



Washington State Ferries

Washington State Department of Transportation Ferries Division

Final Vehicle Reservation System Predesign Study

January 11, 2010



Washington State
Department of Transportation



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WASHINGTON STATE DEPARTMENT OF TRANSPORTATION FERRIES DIVISION (WSF) FINAL VEHICLE RESERVATION SYSTEM PREDESIGN STUDY

EXECUTIVE SUMMARY

1.1 Introduction

The 2009 Washington State Department of Transportation Ferries Division (WSF) Long-Range Plan proposed a reservation system as the primary strategy to manage demand, spread peak vehicle traffic, improve asset utilization, reduce wait times, and minimize the need for costly terminal and vessel expansion projects. The first step in the process of implementing a reservation system is to conduct a predesign study, per a proviso in the 2009-11 transportation Budget.

A vehicle reservation system will reduce queuing and congestion without major terminal and vessel investments and provide enhanced customer service and increased travel predictability. The preferred alternative identified in this study will offer reservations to all vehicle customers on all but four ferry routes. On the remaining routes, where terminal capacity issues limit options for reservations, WSF would offer reservations for commercial traffic as part of its commitment to improve freight mobility. Routes proposed for full reservations account for 60% of all passengers traveling in vehicles.

In addition the preferred alternative proposes significant enhancements to communication systems for all customers on all routes, providing real-time information about congestion, expected delays, available boat capacity and departure times. The improvements to the communication system will address both the reliability of travel information collected by WSF and the means of communicating this information to the traveling public, including expanded use of highway signs, travel advisory radio and direct methods such as text and email broadcasts.

The proposed vehicle reservation system would offer reservations on select commuter-oriented routes making WSF one of the few ferry systems in the world that does this. Implementing reservations on high volume commuter routes will be challenging. Therefore, the system has been designed to be an adaptive system, complete with data gathering and analysis functions that will provide WSF with information to ensure that the system is continually monitored and adjusted as necessary to meet the needs of customers, communities and WSF.

WSF will gradually roll out and implement the reservation system, with purposeful phasing that allows for testing, education, and outreach as reservations become available on each route. WSF may also choose to implement reservations gradually on individual routes, by offering reservations first to a certain customer group (like commercial customers), for a limited number of sailings (like weekends only), or by making a small percentage of vessel capacity available. During the rollout process, the Legislature will have two major decision points, at which times it can evaluate the benefits and success of the reservation system in its funding decisions.

1.2 Purpose

This report has been designed to meet the requirements of a transportation predesign report as laid out in the Office of Financial Management (OFM) Transportation Budget instructions for 2009-2011. This predesign report generally follows the instructions provided by the Office of Financial Management (OFM) for transportation projects, but a predesign for a reservation system for ferry service is a unique project on many levels. This predesign has been formulated to meet the intent of a predesign report, and exact instructions were followed where possible.

1.3 Reservation System Goals

The overarching goal of a successful reservation system would be to improve service and meet the needs of ferry customers, ferry communities and WSF.

- Goal 1: The reservation system needs to benefit customers by being easy to use and offering an adequate degree of predictability, spontaneity, and flexibility for all customers.
- Goal 2: The reservation system needs to benefit ferry communities by reducing the negative impacts of queuing outside terminals and allowing WSF customers and local residents to access local businesses, and by reducing congestion in residential neighborhoods.
- Goal 3: The reservation system needs to benefit WSF by recognizing the unique circumstances of its different routes, helping the agency manage demand, improving asset utilization, and responding to legislative direction.

1.4 Study Approach

As envisioned in the Long-Range Plan, a vehicle reservation system would dramatically improve how most customers interact with the Ferry System, resulting in significant benefits for customers, ferry communities, and WSF. However, given the potential impacts on each of these groups, it was important to design a process that brought together the best resources from within WSF and from outside the agency to critically analyze the opportunities, challenges, and technical aspects of this project. The approach included three key elements:

Build the design on real experiences at WSF and other ferry operators (don't reinvent the wheel). The predesign process included research and analysis of WSF's own experiences with reservations and research from the experiences of other systems, including (1) a review of recent experience at Port Townsend-Keystone and Anacortes-Sidney B.C.; and (2) extensive outreach to other systems to understand how reservations work elsewhere.

Engage all of the key departments at WSF in the process. Internal WSF technical teams were organized to work through the key elements of the predesign analysis.

Engage with customer and community representatives. A group of stakeholders and members of the public provided perspectives on customer needs and concerns and gave feedback on potential business rules, vehicle processing, terminal operation, and information technology options.

An Edmonds-Kingston Partnership Group was formed, bringing together representatives from different customer groups (commuters, regular riders, tourism interests, commercial and freight), as well as representatives from Ferry Advisory Committees, ports, and cities in the Edmonds and Kingston areas. The Edmonds-Kingston route was selected because it provided a clear view of the likely challenges facing a successful implementation of a reservation system. It includes a mix of commuters, ferry

dependent residents, recreational users, and commercial users; short turnaround in between departures, diverse terminals, and serious community congestion problems.

1.5 Lessons Learned

The development of the conceptual design for a WSF reservation system was significantly shaped by the following major lessons learned:

- Customers plan for trips in different ways and want flexibility to meet their needs.
- For regular customers, the return trip presents greater uncertainty around exact travel time.
- On-time performance is a necessary pre-condition to a reservation system.
- Reliable real-time communication is crucial to the success of the system.
- A reservation system can and should be implemented differently on different routes.
- Most large ferry operators have a reservation system and they generally have more terminal capacity than WSF.
- For recreational routes, there are comparable systems to learn from.
- For short, commuter routes, there are no direct comparables.
- Reservations are a key feature of the freight programs offered by other ferry operators.

To better understand the technology options available to support a reservation system, a Request for Information (RFI) was issued in May 2009. Five of the six responses received addressed the issues in the RFI and four have software currently in use by a ferry system somewhere in the world. All of the current systems were described as very flexible and customizable to meet customer requirements. All respondents provided useful information for the evaluation of options, such as system features and capabilities, ability to integrate with existing technology (i.e. fare collection), customer service issues and options, some cost information (though not very detailed), and references for current customers.

1.6 Key Elements of Reservation System

There are four major elements of a potential WSF reservation system: (1) A communication system, (2) business rules, (3) terminal and vehicle processing, and (4) information technology and back office systems. On-time performance is a precondition for a reservation system and WSF should focus initially on reviewing and modifying route schedules where schedule delay is a significant determinant of local terminal congestion and customer delays.

Regional ferry information systems and improved communications. Improved communications would be deployed system-wide and must include improvement and further development of the following: highway/ferry advisory radio, variable messaging regional highway signs, local signs, email and texts to customers regarding their specific reservations, and improvements to traveler information on the WSF website. It is particularly important to significantly increase the quality of the information delivered so customers have enough confidence to use the system to make real-time travel choices.

Business rules. The business rules define how the reservation system will work, including how reservations will be made, when they will be made, how much of the boat is available for reservations and what the change and cancellation policies will be. The key business rules that support the system design goals include:

- Up to 90% of the vessel available for reservations during peak and commute periods; minimum of 50% of the vessel available for reservations during off-peak periods. The share of the boat available for reservations during peak times would be phased in over time, with the share starting much lower and gradually increasing as customers adapt to the new system. Ultimately the share will depend on when congestion at terminals is mitigated, which could be at levels below 90%.
- Reservations on commute period sailings made available 4 weeks in advance, all other sailings available up to 6 months in advance to provide extra incentives for customers with schedule flexibility to reserve non-commute period sailings.
- To address concerns that reservations will favor tourists over residents of ferry communities, there will be two priority access programs to provide regular users with space on all sailings. One will focus on commercial customers while the other on non-commercial regular and frequent users.
- Regular reservations (non-priority access) will require pre-payment of fare.
- There will be no extra fee for reservations.
- There will be flexibility to change or cancel reservations at no charge, though cancellation fees might apply in some cases.
- Customers would need to arrive between 15 and 30 minutes before departure to guarantee their spot on the sailing. During peak periods, a customer arriving late could lose their reservation and be directed to the drive-up queue.

Vehicle processing and terminal operations. Each of WSF's terminals has unique characteristics that affect how reservations will be implemented. The analysis suggests that a reservation system as described in the business rules would work best if: (1) there is at least 120%-150% of a vessel's capacity available for vehicle holding area; or (2) there is more than an hour between departures. Based on these criteria:

- Reservations could be made to work at 17 of 20 WSF terminals (all except Fautleroy, Tahlequah, and Vashon Island).
- While Edmonds does not meet the holding capacity and headway thresholds noted above, there are opportunities to support reservations with some modest modifications to the business rules or method of operation at terminals.
- Mukilteo currently meets the minimal operating needs, however the holding area includes leased land that is available for five years. Without a long-term solution at Mukilteo, it may not be possible to effectively support reservations on this route.
- Fautleroy presents the greatest challenge for implementing reservations due to the inadequate holding area, short headways and turnaround times on the route and multiple destinations. These challenges cannot be overcome without significant terminal expansion or operational changes, such as shifting Southworth traffic to downtown Seattle.
- Customers need to be able to make informed choices with real time information that is available through multiple communications methods.
- Prepayment of fares should be encouraged as a means of speeding the processing time at terminals.

Information technology. Information technology will be needed to support the reservations as defined in the business rules. While the system improvements are feasible, there will be some system

development challenges, particularly around the type of enhanced communications that are necessary to make reservations work effectively on WSF's higher-volume, commuter routes.

The most critical technology link for reservations is with the ticketing system. WSF has recently invested considerable time, effort and resources into a complete overhaul of its ticketing system. Since reservations will offer a way to provide a guaranteed trip, it is best to think of a reservation as pre-selling the space of the boat.

Currently all tickets issued in the Wave2Go system can be redeemed for travel on any sailing within a 90-day window. When a reservation is made, the issued ticket is linked to a specific sailing. If the reservation is canceled, the ticket can also be canceled, or its status returned to "open." The ticketing system integration will address these key requirements:

- The ticketing system is independent from the reservation system, but must be able to share information back and forth.
- At the time of vehicle processing, information available to toll booth operators needs to include reservation confirmations plus any amount pre-paid so the ticket seller can verify that the appropriate fare has been paid and complete the transaction.
- Ticket seller must have the ability to add to any prepaid amounts to account for the final transaction costs reflecting actual vehicle used for the trip and the number of passengers.
- The system must work with the existing multi-ride products.
- To facilitate and speed vehicle processing, the reservation system must accommodate the option of fully pre-paying applicable fares (vehicle and passengers).

These elements of integration will be part of the minimum requirements in any reservation system procurement or development effort.

1.7 Alternatives Considered & Preferred Alternative

The costs and risks associated with developing and implementing the reservation program described above will vary according to specific service and route characteristics. Predesign alternatives were thereby constructed to assess the relative costs and benefits of different deployment concepts. To demonstrate how costs, benefits, and risks change as more elements are added to the WSF reservation system, the alternatives build on each other (beginning with the easiest to the most difficult), until the final option presents an alternative with full reservations implementation on all WSF routes.

Exhibit ES-1 presents the summary assessment of the following five alternatives:

- **Alternative 1: Industry Standard Package Upgrades to Routes that Currently Offer Reservations.** WSF currently operates a basic reservation system on three routes, Anacortes-Sidney, Port Townsend-Keystone, and commercial reservations for the San Juan Islands. Alternative 1 would upgrade the current reservation system with an industry standard reservation package that encourages online bookings. It would be linked to the current ticketing system and would include enhanced communication around general travel-related information.
- **Alternative 2: Alternative 1 plus Expanding Reservations to San Juan Islands vehicle trips and Commercial Reservations System-Wide.** This alternative would build on Alternative 1 by expanding reservations from commercial customers to all service on the Anacortes-San Juan Islands routes

(except Interisland). Commercial reservations would be made available on all routes throughout the system.

- Alternative 3: Alternative 2 plus Intelligent Transportation System (ITS) Communication.** This alternative would develop and build a regional ITS communication system comprised of variable messaging signage, highway advisory radio, and web cameras to notify customers at key travel decision points of congestion at terminals and service disruptions. Alternative 3 would reduce congestion by helping customers make better decisions about which routes and sailings to take and directing them to less congested terminals. An effective real-time communication system that works on a large scale is a key factor for successful implementation of reservations in the Central Sound, and must therefore be in place before reservations are extended to additional routes.
- Alternative 4: Alternative 3 plus Reservations Extended to Seattle – Bremerton, Seattle – Bainbridge, and Edmonds - Kingston.** This alternative makes reservations available for all vehicle traffic on routes where terminal facilities are determined to be adequate (in the case of Edmonds, with minor modifications) to support reservations. All Central Sound routes have been included in order to prevent a shifting of traffic that could potentially occur if one or two Central Sound routes had a reservation system and one or two routes did not.
- Alternative 5: Alternative 4 plus Extend Full Reservations to All Routes.** This option includes implementation of a reservation system for all customers in the system by adding the Vashon Island and Southworth routes plus Mukilteo-Clinton.

Exhibit ES-1 Assessment of Alternatives

		Queue Reduction Potential	Number of Riders who Benefit	Risk	Capital Cost (2009\$)
1	Standard Package Upgrades (current routes w/reservations)	High (on select routes)	4% of vehicle drivers and their passengers would benefit	Low	\$4.1M
2	Alternative 1 plus all San Juan Islands & commercial reservations all routes	High (on select routes)	13% of total vehicle drivers and vehicle passengers benefit	Low	\$6.2M
3	Alternative 2 plus Regional ITS communication system	Medium across the system and high on select routes	13% benefit from reservations; Most riders (including passengers) receive some benefits	Low	\$17.7M
4	Alternative 3 plus full reservations extended to Central Sound routes	High on most routes, with medium on remaining routes	60% of vehicle drivers passengers benefit from reservations; Most riders receive some benefits	Medium	\$23.7M
5	Full reservations & communications on all routes	High	Most riders receive maximum benefits	High	\$26.4M

Preferred Alternative. Alternative 4 is the preferred alternative because it results in the greatest overall benefits in terms of customer time savings and demand management potential. This option offers these benefits to the majority of the system while keeping costs per rider low and implementation risks manageable. South Sound routes and Mukilteo-Clinton, which would not have access to the full reservation program under this option, will still realize benefits through an improved communication system, reliable real-time traveler information and commercial-only reservations.

Without a relocated Mukilteo terminal or a permanent solution at the current site (the Buzz Inn property is secured for only a five year lease term) the implementation risk for full reservation deployment is too high to justify the additional terminal investments needed. If the terminal situation is resolved in such a way as to reduce the operational risks, then extending reservations to this route could be revisited at that time.

On South Sound routes, where terminal and operating constraints are greatest, supporting reservations would require either major terminal investments or major operational changes (like connecting Southworth to Colman Dock, rather than Fauntleroy). Without major investments, reservations would not be feasible at these terminals and the benefits of reservations are not sufficient to justify these much larger capital investments or operational changes.

Exhibit ES-2 shows the improvements that implementation of the preferred alternative would bring to each of WSF's terminals and routes.

Exhibit ES-2 Summary of Preferred Alternative Improvements by Terminal

Terminal	Reservation Availability	Communication Improvements			Terminal-Related Improvements				
		Regional VMS Signs	Highway Advisory Radio	Queue Detection	Local VMS	Traffic Management Signs	Ferry Advisory Radio	Other	
Anacortes	All Customers		X			X	X		
Bainbridge	All Customers	X	X	X	Existing	X	X		
Bremerton	All Customers	X	X		Existing	X	X		
Clinton	Commercial Only		X	X		X	X		
Edmonds	All Customers	X	X	X	Existing	X	X	Additional tollbooth, traffic gate	
Faultleroy	Commercial Only	X	X						
Friday Harbor	All Customers *		X			X		3 Web cameras	
Keystone	All Customers		X			X	X		
Kingston	All Customers	X				X	X		
Lopez Island	All Customers *		X			X	X		
Mukilteo	Commercial Only	X	X	X		X	X		
Orcas Island	All Customers *		X				X		
Point Defiance	Commercial Only		X			X	X	2 Web cameras	
Port Townsend	All Customers		X			X	X		
Seattle	All Customers	X	X				X		
Shaw	All Customers *						X		
Sidney	All Customers								
Southworth	Commercial Only	X	X		Existing	X	X		
Tahlequah	Commercial Only		X				X		
Vashon Island	Commercial Only		X					2 Web cameras	

* Excludes inter-island sailings

1.8 Implementation

The proposed implementation program was developed based on balancing several goals: (1) a desire to minimize implementation risk; (2) to create opportunities for early successes to build customer confidence in the new system; and (3) to offer enhancements where the need is greatest. Toward these ends, the following three-phase approach is proposed:

- **Phase 1: Initial acquisition and testing of the “industry-standard” reservation system (May 2010 through June 2011).** In this phase WSF would procure an industry-standard reservation system and integrate this system with the Wave2Go ticketing system and the rest of the core IT infrastructure. The system would then be deployed on the routes that currently have reservations (likely in spring 2011) and fully tested. These include the International Routes to Sidney, the Port Townsend-Keystone route and commercial reservations in the San Juan Islands. Also, in this phase the basic information collection enhancements to accurately calculate wait times at terminals would be built.
- **Phase 2: Full implementation on the northern routes (July 2011-June 2014).** Once the initial system deployment has been fully tested (likely fall 2012), then the next step for reservations would be to extend the availability of reservations to all of the Anacortes-San Juan Island routes. This phase would also include extending reservations for commercial account customers throughout the WSF route network and implementation of the remaining portions of the regional ferry ITS.
- **Phase 3: Expansion to the Central Sound commuter-oriented routes (July 2015-June 2018).** By this time, the reservation system, including the priority access programs, should have a track record of success and the regional ITS program would be fully operational. These factors will be significant elements of a risk mitigation strategy for fully deploying reservations on the high volume and commuter-oriented routes at Seattle-Bainbridge, Seattle-Bremerton, and Edmonds-Kingston. It will likely take a year to develop the IT system enhancements necessary to support these routes. A pilot would then be tested on one of the Central Sound routes for 3-6 months, prior to extending reservations to all these routes.

One of the benefits of this phased implementation schedule is it allows for a break between Phase 2 and Phase 3. Before committing funding to the final phase where the implementation risks are highest, WSF will have more than two years of operating experience with reservations in the north sound, an understanding of the impact of the ITS investments on demand management in the Central Sound and an opportunity to revisit and refine the approach to reservations on the commuter routes based on these inputs.

Route-level implementation measures. Another key element of the phasing program will be close coordination with local communities and customers on routes where reservations are planned. To support the introduction and early implementation phase on a new route, WSF will organize a Partnership Group for that route as a mechanism to engage key local stakeholders in the decision making process. These Partnership Groups will be modeled on the successful process used for the Port Townsend-Keystone terminal and vessel studies and the Edmonds-Kingston group used to assist in the development of this predesign report. These groups would meet to evaluate how the system should work on their route, comment on terminal modifications/vehicle processing changes and review business rule phasing.

1.9 Budget Analysis

The budget analysis takes the total estimated capital investment needs and spreads these costs over the 16-year Legislative Financial Plan horizon to show both the magnitude and timing of the funding required to implement the preferred alternative. The capital cost estimate of \$24.5 million shown in Exhibit ES-1 is spread out according to an implementation schedule and escalated to year of expenditure dollars, using the forecast implicit price deflator (IPD) as per OFM budget instructions.

Once escalated, total costs are estimated to be \$25.0 million in year of expenditure dollars, and the costs are spread over five biennia. As a point of comparison, in the Long-Range Plan, the investment needs for a WSF reservation system were estimated to be \$18 million over the next five biennia, approximately \$7 million less than current estimates. These estimates were included in the legislative 16-year financial plan.

There are several important differences between the preferred alternative and the Long-Range Plan assumptions, but the one change that has the biggest impact on the budget is the proposed investments in a regional Ferry ITS program. The regional highway variable message signs (VMS) in particular account for a large portion of this difference.

It is possible to think of the preferred alternative as two separate but related projects: (1) a \$12.9 million regional ferry ITS program; and, (2) an \$12.1 million reservations system. The ITS investments will have demand management benefits, irrespective of reservations, and, in fact, could proceed without the reservations element.

By contrast, the reservations investments would provide WSF a much more robust demand management capability in places where the system can reasonably be deployed. However, to maximize the effectiveness of the reservation system investments and support a smooth implementation process, the regional ferry ITS program would need to be in place prior to reservations rolling out to Central Sound routes. If these communications improvements were already in place, then reservations would be an \$12.1 million project.

Another important budget-related factor is the fact that the Phase 3 funding decision does not need to be finalized until the 2015-17 Budget. The cost of deploying full reservations for the Central Sound routes is \$6.7 million. Before the legislature needs to commit to this phase, WSF will be able to demonstrate both how well reservations are working and the demand management benefits of the investments in real-time information.

For the operating budget, the analysis suggests that initially the operating impacts will be relatively minor, with cost impacts of less than \$1 million for each of the first two biennia. Costs are expected to jump to \$1.4 million in 2013-15, \$2.3 million in 2015-2017 and to over \$3.2 million per biennium starting in 2017-2019. Costs are based primarily on staffing impacts for terminal operations (3.7 FTE's), Information Technology support (2.0 FTE's) and additional customer service requirements, primarily related to call center support and the commercial program (7.0 FTE's). The biggest factor in the increased costs in later biennia is a jump in call center staffing needs related to Phase 3 of the reservation system deployment, when reservations are extended to the Central Sound routes.

During the development of the Long-Range Plan, the operating impacts of a potential reservation system were not fully evaluated. However, an annual allowance of \$500,000, or \$1 million per biennium, was included in the long-term financial analysis as a way to account for some unknown impacts.

1.10 Next Steps

Subsequent steps in the implementation will be dependent on legislative action during the 2010 session. Assuming the legislature directs WSF to proceed with the preferred alternative, the steps to implementing Phase 1 will likely be as follows:

- Complete schedule review and realignment (in progress)
- Begin final design of the project elements
- Procure a reservation system through a request for proposal (RFP) process
- Integrate the new reservation system with WSF's existing IT infrastructure
- Convene a local Partnership Group for the Port Townsend-Keystone route to discuss implementation and phasing of the new system on that route
- Complete necessary terminal modifications at the Phase 1 terminals
- Launch the new reservation system on the routes which currently have reservations (Port Townsend-Keystone, International routes, and commercial-only in the San Juan Islands).

