procedures for measuring cost-effectiveness.

6.2.3 Operating and Maintenance Cost Estimates

Operating and maintenance cost estimates for each alternative were determined by multiplying the unit costs by the number of vehicles, hours and miles of service, and, in the case of HRT, the one-way track miles under each option. The fully burdened cost comes from adding the costs generated by these factors as well as the factors for the BRT guideway and an add-on cost for underground stations.

Table 6-2 summarizes the O&M costs for each alternative by operator and within Metro by heavy rail, light rail, and bus operations. Table 6-3 summarizes the estimates increase in annual O&M costs over the No Build Alternative.

The Build HRT alternatives will require between \$96 million (Alternative 1) and \$167 million (Alternative 16) in additional Metro funding. This will represent between a 7 percent and 12 percent, respectively, over the increase in the estimated No Build operating and maintenance cost budget.

Table 6-2. Summary of Operating & Maintenance Costs (2008 Dollars)

Operators	Alternatives							
	No Build	TSM	HRT - Alt 1	HRT - Alt 11A	HRT - Alt 11B	HRT - Alt 14	HRT - Alt 16	BRT - Alt 17
Metro Heavy Rail	\$117,089,183	\$117,056,850	\$213,804,104	\$272,729,420	\$271,219,102	\$227,791,696	\$284,915,464	\$117,535,998
Metro Light Rail	\$258,010,769	\$258,001,858	\$258,809,859	\$258,788,104	\$258,785,400	\$258,684,861	\$258,645,530	\$258,017,038
Metro Bus	\$987,918,525	\$1,002,718,978	\$986,856,197	\$986,710,909	\$986,714,398	\$986,769,087	\$986,655,672	\$993,108,808
Subtotal Metro	\$1,363,018,477	\$1,377,777,686	\$1,459,470,160	\$1,518,228,433	\$1,516,718,900	\$1,473,245,644	\$1,530,216,666	\$1,368,661,844
Santa Monica	\$75,739,423	\$75,706,449	\$75,524,267	\$75,587,199	\$75,588,853	\$75,505,932	\$75,571,150	\$75,713,404
Culver City	\$22,190,059	\$22,190,078	\$22,189,100	\$22,189,122	\$22,189,154	\$22,189,178	\$22,189,200	\$22,189,235
Antelope Valley	\$17,113,299	\$17,113,277	\$17,110,488	\$17,111,146	\$17,110,919	\$17,110,738	\$17,111,463	\$17,112,937
Los Angeles DOT	\$61,167,338	\$61,160,834	\$61,175,325	\$61,150,349	\$61,150,052	\$61,229,655	\$61,151,931	\$61,124,803
Santa Clarita	\$19,245,787	\$19,246,251	\$19,258,883	\$19,262,128	\$19,260,853	\$19,256,681	\$19,257,840	\$19,253,552
West Hollywood	\$1,249,257	\$1,249,257	\$1,249,257	\$1,249,257	\$1,249,257	\$1,249,257	\$1,249,257	\$1,249,257
Subtotal Municipals	\$196,705,163	\$196,666,146	\$196,507,320	\$196,549,201	\$196,549,088	\$196,541,441	\$196,530,841	\$196,643,188
Grand Total	\$1,559,723,640	\$1,574,443,832	\$1,655,977,480	\$1,714,777,634	\$1,713,267,988	\$1,669,787,085	\$1,726,747,507	\$1,565,305,032
Change Compared to No Build (Refer to Table 6-3)	N.A.	\$14,720,192	\$96,253,840	\$155,053,994	\$153,544,348	\$110,063,445	\$167,023,867	\$5,581,392

Table 6-3. Change in Annual Operating & Maintenance Costs (2008 Dollars) Compared to No Build

