PIERCE COUNTY
Public Works & Utilities

Pierce County Public Works & Utilities
Transportation Services

WATERBORNE TRANSPORTATION STUDY

SUMMARY REPORT
October, 2003

506 Second Ave
Suite 600
Seattle, WA 98104

IBI GROUP

in association with the **Elliott Bay Design Group • Jacobs Civil**

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EXECUTIVE SUMMARY

Pierce County Public Works & Utilities – Transportation Services, provides ferry service between the Town of Steilacoom, Anderson Island and Ketron Island. Primary service is provided by the M/V Christine Anderson, a 54 car vessel. Back up service is provided by the M/V Steilacoom, a 30 car vessel that is now almost 70 years old.

The ferry system was last studied fourteen years ago in 1989. Since that time, the population of Anderson Island has increased 64%, the ferry is operating near full capacity in the a.m. and p.m. peak commuter periods, and the M/V Steilacoom has reached the end of its serviceable life. Responding to these changes, the four objectives of the Waterborne Transportation Study are to:

1. Project population changes and assess impacts on ferry service through the year 2025.

2. Identify changes to the ferry service to meet projected demands and provide efficient operations.

3. Identify opportunities to enhance customer service.

4. Achieve 80% recovery of ferry system costs from fares.

Findings from the demographic analysis and traffic projections show that the current ferry service is reaching capacity during the morning (6:00 to 9:00 a.m.) and evening (5:00 to 7:00 p.m.) peak periods, primarily due to the presence of more working families on Anderson Island. With the current schedule, two direct sailings are provided to Anderson Island, and one direct sailing to Ketron Island is provided during each of the morning and evening peak periods. For Anderson Island, this provides an effective peak period capacity of 108 vehicles with the 54 car capacity M/V Christine Anderson (2 sailings x 54 vehicles).

The study projects moderate population growth for Anderson Island, and assesses the impacts of that growth on the current ferry service. With the current schedule, the ferry service is operating close to capacity for that run during the morning and evening peak periods. Traffic projections show that by as early as 2005, more vehicle overloads will occur on the Anderson Island run as traffic demands exceed available capacity.

To accommodate changes in demographics and projected future traffic growth, the study makes four key recommendations:

1. Replace the existing direct Ketron Island runs with triangle runs that serve Steilacoom, Ketron Island, and Anderson Island. This would add a third sailing to Anderson Island during each of the morning and evening peak periods, providing an effective peak period capacity of 162 vehicles (3 sailings x 54 vehicles) and meeting projected demands through 2025. It is also recommended that overlength vehicles be prohibited from peak period runs to maximize available vehicle capacity.

2. Add a 7:30 p.m. weekday Steilacoom-Anderson Island sailing (the last sailing is currently at 6:00 p.m.). This would provide greater convenience for commuters living on the Island, residents who are shopping or conducting other activities on the mainland, and students who wish to participate in after-school activities.

3. Replace the M/V Steilacoom with a new 54 car vessel similar to the M/V Christine Anderson. This would maintain route capacity when the M/V Christine Anderson is in dry-dock, extend periods between major overhauls by regularly alternating service between the two vessels, and keep both vessels in good running condition by using them regularly. In addition, there is the opportunity to

operate both vessels during very high demand periods (e.g., holiday weekends), doubling route capacity.

4. Update the current fare pricing structure so that all fare categories are based on algorithmic relationships between fare types, and update fares on a regular two year cycle. This provides the County with a consistent, structured approach for computing fare prices.

Costs associated with these improvements are estimated, and financial cost recovery profiles generated. A recommendation is made to move towards recovery of 80% of annual ferry system costs from fares (currently about 65% of costs are recovered from fares). Achieving an 80% recovery of costs from fares would allow the County to provide enhanced service and fund future vessel repair or replacement.

