

APPENDIX F: CAPITAL COST ESTIMATE

CAPITAL COST ESTIMATE

INTRODUCTION

There are two types of costs involved in building a new rail line: capital costs and operating/maintenance costs. Capital costs are the one-time expenditures to build the system and typically include tracks, stations, structures, signals, barriers, the maintenance facility, vehicles, fare collection system, and environmental mitigation. Operating/maintenance costs are the annual costs associated with operation of the system and typically include labor, administration, vehicle maintenance, fuel, and insurance.

At this early study stage, the cost estimates are developed on a per unit basis. Assuming analysis of rail transit continues into future study phases the cost estimates contained here will be refined through more detailed engineering.

It should also be noted that the cost estimates contained in this study are intentionally conservative. The estimates are conservative because they contain generous contingencies and do not factor in the economies of scale that are generally realized by the second and third rail lines.

Capital Costs

As stated previously, capital costs are the one-time expenses to construct the rail transit system. For purposes of this study, the order-of-magnitude capital costs were estimated in year 2003, current year, dollars and then escalated to year 2010, the anticipated year of construction. An escalation rate of 2.7 percent per year was used, which is consistent with the escalation rate used in *Central Corridor 2002 Draft Environmental Impact Statement (DEIS)*.

Elements and Unit Costs

Table A presents the unit costs used in developing the capital cost estimates. Data sources for the unit costs included: the *Central Corridor Draft Environmental Impact Statement (DEIS)*, April 2002, the *Hiawatha Corridor Light Rail Transit Capital Cost Estimate Report*, November 1999, the *29th Street and Southwest Corridors Busway Feasibility Study*, February 2000, data from the Colorado Rail Car Company, and data from both the Minnesota Department of Transportation (Mn/DOT) and Metro Transit.

The following elements were included in the capital cost estimate:

Guideway

This element includes the tracks and site preparation required to operate the system. For purpose of this study the following four categories were developed for the guideway: (1) at-grade ballasted track which is generally used in areas such as former rail beds, (2) paved track which is generally used at intersections with roadways or on streets such as Lyndale Avenue, (3) tunneled track which is used in tunnels, and (4) elevated direct fixation track which is generally used in grade-separated areas.

For purposes of the capital cost estimate, it is assumed that LRT service requires two new tracks and that DMU service requires the upgrading of the existing freight rail track and the construction of a second track. These assumptions are conservative because it may be possible to single-track the LRT service through narrow areas and it may also be possible to use sidings and passing tracks rather than a second track for the DMU service.

Streetwork

This element refers to modifications to existing roadways, and construction of new roadways intersecting the guideway and serving transit stations. This component includes roadway, intersection and traffic signal work.

Structures

This element refers to modifications to existing or construction of new roadway bridges.

Utility Relocation Allowance

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This element includes an allowance for relocation of existing public utilities. For this cost estimate the utility relocations were classified as light, medium, or heavy. A light allowance was applied to areas where utilities are known to exist, for example a railroad corridor. A medium allowance was applied to suburban roadways and freeway corridors. A heavy allowance was applied to urban roadways such as Lyndale Avenue, where it is likely to require more extensive work to relocate. Utility allowances were applied based upon field surveys, plans provided by HCRRRA staff, and input from the Southwest Technical Advisory Committee (TAC).

Stations

This element includes the costs of transit stations (i.e., site work, access facilities- handicap ramps, platforms, ticket vending machines, information boards, benches, lighting, shelters and minor facilities for feeder bus access).

Parking

This element includes the costs associated with providing park-and-ride facilities at stations.

Trail Reconstruction

This element includes the cost to reconstruct trails that would coexist with the transit line.

Maintenance Facility

This element includes the costs associated with a new operations and maintenance facility, which is assumed to be required for either LRT or DMU service. The location of a new operations and maintenance facility has not been determined.

Right-of-Way Allowance

This element includes the cost of right of way required at transit stations, park-and-ride facilities and specific areas such as freeway corridors (i.e. TH 169, TH 212 and I-494). This allowance does not apply to areas where HCRRRA owns property.

Systems

This element includes the cost of providing signals, communications, and traction power.

Vehicles

This element includes the cost for an LRV and DMU vehicle including the cost of spare parts and the cost of modifying the DMU vehicles to include dual cabs and wheelchair lifts. This cost estimate also includes the required fleet size, which is based on route length (two vehicles per route mile). This is a conservative approach and yields a higher fleet size than the operational plan.