Operators	Alternatives							
	No Build	TSM	HRT - Alt 1	HRT - Alt 11A	HRT - Alt 11B	HRT - Alt 14	HRT - Alt 16	BRT - Alt 17
Metro Heavy Rail	N.A	-\$32,333	\$96,714,921	\$155,640,237	\$154,129,919	\$110,702,513	\$167,826,281	\$446,815
Metro Light Rail	N.A	-\$8,911	\$799,090	\$777,335	\$774,631	\$674,092	\$634,761	\$6,269
Metro Bus	N.A	\$14,800,453	-\$1,062,328	-\$1,207,616	-\$1,204,127	-\$1,149,438	-\$1,262,853	\$5,190,283
Subtotal Metro	N.A	\$14,759,209	\$96,451,683	\$155,209,956	\$153,700,423	\$110,227,167	\$167,198,189	\$5,643,367
Santa Monica	N.A	-\$32,974	-\$215,156	-\$152,224	-\$150,570	-\$233,491	-\$168,273	-\$26,019
Culver City	N.A	\$19	-\$959	-\$937	-\$905	-\$881	-\$859	-\$824
Antelope Valley	N.A	-\$22	-\$2,811	-\$2,153	-\$2,380	-\$2,561	-\$1,836	-\$362
Los Angeles DOT	N.A	-\$6,504	\$7,987	-\$16,989	-\$17,286	\$62,317	-\$15,407	-\$42,535
Santa Clarita	N.A	\$464	\$13,096	\$16,341	\$15,066	\$10,894	\$12,053	\$7,765
West Hollywood	N.A	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Subtotal Municipals	N.A	-\$39,017	-\$197,843	-\$155,962	-\$156,075	-\$163,722	-\$174,322	-\$61,975
Grand Total	N.A	\$14,720,192	\$96,253,840	\$155,053,994	\$153,544,348	\$110,063,445	\$167,023,867	\$5,581,392

6.3 Proposed Funding Sources

The Westside Extension Transit Corridor is a Tier 1 strategic project in Metro's draft Long Range Transportation Plan (LRTP). As such, it is a high priority project. The AA Study provides the criteria to select the most cost effective fixed guideway transit investment in the Westside Extension Corridor. The AA Study has been prepared in compliance with Federal Transit Administration (FTA) New Starts Program guidelines and standards. Selection of the candidate alternatives and initiation of the second phase of the study will lead to the selection of a cost-effective fixed guideway transit project in this highly congested, major transit corridor which will be competitive for federal funding. Further, it is a necessary step in securing a federal funding grant for the project.

A funding source is not currently identified for any of the proposed Westside Extension Transit Corridor Build Alternatives under consideration. No new revenue sources are assumed to be available over and above those local, state, and federal revenue sources that are currently obtainable or identified by law to become available. Only if Federal, State, or local funds increase, can projects (such as this one) and services be added in accordance with the available revenues and priorities of the Metro Board of Directors.

Most capital projects along with the operating and maintenance costs are funded through the following fund sources:

- **Local Sales Tax Revenues**
 - ▶ Proposition A
 - ▶ Proposition C
 - ▶ Measure R
 - ▶ Transportation Development Act
- **Other Local Revenues**
 - ▶ Bonds/Financing Mechanism (Proposition A and C Bonds)
 - ▶ City/County Contributions
 - ▶ Metro Fare Revenues
- **State Revenues**
 - ▶ Proposition 1B State Infrastructure Bonds
 - ▶ Proposition 42 Sales Tax on Gasoline Funds
 - ▶ Regional Improvement Program (RIP) Funds
 - ▶ State Transit Assistance (STA)
- **Federal Revenues**
 - ▶ Congestion Mitigation and Air Quality (CMAQ)
 - ▶ Section 5307 Urbanized Formula
 - ▶ Section 5309 Bus and Bus Facilities/Section 5308 Clean Fuel Program



- ▶ Section 5309 Fixed Guideway Modernization
- ▶ Section 5309 New Starts
- ▶ Surface Transportation Program (STP)

In addition to the above funding sources, Los Angeles County voters approved Measure R on November 4, 2008, a ½ percent increase in the local sales tax dedicated to transportation projects. This will provide funding for construction of a significant amount of the selected Westside Extension project and its operation. The project development process would require that the Metro Board of Directors also adopt the selected Westside Extension project into the fiscally constrained Metro Long Range Transportation Plan and recommend its inclusion in the Regional Transportation Plan. The Regional Transportation Plan is approved by the Southern California Association of Governments (SCAG) and is a requirement before Federal 5309 New Starts funding and other funding sources can be requested.