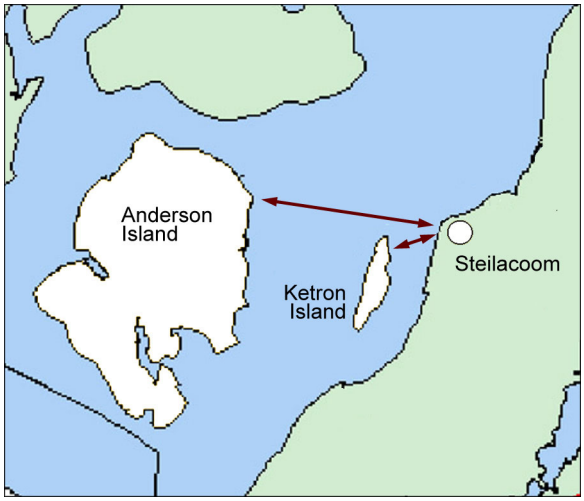
An example long term pricing table is presented that would gradually move the County to 80% cost recovery from fares by the year 2016.Cost recovery should be enhanced by retaining interest in the ferry fund to offset costs and fund future vessel and terminal improvements..

The study also identifies potential near term improvements in ferry facilities, ticketing and public information. For each potential improvement, costs are identified along with the potential impacts on fares.

1. INTRODUCTION

Pierce County Public Works & Utilities – Transportation Services, provides ferry service between the Town of Steilacoom, Anderson Island and Ketron Island as illustrated in Exhibit 1. Primary service is provided by the M/V Christine Anderson, a 54 car vessel. Back up service is provided by the M/V Steilacoom, a 30 car vessel that is now almost 70 years old.

Exhibit 1
Current Ferry System Routes



The ferry system is the lifeline for Island residents. Privately owned companies and private parties provided ferry services from the early 1900's until 1937 for Anderson Island, and until 1962 for Ketron Island. After that the County assumed responsibility for the service, contracting out the operations of the ferry system and Steilacoom dock.

The ferry system was last analyzed fourteen years ago by the 1989 Waterborne Transportation Study. Since that time, the population of Anderson Island has continued to grow and change, ferry demands have increased, and the M/V Steilacoom has reached the end of its serviceable life. Responding to these changes, Pierce County commissioned IBI Group, Jacobs Civil, and the Elliott Bay Design Group to conduct a new Waterborne Transportation Study.

Findings and recommendations from the Waterborne Transportation Study are summarized in this report and described in detail in a series of Technical Memoranda[1] that include:

- *System Demographics*: Analyzes current demographics, rider statistics, customer feedback and projections for future ferry usage.
- *Sensitivity Analysis*: Tests selected key findings in terms of sensitivity to future changes and uncertainty.
- *Propulsion System*: Analyzes the existing propulsion system of the ferry M/V Christine Anderson.
- *Fuel Configuration*: Explores the cost effectiveness, environmental benefits and technical feasibility of utilizing a diesel/natural gas fuel system.
- *System Security*: Provides a confidential assessment of current terminal and vessel security issues. This information will be used as input to the development of a ferry system security plan in early 2004.
- *Public Information*: Identifies potential improvements for dissemination of information to the public.

[1] *Waterborne Transportation Study Technical Memoranda,* October, 2003

2. PUBLIC CONSULTATION PROCESS

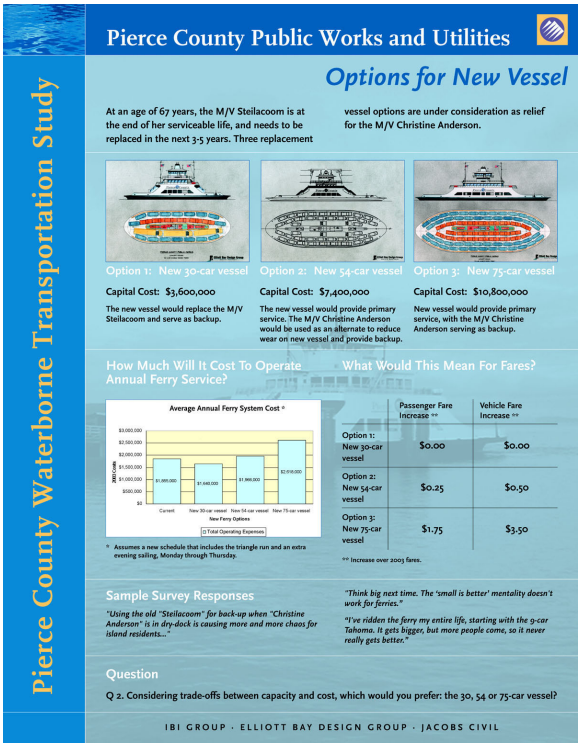
Integral to the study was a comprehensive public consultation process that included:

1. An on-board survey of ferry riders was conducted over four days in late August/early September 2002. The survey was designed to identify ferry rider needs and preferences, and included general demographic, trip behavior and service improvement questions, as well as general comments about the service. Eleven hundred and twenty-three surveys were completed by ferry riders.

2. The results of the on-board survey were supplemented with a property owners survey conducted in October, 2002. Approximately 3,000 surveys were mailed; about 950 completed surveys were returned.

3. A public open house conducted on Anderson Island in February, 2003, mid-way through the study. At the open house, initial options were presented for service and routing changes, ticketing improvements, new vessel procurement, and public information improvements as illustrated in the example presentation board in Exhibit 2. Approximately 250 Island residents and property owners attended the open house, and provided comments on the options presented.

Exhibit 2
Example Open House Presentation Board



Information from the surveys was used to help develop an initial set of proposed ferry system improvements and options. Information from the open house was used to help refine those options and develop a recommended list of improvements.

3. CURRENT ISLAND DEMOGRAPHICS

The demand for ferry service is driven by the demographic makeup of the Islands and associated travel needs. Comparison of US Census data showed that the Anderson Island population grew at a rate of about 5% per year over the period 1990 to 2000, rising from a population of 548 to 900 (an increase of about 64%) by 2000. Ketron Island currently only has a population of 18 people. The impacts of any changes in Ketron Island population on ferry service would be negligible.

As illustrated in Exhibits 3 and 4, the most significant demographic change from 1990 to 2000 was the relative increase in primary householders in the 45 to 64 year old range. Along with this has been a drop in the median age from 58 years old to 52. The number of households on Anderson Island also increased from 1990 to 2000, growing from 517 to 720 (total growth of about 39%). The most significant change was in the number of occupied (as opposed to vacant and seasonal homes) households. These grew from 245 in 1990 to 421 by 2000; an increase of 72%.

Exhibit 3
Age Classification of Primary Householder: 1990 Census (Anderson Island)

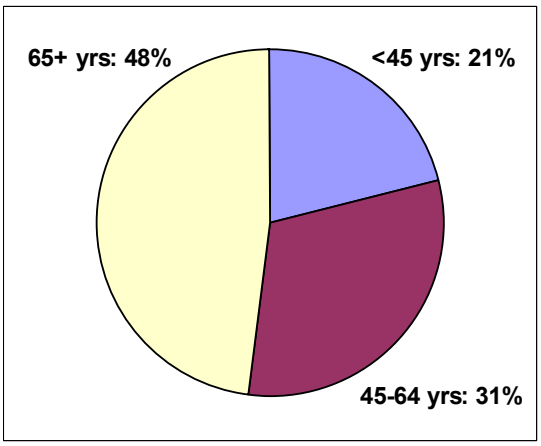
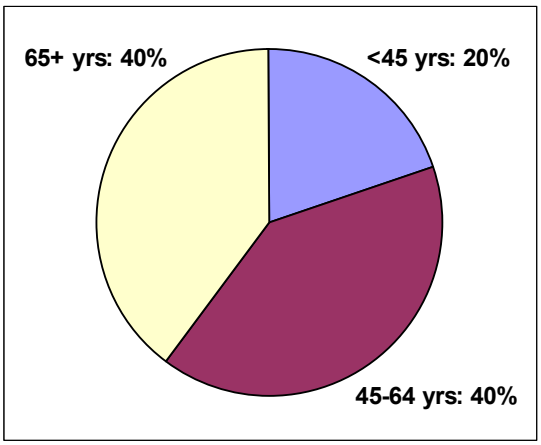


Exhibit 4
Age Classification of Primary Householder: 2000 Census (Anderson Island)



The change in number of occupied households, coupled with the increase in the 45-64 year old age demographic, signifies an increasing proportion of working families on the island. This further suggests that the primary impacts on ferry traffic are during the morning (6:00 – 9:00 a.m.) and evening (5:00 – 7:00 p.m.) peak periods as more residents are traveling to/from work and school.