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Table A: Unit Costs

Description	Unit ²	Unit Cost (Year 2003 Dollars) ¹			Notes
		Bus	LRT	DMU	
Guideway					
At-grade ballasted track	RF	-	\$400	\$400	Includes site preparation and trackwork. LRT: For construction of two new tracks. DMU: Upgrade of one existing track and construction of one new track.
Paved track	RF	-	\$600	\$600	
Tunneled track	RF	-	\$12,000	\$12,000	
Elevated direct fixation track ³	RF	-	\$5,500	\$6,000	
Shoulder widening	LF	\$20	-	-	
Ramp meter bypass	LS	\$300,000	-	-	
Streetwork					
Minor intersection rebuild	EA	\$250,000	\$250,000	\$250,000	Includes roadway, intersection and traffic signal allowances. For 32-foot wide pavement, including curb and gutter. For 52-foot wide pavement, including curb and gutter.
Major intersection rebuild	EA	\$450,000	\$450,000	\$450,000	
2-lane reconstruction	LF	\$350	\$350	\$350	
4-lane reconstruction	LF	\$675	\$675	\$675	
Structures					
Roadway bridge reconstruction	SF	\$85	\$85	\$85	For simple, precast bridge (e.g. over 29th Street). Includes excavation, construction, & landscaping
Retaining wall (to 4ft/to20ft)	SF	\$20/\$35	-	-	
Utility Relocation					
Allowances	RF	\$100	\$100	\$100	Depending on corridor, for example: Railroad corridor Suburban roadway and freeway corridors. Urban roadway corridor.
Light	RF	\$350	\$350	\$350	
Medium	RF	\$600	\$600	\$600	
Heavy					
Stations					
At-grade station	EA	\$250,000	\$1,000,000	\$1,000,000	For rail includes site work/access facilities, canopy, sidewalk, lighting, drainage. For rail more bus berthing space is required.
Elevated station	EA	-	\$4,000,000	\$4,000,000	
Bus berthing	LS	\$125,000	\$500,000	\$500,000	
Parking					
Surface	STALL	\$3,000	\$3,000	\$3,000	No park-and-ride facilities at stations in Minneapolis.
Structure	STALL	\$13,000	\$13,000	\$13,000	
Trail Reconstruction					
Asphalt ⁴	LF		\$50	\$50	For 12-foot wide trail with 2 feet of clear zone on either side, including earthwork and grading. Wooden trail bridge
Trail bridge	SF		\$60	\$60	
Maintenance Facility					
	EA		\$40,000,000	\$38,000,000	Includes midday storage and maintenance/operations facility.
Right-of-Way Allowance⁵					
	EA		\$1,000,000	\$1,000,000	For all stations expect areas owned by HCRRA.
Systems					
Signals	RF		\$300	\$300	Applies only to LRT.
Communications	RF		\$140	\$140	
Traction Power	RM		\$2,000,000	-	
Vehicles⁶					
Rail	EA	-	\$3,200,000	\$3,800,000	LRT and DMU spare parts included. DMU assumes all power cars with dual cabs and wheelchair lifts.
Bus - standard	EA	\$325,000	-	-	
Bus - articulated	EA	\$500,000	-	-	
Engineering & Administration					
Infrastructure		30%	30%	30%	
Right-of-way		-	30%	30%	
Vehicle		5%	5%	5%	
Contingency					
Infrastructure		30%	30%	30%	
Right-of-way		-	100%	100%	
Vehicle		5%	5%	10%	

¹ References: Hiawatha LRT, Phase 2 RFP, Part 5 - Design Criteria/Performance Specifications, 7 April 2000; Central Corridor Draft Environmental Impact Statement, Order-of-Magnitude Cost Estimate, April 2002; and Colorado Railcar specifications as of September 2002. Year 2003 capital cost will be escalated to Year 2010 using a 2.7 percent escalation rate. This rate is consistent with the 2002 Central Corridor DEIS.

² RF = Route Foot (double track foot) LF = Linear Foot RM = Route Mile EA = Each SF = Square Foot LS = Lump Sum

³ DMU elevated direct fixation track costs more than LRT because the vehicle weights more than an LRV and requires greater structural support.

⁴ Existing crushed limestone trail west of TH 169 to be reconstructed with asphalt.

⁵ Includes area for station platforms and park-and-ride facility.

⁶ Vehicles base price is \$2.5 million for LRV (based on Hiawatha Corridor project for Bombardier vehicle) and \$2.9 million is the projected cost for Colorado Railcar's Aero DMU powered car. For this study, DMU trains are assumed to consist of all-powered cars. The number of vehicles is based on two (2) vehicles per route mile.

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Table B: Capital Cost Estimates (Year 2003 and Year 2010)

Alignment	Year 2003		Year 2010	
	Total	Per Mile	Total	Per Mile
LRT 1A	\$ 503.0	\$ 36.5	\$ 606.1	\$ 44.0
LRT 1B	\$ 614.8	\$ 42.0	\$ 740.9	\$ 50.6
LRT 2A	\$ 582.0	\$ 41.8	\$ 701.4	\$ 50.4
LRT 2B	\$ 691.4	\$ 46.8	\$ 833.1	\$ 56.4
LRT 3A	\$ 663.4	\$ 47.0	\$ 799.4	\$ 56.7
LRT 3B	\$ 769.1	\$ 51.4	\$ 926.8	\$ 62.0
LRT 4A	\$ 358.0	\$ 46.1	\$ 431.3	\$ 55.6
LRT 4B	\$ 468.7	\$ 54.5	\$ 564.8	\$ 65.7
DMU 5	\$ 425.5	\$ 29.1	\$ 512.7	\$ 35.0
Bus Baseline	\$ 72.2	\$ 4.0	\$ 87.3	\$ 4.9

Notes

Year 2010 cost estimate derived by escalating year 2003 costs by 2.7 percent per year, which is consistent with the 2002 Central Corridor DEIS. Cost for LRT 3A and 3B includes an option spur to 8th Avenue in downtown Hopkins (\$45.2 million in year 2003 dollars).