

CHAPTER 6 FINANCIAL ANALYSIS AND EVALUATION

CHAPTER OVERVIEW AND ORGANIZATION

This chapter contains two parts. Section I provides the financial analysis for the IOS of the Refined LPA, based on the first full year of IOS operations in 2006. The analysis presented in Section II of this chapter describes the financial analysis for the 2025 No-Build Alternative, TSM Alternative, and Refined LPA. Section II also contains an evaluation of the degree to which various 2025 Alternatives satisfy the project purposes and needs presented in Chapter 1.

The financial analysis is presented in year-of-expenditure (YOE) dollars to provide a better understanding of the actual funds that would need to be expended and of the relative effect of inflation on costs and revenues.

The year 2002 is used as a base for comparison because it is the latest full year that costs can be verified. Baseline costs came from City budget documents (actual expenditures are slightly lower because of savings on expenditure restrictions).

Readers of this FEIS document who have reviewed previous documents will observe that project costs have dropped considerably from the DEIS and SDEIS due to the project refinements explained throughout the document. This has further improved project cost-effectiveness while enhancing service.

I. IWILEI TO WAIKIKI (IOS)

A financial analysis was conducted to identify the capital and operating costs and the timing and level of financial commitments needed from federal and local sources to build and operate the IOS.

The IOS construction is scheduled to be completed by 2005.

1) Capital Costs

The capital cost of the IOS is estimated to be \$48.1 million in 2002 dollars. To determine the adequacy of the funding already approved to meet the capital requirements of the IOS, the capital costs presented in 2002 dollars were converted to year of expenditure (YOE) dollars. Over the roughly two-year implementation period for the IOS (FY 2003 -2005) the capital costs are projected to total \$50.9 million in YOE dollars. This assumes an annual compounded cost escalation rate of 2.5 percent.

The IOS project will be fully funded through a combination of FTA sources matched by City General Obligation bonds. Funding for the IOS capital improvements will be \$7.95 million from the Federal Transit Administration (FTA) Section 5309 Bus Capital Program, \$11.90 million from the FTA Section 5309 New Starts Program, and the remaining \$31.0 million from City General Obligation (G.O.) Bonds. The \$31.0 million of City funding has already been approved in the City's FY 2003 capital improvement budget. The required federal funding has been appropriated by Congress in the FY 2003 Omnibus Appropriations Bill (P.L. 108-7) and the FY 2002 U.S. DOT and Related Agencies Appropriations Act (P.L. 107-87). The IOS is therefore fully funded.

The estimated \$4-5 million cost of the ten hybrid-diesel-electric BRT vehicles that are required for IOS operations is not included in the capital cost of the IOS since all of the vehicles will be purchased with City funds as part of the regular fleet replacement program that will occur with or without the IOS being

implemented. The total size of the City's bus fleet is not expected to change with implementation of the IOS and will remain at 525 buses, including the ten hybrid diesel-electric vehicles.

2) Operating and Maintenance Costs

System-wide operating and maintenance (O&M) costs were forecast for conditions in FY 2006 with and without the IOS. This will be the first full year of operations after the IOS construction is completed in 2005. It is planned that the Kalihi and Kakaako Mauka branches of the In-Town BRT will be opened for service in the latter part of FY 2006. To isolate the O&M cost difference between the IOS and No-Build condition, the O&M costs for these other branches and for TheHandi-Van are not included in the IOS analysis presented in this section. The O&M costs of the other branches and for TheHandi-Van are reflected in the financial plan for the entire Refined LPA discussed in Section II (2025 Alternatives) of this chapter and in the cash flow tables presented in Appendix C.

The FY 2006 system-wide bus O&M cost excluding the Kalihi and Kakaako Mauka branches and TheHandi-Van is estimated to be \$119.3 million in 2002 dollars. This is a \$264,700 savings because of corollary service changes compared to the No-Build condition. The system-wide O&M costs excluding the Kalihi and Kakaako Mauka branches and TheHandi-Van in 2006 YOE dollars will be \$131.7 million. Similar to today, this will be financed through a combination of passenger fares, FTA formula funds and City general funds. Sources of funding for O&M costs in 2006 will be passenger fares (27.3%), FTA Section 5307 formula funds for preventive maintenance (6.4%) and City General Fund (66.3%).

II. 2025 ALTERNATIVES

This section presents the financial analysis for the corridor-wide alternatives - No-Build Alternative, Transportation Systems Management (TSM) Alternative, and Refined Locally Preferred Alternative (LPA), which were described in Chapter 2. This section also presents the alternatives' comparison, which were in Chapter 7 in the Major Investment Study/Draft Environmental Impact Statement (MIS/DEIS) and Supplemental Draft Environmental Impact Statement (SDEIS).

The proposed financial plans for capital and for operations and maintenance (O&M) of the Refined LPA are presented within the context of the comparative costs and revenues associated with each alternative.

The Bus Rapid Transit (BRT) systems in the Refined LPA will be implemented between Fiscal Years (FYs) 2003-2016. As defined in the City and County of Honolulu's Revised Charter, fiscal years extend from July 1 through June 30. Over the 14-year implementation period, the capital cost of the Refined LPA BRT Program is projected to be \$487.6 million in Year of Expenditure dollars (YOE \$). Of this total, \$243.2 million will be for the In-Town BRT system and \$244.4 million will be for the Regional BRT system. If Embedded Plate Technology was to be implemented, \$129.1 million would be added to the capital cost. The capital cost of the IOS is estimated to be \$50.9 million (YOE).

Also included in the Refined LPA's financial analysis are the capital costs required for the acquisition and replacement of the entire bus and TheHandi-Van fleet and other system-wide improvements. These amount to \$426.0 million (in YOE \$) over the 2003 - 2016 period in which the Refined LPA BRT Program is implemented. For the 2003 through 2025 forecasting period used for environmental analyses in this FEIS the capital cost of the bus and TheHandi-Van acquisition and replacement program and other system-wide improvements is projected to be \$723.3 million (in YOE \$). The fleet would be replaced twice during this time period. The total estimated capital cost for the Refined LPA including vehicle acquisition and systemwide improvements is therefore \$1.04 billion for the period 2003 through 2016, and \$1.34 billion for the period 2003 through 2025. These are in YOE dollars.

The City's annual debt service payment between FYs 2003 and 2016 would increase \$7.7 million for the Refined LPA over the No-Build Alternative, and \$3.9 million over the TSM Alternative.

The FEIS financial analysis for the Refined LPA differs from the MIS/DEIS and SDEIS financial analyses in four primary ways:

- Refined LPA capital costs reflect additional refinements made to the proposed project, including alignment modifications. These have lowered the cost;
- State highway funding has been removed as a capital revenue source;
- City highway funding has been removed as a capital revenue source; and
- The implementation phasing plan for the Refined LPA has been adjusted to accommodate a conservative estimate of revenues over the 14-year period extending from FY 2003 to FY 2016.

The financial analysis concludes that the Refined LPA, along with the system-wide bus replacement and expansion program, can be funded without adding new taxes or raising taxes using the following revenue sources:

Capital Funding for the Refined LPA Program

FTA Section 5307 Urbanized Area Formula (UZA) Funds	22%
FTA Section 5309 Fixed Guideway Modernization (FGM) Funds	2%
FTA Section 5309 Bus Capital Funds	5%
FTA Section 5309 New Starts Funds	23%
Federal Highway Administration (FHWA) Funds	13%
City General Obligation (GO) Bonds	<u>35%</u>
TOTAL	100%

Bus and BRT Operations & Maintenance Funding

Passenger Fares	27%
FTA Section 5307 UZA Funds	7%
City Operating Support	<u>66%</u>
TOTAL	100%

In comparing the alternatives, the Refined LPA will provide the greatest increase in ridership within the Primary Corridor with an increase of over 13 percent. The Refined LPA will help achieve a more balanced transportation infrastructure in the Primary Transportation Corridor compared to the No-Build and TSM Alternatives. Compared to the No-Build and TSM Alternatives, the Refined LPA will result in higher islandwide and commuter transit ridership; carry more people during the morning peak hour, and improve the transportation linkage between Downtown Honolulu and Kapolei, Waikiki, UH-Manoa, and Kalihi. The \$5.01 and \$4.52 incremental cost per new transit rider for the Refined LPA over the No-Build and TSM Alternatives respectively is very favorable compared to the \$6.25 incremental cost per new transit rider for the TSM Alternative over the No-Build.

Implementation of the Refined LPA will be phased over 14 years, the first phase consisting of construction of the Initial Operating Segment (IOS), which is scheduled to begin with award of a construction contract in Calendar Year 2003. The IOS Chapter presents the financial analysis for the implementation of this phase.

The conceptual funding plan for the Refined LPA was approved by the City Council when it adopted the LPA. Funding for the Refined LPA is also incorporated in the OMPO regional transportation plan (TOP 2025). For each phase of the total project to be implemented, there needs to be appropriations by the City Council and a commitment of federal matching funds. These appropriations exist for the IOS and will need to be obtained for the balance of the project.

In the discussion below, Section 6.1 describes the financial analysis for the proposed project, including the costs and the proposed funding of the project elements. Section 6.2 addresses differences among the No-Build Alternative, TSM Alternative, and the Refined LPA, based on multiple factors. Section 6.3 lists the permits and approvals that are anticipated for the Refined LPA.

6.1 FINANCIAL ANALYSIS

The Honolulu City Council has supported the financial approach to funding this project with primarily Federal funds and City GO Bonds. Resolution No. 99-338 adopted in December 1999, stated, in part, that “Be it further resolved that the Council strongly supports a preliminary financial approach to include phased use of federal transportation funds, local highway funds and City GO Bonds to provide the necessary funding;...” The Council’s intentions are incorporated in the key elements and assumptions of this financial analysis.

This section summarizes the financial implications by presenting the capital and operating financial plans for each alternative. The financing plans are constructed to be affordable on an annual basis. A description is provided of the assumed revenue sources, commitment of these sources, and schedule of annual outlays planned.

Major existing sources of revenues were examined to determine the adequacy of sources of funds for the capital and operating requirements of the alternatives. Capital costs were then compared to the revenues projected to be available from these sources over the fourteen-year period of FYs 2003 to 2016, the years in which the projects would be implemented. Operating and maintenance costs were compared to the revenues projected to be available over the ten-year period of Fys 2007 to 2016. The reason that O&M costs and revenues are for a different time period than the capital costs is that the In-Town BRT is not scheduled to be completed and in full operation until 2007 (The IOS will start service in 2005). Costs and revenues for capital and O&M costs were, however, also compared over the 23-year period of FYs 2003 to 2025.

The financial analysis is presented in year-of-expenditure (YOE) dollars. This provides a better understanding of the actual funds that would need to be expended and of the relative effect of inflation on costs and revenues. A baseline rate of inflation of 2.5 percent has been assumed. The 2.5 percent rate is consistent with recent trends in the U.S. national inflation rate and one percent higher than Hawaii’s inflation rate of 1.5 percent per year for the past five years. Year-of-expenditure dollar values are computed by multiplying 2002 dollar values by the compounded escalation factor for the relevant year. For example, in year-of-expenditure dollars, \$1.00 in 2002 is equivalent to \$1.025 in 2003 and \$1.051 in 2004, using the assumed baseline inflation rate of 2.5 percent.

The financial analyses have been prepared on the basis of the information and assumptions set forth in this chapter. The projections may be affected by fluctuating economic conditions and are dependent on the occurrence of future events. Therefore, future financial requirements may vary from the projections and such variations could be material. These financial plans are based on specific implementation schedules and estimates of capital costs made during preliminary engineering which will be refined during final design. If available funding, construction costs, planning issues or other factors impact the schedule or the ability of the City to secure financing, the implementation schedules will need to be adjusted to accommodate the changed conditions. The financial plans for the alternatives assume that responsibility for funding and implementation will be shared among the City and federal transit and highway agencies. After environmental clearance is achieved, the respective roles and responsibilities of the various involved parties will be further clarified and their respective commitments of funding confirmed.

6.1.1 Key Measures of Financial Performance

The financial assessment uses a cash flow analysis to evaluate the ability of the various sources of capital and operating revenues to fund the estimated annual capital and O&M costs of the alternatives over the

entire period FYs 2003 – 2025. As indicated above, selected averages for representative years in between have been used for comparing the Alternatives. The sources and uses cash flow analysis consists of four basic components: Capital Costs, O&M Costs, Capital Revenues, and Operating Revenues.

Key measures have been used to assess the financial performance of the alternatives and to contrast the Refined LPA to the No-Build and TSM Alternatives. These measures are:

CAPITAL PERFORMANCE MEASURES

- Total Capital Cost;
- GO Bonds Issued by the City;
- FTA New Starts Funding Required;
- FHWA Funding Required;
- Average Annual Debt Service Payment (Post-2003 Debt);
- Ratio of Debt Service on GO Bonds (including Self-Supporting Bonds) to the City's Total Operating Budget: Maximum Ratio Reached; and
- Ratio of Debt Service on Direct Debt (excluding Self-Supporting Bonds) to General Fund revenues: Maximum Ratio Reached.

OPERATING PERFORMANCE MEASURES (FY 2007-2016)

- Average Annual O&M Costs;
- Average Annual City Operating Support for Transit O&M;

CAPITAL AND O&M PERFORMANCE MEASURES (FY 2007-2016)

- Average Annual Total City Contribution Required for Debt Service and O&M;
- Average Annual Increase in Total City Contribution Over the No-Build Alternative; and
- Average Annual Increase in Total City Contribution Over the TSM Alternative.

The results associated with these measures are discussed in Section 6.1.5.

6.1.2 Costs

The capital and O&M costs of the alternatives were computed in 2002 dollars over the FYs 2003–2025 period. These costs were then inflated to reflect year-of-expenditure dollars based on the proposed implementation schedule for each alternative. The financial analyses and tables focus on the first fourteen years for capital costs, which is the implementation period for the Refined LPA, and Fys 2007-2016 for O&M costs. The sections below summarize the capital and O&M costs of the alternatives.