4. PROJECTED POPULATION AND FERRY TRAFFIC GROWTH

Using historical information and current demographics, low, moderate and high population increase scenarios for Anderson Island through 2025 are:

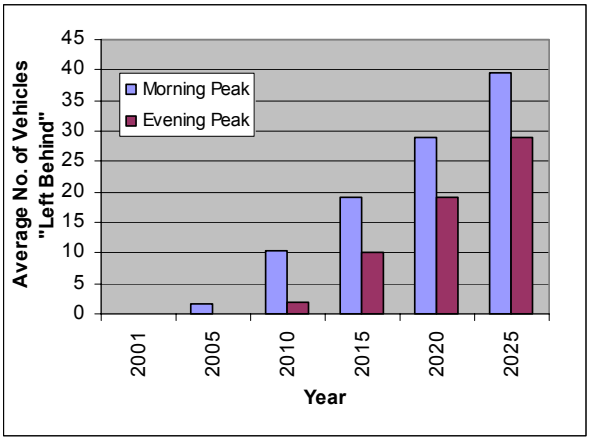
- *Low:* 2%/yr population increase through 2005, 1%/yr population increase from 2006-2015, and no growth thereafter.
- *Moderate*: 2.5%/yr population increase through 2005, 1.5%/yr population increase thereafter through 2025.
- *High*: 5%/yr population increase through 2010, dropping to 2%/yr increase thereafter.

A review of development constraints on Anderson Island[2], limitations of the current water and septic systems, and current economic conditions in the Puget Sound area, suggested that the most likely growth scenario would lie in between the low and high estimates. This scenario, classified as "moderate growth", projects a 2.5%/yr increase in Anderson Island population through 2005, transitioning to 1.5%/yr thereafter through 2025.

[2] Outside of the Riviera Community, R10 zoning requires a 10 acre minimum lot size. For septic and water purposes, the Pierce County Health Department recommends a minimum 1 acre lot size.

Using the moderate growth scenario, projections were made of future ferry system traffic demands through 2025, focusing in particular on impacts on ferry traffic during the morning and evening peak periods. During each of these periods, the M/V Christine Anderson provides a peak period route capacity of up to 108 vehicles (two sailings per peak period, 54 vehicles per sailing).

Exhibit 5
Projected Weekday Peak Period Overloads



An analysis of current traffic conditions showed that sailings during the morning and evening peak periods are now at or near vehicle capacity, particularly morning sailings from Anderson Island. Given the current schedule, overload conditions (where vehicles have to wait a sailing) during these periods are expected to occur with increasing frequency as illustrated in Exhibit 5. The number of vehicles that are "left behind" during the morning or evening peak periods are projected to grow from a few in 2005, to as many as 40 by 2025.

5. PROPOSED NEAR TERM SERVICE CHANGES

To accommodate projected vehicle demands, near term service changes were identified that would provide additional capacity during the weekday morning and evening peak periods. These include:

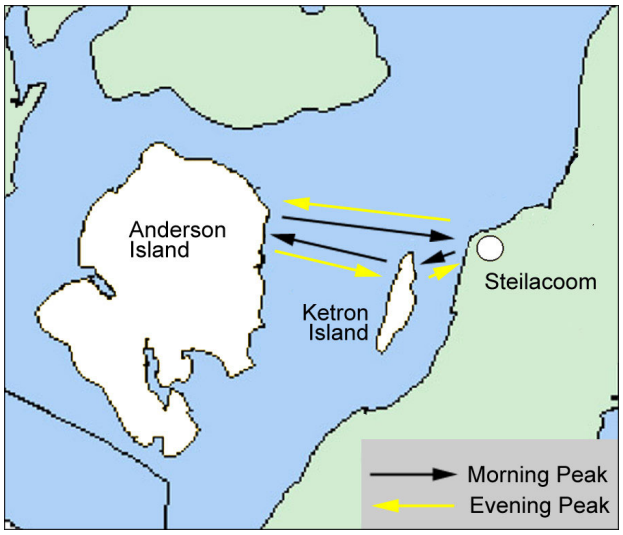
1. Replace existing direct Ketron Island runs with new triangle runs between Steilacoom, Anderson Island, and Ketron Island as illustrated in Exhibit 6. This adds a third sailing to Anderson Island during each of the morning and evening peak periods.

