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Washington State Ferries Financing Study

Technical Appendix 3: Capital Program Prioritization and Terminal and Repair Facility Capital Projects Review

Prepared For:
Joint Transportation Committee
Washington State Legislature

Consultant Team:

Cedar River Group, LLC
Mirai Associates
Norway Hill Development
RL Collier Company

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500 Union Street, Ste. 1045 Seattle, WA 98101 ~ PHN 206.223.7660 ~ FAX 206.223.7665 ~ CedarRiverGroup.com

Contents

List of Tables

List of Figures

Executive Summary

This review of Washington State Ferries' (WSF) capital program prioritization process and of the terminal and repair facility capital projects is part of the Washington State Ferries Financing Study. The review is based on the 2005-07 biennium capital program, as adopted by the 2006 Legislature, and was conducted in association with staff from the Senate Transportation Committee, the House Transportation Committee, the Joint Transportation Committee and the Office of Financial Management (OFM).

Capital Program Prioritization Process

WSF's capital program provides funding for the preservation and improvement of twenty terminals, the Eagle Harbor repair facility and WSF's twenty-eight vessels. WSF has a sixteen-year capital program, with a legislatively approved project list adopted each biennium. WSF's capital program is part of the Washington State Department of Transportation's (WSDOT) capital budget. The only funds appropriated in the capital program are for the current biennium.

Capital Funding

The legislature appropriated $244.2 million for the WSF capital program for the 2005-07 biennium. The anticipated capital expenditures in the 2005-21 time period are $2.2 billion. WSF capital projects are one of three types: terminal, vessel or emergency repairs. Terminal and vessel projects are defined by WSF as either preservation or improvement projects.

Preservation Program

WSF's preservation program is designed to protect assets: "preserving the structural, mechanical and electrical integrity of infrastructure." Within the preservation program, WSF may replace an entire facility or vessel when it is not economically prudent to continue replacing the systems of the terminal or vessel or the asset's characteristics are no longer suited to meet service plan requirements. The preservation program also includes projects that:

- are necessary for regulatory compliance;
- improve program efficiency and effectiveness;
- result in cost savings or cost avoidance; and
- benefit customers and the public.

Life-Cycle Cost Model: WSF uses a life-cycle concept to identify investments needed to ensure its vessels and terminals are preserved. Systems and structures on vessels or at terminals are divided into two groups: vital systems (vital to the protection of people, the environment and infrastructure), and non-vital systems (all other systems). An estimated life is determined for each system and structure based on: (1) the date of initial installation or last major refurbishment, (2) a standard anticipated life for the type of

system or structure, and (3) modifications for actual condition based on location and inspections.

Life-Cycle Rating: WSF identifies a life-cycle rating for vital and non-vital systems to track performance. The life-cycle rating is the percentage of a vessel's or terminal's systems that are operating within their life-cycles at a particular point in time. This percentage is weighted by the cost of replacement so that the percentage reflects the overall cost of replacing the system when due. WSF tracks performance against measures recommended by the 2001 Joint Legislative Task Force on Ferries, which are to have by 2011 (now estimated to be 2015):

- 90 to 100 percent of vital systems operating within their life-cycle, and
- 60 to 80 percent of non-vital systems operating within their life-cycle.

Improvement Program

WSF's improvement program is designed to increase the ability of the ferry system to meet changes in demand. Improvement investments may be made to:

- increase the capacity of a terminal or vessel, as measured by the terminal's throughput capacity, and the vessel's vehicle and passenger carrying capacity; and
- provide riders with more mobility options.

WSF's improvement program is based on the premise that operations and ridership drive fleet size and deployment, which in turn drive terminal shoreside infrastructure.

Emergency Repairs

WSF's emergency repair program is designed to address unanticipated regulatory requirements or damage to a terminal or vessel.

Prioritization

WSF's Capital Committee, which includes the Chief Executive Officer and five other directors, is responsible for selecting projects to include in the capital program and oversees management of WSF's capital program.

To prioritize the discretionary elements of WSF's capital program, the Capital Committee utilizes the Priorities of Government, and what it considers expressions of legislative intent, particularly the recommendations of the 2001 Legislative Joint Task Force on Ferries. The legislature does not give WSF discretion in using Nickel and Transportation Partnership Act funds; these funds are available only for projects named by the legislature.

Terminal/Repair Facility Projects

WSF's 2005-21 biennia terminal capital program includes 67 projects with separate project identification numbers (PINs) with a total budget of $142.6 million for the 2005-07 biennium and $1.2 billion for the 2005-21 biennia. Forty-three of the projects are for

specific facilities and 24 are systemwide projects. Of the 67 projects, 24 are classified as improvement projects and 43 as preservation projects.

Terminal/Repair Facility Projects

Projects	# PINs	Improvement	Preservation	05-07 ($000s)	05-21 ($000s)
Terminals/Repair Facility*	43	22	21	$118,266	$1,091,310
Systemwide Projects	24	2	22	24,382	124,663
Total	67	24	43	$142,648	$1,215,973

*Includes systemwide catch-up preservation project

Appendix A includes a review of projects at each terminal.

Preservation Projects

There are 43 preservation projects with a budget of $79.2 million in the 2005-07 biennium and $699.7 million in the 2005-21 biennia.

Budget Affecting Life-Cycle of Systems and Structures: WSF reports that in 2005, 73 percent of terminal vital systems and 44 percent of non-vital systems were operating within their life-cycle. WSF uses these life-cycle ratings and the impact of the preservation budget on these measures as a key budget justification. The preservation program includes systemwide projects and expenses within terminal projects (i.e., right-of-way acquisition and interim preservation) that do not affect life-cycle ratings. In the 2005-07 biennium, 58 percent of the budget as shown in the WSF life-cycle model affects life-cycle ratings and 42 percent does not. For the 2005-21 biennia, 74 percent of the budget affects life-cycle ratings and 26 percent does not.

Life-Cycle Cost Model: A key element in the life-cycle model is keeping the inventory up-to-date to reflect condition inspections and the life-cycle of new steel and concrete structures that are replacing older timber structures. These updates have not been regularly done, with WSF showing life-cycles as low as 25 years for steel piling as an example. Also, when developing the initial inventory, WSF did not have the ability to inspect each of the 254 items in the "systems and utilities" category (such as water systems, sewer systems, etc.). So it arbitrarily assigned them all (except the point-of-sale system) a standard life of twenty years. In most cases, the system or utility is not ready to be replaced at the end of twenty years even though the results are being calculated into the percentage of systems operating within their life-cycle.

Not updating the inventory and including items that are not replaced at the end of the "standard" life-cycle make the model less useful as a tool for budget planning or performance reporting, which runs the risk of presenting inaccurate and overstated preservation projections. For example, the consultants asked WSF to run various scenarios adjusting, for example, the standard life of steel structures from 25 to 30 years. This adjustment alone makes a 3 percent difference in the percentage of vital systems operating within their life-cycle.

The consultants also reviewed the actual condition of the terminals based on WSDOT bridge inspections. These inspections indicate that the terminals are in good condition, and present a different picture from that suggested by the life-cycle model.

Preservation Replacement Projects: The preservation projects include replacement or significant additions to six facilities: Anacortes, Bainbridge Island, the Eagle Harbor repair facility, Keystone, Port Townsend and Seattle Colman Dock.

The preservation replacement project budgets include 64 percent of the terminal related non-life-cycle expenses in the 2005-07 biennium and 74 percent in the 2005-21 biennia. The high percentage of non-life-cycle expenses in these projects is because they share expenses with companion improvement projects, or are similar to improvement projects. Also, the replacement of structures before their due date to accommodate an improvement project is categorized by WSF as a life-cycle rather than a non-life-cycle expenditure. In addition, although not identified separately in the budget and thus not counted as non-life-cycle costs, some replacement project budgets include expenses for master plans and studies.

Systemwide Projects: The preservation program includes 22 systemwide preservation projects with budgets totaling $24 million for the 2005-07 biennium and $122.4 million for the 2005-21 biennia. The systemwide preservation projects are all for non-life-cycle costs and include all of the overhead expenses for terminal projects. None of the overhead expenses are attributed to the improvement program.

Budgets: The budgets for preservation projects that are intended to preserve systems and structures, are based on the life-cycle cost model. These budget projections become the project budget and are then categorized into preliminary engineering, right-of-way, and construction budgets. The amount being spent on preservation that affects the life of structures and systems is overstated in the life-cycle cost model because the model does not include expenditures for master planning and other non-life-cycle expenses, which can be substantial.

Improvement Projects

There are 22 terminal improvement projects with a budget of $63.4 million in the 2005-07 biennium and $516.3 million in the 2005-21 biennia. The improvement budget is primarily devoted to the Anacortes, Bainbridge Island, Edmonds, Mukilteo and Seattle terminals.

Connection to Draft Long-Range Strategic Plan: WSF's improvement program is based on the premise that operations and demand for ferry service drive fleet size and deployment, which, in turn, drive terminal shoreside infrastructure. The Draft Long-Range Strategic Plan 2006-30 provides a ridership forecast and a fleet deployment and terminal improvement plan to accommodate the projected ridership.

Flexibility: The Draft Long-Range Strategic Plan includes a staggered approach to increasing the capacity of the fleet. Unlike the vessel projects, the terminal improvement projects have limited flexibility; they are being planned for the projected ridership with large capital infrastructure investments that are not intended in most cases to be phased with actual ridership but rather with funding availability.

Vehicular Demand: The increase in capacity of the system for terminals is primarily driven by the projected increases in vehicular demand. The primary impact on the terminals is on the size of the vehicle holding areas, many of which are on trestles over water, which are expensive to construct and maintain.

The level of service standard for vehicles in the Draft Long-Range Strategic Plan is expressed as boat waits, except for the San Juan Island routes where the level of service standard is expressed as percentage of daily capacity. The design guidelines used for terminal improvement and replacement projects is based on a different level of service standard, characterized by the minutes of delay for a vehicle on the approach roadways prior to passing the tollbooth. This design guideline has resulted in larger vehicle holding areas than would be needed under boat wait scenarios.

"Peak of the Peak" Planning: The Draft Long-Range Plan also anticipates a larger percentage increase in walk-on passengers, especially during commute periods. The level of service standard for walk-on passengers is a zero boat-wait throughout the system, which means that passenger service is planned on a "peak of the peak" basis, i.e., for the most congested sailing of the day. The terminal buildings are also being sized to accommodate anticipated increases in ridership and are based on the "peak of the peak" basis.

Life-Cycle Costs: WSF has not done life-cycle costing for all of the proposed terminal improvement or replacement projects, with total operating and capital maintenance costs projected over the life of the terminal. Operating costs of the new terminals will be higher than for the current smaller terminals. The Draft Long-Range Strategic Plan includes assumptions about increases in operating costs, but does not provide detailed information about these costs. So it is not clear to what extent those assumptions are in line with the terminal plans.

Cost-Benefit Analysis: WSF has not undertaken a cost-benefit analysis of systemwide operating changes that might reduce capital investments, such as a modification to the first-come-first-served loading policy. They have also not considered tariff policy and level of service standard adjustments as ways to manage demand. WSF has undertaken limited cost-benefit analysis on individual projects.

Ancillary Revenues: Ancillary revenues from concessions and leases at terminals help improve WSF's operating income and are part of the revenue calculation in determining farebox recovery. In some of the terminal projects, WSF is allocating additional space for concessions in anticipation of additional operating revenue. WSF's analysis also includes

the period in which anticipated revenues would pay back the initial capital investment. These are risky investments with paybacks that may or may not materialize.

Community Requirements: As with the preservation replacement projects, local community requirements are impacting ferry terminal planning and costs.

Joint Use Transit Facilities: WSF is investing in joint use transit facilities to encourage increased walk-on ridership by providing terminal access to other transit agencies. The costs incurred are in most cases being borne by WSF.

Recommendations

The consultants have developed the following recommendations for consideration by the legislature. These recommendations are based on the goals established in SSB 6241, which mandated this ferry financing study.

1. **Capital Program Prioritization Process Recommendations** (see chart, p.8)
    a. WSF capital projects should conform to the OFM definition of a capital project, with maintenance excluded.
    b. WSF preservation and improvement capital projects should conform to the OFM definitions of these categories.
    c. WSF should develop a clear capital prioritization process.

2. **Terminal Preservation Project Recommendations**
    a. Update the terminal life-cycle cost model to make it a better planning tool.
    b. Develop a WSF terminal condition rating performance measurement system.
    c. Allocate systemwide overhead projects between preservation and improvement projects.
    d. Include only life-cycle related expenses in facility-specific preservation projects.
    e. Exclude non-life-cycle costs from the catch-up preservation project.

3. **Terminal Replacement and Improvement Projects**
    a. Replacement preservation and improvement projects should be combined as one improvement program category.
    b. Priority should be given to flexible terminal improvement plans and projects.
    c. A ridership performance measure tied to the capital plan should be developed.
    d. WSF should be required to undertake systematic cost-benefit analysis.
    e. WSF should be required to provide a complete life-cycle cost analysis.
    f. WSF should be required to provide a business plan supporting investments intended to generate ancillary revenues.
    g. WSF should identify funding required to complete construction when master plans are developed.

h. WSF should make the legislature aware of costs incurred to meet local concerns.

i. WSF should make the legislature aware of costs incurred for joint use transit facilities.

j. The legislature should require expert review of WSF projects.

4. Recommendations for Improvement and Preservation Projects

a. WSF should comply with OFM requirements for a predesign study.

Implications for Ferry Financing

1. In order to proceed with ferry financing, an estimate of capital resources needed to preserve and improve terminals is necessary. Given the findings and recommendations in this report, it is difficult to asses these financing needs until the life-cycle cost model is updated and the recommended cost-benefit analysis for terminal improvement projects is completed.

2. Several of these recommendations will affect the actual and projected farebox recovery percentage.

Recommendation 1: Proposed Modifications to WSF Capital Program Definitions

		Current	Proposed
Capital Project Definition		Interim preservation included	Project to construct either new facilities or significant long-term renewal improvements to existing facilities.
Capital Project Category Definitions	Preservation	1. Preserve the structural, mechanical and electrical integrity of infrastructure 2. Improve program efficiency and effectiveness 3. Regulatory compliance 4. Cost saving or cost avoidance 5. Benefit customers and the public	1. Maintain, preserve and extend the life of facilities and assets, and does not meet the definition of an improvement.
	Improvement	1. Meet changes in demand and increase capacity 2. Provide mobility options	1. Meet changes in demand and increase capacity 2. Provide mobility options 3. Improve program efficiency and effectiveness 4. Cost saving or cost avoidance 5. Benefit customers and the public
	Emergency Repair	Address damage and/or unanticipated regulatory requirements.	Address damage and/or unanticipated regulatory requirements.
Capital Project Type Definitions	Preservation	1. Life-Cycle Cost Model or Condition Rating 2. Non-life-cycle costs such as: • Master plans • Property acquisition • Interim preservation • Emergency generators • Placeholder preservation 3. Replacement projects 4. Systemwide administrative projects 5. Systemwide revenue enhancement projects	1. Life-Cycle Cost Model or Condition Rating 2. Proportionate share of systemwide administrative projects
	Improvement	1. Master plans 2. Terminal expansions	1. Terminal expansions and replacements 2. Master plans 3. Property acquisition 4. Emergency generators 5. Proportionate share of systemwide administrative projects 6. Systemwide revenue enhancement projects

Section One
Introduction

This review of Washington State Ferries' (WSF) capital program prioritization process and of the terminal and repair facility capital projects is part of the Washington State Ferries Financing Study. The review is based on the 16 year capital program from the 2006 legislature, and includes the consultants' observations and recommendations.

This review was conducted in association with staff from the Senate Transportation Committee, the House Transportation Committee, the Joint Transportation Committee and the Office of Financial Management (OFM). It included interviews with WSF Finance and Administration, and Terminal Engineering staff; and a review and assessment of the systems inventory, annual condition reports, and life-cycle model for each facility. We also reviewed the budgets, schedule, and scope modifications for each project.

Section Two
Capital Program Prioritization Process

WSF's capital program provides funding for the preservation and improvement of WSF's twenty terminals, the Eagle Harbor repair facility, and WSF's twenty-eight vessels.

WSF has a sixteen-year capital program, with a legislatively approved project list adopted each biennium. The project list, maintained by the Legislative Evaluation and Accountability Program (LEAP) Committee,[1] includes all prior project expenditures for those projects still on the list, project appropriations for the current biennium, and projected project budgets for the next seven biennia. The only funds appropriated are for the current biennium.

WSF's capital program is part of the Washington State Department of Transportation's (WSDOT) capital budget. The WSDOT capital (and operating) budget is submitted to the Governor through OFM for review and approval prior to its submittal to the legislature.

A. Capital Funding

The legislature appropriated $244.2 million for the WSF capital program in the 2005-07 biennium. The anticipated capital expenditures in the 2005-21 time period are $2.2 billion. Fifty-eight percent of the 2005-07 biennium capital budget and 54 percent of the 2005-21 biennia budget is for terminal projects. Forty percent of the 2005-07 biennium budget and 43 percent of the 2005-21 biennia budget is for vessels. Terminal and vessel projects are defined by WSF as either preservation or improvement projects. The remainder of the capital program is for emergency repairs.