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WASHINGTON STATE DEPARTMENT OF TRANSPORTATION FERRIES DIVISION (WSF) FINAL VEHICLE RESERVATION SYSTEM PREDESIGN STUDY

1.0 INTRODUCTION

This chapter introduces the purpose of a predesign and describes how and why this study is different from a typical predesign study. It describes how this study meets the intent of a predesign report and explains how the document is structured, crosswalking the structure to OFM's Transportation Predesign outline.

1.1 What is a Predesign Report?

"Key to the success of any capital project is a clear understanding of the need/problem to be addressed and a thoughtful analysis of available options to meet the need or solve the problem." – Office of Financial Management

This report has been designed to meet the requirements of a predesign report as laid out in the Office of Financial Management (OFM) Transportation Budget instructions for 2009-2011, which include:

The predesign process is a decision making tool for large capital budget expenditures. The intent of a predesign study is to investigate alternatives for public service delivery or administration. It should assess which alternative best solves a specific problem and at what cost. This will assist decision makers in determining whether the project should proceed to design and construction.

During the predesign process, the agency answers specific questions designed to ensure full understanding of the viable alternatives to resolve the need/deficiency that has been identified. The need should be directly related to the delivery of public service. These questions include the refinement of the scope, project management, schedule, quality, budget, and location of a project by answering the questions of who, why, what, where, when, and how much.

The predesign study involves data collection, analysis, organization, communication, and evaluation through which viable alternatives and elements of the proposed projects design shall be explored. It includes the establishment of an agency's programmatic, qualitative, financial, schedule requirements, and limitations for a project. It should explore the physical attributes of a proposed project, as well as the design response to meet service delivery and user needs.

While the predesign is a solid foundation from which to begin design, it does not impose constraints that cannot be altered during the design process if additional information becomes available. Reasonable flexibility, within legislative intent, during the design and construction process is expected and encouraged. Scope changes must be communicated to the agency's transportation budget analyst at OFM.

1.2 Legislative Direction

The 2009 Washington State Department of Transportation Ferries Division (WSF) Long-Range Plan proposed a reservation system as the primary strategy to manage demand, spread peak vehicle traffic, and improve asset utilization, thus reducing customer wait times and minimizing the need for costly terminal and vessel expansion projects. Given the costs associated with such a system (estimated at \$18 million in capital investments in the Long-Range Plan), WSF must complete a predesign study before requesting funding for design and implementation from the Legislature, as directed in the following legislative budget proviso:

“The department shall complete a predesign study and present the study to the joint transportation committee by November 1, 2009. This analysis must include an evaluation of the compatibility of the Washington state ferries' electronic fare system, proposed reservation system, and the implementation of smart card. The department may not implement a statewide reservation system until the department is authorized to do so in the 2010 supplemental omnibus transportation appropriations act.”

The due date was subsequently adjusted by the chairs of the House and Senate Transportation Committees so that a draft predesign report would be released by December 15, 2009, with the final report prepared in advance of the 2010 legislative session.

1.3 Not a Typical Predesign

This predesign report generally follows the instructions provided by OFM for transportation projects, but recognizes that transportation-related predesigns are a relatively new convention and that even within the realm of transportation projects, a predesign for a reservation system for ferry service is a unique project on many levels. This predesign has been designed to adhere to the intent of a predesign report, and exact predesign instructions were followed where possible. Some reorganization of sections and additional analysis has been undertaken where necessary to fully and coherently explain the analysis and proposed design of this reservation system.

This report differs from the OFM predesign outline because of the differences between designing traditional transportation capital projects, such as roadways, and designing a system that has both capital, operational, and customer service impacts. A reservation system is foundationally an information technology service that requires infrastructure to support its function, rather than being first and foremost a piece of transportation infrastructure.

This predesign is also different because options for addressing the demand problems and accommodating ridership during peak periods have already been weighed by the Long-Range Plan. A reservation system has already been selected as a better alternative to no action, congestion pricing, and expanding terminal facilities. This predesign walks through the decision process for selecting a preferred alternative for deploying a reservation system to best serve customers and WSF, and what the cost implications of those decisions might be.

A summary of the modifications made to the OFM standard predesign, as well as an outline of this report, can be found in Section 1.4.

1.4 Organization of this Report

A typical predesign report begins by identifying a problem that needs to be addressed, identifying alternatives to address the problem, and then selecting a preferred alternative. This predesign report, due to the uniqueness of the reservation system, follows instead a two-tiered decision making process.

WSF's first step, the analysis for which was completed during the Long-Range Plan, was to choose a method for addressing its demand management needs. The options were a no-action alternative, implementing reservations, expanding the system which would require a larger fleet and major terminal investments. Using a cost benefit analysis, WSF determined that a reservation system would be the most cost effective way to manage and spread its demand, as was directed by the Legislature. Details about the different alternatives and this decision making process are included in Section 2.2.

Once WSF determined that a reservation system was the best choice, the Legislature directed WSF to undertake this predesign study, which analyzes and identifies alternatives for the second tier of decisions. These decisions include the how a reservation system would really work on WSF routes and the details and choices about implementing reservations across the system.

Report Organization

This predesign report has nine chapters, including this introductory chapter, that address the predesign elements required in OFM's Budget Instructions for Transportation guidelines, as well as other analysis that WSF determined was necessary to fully assess the options and choices available. The remaining eight chapters include:

- **Chapter 2: Background and Context.** This chapter describes the problem a reservation system is trying to address and identifies alternatives to address this problem that were analyzed in the WSF Long-Range Plan.
- **Chapter 3: Process and Lessons Learned.** This chapter explains the process undertaken by WSF to analyze the potential elements of a reservation system, including business rules, vehicle processing techniques, and IT components. It also describes the key lessons that WSF learned from its own experience, the experience of other ferry systems around the world, and from this study's stakeholder process and how each of these impacted system design.
- **Chapter 4: Program Analysis.** This chapter defines what a reservation system is, describes the basic elements of different reservation system models, and identifies the goals and objectives of a reservation system. It also discusses which reservation model elements best meet the demand management needs identified in the Long-Range Plan, as well as the more detailed goals and criteria of a WSF reservation system.
- **Chapter 5: Project Analysis.** This chapter describes the business rules, terminal operations, and IT components needed to support a reservation system on each route.
- **Chapter 6: Cost Benefit Analysis.** This chapter identifies the capital and operating costs associated with the reservation system. It walks through a cost benefit analysis to determine the most cost effective approaches to meeting project objectives and proposes a preferred alternative.
- **Chapter 7: Implementation.** This chapter describes how the reservation system would be implemented in general and at the route level.

- **Chapter 8: Budget.** This chapter describes how and when money would be spent on the reservation system, including funding sources and risk assessment.
- **Chapter 9: Policy and Regulatory Coordination.** This chapter describes how the reservation system would align with State and WSF policies and goals.
- **Appendices.** The following appendices are included with this predesign report:
 - **A: Partnership Group Meeting Summaries.** This appendix includes meeting minutes from all eight Edmonds-Kingston Partnership Group meetings.
 - **B: Public Comments Regarding the Reservation Predesign Study.** This appendix includes public comments mailed to WSF regarding the Reservation Predesign Study.
 - **C: Summary of Other Systems Research.** This appendix includes a summary of business rules and lessons learned from WSF's research into other ferry operators around the world.
 - **D: Summary of Responses to WSF's Request for Information.** This appendix summarizes the five responses that WSF received to its Request for Information from reservation system vendors.
 - **E: Detailed Information about Cost Estimates.** This appendix provides supporting information for all cost estimates presented in this report.
 - **F: Crosswalk to ISB Requirements.** This appendix shows how this predesign report satisfies the requirements of an ISB Feasibility Study.
 - **G: WSDOT Standard Project Management Process.** This appendix includes documents outlining the standard project management processes adopted by WSDOT.

These chapters do not align exactly with the order of information as requested in the OFM Budget Instructions for Transportation, although all requested information is included. Exhibit 1 provides a crosswalk that explains where each of the required elements are in this predesign report, and why they have been modified and organized this way.

Exhibit 1
Crosswalk to Required Predesign Elements from OFM’s Predesign Checklist

Elements Required by OFM	Location in this Report or Explanation of Omission
<i>Executive Summary</i>	Executive Summary
<i>Project Analysis</i>	
Discussion of operational needs	Section 2.1 (ridership growth) Section 4.1 (system goals)
Discussion of alternatives	Section 2.2 (demand management alternatives) Section 4.2 (reservation models) Section 6.1 (project alternatives)
Discussion of selected alternative	Sections 6.4 and 6.5 (cost benefit analysis)
Identification of issues	Section 5 (project analysis – scheduling, communications, IT, etc.)
Prior planning and history	Section 2.1 (LRP history)
Stakeholders	Section 3.1 (Partnership Group and process)
Project description	Section 5 (project analysis – describes the project thoroughly)
Implementation approach	Section 7.1
Project management	Section 7.4
Schedule	Section 7.2
<i>Program Analysis</i>	
Assumptions	Assumptions are spelled out in various sections including in 5.2 (business rules) 5.3 (terminals) 5.4 (IT) 6.2 (capital costs) 6.3 (operating costs) 6.4 (cost benefit analysis) and 8.1 (budget analysis)
Functions and FTEs	Section 6.3 (Ongoing operating costs)
Spatial relationship between the facility and the site	5.1 (communications – includes conceptual maps/diagrams), Appendix E (cost information and support)
Interrelationships and adjacencies of functions	N/A – this is a space planning requirement
Major equipment	Section 6.2 (capital costs – describes specific investments in major equipment)
Special systems such as environmental and information technology	Sections 5.1 (communications), 5.4 (IT) and 6.2 (capital costs)
Future needs and flexibility	Sections 6.5 (preferred alternative description) and 7.1 (approach to implementation)
Sustainability and energy utilization	Section 9.1 (relation to WA State policy goals)
Applicable codes and regulations	Section 9.2 (WAC, Coast Guard, etc.)
<i>Site Analysis</i>	N/A - this project does not have a site selection component
<i>Project Budget Analysis</i>	
Assumptions	Appendix E (detailed cost information)
Detailed estimates	Sections 6.2 and 6.3 (capital & operating costs); Appendix E
Funding sources	Section 8.3
Project cost estimate	Section 6.5

Elements Required by OFM	Location in this Report or Explanation of Omission
Form C-3, Benefit, and Life cycle cost analysis summary	Section 6.4 (cost benefit analysis)
Master Plan and Policy Coordination	
Impacts to existing plans	Section 9.1 (GMA and local planning); No impacts to master plans expected – not a facilities project
Adherence to state policies	Sections 9.1 and 9.2
Facility Operations and Maintenance Requirements	
Assumptions	Section 6.3
Operating costs in table form	Section 6.3
Staffing plan (capital and operating)	Section 6.3
Project Drawings/Diagrams	
Site plans	Appendix E (for selected terminals)
Building plans	N/A – no facilities proposed
Building volumes	N/A – no facilities proposed
Elevations	N/A – no facilities proposed
Appendix	
Predesign checklist	Section 1.4
Project budget unit cost detail	Section 6.4; Appendix E
Sustainable design charrette summary	N/A – no facilities proposed
Additional information as needed	Appendices A, B, C, D, E, F, and G

2.0 BACKGROUND AND CONTEXT

This chapter describes the problem a reservation system is intended to address, the alternatives to a reservation system analyzed prior to this predesign study, and the approach used to develop and analyze the elements of a reservation system.

2.1 Problem Statement/Statement of Need

Space on WSF's vehicle deck during peak times is a scarce commodity. Often there are more vehicles wanting to board a given sailing than can be accommodated given the available capacity. This has led to congestion in and around terminals, growing wait times for customers, and an overall level of service that has been deteriorating over time.

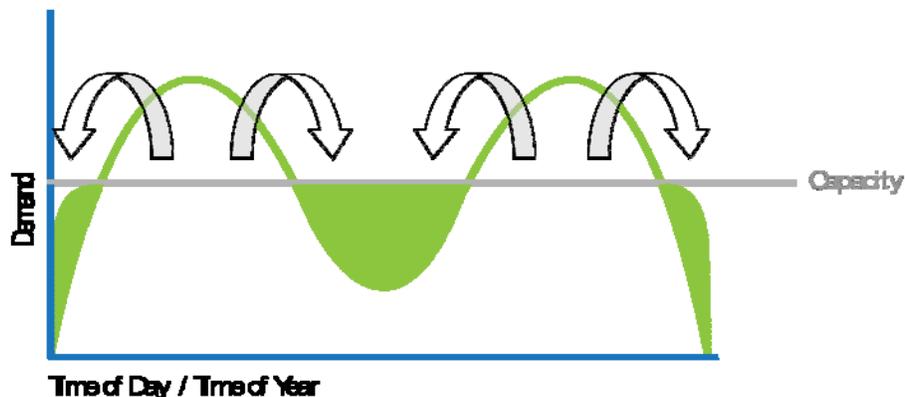
The Long Range Plan projects that demand for ferry services is expected to increase over time and that this situation will likely worsen. Expanding the fleet to add vessel capacity is a costly proposition, and one that needs to be considered in the context of other transportation infrastructure needs across the state. Expanding services would also likely trigger significant terminal capacity investments to support the higher service levels.

Demand Management

Without additional capacity expected (at least over the 22-year long range planning horizon), WSF has been directed by the Legislature to take steps to manage its demand. ESHB 2358, passed in 2007, requires WSF to both accommodate ridership growth and to "level peak period demand." Effectively, this means WSF needs to enact strategies that will move discretionary trips currently happening during peak times to other times during the day where there is capacity. The projected ridership growth is relatively easy to accommodate if it occurs primarily on off-peak sailings.

Exhibit 2 provides an example of the ferry system's demand patterns. Vehicle demand is currently greater than available capacity during certain times of day and in peak seasons. The ferry system's challenge is to accommodate demand growth while shifting riders into time periods that have excess capacity.

Exhibit 2
Shifting Peak Demand to Off-Peak Capacity



WSF’s ability to accommodate forecasted growth levels is significantly affected by the available vessel capacity during the “peak commute periods” and the capacity of terminal facilities to stage traffic during these periods. While demand for ferry services can vary widely by time-of-day, day-of-week, and season, for planning purposes it is useful to look at “typical” peak conditions.

The implications of ferry demand growth on service and terminal planning are summarized in Exhibit 3, which presents the expected growth in traffic during peak periods. The table shows trips moving through the departure and arrival terminals for the afternoon commute period on WSF’s principal commuter routes and focuses on vehicles and walk-ons since these modes of access will have terminal implications. The number of in-vehicle passengers is not included in the table.

**Exhibit 3
Principal Commuter Routes, Westbound PM Ridership**

	Vehicles				Walk-Ons			
	4-Hr Peak		Peak Hr		4-Hr Peak		Peak Hr	
	2006	2030	2006	2030	2006	2030	2006	2030
Departure Terminals								
Pt. Defiance	216	259	75	89	77	101	26	36
Vashon	45	98	13	37	14	24	7	8
Fauntleroy	899	1222	282	387	484	586	157	185
<i>To Vashon</i>	<i>536</i>	<i>630</i>			<i>272</i>	<i>166</i>		
<i>To Southworth</i>	<i>363</i>	<i>592</i>			<i>212</i>	<i>420</i>		
Colman Dock	1,603	2,102	600	785	3,739	4,742	1399	1771
<i>To Bainbridge</i>	<i>1,108</i>	<i>1,535</i>			<i>2,567</i>	<i>3,476</i>		
<i>To Bremerton</i>	<i>495</i>	<i>567</i>			<i>1,172</i>	<i>1,266</i>		
Edmonds	1,002	1,378	353	492	378	671	134	237
Mukilteo	974	1,155	281	340	487	908	138	264
Arrival Terminals								
Tahlequah	216	259	75	89	77	101	26	36
Vashon	581	728	196	240	286	190	99	63
Southworth	363	592	113	186	212	420	71	134
Bremerton	495	567	198	228	1172	1266	463	502
Bainbridge	1,108	1,535	433	604	2,567	3,476	1010	1368
Kingston	1,002	1,378	353	492	378	671	134	237
Clinton	974	1,155	281	340	487	908	138	264

Source: WSF Long-Range Plan, June 2009

The following are the significant demand forecast implications for service and terminal planning:

- Daily vehicle trips through these principal commuter corridors are projected to increase by nearly 1,500 trips by 2030, or approximately 31% during the 4-hour period.
- Approximately 34% of the new vehicle trips (about 500) during the peak period are expected to be on routes operating out of Colman Dock. These new trips are projected to be distributed with 86% destined for Bainbridge Island and 14% to Bremerton.

- Under the current system, automobiles queue within and around the terminals, waiting until there is adequate vehicle capacity on a vessel. This is an extremely inefficient system that has high costs in terms of lost time, unpredictability for riders, customer frustrations, and negative community impacts. Building larger holding areas would only partially improve the system, and would require significant capital investments and would increase operating costs.
- At many terminals during periods of high demand, the capacity of the terminal vehicle holding is reached and traffic begins to overflow. When the holding areas overflow, the traffic and congestion impacts are frequently severe on streets and highways surrounding the terminals. Effects are felt by the neighborhoods and businesses in the terminal area, whose business traffic is impeded. In most cities and towns served by WSF, local and county governments see this traffic impact as untenable. While most understand ferry traffic is an overall benefit to the community, when waiting ferry traffic clogs the streets, increases air pollution, and reduces commerce, it is no longer seen as beneficial and is largely deemed as detrimental.

There are a number of secondary impacts that also result from this situation, in addition to the customer inconveniences in terms of lost time, energy use, lack of predictability, frustration, as well as environmental impacts associated with unnecessary vehicle emissions while customers are spending extra time in ferry queues. The system also experiences higher operating costs for traffic control and often experiences the costs associated with the acquisition, construction, and maintenance of auxiliary holding areas to accommodate these peak conditions.

2.2 Discussion of Alternatives

Given this problem, WSF could pursue a number of options that range significantly in terms of management requirements and costs. These options were discussed at length in WSF's Long-Range Plan and are summarized below.

No Action

As most of the options for addressing a situation where demand exceeds the availability of resources during certain times have substantial initial capital costs associated with them (and several have operating impacts as well), one might assume that a "do nothing" scenario is a viable, low cost option.

This is not the case. Without strategies to encourage mode shift and manage growing vehicle volume at terminals, the ferry system would experience service degradation and vehicle queuing that translates into significant costs and impacts for local communities. While these costs are difficult to quantify, they are experienced in the form of reduced profits for local businesses and negative public health impacts of pollutants generated by idling vehicles.

Expansion of Facility and Vessel Capacity

Given that the no action scenario carries significant costs, a logical conclusion might be to build facilities and vessels that can accommodate the demand. Terminal expansion would require building larger terminal holding areas to accommodate all vehicles, including more extensive use of auxiliary and/or remote holding to accommodate vehicles during overload situations. This would move obstructive traffic away from local businesses, and reduce idling. Two or more boat loads of storage would likely be required to effectively shift vehicles and reduce traffic.

This option has the significant drawbacks of: (1) requiring very costly capital investments for terminal holding, expansion, and vessel acquisition and (2) increasing maintenance and other operating costs. In

the facility options considered, there are substantial investments in large facilities, which if located over water, can be very difficult, if not impossible, to permit.

Historically, WSF has focused on a facility expansion approach to accommodate excess demand. For example, during the 1990s, WSF pursued a multimodal terminal strategy that would have provided a significant increase in the holding capacity at a number of terminals. The total cost of this program was estimated at approximately \$1 billion in year of expenditure dollars.

With respect to vessel acquisition, WSF has requested funding from the Legislature to replace aging vessels. Details of the vessel replacement program are included in the Long-Range Plan. Where appropriate, some modest size increases to existing vessel capacities have been proposed. Within the current 16-year legislative financial plan for transportation, the vessel replacements have yet to be fully funded, and beyond the 16-year window, replacement needs grow substantially. These vessel replacements take priority over any vessel acquisitions that would allow increased service levels, and given the magnitude of statewide transportation infrastructure needs, the Long Range Plan assumes no increase in the size of the WSF fleet in the next 22 years (over the life of the long range planning period).

More recently, given the significant reduction in WSF's dedicated capital funding, a much less ambitious program of improvements has been identified that would address vehicle queuing outside terminals, primarily with remote holding facilities. This approach, which is designed to mitigate terminal traffic impacts at a relatively low cost, is estimated to cost approximately \$280 million in capital costs.

Operating Strategies

For this reason, the Long-Range Plan concluded that a package of well-coordinated operating strategies designed to address the specific situations faced by each ferry terminal is a key component to addressing the problem. In most cases, these strategies would eliminate the need for additional terminal investments or even reduce the existing terminal capital program. Furthermore, they reduce and postpone the demand pressure for additional investment in new vessels.

The strategies identified as having the greatest impact on demand management and operating efficiency objectives are cost effective relative to expansion or no action alternatives and are described in further detail below.

Pricing

WSF ridership and fare history has shown that demand for ferry service is sensitive to fares, and for this reason, general fare increases can also have demand management effects. As prices increase in real terms, total ferry system riders are likely to decrease. Similarly, if prices decrease, demand for services is likely to increase.

Following this logic, a number of pricing strategies ranging from peak period surcharges to small car discounts were analyzed as part of the long range planning process. The analysis relied upon the ferry system's revenue model, constructed using a long history of short-term demand responses to actual fare increases. It was augmented by elasticity coefficients and mode shift information from the Washington State Transportation Commission (WSTC) customer survey conducted in 2008.

Pricing can be a very effective tool for demand management. Take for example a time of day pricing scenario. Time of day pricing targets vehicles traveling during the most congested times of day, when capacity constraints are at their tightest. Based on survey responses, some riders have flexibility with

regard to travel times, and a time of day surcharge would be an effective way to encourage time shifts out of the peak, as well as mode shifts from vehicles to walk-on.