   The addition of a third sailing to Anderson Island increases the peak period capacity from the current 108 vehicles to 162 vehicles. Based on traffic projections, this provides sufficient capacity to meet peak period demands through 2025.

2. Add a 7:30 p.m. Monday-Thursday Anderson Island sailing (currently the last sailing departs at 6:00 p.m.). In the surveys and open house, customers indicated a strong preference for this run, noting that it better fits work schedules, allows additional time for students to participate in after school activities, and relieves concern over missing the last sailing.

3. Restrict overlength (over 40') vehicles to non-peak sailings. This increases the vehicle capacity of the vessel during peak periods, improves overall customer satisfaction, and reduces conflicts between overlength vehicle operators and other customers.

Exhibit 6
Proposed Triangle Runs
(Replacing Direct Ketron Island Runs)



An example near term revised sailing schedule is illustrated in Exhibit 7. The schedule replaces the existing 7:00 a.m., 11:00 a.m., and 4:20 p.m. direct sailings to Ketron Island with triangle runs. It also adds a 7:30 p.m. Monday-Thursday sailing to Anderson Island.

For Ketron Island, the last weekday and weekend sailings are shifted from 4:20 p.m. and 8:00 p.m., to 6:10 p.m. and 10:00 p.m. respectively. This will allow Ketron Island residents extra time to catch the ferry in the evening.

Exhibit 7
Example Near Term Sailing Schedule

	Leave Steilacoom	Leave Ketron	Leave Anderson
Mon-Fri Only	5:55 a.m.		6:30 a.m.
Every Day (1)	7:00 a.m.	7:20 a.m.	7:50 a.m.
Every Day	8:20 a.m.		8:50 a.m.
Every Day	9:20 a.m.		9:50 a.m.
	Break (20 min)		
Every Day (1)	10:40 a.m.	11:00 a.m.	11:30 a.m.
Every Day (2)	12:00 noon		12:30 p.m.
	Maintenance (70 min)		
Every Day	2:10 p.m.		2:40 p.m.
Every Day	3:10 p.m.		3:40 p.m.
Every Day	4:10 p.m.		4:40 p.m.
Every Day	5:10 p.m.		5:40 p.m.
Every Day (1)	6:10 p.m.	7:10 p.m.	6:40 p.m.
Every Day	7:30 p.m.		8:00 p.m.
	Break (15 min)		
Fri-Sat-Sun Only	8:45 p.m.		9:20 p.m.
Fri-Sat-Sun Only (1)	10:00 p.m.	11:00 p.m.	10:30 p.m.

(1) Triangle run
(2) Sailing canceled 1st and 3rd Wednesdays of the month to deliver fuel to the Islands

6. FUEL AND PROPULSION SYSTEM ANALYSIS

Three aspects of the M/V Christine Anderson were analyzed to determine if significant cost, operational or other benefits could be realized through upgrades or changes:

- *Fuel System*: The feasibility of converting the M/V Christine Anderson natural gas/diesel dual fuel was analyzed to determine if significant cost or other benefits could be realized. An economic analysis determined that it is not feasible at this time, primarily because of the costs to construct shore-side natural gas storage facilities at Steilacoom and the necessary ship modification.

- *Propulsion System:* The M/V Christine Anderson's propulsion system was reviewed to determine if benefits would be realized from retrofitting the vessel with a new controllable itch propeller system to improve vessel maneuverability and route speed. Although installation of controllable pitch propellers could improve the vessel's response in an emergency stop, overall travel time between Steilacoom and the Islands would remain unchanged due to the direct nature and short distance of the runs. The estimated cost to retrofit the M/V Christine Anderson is approximately $600,000.