Table 1. WSF Capital Project Definitions

Preservation Projects	Improvement Projects	Emergency Repairs
1. Preserve the structural, mechanical and electrical integrity of infrastructure 2. Improve program efficiency and effectiveness 3. Regulatory compliance 4. Cost saving or cost avoidance 5. Benefit customers and the public	1. Meet changes in demand and increase capacity 2. Provide mobility options	Address damage and/or unanticipated regulatory requirements.

[1] LEAP is a joint, bipartisan legislative committee created by the Washington State Legislature in 1977. It is the Legislature's independent source of information and technology for developing budgets, communicating budget decisions, tracking budget and revenue activity, consulting with legislative committees, and providing analysis on special issues in support of legislative needs. (www.leg.wa.gov)

Terminal preservation projects account for 32 percent of the total capital program for the 2005-07 biennium and 31 percent for the 2005-21 biennia, and vessel preservation projects 40 percent and 43 percent respectively. No vessel improvement funds are included in the 2005-21 biennia capital program. (The four new vessels in WSF's capital program are categorized by WSF as preservation projects.) Terminal improvements account for 26 percent of the 2005-07 biennium budget and 23 percent of the 2005-21 biennia budget.

Table 2. 2006 LEAP Project List

($000s)

	Prior	05-07	%	05-21	%
Terminal Preservation	55,833	78,895	32%	699,342	31%
Vessel Preservation	85,378	97,532	40%	967,675	43%
Terminal Improvements	29,634	63,753	26%	516,631	23%
Vessel Improvements	0	0	0%	0	0%
Emergency Repairs	2,579	4,000	2%	56,795	3%
WSF Capital Program	173,424	244,180		2,240,444	

Source: WSF Legislative Tour Notebook

Sources of funding for WSF's capital program include:

- ***The 2005 Transportation Partnership Act:*** The 2005 Transportation Partnership Act is expected to provide 9 percent of WSF's capital funding for the 2005-21 biennia with no funding for the 2005-07 biennium.
- ***The 2003 Nickel package:*** Fourteen percent of all funding during the 2005-21 time period is anticipated to come from Nickel funds, including 20 percent of the 2005-07 biennium appropriation.
- ***Pre-existing Funds:*** Ongoing funds from sources other than these packages are referred to as pre-existing funds.[2] Seventy-seven percent of WSF's capital program for the 2005-21 biennia is funded through pre-existing funds, including 80 percent of the 2005-07 biennium appropriation.

Table 3. 2006 LEAP List Funding

($000s)

	Prior	05-07	%	05-21	%
Pre-Existing Funds	158,379	195,940	80%	1,734,000	77%
Nickel	15,045	45,240	20%	320,534	14%
Transportation Partnership Act			0%	185,910	9%
Total	173,424	244,180		2,240,444	

Source: WSF Legislative Tour Notebook/March 2006 LEAP list

[2] The 2003 Transportation Funding Package (Nickel) enacted by the 2003 Legislature increased the gas tax by $0.05 per gallon. The Nickel package also included an additional 0.3% sales tax on new and used vehicles and a $20 license plate number retention fee, with the funds generated added to the Multimodal Account. The 2005 Transportation Funding Package (Transportation Partnership Act) passed by the 2005 Legislature increased the gas tax by $0.095 per gallon phased in over four years.

B. Preservation Program

WSF's preservation program is designed to protect assets, with WSF's definition being "preserving the structural, mechanical and electrical integrity of infrastructure. Preserving means replacing or refurbishing terminal and vessel systems when they reach the end of their life-cycles or replacing the terminal or vessel with an asset of similar characteristics" (WSF Construction Program W Description, March 7, 2006).

Within the preservation program WSF may replace an entire facility or vessel. WSF states in its budget materials: "A terminal or vessel may be replaced in its entirety when it is not economically prudent to continue replacing the systems of the terminal or vessel or the asset's characteristics are no longer suited to meet service plan requirements" (WSF Construction Program W Description, March 7, 2006). Service plan requirements are established by WSF's long-range plan.

WSF's definition of its preservation program also includes projects necessary for regulatory compliance. WSF also includes projects that: (1) improve program efficiency and effectiveness ("These investments control the quality of the delivery of the capital program; for example, using life-cycle analysis to allocate capital preservation resources."); (2) result in cost savings or cost avoidance ("for example, installing more fuel-efficient engines"); and (3) benefit customers and the public ("for example, making wireless internet access available at terminals and on vessels") (WSF Construction Program W Description, March 7, 2006).

1. Preservation: Life-Cycle Cost Model

WSF uses a life-cycle concept to identify investments needed to ensure its vessels and terminals are preserved. The life-cycle cost models used by WSF, one for vessels and one for terminals, were reviewed in the 2001 *Washington State Ferries Capital Program Performance Audit.* (See *Washington State Ferries Financing Study Technical Appendix 1: Review of Studies and Reports*, for further information.)

The terminal and vessel life-cycle cost models rely on the same concepts and are based on an inventory of the systems and structures on a vessel or at a terminal. Systems and structures are divided into two groups:

- Vital systems, defined as those "determined by regulatory agencies as vital to the protection of people, the environment and infrastructure" (WSF Construction Program W Description, March 7, 2006); and
- Non-vital systems (all other systems).

An estimated life is determined for each system and structure based on: (1) the date of initial installation or last major refurbishment, and (2) a standard anticipated life for the type of system or structure. Important factors in the life-cycle cost model are as follows.

- The ***anticipated life*** of a particular system or structure is to be modified based on actual condition, as determined by maintenance or inspection reports and/or by

the vulnerability of the location of the structure or system (i.e., an outer dolphin is subject to more wear than an inner dolphin).

- A ***cost for the replacement*** of the structure or system at the end of its anticipated life is estimated in the model based on standard engineering estimates adjusted to the year of anticipated expenditure.
- A ***life-cycle rating*** is the percentage of a vessel's or terminal's systems that are operating within their life-cycles at a particular point in time. This percentage is weighted by the cost of replacement so that the percentage reflects the overall cost of replacing the system when due. This is in conformance with the recommendations of the 2001 performance audit. (See *Washington State Ferries Financing Study Technical Appendix 1: Review of Studies and Reports,* for a summary of the 2001 performance audit.)

WSF has used the life-cycle ratings for vital and non-vital systems to track performance against measures recommended by the 2001 Joint Legislative Task Force on Ferries. The Task Force recommended that the legislature provide sufficient funding to allow WSF, by 2011 (now estimated to be 2015), to have:

- 90 to 100 percent of its vital systems operating within their life-cycle, and
- 60 to 80 percent of non-vital systems operating within their life-cycle.

(See *Washington State Ferries Financing Study Technical Appendix1: Review of Studies and Reports,* for a summary of the Task Force report.)

As noted in the 2001 Capital Program Performance Audit, "the integrity of the information developed from the models is directly related to the accuracy of the models' inventory" (p.23). The performance audit indicated that "vessels and terminals are subject to various third party inspections and are also routinely inspected by WSF personnel. . . . When planned inspections or incidents occur that impact lives of a specific system or structure, this information is updated in the life-cycle cost model" (p. 24).

WSF demonstrates its implementation of this key element of the life-cycle cost model process in the narrative and graphic (Figure 1) on the next page.

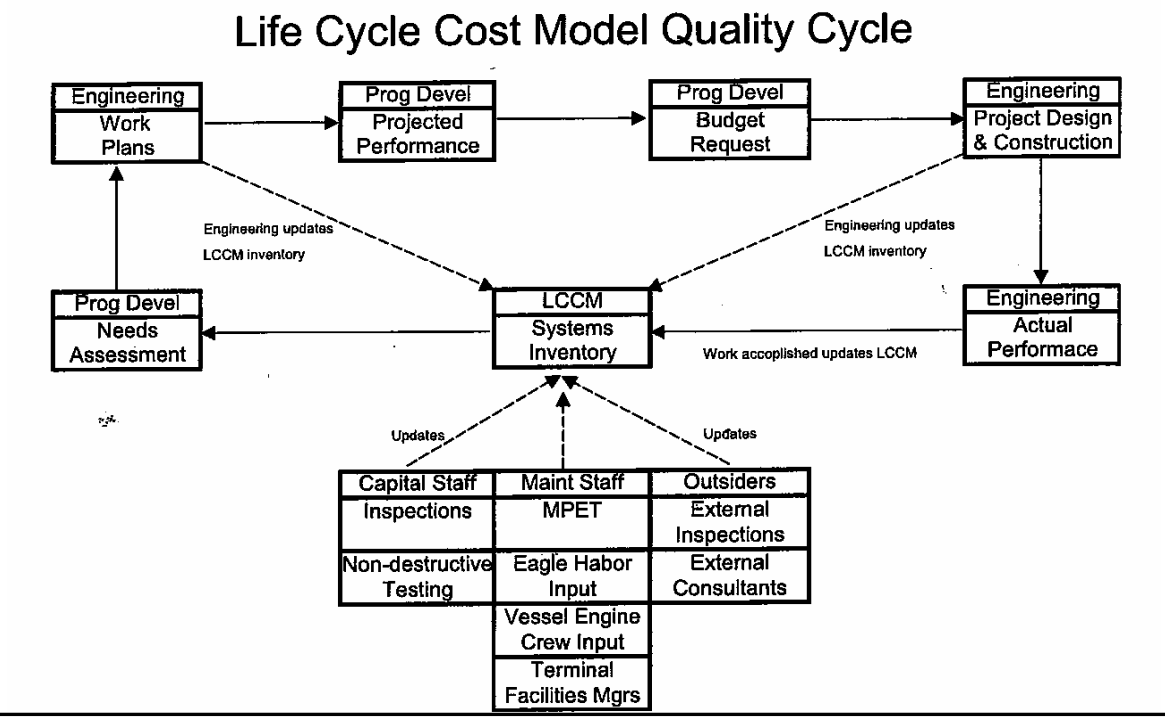
2. Preservation: Replacement

Under its preservation program, WSF replaces an asset when it is no longer economically prudent to replace systems or structures or when the characteristics of the asset are no longer suited to meet service plan requirements. Under WSF's definition of preservation, replacement projects may add additional capacity to meet service requirements. For example, as a preservation project, WSF is planning to replace four steel electric vessels that have a 65-vehicle capacity with four new expanded-Issaquah-class vessels that accommodate 144 vehicles[3]. Service requirements are established in WSF's Draft Long-Range Strategic Plan, which is also used to determine the scope of improvement projects.

[3] WSF states that these larger vessels are intended to replace capacity lost from the retirement of five vessels and the installation of Sub-chapter W life-saving equipment throughout the fleet. (WSF Dec. 2006)

Figure 1. WSF Preservation Using Performance-Based Budgeting

- The engineering staff conducts inspections of assets and performs non-destructive testing to verify the accuracy of the life-cycle cost model data in portraying the status of systems.
- The maintenance staff provides input that adjusts life-cycle cost model data to the actual status of the systems.
- WSF employs external inspectors and consultants to evaluate the accuracy of life-cycle cost model data.



Source: Washington State Ferries, Construction Program W Capital Preservation Using Performance-Based Budgeting, Sept. 2005, p. 13

3. Preservation: Other Projects

WSF also includes in its preservation program projects necessary for regulatory compliance. In addition, WSF includes projects that improve program efficiency and effectiveness, result in cost savings, and/or provide benefits to customers and the public. These include a number of systemwide projects, such as implementation of the electronic fare system.

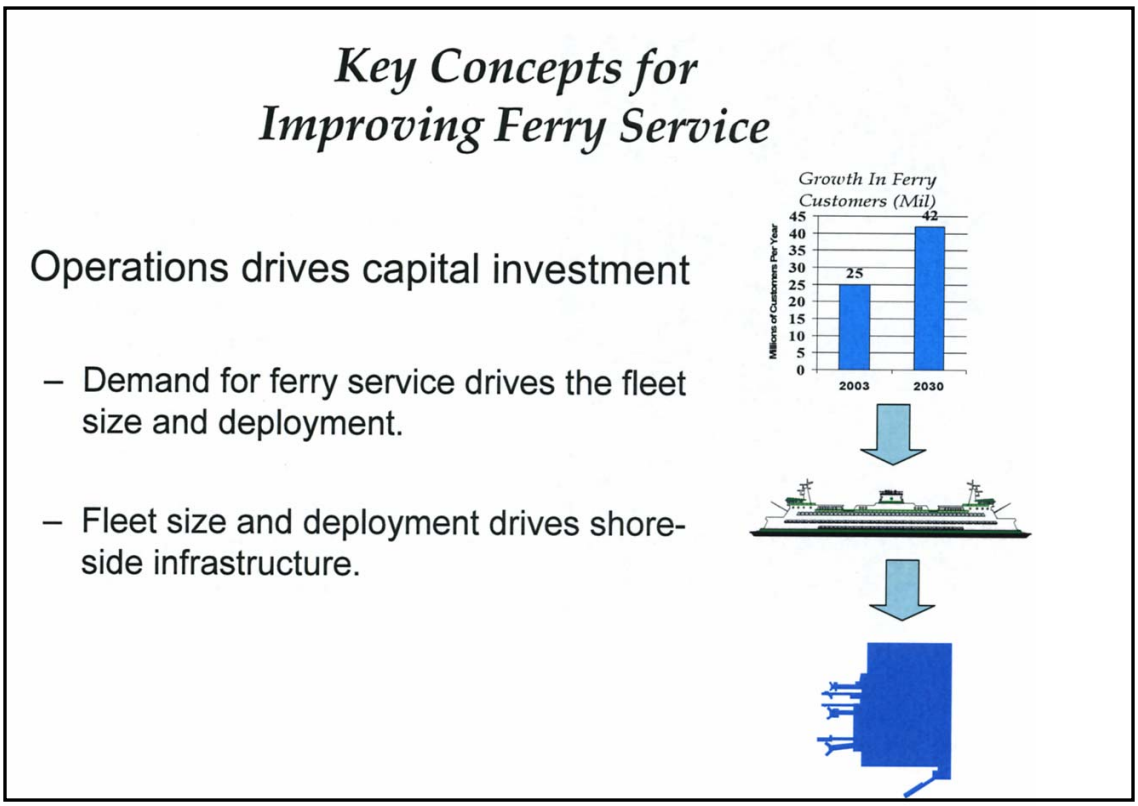
C. Improvement Program: Long-Range Strategic Plan

WSF's improvement program is designed to "increase the ability of the ferry system to meet changes in demand. . . . Improvement investments may be made to increase the capacity of a terminal or vessel. Capacity increases are measured in terms of the terminal's throughput capacity and the vessel's vehicle and passenger carrying capacity. Improvement investments may be made to provide riders with more mobility options" (WSF Construction Program W Description, March 7, 2006, p. 9).

WSF uses its long-range plan to determine the need for improvement investments that increase capacity and to determine the scope of the projects. The 2005-21 biennia capital program was developed prior to the release of the *Washington State Ferries Draft Long-Range Strategic Plan 2006-2030.* (See *Washington State Ferries Financing Study Technical Appendix 1: Review of Studies and Reports,* for a review of the Draft Plan.) The Plan's ridership and service projections should be more fully reflected in the FY 2007-23 capital program that will be presented to the legislature in January 2007.

WSF's improvement program is based on the premise that operations and ridership demand for ferry service, as determined by the long-range plan, drive fleet size and deployment. Fleet size and deployment in turn drive terminal shoreside infrastructure. WSF demonstrates this concept in Figure 2, below.

Figure 2. Improvement Program



D. Emergency Repairs

WSF's emergency repair program is designed to "address unanticipated regulatory requirements or damage to a terminal or vessel that is not the result of deterioration or wear that could be reasonably anticipated" (WSF Construction Program W Description, March 7, 2006). The emergency repairs budget serves as a reserve account, with the allocated amount based on increases for inflation.

E. Prioritization

WSF's Capital Committee is responsible for selecting projects to include in the capital program. The Committee includes WSF's Chief Executive Officer, Chief Financial Officer, Director of Operations, Director of Maintenance, Director of Terminal Engineering and Director of Vessel Engineering. This same committee oversees management of WSF's capital program.

The projects selected by this Committee are placed on a proposed project list, which is submitted to OFM and the governor, and then to the legislature for consideration in the transportation budget. To prioritize the discretionary elements of WSF's capital program, the Capital Committee utilizes the Priorities of Government and what it considers expressions of legislative intent, particularly the recommendations of the 2001 Legislative Joint Task Force on Ferries. The legislature does not give WSF discretion in using Nickel and Transportation Partnership Act funds; these funds are available only for projects named by the legislature.

WSF uses information from its life-cycle cost models to prioritize preservation work intended to preserve structures and systems. A 2004 WSF report notes that this prioritization process "is presently more an art than a science, requiring an understanding of several factors: the service needs of individual routes; the anticipated . . . level of funding that will be available . . . ; the possibility of securing permits in a timely manner . . . ; the ability to deliver a project within a specified time frame . . . ; and reconciliation of the project delivery cycle . . . and the state's two year funding cycle" (Life-Cycle Based Programming of Ferry Terminal Preservation, July 8, 2004, pp. 8-9).