Exhibit 4 shows the estimated system-wide effects of a time of day surcharge. Under increasingly higher peak period surcharges, vehicles priced out of the peak would primarily move to other times, some would leave the system, and a smaller portion would shift to walk-on. While these shifting effects are large (at a 50% peak period surcharge, more than half of the vehicles normally traveling during the peak would change behavior), revenue impacts are relatively small. However, at the high end of surcharges analyzed, the revenue impacts would be negative, as riders would be priced out of the system. The analysis assumes a standard four hour commute peak window, though this would likely vary by route, based on actual congestion levels.

Exhibit 4
Estimated Effects of a Time of Day Peak Surcharge



Because of the negative effects a time of day surcharge would have on customers (especially those unable to shift travel patterns and for lower income customers), this strategy is not currently being considered by WSF for near-term implementation. However, this is an effective demand management strategy and, as such, is something that WSF could revisit if other demand management strategies do not prove to address the problem.

Other pricing strategies that were focused on off-peak or other discounts to incent riders out of the peak showed some promise with respect to demand management goals, but all resulted in substantial revenue loss that would need to be covered by other funding sources.

Transit Enhancements

Transit enhancements are strategies that encourage the use of public transit systems and thereby increase mode shift. The WSTC customer survey corroborated the notion that transit enhancements are likely to have a significant mode shift impact. Particularly on commuter routes, a large portion of ferry customers identified inadequate transit connections and other transit related issues as a significant driver of mode choices.

To effectively implement a package of transit enhancements most likely to result in mode shift behaviors, WSF would need to coordinate closely with local transit agencies. It is expected some of the costs for improvements would be borne by WSF, while local transit organizations would need to provide other service improvements. Like WSF, it is recognized that local transit agencies are hard pressed for

funding service enhancement. While the support of local transit agencies is desirable and provides the biggest mode shift impact, there are still mode shift benefits to be gained by the WSF only improvements, and those will be pursued where funding is available.

Reservation System

In contrast to the capital investment intensive options described above, a vehicle reservation system would have more modest acquisition and operating costs. Terminal updates and information technology capital investments required to implement a vehicle reservation system were estimated in the Long Range Plan to be approximately \$18 million. In addition, a vehicle reservation system was expected to require \$2 million per biennium in additional operating costs. The investment in reservations was determined to have the potential to effectively mitigate the terminal congestion problem, and in comparison to the other options, was much less costly.

Furthermore, where some options, like no action or pricing to manage demand, pose significant costs to WSF customers and communities (in terms of higher prices or traffic congestion), a reservation system provides significant benefits to these groups in terms of reduced congestion and time savings and predictability for customers.

When compared to the other alternatives and considering its effectiveness with respect to demand management and benefits to communities around the ferry terminals, an \$18 million initial investment in a vehicle reservation system was determined to be a cost-effective option.

The cost estimates in the Long Range Plan were based on a very conceptual understanding of what a reservation system would look like and how it would be implemented. The purpose of this predesign is to build on the work in the Long Range Plan and thoroughly assess how a reservation system would work and, based on that more detailed understanding, a much more comprehensive review of capital and operating costs developed. In the chapters that follow, a reservation system for WSF is thoroughly evaluated in terms of system design, business rules, information technology requirements, route level options, and cost benefit of reservations alternatives.

3.0 PROCESS AND LESSONS LEARNED

This section explains the methodology used to analyze elements of a potential reservation system, including the process of collecting data and feedback. Work with stakeholders, discussions with the public, and lessons learned from current WSF reservation systems and other reservation systems around the world, are discussed.

3.1 Process

To ensure a rigorous predesign study WSF designed a process that brought together the best resources from within WSF and from outside the agency to critically analyze the opportunities, challenges, and technical aspects of this project. The predesign process included research on the current WSF reservation system, other ferry reservation systems in the world, and reservation system vendors.

Technical teams conducted analysis of potential business rules, vehicle processing and terminal operations options, and the information technology needed to support a reservation system. A group of stakeholders and members of the public provided input about customer needs and concerns and gave feedback on potential business rules, vehicle processing, terminal operation, and information technology options. This three-pronged approach was iterative, allowing for refinement and further improvement of the potential reservation system.

Research

Rather than design a system from scratch, WSF leveraged existing knowledge about reservation systems, by gathering information from sources both internal and external to the agency. WSF collected data from and conducted interviews with representatives from WSF's current reservation system and other reservation systems around the world. WSF also solicited requests for information from potential reservation system vendors.

WSF's Current Reservation System

WSF currently offers reservations in some capacity on three of its routes: (1) Anacortes-Sidney, (2) Anacortes-San Juan Islands, and (3) Port Townsend-Keystone. Each reservation system has different customers and business rules, and WSF's experience has informed the design of the reservation system presented in this final report. The current reservation system includes:

- **Anacortes-Sidney.** WSF has successfully operated a small reservation system (about 100,000 riders in FY2008) for customers traveling between Washington and Victoria, B.C. Reservations for this route are distributed on a first-come, first-served basis to all customers, and 100% of each sailing is available for reservations. This route only serves recreational riders, as no commercial traffic is allowed.
- **Anacortes-San Juan Islands Commercial Traffic.** WSF offers reservations to customers with commercial accounts traveling between the San Juan Islands and mainland Washington. Customers can either make a single reservation or reserve a specific sailing for an entire season of travel.
- **Port Townsend-Keystone.** In 2008, WSF began offering reservations between Port Townsend (Jefferson County, Olympic Peninsula) and Keystone (Whidbey Island). This route represents WSF's first experience offering reservations to multiple customer types on the same route (recreational users, commuters, commercial freight, and local residents).

Other Ferry Operators with Reservations Systems

WSF researched the use of reservations on ferry systems by reaching out to ten other ferry operators, both within and outside of the U.S. For each of these systems, WSF analyzed how comparable their routes were to WSF routes, in terms of length, sailing frequency, and ridership characteristics. Each system's business rules were compiled and compared. WSF staff conducted interviews with each operator to understand their motivation for implementing reservations, how customers have responded to reservations, and the reasons behind some of their business rules. A description of business rules by operator and interview notes are included in Appendix C.

This comparative survey of ferry operators provided WSF important insight into why reservation systems were instituted, what their impacts were on customers and operators, and what challenges operators struggled with in designing their systems, given specific facility and ridership characteristics. The systems researched include:

- **Bay Ferries/Northumberland Ferries (Canada, Privately owned)** operates three routes between Canada and the Northeast United States, with service to Nova Scotia, New Brunswick, Prince Edward Island, and Maine. Their shorter routes have up to nine round trips per day, and their longest route makes only one round trip per day. Reservations are available on all routes. The majority of ridership on the Bay/NFL ferry system is from tourist traffic, although the shorter routes see up to 30% commercial traffic during some seasons. This system does not serve regular commuters.
- **BC Ferries (Canada, commercial corporation 100% owned by provincial government)** connects Vancouver, B.C., Vancouver Island, the Sunshine Coast, and the Southern Gulf Islands. Routes vary in length between one and three hours, making between one and twelve round trips per day. BC Ferries carries more than 8 million vehicles annually, though there are few routes which serve regular commuters. One route carries a high percentage of commuters, but most are foot passengers.
- **Black Ball Ferries (Canada, Privately owned)** operates one route between Port Angeles, Washington and Victoria, B.C. The crossing takes 90 minutes, and the vessel makes between two and eight round trips per day, depending on the season. Black Ball carries about 120,000 vehicles annually. Approximately 85% of this traffic is tourism, and the rest is commercial.
- **Bridgeport & Port Jefferson Steamboat Company (USA, Privately owned)** operates a single route between Bridgeport, Connecticut and Port Jefferson, New York. The crossing time is approximately 75 minutes, and most ridership is commercial or tourism. There are four daily sailings that carry commuter traffic, but most are passengers, not vehicles.
- **Caledonian MacBrayne (Scotland, Government owned)** operates 26 routes between Scotland and the Scottish Isles, and accepts reservations on 14 of these routes. CalMac carries about one million vehicles annually, including about 100,000 commercial vehicles. Only two routes have a significant number of commuters, but most are foot passengers.
- **Cape May-Lewes (USA, Government owned)** operates one route between Delaware and New Jersey with a crossing time of approximately 80 minutes. Annual ridership is about 1.3 million passengers, and this traffic is nearly 100% tourism-based.
- **Istanbul Deniz Otobusleri (Turkey, Government owned)** is the primary provider of marine commuting services in Istanbul and across the Sea of Marmara. They transport about 6.5 million

vehicles annually, on a mix of shorter and longer routes. However, most of their commuters travel by foot.

- **Red Funnel (England, Privately owned)** operates two ferry routes connecting mainland England to the Isle of Wight. The vehicle ferry route has a crossing time of about 55 minutes, and carries approximately 1.6 million passengers annually. Red Funnel serves regular vehicle commuters, and offers a frequent user program called Island Club to offer special benefits and savings.
- **Scandlines (Denmark, Privately owned)** operates 14 routes between Denmark and Germany. Reservations have been historically available on their longer routes and have been added more recently (in the past three or four years) on their shorter crossings, which serve a small number of daily commuters. Scandlines carries about four million cars and one million commercial trucks annually.
- **Steamship Authority (USA, Government owned)** operates three routes that connect mainland Massachusetts to the islands of Nantucket and Martha's Vineyard. Routes vary in length between 45 minutes and 2 hours, making between 3 and 14 round trips per day. Steamship Authority carries about 450,000 vehicles annually, of which about 25% are commercial trucks. Ridership is a mix of local and tourism traffic, with a higher proportion of tourists during the summer months.
- **Wightlink (England, Privately owned)** operates two auto and one high speed passenger-only routes connecting mainland England to the Isle of Wight. These routes vary in length between 15 and 45 minutes, making about 30 round trips per day. Wightlink carries about 1.2 million vehicles annually. About 40% of traffic is comprised of island residents, including commuters and people leaving for appointments and errands. Island residents have access to multilink tickets, tickets bought in bulk at a discount, which allows them to make reservations on any sailings but are limited on some peak sailings. About 20% of vehicle traffic is from commercial freight.

In addition to the interviews and system reviews completed, a consultant working for the State Legislature traveled to the Isle of Wight and Istanbul (at the consultant's own expense) to experience the operations of Wightlink, Red Funnel, and IDO firsthand. He met with and asked questions of ferry staff and rode commuter and recreational routes to study operations and observe how their facilities and ridership characteristics determined their business rules.

Request for Information

WSF solicited submissions for a Request for Information (RFI) from prospective reservation systems vendors. See Appendix D for a summary of the responses. Five vendors from around the world responded and are described below:

- **Carus**, operating since 1998 and headquartered in Finland, specializes in reservation systems for the marine transportation industry. Clients include ferry operators in Europe, the United States, and Australia, including the Cape May-Lewes Ferry, one of the ferry systems researched in this report.
- **GarageCraft, Inc.**, operating since 2005 and headquartered in Washington, develops systems for the parking access and revenue control industry, including management of some parking garages at Seattle-Tacoma International Airport.
- **Gateway Ticketing Systems**, operating since 1988 and headquartered in Pennsylvania, designs ticketing and admission systems for the transportation and entertainment industries. Their clients include ferry systems, transit providers, theme and water parks, zoos and aquaria, museums and

science centers, and tours and attractions. Gateway currently provides WSF's Wave2Go ticketing system.

- **Hogia**, operating since 1981 and headquartered in Finland, creates reservation systems for ferry operators as their core business purpose. Their clients include Bay/NFL Ferries and Red Funnel, both of which were researched in this report.
- **Revenue+**, operating since 2007 and headquartered in England, specializes in web-based reservation systems and associated technology for the travel and transportation industries. Revenue+ developed the current reservation system for Wightlink, one of the ferry operators researched in this report.

Analysis

Staff from all relevant departments within WSF (including Terminal Operations, Customer Information, Information Technology, Marketing, and Planning), as well as outside advisors, were assigned to three technical work teams. The purpose of the teams was to analyze how examples from other systems could be applied to the WSF ferry system while designing a reservation system that best serves WSF customers. These teams were organized around the following subject matter expertise:

- **Business Rules and Policy Framework.** The purpose of this group was to develop and analyze potential business rules of the vehicle reservation system. This group was responsible for considering the needs and travel patterns of different customer types, ensuring customers would have flexibility and predictability in their travels with WSF, reducing the negative impacts of queuing outside terminals, and recognizing the unique qualities of different routes.
- **Vehicle Processing and Terminal Operations.** The purpose of this group was to determine the most efficient and effective method for processing vehicles at the terminal under the reservation system and to identify what terminal modifications, if any, would be necessary to support the system. This group analyzed vehicle processing options terminal by terminal, taking into account the business rules developed by the Business Rules team and ensuring that those rules were supported by vehicle processing and terminal operations that give customers a positive and convenient experience.
- **Information Technology and Communications.** The purpose of this group was to identify what it would take from a technical standpoint to support the business rules and vehicle processing options developed by the other two teams. This group then developed a set of IT and communication system parameters that, if met, would enable a reservation system with those business rules and vehicle processing options.

These three teams met on a weekly basis during system development. Information was shared between the teams to ensure that the business rules, vehicle processing options, and IT options were in sync and supported each other and the goals of the reservation system.

When the three teams had developed a draft set of rules and options, a Synthesis Team was formed that included members from all three technical teams. This team reviewed the pieces developed by the three work groups and synthesized the results into a cohesive reservation system, which is presented in this final predesign study.

Public Involvement, Input, and Feedback

This final predesign study, particularly Chapters 4 and 5, was also developed with extensive input from the public, including a partnership group and public meetings throughout the ferry service area.

Edmonds-Kingston Partnership Group. WSF convened a partnership group to assist in the conceptual design efforts for this predesign report. This route was selected because it is a route that requires analysis applicable to most other routes in the system. The Edmonds-Kingston route has a variety of ridership types, including recreational, commercial, and commuter traffic, and the Edmonds terminal holding capacity is constrained. The partnership group consisted of representatives from all three customers groups, as well as representatives from Ferry Advisory Committees, ports, and cities in the Edmonds and Kingston areas. For a complete list of participants, please see Appendix A.

This community partnership process helped WSF learn more about how customers make travel decisions, understand how reservation policies might affect customers, identify how a reservation system could be adapted to the unique characteristics of different routes, and determine the feasibility of vehicle reservations on Edmonds-Kingston route. Group members contributed many hours of their time and provided thoughtful feedback including critical evaluations of and innovative ideas for business rules, vehicle processing, and IT options.

The Group raised a number of important concerns and ideas that have helped make the reservation system better tailored to customer needs. The work of the Partnership Group was integral to the development of the reservation system, and WSF appreciates the time and effort of everyone involved. There were a total of eight meetings held from July to December 2009. Any member of the public could also attend these meetings to listen and provide comment. Please see Appendix A for meeting summaries of all eight meetings.

Web page. WSF maintained a web page where the public could access all materials developed for the Edmonds-Kingston Partnership Group meetings, as well as meeting notes and public comment summaries. It provided time and location information for upcoming meetings, as well as a WSF contact person for questions or comments. See Appendix B for comments submitted via the web page, email, or public meetings.

The web page address is: <http://www.wsdot.wa.gov/Ferries/Planning/VehicleReservations.htm>

Public Meetings. WSF holds frequent public outreach meetings in various locations throughout the ferry service area. These meetings include discussions to develop schedules that work for customers, resolve customer problems, and understand regional and local issues. During November 2009, WSF held nine public meetings where customers were provided an overview of the predesign development process and were able to ask questions regarding the reservations and identify route-specific concerns.

3.2 Lessons Learned

Through the iterative process of research, analysis, and partnership group feedback, WSF learned many important lessons. Some of the findings applied to demand management and the basics of a reservation system, while others were specific to business rules, vehicle processing, and information technology.

Demand Management and Reservation System Basics

- **On-time performance is a necessary pre-condition to a reservation system.** When WSF's internal work teams analyzed the various business rule and vehicle processing options for each terminal, a common issue arose. Most of the options identified will only work effectively when sailings are departing on schedule. WSF has already recognized, outside of the work done for this reservation system predesign, that on-time performance is an important part of customer service. Sailing schedules on all routes are being reviewed, and in some cases revisions are being considered to make schedules more attainable.

Realigning sailing schedules so WSF can more consistently sail on schedule will reduce congestion at terminals and improve customers' certainty and travel experience. When sailing schedules get off track, the terminal becomes congested with traffic related to two departures. This schedule delay congestion is a feature on several routes during peak travel times and results in a reduced quality of service for customers. Schedule correction can be an effective demand management tool on its own, but it is also a necessary pre-condition to any successful reservation system.

- **Extensive, real-time communication is an essential step toward demand management.** When customers have access to real-time information regarding travel delays and cancellations, vessel availability, and estimated wait times, they can make informed travel decisions that benefit themselves and the ferry system. Customers with full information will choose sailings and routes that will get them to their destinations most efficiently, thereby reducing congestion and spreading demand across system-wide capacity. This level of communication is effective for managing demand and is also an important foundational element of a successful reservation system.
- **A reservation system can and should be implemented differently on different routes.** Since the need and purpose of a reservation system is dependent on sailing capacities and route-specific ridership characteristics, the policies underlying a reservation system and the decision to implement a reservation system at all, should be determined on a route-by-route basis.
- **Some WSF routes reservations will not be necessary to manage demand if schedule correction and communication systems are implemented.** WSF's primary goal is to manage demand on each route to improve the customer experience and reduce congestion in neighboring communities. If, through the implementation of revised sailing schedules and an extensive communication network, any specific route is no longer experiencing congestion issues, it may not be necessary to implement a reservation system. This may be particularly true for shorter routes with frequent sailings like the Mukilteo-Clinton route. However, this decision should be made on a route by route basis.
- **Some WSF routes and sailings will see significant benefits from reservations, even after schedule corrections and communication system improvements have been made.** On WSF's busiest routes, it is likely that there will still be congestion issues after revising the sailing schedule and improving communication. On these routes, the next step toward demand management would be to implement a reservation system specifically tailored to each route's needs and characteristics, if the facilities are adequate to support the system.
- **A reservation system can and should be phased in over time.** WSF will implement reservations slowly, by incrementally increasing the number of reservations available on each sailing. This process allows customers to adjust to the new reservation system and to spread the need for modifications and adjustments over time. In addition to phasing in reservations on a capacity basis, they may be phased in by customer type. For example, reservations may first be made available to commercial customers, then frequent users and residents, and then to all customers.

Reservation Models

- **Most large ferry operators have a reservation system.** Of the operators that WSF researched, all either offered or required reservations on at least one of their routes. However, among systems, policies regarding reservations are varied. Some systems require that all vehicles have reservations and reserve 100% of the space available on each sailing. Other systems recommend reservations and the amount of space on the vessel available for reservations is less than 100%. This allows some non-reserved customers to drive-up to the terminal and travel if room is available.

- **For recreational routes, there are comparable systems from which WSF can learn.** All of the operators interviewed offer or require reservations on routes with predominantly recreational ridership. These routes equate most closely to WSF's routes serving Sidney, the San Juan Islands, and Port Townsend-Keystone. Crossing times are greater than one hour, and most customers travel relatively infrequently. Reservations are an effective tool for managing demand during peak vacation periods and giving more frequent riders certainty about when they can travel.
- **For short, commuter routes, there are no direct comparables.** No operators that have routes with short headways and vehicle commuters offer reservations on those routes. There were very few of these routes identified, and those that were identified served a relatively small number of commuters. For example, Wight Link operates every 30 minutes and does have some commuters, though not many. Istanbul Deniz Otobusleri (IDO) operates two high-volume commuter routes, but the large number of vessels and lack of a set sailing schedule during peak commute times make reservations unnecessary. WSF recognizes that its commuter routes would benefit from supporting reservations and is designing a set of business rules that will work for both recreational and commuter routes.

Customer Needs and Concerns

- **Customers plan for trips in different ways; ideally reservations would accommodate those different planning needs.** At one end of the spectrum, some vacationers would like to be able to make vehicle reservations at the same time they are making reservations for hotel rooms and booking plane flights. This can be up to a year in advance of the trip. At the opposite end of the spectrum, some commercial customers and local residents don't know they need to travel until a few hours before they would like to make a crossing.
- **Customers deal with variables that affect their ability to arrive at the terminal when they originally planned.** Each "trip" that customers take on WSF has two parts: (1) a departing trip, from the customer's home to their destination, and (2) a return trip, leaving that destination and coming back home. Partnership Group members said customers are able to accurately predict when they will be leaving home and traveling to a particular destination, and therefore will be comfortable making a reservation for their first sailing. However, there are a greater number of variables involved for their return trip, including traffic, demands at work, and other unexpected delays. Partnership Group members expressed concern that these variables could cause customers to arrive late for return sailings, which will require business rules that build flexibility into the cancellation and change policies to accommodate this return trip uncertainty.
- **Customers can make better decisions if they have access to accurate, real-time information.** Information regarding reservation availability, estimated wait times for customers without reservations, and changes to sailing schedules help customers make travel decisions that benefit themselves and WSF, by saving travel time and reducing congestion at terminals. This information should be accurate, in real-time, and available via highway information signs, the reservations website, and by phone.
- **WSF should adequately inform and educate customers about how the reservation system operates.** Policies are created for a reservation system in order to encourage and/or require customers to act in a way that creates an organized and efficient system of travel. WSF discovered that on the Port Townsend-Keystone route, customers expressed confusion or lack of awareness when informed of some policies. If customers were better informed, they could make better

possible travel decisions for themselves, and WSF could spend less time addressing customer questions and complaints.

Business Rules

- **WSF should require a deposit for reservations.** At this point, WSF does not require a deposit to make a reservation on the Port Townsend-Keystone. This policy is resulting in a high no-show rate, which negatively impacts the customer experience and the surrounding community. Based on these experiences, WSF should require a deposit or full fare payment in order to reduce no-shows under the new reservation system.
- **WSF should make more than half of the vessel available for reservations on high demand sailings.** While the Anacortes-Sidney route requires reservations, the Port-Townsend-Keystone route initially had only 50% of deck space available for reservation on each sailing. This allocation was in response to customers' requests to have adequate non-reserved space available to last-minute travelers. However, this significant amount of non-reserved space had two negative impacts. First, it encouraged queuing during peak times. Second, it created customer confusion, because the website would tell customers that a sailing was "full," even though 50% of the vessel space was still available on a first-come, first-served basis. These problems could be helped by increasing the amount of space on the vessel available for reservations and by better informing customers about how the reservation system operates.