1) Capital Costs

[Table 6.1-1](#) summarizes the capital cost estimates for the No-Build Alternative, TSM Alternative, and Refined LPA in YOE dollars, by major cost component, over the fourteen-year implementation period of FYs 2003-2016. The capital cost estimates include construction costs and soft-costs such as final design and construction management costs, as well as set-asides for contingencies. To assure consistency, the implementation schedules used in the financial analyses are consistent with the schedules shown in Chapter 2.

TABLE 6.1-1
CAPITAL COSTS, BY ALTERNATIVE
FISCAL YEARS 2003 – 2016
(YOE \$, 000)

	No-Build	TSM	Refined LPA
SYSTEM-WIDE IMPROVEMENTS			
Bus Acquisitions	\$267,755	\$296,837	\$356,426
TheHandi-Van Vehicle Acquisitions	\$22,905	\$22,905	\$22,905
Bus Maintenance Facility Expansion	--	\$35,668	\$35,668
Transit Centers and Parking	\$10,061	\$31,702	--
Kamehameha Highway Corridor and Transit Centers	\$10,882	\$10,882	\$10,982
Park-and-Ride	--	\$6,076	--
Bus Priority Treatment	--	\$34,434	--
Zipper Lane	--	\$14,982	--
Subtotal, System-Wide Improvements	\$311,602	\$453,486	\$425,982
IN-TOWN BRT COMPONENT			
In-Town BRT Fixed Facilities	--	--	\$227,793
Net Cost of In-Town BRT Vehicles	--	--	\$15,446
Subtotal, In-Town BRT Component	--	--	\$243,239
EMBEDDED PLATE TECHNOLOGY (EPT) COMPONENT			
EPT Fixed Facilities	--	--	\$97,826
Net Cost of EPT Vehicles	--	--	\$31,246
Subtotal, EPT Component	--	--	\$129,072
Subtotal, In-Town BRT and EPT Components			\$372,310
REGIONAL BRT COMPONENT			
BRT Transit Centers and /Parking	--	--	\$31,744
BRT Zipper Lanes	--	--	\$142,410
BRT Priority Ramp Improvements	--	--	\$70,225
Subtotal, Regional BRT Component	--	--	\$244,379
Subtotal, In-Town BRT, EPT, and Regional BRT	--	--	\$616,689
TOTAL CAPITAL COSTS	\$311,602	\$453,486	\$1,042,671

Source: Sharon Greene & Associates, November 2002.

Note: Rounding of numbers may affect subtotals and totals.

2) Operating and Maintenance (O&M) Costs

The O&M costs for the No-Build Alternative, TSM Alternative, and Refined LPA include some or all of the following:

- Bus O&M;
- TheHandi-Van O&M; and
- In-Town BRT System O&M.

Tables 6.1-2A and 6.1-2B summarize O&M costs of the alternatives for two fiscal years in FY 2002 constant dollars. The fiscal years selected are FY 2007, at completion of In-Town BRT System's fixed facilities (in the Refined LPA) and FY 2017 when the Refined LPA is fully operational using Embedded Plate Technology. To facilitate comparison with current costs for transit operation, these costs are presented in 2002 constant dollars and compared to the actual O&M costs for FY 2002 in Table 6.1-2A and 6.1-2B, respectively. Annual O&M costs for each alternative through FY 2025 are reported in Year of Expenditure dollars in the Appendix C cash flow tables. It should be noted that actual O&M costs in FY 2002 were 5.3 percent below the budget.

To be conservative, the budgeted rather than the actual costs in FY 2002 were used as the baseline to project future O&M costs in the financial analyses.

**TABLE 6.1-2A
COMPARISON OF FY 2007 ESTIMATED OPERATING AND MAINTENANCE COSTS,
BY ALTERNATIVE, TO FY 2002 O&M BUDGET (IN 2002 CONSTANT \$, 000)**

	FY 2002 Budget	FY 2007		
		No-Build	TSM	Refined LPA
Bus	\$114,075	\$119,653	\$121,579	\$126,808
TheHandi-Van	\$12,688	\$14,067	\$14,067	\$14,067
TOTAL	\$126,763	\$133,720	\$135,646	\$140,875

Source: Sharon Greene & Associates, November 2002.

Note: At completion of In-Town BRT System fixed facilities.

**TABLE 6.1-2B
COMPARISON OF FY 2017 ESTIMATED OPERATING AND MAINTENANCE COSTS
BY ALTERNATIVE TO FY 2002 O&M BUDGET (IN 2002 CONSTANT \$, 000)**

	FY 2002 Budget	FY 2017		
		No-Build	TSM	Refined LPA
Bus	\$114,075	\$120,233	\$130,699	\$142,286
TheHandi-Van	\$12,688	\$15,129	\$15,129	\$15,129
TOTAL	\$126,763	\$135,362	\$145,828	\$157,415

Source: Sharon Greene & Associates, November 2002.

Note: At first year of operation of the Refined LPA using Embedded Plate Technology.

In addition to O&M costs for bus and TheHandi-Van service, an estimated \$798,500 (in 2002 constant dollars) will be needed for Zipper lane O&M costs attributable to the Regional BRT system in the Refined LPA from the beginning of their use to FY 2025. Additional funds will also be needed for O&M costs attributable to Zipper lane improvements in the TSM Alternative. Since the zipper lane project elements in these alternatives are part of the Interstate highway system and the lanes are shared with high-occupancy vehicles, the financial plans assume that the costs will be borne by the State of Hawaii Department of Transportation (SDOT) as part of their annual O&M costs. Therefore, O&M costs associated with the Zipper lanes are not included in the financial analyses for the TSM Alternative and the Refined LPA.

6.1.3 Revenue Sources

The City's conceptual funding plans propose six revenue sources to fund the capital costs associated with the various cost elements comprising the alternatives. These sources consist of four specific Federal Transit Administration grant programs, Federal Highway Administration funds from various potential sources, and City general obligation bond funds. Three revenue sources are proposed to fund operating and maintenance costs.

1) Revenue Sources for Capital Costs

Revenue sources for the capital costs associated with the alternatives include the following proposed FTA and City sources and potential FHWA sources from a combination of FHWA programs:

Federal Transit Administration (FTA) Funds

- FTA Section 5307 Urbanized Area (UZA) Formula Grants;
- FTA Section 5309(m)(1)(A), Capital Investment Grants and Loans - Fixed Guideway Modernization Formula Grants;
- FTA Section 5309(m)(1)(B) Capital Investment Grants and Loans - New Starts Discretionary Grants; and
- FTA Section 5309 (m)(1)(C) Capital Investment Grants and Loans - Bus Capital Discretionary Grants.

Federal Highway Administration (FHWA)

- Surface Transportation Program (STP) 23 U.S.C. Section 133;
- Congestion Mitigation and Air Quality Program (CMAQ) 23 U.S.C. Section 149;
- Interstate Maintenance Program (IM) 23 U.S.C. Section 119; and
- National Highway System Program (NHS) 23 U.S.C. Section 103(b).

City GO Bond Proceeds

Tables 6.1-3A through 6.1-3C identify the potential capital sources assumed to fund the annual capital costs of the program elements over the FYs 2003-2016 period for each alternative. Costs are presented in year of expenditure dollars. The conceptual funding plans for the FEIS differ from those shown in the MIS/DEIS and SDEIS in four primary ways:

- Refined LPA capital costs reflect additional refinements made to the proposed project, including alignment modifications. These have lowered the overall cost;
- State highway funding has been removed as a capital revenue source and replaced with City GO bond proceeds and FTA Section 5309 New Start grant funds;
- City highway funding has been removed as a capital revenue source and replaced with City GO bond proceeds; and
- The implementation phasing plan for the Refined LPA has been adjusted to accommodate a conservative estimate of revenues over the 14-year period extending from FY 2003 to FY 2016

Federal Transit Administration (FTA) Funds

FTA currently provides federal assistance for the City's mass transit program under the Transportation Equity Act for the 21st Century (TEA-21), as amended, which authorizes FTA programs from Federal Fiscal Year (FFY) 1998 through FFY 2003. New legislation is presently being developed that will authorize FTA's continued operation for another four to six years.

The statute related to transit laws is codified in Title 49 United States Code (U.S.C.) Chapter 53. The various FTA funding sources identified in the financial analyses are described below. The term "apportionment" refers to a statutorily prescribed division or assignment of funds based on formulas in the law. The term "allocation" refers to an administrative or Congressional distribution of those funds that do not have statutory distribution formulas.

While the guaranteed transit funding levels in TEA-21 provide greater certainty about the annual flow of federal transit monies, FTA funds are appropriated on a yearly basis by Congress. Some level of uncertainty remains regarding the amount and timing of the discretionary and formula funds assumed for the alternatives. The conceptual Capital Financial Plans assume an annual apportionment of FTA Section 5307 Urbanized Area formula funds and \$242.0 million in FTA Section 5309 New Starts funds for the BRT component. The continued authorization of FTA grant programs is assumed through FY 2025.

**TABLE 6.1-3A
NO-BUILD ALTERNATIVE
CAPITAL FUNDING PLAN
FISCAL YEARS 2003 – 2016 (IN YOE \$, 000)**

Description *	Costs		FTA		City		Total Revenue
	2003-2016	UZA	FGM	Bus Discr	GO Bonds	FHWA	
Transit Centers	\$10,061	\$0	\$0	\$0	\$10,061	\$0	\$10,061
Bus Acquisitions	\$267,755	\$129,584	\$20,839	\$0	\$117,332	\$0	\$267,755
TheHandi-Van Vehicle Acquisitions	\$22,905	\$13,616	\$0	\$0	\$9,289	\$0	\$22,905
Kamehameha Hwy Corridor and Transit Ctrs	\$10,882	\$0	\$0	\$8,664	\$2,218	\$0	\$10,882
TOTAL NO-BUILD ALTERNATIVE	\$311,602	\$143,200	\$20,839	\$8,665	\$138,899	\$0	\$311,602
% OF TOTAL NO-BUILD ALTERNATIVE		45%	7%	3%	45%	0%	100%

Source: Sharon Greene & Associates, November 2002.

Note: * See Chapter 2 for a detailed description of the project elements in the No-Build Alternative.

**TABLE 6.1-3B
TRANSPORTATION SYSTEMS MANAGEMENT ALTERNATIVE
CAPITAL FUNDING PLAN
FISCAL YEARS 2003 – 2016 (IN YOE \$, 000)**

Description *	Cost		FTA		City		Total Revenue
	2003-2016	UZA	FGM	Bus Discr	GO Bonds	FHWA	
CAPITAL COSTS							
Transit Centers & Parking	\$31,702	\$3,405	\$0	\$0	\$28,297	\$0	\$31,702
Bus Acquisitions	\$296,837	\$132,336	\$20,839	\$0	\$143,661	\$0	\$296,837
TheHandi-Van Vehicle Acquisitions	\$22,905	\$12,077	\$0	\$0	\$10,829	\$0	\$22,905
Expansion of Bus Maintenance Facility	\$35,668	\$4,695	\$0	\$0	\$30,973	\$0	\$35,668
Park-And-Ride	\$6,076	\$0	\$0	\$0	\$6,076	\$0	\$6,076
Bus Priority Treatment	\$34,434	\$0	\$0	\$0	\$34,433	\$0	\$34,434
Zipper Lane	\$14,982	\$0	\$0	\$0	\$2,998	\$11,985	\$14,982
Kamehameha Hwy Corridor & Transit Ctrs	\$10,882	\$0	\$0	\$8,665	\$2,216	\$0	\$10,882
TOTAL TSM ALTERNATIVE	\$453,486	\$152,513	\$20,839	\$8,665	\$259,484	\$11,985	\$453,486
% OF TOTAL TSM ALTERNATIVE		34%	5%	2%	56%	3%	100%

Source: Sharon Greene & Associates, November 2002.

Note: * See Chapter 2 for a detailed description of the project elements in the TSM Alternative.