Project selection (among projects intended to preserve systems and structures) is also guided by a preservation strategy that places top priority on failed structures or systems, the second priority on preserving vital systems and structures, and the lowest priority on preserving non-vital systems and structures. These priorities are balanced to ensure progress toward the Joint Legislative Task Force on Ferries preservation goals of 90 to 100 percent of vital systems and structures and 60 to 80 percent of non-vital systems and structures operating within their life-cycles.

For replacement and improvement projects, prioritization is based in part on the recommendations of the 2001 Joint Legislative Task Force on Ferries. For the 2001-03 biennium, the Task Force recommended funding the Mukilteo and Anacortes terminal

projects that address preservation and multimodal needs (Joint Task Force Report, p. 14). The priorities also reflect Nickel and Transportation Partnership specified projects.

Section Three
Terminal/Repair Facility Projects

WSF's 2005-21 biennia terminal capital program includes 67 projects with separate project identification numbers (PINs) with a total budget of $142.6 million for the 2005-07 biennium and $1.2 billion for the 2005-21 biennia. Forty-three of the projects are for specific facilities and 24 are systemwide projects for items such as server infrastructure. Of the 67 projects, 24 are classified as improvement projects and 43 as preservation projects.

Table 4. Terminal/Repair Facility Projects

Projects	# PINs	Improvement	Preservation	05-07 ($000s)	05-21 ($000s)
Terminals/Repair Facility*	43	22	21	$118,266	$1,091,310
Systemwide Projects	24	2	22	24,382	124,663
Total	67	24	43	$142,648	$1,215,973

*Includes systemwide catch-up preservation project

As illustrated in Table 5, more than half of the 2005-07 biennium capital budget and the 2005-21 biennia budget is for projects at Anacortes, Bainbridge Island, Mukilteo, Seattle Colman Dock, Eagle Harbor repair facility, and systemwide projects.

Table 5. Terminal Capital 2005-07 Budget, By Location*

($000s)

	05-07	%	05-21	%	
Anacortes	30,844	22%	119,857	10%	
Systemwide	24,382	17%	124,663	10%	
Bainbridge	21,867	15%	178,277	15%	
Eagle Harbor	15,617	11%	37,368	3%	
Mukilteo	14,528	10%	130,873	11%	
Seattle	9,043	6%	228,912	19%	> ½ budget
Friday Harbor	7,521	5%	22,676	2%	
Southworth	3,704	3%	31,493	3%	
Keystone	2,200	2%	31,231	3%	
Lopez	3,279	2%	17,092	1%	
Port Townsend	2,959	2%	37,293	3%	
Edmonds	1,500	1%	57,607	5%	
Kingston	987	1%	29,334	2%	
Orcas	967	1%	12,851	1%	
Tahlequah	1,443	1%	5,334	0%	
Vashon	850	1%	44,723	4%	
Bremerton	90	0%	30,602	3%	

	05-07	%	05-21	%
Clinton	289	0%	38,792	3%
Fauntleroy	150	0%	24,802	2%
Point Defiance	368	0%	4,338	0%
Shaw	60	0%	7,855	1%
Total	142,648		1,215,973	

*Distributes the catch-up preservation project to affected terminals

The 24 improvement projects for the 2005-07 biennium have budgets of $63.4 million (44% of the total), and the 43 preservation projects have budgets of $79.2 million (56% of the total). For the 2005-21 biennia the improvement project budgets are $516.3 million (42% of the total), and the preservation budgets are $699.7 million (58% of the total).

Table 6. Preservation and Improvement Capital Budgets

($000s)

Type	05-07	%	05-21	%
Improvement	$63,443	44%	$516,321	42%
Preservation	79,205	56%	699,652	58%
Total	$142,648		$1,215,973	

Appendix A includes a review of projects at each terminal. Over several weeks in August and September 2006, the consultants, along with legislative staff, conducted a series of interviews with the project management team for various terminal projects. The appendix includes for each terminal the 2005-21 biennia capital projects, a review of scope, schedule and budget changes for the projects, a summary of project life expenditures to date, issues or risks identified by WSF, the condition rating of each terminal from the WSDOT bridge inspections, and consultant observations.

As an overview, the consultants note that:

- Design work is typically done in-house by WSF engineers for smaller terminal projects. Consulting engineers and architects are retained for larger projects but overseen and managed by WSF staff.
- Project management is typically performed by WSF staff except for projects of significant size and/or complexity, where a combined team of WSF staff and outside consulting project managers may be used.
- At the project management level, the scope appears to be largely pre-determined by the capital planning process. Mid-project scope changes are approved internally by the WSF Capital Committee.
- Cost estimates are typically performed internally by WSF staff at 15 percent, 30 percent, 60 percent and 90 percent completion of design documents. Where an outside architect or engineer is used, that professional may perform these cost estimates.
- Value engineering is typically performed by WSF and driven by findings from the cost estimates.

A. Preservation Projects

There are 43 preservation projects with a budget of $79.2 million in the 2005-07 biennium and $699.7 million in the 2005-21 biennia (see Table 7 below). of the 2005-07 biennium preservation budget, sixty-five percent (65%) is for systemwide projects, the Eagle Harbor repair facility, and the Bainbridge Island terminal. Of the 2005-21 biennia preservation budget, thirty-nine percent (39%) is for the Seattle terminal and systemwide projects.

Table 7. Terminal Preservation Projects

($000s)

PIN	Project	05-07	%	05-21	%
902019V	Anacortes Terminal Preservation	300	0%	42,699	6%
930513B	Bainbridge Island Terminal Preservation	11,225		65,436	
930513D	Bainbridge Terminal Food Service Improvement	310		310	
	Bainbridge Total	*11,535*	*15%*	*65,746*	*9%*
930410R	Bremerton Terminal Preservation	90	0%	22,746	3%
952516H	Clinton Terminal Preservation	289	0%	10,174	1%
900040N	Eagle Harbor Terminal Preservation	15,617	20%	37,368	5%
900005F	Fauntleroy Ferry Terminal Preservation			24,302	
900005L	Fauntleroy Terminal Preservation	150		500	
	Fauntleroy Total	*150*	*0%*	*24,802*	*4%*
900028Q	Friday Harbor Terminal preservation	7,121	9%	21,676	3%
902017J	Keystone Alternative	2,200	3%	31,231	4%
910414N	Kingston Terminal Preservation	987	1%	25,233	4%
900022G	Lopez Terminal Preservation		0%	11,933	2%
900026L	Orcas Terminal Preservation	917	1%	7,857	1%
900001F	Point Defiance Terminal Preservation	368	0%	4,032	1%
900012D	Port Townsend Terminal Preservation	2,959	4%	23,865	3%
900010A	Seattle Terminal Preservation	2,521	3%	149,619	21%
900024E	Shaw Terminal Preservation	60	0%	5,839	1%
916008N	Southworth Terminal Preservation	1,554	2%	16,122	2%
90002E	Tahlequah Terminal Preservation	200	0%	4,091	1%
900006N	Vashon Terminal Preservation	850	1%	33,978	5%
999940D	Catch-up Preservation	7,465	9%	38,199	5%
966620D	Systemwide ADA Support	75		809	
966640D	Systemwide Aerial Photos	78		762	
989930F	Systemwide Customer Travel Inquiry	300		2,113	
989930E	Systemwide Emergency Management Comm	240		1,505	
989920X	Systemwide Miscellaneous Terminal Projects	5,626		48,235	
9829920K	Systemwide Movable Bridge Modifications	700		1,050	
966620E	Systemwide Operations Construction Support	1,323		12,422	
977731A	Systemwide Planning and Special Studies	1,367		14,105	
966640Q	Systemwide Point of Sale/Regional Fare	3,492		3,492	
9666401	Systemwide Revenue Control System	107		1,313	
989930A	Systemwide Server Infrastructure	125		1,102	

PIN	Project	05-07	%	05-21	%
989930D	Systemwide SMS Enhancements	725		1,950	
999920A	Systemwide steel piling inventory account	54		514	
966640F	Systemwide Terminal Design Standards	234		2,089	
966650A	Systemwide Terminal Phone System Replace	200		988	
989930B	Systemwide Terminal Physical Security Infra	7,894		21,661	
989930G	Systemwide Terminal Physical Security Planning	550		2,254	
999940C	Systemwide Terminal Planning/Design	326		3,183	
999976T	Systemwide Terminal Work Orders by Auditors	96		871	
966620C	Systemwide Toxic Waste Disposal	50		440	
966650B	Systemwide WSF Staff Relocation	300		300	
966650C	Systemwide Terminal Communications (IT)	160		1,284	
	Systemwide Total	*24,022*	*30%*	*122,442*	*18%*
	Total	79,205		699,652	

1. Terminal Preservation Projects – Life-Cycle and Non-Life-Cycle

As discussed in Section 2.b.(1) above, WSF's performance measure for terminal preservation is the percentage of vital and non-vital systems and structures that are operating within their life-cycle. WSF's performance goal is to have 90 to 100 percent of vital systems and structures, and 60 to 80 percent of non-vital systems and structures, operating within their life-cycle by 2015.

WSF uses life-cycle ratings as a key justification for the preservation budget, projecting the impact on life-cycle ratings of planned projects. For example, as shown in Table 8 below, the percentage of vital systems operating within their life-cycle at the Eagle Harbor repair facility is projected to increase from 29 percent in the 2005-07 biennium to 100 percent in the 2007-09 biennium with the planned preservation project.

Table 8. Life-Cycle Rating Projections: Vital/Non-Vital Systems

Facility	Start		05-07		07-09		09-11		11-13		13-15	
	Vital	Non	Vital	Non	Vital	Non	Vital	Non	Vital	Non	Vital	Non
Anacortes	72%	19%	82%	19%	84%	77%	83%	98%	87%	99%	98%	98%
Bainbridge	95%	23%	92%	28%	97%	35%	97%	93%	97%	90%	97%	88%
Bremerton	79%	92%	78%	92%	78%	98%	84%	98%	95%	98%	87%	97%
Clinton	100%	74%	100%	75%	100%	97%	100%	89%	100%	89%	99%	89%
Eagle Harbor	57%	53%	29%	26%	100%	59%	100%	55%	100%	55%	100%	55%
Edmonds	98%	66%	98%	66%	85%	86%	84%	81%	72%	81%	62%	81%
Fauntleroy	73%	11%	73%	9%	73%	31%	73%	31%	73%	31%	38%	31%
Friday Harbor	82%	86%	86%	90%	85%	95%	85%	84%	83%	73%	91%	83%
Keystone	26%	45%	30%	45%	30%	66%	100%	95%	100%	100%	100%	100%
Kingston	96%	77%	96%	77%	96%	83%	93%	85%	94%	85%	95%	85%
Lopez	72%	51%	58%	51%	66%	51%	65%	9%	71%	3%	71%	3%
Mukilteo	63%	65%	63%	63%	63%	88%	100%	100%	100%	100%	100%	100%
Orcas	75%	98%	69%	72%	93%	55%	93%	34%	90%	37%	100%	62%

Facility	Start		05-07		07-09		09-11		11-13		13-15	
	Vital	Non	Vital	Non	Vital	Non	Vital	Non	Vital	Non	Vital	Non
Point Defiance	99%	42%	89%	45%	96%	72%	86%	72%	86%	66%	89%	37%
Port Townsend	61%	63%	58%	59%	98%	81%	100%	90%	100%	90%	100%	90%
Seattle	55%	7%	55%	7%	54%	13%	51%	13%	51%	18%	78%	18%
Shaw	75%	46%	79%	46%	72%	46%	76%	46%	90%	29%	90%	29%
Southworth	58%	14%	59%	12%	59%	31%	59%	31%	59%	31%	100%	87%
Tahlequah	78%	52%	78%	52%	76%	52%	76%	52%	76%	52%	76%	7%
Vashon	49%	66%	50%	70%	57%	70%	54%	74%	46%	48%	88%	58%
All Terminals	73%	44%	73%	37%	79%	60%	81%	67%	81%	66%	87%	68%

Source: WSF Construction Program W 2007 LEAP (Proposed), v 2007-4

Preservation projects include a number of expenses that do not affect life-cycle ratings, which WSF refers to as non-life-cycle expenses. There are two main types of such expenses:

1. Non-life-cycle expenses within individual terminal preservation projects. Examples include property acquisition, interim preservation (maintenance) projects, purchase of emergency generators to support the electronic fare system, environmental mitigation, and placeholder preservation allowances.
2. Non-life-cycle systemwide projects intended to meet other preservation criteria, such as efficiency and effectiveness, cost savings, and regulatory compliance. Examples of these expenditures include the electronic fare system implementation, terminal physical security infrastructure and miscellaneous terminal projects.

In the 2005-07 biennium, 58 percent of the budget affects life-cycle ratings and 42 percent does not. For the 2005-21 biennia, 74 percent of the budget affects life-cycle ratings and 26 percent does not. See Table 9.

Table 9. Life-Cycle and Non-Life-Cycle Preservation Projects

($000s)

		05-07			05-21		
PIN	Project Title	Life Cycle	Non-Life Cycle	Total	Life Cycle	Non-Life Cycle	Total
902019V	Anacortes Terminal Preservation		300	300	37,925	4,774	42,699
930513B	Bainbridge Island Terminal Preservation	11,075	150	11,225	58,935	6,501	65,436
930513D	Bainbridge Terminal Food Service Improvement		310	310		310	310
	Bainbridge Total	*11,075*	*460*	*11,535*	*58,935*	*6,811*	*65,746*
930410R	Bremerton Terminal Preservation	90		90	22,746		22,746
952516H	Clinton Terminal Preservation	50	239	289	7,000	3,174	10,174
900040N	Eagle Harbor Terminal Preservation	12,600	3,017	15,617	34,351	3,017	37,368
900005F	Fauntleroy Ferry Terminal Preservation				24,302		24,302
900005L	Fauntleroy Terminal Preservation		150	150		500	500
	Fauntleroy Total		*150*	*150*	*24,302*	*500*	*24,802*

PIN	Project Title	05-07 Life Cycle	05-07 Non-Life Cycle	05-07 Total	05-21 Life Cycle	05-21 Non-Life Cycle	05-21 Total
900028Q	Friday Harbor Terminal preservation	6,436	685	7,121	20,991	685	21,676
902017J	Keystone Alternative	1,265	935	2,200	18,021	13,210	31,231
910414N	Kingston Terminal Preservation	535	452	987	19,843	5,390	25,233
900022G	Lopez Terminal Preservation				11,933		11,933
900026L	Orcas Terminal Preservation		917	917	6,940	917	7,857
900001F	Point Defiance Terminal Preservation		368	368	3,664	368	4,032
900012D	Port Townsend Terminal Preservation	2,659	300	2,959	20,599	3,266	23,865
900010A	Seattle Terminal Preservation	2,519	2	2,521	140,455	9,164	149,619
900024E	Shaw Terminal Preservation		60	60	5,781	58	5,839
916008N	Southworth Terminal Preservation	1,554		1,554	14,568	1,554	16,122
90002E	Tahlequah Terminal Preservation	200		200	3,891	200	4,091
900006N	Vashon Terminal Preservation	850		850	33,128	850	33,978
999940D	Catch-up Preservation	6,222	1,243	7,465	33,972	4,227	38,199
966620D	Systemwide ADA Support		75	75		809	809
966640D	Systemwide Aerial Photos		78	78		762	762
989930F	Systemwide Customer Travel Inquiry		300	300		2,113	2,113
989930E	Systemwide Emergency Management Comm		240	240		1,505	1,505
989920X	Systemwide Miscellaneous Terminal Projects		5,626	5,626		48,235	48,235
9829920K	Systemwide Movable Bridge Modifications		700	700		1,050	1,050
966620E	Systemwide Operations Construction Support		1,323	1,323		12,422	12,422
977731A	Systemwide Planning and Special Studies		1,367	1,367		14,105	14,105
966640Q	Systemwide Point of Sale Repl/Regional Fare		3,492	3,492		3,492	3,492
9666401	Systemwide Revenue Control System		107	107		1,313	1,313
989930A	Systemwide Server Infrastructure		125	125		1,102	1,102
989930D	Systemwide Safety Management System		725	725		1,950	1,950
999920A	Systemwide steel piling inventory account		54	54		514	514
966640F	Systemwide Terminal Design Standards		234	234		2,089	2,089
966650A	Systemwide Terminal Phone System Replace		200	200		988	988
989930B	Systemwide Terminal Physical Security Infra		7,894	7,894		21,661	21,661
989930G	Systemwide Terminal Physical Security Planning		550	550		2,254	2,254
999940C	Systemwide Terminal Planning/Design		326	326		3,183	3,183
999976T	Systemwide Terminal Work Orders by Auditors		96	96		871	871
966620C	Systemwide Toxic Waste Disposal		50	50		440	440
966650B	Systemwide WSF Staff Relocation		300	300		300	300
966650C	Systemwide Terminal Communications (IT)		160	160		1,284	1,284
	Systemwide Total		*24,022*	*24,022*		*122,442*	*122,442*
	Total	46,055	33,150	79,205	519,045	180,607	699,652
	Percentage	58%	42%		74%	26%	

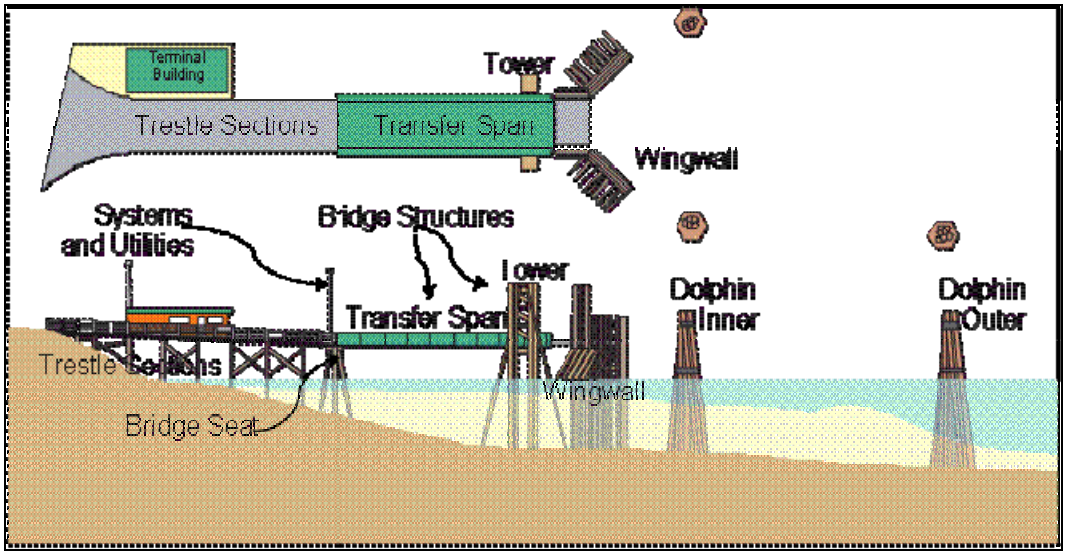
2. Life-Cycle Cost Model

The terminal life-cycle cost model is the basis for that portion of the preservation budget that preserves structures and systems.

a) Inventory

The terminal life-cycle cost model categorizes terminal structures and systems into nine categories. The location of these types of structures and systems is shown below in Figure 3, and the list of the nine structures and systems in Table 10.