In addition, looking at the various applications of reservations around the world, there are generally two models. The first offers reservations for all or almost all of the space on each sailing. These "100%" reserved systems have essentially no queuing and minimal terminal congestion issues. The other approach is to offer a relatively small share of the boat for reservations and to charge a premium for the reserved space. In this situation, the majority of the boat is still first-come, first-served and so there is still significant queuing and terminal congestion during peak periods.

- **Other systems, such as Wightlink and Red Funnel, incent freight customers, in particular.** Several ferry operators stated that commercial traffic increased when they began offering reservations. Since commercial traffic can be a steady and lucrative revenue source and supporting freight mobility is important to local economies, the operators created freight programs that incent companies to move freight using ferry systems. These programs range from offering commercial users dedicated reservation space to offering trailer transport services so drivers don't need to cross with their load.

Vehicle Processing

- **Other high volume ferry systems have more terminal capacity than WSF.** During interviews with other operators and through on-site visits, WSF learned that most ferry systems that carry a similar volume of vehicles have significantly larger terminals. These operators can store multiple boatload of vehicles inside their terminals without mixing sailings and causing congestion in neighboring communities. WSF's terminals are constrained by neighboring communities and the geography of each terminal. This constraint poses unique operating challenges for WSF and reduces the margin of error when dealing with service disruptions and high demand sailings.
- **Terminals that can hold approximately 120%-150% of the vessel are ideal for reservations.** When staging vehicles at the terminal under the new reservation system, vehicles will need to be separated according to height, reservation, and priority load status (as described in the Washington

Administrative Code, chapter 468-300-700, on preferential loading). This separation is easiest when WSF has more than one boatload of terminal space to work with, as some lanes may only be half full with their specified vehicle type. Terminals with approximately 120%-150% of a boatload of holding space are adequate for staging all the necessary vehicle types.

- **Terminal managers have a great deal of authority and flexibility.** Although there are standard business rules and operating procedures at each terminal, a terminal manager has the authority to adjust vehicle processing due to service disruptions and other unforeseen circumstances. It is important to have a knowledgeable manager or supervisor at each terminal to deal with potential issues and ensure customers are being served fairly and efficiently during any situation.
- **WSF terminal staff needs access to frequent and accurate information about vessel capacity and available reservations.** Terminal staff members are continually making decisions regarding management of vehicles both on the dock and during vessel loading. In order to make informed decisions, it is important that they have accurate information regarding how many reservations have been made on a specific sailing. This information allows terminal staff to most effectively stage vehicles in the terminal, so they can be efficiently loaded onto the vessel.

Information Technology

- **The RFI respondents offered many features that would benefit WSF and its customers.** Since most large ferry operators around the world have been offering reservations for years, software providers have designed extensive reservation systems for this market. The systems described in the responses to the RFI have many features that would streamline the reservation management process on WSF's side, as well as provide customer service options to improve the experience for ferry travelers. Through activity surrounding this predesign report, features not called out in the RFI responses were identified that will require software customization or custom integration to implement.
- **The market for reservations systems as reflected in the RFI responses does not align with WSDOT "level-playing field" standards for technology and system architecture.** A key to successful long-term support and maintenance of acquired systems is having the skills in place to fully understand the system components and make appropriate adjustments as needed. WSDOT's Office of Information Technology plans and staffs projects that work within its established standards. The vendors responding to the RFI used system architectures based on the Linux operating systems (as opposed to Microsoft Windows) with Oracle, IBM Informix, or PostgreSQL databases (as opposed to Microsoft SQL Server). Supporting those elements of the system architecture will require skill sets to be developed or acquired.
- **System providers are able to customize their base software to fit the needs of any ferry system.** Many of the respondents provided reservation systems for multiple ferry operators and tailored the system to the needs of the customers. Information such as terminal size, vessel size, and crossing time all impact how the system must operate, and providers have built these variables into their systems to accommodate any route. In addition, extra features can be added to this base system to accommodate customer and operator needs.
- **Customizing a base system with extra features can increase the price considerably.** A base reservation system typically includes the ability to make reservations through a website and over the telephone by speaking to an operator. WSF wants to ensure that its reservation system is customer friendly and integrates smoothly with other operations, such as ticket sales and vehicle

processing at terminals. The respondents all offered features that will improve the customer experience and operations, but require customization of the base software. These custom options would significantly increase the price of a reservation system. It should be noted that some of these “enhanced features” are driven by the particular needs of WSF’s high-volume, commuter-oriented routes.

- **Reservation systems typically include load management capabilities.** In reading the RFIs, WSF learned that load management software is integral to a successful reservation system, and therefore is included with most systems. Load management software helps a ferry operator understand and manage its reservations and vehicles arriving at the terminal.
- **A load management system is an important component of a reservation system.** Automatic, electronic load expectation reports would be able to present a real-time automated report of how much space has been reserved. This information would allow for appropriate load management, ensure that the tunnel space is not overcommitted, and be used to support the real-time communications system.
- **A membership system is an important component of a reservation system.** A membership management system is necessary to facilitate the administration and management of priority access programs. Such systems simplify the functions of these programs and provide a user-friendly online interface with customers. These types of systems are commonly incorporated throughout the online retail world.
- **A data warehouse is an important component of a reservation system.** In order to adapt and respond to actual changes in usage patterns and customer behavior, a robust capacity to store relevant information is needed in a reservation system. A data warehouse would enable WSF to learn from its experience and continue to improve the system through flexibility in how it implements its business rules.

4.0 PROGRAM ANALYSIS

This chapter discusses which reservation model might best meet the demand management needs identified by the Long-Range Plan. The chapter identifies reservation system goals and describes the criteria derived from those goals. Four conceptual reservation models and their basic elements are outlined and evaluated in terms of how well they might serve WSF's diverse customer base and achieve the stated goals.

4.1 Goals and Criteria

Goals

In order to determine what reservation system model best meets WSF programmatic needs, it is necessary to establish goals and criteria.

From that purpose, the following three goal statements have been identified:

1. The system must work for WSF customers, being easy to use and offering an adequate degree of predictability, spontaneity, and flexibility.
2. The system must work for ferry communities, reducing the negative impacts of queuing outside the terminal and allowing WSF customers and local residents to access local businesses and reduce congestion in residential neighborhoods.
3. The system must work for WSF, recognizing the unique circumstances of its different routes, helping the agency manage demand, improving asset utilization, and responding to legislative direction.

Evaluation Criteria

From the goal statements above, 12 criteria were developed by WSF and with input from the Edmonds-Kingston Partnership Group to design the best possible model for a WSF reservation system. The criteria are grouped into the following three categories:

1. The system must work for customers

- Recognizes that different customer types, including commuters, frequent riders, commercial freight, recreational users, and other passengers, make plans for traveling at different times and supports those different planning needs
- Provides priority access to certain customer types at certain times based on their travel needs
- Provides multiple, accessible, and easy to use, points for making, changing and canceling reservations
- Provides flexibility to change, cancel, or make adjustments to the reservation

2. The system must work for ferry communities

- Reduces/eliminates congestion in communities
- Improves traffic flow and reduces/eliminates queuing around terminals
- Operates efficiently for peak and non-peak sailings, regardless of season and time of day

3. The system must work for WSF

- Spreads demand from peak to off-peak sailings
- Maximizes use of existing assets (vessels, terminal facilities, etc.)
- Allows for growth in vehicle ridership over time without building more vessels, minimizing capital costs
- Supports increased ridership without significantly increasing operating costs

These goals and criteria are intended to guide the design and selection of a reservation model that will work best for WSF customers, within existing terminal constraints.

4.2 Conceptual Reservation System Models

Definition

A reservation system is a way to allocate a scarce resource or service. Like appointments at a doctor's office or some local DMVs, reservations help ensure a scarce resource or service is delivered in a timely, organized way, that provides predictability for the customer. Communications at the time of booking and at the time of the expected service provision are a key component to reservation systems generally. Good communications systems ensure the customer is informed about availability of alternatives and expected timeliness of service provisions so that he or she can make better choices.

It is important to note that reservation systems are not intended to *reduce* demand; in fact, the predictability they provide might actually increase customer demand. They do, however, reduce queuing by guaranteeing when a customer gets a service or resource. Reservation systems provide opportunities for customers to shift their travel by signaling that a service or resource is available at a particular time.

Types of Reservations

There are multiple proven models for reservation systems. For purposes of discussion, these models can be organized according to whether or not the customer is charged an extra fee for reservations and by the method through which the reservations are distributed, as described below:

- **Charges for reservations:** Where there are explicit charges for the reservation itself, the reservation and the guarantee it provides is an extra service (i.e. it allows customers to pay extra for the guarantee of being able to access a scarce resource when it's most convenient to them). Conversely, the reservation might be strictly a method for allocating the resource, available without an additional fee.
- **How reservations are made available:** How a customer acquires a reservation can vary across models, with common methods including reservations available on a first-come, first served basis or reservations based on price or other preference programs.

Three existing models are described below. Given the reservation system goals and criteria, and WSF's current terminal configuration, the models identified are not applicable to WSF in their entirety, though they each include applicable components.

BC Ferries: Routes Serving Vancouver Island and the Sunshine Coast

On the routes connecting Greater Vancouver with Vancouver Island and the Sunshine Coast, ferries charges customers a fee (on top of the ticket price) for the privilege of making a reservation. They generally have less than 50% of vessel available for reservations on any given sailing, even at peak times.

Customers who have paid for reservations are allowed to “cut in line” guaranteeing them departure on the sailing for which they have made a reservation. During peak periods, customers without reservations generally have to wait in-line, uncertain on which sailing they will depart. Reservations are distributed on a first-come, first-served basis; there is no amount of space set aside for particular customer types. This is partly because BC Ferries is a government-owned commercial enterprise that operates on a for-profit basis, and the reservation system was introduced in part to increase revenue.

This model meets a number of the goals and criteria described above. It provides multiple, accessible, and easy-to-use points of booking and flexibility to change, cancel, or make adjustments to a reservation (though a \$9.00 change fee applies in most instances). Given the limited space set aside for reservations on most routes, this model does very little to support the reduction of congestion in communities and queuing outside of terminals.

However, this model works in part because BC Ferries has relatively large terminals that hold many sailings worth of vehicles. The model does not explicitly try to shift peak period demand (as there is usually adequate holding to accommodate queues). The communication with customers inherent in this model might result in some demand shift (as customers without reservations might not come if wait times are long), but no other tools are used to encourage customers to travel during off-peak periods. Consequently, use of existing assets may not be fully maximized.

Furthermore, the BC Ferries does not tailor its program to different customer types on these routes. Instead, it charges a fee for reservations, making limited reservations accessible only to those who can afford or are willing to pay the additional fee.

Therefore, while this approach might meet some of the WSF criteria for a reservation system, WSF would likely need larger terminals to achieve reduction in queuing at the terminals and congestion in the community, which would result in higher capital and operating costs. Also, charging an additional fee for reservations poses an equity concern that has been raised previously, as it provides priority access only to those with the ability to pay for it.

BC Ferries: Vancouver-Southern Gulf Islands Route Model

On the Vancouver-Southern Gulf Islands route, customers are not charged an extra fee for their reservation, and BC Ferries makes the entire vessel available for reservations. In other words, this model uses reservations to distribute scarce resources and provide its customers with a degree of predictability, similar to WSF’s objectives.

The reservation and ticket are available at the same price as just the ticket. However, the full ticket fare must be paid for at the time the reservation is made. The reservations are distributed on a first-come, first-served basis, for up to 100% of the available tickets. There is no distinction made between types of customers. No one is required to get a reservation; they have a choice just to show-up and wait in line until a space is available. This is also the model used for Washington State Parks Overnight Permits, Washington Department of Motor Vehicles appointments, and the Disneyland Fast Pass.

The approach used on the Vancouver-Southern Gulf Islands route would also meet many of the WSF criteria. It provides multiple, accessible, and easy-to-use points of booking; gives flexibility to change, cancel, or make adjustments to the reservation (though again, a \$9.00 change fee applies in most instances); reduces congestion in communities; and reduces queuing outside of terminals.

This model is preferable to the previous model in that it does not charge a fee for reservations, alleviating equity concerns. However, it does not make accommodations for different customer types.

Airline Reservation Model

The Airline Reservation Model is like the Vancouver-Southern Gulf Island approach in that up to 100% reservations are available for any given departure, and the reservation does not cost extra. A purchase of a ticket automatically gets the customer a reservation. Airlines, Amtrak, and Greyhound services differ from the Vancouver-Southern Gulf Island approach in that they have special programs that give discounts to or set-aside reservation space for special customers. Airlines and Amtrak have loyalty programs for repeat customers.

The other key difference in the Airlines Reservation Model is that it also employs dynamic pricing as a way to match available supply with demand while maximizing profit – the higher the demand for a particular departure, the higher the cost of the ticket. This approach uses reservations to simplify terminal operations and to target pricing to the customers' willingness to pay, which often results in different fares for essentially the same service on the same flight.

Unlike the previous two models, the airline model recognizes that different customer types, including commuters, frequent riders, commercial freight, recreational users, and other passengers, make plans for traveling at different times and supports those different planning needs. It provides priority access to certain customer types at certain times based on their travel needs.

Like the previous two models, it provides customers with multiple, accessible, and easy-to-use points of booking and the flexibility to change, cancel, or make adjustments to the reservation (though substantial change fees frequently apply). If applied to a ferry system, the model would reduce traffic congestion and vehicle queuing around the terminal and in the neighboring communities.

As pricing is such an integral component to this model, it is quite effective at shifting demand and maximizing the use of existing assets. This model provides a framework to optimize profitability and utilization on individual sailings. However WSF is a public organization, and the complexity and potential inequity in a profit-maximizing pricing model would not be considered appropriate public policy by many stakeholders and would clearly not be viewed as in the best interest of many of its customers.

4.3 Comparison of Reservations Models

The table below identifies whether each of the models described above meets the criteria and programmatic requirements of WSF.

Reservation System Criteria	BC Ferries: Vancouver Island & Sunshine Coast Routes	BC Ferries: Vancouver - Southern Gulf Islands Route	Airline Model
1. The system must work for customers			
Recognizes that different customer types, including commuters, frequent riders, commercial freight, recreational users, and other passengers make plans for traveling at different times and supports those different planning needs			X
Provides priority access to certain customer types at certain times based on their travel needs			X
Provides multiple, accessible, and easy to use points of booking	X	X	X
Provides flexibility to change, cancel, or make adjustments to the reservation	X	X	X
2. The system must work for ferry communities			
Reduces/eliminates congestion in communities	X	X	X
Improves traffic flow around terminals	X	X	X
Reduces/eliminates queuing outside of terminals	X	X	X
Operates efficiently for peak and non-peak sailings, regardless of season and time of day	X	X	X
3. The system must work for WSF			
Supports spreading demand from peak to off-peak sailings	X	X	X
Maximizes use of existing assets (vessels, terminal facilities, etc.)			X
Increases vehicles served over time without building more vessels, minimizing capital costs			X
Increases ridership without significantly increasing operating costs			X

A Hybrid Model to Fit WSF Needs

From the discussion above, it seems clear that none of the existing models reviewed will work perfectly for WSF, though all of them contain components that can be applied to WSF. Therefore the model that is most likely to meet WSF's programmatic needs will take elements from the BC Ferries and the Airlines Models.

Although the model will be applied differently on different routes and different sailings, in general 70% to 90% of space should be available for reservations on routes that have the most peak ridership during peak and congested periods. This is close to both the Southern Gulf Islands Model and the Airlines Model. The higher rate of reservations available helps discourage drive-ups, which will reduce queuing around the terminals and congestion in the community. Reservations should be available at no additional charge, but with some portion of the fare charged at the time of the reservation, as in the Southern Gulf Islands Model and the Airlines Model, to discourage no-shows.

Like the Airline Model, reserved space should be set-aside for certain types of customers and certain types of travel. However, the airline approach to pricing would not be incorporated into WSF's reservation system model.

This type of hybrid meets all of the criteria identified above: it meets customer and community needs, while containing capital and operating costs. It is important to note that forgoing congestion pricing means that communication and on-time performance are even more important tools for managing demand. The sections that follow describe in detail how this model might be applied to WSF.

4.4 Performance Metrics

The research and analysis outlined in Section 3.1 have guided WSF in developing a reservation system that will bring immediate benefits to ferry customers, ferry communities, and WSF. However, WSF recognizes that ferry customers and individual ferry routes are unique, and possibly have challenges and needs that could not be anticipated during this predesign study. Therefore, a successful reservation system will be one that constantly learns and improves, in order to best meet the goals discussed above.

Information is the key to understanding whether the reservations system meets the above goals. WSF will implement a reservation system that will be able to quantitatively measure when it is meeting its goals, and when changes need to be made to better reach them. This will be done using a set of performance metrics.

A performance metric is a tool used to measure the success of an organization or system. For example, WSF wants a reservation system that has enough reservations available to reduce queuing outside of terminals, to enable as many customers as would like to make a reservation. But, WSF does not want to offer more reservations than warranted to achieve the above goals, as that would begin to reduce a customer's travel flexibility and spontaneity. A performance measure such as queue length would help determine when enough reservations are being made available.

The following performance metrics are examples of measures that could be used to analyze how well the reservation system is meeting the goals described above. They are simply illustrative; a performance metric framework based on this initial discussion will be developed in full detail during the design phase of the reservation system.

Example Potential Metrics

The system must work for customers:

- **Customer satisfaction.** Measuring customer satisfaction is the most effective way of determining how well the reservation system is working for customers.
- **Customer use of the reservation system.** A successful reservation system would have many repeat customers and usage would increase over time, showing that customers find it useful and beneficial to their travel.
- **Balance of reservations available to reservations made.** Knowing this measure will help determine if WSF is offering too many reservations, or if all reservations are being used, implying unmet demand for reservations.
- **Wait times.** Reducing wait times would improve the customer experience on WSF.

The system must work for ferry communities

- **Community satisfaction.** Measuring community satisfaction will help WSF determine if a reservation system is improving ferry-served communities' experiences.
- **Queues outside of terminals.** Measuring queue length is important in determining how many reservations WSF should offer, and when it has met the minimum number of reservations to adequately reduce queues in communities.

The system must work for WSF

- **Demand spread and maximum use of vessel.** WSF would like the reservation system to spread peak period demand and maximize the use of existing resources in order to reduce the need for capital and operating investments.
- **Overall ridership.** Increases in ferry ridership, especially on off-peak sailings, will show that the reservation system is working for customers, and increase revenues.
- **No-shows and last-minute cancelations.** WSF has designed business rules to reduce the number of no-shows and last-minute cancelations, which undermine the integrity of a reservation system.

These goals and criteria are intended to guide in the design and selection of a reservation model that will work best for WSF customers, within existing terminal constraints.

Exhibit 5 provides a list of example performance targets for each of the above performance metrics.

Exhibit 5 Illustrative Examples of Performance Metric Targets

Sample Performance Metric	Illustrative Example Performance Target
<i>The system must work for customers</i>	
Customer satisfaction	<ul style="list-style-type: none"> • Average level of satisfaction with reservation system • Increase in reported customer satisfaction with reservation system • Degree to which customers can book first or second sailing choice (Both examples could be broken out by customer type and route)
Customer use of the reservation system	<ul style="list-style-type: none"> • Increase in number of reservations made over time • Number of customers making repeat reservations; • Number of Commercial account customers • Increase in Commercial account customers • Number of Premier account customers • Increase in Premier account customers (All examples could be broken out by customer type and route)
Balance of reservations available to reservations made	<ul style="list-style-type: none"> • Average percentage of available reservation space reserved (Example could be broken out by customer type and route)
Wait Times	<ul style="list-style-type: none"> • Average wait time; broken out by sailing • Decrease in wait time (Both examples could be broken out by terminal and route)
<i>The system must work for ferry communities</i>	
Community satisfaction	<ul style="list-style-type: none"> • Average level of satisfaction with reservation system • Increase in reported local business satisfaction with reservation system (Both examples could be broken out by terminal and route)
Queues outside of terminals	<ul style="list-style-type: none"> • Average number of cars waiting outside of terminals; • Decrease in average number of cars outside of terminals (Both examples could be broken out by terminal and route)
<i>The system must work for WSF</i>	
Demand spread and maximum use of vessels	<ul style="list-style-type: none"> • Average daily volume to capacity ratio • Increase in daily volume to capacity ration (Both examples could be broken out by sailing and route)
Overall ridership	<ul style="list-style-type: none"> • Average ridership on routes with reservations available compared to those without reservations available • Ridership increase on routes with reservations available compared to those without reservations available (Both examples could be broken out by sailing)
No shows and last minute cancelations	<ul style="list-style-type: none"> • Rate of no-shows per reservation made • Rate of cancelations within 24 hours of departure per reservation made (Both examples could be broken out by customer type and sailing type)

5.0 PROJECT ANALYSIS

Having identified the preferred reservation model in the previous chapter, this chapter describes the schedule and communications infrastructure improvements, business rules, terminal operations, and information technology components needed to support the reservation system on each route and identifies remaining route-level and system options.

WSF plays a unique role in the state's highway network and transit system, and any reservation system for WSF would need to be designed in a way that recognizes its multiple roles and the varying types of customers it serves. As such, the reservation system described here is complex and includes multiple, inter-connected components.

The components of the reservation system can generally be broken down into four categories:

1. Communication system
2. Business rules
3. Terminals and vehicle processing
4. Information technology and back office systems

As identified through research of other systems and Partnership Group input, on-time performance and communication with customers about sailing status and reservation availability are essential components of a reservation system. In addition, these are strategies that on their own help reduce queuing at the terminal, congestion in communities, and provide more predictability and certainty to customers.