**TABLE 6.1-3C
REFINED LOCALLY PREFERRED ALTERNATIVE
CAPITAL FUNDING PLAN
FISCAL YEARS 2003 – 2016 (YOE \$, 000)**

Description *	Cost	FTA			New Start		City	FHWA	Total Revenue
	2003-2016	UZA	FGM	Bus Discr	In-Town	Regional	GO		
CAPITAL COSTS									
IN-TOWN BRT PROGRAM									
Fixed Facilities	\$227,793	\$0	\$0	\$0	\$113,896	\$0	\$113,897	\$0	\$227,793
Net Cost for Hybrid-Electric Vehicles	\$15,446	\$0	\$0	\$2,345	\$7,723	\$0	\$5,378	\$0	\$15,446
SUBTOTAL, IN-TOWN BRT COMPONENT	\$243,239	\$0	\$0	\$2,345	\$121,619	\$0	\$119,275	\$0	\$243,239
% OF IN-TOWN BRT COMPONENT		0%	0%	1%	50%	0%	49%	0%	100%
EMBEDDED PLATE TECHNOLOGY									
Fixed Facilities	\$97,826	\$0	\$0	\$0	\$48,913	\$0	\$48,913	\$0	\$97,826
Net Cost of EPT Vehicles	\$31,246	\$0	\$0	\$9,374	\$15,623	\$0	\$6,249	\$0	\$31,246
SUBTOTAL, EMBEDDED PLATE TECHNOLOGY	\$129,072	\$0	\$0	\$9,374	\$64,536	\$0	\$55,162	\$0	\$129,072
% OF EMBEDDED PLATE TECHNOLOGY		0%	0%	7%	50%	0%	43%	0%	100%
TOTAL, IN-TOWN BRT COMPONENT AND EPT	\$372,310	\$0	\$0	\$11,719	\$186,155	\$0	\$174,437	\$0	\$372,310
% OF IN-TOWN COMPONENT AND EPT		0%	0%	3%	50%	0%	47%	0%	100%
REGIONAL BRT PROGRAM									
BRT Transit Centers and Parking	\$31,744	\$0	\$0	\$0	\$0	\$14,818	\$6,349	\$10,577	\$31,744
BRT Zipper Lanes	\$142,410	\$0	\$0	\$0	\$0	\$15,540	\$28,482	\$98,388	\$142,410
BRT Priority Ramp Improvements	\$70,225	\$0	\$0	\$0	\$0	\$25,487	\$14,045	\$30,693	\$70,225
SUBTOTAL, REGIONAL BRT COMPONENT	\$244,379	\$0	\$0	\$0	\$0	\$55,845	\$48,876	\$139,658	\$244,379
% OF REGIONAL BRT COMPONENT		0%	0%	0%	0%	23%	20%	57%	100%
SUBTOTAL, IN-TOWN, EPT, AND REGIONAL BRT	\$616,689	\$0	\$0	\$11,719	\$186,155	\$55,845	\$223,313	\$139,658	\$616,689
% OF IN-TOWN, EPT, AND REGIONAL BRT		0%	0%	2%	30%	9%	36%	23%	100%
SYSTEM-WIDE IMPROVEMENTS									
Bus Acquisitions	\$356,426	\$185,056	\$20,839	\$27,281	\$0	\$0	\$123,250	\$0	\$356,426
Handi-Van Vehicle Acquisitions	\$22,905	\$14,656	\$0	\$0	\$0	\$0	\$8,249	\$0	\$22,905
Bus Maintenance Facility	\$35,668	\$22,801	\$0	\$0	\$0	\$0	\$12,867	\$0	\$35,668
Kamehameha Highway Corridor and Transit Centers	\$10,982	\$0	\$0	\$8,745	\$0	\$0	\$2,237	\$0	\$10,982
SUBTOTAL, SYSTEM-WIDE IMPROVEMENTS	\$425,982	\$222,514	\$20,839	\$36,026	\$0	\$0	\$146,603	\$0	\$425,982
% OF SYSTEM-WIDE IMPROVEMENTS		52%	5%	8%	0%	0%	35%	0%	100%
TOTAL, BRT ALTERNATIVE	\$1,042,671	\$222,514	\$20,839	\$47,744	\$186,155	\$55,845	\$369,917	\$139,658	\$1,042,671
% OF TOTAL BRT ALTERNATIVE		22%	2%	5%	18%	5%	35%	13%	100%

Source: Sharon Greene and Associates, November 2002.

Note: *See Chapter 2 for a detailed description of the project elements in the Refined LPA.

Urbanized Area (UZA) Formula Program, 49 U.S.C. Section 5307

The UZA Formula Program provides FTA funds for transit capital (including preventative maintenance) and planning. The term “preventive maintenance” is defined as all maintenance costs. The federal share for capital and planning assistance projects under the UZA Formula Program is up to 80 percent of the net project cost. The City is the direct recipient of Section 5307 funds.

A total of \$25.3 million is assumed as the City’s FY 2003 Section 5307 apportionment amount. This aggregated amount for the Honolulu and Kaneohe urbanized areas was calculated by FTA using the U.S. Department of Transportation’s proposed FFY 2003 budget. From this total, \$1.7 million will be transferred to FHWA in 2003 for the State’s vanpool program, with \$1.0 million assumed to be transferred annually thereafter. The City’s annual Section 5307 apportionments are projected to increase 2.3 percent per year, consistent with the forecast assumptions of the General Accounting Office.¹

The financial analyses allocate \$20.0 million in Section 5307 funds for preventive maintenance in 2003 and 2004. Beginning in 2005, 30 percent of the City’s annual Section 5307 apportionments are earmarked for preventive maintenance, up to the maximum statutory limit. The remaining 70 percent is used for other capital and planning activities. In years in which the entire 70 percent is not required for capital or planning activities, the remaining amounts are used for preventive maintenance. The Section 5307 assistance for preventive maintenance reduces the City’s annual subsidy for transit operating and maintenance (O&M) costs. Section 5307 funds are used for all alternatives. Over the FY 2003-2016 period, a total of \$730.5 million is projected to be received.

Capital Investment Grants and Loans, 49 U.S.C. Section 5309

Under 49 U.S.C. Section 5309, FTA makes grants to assist in financing capital projects under the following three categories of projects:

- Modernization of fixed guideway systems, 49 U.S.C. Section 5309(m)(1)(A);
- Construction of new fixed guideway systems and extensions (New Starts), 49 U.S.C. Section 5309(m)(1)(B); and
- Bus and bus-related facilities, 49 U.S.C. Section 5309(m)(1)(C).

Fixed Guideway Modernization (FGM)

Capital projects to modernize or improve fixed guideway systems are eligible for Fixed Guideway Modernization assistance. The term “fixed guideway” refers to any transit service that uses exclusive or controlled rights-of-way or rails, entirely or in part. The term includes the portion of motor bus service operated on exclusive or controlled rights-of-way, and high occupancy vehicle (HOV) lanes. Eligible projects include, but are not limited to, the purchase of rolling stock, signals and communications, operational support equipment, and preventive maintenance. This funding source is used for bus acquisition in the capital financing plans for each alternative.

The City is the direct recipient of Section 5309 FGM funds. Approximately \$1.3 million is assumed as the City’s FY 2003 Section 5309 FGM apportionment amount. The amount was calculated by FTA using the US Department of Transportation’s proposed FFY 2003 budget. The City’s annual FGM apportionments are

¹ “Budget of the United States Government, Analytical Perspectives, Fiscal Year 2003,” Chapter 7. Table 7-3: Federal Investment Spending and Capital Budgeting. Federal Investment Budget Authority and Outlays: Grant and Direct Federal Funds, page 137.

projected to increase two percent per year. A total of \$20.8 million in Section 5309 FGM funding is projected over the FY 2003-2016 period. The City would qualify for higher levels of FGM funding when the BRT fixed guideway systems in the Refined LPA are at least seven years old. The potential increases in future FGM funding are not included in the financial analyses and result in a conservative estimate of future funding levels from this source.

New Starts

The term “New Starts” refers to a project that involves building a new fixed guideway system or extending an existing fixed guideway. Projects become candidates for funding by successfully completing the appropriate steps in FTA’s major capital investment planning and project development process. Capital projects under this category include, but are limited to, preliminary engineering, acquisition of real property (including relocation costs), final design, construction, and initial acquisition of rolling stock for the system.

FTA Section 5309 New Starts funding is proposed only for the Refined LPA. New Starts funds are assumed to pay for 39 percent of the BRT systems in the Refined LPA. By BRT system component, New Start monies will fund 50 percent of the cost of the In-Town BRT system, 50 percent of the cost of the EPT, and 23 percent of the cost of the Regional BRT system, with FTA Bus Capital, FHWA, and local funds paying the balance. A total of \$242.0 million in FTA New Starts funding is proposed. The City would be the direct recipient of FTA New Starts funding allocations for the Refined LPA.

Bus and Bus-related Facilities (Bus Capital)

The major eligible items under this category are buses and other rolling stock, ancillary equipment, and the construction of bus facilities. This category also includes bus rehabilitation and leasing, park-and-ride facilities, parking lots associated with transit facilities, and bus passenger shelters.

Section 5309 Bus Capital funds are assumed in the financial analysis of all alternatives. Over the FY 2003-2016 period, a total of \$8.7 million in Section 5309 Bus Capital funding is proposed for the No-Build and TSM Alternatives and \$47.7 million for the Refined LPA. Funding for Bus Capital projects is at the discretion of Congress or the Secretary of Transportation, and is not allocated using a statutory formula. The City would be the direct recipient of Section 5309 Bus Capital funds allocated for its bus and bus-related facility projects.

Federal Highway Administration (FHWA) Funds

Like FTA, FHWA is authorized to provide federal aid under TEA-21 until FFY 2003. The next surface transportation authorization act will also include FHWA programs. The State of Hawaii Department of Transportation is the direct recipient of FHWA funds and currently receives between \$116.0 million to \$120.0 million each year. Funding for the Refined LPA is projected to use about 17 percent of the total FHWA funds available for transportation projects, not including any formula increases after the TEA-21 authorization period. The funding plan for the Refined LPA is included in the Transportation for Oahu Plan (TOP) 2025, approved by Oahu Metropolitan Planning Organization (OMPO) on April 6, 2001.

Federal highway law is codified in Title 23 U.S.C. The FHWA programs that are potential sources of funds are described below. The funds under these programs are all apportionment funds. The financial analyses assume that the FHWA program funds would provide up to 80 percent of the eligible costs with City general obligation bonds providing a local match of at least 20 percent. Approximately \$12.0 million in FHWA funds is assumed in the financial analysis for the TSM Alternative. For the Refined LPA, a total of \$139.6 million is assumed, with a \$20.0 million annual maximum during the FYs 2003-2016 period. The annual levels of FHWA funding proposed in the financial analysis will require the City to utilize GO bond proceeds and/or short-term financing in advance of receiving FHWA funds to pay for the transit-related highway capital elements in certain years. These advances will be reimbursed after FHWA funds are received and are credited back to the City in the cash flow analysis.

Surface Transportation Program (STP), 23 U.S.C. Section 133

The STP provides funding that may be used by states and localities for projects on any Federal-aid highway, bridge projects on any public road, transit capital projects, and intracity and intercity bus terminals and facilities. Zipper Lane enhancements proposed in the TSM Alternative and Refined LPA are eligible for STP funding. Costs of the regional transit centers and park-and-ride lots, and BRT priority ramp improvements associated with the Refined LPA are also eligible for STP funding.

Congestion Mitigation and Air Quality Improvement (CMAQ) Program, 23 U.S.C. Section 149

The primary purpose of the CMAQ Program is to fund projects and programs in air quality non-attainment and maintenance areas for ozone, carbon monoxide, and small particulate matter which reduce transportation-related emissions. As a state that does not have and never has had a non-attainment area under the Clean Air Act, Hawaii is authorized to use its annual CMAQ apportionment for any project eligible for STP funds.

Interstate Maintenance (IM) Program, 23 U.S.C. Section 199

The Interstate Maintenance Program provides funding for resurfacing, restoring, rehabilitation and reconstructing most routes on the Interstate System. Costs associated with the H-1 Zipper Lane and direct access ramps are eligible under the Interstate Maintenance Program.

National Highway System (NHS) Program, 23 U.S.C. Section 103(b)

This program provides funding for improvements to rural and urban roads that are part of the National Highway System, including the Interstate System and designated connections to major intermodal terminals. Under certain circumstances, NHS funds may also be used to fund transit improvements in NHS corridors.

The TSM Alternative and Refined LPA incorporate transit-related highway improvements on portions of the State and federal highway system. In the TSM Alternative, FHWA funds are assumed to pay 80 percent of the cost of proposed improvements to the zipper lane. In the Refined LPA, FHWA funds are proposed to be used for a portion of the cost of the regional transit centers and park-and-ride lots, zipper lane enhancements, and BRT priority ramp improvements. These projects are eligible for funding from one or more of the federal highway sources described above. All of the projects are eligible for Surface Transportation Program (STP) and Congestion Mitigation and Air Quality (CMAQ) funds. The H-1 Zipper Lane and access ramp improvements are eligible for receipt of Interstate Maintenance (IM) funds. Most of the projects are on the National Highway System and are therefore eligible for National Highway System (NHS) High Priority Project funds. The financial analyses do not identify revenues from definitive FHWA sources because programming of FHWA funds for specific projects is done through joint FTA/FHWA regulatory planning processes.

General Obligation Bonds

The City issues general obligation (GO) bonds for the construction of major capital facilities. GO bonds are direct obligations of the City for which its full faith and credit are pledged.

City GO Bonds are proposed to finance the local funding share required for transit capital improvements. Proceeds from the GO Bonds will be used for on-going system-wide bus and TheHandi-Van vehicle acquisitions and replacements and other capital projects proposed in the City's annual Six-Year Capital Improvement Program, as well as for the In-Town and Regional BRT systems in the Refined LPA. Issuance of GO Bonds will be required to meet annual cash flow requirements during the FYs 2003-2016 capital project implementation period for all alternatives. Due to limitations assumed on the annual levels of FHWA highway funds received over this period, the City will also need to issue bonds in order to advance funds in place of the federal highway monies to be received in subsequent years for the Refined LPA.

To accommodate the annual levels of capital funding required through FY 2016, a total of \$259.5 million and \$369.9 million in bonds would be needed for the TSM Alternative and Refined LPA respectively with \$138.9 million in bonds required for the No-Build Alternative. Over the FY 2017 to 2025 period, an additional \$84.3 million and \$92.6 million in bonds will also need to be issued to assist in funding the annual costs of bus and TheHandi-Van vehicle replacements of the TSM Alternative and Refined LPA, respectively, with an additional \$64.9 million in bonds needed for the No-Build Alternative.

There are several policy criteria assumed in the use of GO Bonds. First, the annual level of outstanding bond indebtedness is assumed to be capped relative to projected City revenues. The assumption is that property values will remain flat and that the City will maintain the current property tax rate. This creates a ceiling on the amount of GO Bonds the City would be able to issue because it limits the City's debt service payment capacity to the current level of property tax revenues. Second, and related to the first criterion, is the assumption that the City will retain its AA-/Aa3 Credit Rating for GO Bonds and its associated discounted cost of borrowing.

With regard to the first criterion, the Council of the City and County of Honolulu adopted Resolution No. 02-140, CD1. This resolution enunciates the Debt and Financial Policies under which the City manages its operating and capital programs and budgets and its debt program. In accordance with the Debt Policies contained in the resolution, the City has established affordability guidelines in order to preserve credit quality. The affordability guidelines, "which may be suspended for emergency purposes or because of unusual circumstances," are as follows:

- a) Debt service for GO bonds as a percentage of the City's total operating budget should not exceed 20 percent; and
- b) Debt service on direct debt, excluding self-supporting bonds, as a percentage of General Fund revenues should not exceed 20 percent.