- *Control System:* The existing pneumatic propulsion control system was reviewed to determine if installation of an electronic control system would increase the system reliability. Retrofitting the M/V Christine Anderson with electronic controls could increase the system reliability. The estimated cost is $115,000.

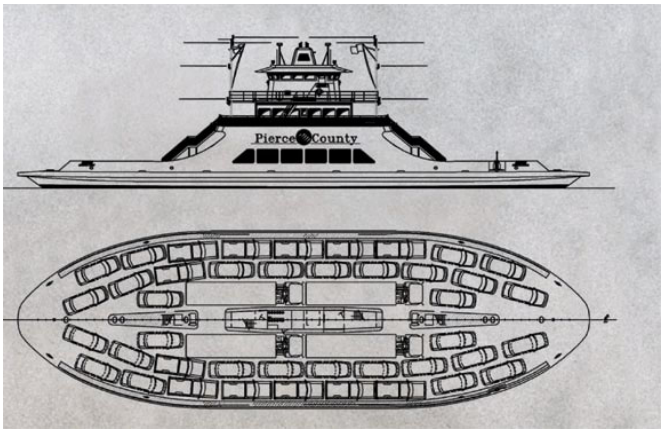
7. VESSEL REPLACEMENT OPTIONS

One of the primary objectives of the study was to identify options for replacement of the M/V Steilacoom which is at the end of its serviceable life. Five alternative options were considered, including:

1. Procure a new 30 car ferry to provide a direct replacement for the M/V Steilacoom.
2. Procure a new 54 car ferry to provide greater capacity than the M/V Steilacoom. This vessel would alternate with the M/V Christine Anderson to provide constant capacity all year.
3. Procure a new 75-car ferry to provide greater capacity than the M/V Steilacoom. This would serve as the primary vessel with the M/V Christine Anderson acting as backup.

4. Provide a passenger-only ferry during maintenance of the M/V Christine Anderson. No vehicle service would be available for up to four weeks a year.
5. Provide a leased vehicle ferry during maintenance of the M/V Christine Anderson.

Exhibit 8
New 54 Car Vessel



A screening process was used to evaluate the different vessel replacement options and concluded that:

- Traffic levels have risen to the point where a 30 car vessel cannot provide sufficient back-up capacity.
- The availability of a leased vessel is uncertain, particularly during unplanned service disruptions.
- A passenger-only ferry would not be able to meet vehicle demands.
- A new 54 car vessel, operating under the service schedule identified in Exhibit 3, provides sufficient capacity to meet projected traffic demands through 2025. A 75 car vessel would provide excess capacity, would have higher operating costs, and would be significantly underutilized during low demand periods.
- A new 54 car vessel could alternate service with the M/V Christine Anderson, providing a constant level of capacity. This would extend the time period between major overhauls, provides more flexible dry-docking options, keeps both vessels in good running condition by having both used on a regular basis, and provides an option of operating both vessels in parallel during very high demand periods (e.g., holiday weekends).

Recommendations are to procure a new 54 car vessel as illustrated in Exhibit 8. This provides the most flexible service option and should accommodate projected demands through 2025.

8. FUTURE FARE CHANGES

In order to help finance proposed service changes, procure a new vessel to replace the M/V Steilacoom, and achieve fare recovery goals, a future fare pricing model was developed based on algorithms or relationships among fare attributes. Attributes include passenger/vehicle classification (e.g., vehicle type, single fare, commuter) and customer type (e.g., adult, senior/disabled, youth, child).

This model provides Pierce County with a consistent, structured approach for computing fare prices. It is based on implementing fare changes on a regular two year cycle, and adjusting fares over time to recover 80% of costs from fares (similar to State goals for the Washington State Ferry system). The model also includes pricing passenger fares in multiples of $0.10 and vehicle fares in multiples of $0.25.