Figure 3. Terminal Structures and Systems



Source: WSF

Table 10. Terminal Life-Cycle Cost Model Categories

Categories	#
Systems & Utilities	254
Bridge	195
Dolphin	168
Trestle	92
Paved Area	80
Terminal Building	74
Overhead Loading	65
Wingwall	33
Passenger-Only Facilities	5
Total	**966**

Source: WSF

For each terminal, the life-cycle cost model includes:

- each system or structure within the nine categories,
- the inventory number,

- description,
- priority (vital or non-vital),
- standard life-cycle,
- adjustment for location,
- adjustment for condition,
- revised life-cycle (the net of the standard life-cycle and the two adjustments),
- the last year the system or structure was installed or modified,
- the contract number,
- year due for replacement (taking the revised life-cycle and the year installed or modified to project year due for replacement), and
- the remaining useful life (the net of current year and the year due for replacement).

The model then projects the cost of replacing the asset in the year due based on year of expenditure dollars.

An example of the inventory of structures and systems for the Bainbridge Island terminal is shown below.

Table 11. Life-Cycle Inventory Sample: Bainbridge Island (Partial)

Inven-tory #	Description	Priority*	Standard Life Cycle	Adjust for Location	Adjust for Condition	Adjusted Life-cycle	Last Year Completed	Contract Number	Year Due	Remaining Useful Life
	Dolphins									
	Slip 1 (Main N.)									
2137	Left Inner, 6 Steel, Main N 1	3a	25			25	2002	6293	2027	22
2138	Left Outer, 13 Steel Main N 1	3a	20			20	2002	6293	2022	20
2139	Right Inner, Double-sided, 12 Steel, Main N 1/Aux Ctr 2	3a	25			25	2002	6293	2027	25
2140	Right Outer, Double-sided, 25 Steel, Main N 1/Aux Ctr 2	3a	20			20	2002	6293	2022	20
	Wingwalls									
2148	Wingwalls, Steel, Main N 1	3a	25			25	1998	5341	2023	18
2149	Wingwalls, Steel, Aux Ctr 2	3a	25							
	Bridge Seats									
2158	Bridge Seat, Concrete, Main N 1	3a	50			50	1995	4513	2045	40
2159	Bridge Seat, Timber, Aux Ctr 2	3a	30			30	1976	0278	2006	1
	Trestles									
2161	Trestle, South, Steel/Concrete	3a	40			40	1966	8000	2006	1
2162	Trestle, Slip 2 Extension, Timber 1976	3a	40		(10)	30	1976	0278	2006	1
2163	Trestle, Tie-Up Slip, Steel/Concrete	3c	40		(10)	30	1982	2274	2012	7
2165	Trestle North Concrete, 1984	3a	50			50	1995	4513	2045	40
	Paved Areas									
2177	Pavement on Concrete Trestle (North)	3c	20			20	1984	2791	2004	(1)
2178	Pavement on Steel/Concrete Trestle	3c	10			10	2003	6423	2013	8
2179	Traffic Lanes, upland	3c	15			15	1984		1999	(6)
2180	Holding Area, upland	3c	20			20	2003	6423	2023	18
	Systems									
2181	Power	3a	20			20	1997	5061	2017	12

Inven-tory #	Description	Priority*	Standard Life Cycle	Adjust for Location	Adjust for Condition	Adjusted Life-cycle	Last Year Completed	Contract Number	Year Due	Remaining Useful Life
2182	Lighting	3a	20			20	1984	?	2004	(1)
2183	Cathodic Protection, currently nonfunctional	3c	20		(19)	1	1990	3758	1991	(14)
2184	Vessel Backfeed	3a	20			20	1999	?	2019	14
2185	Backup Generator	3a	20			20	1997	5061	2017	12
2186	Communications	3a	20			20	1984	?	2004	(1)
2187	Point of Sale System	3c	10			10	1994	?	2004	(1)
2188	Traffic Controls	3c	20			20	1984	?	2004	(1)
2189	Storm Drainage	3c	20			20	1984	?	2004	(1)
2190	Water Supply	3c	20			20	1955	?	1975	(30)
2191	Sewer	3c	20			20	1955	?	1975	(30)
2192	Signage	3c	20			20	1984	?	2004	(1)
2193	Fire Protection	3a	20			20	1984	?	2004	(1)
2194	HVAC	3c	20			20	1984	?	2004	(1)
	Terminal Buildings									
2196	Main Terminal Building (TO BE RETIRED)	3c	40			40	1955	Pre-1955	1995	(10)
2197	Emergency Generator Shelter	3c	20			20	1997	5061	2017	12
2198	Storage Buildings (On Trestle)	3c	20			20	1995	4513	2015	10
2195	Toll Booths (4)	3c	20			20	1992	4170	2012	7

* Priority 3a is preservation of vital systems; 3c preservation of non-vital systems.

Source: WSF

b) Standard-life-cycles: steel and concrete structures

WSF's preservation program replaces older timber structures with steel and concrete structures. The standard life-cycles used in the terminal life-cycle model do not reflect the longer lives of these steel and concrete structures, and are much shorter than the design standards used by WSF terminal engineers. See Table 12 below.

The consultants reviewed the terminal inspection reports provided by WSF. In the review of those reports it was noted that steel pilings vary in wall thickness from 0.605 inches to 1.00 inches. At Bremerton, for example, steel pilings placed in service prior to 1999 were 0.75 inches, and those after, 1.00 inch. WSF staff indicated that the change to thicker wall piling was to replace corrosion protection measures that had proven unsatisfactory. It would seem reasonable that the standard life-cycle for thicker wall piling in the same service would vary due to the pile thickness. All pilings are listed as 25-year standard life-cycle.

Table 12. Design Life vs. Life-Cycle Cost Model Replacement

(years)

Structure	Design Life (1)	Planned Replacement (2)	Gap	% of Design Life
Bulkhead	75	40	35	53%
Trestle	75	40	35	53%
Transfer Span	75	40	35	53%
Transfer Span Substructure	75	40	35	53%
Wingwalls	50	25	25	50%
Inner Dolphins	50	25	25	50%
Floating Dolphin Pontoons	50	25	25	50%
Floating Dolphin Anchors	25	25	0	100%
Pedestrian Facilities	75	40	35	53%
Building	75	40	35	53%
Retaining Wall	75	75	0	100%

(1) Design life based on deterioration due to corrosion or fatigue.

(2) Planned replacement based on Life-Cycle Cost Method for purposes of planning and budgeting. Replacement life of structures may be reduced due to functional obsolescence. Replacement life of berthing structures also may be reduced due to damage from vessel Type II or Type III impact.

Source: WSF

It is not clear why WSF has the life-cycle of some of its steel and concrete structures at 50 to 53 percent of the design life. Assuming that the structures are reasonably maintained, there is no reason to believe that they will not last well beyond 50 percent of their design life.

At the request of the consultants, WSF provided a life-cycle cost model condition projection based on the assumption that steel structures such as wingwalls and inner

dolphins will last thirty years instead of the standard twenty-five. See Table 13, below. The percentage of vital systems operating within their life-cycle increased by 3 percent in the later years of the capital plan with just this one modification. The difference would increase even more in later years, since only the very first steel structures installed by WSF will come due for replacement during this capital program period. (The steel structures are primarily in vital systems. There is no impact on the non-vital system life-cycle ratings from changing the steel systems to a thirty-year standard life.)

Table 13. Steel Structures: 25-Year Standard Life vs. 30-Year

(% operating within their life-cycle)

Vital Systems	Current/Steel Structures at 25 Years	Steel Structures at 30 Years	Diff.
Start	73%	73%	0%
05-07	73%	73%	0%
07-09	79%	80%	1%
09-11	81%	81%	0%
11-13	81%	82%	1%
13-15	87%	88%	1%
15-17	94%	94%	0%
17-19	92%	94%	2%
19-21	93%	96%	3%
21-23	93%	96%	3%

Source: WSF Life-Cycle Model V2007-4

c) Standard life-cycles: systems and utilities

The life-cycle model includes 254 inventory items under the category "systems and utilities" accounting for 26 percent of all the inventory items. As shown in Table 11 for Bainbridge, these systems include power, lighting, cathodic protection, vessel backfeed, backup generator, communications, traffic controls, storm drainage, water supply, sewer, signage, fire protection and HVAC systems—all with a standard life of 20 years. The point-of-sale system has a standard life of 10 years.

When developing the initial terminal inventory, WSF did not have the ability to inspect each of these systems and so arbitrarily assigned them all, except the point-of-sale system, a life-cycle of twenty years. In most cases, the system is not ready to be replaced at the end of twenty years unless the entire facility is being replaced (i.e., storm drainage and water supply systems are not generally replaced at the end of twenty years.) Despite this, the life-cycle model carries "overdue" systems into the calculation of vital and non-vital systems that are operating within their life-cycle; i.e., a twenty-five-year-old storm drain would show as operating outside its twenty-year life-cycle even though it does not need to be replaced.

At the request of the consultants, WSF provided a life-cycle cost model condition projection that eliminates the system and utilities category. See Table 14, below. The

percentage of vital systems operating within their life-cycle increased by 3 percent in the later years of the capital program and 4 percent for non-vital systems.

Table 14. Life-Cycle Model With "Systems and Utilities" Category and Without

(% operating within their life-cycle)

	Current/ With Systems & Utilities	Without Systems & Utilities	Diff.
Vital Systems			
Start	73%	74%	1%
05-07	73%	74%	1%
07-09	79%	80%	1%
09-11	81%	82%	1%
11-13	81%	82%	1%
13-15	87%	87%	0%
15-17	94%	94%	0%
17-19	92%	92%	0%
19-21	93%	93%	0%
21-23	93%	94%	1%
Non-Vital Systems			
Start	44%	48%	4%
05-07	37%	39%	2%
07-09	60%	58%	-2%
09-11	67%	65%	-2%
11-13	66%	64%	-2%
13-15	68%	66%	-2%
15-17	87%	87%	0%
17-19	84%	87%	3%
19-21	84%	87%	3%
21-23	85%	89%	4%

Source: WSF Life-Cycle Model V2007-4

d) Adjustment for condition

As discussed in Section 2.B.(1), the 2001 Capital Program Performance Audit noted the importance of the life-cycle models' inventory, and particularly, the importance of updating the inventory through periodic inspections. WSF's quality cycle chart (see Figure 1) indicates that the life-cycle cost model is kept current through inspections, the Maintenance Performance Evaluation Tool (tracking maintenance work), terminal facilities managers' reports, outside inspections (the terminals have annual bridge, electrical system and dive inspections), and consultations.

Interviews with WSF staff indicate that the inventory has not been regularly updated with condition adjustments, and that the model has not been updated during the 2006-07 biennium to date. (The consultants' review found that the inventory had been updated

from the 2005 inspections. It did not appear that an update was done from the 2004 inspections.) WSF's model indicates that 20 percent of the structures and systems in the inventory have received condition adjustments, but when the adjustments were made is not clear.

To conform to the performance audit and WSF's policies, the condition for each item should be assessed and modified on a regular basis from the available inspection and maintenance reports. Without this update, the life-cycle cost model is not as useful a tool for budget planning or performance reporting as it could be, and runs the risk of presenting inaccurate projections.

Mechanical and electrical inspections: The consultants reviewed the mechanical and electrical inspection reports for all terminals. These reports deal with maintenance matters. There are three groups of issues.

- Priority one deficiencies are those that are severe enough to compromise public safety or system reliability. These include such items as: disconnect and reconnect ground wires on ground bus in Panel A; replace the fluid in transfer span gearbox; replace the suction hose that leads from reservoir to pump; and replace undersized feeder conductors between Panel MDP and the start-up transformer.
- Priority two deficiencies are not critical in nature but should be addressed or repaired. These include such items as: install locknuts on the turnbuckles for the two long counterweight wire ropes; place tags on the suction and return filters that states "Date of Change"; and perform hoist motor break test during electrical inspections.
- Priority three is assigned to items that should be addressed for the long-term service of the system. These include such items as: replace lubricant used on the wire rope with a lubricant that is translucent; add documentation to the PLC program describing the purpose and logic in each rung or for groups of rungs that are related; and clean up and repaint rust spots inside the shore power service disconnect enclosure.

Bridge inspections: The consultants also reviewed the WSDOT bridge inspectors' inspection reports, which bear directly on the condition of the system. The bridge inspectors routinely inspect structures at the terminals. The reports provide a rating for the structures which, while there are different specifics for each item, are generally:

State 1 – No Deterioration
State 2 – Minor Deterioration: Corrective action optional
State 3 – Medium Deterioration: Not sufficient to affect strength and/or stability
State 4 – Advanced Deterioration: Sufficient to warrant analysis of strength and/or stability

The consultants compared the condition ratings prepared by the WSDOT bridge inspections with the life-cycle cost model's economic condition rating, and found variation between the condition as represented by inspections and the life-cycle cost

model. See Table 15, below. The life-cycle cost model shows that for vital systems 73 percent are operating within their life-cycle. A comparative condition rating based on the condition of inspected structures would be 84 percent considering only State 1 items (no deterioration), and 96 percent with both State 1 and 2 items (no or minor deterioration). This sample bridge condition report rating is not economically weighted. For total accuracy, such weighting would be recommended. However, the relative weighting of the items is not likely to alter these findings significantly.