The business rules are a set of policies that define how the customer will interact with the reservation system and how WSF will manage the reservation system to allocate vehicle deck space to its customers. The business rules drive the customer experience and must be supported by all other system components. Scheduling improvements and the communication system provide a platform for implementing the business rules successfully. Terminal/vehicle processing needs and IT/back office requirements have been analyzed and designed to specifically support the business rules.

5.1 Communication System

A robust communication system is essential for helping customers make informed decisions about the best travel options available to them. There are three parts of a communication system: general information about sailings, general reservations related communication, and personalized communication with a reservation holder. Elements of a communication system that can help WSF manage demand while improving service are described below.

General Information Communication

General information communication helps reduce congestion by notifying customers which routes and sailings are on schedule and which terminals have shorter wait times. Better communications alone will not be sufficient to reduce all congestion for all routes; however, it has system-wide demand management benefits and is necessary for successful implementation of a reservation system.

The General Information Communication system has two parts, information collection and information sharing.

Information Collection

WSF currently collects information about its real time activities through its ticketing system, the GPS system which monitors vessel locations and schedule performance, and a series of web and highway cameras to show status in and outside selected terminals. The current implementation of these measures suffers from several limitations, including incomplete coverage and a lack of integration of these data collection systems in a way to facilitate timely communications. These shortcomings have led to a situation where customers are either unaware that some of this information is available or there is a lack of confidence in the information. In either case, WSF is not getting as much as it could from its current systems.

To improve both coverage and reliability, a regional communication system would require extending the data collection more thoroughly throughout the system and more fully integrate the various data sources. A key element in this effort will be to expand the number of webcams and installing a loop system outside some terminals to provide much better real time information about terminal conditions.

Information Sharing

Highway Advisory Radio. Low-power AM radio broadcasts will provide information about departure times, drive-up wait times, and alternative route options where customers have choices (i.e. at the Hood Canal Bridge approach, customers could tune in to learn whether Kingston, Bainbridge, Bremerton, or the Tacoma Narrows Bridge offered the best alternative for a west-east crossing.) While elements of the system are already in place, they will need to be significantly improved and more broadcasts will need to be added.

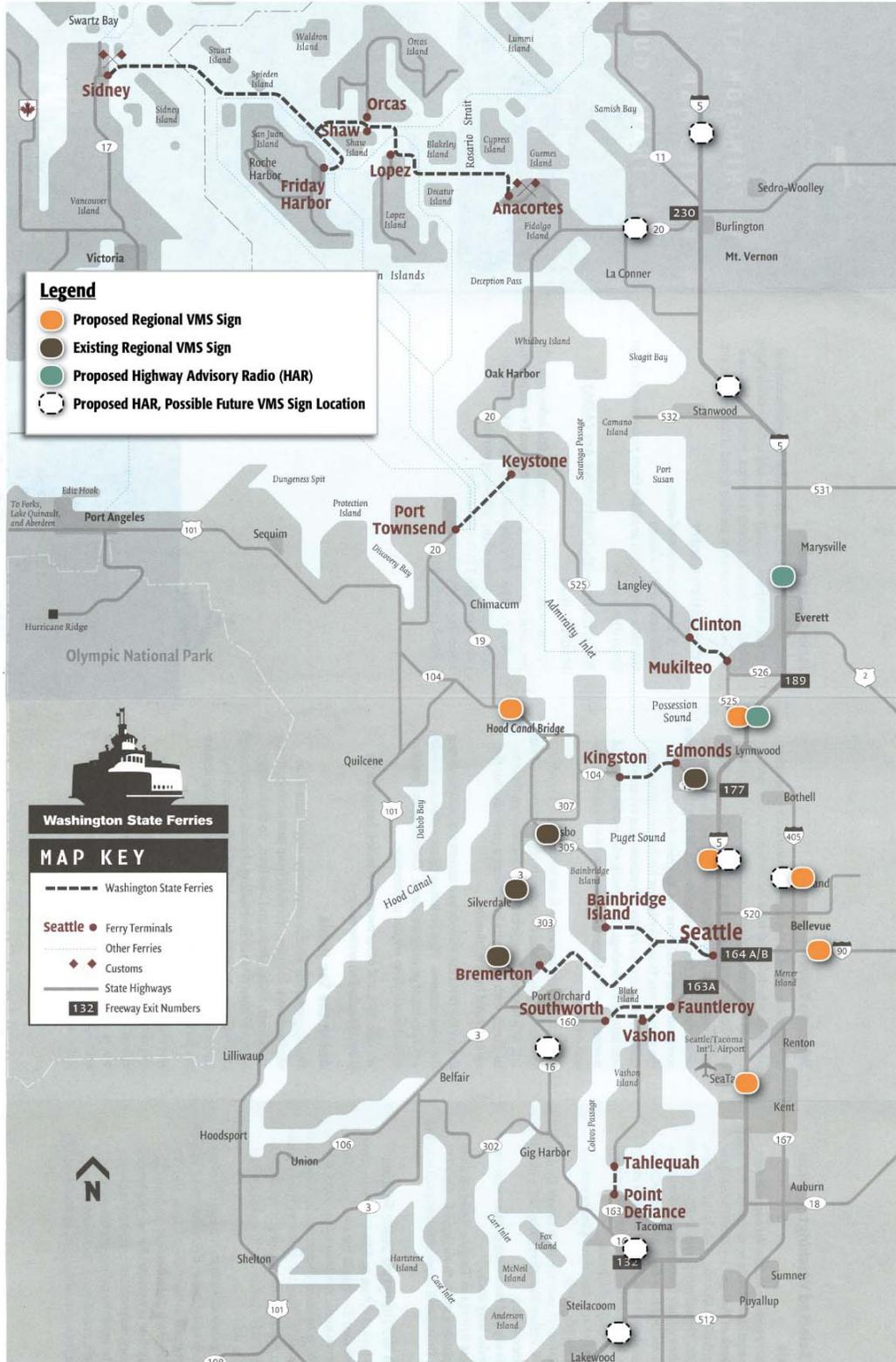
Variable Messaging Highway Signs. These signs will display, for multiple routes, predicted departure time for the next sailing and drive-up wait times to help direct drive-up traffic to terminals with the most available capacity. Exhibit 6 provides an illustrative example of the information that might be included on such regional signs. Final design and information provided will ensure reasonable readability while driving on a highway.

**Exhibit 6
Conceptual Regional Highway Sign**

	KINGSTON	BREMERTON	BAINBRIDGE
NEXT SCHEDULED DEPART	3:45 PM	4:15 PM	3:50 PM
ON TIME/DELAYED	100% FULL	80% FULL	80% FULL
DRIVE-UP WAIT TIME	ON TIME	ON TIME	DELAYED 10 MIN
	2 HOURS	0 MIN	0 MIN

A map of where such signs might be located is shown in Exhibit 7 below. This is simply an example of where signs could be located to allow drivers the opportunity to make decisions about which ferry crossing or drive around option to take. Assuming approval of the reservation predesign, the actual placement of the signs will be determined during the design phase of the system.

Exhibit 7
Map Identifying Potential Locations for Regional VMS Signs



Local Signs. Located in proximity to WSF terminals, these signs would display the next sailing, drive-up wait times, and vehicle processing directions for the local terminal. The signs should be placed far enough from the terminal that in the event of a delayed sailing, an individual could make a more informed choice about his or her travel decision (i.e. he or she could delay his or her drive to the terminal and instead enjoy more leisure time in the ferry community). Exhibit 8 provides an illustrative example of the information that would be provided on signs in the local. For the purposes of the predesign, it was determined that the initial program would make use of the few existing local signs in WSF’s network and not propose any new signs.

**Exhibit 8
Sample Local Community Sign**



Exhibit 9 provides an illustrative example of a sign directing traffic into the correct lanes as customers approach the terminal. These would be necessary at all terminals wherever WSF intends to fully deploy reservations.

**Exhibit 9
Sample Terminal Traffic Sign**



Reservations-Related Communication

A robust communication system is a foundational component of a reservation system. The communications infrastructure described above will ensure the demand management potential of the reservation system is maximized and provide significant customer benefits through reduced congestion and better information about terminal conditions. In addition to the general travel information provided by highway radio, regional highways signs, and local signs, customers with reservations will receive specific information about their reserved sailing, including:

- **Email** – reservation holders will be sent alerts and updates via email about their individual reservations, potentially including information on delays and cancelations, and optional regular reminders

- **Text message** – reservation holders will be sent alerts and updates by text message about their individual reservations, potentially including information on delays and cancelations, and optional regular reminders

Email and text message alert systems could also be provided in the absence of a reservation system to voluntary subscribers, much as WSDOT provides for other parts of its system. This would provide yet another method for communication about service exceptions and travel delays.

5.2 Business Rules

A vehicle reservation system is foundationally a set of business rules that work together so customers, communities, and WSF have a seamless reservation and travel experience. Business rules are a group of policies, procedures, and constraints that define how a given system will operate. The business rules for the vehicle reservation system were designed to work with each other to meet the goals identified in Section 4.1, summarized as follows:

- **The system must work for WSF customers.** It must be easy to use and offer an adequate degree of spontaneity, flexibility, and certainty.
- **The system must work for ferry communities.** It must reduce the negative impacts of queuing outside the terminal, and allow WSF customers and local residents to access local businesses.
- **The system must work for WSF.** It must recognize the unique circumstances of its different routes, help the agency manage demand, improve asset utilization, and respond to legislative direction.

The business rules developed to meet these goals have been derived from the lessons learned through research, discussions with the Partnership Group and public input, and technical team analysis (described in Section 3.2 above). The system was designed to balance simplicity with the level of detail necessary to achieve the factors for success listed above.

Where possible, business rules will be uniform across all routes and all sailings in order to keep the customer experience consistent and minimize potential points of confusion. However, route-level differences will be required in some instances to accommodate unique ridership patterns and individual terminal characteristics. Supporting different types of customers' travel planning needs is a particular focus of the reservation system business rules.

There are three main categories of business rules that are the foundation for how the system operates and how customers interact with the system:

- **Share of vessel made available for reservations.** On each sailing, a specified number of vehicle spaces will be available for customers to reserve. The rest of the vehicle spaces will be available on a first-come, first-served basis, allowing customers to drive up without a reservation and facilitating last minute changes by reservation holders. Percent of space available for reservations will be determined in part by the type of sailing, time of sailing, history of congestion, and will differ for different routes.
- **Priority access programs.** WSF will create two customer loyalty programs that will give commuters, frequent users, ferry community residents, and commercial customers priority access to reservations on high-demand sailings. Customers that choose not to join a loyalty program will have limited access to reservations on peak and commute sailings, but greater access to reservations on off-peak sailings. This set of business rules includes minimum eligibility requirements to join the priority access programs, reservation space set-aside for those customers, and payment policies.

- **Changing, canceling, and using reservations.** This set of business rules includes policies regarding how and when customers can change and cancel their reservations, and when customers must arrive at the terminal to use their reservation.

Share of Vessel Made Available for Reservations

The share of each vessel that is made available for reservations is a business rule that plays a large part in determining to what extent a reservation system will meet the goals described above. The percentage of space available for reservations helps to spread demand and reduce congestion at terminals and can be adjusted to accommodate different ridership needs.

As much as possible the reservation system should meet the needs of all different customer types—including commuters, frequent riders, commercial freight, and recreational users — and operate efficiently for peak and off-peak sailings. To meet these two criteria, the reservation system would need to be flexible to adjust the number of available reservations to accommodate those differences rather than establishing one common percentage for all routes and sailings. This is a more customer friendly, albeit more complicated approach, which necessitates grouping sailings by their ridership characteristics and analyzing how business rules might differ between these groupings.

Types of Sailings

Ridership characteristics include how full a sailing has historically been, what percentage of its ridership has historically been commuters, and what percentage of its ridership has historically been commercial freight. Once these characteristics were determined, business rules were defined for each type of sailing to balance the importance of customer service with the legislative direction to spread demand.

The analysis of ridership characteristics showed there were three primary types of sailings:

- **Peak Commute Sailings.** These are sailings that have historically been used by commuters traveling back and forth between home and work multiple days each week. Commute sailings are typically full or almost full. Customers who want to travel during the commute period currently must arrive early for their desired sailing, or risk having to wait until the next boat. This can cause long queues at terminals during commute periods that disrupt local traffic and businesses.

Commuters are important customers to WSF. The business rules on peak commute sailings are designed so that commuters will be able to travel on their preferred sailings and will have the flexibility to change their reservations due to unforeseen circumstances.

Peak commute sailings will be defined on a route by route basis, but there are typically two peak commute periods during each weekday on heavy commuter routes: a morning commute (from approximately 6:00am to 9:00am) and an evening commute (from approximately 3:00pm to 7:00pm). Not all routes will have both a morning and an evening commute period, and some routes will have no commute periods.

- **Other Peak Sailings.** These are sailings that have historically been full or nearly full, but do not occur within the commute windows of their particular route. These sailings are typically used by recreational customers and ferry community residents traveling between home, tourist destinations, errands, and recreational activities. High demand for these sailings results in long customer wait times and causes queuing in local communities.

Generally a peak sailing is one that is consistently 80% or more full and is preceded and/or followed by a sailing that is 80% full. Peak sailings will be defined on a route by route basis and will be chosen

based on how full each sailing has historically been. These sailings will vary by day of week and season of year.

- **Off-Peak Sailings.** These are sailings that have historically had unused capacity and do not occur during the defined commute windows of their particular route. These sailings are typically used by recreational customers and ferry community residents. Wait times are low, and there are not congestion issues in local communities before these sailings.

WSF designed business rules that will encourage customers to make discretionary trips on these off-peak sailings. This will spread demand—per legislative direction—and also decrease customer wait times and the negative community impacts of queuing.

The amount of space available for reservations will be determined on a route by route basis and by sailing type. This amount will be defined as a percentage of the total vehicle space available on each vessel. During the analysis process, the following questions were considered to help determine this business rule:

- **How can this rule be used to help reduce congestion and long lines at terminals?** One of the keys to reducing congestion around terminals is to reduce the number of vehicles that are showing up for each sailing, so that arrival patterns align with available space on sailings. Reservations accomplish this goal by apportioning the majority of sailing space to specific customers. There is a relationship between the percent of vessel space reserved and how many vehicles show up for a sailing.

If 100% of a vessel is reserved, the exact number of vehicles necessary to fill up the boat would show up for each sailing, and terminal backups would be eliminated. Non-reserved customers would not arrive for the sailing because they would know it was already full. However, reserving 100% of a vessel also has some negative implications. If less than 100% of the boat is reserved, some drive-ups will arrive for each sailing in hopes of filling unreserved space. The lower the percentage of space available for reservations, the more drive-ups will arrive and wait in line, increasing congestion.

- **How can this rule help spread demand into off-peak sailings?** Reservations can act as a signal to customers, informing them which sailings are full and which have space available. Customers who have discretion about when they can travel will be able to select reservations on emptier sailings during off-peak times, therefore spreading demand. This works especially well when incorporated with a communication system that can inform customers about reservation availability and estimated wait times for non-reserved customers.
- **How can this rule allow customers to plan trips in advance, while still allowing some same-day travel decisions?** WSF recognizes that different customer types plan travel in different ways and at different times. It is important to offer enough reservations that customers who want to plan in advance will be able to reserve vessel space if it is available. If reservation amounts are too low, customers who would have made reservations will be forced to drive up to the terminal and wait in line for their desired sailing on a first-come, first-served basis.

On the other hand, not all customers know when they need to travel; they can be uncertain about when their return trip will be. It is important that customers who make last-minute travel arrangements, or have emergencies that require them to travel immediately, are able to drive up to the terminal and have a reasonable chance of making a sailing relatively soon after they arrive.

Taking into account these three considerations, as well as the potential for tweaking business rules across sailing types, the following reserved percentages were identified as a base for WSF's reservation system. These percentages will be tailored to each individual route, but serve as general principles.

- **On Peak and Commute Sailings, 70-90% of the vessel will be available for reservations.** As noted above, reserving 100% of a vessel eliminates congestion and queuing around terminals during high demand periods. However, WSF recognizes that many customers need flexibility around same-day travel, either due to preference or to unforeseen emergencies. Having at least 10% of each vessel available for drive-up customers will keep drive-up traffic to a minimum, while still giving drive-up customers access to sailings. Additionally, WSF will start with a lower percent of the vessel space available for reservations and increase that percentage as customers adapt to the system, if further queue reduction is needed, or there is customer demand for more reservation space.
- **On Off-Peak Sailings, between 50% and 90% of the vessel will be available for reservations.** During off-peak sailings, congestion and queuing are not a problem at most terminals. For these sailings, WSF might only reserve 50% of available vessel space. This will allow customers who want to plan their travel in advance to make reservations, but will also allow flexible travel during off-peak periods for customers without a reservation. Higher shares of sailings might be made available for reservations if demand warrants it.

It is important to note that allowing up to a certain percentage of vessel space to be reserved does not mean that all of these reservations will be taken. Although 50% of each off-peak sailing might be available for reservations, customers may learn over time that demand is low enough during off-peak sailings that reservations aren't necessary and will choose to drive up instead. Again the portion of space available for reservations on off-peak sailings will vary by route and by sailing in order to best accommodate ferry communities while still meeting the goals of the reservation system.

Priority Access Programs

Through its work with the Edmonds-Kingston Partnership Group and internal analysis, WSF identified three groups of customers that can be categorized by trip frequency and purpose of trip:

- **Frequent Users.** This category consists of regular ferry commuters and residents of ferry-served communities that travel on WSF for many of their regular trips, such as errands, doctor's appointments, and recreation. These customers rely on ferries as part of their lives and make up a significant portion of annual trips on WSF.

These customers have less discretion about when they can travel because their trips are often to and from work or other appointments.

- **Commercial and Freight.** Commercial and freight customers vary in frequency of use, but their trip purpose is uniquely business-related. Examples include shipping service trucks that frequently transport packages arriving at Seattle-Tacoma International Airport to west sound communities and infrequent stock trucks that carry food and supplies to island communities.
- **Infrequent Users.** Infrequent users are those who travel on WSF a few times or less per year. Their trip purpose is most often recreational, and they have more discretion about when they can travel.

WSF has two options for addressing the different customer types that it serves on its routes. The first option would be to treat all customers the same with regard to reservations, and let anyone make reservations on a first-come, first-served basis until all space available for reservations is full. This is the

simplest form of a reservation system and would help WSF spread demand and reduce congestion. However, this method does not address concerns that some customers have, especially among commercial users and residents of ferry-dependent communities.

Both commercial users and ferry community residents expressed concern with allowing a high percentage of each sailing to be reserved. Many of their trips are necessary and must be made within certain windows. They were worried that sailings would fill up before they made their travel plans, resulting in their trips being pushed to undesirable sailing times. WSF recognizes that commercial and frequent users comprise a significant portion of ferry customers and are an important and loyal customer group. Additionally, it recognizes the importance of its service in supporting the State's freight mobility goals. In order to ensure that these customers have a positive experience and priority access to high-demand sailings, two priority access programs were developed.

Priority access programs provide enrolled customers additional benefits over un-enrolled customers. A well known example of a priority access program is an airline frequent flyer program. Frequent flyer programs are used by airlines to reward loyal customers with simple ways to make reservations, easy check-in at terminals, and access to flights and seats not sold to general customers.

While WSF will have the option in the future of expanding the scope of its priority access programs, their purpose for now is to ensure that space is available for commercial and frequent users on the sailings that they prefer. The two priority access programs are described below.

The Premier Account

Description. The Premier Account was designed to ensure that the reservation system works well for commuters and frequent users during peak and commute sailing times.

Eligibility. Any WSF customer may enroll in the Premier Account by doing one of the following:

- Setting up an online reservation account using a credit card or
- Depositing and maintaining a minimum dollar value in their account.

Payment. Premier Account holders can make reservations without being charged for the reservation until the reserved sailing departs. They can choose whether to have that trip paid for by a credit card, their *Good To Go!* account, or a multi-ride revalue card.

Program Benefits. The primary benefit is that account holders will have access to space on vessels reserved solely for Premier Account members. A portion of the total space allocated for reservations can only be reserved by Premier Account holders up until 24 hours in advance of the sailing. (Within 24 hours of the sailing, this space will be made available to all customer types to help ensure a more full sailing). Additional benefits include:

- Premier Account holders will not be required to pay for the ticket in order to hold the reservation. Having a credit card, or a *Good To Go!* or multi-ride account number stored in their account plus an account minimum balance, will be sufficient.
- Premier Account holders will be able to make multiple reservations at one time
- Premier Account holders will be given greater flexibility to change and cancel reservations

Program Rules. The following rules reflect a system where WSF gives Premier Account holders the above privileges and advantages described above over other customers. In return, WSF expects Premier

Account holders to proactively manage their accounts and communicate changes and cancellations to WSF in a timely manner.

- The amount of reserved space set aside for Premier Account holders will vary by route, but generally it will be allocated by sailing type, according to the following principles:
 - On Commute Sailings, up to 90% of the vessel will be reserved, and the majority of this space will be set aside for Premier Account holders.
 - On Peak Sailings, up to 90% of the vessel will be reserved, and this space will be balanced between Premier Account holders and general customers.
 - On Off-Peak Sailings, the majority of reserved space will be available for general customers.
- Premier Account holders will be able to make reservations in general customer space once all dedicated Premier Account space on a sailing is full.
- Premier Account holders will be expected to make reservations only for trips they intend on taking. Excessive cancellations or changes will result in removal from the program.

Over time, as WSF learns more about the frequency and trip patterns of its most frequent users, tariff policies around volume-based discounts or other incentives might be refined to better align with the ridership patterns of frequent riders.

The Commercial Account

Description. The Commercial Account was designed to meet the needs of freight and other commercial customers. It is similar to the Premier Account outlined above.

Eligibility. Customers may enroll in the Commercial Account if they meet the following eligibility requirements:

- Customers must meet WSF's current commercial account eligibility minimums, including passing a credit screen
- Customers must set up an account with the commercial program and make reservations using their WSF commercial account number.
- Customers must pay a small annual fee (also required by the current commercial program).

Payment. Commercial Account holders will be billed at the end of each month based on that month's ridership.