An analysis was conducted to assure compliance with the City's Debt and Financial Policies, which included debt service payments on outstanding bonds issued before FY 2003, planned future notes and bonds as projected by the City, and additional bonds required as a result of this project. The analysis shows that there is additional bonding capacity in each of the project years. The second criterion assumes that the City will retain its GO Bond Rating (Aa3 from Moody's and AA- from Standard & Poor's) throughout the plan period. The City's high credit quality allows it to borrow at a lower cost than if it had a lesser credit rating. Therefore, the level of GO Bonds that are outstanding in any given year is assumed not to increase to an extent that will threaten the City's credit rating. There are many other factors that are included in a GO Bond credit rating in addition to the amount of outstanding direct bonded debt.² Broadly speaking, these are the socioeconomic and assessed property value base that generates tax revenues, the City's financial operations (current account and budget balances), legal bond considerations, financial management and other factors.

Consistent with current City practice, the financial terms and conditions of the GO Bonds assumed in the financial analyses are a 25-year maturity with a 5.5 percent interest rate and interest-only payments in the first three years. The interest rate reflects the Bond Buyer 11 High Grade GO Bond Index. The annual level of bonding for all Alternatives was capped so as not to exceed \$50.0 million in bonds issued in any one year.

While prudent relative to current market conditions, the financing costs associated with the GO Bonds assumed in this analysis are subject to potential fluctuations in the market. These assumptions should be

² The most important factor is the value of property. Honolulu has experienced a decline in property values since the early 1990s and has also seen an increase in appeals by homeowners to reassess the value of their property. The City has processed the majority of these requests and has stabilized the decline in property tax revenues.

periodically reviewed and updated, as required. It should be noted that financing costs associated with New Starts projects are eligible for New Starts and other FTA funding. While no such funding has been assumed in the financial plans for this purpose at this time, the availability of such funding would serve to reimburse the City for up to 50 percent of the financing costs on GO bonds associated with the New Starts BRT systems within the Refined LPA.

City Highway Fund

The City Highway Fund is earmarked by State law for highway and related activities. Major revenue sources include the City fuel tax, vehicle weight tax, and public utility franchise tax. While there have been fluctuations in the annual rate of growth of the Highway Fund, over the most recent ten year period Highway Fund revenues increased at a compound annual growth rate of 0.62 percent, with the major revenue sources in the Fund projected by the City to increase 1.6 percent annually over the next five years. For purposes of the financial analysis, the City Highway Fund was projected to increase 0.5 percent per year. Thus, to provide a conservative estimate, the assumed annual growth rate of the Highway Fund is below that of the past ten years and is one-third the rate of the City's projections.

City Highway Fund revenues are used to pay highway-related expenses of executive agencies. In addition, portions of the Highway Fund are transferred annually to the City General Fund for payment of transportation-related debt service and to the City Bus Transportation Fund for partial payment of bus transportation operating costs. In projecting the level of funds available for debt service in a particular year, the non-debt service expenditures made from the Fund were assumed to grow 1.0 percent annually, or at twice the rate of growth of the Fund itself. The balance remaining in the Fund after deduction of these other expenses was assumed to be the maximum amount of City Highway Fund revenues that would be available for debt service payments in that year.

2) O&M Funding Sources

O&M funding for the alternatives is derived from three main sources:

- Fare box revenues;
- FTA Section 5307 funds for preventive maintenance; and
- City Operating Support for Transit O&M.

Fare box Revenues

Fare box revenue projections for each of the three alternatives were developed in conjunction with the ridership forecasting process, and reflect current fare levels and an adopted City Council policy requiring the bus fare box recovery ratio to not fall below 27 percent nor exceed 33 percent. This fare box recovery ratio policy does not apply to TheHandi-Van. Based on the analysis results, bus fares including fares for BRT service are expected to cover roughly 27 percent of bus O&M costs over the FYs 2003 - 2025 period. TheHandi-Van fares are projected to cover roughly 11 percent of TheHandi-Van O&M costs. Together, bus and TheHandi-Van fare revenues are projected to provide 26 percent of transit O&M costs. These projected fare box recovery levels are consistent with historical levels.

FTA Section 5307 Urbanized Area (UZA) Formula Funds For Preventive Maintenance

As noted earlier, FTA Section 5307 UZA formula funds for capital assistance can also be used for preventive maintenance costs associated with the transit system. The financial plan proposes that \$20.0 million in FTA Section 5307 funds be reserved for preventive maintenance in FYs 2003 and 2004. In other years, a target level of at least 30 percent of the formula funds is used for preventive maintenance. Over the FY 2003-2016

period, the total level of FTA Section 5307 funds projected to be used for preventive maintenance purposes is \$253.6 million for the No-Build Alternative, \$244.3 million for the TSM Alternative, and \$174.3 million for the Refined LPA. FTA Section 5307 UZA funds used for preventive maintenance are projected to cover 11, 10, and 7 percent of O&M costs in the No-Build Alternative, TSM Alternative, and Refined LPA, respectively. This decrease in the share of FTA Section 5307 UZA funds used for preventive maintenance is attributable to the larger share of such funds used for capital in the more capital-intensive alternatives.

Use of FTA Section 5307 funds for preventive maintenance serves to reduce the level of City operating support required.

City Operating Support

The City provides annual funding support for transit O&M. This operating support is provided chiefly through transfers from the City Highway Fund and the City General Fund to the Bus Transportation Fund. These transfers supplement fare revenues and prior year carryover monies in the Bus Transportation Fund. The City Highway and General Fund transfers to the Bus Transportation Fund provide the largest source of O&M funding and cover 63, 65, and 67 percent of the O&M costs of the No-Build Alternative, TSM Alternative, and Refined LPA, respectively. The City's FY 2003 Operating Budget Ordinance (Ordinance 02-26) identifies approximately \$75.8 million to be transferred from the City Highway Fund (\$35.1 million) and the City General Fund (\$40.7 million) to the Bus Transportation Fund.

Within the financial analyses, the FY 2003 level of City operating support for all alternatives was estimated to be \$81.9 million, or higher than the FY 2003 Budget. Over the FY 2003 – 2016 period for completing the In-Town and Regional BRT systems in the Refined LPA, the level of City operating support transfers into the Bus Transportation Fund is projected to increase (in Year of Expenditure dollars) to an annual average of \$102.0 million for the No-Build Alternative, \$107.4 million for the TSM Alternative, and \$119.3 million for the Refined LPA. In 2002 constant dollars, the equivalent levels of annual average operating support are projected to be \$86.0 million, \$90.4 million, and \$100.4 million for the alternatives respectively. For all three alternatives, the increased levels of City operating support are required to offset annual increases in O&M costs attributable to inflation. For the TSM Alternative and the Refined LPA, the increases are also attributable to the incremental O&M costs associated with the higher levels of service.

Noted in the discussion of the City Highway Fund above, the funds transferred from the City Highway Fund to the Bus Transportation Fund are assumed to grow at 1 percent per year, or below the rate of growth in O&M costs. As a result, the share of City operating support derived from the City Highway Fund is projected to decrease annually while the share derived from the City General Fund increases annually. By 2016, the share of City operating support from the Highway Fund and General Fund respectively are projected to be 25 percent and 75 percent.

6.1.4 Cash Flow Requirements

Tables 6.1-4 and 6.1-5 summarize the capital and O&M funding required by source for the No-Build Alternative, TSM Alternative, and Refined LPA. Table 6.1-4 compares the levels of capital funding required by source for each alternative over the fourteen-year implementation period of FYs 2003-2016. Table 6.1-5 contrasts the levels of O&M funding required, by source, for the representative years of FY 2007 and FY 2016.

The alternatives differ with regard to their relative levels of reliance on individual funding sources. With regard to capital revenues, sources such as FTA Section 5307 UZA and FTA Section 5309 FGM grants are common to all alternatives. While the two sources assume the same annual apportionment levels for each alternative, the alternatives differ with respect to the amount of FTA Section 5307 UZA funds used as capital sources.

FTA Section 5309 Bus Capital grants and GO Bond proceeds are common to all alternatives but provide different levels of funds. FHWA funds are common to the TSM Alternative and Refined LPA, but at different levels of funding. FTA Section 5309 New Starts grant funds are unique to the Refined LPA.

**TABLE 6.1-4
FUNDING SOURCES FOR CAPITAL COSTS, BY ALTERNATIVE
FISCAL YEARS 2003- 2016 (YOE \$, 000)**

	NO-BUILD	TSM	Refined LPA
<i>CAPITAL SOURCES</i>			
<i>Federal Transit Administration</i>			
Sec. 5307 UZA Formula	\$143,200	\$152,513	\$222,514
Sec. 5309 FGM	\$20,839	\$20,839	\$20,839
Sec 5309 Bus Capital	\$8,665	\$8,665	\$47,744
Sec. 5309 New Starts	--	--	\$242,000
<i>Federal Highway Funds</i>			
FHWA	--	\$11,985	\$139,659
<i>Local Funds</i>			
G.O. Bonds	\$138,899	\$259,48	\$369,917
TOTAL CAPITAL FUNDS	\$311,602	\$453,486	\$1,042,671

Source: Sharon Greene & Associates, November 2002.

Note: Totals may differ due to rounding.

**TABLE 6.1-5
FUNDING SOURCES FOR O&M COSTS, BY ALTERNATIVE
FISCAL YEARS 2007 AND 2017 (YOE \$, 000)**

	NO-BUILD	TSM	Refined LPA
<i>FY 2007 OPERATING REVENUES</i>			
Passenger Fares (Bus)	\$37,195	\$37,252	\$39,199
TheHandi-Van Fares	\$1,705	\$1,705	\$1,705
FTA Sec. 5307 UZA Funds (Preventive Mtnce)	\$18,760	\$19,995	\$12,838
General Fund Revenues (for transit support)	\$93,632	\$94,519	\$105,645
TOTAL O&M REVENUES	\$151,292	\$153,471	\$159,387
<i>FY 2017 OPERATING REVENUES</i>			
Passenger Fares (Bus)	\$49,976	\$51,649	\$57,621
TheHandi-Van Fares	\$2,346	\$2,346	\$2,346
FTA Sec. 5307 UZA Funds (Preventive Mtnce)	\$16,114	\$16,114	\$11,133
General Fund Revenues (for transit support)	\$127,608	\$141,093	\$156,885
TOTAL O&M REVENUES	\$196,045	\$211,202	\$227,984

Source: Sharon Greene & Associates, November 2002.

Notes: Includes TheHandi-Van O&M costs.

Totals may differ due to rounding.

As indicated in Table 6.1-5, the differences in annual O&M revenues for the alternatives increase over time, from a differential when comparing the Refined LPA to the No-Build Alternative of approximately \$8 million in

FY 2007 with completion of the In-Town BRT system's fixed facilities, to a differential of approximately \$32 million in FY 2017 when the Refined LPA is fully operational using embedded plate technology. These system-wide O&M cost estimates include TheHandi-Van.

1) Annual Cash Flow Requirements: FYs 2003 to 2016

Tables 6.1-3A through 6.1-3C presented earlier summarized the capital funding that would be required by source over the FYs 2003-2016 implementation period for the Alternatives as a whole and for the major project elements comprising them. In the absence of a major capital investment, the transit capital program represented by the No-Build Alternative would consist primarily of bus and TheHandi-Van vehicle acquisition and replacement costs. These would be funded chiefly with FTA Section 5307 Urbanized Area Formula Grant funds, supplemented with FTA Section 5309 Fixed Guideway Modernization, FTA Section 5309 Bus Capital funding, and City GO bond proceeds. Beyond the No-Build Alternative level, the capital program additions included in the TSM Alternative and the Refined LPA will require utilization of higher levels of City bonding to provide annual revenues sufficient to meet capital expenditure levels concentrated over the 14-year implementation period. While the Refined LPA assumes FTA Section 5309 New Starts funding and funding from FHWA highway sources, additional City short or long term bonding will also be required as a result of the \$20 million cap on the annual level of FHWA funding. In the years in which the deferred FHWA funds are received, they are treated as reimbursements within the cash flow analysis.

Funding Plan for In-Town Bus Rapid Transit

As shown in Table 6.1-6, the capital cost of the In-Town BRT project element of the Refined LPA is \$243.2 million (in YOE \$). This amount includes \$227.8 million in cost for the In-Town BRT fixed facilities and \$15.4 million for the net cost of acquiring 30 hybrid-electric vehicles to operate In-Town BRT service prior to adding EPT. "Net cost" refers to the incremental cost for acquiring low-emission, environmentally-friendly hybrid-electric vehicles to operate along the In-Town BRT alignment fixed facilities relative to the base cost of similarly sized conventional diesel-powered buses that would be acquired for initial In-Town BRT service. While the incremental cost of the hybrid-electric vehicles is considered part of the In-Town BRT program, the base cost of \$ 16.5 million (YOE \$) for these vehicles is included in the System-Wide capital cost component of the Refined LPA.

**TABLE 6.1-6
CAPITAL FUNDING SOURCES FOR IN-TOWN BUS RAPID TRANSIT SYSTEM
FISCAL YEARS 2003 – 2016 (YOE \$, 000)
(REFINED LPA)**

Source	Total \$ (%)	In-Town BRT Elements
FTA Sec. 5309 New Starts	\$121,619 (50%)	<ul style="list-style-type: none"> • In-Town BRT fixed facilities • Net cost of hybrid-electric vehicles
FTA Sec. 5309 Bus Capital	\$2,345 (1%)	<ul style="list-style-type: none"> • Net cost of hybrid-electric vehicles
City GO Bonds	\$119,275 (49%)	<ul style="list-style-type: none"> • In-Town BRT fixed facilities • Net cost of hybrid-electric vehicles
TOTAL	\$243,239 (100%)	

Source: Sharon Greene & Associates, November 2002.