Exhibit 9 summarizes the proposed fare structure for 2004-2005 based on the model. Attributes of this structure include:

- All prices are based on algorithmic relationships with two baseline fare categories: single adult fare and single vehicle-driver off-season fare (September-May).
- Summer peak season (June-August) vehicle fares are based on 120% of the off-season fare per current practice.
- Commuter fares are priced at 80% of the baseline fares.
- Senior/disabled, youth and motorcycle fares are priced as a percentage of corresponding peak season or off-season single fare adult fares.

Exhibit 9
Proposed 2004-2005 Fare Structure

	Current		2004-2005	
	Off Season	Peak Season	Off Season	Peak Season
Passengers				
Adults	$ 3.30	$ 3.30	$ 3.80	$ 3.80
Commuters (5 trips)	$ 2.10	$ 2.10	$ 3.00	$ 3.00
Child	$ -	$ -	$ -	$ -
Senior	$ 1.65	$ 1.65	$ 1.90	$ 1.90
Youth 5-18	$ 2.00	$ 2.00	$ 2.30	$ 2.30
Automobiles				
Auto w/driver	$ 11.50	$ 13.80	$ 12.50	$ 15.00
Auto w/Senior driver	$ 9.20	$ 11.00	$ 10.00	$ 12.00
Auto w/Comm. driver	$ 9.20	$ 9.20	$ 10.00	$ 10.00
Motorcycles				
Motorcycle Single	$ 6.00	$ 7.20	$ 7.50	$ 9.00
Motorcycle Commuter	$ 3.60	$ 3.60	$ 6.00	$ 6.00
Overlength Vehicles				
Under 20'	$ 11.50	$ 13.80	$ 12.50	$ 15.00
20'-30'	$ 20.50	$ 24.60	$ 22.50	$ 27.00
30'-40'	$ 30.25	$ 36.30	$ 33.25	$ 40.00
40'-50'	$ 40.00	$ 48.00	$ 45.00	$ 54.00
50'-60'	$ 50.00	$ 60.00	$ 57.75	$ 69.25
60'-70'	$ 60.00	$ 72.00	$ 71.50	$ 85.75
70'-80'	$ 70.00	$ 84.00	$ 86.25	$ 103.50
80' +	$ 80.00	$ 96.00	$ 102.00	$ 122.50

Overlength vehicle fares are computed on a per-foot basis for the mid-range of the category. To account for excess weight and deck utilization impacts of very large vehicles, pricing is based on a sliding scale of higher per foot prices for longer vehicles.

9. PROJECTED COSTS AND REVENUES

The study projected future ferry system costs and revenues through 2025 based on implementation of the proposed service changes and procurement of a new 54 car vessel.

Exhibit 10
Projected Costs and Revenues

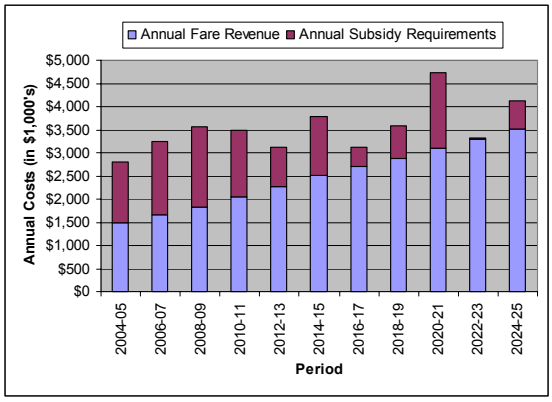


Exhibit 11
Projected Fare Recovery

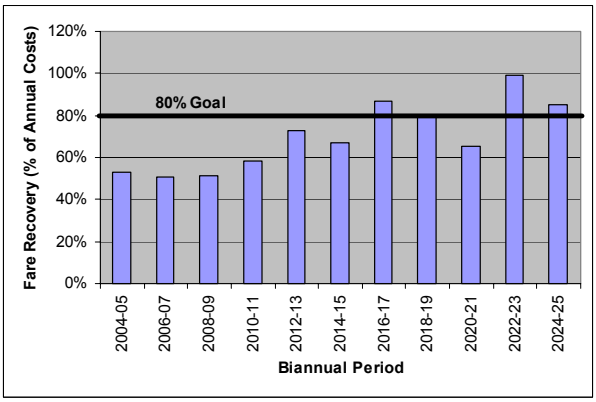


Exhibit 10 summarizes the projected fare revenue and the County or other subsidy requirements. Projections are based on implementing 8% fare increases every two year cycle through 2016, reducing to

4% every two years thereafter. As illustrated in Exhibit 11, this would allow the County to gradually move towards recovery of 80% of annual ferry system costs by 2016.