Table 15. Terminal Bridge Condition Report Ratings

Terminal	Year Inspected	Life-Cycle Rating	Units	State (Condition Rating)				
		Vital	Measured	1	2	1&2	3	4
Anacortes	2005	72%	89,715	71,579	14,190		3,857	69
				80%	16%	96%	4%	0%
Bainbridge	2006	92%	185,387	177,530	6,494		908	455
				96%	4%	99%	0%	0%
Bremerton	2006	78%	95,018	72,563	16,151		3,245	3,016
				76%	17%	93%	3%	3%
Clinton [1]	2005	100%	259,317	258,401	908		7	1
				100%	0%	100%	0%	0%
Eagle Harbor [2]	2005	57%	155,189	143,099	7,488		2,396	2,206
				92%	5%	97%	2%	1%
Edmonds [3]	2005	98%	52,365	41,866	6,245		4,243	24
				80%	12%	92%	8%	0%
Fauntleroy [4]	2006	73%	149,720	146,808	2,719		174	19
				98%	2%	100%	0%	0%
Friday Harbor [5]	2005	82%	52,833	44,817	7,915		148	3
				85%	15%	100%	0%	0%
Keystone	2006	30%	11,427	9,754	1,538		130	5
				85%	13%	99%	1%	0%
Kingston	2005	96%	138,645	126,127	11,213		1,305	0
				91%	8%	99%	1%	0%
Lopez [6]	2005	72%	52,390	30,683	6,466		15,231	10
				59%	12%	71%	29%	0%
Mukilteo	2005	63%	23,046	19,567	2,827		618	34
				85%	12%	97%	3%	0%
Orcas	2005	75%	29,894	21,320	6,975		1,558	41
				71%	23%	95%	5%	0%
Point Defiance	2006	99%	37,085	30,167	4,804		2,096	18
				81%	13%	94%	6%	0%
Port Townsend	2006	58%	122,566	92,689	26,433		3,215	223
				76%	22%	97%	3%	0%
Seattle Slip 1			371,862	358,134	10,289		3,438	1
Seattle Slip 2			408,627	300,001	79,816		28,577	233

Terminal	Year Inspected	Life-Cycle Rating Vital	Units Measured	State (Condition Rating) 1	2	1&2	3	4
Seattle Slip 3			29,512	12,687	8,760		5,214	2,851
Seattle POF			23,348	14,880	7,378		1,090	0
Seattle Total	*2005*	*55%*	*833,349*	*685,702*	*106,243*		*38,319*	*3,085*
				82%	13%	95%	5%	0%
Shaw	2005	75%	14,947	13,654	479		408	406
				91%	3%	95%	3%	3%
Southworth	2006	58%	85,049	71,545	9,772		2,460	1,272
				84%	11%	96%	3%	1%
Tahlequah	2006	78%	47,978	37,453	8,627		1,896	2
				78%	18%	96%	4%	0%
Vashon	2006	50%	205,791	119,894	78,460		6,541	894
				58%	38%	96%	3%	0%
WSF Total		73%	2,641,711	2,215,218	325,947		88,755	11,783
				84%	12%	96%	3%	0%

[1] One dolphin listed as State 3, two listed as State 4

[2] States 3 and 4 deficiencies are mainly coal tar epoxy coating deficiencies

[3] State 3 is 95% coal tar epoxy coating failure State 4 includes one dolphin

[4] State 4 includes one dolphin

[5] Four dolphins listed as State 3, one listed as State 4

[6] States 2 and 3 items are almost 100% coal tar epoxy coating failures

3. Preservation Replacement Projects

The preservation projects include replacement or significant additions to six facilities: Anacortes, Bainbridge Island, the Eagle Harbor repair facility, Keystone, Port Townsend and Seattle Colman Dock. For four of these facilities, one or more preservation projects is managed in conjunction with one or more improvement projects. Together with the associated improvement projects, these projects represent 52 percent of the 2005-21 biennia capital budget of $1.2 billion, and include 51 percent of the preservation budget and 54 percent of the improvement budget.

Table 16. Preservation Replacement Projects

($000s)

Preservation Project	Budget 05-21	Improvement Project	Budget 05-21	Total
Anacortes Preservation Terminal Preservation	42,699	Anacortes Multimodal Terminal	59,885	
Catch-up Preservation Project	3,278	Anacortes Upland Parking	75	
		Anacortes Third Slip Overhead Loading	13,920	
		Anacortes Total		*119,857*
Bainbridge Island Terminal Preservation	65,436	Bainbridge Island Trestle Improvement	12,634	
Bainbridge Island Food Service Improvement	310	Bainbridge Island Multimodal Terminal	81,256	
		Bainbridge Island Multimodal Terminal	18,641	

Preservation Project	Budget 05-21	Improvement Project	Budget 05-21	Total
		Bainbridge Island Total		*178,277*
Eagle Harbor Terminal Preservation	37,368			37,368
Keystone Alternative	31,231			31,231
Port Townsend Terminal Preservation	23,865	Port Townsend Ferry Improvement	13,428	37,293
Seattle Terminal Preservation	149,619	Seattle South Trestle Expansion	75,170	
		Seattle SR 519 P52 Access Improvement	37	
		Seattle Interim Retail Development	1,124	
		Seattle Terminal Building Repl-New Retail	2,962	
		Seattle Total		*228,912*
Total	353,806		279,132	632,938
% of budget	51%		54%	52%

a) Replacement projects: non-life-cycle expenses

The preservation replacement project budgets include 64 percent of the terminal related non-life-cycle expenses in the 2005-07 biennium and 75 percent in the 2005-21 biennia (see Table 17). Preservation projects share expenses with associated improvement projects. For example, a property acquisition for $3.75 million on Bainbridge Island was funded by the terminal preservation project ($150,000), the Eagle Harbor repair facility preservation project ($2.0 million), and the Bainbridge Island Multimodal improvement project ($1.6 million). Plans for the property, which lies adjacent to both facilities, have not been developed. The Eagle Harbor repair facility master plan currently does not include use of the property.

In other cases the non-life-cycle expenses are attributable to the fact that the project is very similar to an improvement project. This is particularly striking in the case of the Keystone Alternative project, which includes $13.2 million in site work for the relocated terminal. In the case of the Mukilteo and Edmonds Improvement projects, both of which involve moving terminals a similar distance, these expenses are treated as improvement expenses.

Table 17. Preservation Replacement Projects: Non-Life-Cycle Expenses

($000s)

Project Title/Non-Life-Cycle Expense	05-07 Non-Life	05-21 Non-Life
Anacortes Terminal Preservation		
Property Acquisition	300	4,474
Interim Preservation		300
Total Anacortes Terminal Preservation	*300*	*4,774*
Bainbridge Island Terminal Preservation		
Placeholder Preservation		2,616
Non-life trestle widening mitigation		92
Interim Preservation		3,643

Project Title/Non-Life-Cycle Expense	05-07 Non-Life	05-21 Non-Life
Property Acquisition	150	150
Total Bainbridge Island Terminal Preservation	*150*	*6,501*
Bainbridge Terminal Food Service Improvement	310	310
Eagle Harbor Terminal Preservation		
Mitigation	1,017	1,017
Property Acquisition	2,000	2,000
Total Eagle Harbor Terminal Preservation	*3,017*	*3,017*
Keystone Alternative		
Site work	935	13,210
Port Townsend Terminal Preservation		
Property Acquisition	300	1,100
Placeholder Preservation		2,166
Total Port Townsend Terminal Preservation	*300*	*3,266*
Seattle Terminal Preservation		
Removal of Passenger-Only	2	125
Placeholder Preservation		9,039
Total Seattle Terminal Preservation	*2*	*9,164*
Total	5,014	40,242
% of Terminal Non-Life Preservation Expenses	64%	75%

b) Replacement projects: early life-cycle costs

In the case of Port Townsend, preservation dollars are being used to build new wingwalls, transfer spans, dolphins and other berthing structures on the elongated trestle being built as an improvement project. The Port Townsend preservation project is replacing some structures well in advance of their life-cycle replacement date in order to accommodate the improvement project (i.e., a steel wingwall built in 2005 that is not due for replacement until 2030 is being replaced)[4].

The replacement of structures before their due date to accommodate an improvement project is categorized by WSF as a life-cycle rather than a non-life-cycle expenditure.

c) Replacement projects: master plan expenses

Although not identified separately in the budget, and thus not counted as non-life-cycle costs, some replacement project budgets include expenses for master plans and studies. For example, for the 2005-07 biennium the WSF Construction Program Variance Report

[4] WSF indicates the steel wingwall is on a tie-up slip. "The wood wingwall it replaced was in very poor condition and was kept barely functional by a series of maintenance and emergency contracts in anticipation of eventual full replacement. Meanwhile, the capital funding for full replacement repeatedly was deferred because the fate of the terminal was undecided. Finally, the wingwalls were replaced with steel in 2005 on an emergency contract because their condition was compromising safety and they could no longer be repaired. The Port Townsend wingwalls are of a non-standard design, shorter-lived and less costly, designed and built with salvage in mind." (WSF Dec. 2006)

July 06 for the Seattle terminal projects shows that 93 percent of the $1.8 million in costs incurred for the Seattle Colman Dock Long-Range Plan this biennium through July 2006 have been charged to the preservation project. For the Bainbridge Island Master Plan, 32 percent of the costs have been charged to the preservation project and 68 percent to the Trestle Improvement project. See Table 18, below.

Table 18. Long-Range Plan Expenses – Seattle Colman Dock/Bainbridge Island
2005-07 Biennium
($000s)

PIN	Project	Jul-06	%
900010A	Seattle Terminal Preservation	1,655.2	93%
900010G	Seattle South Trestle Expansion	132.6	7%
	Total Colman Dock Long Range Plan	*1,787.8*	
930513A	Bainbridge Island Trestle Improvement	700.7	68%
930513B	Bainbridge Terminal Preservation	323.2	32%
	Total Bainbridge Terminal Master Planning	*1,023.9*	

d) Replacement projects: budgets

The budgets for preservation projects that are intended to replace systems and structures are based on the life-cycle cost model, with projections for the cost of systems to be replaced expressed in rough-order-of magnitude year-of-expenditure and constant dollars. The rough-order-of-magnitude cost is revised as the project design phase provides more detailed plans, specifications and estimates. By the time the project is ready for advertisement, the cost estimate has evolved from a life-cycle cost factor to an engineering estimate. Once the total project budget is determined it is categorized into preliminary engineering, right-of-way, and construction budgets.

The amount being spent on preservation that affects the life-cycle of structures and systems is overstated in the life-cycle cost model, because it includes expenditures for master planning and other non-life-cycle expenses, which as noted above, can be substantial. Master planning expenses are counted as life-cycle costs and attributed to the preservation of particular structures or systems in the life-cycle cost model budget.

An example of the difference among the life-cycle cost model budget, the program budget and the project budget reporting is shown in Table 19 below for the Seattle Colman Dock terminal. The table shows, on the right-hand side, the budget in the life-cycle cost model distributed by system or structure within the Colman Dock inventory, with a total for preservation of $2.5 million On the left side, the table shows first the program budget as provided to the legislature. This budget is broken down between preliminary engineering and construction expenses. The next section in the table shows the project budget reporting, with actual expenses year-to-date. These expenses are primarily for the Colman Dock master plan.

Table 19. Seattle Colman Dock: Life-Cycle Cost Model Budget Compared to Program Budget and Budget Reporting

2005-07 Biennium

Program Budget: 2006 Legislative Final List WSF Construction		Budget $
PIN 900010A Seattle Terminal Preservation		2,521,000
	Preliminary Engineering	2,296,000
	Construction	225,000
	Total	2,521,000

Project Budget Reporting: Construction Variance Report: Expenditures to Date		Budget $	Expense $ 7/06
PIN 900010A Seattle Terminal Preservation		2,521,000	
006784	Timber Trestle Preservation		61
006924	Seattle Ferry Terminal Coating Repair		19,012
006989	Bainbridge/Seattle Terminal Physical Security Infrastructure		90,007
XL1982	Seattle Slip 2/3 Overhead Loading Maintenance		12,934
XL1987	Colman Dock Long-Range Plan		1,655,209
	Total Expense To Date		1,777,223
	Balance	743,777	

Life-Cycle Cost Model Budget: Description	Budget $
PIN 900010A Seattle Terminal Preservation	2,521,000
SE31 EXIT GATE INSTALLATION	120,000
3877Seattle Systems Security Gates	120,000
SE33 COLMAN DOCK REDEVELOPMENT - PRESERVATION	2,401,000
2836Seattle Trestle Bulkhead, Concrete (Alaskan Way seawall)	15,000
2838Seattle Trestle Riprap	6,000
4601Seattle Bridge NEW Bridge Seat, Steel/Concrete, Slip 2	6,000
4595Seattle Bridge NEW Apron, Hydraulic, Slip 2	5,000
4594Seattle Bridge NEW Apron, Hydraulic, Slip 1	5,000
4607Seattle Bridge NEW Trestle, Steel/Concrete, Center	519,000
4609Seattle Bridge NEW Bulkhead, Steel Sheetpile	15,000
4596Seattle Bridge NEW Apron, Hydraulic, Slip 3	5,000
2817Seattle Bridge Towers (L & R), Pipe Pile/Concrete/Steel,	47,000
2819Seattle Bridge Transfer Span, Girder, Brem S 1	35,000
2825Seattle Bridge Bridge Seat, Concrete, Brem S 1	6,000
2827Seattle Bridge Bridge Seat, Pipe Pile/Concrete, Bain N 3	6,000
2821Seattle Bridge Transfer Span, Girder, Bain N 3	35,000
2820Seattle Bridge Transfer Span, Girder, Aux Ctr 2	35,000
2818Seattle Bridge Towers (L & R), H Pile, Bain N 3	47,000
2816Seattle Bridge Towers (L & R), Pipe Pile/Concrete/Steel	47,000
4608Seattle Bridge NEW Trestle, Steel/Concrete, North	320,000
4590Seattle Dolphin NEW Dolphin, (Placeholder), Double-	48,000
4588Seattle Dolphin NEW Dolphin, Right Outer, Double-Sided,	48,000
4586Seattle Dolphin NEW Dolphin, Right Outer, Double-Sided,	48,000
4589Seattle Dolphin NEW Dolphin, Left Inner, Steel, Slip 3	21,000
4587Seattle Dolphin NEW Dolphin, Right Inner, Steel, Slip 2	21,000
4585Seattle Dolphin NEW Dolphin, (Placeholder), Steel, Slip 1	21,000

2815Seattle Wingwall Wingwalls, Steel, Bain N 3	43,000
2814Seattle Wingwall Wingwalls, Steel, Aux Ctr 2	43,000
2813Seattle Wingwall Wingwalls, Steel, Brem S 1	43,000
4621Seattle OHL NEW Walkway Foundations/Columns	10,000
4617Seattle OHL NEW Cab, Steel, Fully Enclosed	51,000
4611Seattle OHL NEW Cab, Steel, Fully Enclosed	51,000
Life-Cycle Cost Model Budget	Budget
4616Seattle OHL NEW Elevator Tower, Steel/Concrete	48,000
4610Seattle OHL NEW Elevator Tower, Steel/Concrete	48,000
4613Seattle OHL NEW Transfer Span, Steel Fully Enclosed	18,000
4615Seattle OHL NEW Walkway Foundations/Columns	10,000
4620Seattle OHL NEW Walkway, Steel, Fully Enclosed	4,000
4614Seattle OHL NEW Walkway, Steel, Fully Enclosed	4,000
4618Seattle OHL NEW Apron, Aluminum, Hydraulic	9,000
4619Seattle OHL NEW Transfer Span, Steel, Fully Enclosed	18,000
4612Seattle OHL NEW Apron, Aluminum, Hydraulic	9,000
2882Seattle Terminal Agent's Office	13,000
2881Seattle Terminal Main Terminal Building	504,000
4653Seattle Paved Ar NEW Pavement on New Concrete Trestle	5,000
2866Seattle Paved Ar Pavement on Retained Fill	1,000
2877Seattle Systems Sewer	6,000
2878Seattle Systems Signage	6,000
2880Seattle Systems HVAC	6,000
2869Seattle Systems Cathodic Protection (nonfunctional)	6,000
2867Seattle Systems Power	26,000
2875Seattle Systems Storm Drainage	13,000
2870Seattle Systems Vessel Backfeed	6,000
2868Seattle Systems Lighting	13,000
2879Seattle Systems Fire Protection	6,000
2872Seattle Systems Communications	6,000
2876Seattle Systems Water Supply	6,000
2871Seattle Systems Backup Generator	6,000
3661Seattle Non-Life Passenger-Only Facility Removal	2,000

e) Replacement projects: Long-Range Strategic Plan

As will be discussed further below regarding improvement projects, the scope of the replacement projects is reliant on the projections on ridership from the draft Long-Range Strategic Plan. As noted in Section 2.B.(1), replacement of assets can add capacity to meet service requirements. For the terminal replacement projections, a key planning consideration is adding capacity to meet projected ridership.

An example is the case of the Keystone Alternative project, which is intended to "maintain existing service and accommodate future growth on the Keystone-Port Townsend route" (WSF Keystone Project Scoping Outreach and Comment Summary, p. 1). A Keystone Harbor Study was completed in January 2005, which identified four alternatives:

1. Relocate the jetty 300 feet to the east and widen the harbor to the east to accommodate a larger vessel with capacity between 124 and 144 cars;
2. Extend the jetty 600 feet into the water and widen the harbor to the west to accommodate a larger vessel between 124 and 144 cards;
3. Use the existing harbor, and acquire new, unique vessels with a special propulsion system that would allow them to operate in the existing Keystone Harbor; or
4. Use the existing harbor and terminal, and acquire new vessels that are similar in size to the existing vessels, approximately 65-car capacity.