The In-Town BRT component is proposed to be funded with 50 percent FTA Section 5309 New Starts funds, matched with 49 percent in local capital funds in the form of City GO Bonds. FTA Section 5309 Bus Capital Funds would contribute the remaining one percent.

Funding Plan for Embedded Plate Technology (EPT)

As shown in Table 6.1-7, the capital cost of the EPT project element of the Refined LPA is \$129.1 million (YOE \$). This amount includes the cost of EPT fixed facilities and the net cost of the EPT vehicles. The incremental cost of the EPT components of the vehicles is considered part of the EPT component. The base cost for these vehicles is included in the System-Wide capital cost component of the Refined LPA.

**TABLE 6.1-7
CAPITAL FUNDING SOURCES FOR EMBEDDED PLATE TECHNOLOGY SYSTEM
FISCAL YEARS 2010 - 2016 (YOE \$, 000)
(REFINED LPA)**

Source	Total \$ (%)	EPT Elements
FTA Sec. 5309 New Starts	\$64,536 (50%)	<ul style="list-style-type: none"> • EPT fixed facilities • Net cost of EPT vehicles
FTA Sec. 5309 Bus Capital	\$9,374 (7%)	<ul style="list-style-type: none"> • EPT fixed facilities • Net cost of EPT vehicles
City GO Bonds	\$55,162 (43%)	<ul style="list-style-type: none"> • EPT fixed facilities • Net cost of EPT vehicles
Total	\$129,072 (100%)	

Source: Sharon Greene & Associates, November 2002.

The EPT component is assumed to be funded with 50 percent FTA Section 5309 New Starts funds matched with 43 percent in local capital funds in the form of City GO Bonds. FTA Section 5309 Bus Capital funds would contribute the remaining seven percent.

Funding Plan for Regional Bus Rapid Transit (BRT)

As shown in Table 6.1-8, the total capital cost of the Regional BRT element of the Refined LPA is projected to be approximately \$244.4 million (in YOE \$). This total includes the cost of the Regional BRT transit centers and parking facilities, Zipper lane, and BRT priority ramp improvements. Many of the Regional BRT components are improvements to provide dedicated or priority treatment for both buses and HOVs on portions of the Interstate system, including construction of bus-only access ramp improvements. Therefore, the conceptual financial plan calls for 57 percent of the cost of the Regional BRT to be paid for with FHWA funds. Project elements such as the transit centers and parking, Zipper lanes and priority ramp improvements are also eligible for FTA Section 5309 New Starts funds, shown in this plan to provide 23 percent of the funding for the Regional BRT, with City funds in the form of GO Bonds contributing the remaining 20 percent.

Funding Plan for Combined In-Town BRT, EPT, and Regional BRT Systems

Table 6.1-9 summarizes the funding plan for the combined In-Town, EPT, and Regional BRT systems in the Refined LPA over the FYs 2003–2016 implementation period. As shown in the table, the total cost of the combined In-Town, EPT, and Regional BRT Program is projected to be \$616.7 million (YOE \$).

As shown in the table, the combined BRT components are proposed to be funded with approximately 39 percent FTA New Starts funds, 36 percent City GO Bonds, 23 percent FHWA highway funds, and two percent FTA Section 5309 Bus Capital funds.

TABLE 6.1-8
CAPITAL FUNDING SOURCES FOR REGIONAL BUS RAPID TRANSIT SYSTEM
FISCAL YEARS 2003 - 2016 (YOE \$, 000)
(REFINED LPA)

Source	Total \$ (%)	Regional BRT Elements
FTA Sec. 5309 New Starts	\$55,845 (23%)	<ul style="list-style-type: none"> • BRT transit centers and parking • Zipper lane • BRT priority ramp
FHWA	\$139,658 (57%)	<ul style="list-style-type: none"> • BRT transit centers and parking • Zipper lane • BRT priority ramp improvements
City GO Bonds	\$48,876 (20%)	<ul style="list-style-type: none"> • BRT transit centers and parking • Zipper lane • BRT priority ramp improvements
Total	\$244,379 (100%)	

Source: Sharon Greene & Associates, November 2002.

TABLE 6.1-9
CAPITAL FUNDING SOURCES IN-TOWN, EPT, AND REGIONAL BRT SYSTEMS
FISCAL YEARS 2003 – 2016 (YOE \$, 000)
REFINED LPA

Source	Total \$ (%)	Project Element
FTA Sec. 5309 New Starts	\$242,000 (39%)	<ul style="list-style-type: none"> • All project elements
FTA Sec. 5309 Bus Capital	\$11,719 (2%)	<ul style="list-style-type: none"> • Regional BRT transit centers and parking • Zipper lane • BRT priority ramp improvements
FHWA	\$139,658 (23%)	<ul style="list-style-type: none"> • Regional BRT transit centers and parking • Zipper lane • BRT priority ramp improvements
City GO Bonds	\$223,313 (36%)	<ul style="list-style-type: none"> • All project elements
TOTAL	\$616,689 (100%)	

Source: Sharon Greene & Associates, November 2002.

Note: Totals may differ due to rounding.

2) Funding Plan for Operating and Maintenance

Table 6.1-10 compares the TSM Alternative and Refined LPA to the No-Build Alternative with regard to the average annual O&M cost over the FY 2007-2016 period in which BRT service would be fully operational. As shown in the table, the alternatives differ by over 12 percent with regard to projected average annual O&M costs. The projected average annual O&M costs of the Refined LPA are 12.2 percent higher than the No-Build Alternative and 7.9 percent higher than the TSM Alternative.

As the projected average annual O&M costs in the Table 6.1-10 are in year of expenditure dollars, a comparison to current O&M costs requires presentation of the data in constant dollars. Table 6.1-11

compares O&M costs for the bus and TheHandi-Van service components of the alternatives to the estimated 2003 O&M costs using 2002 constant dollars.

TABLE 6.1-10
ESTIMATED AVERAGE ANNUAL OPERATING AND MAINTENANCE COSTS
OVER FISCAL YEARS 2007 – 2016 (YOE \$, 000)

Alternative	Average Annual O&M Cost	% Increase Over No-Build
No-Build	\$170,469	
TSM	\$177,280	4.0%
Refined LPA	\$191,263	12.2%

Source: Sharon Greene & Associates, November 2002.

Note: Includes TheHandi-Van O&M costs.

TABLE 6.1-11
ESTIMATED AVERAGE ANNUAL OPERATING AND MAINTENANCE COSTS
OVER FISCAL YEARS 2007 – 2016 (CONSTANT 2002 \$, 000)

Alternative	Bus	TheHandi-Van	Total
FY 2003 Estimated	\$119,421	\$13,663	\$133,084
NO-BUILD	\$119,914	\$14,539	\$134,453
TSM	\$125,111	\$14,539	\$139,650
Refined LPA	\$136,047	\$14,539	\$150,586

Source: Sharon Greene & Associates, November 2002.

As shown in Table 6.1-11, expressed in 2002 constant dollars, the average annual O&M cost of the alternatives range from \$134.5 million for the No-Build to \$150.6 million for the Refined LPA. In comparison to the estimated FY 2003 O&M cost of \$133.1 million, the No-Build Alternative, TSM Alternative, and Refined LPA are within 1 percent, 5 percent, and 13 percent of the FY 2003 estimated O&M cost. In addition to bus and TheHandi-Van O&M costs, the Refined LPA includes the cost of providing and maintaining the Regional and In-Town BRT service within the bus costs.

With respect to vanpool service, the cost of administering the Vanpool Hawaii program is assumed to equal the direct revenues received plus federal funding. None of the alternatives include the cost of the vanpool program currently borne by the SDOT. These costs would be common to all alternatives in the event the City assumed the vanpool program. If that were to occur, the City would receive an additional \$1 million annually in FTA Section 5307 UZA funds that are assumed to be transferred to FHWA for SDOT operation of the program.

Revenues for the O&M costs associated with the alternatives would come from the following sources:

- Bus fares: these would cover a minimum of 27 percent of bus O&M costs;
- TheHandi-Van fares: these would cover roughly 11 percent of TheHandi-Van O&M costs;
- City Operating Support; and
- FTA Section 5307 Urbanized Area formula grant funds used for bus preventive maintenance.

In the absence of any new revenues to fund the higher local operating subsidy required, the financial analysis indicates that the City will have the financial capacity to fund the increased level of subsidy using existing sources of revenue through appropriations from the City's General Fund.

6.1.5 Financial Performance Measures

The results of the financial analyses are summarized in [Tables 6.1-12 through 6.1-15](#) and are discussed below. The financial analyses focus on the performance of the Refined LPA relative to the No-Build and TSM Alternatives with respect to the following key measures:

Capital Funding and Debt Service Requirements, FYs 2003 – 2016³

- Total and Annual Capital Funding Required;
- Level of City GO Bonding Required;
- FTA Section 5309 New Starts Funding Required;
- FHWA Funding Required;
- Average Annual Debt Service Payment Required (Post-2003 Debt);
- Ratio of Debt Service on GO Bonds (including Self-Supporting Bonds) as a Percentage of the City's Total Operating Budget (By policy, should not exceed 20 percent); and
- Ratio of Debt Service on Direct Debt (excluding Self-Supporting Bonds) as a Percentage of General Fund Revenues (By policy, should not exceed 20 percent).

Operating And Maintenance Funding Requirements, FYs 2007 - 2016

- Average Annual Operations and Maintenance Costs; and
- Average Annual City Operating Support for Transit O&M.

Capital, Debt Service, and Operating Funding Requirements, FYs 2007 – 2016

- Average Annual Total City Contribution Required for Debt Service and Operating Support;
- Average Annual Increase in Total City Contribution over No-Build; and
- Average Annual Increase in Total City Contribution over TSM.

Detailed cash flow analyses were conducted for each alternative to assess total and annual financial requirements over the 2003 -2025 period. The analyses were performed using year of expenditure dollars inclusive of inflation. The detailed cash flow analyses are provided in Appendix C.

1) Capital Funding Requirements

The sections below summarize the key findings related to the seven capital funding evaluation measures:

- Total and Annual Capital Funding Required;
- Level of City GO Bonding Required;
- FTA Section 5309 New Starts Funding Required;
- FHWA Funding Required;
- Average Annual Debt Service Payment Required (Post-2003 Debt);
- Ratio of Debt Service on GO Bonds (including Self-Supporting Bonds) to the City's Total Operating Budget (Maximum Ratio Reached); and
- Ratio of Debt Service on Direct Debt (excluding Self-Supporting Bonds) to General Fund revenues (Maximum Ratio Reached).

³ FTA Section 5307 funding is not included as a key measure since the City's annual apportionment would be the same for all alternatives.

Total and Annual Capital Funding Required, FYs 2003 - 2016

Table 6.1-12 summarizes the total annual capital funding required for the No-Build Alternative, TSM Alternative, and Refined LPA over the 14-year implementation period. The capital costs of the Alternatives increase with the level of service being proposed. To an extent, the alternatives represent a spectrum, ranging from the No-Build Alternative, to the introduction of BRT-type elements in the TSM Alternative, to a high level of service provided by the In-Town and Regional BRT components in the Refined LPA. The spectrum of costs ranges from \$311.6 million for the No-Build Alternative to \$453.5 million for the TSM Alternative, to \$1.04 billion for the Refined LPA.

**TABLE 6.1-12
SUMMARY OF KEY FINANCIAL MEASURES BY ALTERNATIVE
OVER FYs 2003 - 2016 (YOE \$, 000)**

	No-Build	TSM	Refined LPA
CAPITAL PERFORMANCE MEASURES: FY 2003–2016			
Total Capital Cost	\$311,602	\$453,486	\$1,042,671
GO Bonds Issued	\$138,899	\$259,484	\$369,916
FTA New Starts Funding Required	--	--	\$242,000
FHWA Funding Required	--	\$11,985	\$139,659
Average Annual Debt Service Payment (Post-2003 Debt)	\$9,986	\$13,800	\$17,664
Ratio of Debt Service on GO Bonds (including Self-Supporting Bonds) to the City's Total Operating Budget: Maximum Ratio Reached	19.09% (FY 2004)	19.24% (FY 2004)	19.05% (FY 2004)
Ratio of Debt Service on Direct Debt (excluding Self-Supporting Bonds) to General Fund revenues: Maximum Ratio Reached	15.49% (FY 2011)	15.61% (FY 2011)	15.70% (FY 2011)
OPERATING PERFORMANCE MEASURES: FY 2007-2016			
Average Annual Operations and Maintenance Costs	\$170,469	\$177,280	\$191,263
Average Annual City Operating Support for Transit O&M	\$108,328	\$115,540	\$129,240
CAPITAL AND OPERATING PERFORMANCE MEASURES: FY 2007- 2016			
Average Annual Total City Contribution Required for Debt Service and O&M(Post-2003 Debt)	\$120,678	\$132,965	\$151,899
Average Annual Increase in Total City Contribution Over No-Build		\$12,287	\$31,221
Average Annual Increase in Total City Contribution Over TSM			\$18,934

Source: Sharon Greene & Associates, November 2002.

Tables 6.1-3A through 6.1-3C presented earlier summarize the capital funding requirements for the alternatives over the FYs 2003 -2016 implementation period. As shown in the tables, different levels of GO bonding, FTA Section 5309 New Starts funding, and FHWA funding are required to provide adequate funding during this period.