The cost and revenue profile shown in Exhibit 10 includes vessel and terminal depreciation costs. They are used to fund future vessel procurements and terminal capital improvements. Interest from the fund assets is currently diverted for other purposes by the County. If interest were retained, it will be used for the County ferry system. Allocating depreciation costs for a new 54 car vessel alone would generate annual interest ranging from approximately $20,000/yr in 2005, to as much as $300,000/yr by 2025[3].

10. OTHER NEAR TERM IMPROVEMENTS

The study identified facility, ticketing, and public information improvements. Exhibit 12 summarizes potential near term improvements that should be considered. In each case, the potential impacts on fares are identified.

Exhibit 12
Potential Near Term Improvements

Improvement	Capital Cost	Amount to be Recovered through Fares[4]	Potential Impact on Fares	
			Passenger	Auto/Driver
Facility Improvements[5]				
Anderson Island pontoon replacement	$280k[6]	$12,000/yr	Negligible	$0.15
Anderson Island dolphin replacement	$0.6 Million	$25,300/yr	$0.05	$0.25
Second ferry slip – Steilacoom landing	$4.0 Million	$168,500/yr	$0.30	$1.50
Steilacoom waiting facility paint and re-roof	$30k	$1,300/yr	Negligible	Negligible
Ticketing Improvements				
Provide ticket sales at a retail location on Anderson Island	$40k+$13k/yr O&M	$14,000/yr	Negligible	$0.15
Provide online sales of tickets through the Internet	$12k/yr O&M	$10,000/yr	Negligible	$0.11
Participate in the Regional Smart Card Program	$40k+$4k/yr O&M	$11,000/yr	Negligible	$0.12

[3] $8.6 million vessel capital cost depreciated over 20 years. Interest retained in the fund and compounded.
[4] This reflects amortization of 80% of the identified capital costs over a 20-year period at 0.5% interest.
[5] Many of these are already funded and programmed by Pierce County.
[6] Total cost of the pontoon replacement is $1.4 million, however the County has secured grant funding such that only $280k needs to be funded locally.

Exhibit 12 Continued
Potential Near Term Improvements

Improvement	Capital Cost	Amount to be Recovered through Fares	Potential Impact on Fares	
			Passenger	Auto/Driver
Public Information Improvements				
Update and improve information pamphlets	$1k	Negligible	Negligible	Negligible
Add parking, transit and other information to ferry system website	$25k	$2,000/yr	Negligible	$0.02
Install a "web camera" providing images of the Steilacoom holding area over the Internet	$100k+$2k/yr O&M	$10,000/yr	Negligible	$0.11
Develop an information dissemination procedures manual	$15k	$1,000/yr	Negligible	$0.01
Provide automated email notification of service disruptions	$1k+$4k/yr O&M	$3,000/yr	Negligible	$0.03
Add parking and other information to the automated telephone system	$1k+$4k/yr O&M	$3,000/yr	Negligible	$0.03

11. CONCLUSIONS AND RECOMMENDATIONS

Conclusions and recommendations from the Waterborne Transportation Study include:

1. Implement the proposed triangle runs, and add a later (7:30 p.m.) Monday-Thursday evening sailing to Anderson Island.

2. Implement proposed fare changes starting in 2004. Update thereafter in two-year cycles with a goal of moving towards 80% fare recovery by 2016.

3. Begin procurement of a new 54 car vessel to replace the M/V Steilacoom.

4. Implement overlength vehicle restrictions on morning and evening peak period sailings to provide additional auto capacity.

5. Retain the interest income generated by the ferry service.

6. Consider implementation of near term facility, ticketing and public information improvements, as they can be programmed into capital or other improvement projects and funding.

7. Consider retrofitting the M/V Christine Anderson with an electronic control system.