In conducting the analysis of these four alternatives, the Keystone Harbor Study concluded that option four, using the existing harbor and acquiring new vessels the size of the current ones, would have the highest total life-cycle costs because "the additional cost of a third vessel on the route, and the fact that the costs cannot be shared with the rest of the system" (p. 2). Both of these assumptions are reliant on the forecasts of ridership. It is assumed that given ridership projections, "the Keystone Special vessel would have no utility elsewhere in the system, as its size and speed would not meet service schedules and capacity needs on any other route beyond 2010" (p. 20). The study also states that: "During the period FY 2011 through FY 2017, there will be travel demand for two (Keystone Special) vessels in the summer and one vessel in the winter. . . . . During the period FY 2018 through FY 2041, there will be travel demand for three vessels in the summer and two in the winter" (Keystone Ferry Terminal Study Cost Analysis of Alternate Courses of Action, p. 11). If these two assumptions related to ridership increases are not realized, the total life-cycle cost of the Keystone Special vessel would be less than the other three alternatives.

f) Replacement projects: community costs

As will be discussed with the improvement projects, WSF can experience difficulties with local communities in expanding its facilities. As part of the Eagle Harbor repair facility preservation project, WSF has developed a master plan for the facility. This plan has generated considerable local concern and opposition from the City of Bainbridge Island. The project is currently delayed as WSF is appealing the City's attempt to assume lead agency status for the State Environmental Protection Act (SEPA) review. The

preservation program includes $870,900 for Shoreline Substantial Development Permit mitigation measures.

Table 20. Eagle Harbor Repair Facility: Shoreline Substantial Development Permit Mitigation

Mitigation Measure	Budget
North fence with signs	28,600
Fencing	40,500
Pedestrian lighting	66,000
Physical security	300,000
Landscaping	23,800
Screen wall	393,000
Trail	19,000
Total	870,900

4. Systemwide Preservation Projects

The preservation program includes twenty-three systemwide preservation projects with budgets totaling $24 million for the 2005-07 biennium and $122.4 million for the 2005-21 biennia. The systemwide preservation projects are all for non-life-cycle costs, and include the following types of projects:

- terminal miscellaneous (23% of the 2005-07 biennium systemwide preservation budget/39% 2005-21biennia);
- security (36% and 21%);
- point of sale (15% and 4%); and
- administrative projects (20% and 31%).

There are no equivalent administrative or overhead expense projects for the terminal improvement budget. This means that all such costs are attributed by WSF to the preservation program.

a) Systemwide miscellaneous terminal project

The systemwide miscellaneous terminal project has a budget of $5.6 million for the 2005-07 biennium (23 percent of systemwide project budgets) and $48.2 million for the 2005-21 biennia, 39 percent of the budget. Table 21 details the items included in the miscellaneous terminal project, their cost and the percent that each items represents of the miscellaneous terminal project budget.

Table 21. Systemwide Miscellaneous Terminal Project
PIN 989920X
$000s)

Item	05-07	%	05-21	%
SW20a Bridge Inspections/Dive Inspections	486	9%	5,272	11%
SW20b Scour Monitoring	149	3%	1,603	3%
SW20c Mechanical/Electrical Inspections and Preservation	598	11%	5,889	12%
SW21 Life-Cycle Preservation Management	264	5%	2,838	6%
SW22 Project Controls/Life-Cycle Preservation Management	880	16%	9,460	20%

Item	05-07	%	05-21	%
SW23 Systemwide Environmental Support	375	7%	3,769	8%
SW25 Library	74	1%	744	2%
SW26 Load Restrictions	37	1%	366	1%
SW31 Imaging Support	70	1%	1,039	2%
SW37 Systemwide Budgeting	346	6%	3,777	8%
SW38 Systemwide Long-Range Scoping	346	6%	3,772	8%
SW44 Basemaps	143	3%	532	1%
SW45 Administrative Tasks	98	2%	1,165	2%
SW 47 Work Order Task Management	96	2%	951	2%
SW49 Signing	27	0%	267	1%
SW50 Training	161	3%	1,616	3%
SW51 Attorney General Support	141	3%	1,596	3%
SW52 General Administration Purchasing Administrative Fees	27	0%	267	1%
SW54 Hydraulic Vulnerability Study	1,100	20%	1,100	2%
SW57 Terminal Property Management	47	1%	339	1%
SW67 Forecast Estimating	161	3%	1,873	4%
Total	5,626		48,235	
% of Systemwide Budget	23%		39%	

b) Systemwide security and emergency management projects

Systemwide security and emergency management projects include the Systemwide Emergency Management Communication, Terminal Physical Security Infrastructure, and Terminal Physical Security Planning projects. These projects total $8.7 million for the 2005-07 biennium (36 percent of the total systemwide budget), and $25.4 million for the 2005-21 biennia (21 percent). See Table 22.

Table 22. Systemwide Security & Emergency Management Projects

($000s)

PIN	Systemwide Project	05-07	05-21
989930E	Systemwide Emergency Management Communications	240	1,505
989930B	Systemwide Terminal Physical Security Infrastructure	7,894	21,661
989930G	Systemwide Terminal Physical Security Planning	550	2,254
	Total	8,684	25,420
	% of Systemwide Budget	36%	21%

c) Systemwide point-of-sale and revenue control projects

Systemwide point-of-sale and revenue control projects include the Point-of-Sale/Regional Fare and Revenue Control System projects. These projects total $3.6 million or 15 percent of the 2005-07 biennium systemwide budget, and $4.8 million or 4 percent of the 2005-21 biennia systemwide budget. See Table 23.

Table 23. Systemwide Point-of-Sale and Revenue Control Projects

($000s)

PIN	Systemwide Project	05-07	05-21
966640Q	Systemwide Point-of-Sale Repl/Regional Fare	3,492	3,492
9666401	Systemwide Revenue Control System	107	1,313
	Total	3,599	4,805
	% of Systemwide Budget	15%	4%

The point-of-sale project does not include $1.2 million in the 2005-07 biennium preservation budget to provide individual terminals with emergency generators to back up the point-of-sale system. See Table 24.

Table 24. Emergency Generators – Terminal Preservation Project Budgets

($000s)

Project	05-07
Fauntleroy	100
Kingston	437
Orcas	517
Point Defiance	100
Shaw	58
Total	1,212

d) Systemwide administrative projects

Systemwide administrative projects include Operations Construction Support, Planning and Special Studies, Server Infrastructure, Safety Management System Enhancements, Terminal Design, Terminal Phone System Replacement, Terminal Planning/Design, WSF Staff Relocation, and Terminal Communications (IT) projects. These projects total $4.8 million, or 20 percent of the systemwide budget for the 2005-07 biennium, and $37.4 million, or 31 percent for the 2005-21 biennia.

Table 25. Systemwide Projects

($000s)

PIN	Systemwide Project	05-07	05-21
966620E	Systemwide Operations Construction Support	1,323	12,422
977731A	Systemwide Planning and Special Studies	1,367	14,105
989930A	Systemwide Server Infrastructure	125	1,102
989930D	Systemwide SMS Enhancements	725	1,950
966640F	Systemwide Terminal Design Standards	234	2,089
966650A	Systemwide Terminal Phone System Replacement	200	988
999940C	Systemwide Terminal Planning/Design	326	3,183
966650B	Systemwide WSF Staff Relocation	300	300
966650C	Systemwide Terminal Communications (IT)	160	1,284
	Total	4,760	37,423
	% of Systemwide Budget	20%	31%

5. Catch-up Preservation Project

The Nickel package includes a catch-up preservation project of $38.2 million for the 2005-07 through 2011-13 biennia, when the project will be complete. The project is intended to assist WSF in catching-up to its preservation goal of having 90 to 100 percent of vital systems operating within their life-cycle by 2015 and 60 to 80 percent of non-vital systems. The 2005-07 biennium catch-up preservation budget is $7.5 million. See Table 26, below.

Projects are programmed at the Anacortes, Bremerton, Kingston, Lopez, Orcas, Point Defiance, Shaw, Tahlequah, and Vashon terminals. However, as WSF has done since the creation of the project in 2003, the projects may shift to other preservation projects "if more pressing preservation needs emerge" (Project Detail Report Catch-Up Preservation, LEAP 2007, Version 2007-3). The budget at these terminals includes interim preservation and retrofit projects that do not affect the life-cycle of the structures and are essentially maintenance projects. These are noted as non-life-cycle in the WSF system and constitute 17 percent of the 2005-07 biennium catch-up preservation budget and 11 percent of the FY 2005-13 budget.

Table 26. Catch-Up Preservation Nickel Project

($000s)

Catch-Up Preservation Project Detail	05-07	05-13
ANO6 Anacortes Dolphin Replacement Phase 2	2,943	2,943
AN34 Apron Replacement Slip 1		335
Total Anacortes	*2,943*	*3,278*
BR03 Bremerton Slip 1 Dolphins		2,909
BR10 Bremerton Slip 2 Dolphins		4,656
BR18 Bremerton Apron Replacement Slip 1		291
Total Bremerton		*7,856*
KI13 Kingston Phase 3 Dolphin Replacement		3,841
LO02 Lopez Dolphin Replacement	3,279	3,279
LO03 Lopez Interim Terminal Preservation *		313
LO11 Lopez Apron Replacement		378
Total Lopez	*3,279,000*	*3,970*
OR02 Orcas Dolphin Replacement		4,944
PD08 Point Defiance Apron Replacement		306
SH04 Shaw Dolphin Replacement		2,016
TA05 Tahlequah Transfer Span Retrofit *	1,243	1,243
VA03 Vashon Dolphin Replacement		8,074
VA07 Vashon Transfer Span Retrofit *		2,671
Total Vashon		*10,745*
Total	7,465	38,199
Non-Life Budget	1,243	4,277
% Non-Life	17%	11%

* Non-life-cycle expenses

B. Improvement Projects

There are 24 terminal improvement projects with a budget of $63.4 million in the 2005-07 biennium and $516.3 million in the 2005-21 biennia. The improvement budget is primarily devoted to the Anacortes, Bainbridge Island, Edmonds, Mukilteo and Seattle terminals. Ninety-five percent of the 2005-07 biennium budget, and 88 percent of the 2005-21 biennia budget, is for projects at these terminals. See Table 27.

Table 27. Terminal Improvement Projects

($000s)

PIN	Project Title	05-07	%	05-21	%
902019U	Anacortes Multimodal Terminal	27,526		59,885	
902019X	Anacortes Upland Parking Improvement	75		75	
902019Y	Anacortes Third Slip Overhead Loading			13,920	
	Anacortes Total	*27,601*	*44%*	*73,880*	*14%*
930513A	Bainbridge Island Trestle Improvement	10,332		12,634	
930513E	Bainbridge Island Multimodal Terminal Improvement			81,256	
930513C	Bainbridge Island Terminal Multimodal Improvement			18,641	
	Bainbridge Island Total	*10,332*	*16%*	*112,531*	*22%*
952616I	Clinton Overhead Loading	0	0%	28,618	6%
910413M	Edmonds Multimodal Terminal	1,500	2%	57,607	11%
900028R	Friday Harbor Master Plan	250		250	
900028S	Friday Harbor Additional Holding Area	150		750	
	Friday Harbor Total	*400*	*1%*	*1,000*	*0%*
910414R	Kingston Site Planning Study			260	0%
900022H	Lopez Additional Parking Improvement			1,189	0%
952515J	Mukilteo Multimodal Terminal	4,279		12,649	
952515K	Mukilteo Multimodal Terminal	10,249		118,224	
	Mukilteo Total	*14,528*	*23%*	*130,873*	*25%*
900026M	Orcas Upland Property Purchase	50	0%	50	0%
900012G	Port Townsend Ferry Terminal Improvements			13,428	3%
900010I	Seattle South Trestle Expansion	5,294		75,170	
151902F	Seattle SR 519 P52 Access Improvements	37		37	
900010H	Seattle Interim Retail Development	1,124		1,124	
900010G	Seattle Terminal Building Repl.- New Retail	67		2,962	
	Seattle Total	*6,522*	*10%*	*79,293*	*15%*
916008Q	Southworth Second Slip	2,150		5,000	
916008P	Southworth Trestle Improvements			10,371	
	Southworth Total	*2,150*	*3%*	*15,371*	*3%*
977740A	Systemwide WSF Business Initiatives	250		2,111	
900030C	Systemwide Sidney Terminal Cruise Ship	110		110	
	Systemwide Total	*360*	*1%*	*2,221*	*0%*
	Total	63,443		516,321	

All the facility-specific improvement projects, except Edmonds and Mukilteo, have corresponding preservation projects.

1. Draft Long-Range Strategic Plan 2006-2030

As discussed in Section 2.C., WSF uses its long-range strategic plan to determine the need for improvement investments that increase capacity. WSF's improvement program is based on the premise that operations and demand for ferry service drive fleet size and deployment. Fleet size and deployment in turn drive terminal shoreside infrastructure. The Draft Long-Range Strategic Plan provides a ridership forecast and a fleet deployment and terminal improvement plan to accommodate the projected ridership. (See *Washington State Ferries Financing Study Technical Appendix 1: Review of Studies and Reports,* for a summary of the Draft Long-Range Strategic Plan.)

The terminal improvement projects are based on the projections of ridership and service plans in the Draft Long-Range Strategic Plan. For example, the Bainbridge Island projects will result in a much larger terminal building and vehicle holding area to accommodate "ridership . . . projected to grow to 11.5 million by 2030" (www.wsdot.wa.gov/projects/ferries/bainbridgeterminalMPU).

The Seattle Colman Dock master plan anticipates the addition of a fourth slip to accommodate the Draft Long-Range Strategic Plan's proposed new Southworth to Seattle route, and enlargements of the terminal building and holding areas to accommodate projected ridership. "According to WSF's 2006 Draft Long-Range Strategic Plan, ridership on the Bainbridge Island and Bremerton routes will double over the next 25 years and walk-on passengers will triple by 2030, primarily during the peak afternoon commuting times. Vehicle service is projected to double by 2030, primarily in the non-peak periods when there is vehicle capacity to accommodate growth" (The Seattle Ferry Terminal Project At Colman Dock Scoping Outreach and Comment Summary, p. 1).

a) Flexibility in terminal plans

The draft Long-Range Strategic Plan includes a staggered approach to increasing the capacity of the fleet.

> "While the plan was designed as WSF's best means of accommodating the projected future growth in ridership, this growth reflects changes in demographics and regional travel patterns that may or may not come to be. . . .In recognition of that fact, the plan has been designed to be flexible – equipped to handle as much of the projected growth as possible, but capable of being scaled back to avoid over investment if that growth does not materialize. Flexibility is possible because the vessels scheduled for purchase in the first and third decades of the planning period will primarily replace retiring vessels, while the majority of vessels needed for expansion are not scheduled until the second decade. This schedule will allow WSF to observe real ridership growth until a decision point in 2010 before deciding what service enhancements are really necessary" (p. 45).

Unlike the vessels, the terminal improvement projects have limited flexibility; they are being planned for the projected ridership with large capital infrastructure investments that are not intended in most cases to be phased with actual ridership but rather with funding availability. As an example, in the Keystone Harbor Study discussed above, the ridership

projection past 2010 is driving the selection of the vessel type for the Keystone-Port Townsend route, which is in turn driving the Keystone terminal configuration. The cost-benefit analysis in the study assumes that a third Keystone Special vessel would be needed on that route to support the ridership demand in 2018, and that after 2010 a smaller vessel could not meet projected ridership demand on any other route, so costs of the vessel cannot be spread over other routes. If a Keystone alternative is selected to accommodate the larger vessels, there will be no flexibility to modify it if ridership does not meet the projected levels.

On the other side of the route, the Port Townsend Improvement project with a budget of $13.4 million will increase the vehicle holding capacity from 210 cars to 310 – a 48 percent increase. This expansion is based on the Strategic Plan's projected 43 percent increase in vehicles on this route between 2005 and 2030 (Draft Long-Range Strategic Plan, p. 42). The project will extend the trestle 180 feet further over the water in order to create waiting space for 90 more vehicles for a total of 190 at the terminal. The other 120 spaces will continue to be on the road and at a new remote holding area that will accommodate the same number of vehicles as the current remote holding area.[5] There is no flexibility once the trestle is expanded. If an option were developed to create more off-site holding area parking rather than expanding the trestle, then the holding area could expand or not as ridership actually materializes.

It should be noted that the trestle expansion will also allow the Port Townsend terminal to accept the larger vessels being considered for the route. The Keystone Alternative Study did not take into account modifications required on the Port Townsend route. The trestle expansion project will require additional dredging and different outer dolphins if larger vessels are selected (Quarterly Report Sept. 2006).

Some of the projects could be phased with ridership. The September 2006 quarterly report for the Edmonds terminal indicates that the third pier would be added later based on actual ridership.

b) Vehicle holding

The increase in capacity of the system is primarily driven by the projected increases in vehicular demand. "Most of the pressure to expand services is coming from the growth in vehicles. Under currently programmed service, all but three routes are projected to exceed their vehicle service standards by 2030 and there are passenger service challenges on the Seattle-Bainbridge Island route" (Draft Long-Range Strategic Plan, pp. 68 and iv).