Level Of City GO Bonding Required, FYs 2003 - 2016

The financing plans for the No-Build Alternative, TSM Alternative, and Refined LPA assume that the City would use a portion of its GO bonding capacity. Table 6.1-13 summarizes the annual level of GO bonding required for each alternative. As shown in Table 6.1-13, the level of GO bonding required corresponds to the relative capital cost of the alternative over Fys 2003 to 2016. The highest cost alternative (Refined LPA) would have the greatest need for bonding (\$369.9 million) compared with \$138.9 million and \$259.5 million

for the No-Build and TSM Alternatives respectively. A portion of the GO bonding required in the Refined LPA would be to provide capital funding in advance of receipt of FHWA federal grant funds. Table 6.1-13 summarizes the annual bonding that would be required for the Refined LPA over the FYs 2003-2016 period.

**TABLE 6.1-13
ANNUAL GENERAL OBLIGATION BONDING REQUIRED BY ALTERNATIVE
OVER FISCAL YEARS 2003 – 2016 (YOE \$, 000)**

Fiscal Year	NO-BUILD	TSM	REFINED LPA
2003	\$20,437	\$22,181	\$23,232
2004	\$21,642	\$33,882	\$45,712
2005	\$26,497	\$44,776	\$49,984
2006	\$18,994	\$30,240	\$46,589
2007	\$11,365	\$19,649	\$16,384
2008	\$5,754	\$7,162	\$21,276
2009	\$1,025	\$1,548	\$28,977
2010	\$844	\$3,315	\$16,265
2011	\$1,955	\$12,817	\$24,508
2012	\$80	\$10,318	\$5,299
2013	\$3,618	\$7,673	\$12,003
2014	\$1,396	\$17,780	\$20,258
2015	\$8,584	\$30,076	\$28,673
2016	\$16,758	\$18,068	\$30,756
TOTAL	\$138,899	\$259,484	\$369,916

Source: Sharon Greene & Associates, November 2002.

FTA Section 5309 New Starts Funding

Table 6.1-14 summarizes the level of FTA Section 5309 New Starts funding required for the Refined LPA. On an annual basis, the financial plan assumes availability of New Starts funding for the Refined LPA at the expenditure levels presented in the table.

As shown in Table 6.1-14 and earlier in Table 6.1-3C, New Starts funding would provide approximately 39 percent for the total BRT Program. New Starts funding would constitute 50 percent of the capital revenues for the In-Town BRT related components, 50 percent for the EPT component, and 23 percent for the Regional BRT, with revenues received over the FYs 2003-2016 period. A total of \$242.0 million in New Starts funding would be used for the Refined LPA.

FHWA Funding Required

The financial plan proposes that FHWA funding would be available for eligible projects components in the TSM Alternative and Refined LPA, up to an annual ceiling. The total level of FHWA funding over the FYs 2003-2014 periods is proposed not to exceed \$20.0 million per year. FHWA funds are assumed to provide 80 percent of capital costs for eligible projects, with a 20 percent match coming from City GO Bonds. Actual

⁴ FTA Section 5307 funding is not included as a key measure since the City's annual apportionment would be the same for all alternatives.

annual Federal highway funding levels and the relative shares from each FHWA program source would be determined through the federal programming process.

**TABLE 6.1-14
FTA SECTION 5309 NEW STARTS FUNDING
ANNUAL EXPENDITURE LEVELS
FOR THE REFINED LPA
FISCAL YEARS 2003 – 2016 (YOE \$, 000)**

Fiscal Year	Amount
2003	\$3,515
2004	\$25,028
2005	\$45,000
2006	\$39,745
2007	\$12,507
2008	\$0
2009	\$3,711
2010	\$19,109
2011	\$30,170
2012	\$17,646
2013	\$19,604
2014	\$12,830
2015	\$5,331
2016	\$7,803
TOTAL	\$242,000

Source: Sharon Greene & Associates, November 2002.

Table 6.1-15 summarizes the schedule assumed for receiving FHWA highway funds through the State of Hawaii for the TSM Alternative and Refined LPA. Even with the higher levels of FHWA funding required for the Refined LPA, less than 50 percent of the funds from eligible categories (IM, NHS, STP and CMAQ) and 13 percent of the total FHWA funding received by the State would be used over the 12-year period.

The financial analysis in the MIS/DEIS and SDEIS called for a total of \$160.0 million in FHWA funding. This amount has been reduced by \$20.4 million in the FEIS as a result of additional refinements made to the proposed project, including alignment modifications.

Average Annual Debt Service Payment Required

Table 6.1-12 summarizes the average annual debt service payment on post-2003 bond issues required for the alternatives. In comparison to the \$10.0 million and \$13.8 million in additional average annual debt service payments required for the No-Build and TSM Alternatives respectively, the additional average annual debt service payment required for the Refined LPA is \$17.7 million.

2) O&M Funding Requirements

Two comparative measures have been used to evaluate the Alternatives:

- Average Annual Operating and Maintenance Costs; and
- Average Annual Operating Support for Transit O&M.

TABLE 6.1-15
ANNUAL FEDERAL HIGHWAY FUNDING REQUIRED
FOR THE TSM ALTERNATIVE AND REFINED LPA
FISCAL YEARS 2003-2016 (YOE \$, 000)

Fiscal Year	TSM Alternative	Refined LPA	Amount Available for Other Statewide Projects with Refined LPA
2003	\$0	\$0	\$86,327
2004	\$0	\$0	\$87,190
2005	\$0	\$0	\$88,062
2006	\$858	\$1,207	\$87,736
2007	\$5,495	\$11,587	\$78,245
2008	\$5,632	\$20,000	\$70,730
2009	\$0	\$20,000	\$71,639
2010	\$0	\$20,000	\$72,555
2011	\$0	\$20,000	\$73,480
2012	\$0	\$20,000	\$79,361
2013	\$0	\$20,000	\$75,358
2014	\$0	\$6,865	\$84,587
2015	\$0	\$0	\$0
2106	\$0	\$0	\$0
TOTAL	\$11,985	\$139,659	\$955,270
	1%	13%	87%

Source: Sharon Greene & Associates, November 2002.

Note: Includes NHS, STP, CMAQ, and IM funding categories only. FY 2003 amount is from the estimated TEA-21 apportionment, as provided by the State Department of Transportation. Estimates for FY 2004 and beyond are calculated at a conservative 1.00% increase per year. Funding for FHWA Bridge Rehabilitation and Replacement, Metropolitan Planning, Innovative Projects / Rec. Trails, High Priority Projects, and Minimum Guarantee categories are not included in the total.

Average Annual Operating and Maintenance Costs: FY 2007-2016

As shown in Table 6.1-12, over the FY 2007-2016 period in which the In-Town BRT program becomes fully operational, the average annual O&M cost for bus and TheHandi-Van service is projected to range from \$170.5 million for the No-Build Alternative to \$177.3 million and \$191.3 for the TSM Alternative and Refined LPA respectively. The percentage difference between the TSM and No-Build Alternatives is 4 percent, with a 12 percent difference between the Refined LPA and the No-Build. Between the Refined LPA and the TSM Alternative, the percentage difference is 8 percent.

Average Annual City Operating Support for Transit O&M: FY 2007-2016

All of the alternatives would require City operating support to supplement fares and FTA Section 5307 UZA funds for the O&M costs of the bus and TheHandi-Van services. As shown in Table 6.1-12, over the FY 2007-2016 period in which the In-Town BRT program becomes fully operational, the average annual City operating support for O&M would be \$108.3 million for the No-Build Alternative, \$115.5 million for the TSM

Alternative, and \$129.2 million for the Refined LPA. The difference between the lowest (No-Build) and highest (Refined LPA) average annual level of City operating support would be \$20.9 million.

The Operating and Maintenance Financial Plans reflect an 11.9 percent increase over the TSM in the annual level of local operating support for the Refined LPA. If actual O&M costs are higher than the projections, or if actual fare revenues are lower, there still remain a variety of means for the needed level of support to be met.

For example, changes in the fare structure could be made that would minimize impacts on transit dependents yet maintain or increase revenues. As another example, increases in the "cap" within which employers may fund employee transit expenses without these being considered "income" for Internal Revenue Service reporting purposes would also enhance transit's ability to increase operating revenue from the fare box. Thus, many ways exist to meet the levels of operating support assumed in this analysis.

3) Capital and Operating Performance Measures

Three comparative measures have been used to evaluate the alternatives with respect to total City contribution required for both capital and for O&M funding:

- Average Annual Total City Funding Support Required for Debt Service and O&M;
- Average Annual Increase in Total City Contribution over the No-Build Alternative; and
- Average Annual Increase in Total City Contribution over the TSM Alternative.

Average Annual Total City Funding Support Required for Post-2003 Debt Service and O&M

As shown in [Table 6-1.12](#), higher levels of City financial support would be required for the TSM Alternative and Refined LPA relative to the No-Build Alternative. The average annual level of City contribution required for post-2003 debt service and operating support for Fys 2007 to 2016 would be \$120.7 million for the No-Build Alternative, \$133.0 million for the TSM Alternative, and \$151.9 million for the Refined LPA.

Average Annual Increase in Total City Funding Support over the No-Build Alternative

Relative to the No-Build Alternative, the average annual incremental level of City contribution required for Fys 2007 to 2016 would range from an additional \$12.3 million per year for the TSM Alternative to \$31.2 million for the Refined LPA.

Average Annual Increase in Total City Funding Support over the TSM Alternative

Relative to the TSM Alternative, the average annual incremental level of City contribution for FY 2007 to 2016 would be \$18.9 million per year for the Refined LPA.

6.2 ALTERNATIVES COMPARISON

In the MIS/DEIS and SDEIS, the alternatives comparison was presented in Chapter 7. This discussion is being presented in this chapter. Chapter 7 presents the responses to comments received in response to the MIS/DEIS and SDEIS. This section compares how and the degree to which the alternatives satisfy the project purposes and needs presented in Chapter 1. It discusses the financial and environmental costs of satisfying these needs. Finally, this section reports the cost-effectiveness and equity (distribution of benefits) of each alternative; these are two criteria that the Federal Transit Administration (FTA) considers in deciding whether to qualify a new transit system for federal funding.

The alternatives are compared using cost, mobility, growth-shaping, land use, quality of life, environmental impact, cost-effectiveness, and equity criteria. Table 6.2-1 summarizes the evaluation findings for those criteria. This analysis is meant only to reconfirm selecting the BRT as the Locally Preferred Alternative (LPA).

**TABLE 6.2-1
SUMMARY OF KEY EVALUATION MEASURES**

Measures	No-Build	TSM	Refined LPA
CAPITAL AND O&M COSTS			
Total Capital Cost (FY 2003-2025) (Millions of 2002 \$)	\$404.4	\$540.8	\$954.9-\$1,038.2*
Annual Operating and Maintenance Cost at Full System Operation (Millions of 2002 \$)	\$120.7	\$139.8	\$151.2
Impact on City Budget (Average Annual Costs for Debt Service and O&M Net of Fare Revenue) FY 2003-2016 (YOE)	\$120.7 million	\$133.0 million	\$151.9 million
MOBILITY			
Daily Transit Trips Within the Primary Transportation Corridor (2025) (Daily Linked Trips)	261,130	279,400	312,570
Increase in Transit Trips Over the No-Build Within the Primary Transportation Corridor (2025)	N.A.	18,270	51,440
Daily Transit Mode Share Within the Primary Transportation Corridor (2025) (Work Trips)	19.2%	19.5%	22.6%
Daily Revenue Bus Miles (2025)	62,560	77,790	84,450
Comfort Level (Passengers Per Transit Seat) (2025)	1.31	1.01	0.90
Daily Reduction in Vehicle Miles of Travel (Compared to No-Build) (2025)	N.A.	27,340	718,530
Daily Reduction in Vehicle Hours of Delay (2025) (Compared to No-Build)	N.A.	13,285	78,080
Projected Transit Travel Time Between Downtown and Kapolei (2025)	83.1 minutes	78.0 minutes	58.2 minutes
Projected Transit Travel Time between Downtown and Waikiki (2025)	25.0 minutes	25.0 minutes	23.1 minutes
Projected Transit Travel Time between Downtown and UH-Manoa (2025)	24.4 minutes	23.3 minutes	22.6 minutes
Projected Transit Travel Time between Downtown and Kalihi (2025)	17.6 minutes	16.3 minutes	13.3 minutes
Typical Levels of Service on In-Town Roads (Transit)	E/F	E/F	B/C
Typical Levels of Service on In-Town Roads (Autos)	E/F	E/F	E/F
New Parking Spaces Provided at Transit Centers/Park-and-Rides	0	600	1,520
On-Street Parking Spaces Removed (Unrestricted/Restricted) (U/R)	0	166 (U)	IOS: 22 (U) Middle St. to Iwilei: 27 (U) Iwilei to Waikiki: 124 (R) Kakaako Mauka: 69 (U) / 66(R) UH-Manoa: 199 (U) / 343 (R)
Number of Loading Zones to be Mitigated	0	14	26
LAND USE DEVELOPMENT			
Support of transit-oriented development	Not supportive	Somewhat supportive	Most supportive
ECONOMIC IMPACT			
Employment (direct and indirect person-years jobs)	704	1,797	9,418

**TABLE 6.2-1 (CONTINUED)
SUMMARY OF KEY EVALUATION MEASURES**

Measures	No-Build	TSM	Refined LPA
QUALITY OF LIFE AND LIVABILITY			
In-Town Transit Technology	Diesel Buses	Diesel Buses	Hybrid diesel/electric or EPT for In-Town BRT
Visual Character	No Changes	Development of transit centers provide opportunities to improve the visual environment	Development of transit centers and In-Town BRT stops provide opportunities to improve the visual environment. Sound barrier near future Aloha Stadium Transit Center will cause visual impact.
Noise/Vibration (In-Town)	No or very little perceptible difference from existing conditions	Similar to the No-Build Alternative	Moderate noise impacts at residences from In-Town BRT operations on Dillingham Boulevard, using the hybrid-diesel vehicle. Use of hybrid diesel/electric or electric In-Town BRT vehicles generally less noisy than diesel buses.
Noise/Vibration (Regional)	No Impacts	No Impacts	Moderate noise impacts to nearby residences from increase in bus operations at future Aloha Stadium Transit Center and associated Luapele Ramp.
ENVIRONMENTAL IMPACTS			
Number of Business and Residential Displacements	Loss of four acres of agricultural land.	Loss of four acres of agricultural land.	Removal of two parking spaces at an apartment complex. Displacement of parking stalls, landscaping, and/or driveway effects on 22 businesses. Loss of four acres of agricultural land.