Program Benefits. The primary benefit is that account holders will have access to space on vessels reserved solely for Commercial Account members, including space for vehicles over 7'6" tall. This space will be held for Commercial Account holders up until 30 minutes before sailing time, when it will be released to all customers. Additional benefits include:

- Recognizing the importance of commercial customers, WSF will work through the current commercial program to provide more and better services related to reservations.
- Commercial Account holders who travel frequently will be guaranteed a reservation on their preferred sailing as long as they make the reservation an hour or more in advance of the sailing.

- Commercial Account holders will not be required to make a deposit to hold a reservation. Their commercial account information is sufficient, and they will be billed for all travel at the end of the month.
- Commercial Account holders will not be limited to a certain number of roundtrips during peak commute windows.
- Commercial Account holders will be able to make multiple reservations for multiple vehicles in their fleet.
- Commercial Account holders will be given greater flexibility to change and cancel reservations

Program Rules. The Commercial Account program is similar to the Premier Account program, in that they both provide priority access and advantages over general customers. In exchange for these privileges, WSF will require that Commercial Account holders proactively manage their accounts and communicate with WSF in a timely manner.

- Again the amount of reserved space set aside for Commercial Account holders will vary by route, but generally it will be allocated by sailing type, according to the following principles:
 - On Commute Sailings, up to 90% of the vessel will be reserved, and a portion around 10% (based on historical commercial ridership) will be set aside for Commercial Account holders. This will be tunnel space, which accommodates tall vehicles. The amount set-aside will grow as the commercial program grows.
 - On Peak Sailings, up to 90% of the vessel will be reserved, and a portion around 10% (based on historical commercial ridership) will be set aside for Commercial Account holders. This will be tunnel space, which accommodates tall vehicles. The amount set-aside will grow as the commercial program grows.
 - On Off-Peak Sailings, Commercial Account holders will receive a portion around 15%, more space than is historically used by commercial riders and more than will be set aside for Premier Account holders. This will be tunnel space, which accommodates tall vehicles. The amount set-aside will grow as the commercial program grows.
- Commercial Account holders will be able to make reservations in general customer space once all dedicated Commercial Account space on a sailing is full.

Making, Changing, Canceling, and Using Reservations

These business rules govern how customers will interact with WSF's reservation system. They were designed with extensive input from WSF staff and customers through the Edmonds-Kingston Partnership Group. The purpose of these policies is to balance the customer's need for flexibility and ease of use with WSF's need to minimize behaviors that negatively affect the reservation system and can cause boats to leave with extra capacity. Business rules have been designed to support commuter, commercial, and general customer travel; this, however, leads to more complex rules, particularly around making, changing, and canceling reservations.

Making Reservations

The customer's first interaction with the system will be in finding their desired sailing and placing a reservation or deciding to travel on the sailing without a reservation. This section details when and how a customer can make a reservation with WSF.

How can I access space on the vehicle deck of a vessel?

Under a reservation system, customers will be able to access vessel space in five ways. Three of the methods involve having a reservation:

- Customers can join the Premier Account and make a reservation using a linked credit card, *Good To Go!* account, or multi-ride revalue card.
- Customers can join the Commercial Account and make a reservation using their commercial account billing information.
- Customers can also make a reservation in general customer space without joining a priority access account.

The other two methods for accessing vehicle deck space do not require reservations:

- Drive-up customers can arrive at the terminal at any time without a reservation and wait to travel on a first-come, first-served basis. Customers will be able to drive onto any sailing that is not full without a reservation.
- Emergency vehicles, or customers requiring emergency service as defined in the Washington Administrative Code (WAC), can arrive at the terminal without a reservation and be given priority loading before other drive-up customers, using the at least 10% of unreserved space that will be available on all sailings.

How far in advance can I make a reservation?

The earliest date before the scheduled sailing a customer will be permitted to hold a space on a ferry will vary by sailing type. This differentiation recognizes that different customer types plan travel differently and is designed to spread demand away from commute sailings.

On off-peak and non-commute peak sailings, a customer will be able to make a reservation six months in advance. The Partnership Group informed this decision, telling WSF that customers planning recreational travel typically begin planning their trips up to six months in advance and would like to make reservations at that time. This will allow travelers who may also be planning hotel reservations and airplane tickets to book their desired ferry sailing at the same time they are making their other travel plans.

On commute sailings, a customer will be able to make a reservation 30 days in advance. Customer input identified that generally, commute customers do not need to make their travel plans more than 30 days in advance. Additionally, delaying the availability of reservations on commute sailings will help spread demand because customers that need to make reservations farther in advance will make them on non-commute (on-peak and off-peak) sailings.

How close to departure can I make a reservation?

At the latest, customers will be able to make reservations 30 minutes in advance. This is the minimum amount of time that WSF needs to process a new reservation through the system and be ready to check in the customer at the terminal. Customers will be able to drive directly onto any sailing that is not full without a reservation.

Will I have to pay a deposit for my reservation?

This business rule varies based on customer type. Customers making a reservation outside one of the priority access programs will be charged for the full price of the ticket when they make their reservation. This business rule was informed through the research of other ferry systems worldwide, as well as WSF's own experience operating reservations on its Anacortes-Sidney route. These references determined that requiring a deposit reduces the instance of customers making reservations that they do not intend to use.

Premier Account holders will not be required to pay a deposit for their reservations since WSF will have access to a credit card, *Good To Go!*, or multi-ride account number to charge them for their trip upon travel.

Commercial Account holders will not be required to pay a deposit for their reservations, and instead will be billed for all travel at the end of the month using their commercial account billing information.

How many reservations will I be able to make at one time?

All customers will be able to make multiple reservations at one time.

How many reservations will I be able to make for the same day?

Customers will be allowed to make unlimited reservations for the same day on off-peak and non-commute peak sailings. Premier Account and un-enrolled customers will be limited to one trip in each direction on commute sailings per day. Commercial customers will be able to make multiple round trip reservations on peak commutes on the same day. It is foreseeable that premier account and un-enrolled customers may need to reserve two trips per day during the peak period on different routes. WSF will consider the option of providing this capability for non-substitutable routes.

How do I make a reservation?

Customers will be able to make reservations online, through an automated phone service, with a WSF operator, and at a WSF Kiosk.

Changing and Canceling Reservations

WSF understands that customers' travel plans may change after they have already made a reservation. Meetings that run long or short, traffic, or just the desire to stay on the other side of the water for a longer period, mean that sometimes customers have uncertainty about when they will make their return trip. The following business rules will determine how and when a customer can make a change or cancellation and what the implications will be. These business rules are designed to balance meeting customer service needs with the cost to WSF of changes and cancellations. Depending on the payment method and timing of a change or cancellation, there may be substantial financial impacts to WSF.

How do I cancel my reservation when I do not want to switch to a different sailing?

There are two impacts that reservation cancellations have on WSF. The first is a financial impact and is specific to reservations where deposits are paid with a credit card. There is a transaction cost associated with refunding purchases made with credit cards. Minimizing cancellations minimizes those transactions costs, and therefore WSF wants to keep the number of those types of cancellations low.

The second impact is on space utilization. One of WSF's priorities for implementing the reservation system is to efficiently utilize existing assets, which includes making sure that sailings are leaving as full

as possible. When customers cancel reservations close to sailing time, there is a higher probability that boats will be sailing below capacity.

While it is important that customers have incentives to cancel rather than simply not show up for a reserved sailing, last minute cancellations will result initially in boats sailing below capacity and later in increased queuing as people learn that they can drive-up to boats that are mostly reserved because many of those reserved spaces will be available due to cancellations.

In order to reduce credit card transaction fees, maximize vessel capacity, and minimize the number of reserved spaces that become available at the last minute, the cancellation policies will be applied as follows:

- General customers typically pay reservation deposits using a credit card, and there are associated transaction costs with refunding credit card purchases. If there are few cancellations the impact to WSF will be minimal and no fee will be charged. However, if there are frequent cancellations by general customers, WSF reserves the option to require a cancellation fee for all reservation cancellations.
- Priority access customers are not paying a deposit toward their reservation so there is no transaction fee associated with a cancellation. Therefore, customers will likewise not be charged a cancellation fee. However, if a customer cancels reservations excessively, they will be removed from the priority access program. Additionally, if in the future WSF experiences a large number of cancellations it may impose a cancellation fee on priority access customers as well to discourage them from making reservations they do not intend to keep.

Cancellations will only be allowed up to 30 minutes in advance of a sailing. After 30 minutes, a customer will either be considered a late arrival or a no-show. The business rules for these two scenarios are discussed below under “Using Reservations.”

How do I change my reservation to a different sailing?

WSF wants to give customers the flexibility to change their reservations when their travel plans change. Unlike cancellations, there is not a direct financial cost to WSF when customers change reservations to a different sailing because no monetary transaction takes place. The cost to WSF is instead dependent on how customers choose to change their reservation. If a significant number of customers change reservations via phone, WSF may need to increase its staff, thus also increasing its operating costs.

To allow customer flexibility and to minimize changes by phone, the following business rules will apply:

- For all customer types, WSF will allow changes to be made up to 30 minutes in advance of a sailing at no charge if they are made online, at a WSF kiosk, or through an automated telephone service. After 30 minutes, a customer will either be considered a late arrival or a no-show. The business rules for these two scenarios are discussed below under “Using Reservations.”
- If the volume of calls to WSF operators for changes or cancellations is very high even after the reservation system is well established, WSF has the option of allowing changes or cancellations through a WSF operator but charging for the change or cancellation if an operator is used.

Using Reservations

The last step in customer interaction with the reservation system will be completing the reserved trip. This section outlines when a customer must arrive at the terminal, what the implications are of arriving

late for a sailing, and what the implications are of choosing not to use a reservation. Flexibility and convenience for the customer was balanced against time needed for vehicle processing and the desire to fill the boat as much as possible before departure.

How far in advance can I show up and wait for my sailing?

The earliest time at which a customer is allowed to show up and get in line for their reserved sailing will vary significantly by route, because it is dependent on the amount of time between sailings at each terminal. The main considerations for this business rule are how it would impact lines at the terminal and congestion in surrounding communities, and how it would complicate vehicle processing if vehicles from more than one sailing were overlapping in the terminal.

Generally, terminal holding will be available to customers up to an hour before the sailing.

How close to departure can I arrive and still use my reservation?

The latest time at which a customer will be able to show up and retain their reserved spot on the boat is up until 15 minutes in advance of the reserved sailing on all domestic routes, and 60 minutes in advance on international routes. International travelers need to arrive farther in advance than domestic travelers because of the time it takes to check travel documents such as passports.

Through its work with the Partnership Group, WSF recognized that customers would like the time they need to arrive in advance of their sailing to be as short as possible. However, WSF needs a certain amount of time to process vehicles at the terminal, and the 15 minute minimum was determined through two main analyses:

- **The amount of time WSF needs to check in and load a vehicle.** WSF typically begins loading a vessel 10 minutes before its scheduled departure time. At this time, WSF needs to have all reserved vehicles checked in through the tollbooths and staged on the dock, ready to be loaded. Requiring vehicles to arrive an hour to 15 minutes in advance, depending on the terminal, ensures that WSF will have adequate time to process and load all vehicles without causing sailing delays.
- **The amount of time WSF needs to notify drive-up customers whether or not they can travel on the sailing.** For many sailings, WSF will have customers without reservations who have driven to the terminal in the hopes of traveling on the next boat. WSF cannot inform these customers whether or not they will travel on the sailing, and therefore begin processing them through the tollbooths, until WSF knows how many reservation holders have checked-in for the sailing. Once the 15-minute cutoff time has passed, all reservation holders who have not yet checked in will lose their spots on the vessel, and WSF can inform the correct number of drive-up customers that they will be traveling on the next sailing. This 15 minute minimum ensures that WSF will have adequate time to process enough drive-up customers so the vessel leaves full, therefore serving as many customers as possible.

If sailings are behind schedule, the 15 minute time window would apply to the new estimated departure time as communicated through the proposed ITS system and to reservation holders through other media (e.g. text and voice messages). In all instances, the Terminal Manager will have discretion to allow late arrivals on board, if space permits.

What happens if I show up after the 15 minute minimum arrival time, and do not notify WSF of my change in advance?

If a reservation holder fails to show up more than 15 minutes in advance of their reserved sailing and does not notify WSF, the customer will lose their reserved spot on the vessel.

The customer will then be placed at the end of the drive-up line, where he will be loaded on a first-come, first-served basis as space becomes available on a future sailing. This penalty of additional wait time will likely be enough to discourage this behavior, and a financial penalty should not be necessary. For general customers the deposit made toward the fare will still be valid, and the balance will be charged once vessel space becomes available and the customer is processed through the tollbooths. For priority access customers, the trip will not be deducted from their account until they are processed through the tollbooths.

If an excessive number of late arrivals occur on a route or system-wide, WSF may charge a monetary penalty for late arrivals.

What happens if I don't travel on the day of my reserved sailing and do not notify WSF of my change or cancelation in advance?

When a customer does not show up for their reserved sailing and does not show up to travel for the rest of the day, WSF will consider them a "no-show." WSF has the option of defining a "day" as the 24 hour period following the reserved departure or as that business day. Minimizing the number of no-shows on each sailing is important to WSF because they have a twofold negative impact on the system:

- **A high rate of no-shows will cause vessels to sail below full capacity.** No-shows impact both customers and WSF. One of WSF's priorities in implementing a reservation system is to maximize the use of its assets, including all vessel space. When customers do not show up for sailings in significant numbers, there will not be adequate drive-up customers to take their place. Therefore, sailings will be leaving below capacity. This is a lesson learned from the reservation system on the Port Townsend-Keystone route.

Additionally, a high rate of no-shows implies that customers have made reservations that they did not intend to use. This negatively impacts other customers, who may have wanted reservations on the sailing, but were unable to make them because it was already full.

- **A high rate of no-shows will encourage drive-up traffic.** One of the goals of the reservation system is to reduce congestion and wait times at terminals. Having a high percentage of each vessel available for reservations during peak times is expected to reduce drive-up demand at these times and thus reduce queuing. However, if business rules are not in place to prevent significant numbers of no-shows, more vehicles than desired will be accepted as drive-ups, and therefore encourage drive-up behavior and terminal congestion.

Given the negative impacts of no-shows, WSF developed business rules that encourage customers to either travel on their reserved sailing, or notify WSF in advance if they have a change in plans. Therefore, any customer who does not arrive in time for their reserved sailing, does not attempt to travel for the rest of the operational "day", and does not notify WSF will lose his reserved spot on the vessel. The customer will also be charged the full fare for the reserved trip.

Modifying Standard Business Rules during Service Exceptions

The above business rules will allow WSF to run efficiently and to effectively serve customers during most operational hours. However, throughout the year, exceptions can occur that disrupt service and will necessitate business rule modifications in order to adjust for circumstances and continue serving all customers fairly. These service exceptions include delayed sailings, canceled sailings, and vessel changes and substitutions due to planned and unplanned maintenance periods.

On-time Performance

During a service day, sailings can get behind schedule due to many reasons, including inclement weather, traffic congestion at the loading terminal, and vehicles that fail to start during unloading. Most of WSF's sailing schedules have a buffer built in so vessel operators can get back on schedule, but there still may be a block of sailings during the day that are running late.

WSF has already begun to address this issue independently of this predesign study by beginning a review process of sailing schedules on certain routes and determining if schedules should be revised to be more realistic, and if longer buffer periods should be built in so sailings can get back on schedule as quickly as possible. While this will help reduce periods of delayed sailings, exceptions will still occur. During these times, WSF will take the following actions to ensure that customers are served as well as possible and receive real-time information about how the delays will affect their travel.

During a period of delayed sailings, WSF will continue to operate under regular business rules as long as possible. Changes will be made once sailings get significantly behind, when traffic arriving for the next sailing is interfering with traffic arriving for previous sailings that have not yet departed. This causes terminal congestion and queuing in communities. This will mainly be a concern during high-demand sailings.

Once this backup becomes big enough, WSF will switch to a first-come, first-served model for reservation holders. Under this scenario, all customers arriving at the terminal who have a reservation for a sailing that day will be loaded in the order they arrive, instead of according to their actual reservation time. This will allow WSF to more efficiently manage traffic at the docks and ensure that customers travel as soon as possible after arriving at the terminal. No new reservations will be taken and no drive-up customers will be allowed to travel until all current reservation holders have been served.

In addition to addressing the congestion at the terminal through business rule modifications, WSF will reduce congestion by informing reservation holders of delayed sailings. The communication system will send out notification messages, either via email or text message, to all reservation holders alerting them of the revised schedule. These messages will include information on how late each sailing is likely to be and advise customers to stay away from the terminal until their new estimated departure time. If customers affected by the delays choose to cancel their reservation, not show up for their sailing, or move their reservation to a different sailing, they will not be charged a fee. Those who paid their fare will receive a refund.

Capacity Reductions

Capacity reductions occur when vessels are unable to operate, either due to mechanical issues or planned maintenance. When maintenance is planned, WSF knows months in advance when it will occur and what size vessel will be used in place of the one in maintenance. When mechanical issues occur, they are usually unforeseen and can cause same-day capacity reductions that affect customers. A vessel

that is out of service may be replaced by a smaller vessel, therefore reducing the number of customers that can be carried, or it may be out of service until repairs can be made, which causes canceled sailings.

Same-Day Capacity Reductions. Same-day capacity reductions are an issue because WSF has already sold reservations on sailings that are now either served by a smaller vessel, or are canceled. When one of these scenarios occurs, WSF will send out notifications to all affected reservation holders by either email or text message, explaining what has occurred, and how each customer is affected. Customers who choose to cancel their reservation, not show up for their sailing, or move their reservation to a different sailing will not be charged a fee.

To best serve customers that still want to travel, WSF will load reservation holders on a first-come, first-served basis as vessel space is available. No new reservations will be accepted, and drive-ups will not be accepted until all current reservation holders have been served.

Capacity Reductions with Advance Warning. In some instances of capacity reduction, WSF will have advanced knowledge of the situation and will be able to inform customers in advance. The most common type of capacity reduction with advance warning occurs when WSF learns that planned maintenance is going to take longer than expected. The vessel is typically already out of service when this happens, and its return date is pushed back. WSF is usually informed of these situations many days in advance.

When these reductions occur, WSF's first priority will be to make sure as many customers as possible who already have reservations will still be able to travel on or near their original sailings. To accomplish this goal, WSF will allow up to 100% of the replacement vessel space to be reserved in order to accommodate as many existing reservations as possible. If not all reservation holders fit onto the replacement vessels, priority will be given based on the order of when reservations were originally placed. No new reservations will be allowed on these sailings unless there is space available after existing reservation holders have been served.

WSF will send notification to reserved customers informing them of the situation and offering assistance in rescheduling bumped reservations on other sailings or routes. All cancellation fees will be waived for customers who decide not to travel on an alternate sailing. Those who paid their fare will receive a refund.

Sailing Cancellations on Routes with 2+ Boats

Many of WSF's routes are served by more than one vessel. On these routes, it is possible for one vessel to be out of service while one vessel is still running. This results in every other sailing being canceled. In this scenario, WSF will send out notifications to all reservation holders on canceled sailings letting them know their reservation has been canceled.

The reservation system will support the re-allocation these canceled reservations to future sailings as space is available, reserving up to 100% of the remaining vessel to accommodate as many customers as possible. Reservations will be rescheduled in the order in which they were originally placed. Notifications will also let customers know that all no-show and cancellation fees will be waived if they choose to cancel their reservation, not show up for their sailing, or move their reservation to another sailing or another route. Those who paid their fare will receive a refund.

5.3 Terminal Operations and Vehicle Processing

Each of WSF's terminals has unique characteristics that affect how reservations will be implemented at that terminal and on routes served by that terminal. The most significant characteristic that determines how reservations will work is terminal holding capacity, which is the number of vehicles that can be held at a specific terminal inside the processing tollbooths.

The analysis done below is organized terminal by terminal in order to document where reservations might be feasible and what sort of terminal or business rules modifications might be needed. On routes where all terminals are determined to be able to support reservations, then reservations would be operationally feasible from a terminal and vehicle processing perspective. Where one or more terminals is determined to be inadequate, the operational feasibility of implementing reservations on that route would become more difficult and potentially impractical. A discussion of how the feasibility of reservations at each terminal informs the feasibility of reservations for different routes is discussed in section 6.1.

A terminal that can hold between 120%-150% of the vessel serving that route is ideal for reservations. This amount of space allows WSF to stage vehicles in the same manner that they will be loaded onto the vessel and hold all arriving vehicles inside the terminal while accommodating drive-ups and limited instances of customers arriving prior to their designated arrival window. Most importantly, this level of terminal capacity reduces queuing through communities. Most of these objectives can also be accomplished at terminals that can hold between 100%-120% of vessel capacity, though there is less flexibility to accommodate additional drive-up customers or early arrivals.

Given limited vessel space for tall vehicles (over 7'6"), vehicle staging for these vehicles must ensure they have access to that space, which in some instances means that tall vehicles must be held in separate lanes from standard height vehicles so they can be loaded independently onto the vessel.

Vehicle processing will also need to separate reservation holders from drive-up customers to ensure that all reservation holders can be processed and loaded while drive-ups wait for space to become available. This means that there are up to four categories of customers that must be staged for each sailing:

- Reserved standard vehicles
- Reserved tall vehicles
- Drive-up standard vehicles
- Drive-up tall vehicles.

The second most significant terminal characteristic that affects how reservations will operate is headway. Headway is the amount of time between sailing departures on a particular route. Headway is important because it is the amount of time that WSF has to process a full boatload before vehicles need to be loaded again. It will be more difficult to implement reservations at terminals with shorter headways, especially if terminal holding space is at or below 100%-120% of the vessel.

Because customers will not be able to make, change, or cancel reservations at the tollbooth, the only additional tollbooth function anticipated to be required by the reservation system is verification of the reservation itself (via bar code or confirmation code). This is not expected to slow vehicle processing to a significant degree, and reservations would be implementable given current headways.