Although the number of tolling booths and other elements are being enlarged to accommodate the projected increase in vehicular use, the primary impact on the terminals is on the size of the vehicle holding areas, many of which are on trestles over water,

[5] The quarterly report Sept. 2006 indicates that the number of vehicles to be accommodated at the expanded terminal is 190, plus 90 in the removed holding area. The map on the project Web site indicates that the expanded terminal will accommodate 170 cars and the remote holding area 80.

which are expensive to construct and to maintain. WSF operates under a first-come-first-served policy, with reservations available only on the Sidney international route. This means that people drive their cars to the ferry early in order to wait for the ferry and must be accommodated in holding areas before the ferry arrives and, if it is full, until the next one arrives. (See *Washington State Ferries Financing Study Technical Appendix 1: Review of Studies and Reports*, for a review of vehicle wait information in WSF's origin and destination studies.)

The level of service standard (LOS) for vehicles in the Draft Long-Range Strategic Plan is expressed as boat waits, except for the San Juan Island routes where the level of service standard is expressed as percentage of daily capacity. Outside of the San Juans, the level of service standard is a one-boat wait, except for Bainbridge and Mukilteo, where it is a two-boat wait because service is more frequent than on the one-boat wait routes.

The design guidelines used for terminal improvement and replacement projects is based on a different level of service standard, characterized by the minutes of delay for a vehicle on the approach roadways prior to passing the tollbooth. "WSF characterizes the desired Level of Service A for vehicle passengers as allowing them to turn their car off in the holding area and have no vehicles idling on the approach roadways. There is a four-minute difference between each LOS A, B, C, D, E and F. . . . [E]ach drop in level of service (B-F) represents a four-minute delay for a vehicle on the approach roadways prior to passing the tollbooth" (Bainbridge Community Advisory Group Meeting Summary, March 22, 2006, p. 6).

Sizing of the vehicle holding areas is determined under these guidelines by the most onerous of the following four criteria:

1. LOS A for the median day of the year and number of vehicles on that occurrence during the peak use period.
2. Projected number of vehicles during a four-hour peak period.
3. Meeting LOS C for 30th day of highest ridership.
4. Meeting LOS E on the 10th day of highest ridership.

(Bainbridge Community Advisory Group Meeting Summary, March 22, 2006, pp. 5-6)

This design guideline has resulted in larger vehicle holding areas than under boat wait scenarios. At Bainbridge Island the 1998 master plan included a 330-vehicle holding area that would accommodate 1.5 boat loads of cars. The plan currently being developed calls for 575 spaces in the holding area to accommodate the needs of vehicles on the median day of the year. The vehicle holding areas being planned at four of the new terminals are shown below. Only Mukilteo is consistent with the number required to meet the boat-wait level of service.

Table 28. Vehicle Holding Areas

	Plan - LOS	Terminal Plan	Boat-Loads	
Bainbridge Island*	2 boat	575	2.64	Trestle
Edmonds**	1 boat	820	6.31	Land
Mukilteo**	2 boat	260	2.00	Land
Port Townsend ***	1 boat	190	1.44 -3.85	Trestle
		90		Remote

* 218 vehicle capacity vessel
** 130 vehicle capacity vessel
*** 144 vehicle capacity/65 vehicle capacity

c) Walk-on facilities

Although the growth in service levels and corresponding capital investments are primarily driven by the projected increase in vehicular demand, the Draft Long-Range Strategic Plan anticipates a larger percentage increase in walk-on passengers, especially during commute periods. "Commuter-period walk-ons are expected to grow at a much faster rate than all other ridership segments" (Draft Long-Range Strategic Plan, p. 16).

The level of service standard for walk on passengers is a zero boat-wait throughout the system, which means that passenger service is planned on a "peak of the peak" basis, i.e., for the most congested sailing of the day.

The terminal buildings are also being sized to accommodate anticipated increases in ridership and are based on the most congested sailing of the day. The consultants asked each of the project managers for these terminals what throughput they were using to plan the size of new terminal buildings. Each indicated that planning was to accommodate the peak level of ridership.

As an example, the new Anacortes terminal building will increase from 5,200 square feet to 31,000 square feet. The ridership projection in the Draft Long-Range Strategic Plan shows that for the Anacortes based routes to the San Juans and Sidney, there is a substantial summer peak. Winter ridership falls to a weekday average of 412 passengers and 516 vehicles in 2006, growing to 811 and 819 in 2030, under the draft plan levels of service.

Table 29. Anacortes Route Ridership:
Draft Long-Range Strategic Planned Service

	2006		2030	
	Vehicles	Passengers	Vehicles	Passengers
% Spring	21%	17%	21%	16%
Average Weekday	748	721	1,187	1,417
Average Weekend	1,177	3,611	1,867	5,913
% Summer	43%	57%	43%	58%
Average Weekday	1,724	4,250	2,735	8,352
Average Weekend	1,819	7,622	2,885	12,480

	2006		2030	
	Vehicles	Passengers	Vehicles	Passengers
% Fall	21%	17%	21%	16%
Average Weekday	748	721	1,187	1,417
Average Weekend	1,264	3,548	2,005	5,809
% Winter	15%	10%	14%	9%
Average Weekday	516	412	819	811
Average Weekend	919	2,291	1,458	3,751

Table 30 details the space planning for the new terminal. At 31,000 square feet with 7,400 square feet of interior passenger waiting area and 3,000 square feet of concession space, the terminal is likely to be under-utilized much of the year. It should be noted that the growth in size of the Anacortes terminal building is not solely to accommodate waiting passengers. Part of the increase is to provide additional administrative and concession space to meet business goals.

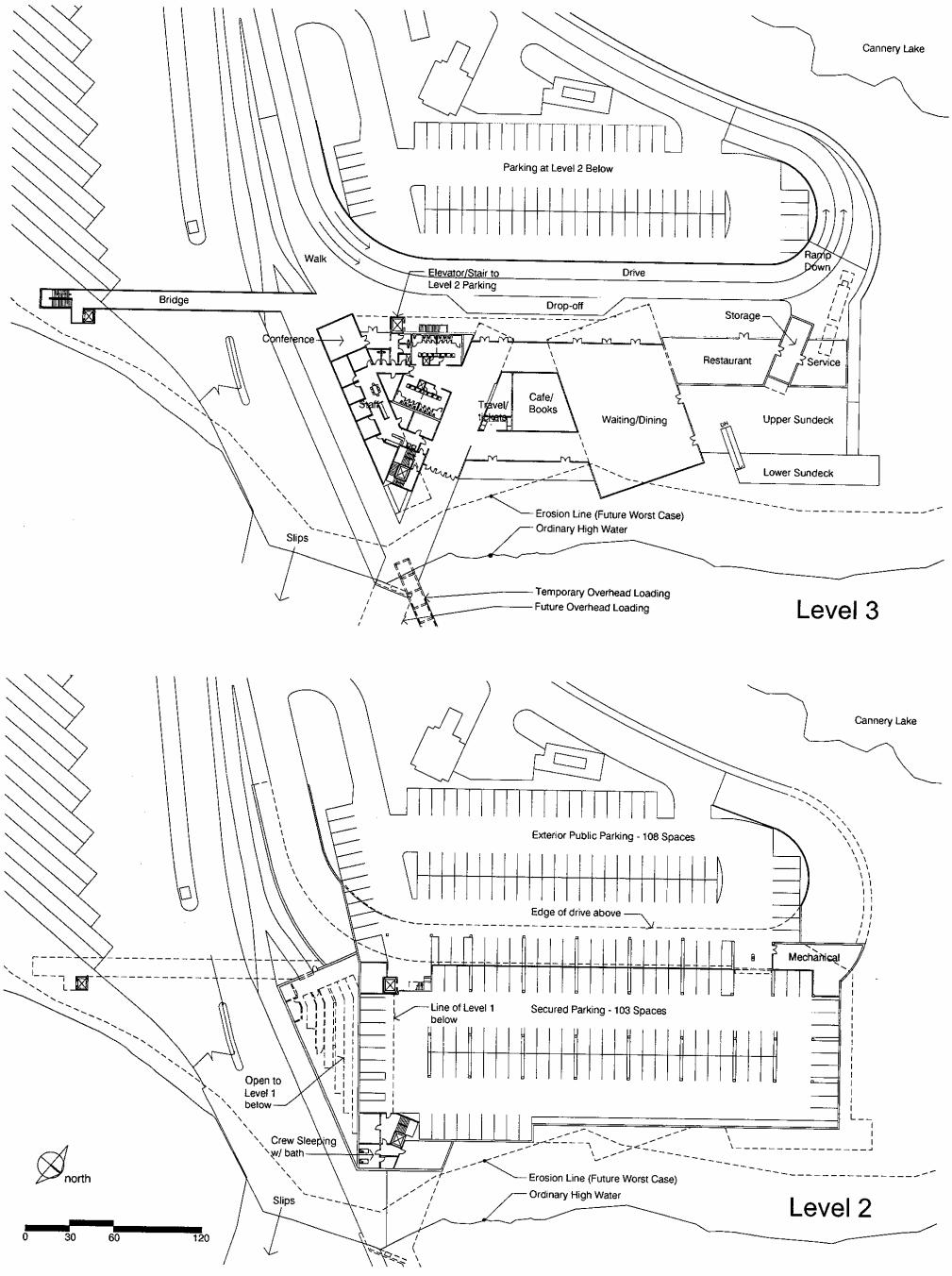
Table 30. Anacortes New Terminal Building Plan

		Area (sq. ft.)	
Terminal Building	Count	New	Existing
Parking Places Employees Underground	103		
Public Parking Exterior	108		
Waiting Area Interior		7,400	
Waiting Area Exterior		7,000	
Administrative		1,800	
Concessions		3,000	
Amenities		2,200	
Storage		2,600	
Kayak holding area		3,000	
Food-related		4,000	
Total	211	31,000	5,200

Source: WSF

The Anacortes terminal, which is under design, is elevated to provide handicapped access to the pedestrian bridge, which has enabled the creation of underground, secured parking for employees. See Figure 4 on the next page for the plan for the new terminal.

Figure 4. Anacortes Terminal Plan



2. Life-Cycle Costs

WSF has not done life-cycle costing for all of the proposed terminal improvement or replacement projects, with total operating, maintenance and preservation costs projected over the life of the terminal.

a) Operating costs

Operating costs of the new terminals will be higher than for the current smaller terminals. The Draft Long-Range Strategic Plan includes assumptions about increases in operating costs. Because the Draft Long-Range Strategic Plan does not provide detailed information about the operating costs, it is not clear to what extent those assumptions are in line with the terminal plans. (See p. 51 of the Draft Long-Range Strategic Plan for discussion of operating and maintenance costs.)

Operating costs bear directly on the route and system's farebox recovery rate. In the case of the Edmonds terminal, the Edmonds-Kingston route has a high farebox recovery, with fares more than covering route operating costs. The recovery rates were 121 percent in 2003 and 108 percent in 2005. These percentages may change if the new terminal at Edmonds is constructed. The Environmental Impact Statement (EIS) for the Edmonds project shows that the total operating cost for phase one of the preferred alternative would be $4.5 million, and for phase two, $4.7 million. (See Table 31.) By comparison the 2003 route summary statement shows the operating cost for both the Edmonds and the Kingston terminals at $4.5 million. For phase two WSF indicates it should be able to share some of the operating costs with other affected agencies such as Sound Transit, Amtrak and Community Transit, although agreement on the cost allocation has not been reached.

Table 31. Edmonds Annual Operation & Maintenance Costs

(2003 dollars, 000s)

	Operation	Maintenance	Total
Phase I Ferry terminal and holding area	3,567	941	4,508
Phase II Multimodal center, holding area, parking garage	3,179	1,489	4,668
Route Summary - Both Kingston-Edmonds terminals	3,768	749	4,517

Source: Edmonds Crossing Final EIS, p. 5-2

b) Terminal preservation

The preservation costs of the new terminals have not yet been estimated, although the terminal life-cycle cost model anticipates adding the new structures and systems when they are constructed. A life-cycle cost of the terminal improvement projects would provide an assessment of the long-term preservation costs of these expansions.

3. Cost-Benefit Analysis

WSF has not undertaken an analysis of operating changes that might reduce capital investments, such as a modification to the first-come-first-served loading policy. They have also not considered tariff policy and level of service standard adjustments as ways to manage demand. "One way to reduce the demand for expanded ferry services would be

to relax the Commission congestion standards for vehicles. Not only would this push service triggers further into the future, but it would also increase congestion and possibly lead to higher levels of walk-on traffic. . . . An option that would reduce the demand for vehicles and possibly improve the mode shift on ferry routes would be to make vehicle fares relatively more costly than passenger fares over time" (Draft Long-Range Strategic Plan, p. 69). A cost-benefit analysis on operating and policy adjustments versus the proposed improvement projects has not been conducted.

At the project level WSF does not engage in systematic cost-benefit analysis of tradeoffs. In some cases, as with the Keystone Harbor Study, WSF conducts a thorough cost-benefit analysis in which it is possible to understand the assumptions and look at the tradeoffs in capital, operating, and preservation costs among the alternatives.

In other cases individual project managers may undertake partial cost-benefit analysis. For instance, the Port Townsend project management team has examined the capital cost difference between off-site and overwater vehicle holding stalls, which shows that overwater holding areas are three times as expensive as upland holding areas. WSF is recommending the overwater option based on operational efficiencies, but has not yet conducted a cost-benefit analysis of the options.

Table 32. Port Townsend
Cost Comparison of Overwater vs. Upland Holding

	$/sf	sf/stall	$/stall
Overwater - trestle construction	$120	200	$24,000
Upland - land acquisition	$20	200	$4,000
Upland-grading & paving	$20	200	$4,000
Total Upland			*$8,000*

Source: WSF

4. Ancillary Revenues

Ancillary revenues from concessions and leases at terminals help improve WSF's operating income and are part of the revenue calculation in determining farebox recovery. In some of the terminal projects, WSF is allocating additional space for concessions in anticipation of additional operating revenue. WSF's analysis also includes the period in which anticipated revenues would pay back the initial capital investment.

WSF has conducted an analysis of potential concession income at the new Anacortes terminal. This analysis shows the risks inherent in building concession space. A June 2004 Anacortes Concession Plan projected concession sizing and revenues using 2003 as a base and growth projections from the Anacortes master plan prepared in 1996. It shows a payback period of 14.4 to 18.7 years of initial capital costs based on different level of sales per departing passenger (SDP), with SDP ranging from $1.59 to $2.06 under the different scenarios. This analysis, which updates a study done with the 1996 Anacortes master plan, shows more risk for WSF than originally anticipated.

"All of the options show a much greater risk to WSF than originally projected. The decrease from the original passenger traffic projections and the lower market penetration during the off season combined to result in insufficient gross sales to keep all (retail) concepts operational year round. This significantly reduces the projected income stream. . . . This analysis doesn't reflect additional risk factors which should be considered when determining a final design for the Anacortes terminal. It will be difficult to attract experienced operators to a terminal which only allows them seasonal operations. In order to incent potential tenants, WSF might have to reduce its anticipated percentage rent of 9 percent, further reducing WSF revenues and prolonging any payback period" (WSF - Anacortes Concession Plan Update).

5. Improvement Project Phasing/Financing

The terminal improvement projects are not being planned, as are the vessel acquisitions, to be flexible according to actual ridership. Most of the terminal improvement projects are, however, phased for funding reasons with current programmed dollars insufficient to complete the projects.

The largest project at Seattle's Colman Dock has a total budget, including the preservation project, of $228.9 million in the 2005-21 biennia. The project is at a master planning stage, with cost estimates for the total project very preliminary. Interviews with the project manager indicate that since the budget was developed, several additions have been made to the project. These include building to the silver Leadership in Energy and Environmental Design (LEED) standard, tribal mitigation, purchase of Pier 48, cost escalation factors, and the requirement for a 1,500-car holding area to meet the new standard for sizing holding areas (see discussion above) and the proposed Southworth Seattle service. The current preliminary estimate is $275 million for the project. WSF is pursuing additional federal funds for the project and examining ways to keep the budget at the current figure.

The Edmonds terminal is being phased, with the first phase including two of three planned slips, a vehicle holding area for 600 vehicles, passenger overhead loading, and grade separation between ferry and rail traffic. The quarterly project report for September 2006 notes: "At this time, existing State and partnership funding will not complete the initial phase of construction. An additional $37 million is needed to complete the first phase of the project; $65 million more will complete the final phase of terminal construction" (Quarterly Project Report, Sept. 06, p. 1). The Edmonds terminal is on the current list of projects under consideration by the Regional Transportation Improvement District (RTID) for $123.4 million. The final RTID package, to be submitted to the voters in November 2007, may or may not include funding for this project. The Edmonds terminal is also under consideration for the companion Sound Transit 2 package, which at this point includes $50.2 to $57.8 million to move the interim Sounder station in Edmonds to the new terminal location and expand parking for Sounder riders. The final Sound Transit 2 package, to be submitted to the voters in November 2007, may or may not include funding for this project.

The Mukilteo terminal is also being phased. As indicated in the Draft EIS, "Because of the estimated costs associated with full buildout of the multimodal facility and current funding limitations, the actual implementation of the project may be phased over time. The initial phase of development would include all road improvements, the waterfront promenade, ferry terminal building, and holding facility. Construction of the parking garage is the major component that could be deferred beyond the 2010 opening year. . . . Construction of the second slip could also be deferred beyond 2010 under the Compact Terminal Alternative" (Draft Mukilteo Multimodal Ferry Terminal EIS, February 2006, p. 3). Funding is included in the current Sound Transit 2 funding package for the parking garage at Mukilteo for $12.1 to $13.9 million. The final Sound Transit 2 package, to be submitted to the voters in November 2007, may or may not include funding for this project.