**TABLE 6.2-1 (CONTINUED)
SUMMARY OF KEY EVALUATION MEASURES**

Measures	No-Build	TSM	Refined LPA
Street Trees	No Impact	No Impact	Some tree trimming will be required. 32 "notable" and 68 non-notable trees will be relocated near their original locations. Roughly 50 other trees will be replaced. No designated exceptional trees will be affected.
Change in Energy Consumption Compared to No-Build (in thousands of barrels of oil)	N/A	35	-215
Historical Resources	No Impacts	No Impacts	Construction of an EPT system may uncover archaeological resources or native-Hawaiian ancestral burial sites along certain segments. In-Town BRT stops located within or near historic districts or properties with high visual integrity have the potential to affect historic characteristics.
Parkland Impacts	Joint-use of Aloha Stadium Kamehameha Highway parking lot as a transit center/park-and-ride	Same as No-Build Alternative	Same as No-Build Alternative
COST-EFFECTIVENESS			
Incremental Cost Per New Rider (compared to No-Build Alternative)	N/A	\$6.25	\$5.01
EQUITY			
Impacts/benefits to minority or low-income populations	No adverse impacts/ No increased benefits	No adverse impacts/ Some improvement in transit service	No adverse impacts/ Substantial improvement in transit service

Source: Parsons Brinckerhoff, Inc., November 2002.

Note: *If hybrid diesel/electric vehicles are used, the estimated cost is \$954.9 million. If EPT vehicles are used, the estimated cost is \$1,038.2 million.

6.2.1 Comparison of Alternatives Against Project Purposes and Needs

The purposes and needs to be addressed by a major transportation investment in the primary transportation corridor are listed below (from Chapter 1):

1. Increase the people-carrying capacity of the transportation system in the primary transportation corridor by providing attractive alternatives to the private automobile;
2. Support desired development patterns;
3. Improve the transportation linkage between Kapolei and Honolulu's Urban Core; and
4. Improve the transportation linkages between communities in the Primary Urban Center (PUC).

Increase The People-Carrying Capacity Of The Transportation System In The Primary Transportation Corridor by Providing Attractive Alternatives to the Private Automobile

Detailed mobility analyses are presented in Chapter 4. The following enhanced mobility measures are used to compare the alternatives:

1. Person-carrying capacity of the roadway system;
2. Increased transit usage islandwide;
3. Reduced traffic congestion; and
4. Improvement to other level of service indicators.

1) Person-Carrying Capacity of the Existing Roadway System

The TSM Alternative and Refined LPA would increase person-carrying capacity by enhancing the level of transit service. Additionally, roadway lanes would become more efficient by reallocating them from general-purpose use to transit or ride-share use. The Refined LPA would provide substantially more person-carrying capacity within the Urban Core than the TSM Alternative, because of its superior level of transit priority.

Table 6.2-2 compares the A.M. peak hour person throughput for selected screenlines within the Urban Core for each of the alternatives. Table 6.2-2 shows that the Refined LPA would improve person-carrying ability within key corridors within the Urban Core by a range of 8 to 18 percent over the No-Build Alternative. To get an equivalent increase in person-carrying capacity through road construction alone, the roadway lanes in the Urban Core would need to be increased by almost two lanes in each direction (four lanes total). This is not feasible without major displacement of existing land uses and the accompanying adverse social and environmental impacts.

The TSM Alternative would not improve person-carrying capacity over the Refined LPA.

Transit systems have the additional advantage of being able to provide still further person-carrying capacity and expansion potential. Each In-Town BRT vehicle has an assumed capacity of 120 persons, corresponding to a 60-foot articulated vehicle with a single articulation joint. Using higher capacity vehicles (i.e. bi-articulated buses) or a further increase in the BRT frequency of service would add more person-carrying capacity, without the need for additional roadway construction. Therefore, the Refined LPA has the potential to further increase the person-carrying capacity beyond that provided by the No-Build and TSM Alternatives. The Regional and In-Town BRT systems are investments that would efficiently serve growth in travel demand well into the future, beyond the 2025 planning horizon.

**TABLE 6.2-2
PROJECTED 2025 A.M. PEAK HOUR PERSON-CARRYING CAPACITY
AT SELECTED SCREENLINE LOCATIONS
(PERSONS/HOUR)**

Screenline Location	Alternative		
	No-Build	TSM	Refined LPA
Ewa-bound at Ward Avenue	21,120	20,600	24,940
Ewa-bound at Punchbowl Street	21,105	20,520	22,865
Koko Head-bound at Liliha Street	24,310	22,825	28,760
Koko Head-bound at Bishop Street	24,665	23,765	27,920

Source: Parsons Brinckerhoff, Inc., October 2002.

Note: Capacity can be increased through using larger vehicles or providing more frequent service.

2) Increased Transit Usage Islandwide

Transit ridership reflects trips taken on transit (not counting transfers). The measure "ridership" addresses key goals of increasing the number of people using transit, decreasing the number using individually driven automobiles, and increasing the patrons paying fares. Higher ridership indicates increased attractiveness of a transit system, otherwise transit patrons would choose another mode. Increased transit ridership amplifies the secondary benefits already enumerated for transit, such as reduced energy consumption, enhanced air quality, and support for desired land use development patterns.

Table 6.2-3 compares total daily transit ridership among the alternatives. The Refined LPA, with the highest level of transit service, is forecast to attract the most transit ridership.

**TABLE 6.2-3
RIDERSHIP FORECASTS ISLANDWIDE
(FORECAST YEAR 2025)**

	No-Build	TSM	Refined LPA
Total Transit Trips (Daily Linked Trips)	261,130	279,400	312,570
New Transit Trips compared with No-Build	Not Applicable	18,270	51,440
New Transit Trips compared with TSM	Not Applicable	Not Applicable	33,170
Transit Mode Share:			
All Trip Purposes	6.6%	6.9%	7.9%
Work Trips	14.7%	15.7%	18.4%

Source: Parsons Brinckerhoff, Inc., October 2002.

Transit mode share is the proportion of total trips taken on the transit system, indicating the contribution of the transit system towards satisfying total travel demand. The higher the transit mode share, the fewer the automobiles that will be on the roads. The Refined LPA would result in increased transit mode share, compared to the other alternatives. As shown in Table 6.2-4, the advantages of improved transit service with the Refined LPA are even more pronounced within the primary transportation corridor, as evidenced by the even higher transit mode split within the corridor compared to islandwide.

**TABLE 6.2-4
TRANSIT RIDERSHIP WITHIN THE PRIMARY TRANSPORTATION CORRIDOR
(DAILY LINKED TRIPS IN 2025)**

	No-Build	TSM	Refined LPA
Total Transit Trips	202,000	216,130	234,390
Transit Mode Share:			
All Trip Purposes	8.5%	8.7%	10.0%
Work Trips	19.2%	19.5%	22.6%

Source: Parsons Brinckerhoff, Inc., October 2002.

3) Reduced Traffic Congestion

Restoring a balance between automobile, transit, pedestrian and bicycle modes is a prime objective within the primary transportation corridor. Transit improvements would encourage some people to modify their travel behavior by switching from private automobiles to transit, thereby decreasing traffic congestion. Vehicle Miles of Travel (VMT) is a measure of roadway congestion. Higher VMT reflects more vehicle trips made (higher roadway demand and more congestion), and more circuitous travel as drivers “hunt” for less congested routes. The search for less congested routes affects neighborhoods, as streets meant to accommodate local traffic become through traffic routes as drivers seek ways to avoid congestion on major arterial roadways. Table 6.2-5 shows that in 2025, the Refined LPA (which would provide the highest level of transit service) is projected to have the lowest peak period VMT compared to the other alternatives.

**TABLE 6.2-5
PROJECTED YEAR 2025 PEAK PERIOD VMT AND VHD**

Measure	Time Period	Alternative		
		No-Build	TSM	Refined LPA
VMT	A.M.	5,145,570	5,133,800	4,893,630
	P.M.	5,596,345	5,587,195	5,361,660
	Total Peak	10,741,915	10,720,995	10,255,290
VHD	A.M.	177,750	173,015	145,470
	P.M.	192,890	184,155	156,020
	Total Peak	370,640	357,140	301,760
Vehicle Trips Assigned	A.M.	555,140	554,970	535,040
	P.M.	660,150	660,250	641,125
	Total Peak	1,215,290	1,215,220	1,176,165

Source: Parsons Brinckerhoff, Inc. October 2002.

Notes: VMT = vehicle miles of travel

VHD = vehicle hours of delay

Lower peak period VMT for the Refined LPA reflects increased use of travel modes such as transit as opposed to single-occupant vehicles (SOVs), and less congestion on roadways. This finding is consistent with the fewer vehicle trips projected to occur with the Refined LPA (because there are more transit trips) than with the TSM or No-Build Alternatives.

Another indicator of regional roadway performance is Vehicle Hours of Delay (VHD), which is the difference in hours of travel between that associated with free-flow traffic conditions, and that associated with projected roadway congestion levels (see Table 6.2-5). Lower VHD indicates that the roadway network is handling travel demand more efficiently, with less aggravation and frustration for travelers. The Refined LPA and TSM

Alternative are projected to have lower daily VHD than the No-Build Alternative in 2025. While the Refined LPA would provide a greater person-carrying capacity than the TSM or No-Build Alternatives, it would also result in less VHD for motorists than the TSM Alternative since some general-purpose traffic lanes would be converted to provide priority for transit vehicles.

4) Improvement to Other Level of Service Indicators

The ridership forecasting results can be used to compute several other indicators of the level of service provided by each alternative. These measures are presented in Table 6.2-6 and discussed below.

**TABLE 6.2-6
OTHER MEASURES OF SERVICE
(FORECAST YEAR 2025)**

Measure	No-Build	TSM	Refined LPA
Boardings per Linked Trip (Transfer Rates)	1.29	1.33	1.38
Passenger per Seat at Peak Load Point (Comfort)	1.31	1.01	0.90

Source: Parsons Brinckerhoff, Inc., October 2002.

One level of service indicator is the transfers a typical rider must make to complete a trip. Riders prefer not to transfer, unless transferring produces a shorter total travel time. In Table 6.2-6, the transfers are reflected by the boardings per linked transit trip. The Refined LPA would require the greatest amount of transferring because many riders would access the BRT systems by feeder bus. In the No-Build and TSM Alternatives, more riders would have a one-seat ride from origin to destination. The additional transferring in the Refined LPA would be offset, however, by the more frequent, more comfortable, and more reliable service provided, and in many cases, by a shorter total travel time. The Refined LPA would provide the most travel time savings for transit patrons.

Since transit service in mixed traffic is subject to delays caused by traffic congestion, transit service reliability is correlated to the extent the system utilizes exclusive travel lanes (which would not be affected by the congestion in general purpose lanes). Since the Refined LPA would provide substantially more priority transit lanes, it would offer the most reliable service.

One measure of comfort is the probability of getting a seat on a transit vehicle during the peak hour. As shown in Table 6.2-6, the projected ridership in 2025 will exceed available seats by over 30 percent under the No-Build Alternative. Over 30 percent of all riders would be required to stand, sacrificing comfort and decreasing the attractiveness of travel by transit. Worse, buses would be full and pass by riders waiting at stops in some instances.

The available seats under the TSM Alternative would be about equal to the demand. On an average weekday, there would typically be a seat for every rider, even at the most heavily used parts of the system.

The available seats under the Refined LPA would be slightly greater than the demand, increasing the probability that a rider would find a seat and have a comfortable ride. The availability of surplus seats also reflects the ability of the Refined LPA to accommodate even further increases in ridership growth without having to increase the number of vehicles.

Support Desired Development Patterns

Chapter 5 provides detailed information on the growth-shaping attributes of the alternatives analyzed. The No-Build and TSM Alternatives would not encourage land use development in desired patterns or support implementation of an urban growth strategy that integrates land use and transportation elements.

The Refined LPA would substantially increase the people-carrying capacity within the corridor and help focus growth along the alignment of the In-Town BRT system. Because of the permanency of the fixed facilities that would be constructed under this Alternative, it would be highly effective in supporting implementation of an urban growth strategy that integrates land use and infrastructure planning. In combination with favorable land use policies it would help facilitate desired land use development patterns consistent with the vision for the island. Transit centers and transit stops would serve as focal points for transit-oriented development and would be designed to maintain or improve visual conditions through cohesively designed structures, street furniture, landscaping and lighting. The Refined LPA would improve the quality of urban living by enhancing transportation service within the Urban Core, and by reducing air and noise emissions in comparison to the diesel buses in the No-Build and TSM Alternatives. Because the Refined LPA would reduce automobile travel, regional air emissions would be less.

Improve the Transportation Linkage Between Kapolei and Honolulu's Urban Core

Improving connections within the primary transportation corridor, including the key linkage between Kapolei and Honolulu's Urban Core, is a principal project goal.

The Refined LPA would provide priority treatments in the H-1 Corridor, which would be used by vehicles with two or more occupants in addition to Regional BRT vehicles. This would enhance the linkage between Kapolei and the Urban Core for all higher occupancy vehicles. The benefits of the P.M. zipper lane, express lanes, and exclusive bus ramps with the Refined LPA are reflected in the reduced travel time for transit riders shown in Table 6.2-7.