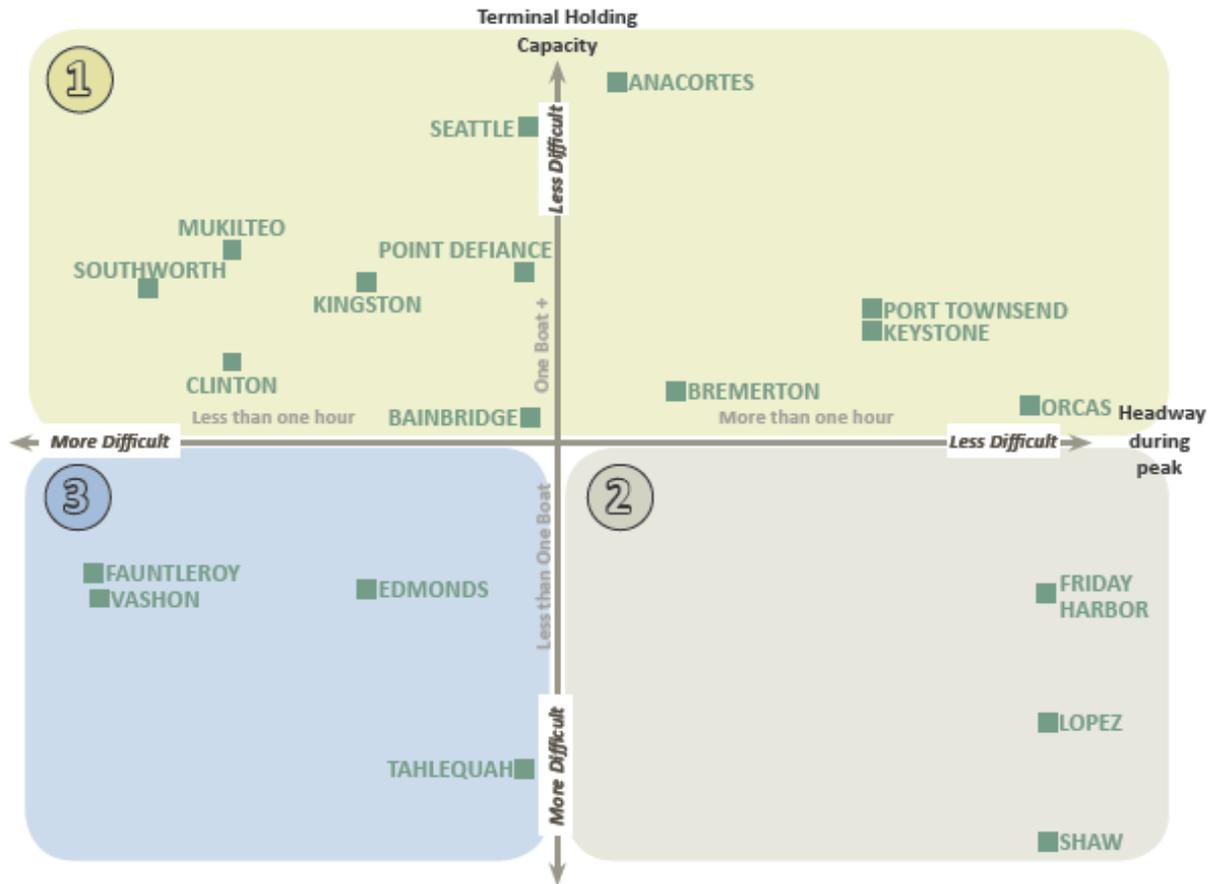
In research conducted about other ferry systems with reservations systems, it was common to separate the ticket purchasing function from the tollbooth in order to speed processing. If vehicle processing under a reservation system at WSF terminals needs to be more efficient in order to uphold the reservation system goals and business rules, WSF may consider separating ticket purchases from the tollbooth as well.

However, it is important to note that a number of WSF customer service and fare policies (like multi-ride passenger fare products and a preferred program that does not require advance purchase of a ticket) would be affected by separating ticket purchases from the tollbooth. Furthermore, ongoing projects like tollbooth re-alignment at Edmonds and Keystone terminals are expected to improve throughput. Therefore, WSF will examine the possibility of separating ticket purchase from the tollbooth only if the need arises.

Exhibit 10 plots each of WSF's terminals according to their terminal capacity and average headway. Terminals on the top of the framework have adequate terminal holding capacity, defined as at least 100% of a vessel. Terminals on the bottom of the framework have less than one boatload of holding available.

Terminals on the right of the framework have headways of more than 50 minutes. Terminals on the left of the framework have short headways of less than 50 minutes.

Exhibit 10 Vehicle Processing Framework



Based on these characteristics, terminals can be grouped into three levels of difficulty, with regard to accommodating reservations:

1. **Terminals with Adequate Holding** (Terminals in the top half). These terminals have at least 100% of a boatload of holding space, which will make reservations possible with minimal terminal modifications, even for routes with shorter headways. Of WSF’s 19 terminals, 12 fit in this category.
2. **Terminals with Inadequate Holding and Longer Headways** (Lower Right). These terminals have less than 100% of a boatload of holding space, but have substantially longer headways. The headways give WSF some flexibility, and reservations can be implemented at these terminals with only moderate terminal or business rule modifications. This category encompasses three of the seven remaining terminals.
3. **Terminals with Inadequate Holding and Shorter Headways** (Lower Left). Terminals in this quadrant have less than 100% of a boatload of holding space, and headways shorter than 50 minutes. Implementing reservations at these terminals presents challenges and may require extensive modifications to terminal facilities, business rules, or vehicle processing techniques. Only four of WSF’s terminals fall into this category, and their constraints are discussed in detail below.

All terminals will need some terminal modifications to help identify reservation holders and help customers be in the right place and be aware of current information. These communication

modifications include signs directing traffic into the correct lanes for the four customer types listed above, as well as signs as customers approach the terminal listing reservation availability, service disruptions, and estimated wait times for non-reserved customers (discussed in Section 5.1). In addition to signage, all terminals with reservation systems will require basic technology upgrades to tollbooths.

Terminal by Terminal discussion

The terminal framework above is useful for grouping terminals into levels of implementation risk and difficulty. It shows that 16 of WSF's 20 terminals will be able to accommodate reservations with minimal to moderate terminal modifications. WSF also recognizes that each terminal has unique constraints that require unique solutions. This section addresses terminals individually, explaining the constraints and characteristics of each.

Terminals with Adequate Holding

It will be possible to implement reservations at all of these terminals with only minor modifications to terminals, business rules, or vehicle processing.

Anacortes. The Anacortes terminal holds approximately 560 vehicles, and is served by 124- and 144-car ferries leaving to Sidney or to the San Juan Islands. This means that there are approximately 280 vehicle spaces available for each route, which is over 100% of both vessel sizes. Additionally, Anacortes' shortest headways are about 50 minutes, which gives adequate time to stage vehicles between sailings. Reservations can be improved and expanded at this terminal with only minimal modifications to improve communication and signage and upgrade tollbooth technology.

Bainbridge. The Bainbridge terminal is served by two 202-car ferries and has holding capacity for approximately 225 vehicles. This gives it more than 100% of a vessel in holding capacity. Additionally, the headway is 50 minutes on average which will allow reservations to be implemented at Bainbridge without significant terminal modifications.

Bremerton. The Bremerton terminal holds about 195 vehicles, and is served by 124-, 144-, and 188-car ferries rotated throughout the course of the year, giving it enough space to hold more than 100% of a vessel. Bremerton also has relatively long headways, which will allow this terminal to accommodate reservations with only minimal terminal modifications to improve communication and signage and upgrade tollbooth technology.

Clinton. The Clinton terminal is served by a 124-car ferry and can hold 150 vehicles. This gives it greater than 100% of a vessel in holding capacity. Clinton experiences short peak headways of 30 minutes, but the adequate holding capacity will allow reservations to be accommodated with only minor modifications to terminals. Adjustments to business rules governing customers' arrival times may be necessary.

Friday Harbor. Including remote holding, the Friday Harbor terminal has capacity for about 255 vehicles, and is served by 124- and 144-car ferries, giving it more than 100% of a vessel in holding space. As currently envisioned, the system will only provide reservations for customers traveling to Anacortes from Friday Harbor, as interisland traffic presents significant operational challenges with respect to vehicle processing. This simplifies vehicle processing and allows Friday Harbor to take advantage of long headways between reserved sailings to process vehicles.

Friday Harbor will require basic terminal modifications to communication and signage. Beyond these basic changes, it may be necessary to add a checkpoint or tollbooth to check in customers arriving with reservations.

Keystone. The Keystone terminal will be served by a 64-car ferry and has capacity for 90 vehicles, giving it more than 100% of a vessel in holding space. Currently, due to four vessels being removed from service in 2007, Keystone experiences 90-minute headways. However, a second vessel will soon be added to this route and will reduce peak headways to 45 minutes. Either way, the surplus of holding space will allow reservations to be implemented with only minimal terminal modifications to communications and signage.

Kingston. The Kingston terminal has capacity for 288 vehicles, and is served by 188- and 202-car ferries, giving it more than 100% of a vessel in holding space. The reservation system can work within the existing footprint of the Kingston terminal because of this adequate holding space, even though headways are as short as 35 to 40 minutes between peak sailings. The WSDOT Kingston Traffic Circulation Study includes a recommendation that the approach to the Kingston terminal be relocated to NE 1st Street. The conception design proposes two lanes for access to the terminal and two lanes for egress, though it is suggested that the access lanes could be reduced to one lane. To make reservations work at Kingston, both access lanes would need to be available so drive-ups and customers with reservations can be separated before arriving at the toll booth.

Mukilteo. The Mukilteo terminal has holding capacity for 198 vehicles and is served by a 124-car ferry, giving it holding space for more than 100% of a vessel, assuming continued WSF access to the Buzz Inn property or relocates the terminal as proposed. Although Mukilteo has headways as short as 30 minutes during peak periods, reservations could be implemented with only minimal terminal modifications if WSF continues to have access to the Buzz Inn property or the terminal is relocated. Given the short headways and regular sailing schedule, reservations may be implemented on a limited basis on this route. Some adjustments to business rules governing arrival times for customers would need to be made, and those options will be evaluated prior to any implementation.

Orcas Island. The Orcas Island terminal has capacity for approximately 150 vehicles at the terminal and is served by 124- and 144-car ferries, giving it more than 100% of a vessel in holding space. Additionally, adequate headways mean that the Orcas Island terminal will only need minimal modifications in order to implement reservations.

Port Townsend. The Port Townsend terminal will be served by a 64-car ferry and has capacity for 90 vehicles, giving it more than 100% of a vessel in holding space. Currently, Port Townsend experiences peak headways of approximately 90 minutes, but headways will be reduced to approximately 45 minutes when a new vessel comes online. Under either headway, the terminal's surplus of holding space will allow reservations to be implemented with only minimal terminal modifications to improve communication and signage and upgrade tollbooth technology and location.

Seattle. Colman Dock holds vehicles traveling to both Bremerton and Bainbridge Island and has a total holding capacity of 545 vehicles, or about 270 vehicles per route. Neither route is served by a vessel larger than 202 vehicles, therefore Colman Dock can hold more than 100% of a vessel for each of its routes, giving it adequate terminal capacity.

Additionally, headways to Bremerton and Bainbridge Island are long enough that they will not complicate vehicle processing. Reservations can be implemented at Colman Dock after minimal terminal modifications to improve communication and signage and upgrade tollbooth technology.

Sidney. WSF contracts out for operations support at the Sidney terminal. Reservations are currently required out of the Sidney terminal, and WSF expects that the new reservation system can be implemented at Sidney without any terminal modifications.

Southworth. The Southworth terminal has holding for 160 vehicles and is served by 87- and 124-car ferries, giving it more than 100% of a boatload of capacity. However, it experiences short headways of 30 minutes between peak sailings. These short headways may necessitate minor adjustments to business rules governing customers' arrival times, but reservations could still be implemented with only minimal terminal modifications to improve communication and signage and upgrade tollbooth technology.

Terminals with Inadequate Holding and Longer Headways

These terminals will be able to accommodate reservations with moderate modifications to terminal facilities, business rules, or vehicle processing.

Lopez Island. The Lopez Island terminal has holding capacity for approximately 75 vehicles, while the route is served by 124- and 144-car ferries. This is significantly less than 100% of a vessel in terminal capacity (though where allotments are less than a full boat, the holding capacity may be adequate). Headways are sufficiently long, but moderate terminal and business rule modifications may be necessary to implement reservations here, including some infrastructure additions.

Point Defiance. The Point Defiance terminal can hold 50 vehicles and is currently served by a 48-car ferry, but will have 64-car ferry by 2012, giving it more than 100% of a vessel in holding capacity in the short-term and less than 100% of a vessel after 2012. Point Defiance also has headways in excess of 50 minutes at all times. Basic terminal modifications to allow for reservation implementation would include signage directing customers into the correct lanes and communication signs.

Shaw. The Shaw dock has holding space for 15 vehicles for routes served by 124- and 144-car ferries. Although only a small portion of those boats will be used to carry vehicles traveling from Shaw, business rules at Shaw will need to be modified to accommodate reservations. Shaw does not currently have a checkpoint or WSF staff available to manage traffic at the terminal.

Terminals with Inadequate Holding and Shorter Headways

These three terminals will prove the most challenging when trying to implement reservations. Their level of operational risk and difficulty varies based on the insufficiency of vehicle space, the geography of the surrounding community, the number of destinations departing from the terminal, and the length of headways.

Edmonds. The Edmonds terminal holds about 155 vehicles and is served by 188- and 202-car ferries, giving it less than 100% of a vessel in holding capacity. In addition, short headways of approximately 35 to 40 minutes between peak sailings complicate vehicle processing. WSF and the Edmonds-Kingston Partnership Group worked together to compile options that would allow reservations to be accommodated at this terminal. The cost estimates for these options are included in Appendix E.

Fauntleroy. The Fauntleroy terminal will need the most modifications in order to support reservations. A mix of inadequate holding space (only 84 vehicles, for 87- and 124-car vessels), short headways (as little as 20 minutes), and sailings with mixed destinations create a challenging situation. In addition to mixed destination sailings, Fauntleroy also serves direct sailings to Vashon and to Southworth. This mixing of destinations creates vehicle processing challenges at the Fauntleroy dock, as vehicles for future sailings are often arriving as vehicles for the current sailing are being loaded.

WSF's internal work teams identified options for vehicle reservations at Fauntleroy, all of which would require significant investment or operational changes.

Tahlequah. The Tahlequah terminal is served by a 48-car ferry, but only has holding capacity for approximately 10 vehicles. It will be served by a 64-car vessel beginning in 2012. Additionally, the Tahlequah terminal does not have tollbooths or staff that could be used as a checkpoint to process reservation holders. Tahlequah would require significant terminal modifications or changes to business rules to support reservations.

Vashon Island. The Vashon Island terminal has very limited holding capacity. Additionally, short headways complicate vehicle processing and a lack of infrastructure, such as tollbooths and reservation checkpoints, would require significant improvements.

5.4 IT/Back Office Core System Description

This is a predesign study for a project that has a significant technology component. A major technology project has its own technology requirements, as laid out by the Washington State Department of Information Services. Appendix F demonstrates how this predesign study satisfies both the OFM predesign requirements and the ISB requirements.

Existing WSF Reservation System

As discussed earlier, WSF currently provides reservations on a very limited basis. There are two routes – Port Townsend-Keystone and the International service to Sidney – where reservations are available to all customers, and in the San Juan Islands there is a special reservations program for commercial customers only. These routes account for less than 4% of all vehicles carried on Washington State Ferries and primarily serve an infrequent/tourist ridership base (in the case of the International Route, all of the trips are recreation/tourism related).

The reservation system that supports these programs was developed by a third party over ten years ago and has since been enhanced by WSF staff; it offers basic functionality, but it was never designed to be a platform to launch a more extensive use of reservations throughout the ferry system. In fact, there is not one but three different reservation “systems” that have grown out of the original system to service each of these three routes. Each one was designed to fit the narrow requirements of the route.

- **The International Route.** Reservations have been available on this route for more than ten years. The system is relatively simple, with customers able to make reservations online or by phone, but cancelations and changes are only possible by phone. Reservations must be secured by a deposit. The reservation system holds information about the customer and links to both the scheduling system and the ticketing system. On the day of sailing, a list of reservation holders is delivered to the terminal. As customers are processed, they are confirmed to be on the list and then pay the applicable fare, less their deposit.
- **Port Townsend-Keystone.** In 2008 reservations were offered on the Port Townsend-Keystone route on an emergency basis to help mitigate the impacts of a significant reduction in service in response to the loss of the Steel-Electric vessels. Reservations can be made online (through a different online interface than the one used for Sidney) or by phone, but can only be canceled or changed by phone. There is no deposit requirement currently, which has led to significant operational challenges due to a high number of no-shows. There is no connection between the Port Townsend-Keystone reservation and the ticketing system; customers pay for and receive their tickets in a completely separate operation from making a reservation.

- **San Juan Islands Commercial.** The reservations for the San Juan Island commercial customers are available for registered commercial account holders only. Reservations are made for an entire schedule season at one time, with commercial account holders submitting preferred sailing times and WSF staff matching requests with availability. Once the season schedule is set, customers are notified of their individual sailing schedules. This is a predominantly manual process involving significant staff time. Customers pay an extra fee to participate in this program.

What the current solution can do. The current systems are able to support the very limited approach to reservations that is currently offered and have the ability to support minor upgrades to the existing program rules. For example, the system for Port Townsend-Keystone can be improved to require pre-payment of the fare at the time the reservation is made (this change is expected to have a dramatic effect on the number of no-shows who hold reservations). Methods are also under development to provide ways for customers to cancel reservations without needing to speak with an information agent by phone.

What the current solution cannot do. There are many features that are common to reservation systems elsewhere in the world that the current WSF systems cannot reasonably support including: (1) increasing the volume of reservations beyond its current load, effectively limiting expansion to other routes; (2) providing fully-automated methods for changing or canceling reservations online; and (3) integrating deposits with WSF frequent user products, such as the multi-ride discount card.

With WSF considering making reservations a permanent feature of the Port Townsend-Keystone route, and given the operational challenges that still need to be addressed it appears that the current system has reached the limits of its effectiveness.

Information Technology System Requirements

The business rules (Section 5.3) describe a reservation system where most vehicles traveling during peak periods would likely have a reservation. This describes a very different operational approach than the current first-come, first-served approach and requires that a reservation system be designed to handle a large volume of activity, place a premium on customer ease-of-use, and provide real-time information to facilitate two way communications between the ferry system and customers to make, change, or cancel reservations. To minimize operational cost impacts, it will be important that communication options are developed that minimize the reliance on telephone interactions with customer support staff.

In addition, the system must support the needs of the two priority access programs, be flexible such that business rules may be tailored to route-level needs, and support ongoing analysis of system performance so business rules can be adjusted to better fit actual use patterns. Toward these ends, the following have been identified as core features to be introduced incrementally, and that will need to be supported by the IT and back office systems to effectively deliver the business rules identified earlier.

These requirements are based on the specific challenges of implementing reservations across all WSF routes, however, it is worth noting that many of the more intensive communication requirements are driven by the particular challenges involved in deploying reservations on WSF's high-volume, commuter-oriented routes. In the other parts of WSF route structure, implementing the business rules is not nearly as complex. In fact, the additional requirements of the commuter-oriented routes would push some aspects of this reservation system beyond what other operators have typically done.

- **Real-time Information.** The reservation system would be able to process and present summary data within two minutes of changes being made. This process includes reservations activity being logged

in the system (including changes or cancelations), and showing the resulting space availability to customers and staff.

- **Multiple customer options for working with reservations.** To improve ease-of-use and offer flexibility to customers while minimizing staff support requirements, customers would be able to manage reservations via:
 - Phone operator – customers would be able to call in and speak to an operator to make, change, or cancel reservations.
 - Touch-tone phone – customers would be able to call in and make, change, or cancel reservations using a touch-tone phone service (with no contact with support staff).
 - Voice-Operated Phone – customers would be able to call in using a hands-free device to make, change, or cancel reservations using voice commands instead of their touch-tone keypad (with no contact with support staff, e.g. “press or say 2”).
 - Online – customers would be able to access a WSF Reservations website where they could make, change, or cancel their reservations using an easily navigable web interface.
 - WSF kiosk – customers would be able to make, change, or cancel reservations at WSF kiosks.
- **General information communication with customers.** Customers will be able to receive information about travel-related updates via:
 - Regional Highway Signs – will provide next sailing information, including drive-up wait times, for multiple routes to help direct drive-up traffic to the terminal with the most available capacity.
 - Local Signs – will provide next sailing information, including drive-up wait times, as well as vehicle processing directions.
 - Highway advisory radio – will provide information about schedules, drive-up wait times, and information about alternative route options where customers have choices (i.e. approaching the Hood Canal Bridge, customers without reservations would learn whether Kingston, Bainbridge, Bremerton or the Tacoma Narrows Bridge offered the best alternative).
- **Reservation-specific communication with customers.** Customers will be able to receive information about their reservations via:
 - Email – reservation holders would be sent alerts by email about their individual reservations, potentially including service exceptions and optional regular reminders.
 - Text message – reservation holders would be sent alerts by text message about their individual reservations, potentially including service exceptions and optional regular reminders.
- **Account Set-up and maintenance.** Customers in the priority access program would have the ability to manage their personal account information, and review travel history and the status of current reservations.
- **Different website screens for different customers.** The online interface would be tailored to offer different screens and different reservation availability to different customer types (commercial, premier, general). It would also have a page for priority access account management.
- **Assign barcode and confirmation number to each reservation.** The reservation system would associate each individual reservation with a specific barcode and confirmation number to be used

for checking in at the tollbooth, or looking up a reservation to cancel or change. This information would be linked to the ticketing system.