6. Community Costs/Concerns

As with the preservation projects, local community requirements are impacting ferry terminal planning and costs. The driving force for the Edmonds terminal relocation has been community concerns about the traffic impact of the terminal on adjacent streets. "[T]he City of Edmonds is soliciting for the Edmonds Crossing Design consultant contract and is the lead coordinating agency and project proponent on grant and legislative actions" (Letter August 22, 2006, WSF to City of Edmonds).

The City of Seattle has expressed reservations about the direction of planning for the Colman Dock. Similar to Edmonds, the City of Seattle is concerned about the amount of traffic on city streets. The City's comments on notice of scoping for the Seattle terminal EIS, noted that for the traffic analysis "All alternatives should include a transportation demand management component with the objective of accommodating planned growth while potentially reducing the need for expensive capital facility investments by effectively managing demand for the facility. This plan should include pricing, methods to shift modes and methods to shift peak travel to off-peak travel" (City of Seattle Letter, May 19, 2006, p. 9).

It should also be noted that for the Bainbridge terminal project and others WSF has conducted considerable community outreach, working closely with local communities to identify issues of concerns and address them early in the design of the project.

7. Joint Use Transit Facilities

One of WSF's priorities is to develop multimodal terminals that encourage walk-on ridership by providing easy access to connecting transit options. These range from bus transit facilities to connections to Sound Transit rail services at Edmonds and Mukilteo. The costs for these joint use transit facilities are being borne by WSF. Legislators and members of the Ferry Finance Advisory Committee are concerned about the costs being borne by WSF that should perhaps be shared with other transit agencies.

Section Four
Recommendations

After reviewing the WSF capital prioritization process and the terminal projects, the consultants have developed recommendations for consideration by the legislature. These recommendations are based on the goals established in SSB 6241, which mandated the ferry financing study, and include:

- Create greater transparency for the legislature and members of the public to more easily understand and monitor WSF capital planning and budgeting.
- Create greater consistency between WSF capital budget definitions and state capital definitions.
- Clarify what costs should be part of a preservation budget.
- Suggest performance measures for the capital program.

Following are recommendations on the capital prioritization process, terminal preservation projects, and terminal replacement and improvement projects.

A. Capital Program Prioritization Process Recommendations

The consultants recommend that the legislature require WSF to conform to the Office of Financial Management (OFM) definitions of capital project, preservation and improvement, and that WSF clarify its project prioritization process.

1. WSF Capital Projects Should Conform to the OFM Definition of a Capital Project

The consultants found that WSF is using capital funds to fund projects that do not substantially extend the life of a system or structure, and that are essentially maintenance projects. These types of projects include interim trestle preservation and transfer span retrofits, which extend the life of the trestle or transfer span for a few years until a major replacement is scheduled.

The consultants recommend that the legislature require WSF to utilize the OFM definition of a capital project as a "project to construct either new facilities or significant long-term renewal improvements to existing facilities" (OFM 2007-2017 Capital Budget Instructions, p. 17). WSF's category of interim preservation projects would, under this definition, be part of the maintenance budget.

2. WSF Preservation and Improvement Capital Projects Should Conform to the OFM Definitions of these Categories

The consultants found that WSF's classification of its terminal projects into preservation or improvement categories has created confusion. This is particularly true for replacement preservation projects and for preservation projects intended to improve program efficiency and effectiveness, result in cost savings or cost avoidance, and/or

benefit customers and the public. While worthwhile goals in and of themselves, they do not meet the more standard definition of preservation.

OFM classifies state projects as either preservation or programmatic (i.e., improvement). Under the OFM definitions, preservation projects "maintain, preserve and extend the life of existing state facilities and assets, and do not significantly change the program use of the facility. Preservation category budgets generally have little effect on future operating programs and budgets, except for reductions in the agency's maintenance costs and the deferred maintenance backlog" (OFM 2007-2017 Capital Budget Instructions, p. 17).

Programmatic (improvement) projects "primarily achieve a program goal, such as changing or improving an existing space to new program requirements or creating a new facility or asset. . . . This category is less concerned with life extension of a facility, and includes projects ranging from building new facilities to significant renovation of existing facilities. Program projects may also improve conditions, accommodate changes in services or clientele . . . ." (OFM 2007-2017 Capital Budget Instructions, p. 18).

The consultants recommend that the legislature require WSF to conform to OFM definitions of capital improvement and preservation projects. Under the OFM category definitions, WSF would classify projects as preservation only if they extend the life-cycle of a structure or system. WSF would not classify projects as preservation that are replacing terminals and expanding them to meet service requirements. Nor would WSF classify projects as preservation that are intended to improve program efficiency and effectiveness, result in cost savings or cost avoidance, and/or benefit customers and the public. This change would mean that projects such as the Keystone Alternative and the Electronic Fare System would be classified as improvements. It would also reflect the reality that the projects at terminals such as Bainbridge Island, Anacortes, and Seattle Colman Dock are being jointly funded from preservation and improvement budgets.

3. WSF Should Develop a Clear Capital Prioritization Process

If the legislature adopts a more narrow definition of WSF preservation, it will be necessary for WSF to clarify its capital prioritization process so that the trade-offs being made in terms of funding and scheduling are evident. The consultants found that WSF's prioritization process for terminal projects is based on three factors: (1) the life-cycle cost model; (2) ridership projections and service plans in the Draft Long-Range Strategic Plan; and (3) the judgment of WSF management. The consultants recommend that WSF update this prioritization process in light of this study's findings and recommendations.

Table 33 on the following page provides a summary of the suggested modifications in the WSF capital program definitions.

Table 33. Proposed Modifications to WSF Capital Program Definitions

		Current	Proposed
Capital Project Definition		Interim preservation included	Project to construct either new facilities or significant long-term renewal improvements to existing facilities.
Capital Project Category Definitions	Preservation	1. Preserve the structural, mechanical and electrical integrity of infrastructure 2. Improve program efficiency and effectiveness 3. Regulatory compliance 4. Cost saving or cost avoidance 5. Benefit customers and the public	1. Maintain, preserve and extend the life of facilities and assets, and does not meet the definition of an improvement.
	Improvement	1. Meet changes in demand and increase capacity 2. Provide mobility options	1. Meet changes in demand and increase capacity 2. Provide mobility options 3. Improve program efficiency and effectiveness 4. Cost saving or cost avoidance 5. Benefit customers and the public
	Emergency Repair	Address damage and/or unanticipated regulatory requirements.	Address damage and/or unanticipated regulatory requirements.
Capital Project Type Definitions	Preservation	1. Life-Cycle Cost Model or Condition Rating 2. Non-life-cycle costs such as: • Master plans • Property acquisition • Interim preservation • Emergency generators • Placeholder preservation 3. Replacement projects 4. Systemwide administrative projects 5. Systemwide revenue enhancement projects	1. Life-Cycle Cost Model or Condition Rating 2. Proportionate share of systemwide administrative projects
	Improvement	1. Master plans 2. Terminal expansions	1. Terminal expansions and replacements 2. Master plans 3. Property acquisition 4. Emergency generators 5. Proportionate share of systemwide administrative projects 6. Systemwide revenue enhancement projects

B. Terminal Preservation Project Recommendations

The consultants recommend that the legislature require WSF to: update the life-cycle cost model to make it more useful as a planning tool; develop a condition rating performance measurement system; allocate systemwide overhead projects between the preservation and improvement program categories; include only life-cycle related expenses in facility-specific preservation projects; and exclude non-life-cycle costs from the catch-up preservation project.

1. Update the Terminal Life-Cycle Cost Model to Make it a Better Planning Tool

The consultants found that the terminal life-cycle cost model is not as useful a planning tool as it could be. To be more useful the model must:

- Be based on an inventory that is regularly updated from maintenance and condition reports.
- Include only systems and structures that are replaced at the end of their life-cycle and not systems, such as water systems, that are replaced only when the terminal is rebuilt.
- Reflect more accurate information on the standard life-cycle of structures.

The consultants recommend that the legislature not consider information from the life-cycle cost model until it has been updated and modified.

2. Develop a WSF Terminal Condition Rating Performance Measurement System

The consultants found that the condition rating of terminals provided through bridge, mechanical, and dive inspections provides a good third-party rating of the condition of the terminal's assets. The consultants recommend that the legislature require the development of a condition rating performance measure for terminal preservation. Condition ratings are already in use elsewhere in WSDOT, including for road pavement and bridge conditions. A condition rating system is less dependent on the ability of WSF to keep the life-cycle model information current, may provide a better picture of the state of preservation of WSF's assets, and is easier to communicate to decision-makers (i.e., it is easier to understand whether structures and systems are in good, fair, poor or substandard condition than to understand the percent of vital and non-vital systems and structures operating within their life-cycle.)

3. Allocate Systemwide Overhead Projects Between Preservation and Improvement Projects

The consultants found that WSF attributes all systemwide overhead projects to the preservation budget. The consultants recommend the legislature direct WSF or OFM to develop a basis for allocating those overhead costs between the preservation program, as re-defined, and the improvement program, as re-defined.

4. Include Only Life-Cycle Related Expenses in Facility-Specific Preservation Projects

The consultants found that within the preservation budgets of specific facilities, there were non-life-cycle costs, including property acquisition, master plan development, purchase of emergency generators to support the electronic fare system, and other costs. The consultants recommend that these costs not be included in facility preservation budgets but rather be included in improvement budgets, since they do not extend the life of a system or structure. This change will ensure conformance with the OFM definition of a preservation project and aid legislative understanding.

5. Exclude Non-Life-Cycle Costs from the Catch-Up Preservation Project

The consultants found that 17 percent of the catch-up preservation project, specifically provided to allow WSF to catch-up with its life-cycle goals, was being used for non-life-cycle expenses. The consultants recommend that these expenses not be included in the catch-up preservation project.

C. Terminal Replacement and Improvement Projects

1. Preservation Replacement and Improvement Projects Should be Combined as One Improvement Program Category

The consultants recommend that replacement and improvement projects be combined into the improvement capital budget. This would be consistent with OFM definitions and allow the legislature to see more clearly the relationship between these improvements and the Draft Long-Range Strategic Plan.

2. Priority Should be Given to Flexible Terminal Improvement Plans and Projects

The consultants found that the Draft Long-Range Strategic Plan provides flexibility in the scheduling of new vessels, so that vessel planning can be changed as real ridership is known. However, there is only limited flexibility in the terminal plans.

The legislature should give priority to those terminal projects that are designed to be flexible in the way that the vessel procurement schedule is flexible. Examples of flexibility might include: terminal buildings or vehicle holding areas that are built-out in phases; and developing upland or remote vehicle holding areas rather than building holding areas on permanent trestles, which require a greater initial capital investment and are difficult to modify once constructed.

3. A Ridership Performance Measure Tied to the Capital Plan Should be Developed

The consultants found that the improvement projects rely on the Draft Long-Range Strategic Plan to develop the scope of the projects. A performance measure relating to ridership and the capital program should be developed to help the legislature track the validity of the investment assumptions and to inform investment decisions. This would allow the legislature to make the same type of flexible, ridership based decision that has been suggested for vessel acquisition in WSF's Draft Long-Range Strategic Plan.

4. WSF Should be Required to Undertake Systematic Cost-Benefit Analysis

The consultants found that WSF does not undertake systematic cost-benefit analysis. WSF has not undertaken a systematic analysis of operating changes that might reduce capital investments, such as a modification to the first-come-first-served loading policy. They have also not considered tariff policy and level of service standard adjustments as ways to manage demand. The legislature should require a cost-benefit analysis of operational, level of service standard and tariff modifications that could reduce the required investment in terminals, particularly in the sizing of terminal buildings and vehicle holding areas, prior to funding expansions.

5. WSF Should be Required to Provide a Complete Life-Cycle Cost Analysis

The consultants found that WSF does not always do a complete life-cycle cost analysis of its new terminal construction. A complete life-cycle cost analysis would allow for a better prediction of the operating and preservation budget impacts of new construction. It will be important for the legislature to understand these costs, particularly as they affect farebox recovery and future preservation budgets. The life-cycle cost analysis is different from the life cost-cycle model, which is designed to predict preservation costs rather than operating costs.

6. WSF Should be Required to Provide a Business Plan Supporting Investments Intended to Generate Ancillary Revenues

The consultants found that WSF is trying to improve farebox recovery through the addition of concession space. These are inherently risky investments. The consultants recommend that the legislature require WSF to provide temporary facilities to test concession income prior to making large capital infrastructure investments at terminals where there is limited concession experience, and/or provide a business plan that projects the rate of return from such investments.

7. WSF Should Identify Funding Required to Complete Construction when Master Plans are Developed

The consultants found that the 2005-21 biennia capital plan does not include sufficient funding to implement the master plans for the major terminal projects. The legislature should be aware of any unfunded components of the master plans for these major projects in order to gauge the level of future funding that may be necessary if the projects proceed. This is particularly important for those projects where terminals are being entirely relocated.

8. WSF Should Make the Legislature Aware of Costs Incurred to Meet Local Concerns

The consultants found that projects are incurring costs to satisfy local community concerns. In some cases, such as with the Eagle Harbor repair facility and the Mukilteo projects, funds are allocated for specific mitigation strategies. The legislature should be aware of these costs and provide direction in terms of state funding for local amenities.

9. WSF Should Make the Legislature Aware of Costs Incurred for Joint Use Transit Facilities

Members of the Ferry Financing Advisory Committee and legislators have expressed concern about WSF financing of joint use transit projects. The legislature should be aware of these costs and provide direction in terms of state funding for joint use transit facilities.

10. The Legislature Should Consider Requiring Expert Review of WSF Projects

Consultant interviews with legislators and legislative staff indicated a concern about the structure of WSF. In particular some interviewees suggested that outside review bodies should be created to help WSF. These review bodies might include a panel to review major projects to ensure that they utilize best practices in terms of efficiency, technology and business analysis of tradeoffs. The findings in this review of terminal projects reinforce this concern. The consultants recommend that the legislature require expert review of the major projects. (See *Washington State Ferries Financing Study Appendix 2: Legislative Concerns and Directions*, for a review of consultant interviews with legislators and legislative staff.)

D. Recommendations for Improvement and Preservation Projects

1. Require a Predesign Study for Terminal Projects Over $5 million

One way to implement the recommendations relating to life-cycle cost analysis, cost-benefit analysis, and business plan for specific terminal projects would be to require WSF to submit a pre-design study on major projects. A predesign study is required by OFM for all major projects defined as "those with an estimated cost of $5 million or more" (OFM Predesign Manual p. 6).

OFM's pre-design manual includes detailed instructions for pre-design studies for both improvement and preservations projects, as follows:

> "A predesign study should include the following for additions, renovations and new facilities:
>
> - A description of the service delivery needs to be met – the problem;
> - An architectural/functional program and thorough explanation of the scope of work;
> - An analysis of potential and recommended project site(s);
> - An analysis of existing building conditions for remodels and upgrades;
> - A project budget in the format of the Project Cost Estimate Worksheet;
> - Cost-benefit and life-cycle cost information for major decisions involving economic trade-offs;
> - A discussion of relevant master plans and other planning documents that affect the project;
> - A thorough analysis of the operating impacts of the project including Full-Time Equivalent positions (FTEs), and operating and maintenance costs; and

- A complete set of conceptual or preliminary drawings.

"For infrastructure (such as electrical, water, sewer, roofs and roads) preservation/replacement projects:

- A description of the service delivery needs to be met – the problem;
- A thorough explanation of the scope of work;
- An analysis of existing infrastructure conditions and maintenance impacts including an engineer's report analyzing the problem and identifying potential solutions;
- A project budget in the form of the Project Cost Estimate Worksheet;
- Cost/benefit and life-cycle cost information for major decisions involving economic trade-offs;
- An analysis of how future needs and growth are accommodated;
- A discussion of relevant master plans and other planning documents that affect the project;
- A discussion and recommendation regarding the project delivery and agency project management to be used;
- Conceptual drawings (prior to schematic design phase); and
- Operating and maintenance impacts." (OFM Predesign Manual p. 7)

Section Five
Implications for Ferry Financing

A. Projection of Funding Needed

In order to proceed with ferry financing, an estimate of capital resources needed to preserve and improve terminals is necessary. Given the findings and recommendations in this report, it is difficult to assess these financing needs until the life-cycle cost model is updated and the recommended cost-benefit analysis for terminal improvement projects is completed.

B. Impact on Farebox Recovery Percentage

Several of these recommendations will affect the actual and projected farebox recovery percentage. The move of interim preservation to the maintenance budget will increase operating costs and reduce the farebox recovery rate. If life-cycle costs are projected, they should include operating costs of the new terminals, which will affect the long-term projection of the farebox recovery rate.