**TABLE 6.2-7
PROJECTED 2025 TRANSIT TRAVEL TIME FROM DOWNTOWN TO KAPOLEI**

	No-Build	TSM	Refined LPA
Travel Time (minutes)	83.1	78.0	58.2

Source: Parsons Brinckerhoff, Inc., October 2002.

Improve the Transportation Linkages Between Communities in the PUC

Another project goal is to improve mobility within the PUC through enhanced transit service. The Refined LPA would attract additional transit riders by improving mobility within the PUC and strengthening the connections between the PUC and the rest of Oahu. This ridership increase reflects the service benefits – particularly reduced travel time – that such a system would provide in the primary transportation corridor. While the TSM Alternative would achieve some benefits, the benefits of a high capacity BRT system would be substantially greater, especially for travel within the PUC.

As shown by the travel times in Table 6.2-8, due to the provision of exclusive transit lanes, the Refined LPA would provide faster transit travel times (and more reliable service) within the PUC than either the TSM or No-Build Alternatives.

**TABLE 6.2-8
PROJECTED 2025 TRANSIT TRAVEL TIME WITHIN THE PRIMARY URBAN CENTER**

	No-Build	TSM	Refined LPA
	Travel Time (minutes)	Travel Time (minutes)	Travel Time (minutes)
Downtown - Waikiki	25.0	25.0	23.1
Downtown - UH-Manoa	24.4	23.3	22.6
Downtown - Kalihi	17.6	16.3	13.3

Source: Parsons Brinckerhoff, Inc., October 2002.

6.2.2 Impacts of Alternatives

This section summarizes the environmental consequences associated with the alternatives analyzed. Chapter 3 describes the existing environmental conditions and Chapter 5 provides more detailed information on the environmental impacts of the alternatives.

No-Build Alternative

The No-Build Alternative would rely on conventional diesel buses, at least for the immediate future, and continue the present focus on automobiles for transportation. Consequently, congestion would be the worst of any of the alternatives and regional air pollutant emissions would increase about 15-30 percent by 2025. Out of 23 intersections, localized air quality (worst-case 1-hour microscale concentrations) would deteriorate at ten locations studied in the a.m. and eleven locations studied in the p.m. Noise levels along streets would remain similar to present levels, even with an increase in the number of diesel buses and vehicles, because the vehicles would be moving more slowly (“passby” noise increases with speed).

The No-Build Alternative would not adequately support the purposes and needs of the project. It would not provide a transportation system that would effectively handle present or future levels of travel demand. It would not even maintain current mobility levels. It would not develop attractive travel alternatives to the private automobile, encourage land use development in desired patterns, support implementation of an urban growth strategy that integrates land use and infrastructure planning, nor maintain the existing quality of life. It would only minimally increase the linkage between Kapolei and the Urban Core, and would not improve mobility within the Urban Core. Impacts to ecosystems and visual, historic, water and park resources would generally be limited to localized impacts associated with the construction of roadway and other transportation improvements anticipated over the next 23 years. The No-Build Alternative would not require any business or residential displacements, although it would entail the displacement of four acres of farmland.

Because there would be no new federal construction funds beyond those already expected to be received through formula programs, the No-Build Alternative would produce no additional jobs.

TSM Alternative

Compared to the No-Build Alternative, the TSM Alternative, with its emphasis on enhancing and restructuring bus service, would provide some support to the project’s purposes and needs in terms of enhancing people-carrying capacity within the corridor. However, this alternative would not go far in providing an attractive alternative to the private automobile, nor in enhancing desired land use development patterns or the City’s urban growth strategy that integrates land use and infrastructure planning. There would be some improvement in the linkage between Kapolei and the Urban Core, but it would not significantly improve mobility within the Urban Core.

Without the implementation of significant transit-oriented infrastructures, transit operation under the TSM Alternative would not be able to maintain current mobility levels. Travel delays would be lengthy, and air pollution emissions would increase about 20 percent as a result of the increased diesel buses and private vehicle congestion associated with the TSM Alternative.

Impacts to neighborhoods, historic resources, ecosystems, noise levels, water resources, and parklands would be similar to those under the No-Build Alternative. The TSM Alternative would entail the displacement of up to four acres of agricultural land. Under the TSM Alternative, approximately 166 unrestricted parking spaces that are currently available during peak and off-peak hours would be eliminated. The TSM Alternative would not affect on-street restricted parking spaces. Fourteen (14) loading zones would be adversely affected.

Since there would be no FTA discretionary (New Starts) funding available for use with the TSM Alternative, there would be no additional jobs created beyond those that would occur with the normal in-flow of federal formula funds to the State.

Refined LPA

The Refined LPA would do the most to better serve existing transit riders and attract people out of their autos. Because the Refined LPA would reduce automobile travel, congestion and regional air emissions would be less. Also, the electric buses that will be used on the In-Town BRT would generally be quieter than conventional diesel buses. The Refined LPA represents a major improvement over the No-Build and TSM Alternatives in meeting the project purposes and needs. It would substantially increase people-carrying capacity within the corridor and help focus growth along the alignment of the In-Town BRT. Higher density redevelopment in a transit-supportive manner, particularly at transit centers and transit stops, would be encouraged. This alternative would be more effective than the TSM and No-Build Alternatives in supporting implementation of an urban growth strategy that integrates land use and infrastructure planning. It would help facilitate desired land use development patterns consistent with the vision for the island.

This alternative would establish transit as an attractive, viable alternative to the automobile. Transit patrons would reap travel time savings. The Refined LPA would cause less motorist delay than either the TSM or No-Build Alternative. The Refined LPA would establish an attractive, high capacity linkage between Kapolei and the Urban Core. It would improve mobility within the Urban Core by improving linkages between key destinations such as Downtown, Kakaako, Kalihi, UH-Manoa, and Waikiki, and would decrease transit travel times between these key destinations.

There would be no relocations of businesses or residents with the Refined LPA, though some partial displacements of driveways, parking, and/or landscaping will be necessary. Parking provided at transit centers and park-and-ride lots would be greater than with the TSM Alternative, as would the loss of on-street parking spaces and loading zones. Impacts on historic resources would be minor.

As part of the Refined LPA, transit centers, transit stops, and other project elements would be designed to maintain or improve visual conditions through cohesively designed structures, street furniture, landscaping and lighting. The quality of urban living would improve. Impacts to ecosystems, and water resources would be similar to that attributable to the No-Build and TSM Alternatives. Some trees will need to be relocated or replaced, but no exceptional trees will be affected.

The construction-phase impacts of the Refined LPA would be greater than those of the TSM Alternative because of the larger scale of construction. Construction impacts would be temporary and detailed mitigation plans will be developed, including a maintenance of traffic plan during the final design phase. The additional federal discretionary funds that would be provided under this alternative would create an estimated 2,787 person-years of new jobs during construction of which 1,106 would be for construction workers.

6.2.3 Cost-Effectiveness and Equity of Alternatives

Capital and operating/maintenance costs are addressed in Chapter 2 and earlier in this chapter. Cost-effectiveness, the measure used by FTA to compare the cost of a transit investment in relation to its ability to attract new riders to transit, is discussed in this section. This section also addresses equity, which is the distribution of costs, impacts and benefits.

Cost-Effectiveness Analysis

Cost-effectiveness relates the ability of an alternative to attract new riders to its costs. The FTA has established a cost-effectiveness index (CEI) for evaluating the relative merits of fixed guideway or transit lane alternatives within a corridor. The FTA also uses the index as input into its rating system, which compares projects across the country, and identifies those most worthy of federal funding. The CEI analysis is used by FTA for comparative purposes. It is not an absolute indicator of costs and benefits because of its narrow focus on projected new ridership. The index measures the additional cost of proposed transit investments, using the cost per additional rider projected under the No-Build and TSM Alternatives as the measure against which the Refined LPA is compared.

The cost-effectiveness analysis translates the capital costs of the alternatives into equivalent uniform annual costs. These uniform annual capital costs reflect assumptions about the economic life of the capital components of each alternative (based on federal guidelines) and the cost of capital (i.e., the discount rate). Uniform annual capital costs are combined with annual O&M expenses and then compared to additional transit patronage to arrive at a CEI for the alternatives.

Because all costs used in the analysis are in constant dollars, the effects of inflation are already taken into account; the discount rate used in the analysis is a "real" discount rate that reflects prevailing interest rates net of the effect of inflation. A real discount rate of 7 percent was used, which is FTA recommended practice.

Assumptions about the effective useful lives of major cost components correspond to the economic lives of the major categories of capital cost. The economic life of heavy construction items, for instance, is assumed to be 50 years, while buses and BRT vehicles are assumed to have a service life of 12 years before needing replacement.

When alternatives are compared using the CEI parameter, the one with the lower cost per new rider represents the more cost-effective alternative. As shown in Tables 6.2-9A and 6.2-9B, compared to the transit ridership that would be achieved with the No-Build Alternative, the incremental cost per new rider for the TSM Alternative is \$6.25, which is greater than the cost per new rider for the Refined LPA of \$5.01, also compared to the No-Build Alternative. Therefore, the Refined LPA is more cost-effective than the TSM Alternative in increasing transit ridership over the No-Build Alternative. Compared to the transit ridership that would be achieved with the TSM Alternative, the CEI of further boosting transit ridership to the level forecast to occur with the Refined LPA would be \$4.52.

Equity/Environmental Justice

Equity is defined as the fairness of the distribution of costs, benefits, and impacts across various population subgroups. Fairness is determined by the extent to which the costs and impacts are distributed in a way that is consistent with regional goals.

**TABLE 6.2-9A
FACTORS USED TO DEVELOP FTA COST-EFFECTIVENESS INDEX**

Factor	Alternative		
	No-Build	TSM	Refined LPA
Annualized Capital Cost (2002 dollars)	\$ 28,760,000	\$ 37,910,000	\$ 78,400,000
Total Systemwide Annual Operating and Maintenance Cost (2002 dollars)	\$ 120,700,000	\$ 139,800,000	\$ 151,200,000
Total Annualized Cost in Forecast Year (2002 dollars)	\$149,460,000	\$ 177,710,000	\$ 229,600,000
Total Annual Ridership (forecast year)	80,428,040	86,055,200	96,271,560

Source: Parsons Brinckerhoff, Inc., October 2002.

**TABLE 6.2-9B
FTA COST-EFFECTIVENESS INDEX**

Factor	Comparison		
	TSM vs. No-Build	Refined LPA vs. No-Build	Refined LPA vs. TSM
Incremental Annualized Cost	\$ 28,000,000	\$80,000,000	\$ 52,000,000
Incremental Annual Ridership	6,000,000	16,000,000	10,000,000
Cost-Effectiveness (incremental cost per new rider)	\$ 6.25	\$ 5.01	\$ 4.52

Source: Parsons Brinckerhoff, Inc., October 2002.

1) Impact on Low Income Areas

Certain areas within the primary transportation corridor contain concentrations of minority and low-income populations (see Section 5.3 which discusses the project's Environmental Justice compliance in more detail). Input from community residents and business owners serving the minority and low-income populations has been actively solicited throughout project planning through the community based planning program (see Appendix A). None of the alternatives would cause a disproportionately high and adverse health or environmental effect on any population group, including minority and low-income populations. Benefits to these groups would be substantial.

2) Environmental/Socioeconomic Equity and Benefit

An analysis of equity and benefit from an environmental and socioeconomic perspective was developed based on the relative balance between environmental and/or socioeconomic impacts and change in transit accessibility. The Refined LPA would result in improved transit accessibility islandwide relative to the No-Build and TSM Alternatives. The Refined LPA would increase daily transit trips by 19.7 percent over the No-Build Alternative. The Refined LPA is projected to produce a 10.6 percent increase in daily transit trips over the TSM Alternative.

The Refined LPA would provide greater support for desired land use development patterns in comparison to the No-Build and TSM Alternatives.

3) Local Financing Options Equity and Burden

Earlier in this chapter the financing plans for the alternatives were discussed. No new local revenue sources or tax increases would be required for any alternative. The City would provide its portion of the local funding with existing City funding lines and General Obligation (GO) bonds. FTA formula and discretionary grants also would be used. Transit related components on State highway facilities would be funded with federal highway funds and a local city match.

No geographic or socioeconomic group would pay a disproportionate share of the project's costs.

6.3 REQUIRED PERMITS AND APPROVALS

Table 6.3-1 lists the permits or approvals that may be required by alternative. At this point in project planning, the permit applications have not been completed or submitted to the appropriate agencies. Permit applications will be completed during the project's final design phase.

**TABLE 6.3-1
PERMITS POTENTIALLY REQUIRED**

PERMIT	ALTERNATIVE		
	No-Build	TSM	Refined LPA
Federal			
U.S. Coast Guard – Bridge Permit			X
U.S. Department of Transportation Notice of Proposed Construction Near Airports			X
U.S. Department of Transportation FHWA Approval of Modifications Within Limits of Interstate Highways			X
U.S. Army Corps of Engineers – Clean Water Act Section 404 permit (Nationwide)			X
State			
State Department of Transportation Permit to Perform Work Upon a State Highway			X
State Department of Health Clean Water Act Section 401 Water Quality Certification			X
State Department of Health Noise Permit/Variance	X	X	X
National Pollutant Discharge Elimination System (NPDES) Permit - Stormwater Associated with Construction Activity	X	X	X
Commission on Water Resource Management – Stream Channel Alteration Permit			X
Disability and Communication Access Board Approval		X	X
County			
Special Design District Permit			X
Zoning Waivers for Public Uses, Public Utilities and Walls			X
Building Permit		X	X
Development Application in Flood Hazard Districts			X
Special Management Area Use Permit			X
Construction Dewatering Permit (Temporary)	X	X	X
Grubbing, Grading, Excavation, and Stockpiling Permit		X	X
Street Tree Review	X	X	X
Permit to Excavate on Public Right-of-Way (Trenching)		X	X
Street Usage Permit	X	X	X

Source: Parsons Brinckerhoff, Inc., April 2003.