- **Reservations would have a date and time stamp.** All reservations would be stamped with the date and time they were made to facilitate load management adjustments when there are service disruptions, such as a canceled sailing or a vessel being replaced with a smaller-capacity vessel due to unscheduled maintenance needs.
- **Automatic, electronic load expectation reports.** The system would present a real-time automated report of how much space has been reserved. To do this, the system needs to collect vehicle size information at the time of the reservation, including length and height. This information would allow for appropriate load management, ensure that the tunnel space is not overcommitted and be used to support the real-time communications system so customers are aware of space available either for the purposes of making or changing a reservation or to make more spontaneous drive-up decisions. The system will also need to be able to verify and change this information at time of processing to assure accurate load management.
- **Database reporting and metric tracking.** The system needs to keep data on all aspects of the performance of the reservation system, such as how quickly reservations were taken, cancellation and change rates, etc. This would require having a data warehouse and management analysis system to evaluate actual performance and to support periodic modifications of business rules to maximize the effectiveness of reservations in meeting the goals of demand management, reduced community impacts, and increased vessel utilization.
- **Exception reporting and customer behavior auditing.** An important system element will be the ability to automatically report events that WSF is interested in, such as excessive cancellations and changes, and other abusive behaviors. The business rules are designed to make using reservations as customer-friendly as possible, so behaviors which are counter to the effectiveness of the system overall and which negatively impact other customers need to be flagged. Once identified, WSF would have options to issue warnings and/or other penalties to discourage continuation of these practices.
- **Reservations and load management during service exceptions.** Service exceptions include canceled sailings, schedule delays, or substitution of an out-of-service vessel with a smaller vessel. When one of these events occurs, the reservation system needs to be able to support the reallocation of existing reservations to fit the new available space, notify customers of changes to their reservations, and offer options for changing or canceling.

In addition to these system requirements, a number of other features were identified as either desirable or potential customer-friendly enhancements which are otherwise not necessary to support the business rules. These optional or potential extra features generally would also add complexity to the system requirements and costs for system procurement and development. These potential **extra features** include:

- **Text message receive and respond.** The system would allow customers to confirm changes or cancellations to their reservations via simple text commands.
- **Managing reservations via voice-commands using keywords.** The core requirements would include a more basic voice command system, such as “if you want to make a reservation say 1.” That approach allows customers to use a phone to make or change a reservation without talking to a

person, but it can be slow and frustrating. In a more advanced system customers would be able to call in and make, change, or cancel reservations using voice commands and keywords, such as “Bainbridge or Tuesday” instead of simple number choices.

- **Managing reservations via dataphone application.** Customers would be able to download and install an application on their dataphone (iPhone, Blackberry, etc.) where they could make, change, or cancel a reservation through this custom interface. It is likely that this feature could be developed by a third party and made available to customers, as many other dataphone applications are today.
- **Individualized homepages for priority access members.** As a customer convenience it may be desirable to offer customizable online homepages for priority access customers. In this way a customer can set their interface to focus only on their route of choice or automatically pull up certain customer information as standard homepage content.
- **Rolling Reservations.** Priority access customers (both premier and commercial account holders) could have regular reservations for the same sailings automatically roll over each week as new sailings become available for reservations. The customer would still need to confirm sometime before travel, but confirmation could be sent via email, significantly simplifying the process of making reservations for regular customers.
- **Wait list.** Customers would be held in a virtual queue for specific sailings, and then automatically be assigned a reservation if space becomes available. For example, if a customer wanted to take the 12:15 to Orcas but the only space available was on the 3:30, they could take the later reservation but go on a wait list for the earlier one. In the event of a cancellation on the earlier sailing, if the customer were first on the wait list, they would automatically get moved to their preferred sailing.

Integration with Wave2Go (EFS) and ORCA (Smart Card) Systems

A specific legislative requirement of this predesign effort is to document how the proposed system enhancements will be integrated with the existing electronic fare collection system and the implementation of the regional smart card program. Working with the IT staff at WSF, there was extensive discussion of how a reservation system with the features described above would integrate with existing systems.

The most critical link between the proposed system elements and the existing WSF technology infrastructure is with the ticketing system. WSF has recently invested considerable time, effort and resources into a complete overhaul of its ticketing system. Since reservations would essentially offer a way to provide a guaranteed trip, it is best to think of a reservation as pre-selling the space on the boat.

Currently all tickets issued in the Wave2Go system are essentially “open” tickets that can be redeemed for travel on any sailing within a 90-day window. When a reservation is made, the issued ticket is linked to a specific sailing. If the reservation is canceled, the ticket can also be canceled, or its status returned to “open.” Whether or not there is an actual pre-payment, the ticketing system will be integral to how reservations are managed. In particular, ticketing system integration will address the following key requirements:

- The ticketing system is different and independent from the reservation system, but must be able to share information back and forth
- Final fare transactions at the toll booth need to be integrated with reservation confirmation and include amounts paid (either as a deposit or prepaid fares) and date and time of reservation

- Has to show amount paid so the ticket seller can verify that the appropriate fare has been paid
- Ticket seller must have the ability to add to any prepaid amounts to account for the final transaction costs reflecting actual vehicle used for the trip and the number of passengers
- The system must work with the existing multi-ride products and has to be able to deduct trips as a deposit requirement or where pre-payment of fares is required for reservations
- To facilitate and speed vehicle processing, the reservation system must accommodate the option of fully pre-paying applicable fares (vehicle and passengers) whether this is a business rule requirement or simply an option offered for customer convenience

These elements of integration will be part of the minimum requirements in any reservation system procurement or development effort. The ticketing system must be at the center of the broader customer-oriented IT systems and connectivity and effective integration established are core operating requirements.

Beyond the WSF Wave2Go system, there are two other ticketing-type systems that were considered in the assessment of system compatibility and integration requirements: (1) the regional smart card program (ORCA); and (2) the WSDOT *Good To Go!* system.

Regional smart card (ORCA). The regional smart card program is principally a transit product that is designed to facilitate transfers among all of the transit partners in the central Puget Sound region. As a partner in this program, WSF is bound to ensuring reasonable integration of its products and policies with the regional system. The card allows customers to load various fare products offered by the partner agencies and to then use a single card interchangeably throughout the region.

When considering the opportunities to link ORCA with the prospective reservation system, it quickly became apparent that there is a mismatch between the basic goals and functionality of these two systems. The ORCA card is first and foremost a transit product and is designed to work with WSF's passenger fare products. The reservation system is fundamentally a demand management tool for WSF customers traveling in vehicles.

As of this writing, special modifications to ORCA are being implemented to allow its use as a form of payment for vehicle fares at WSF tollbooths. This work will enable ORCA to be similarly used to pay for tickets that include a reservation. No deeper integration of the Reservations system with ORCA is foreseen. ORCA will remain the key regional product for WSF customers that are principally using transit connections to move around, and will be a convenient way to pay for occasional ferry reservations for some customers.

Good To Go! (WSDOT). The *Good To Go!* system is the electronic tolling program for WSDOT. The program was initiated as part of the implementation of toll collection for the new Tacoma Narrows Bridge and has since been extended to the HOT lanes on SR 167 and is intended to be the core customer program for all of the WSDOT's tolling operations in the future. As the Ferries Division of WSDOT, WSF is essentially the largest current component of the WSDOT tolling universe. As such, there are a number of interesting and attractive opportunities that would flow from integration of WSF reservations with the WSDOT *Good To Go!* program. In particular:

- The *Good To Go!* program is a vehicle based system and not a passenger-based system like ORCA

- There are a number of WSF customers who are already enrolled in this program and would benefit from the flexibility of using their *Good To Go!* accounts for ferry travel along with travel on other WSDOT tolled facilities.
- As tolling becomes more widely used, especially in the Puget Sound region, more and more residents will have *Good To Go!* accounts and could benefit from the option of using these accounts for ferry travel as well.
- Integration with *Good To Go!* will further the goal of integrating the WSF into the broader active management programs at WSDOT.
- Addressing integration now will allow WSF to take advantage of future development of the back end tolling infrastructure that WSDOT is currently planning and designing.
- Integration could also provide opportunities for economies of scale to the extent that elements of the WSF program (reservations, ticketing, accounting, and reporting) can be built on existing or developing WSDOT platforms.

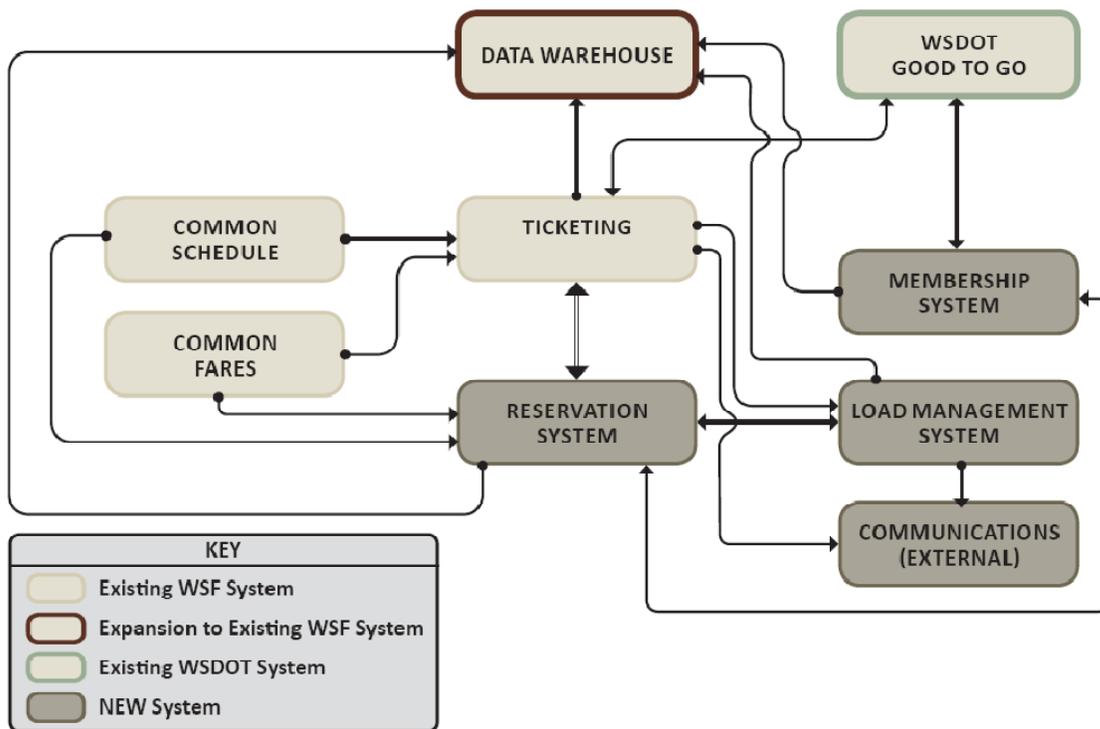
In thinking about *Good To Go!* integration it is important to note that there are really two distinct aspects of potential integration: (1) integration of the back end account system to allow *Good To Go!* account holders to access reservations and pay for ferry travel with their account; and (2) integration with *Good To Go!* vehicle identification systems, like transponders and/or vehicle license plate recognition. From the point of view of the reservation system, the majority of the benefits would come from offering the former as opposed to the latter.

At this time, it is expected that fully integrating the vehicle identification technology at WSF terminals would not provide a meaningful improvement in the terminal and vehicle processing capabilities and so the significant additional costs would not be justified. As a result, the best approach to integration at this time is with the back end account system to provide interchangeability for customers in the *Good To Go!* program who also ride ferries on a frequent or even infrequent basis.

Proposed System Enhancements

Building on the identified core system features and the requirements to effectively integrate with existing systems, the proposed reservation system would actually be comprised of five basic elements, four of which represent new systems and one which represents an increase in the functionality and capacity of an existing system. Exhibit 11 shows each of these new and expanded system components and how these elements would need to be integrated with the existing core IT infrastructure. These new and expanded elements would be housed at the WSF headquarters building in Seattle and maintained by WSF IT staff.

Exhibit 11 Flow Chart about Integration with Other Systems



As depicted in this flow chart, the existing ticketing system (Wave2Go/EFS) is really the central element of the WSF IT infrastructure that will support reservations, with all other elements either directly or indirectly connecting to this system. Making the ticketing system the core of the reservations system greatly simplifies the eventual integration issues surrounding the WSDOT tolling back office project. As WSDOT migrates to a new system for its tolling operations, the principal point of connectivity and integration with WSF will be through the ticketing system. The proposed new and expanded elements include:

Reservation Management System. The reservation management system would provide industry-standard functionality to support making, changing, and canceling reservations. This system would need to connect with the schedule, fare, and vessel information as well as ticketing and the other new elements. The reservation system would allow for the various interface options with the customer, including online, dataphone, and WSF kiosk.

Load Management System. The load management system is where individual sailing details would be held including how much of a vessel is available for reservations and what portion of the reserved space has been taken. This system would need to connect with the reservation system, ticketing and the data warehouse. A key functional element of this system is to ensure that the vessel is not overbooked and that overheight space (tunnel space) is appropriately accounted for. Also, the load management system will need to actively support reallocation of reserved spaces in the event of service exception situations, such as canceled sailings, significant schedule delays, and unscheduled maintenance events where there is a loss of vehicle capacity because the replacement vessel is smaller.

Communication Management System. As discussed at some length in previous sections, communications and real-time information are absolutely central to any efforts to meaningfully address demand management, and are a critical building block for delivering the type of reservations system envisioned in this predesign. The communication management system will be the hub for WSF communications externally, including via email and text messaging. This element would likely be the conduit for communications through the highway message signs, highway radio and communications with terminal operations personnel.

Membership Management System. To facilitate the administration and management of the priority access programs, it is likely that a membership management system would be necessary to simplify these functions and provide a user-friendly online interface for customers. These types of systems are commonly incorporated throughout the online retail world. The membership system will primarily need to connect with the reservation system.

Analytics/Business Intelligence System. WSDOT currently employs a data warehouse structure to collect, organize, and store mission critical information for later analysis and reporting. Since a key aspect of the reservation system is the ability to adapt and respond to actual changes in usage patterns and customer behavior, it is critically important to have a robust capacity to store relevant information about how reservations are used so WSDOT can analyze and learn from its experience and continually improve the system through the flexibility in the business rules.

System Sizing Requirements

In addition to the specific operational requirements of the reservation and associated systems, a key element in sizing the necessary information technology systems will be the expected volume of transactions. Toward this end, an analysis of current ridership was conducted to determine the probable range of participation in the various program elements. Given the business rules and the conceptual IT system design, the key operational metrics include the likely range of annual reservations, the number of reservations during a peak summer day and hour, and the likely number of participants in each of the priority access programs.

The total number of potential annual reservations was based on an analysis of ridership patterns and the proposed business rules. The **high end** of the range assumes that all available reservations are made when there is sufficient demand. For example on a peak sailing where 90% of the vessel is made available for reservations, if that sailing were 100% full, then all reservations are assumed to have been filled and the additional trips are drive-up trips. If that same peak sailing were only 85% full then the assumption is that all of the vehicles traveled with reservations and there were no drive-ups. In the off-peak, where reservations would not be necessary to ensure space on the vessel in most cases, it is assumed that 50% of the vehicle drivers would make reservations and the remainder would drive-up.

On the **low end** of the range, the assumption was made that only 70% of peak period sailings were occupied by reservation holders, which could be the result of limiting available reservations to 70% of the boat or that not all available reservations are taken on these sailings. On the off-peak sailings, the assumption was made that only 10% of the sailing was taken up by reservations even though 50% was available for reservations. The off-peak assumptions in this scenario are probably going to be closer to the reality of reservations, since most regular customers will know which sailings they are most likely to need reservations and which ones will not and only make reservations when there is a real need to do so.

As shown in Exhibit 12, if reservations were implemented on all routes in the system, the likely range of annual reservations is between 3.7 million and 6.9 million. These values can be compared with current vehicle ridership of approximately 10.6 million per year, suggesting reservations might make up between 35% and 65% of total vehicle trips. It is important to note that these estimates assume that reservations are deployed system-wide and that the standard business rules would apply everywhere as this would represent the maximum potential number of reservations. If reservations are limited to certain routes, or the percent of the vessel that is made available for reservations is limited to reflect local route conditions, then the volume of reservations would be correspondingly less.

Clearly the high end of the range is most likely to overstate the number of reservations, since it assumes that there are drive-ups only in situations where all of the reservations have been taken. On the low end, it is likely that the reservations on the peak and commute sailings are understated. Since the most important number in a system sizing context is the high end, the fact that this estimate is likely too high should ensure that the system can accommodate the likely number of reservations with some margin for error.

**Exhibit 12
Potential Number of Reservations (Annual)**

	<u>Low Estimate of Expected Reservations</u>				<u>High Estimate of Expected Reservations</u>			
	Off-Peak	Peak	Commute	Total	Off-Peak	Peak	Commute	Total
Edmonds-Kingston	89,000	427,000	328,000	844,000	444,000	610,000	468,000	1,522,000
Mukilteo-Clinton	69,000	506,000	330,000	905,000	344,000	723,000	471,000	1,538,000
Seattle-Bainbridge	83,000	359,000	301,000	743,000	414,000	513,000	429,000	1,356,000
Fauntleroy-Vashon-Southworth	88,000	153,000	319,000	560,000	440,000	218,000	455,000	1,113,000
Seattle-Bremerton	39,000	18,000	171,000	228,000	193,000	26,000	245,000	464,000
Anacortes-San Juan Islands	42,000	163,000	-	205,000	209,000	232,000	-	441,000
Point Defiance-Tahlequah	27,000	-	73,000	100,000	135,000	-	104,000	239,000
Port Townsend-Keystone	17,000	35,000	60,000	112,000	83,000	50,000	86,000	219,000
Anacortes-Sidney	4,000	-	-	4,000	18,000	-	-	18,000
TOTAL SYSTEMWIDE ESTIMATES	458,000	1,661,000	1,582,000	3,701,000	2,280,000	2,372,000	2,258,000	6,910,000

Another key factor in system sizing is the peak number of reservations for a given day or hour. This metric is important as an indicator of the level of activity on any given day in terms of communications with the terminal staff, potential for customer-initiated contacts for changes and the number of contacts seeking real-time travel information. Exhibit 13 presents the results of the peak day and peak hour analyses and suggests that, if reservations were deployed system-wide, then a peak day could involve between 13,300 and 25,100 reservations and at the peak hour, between 940 and 1,200 reservations would be processed throughout the system. The “peak hour” estimate is based on one peak sailing, and is understated for routes that have more than one departure during the peak hour.

Exhibit 13
Peak Day and Peak Hour Reservations

	Peak Day		Peak Hour	
	Low	High	Low	High
Edmonds-Kingston	3,100	5,600	180	220
Mukilteo-Clinton	3,100	5,200	140	180
Seattle-Bainbridge	2,600	4,800	140	180
Fauntleroy-Vashon-Southworth	1,900	3,900	100	130
Seattle-Bremerton	900	1,800	100	130
Anacortes-San Juan Islands	800	1,700	90	110
Port Townsend-Keystone	600	1,100	60	80
Point Defiance-Tahlequah	300	800	90	110
Anacortes-Sidney	-	200	40	60
TOTAL SYSTEMWIDE ESTIMATES	13,300	25,100	940	1,200

The third relevant system sizing metric is the potential number of priority access customers. A key component of the reservation system is the priority access program, where WSF will be able to offer additional security regarding access to reservations and other potential special benefits to regular customers and residents of ferry dependent communities. The potential number of participants in these programs will be a determinant of the system requirements. The priority access programs are divided into a commercial customer program (Commercial Program) and one targeting regular customers and ferry community residents (Premier Account Program). The estimates of potential program participation are summarized in Exhibit 14.

Exhibit 14
Potential Number of Priority Access Program Customers

	High Estimate	Low Estimate
Estimated Premier Accounts:		
Kitsap County and Olympic Peninsula	22,000	13,000
Island County	13,000	8,000
Vashon Island	4,000	2,000
San Juan Islands	2,000	1,000
Other	4,000	2,000
Total Premier Account Holders	45,000	26,000
Commercial Program	2,000	1,000
Grand Total Priority Access Programs	47,000	27,000

For system sizing purposes, it was determined that total participation could be between 27,000 and 47,000 customer accounts, with the majority of these being Premier Account holders. The Premier Account program participation rates were developed based on current ridership for customers using the frequent user multi-ride card and information from the WSTC customer survey in 2008 about frequency of use. The participation rates were also compared with households in these ferry communities, and as one might expect, the more a community is dependent on the ferry the higher the share of expected participation. The commercial account participation was based on a review of the participation in WSF's current commercial account program.

A final factor to be considered in system sizing and the technology buildout required to support Ferries Reservations is the changes or “churn” in tickets and reservations that arise from two sources: changes in customer plans and changes driven by service disruptions. From observing other systems and also noting the pattern of no-shows the current Port Townsend-Keystone route, we expect that 16%-18% of reservations will be changed or canceled by customers. Service disruptions driven by weather, mechanical failures, and crewing issues impact would further impact a portion of scheduled sailings, and each of these requires active re-distribution of the vehicle load across remaining sailings.

Each of these changes, or the “churn,” engenders additional records in the reservation and ticketing systems data bases. Therefore, the expected system transaction load must be upsized by a factor of 1.2 to 1.25 to more accurately reflect the true compute requirement. This churn effect is likely to be particularly impactful on the high-volume, commuter-oriented routes.

System Development and Procurement Options

Many of the system elements identified above are readily available from multiple potential vendors. As the RFI process demonstrated, there are several systems that have been developed and successfully deployed by ferry systems around the world that would be able to support the business rules and program elements in this predesign. As a result, it is most likely that the process of implementation would include a combination of procurement of key system components and a process of building the necessary connectivity to integrate the new systems into WSF’s existing infrastructure. Exhibit 15 briefly identifies some preliminary concepts for how these system elements might be developed.

Exhibit 15 Approach to System Development

System Component	Build/Procure	
Reservations	Procure	There are a number of systems available which will support the program design.
Load management	Procure	A number of load management systems are available, many of which are part of a more robust reservation system.
Membership management	Procure	There are many membership management systems available.
Communications	Build/procure	It is likely that the communications enhancements will be a combination of procure and build. Some of the build elements will involve integration with WSDOT’ system.
Data warehouse and Business Intelligence System	Build	This is an enhancement of the existing WSDOT data warehouse.

6.0 COST BENEFIT ANALYSIS

This chapter identifies the capital and operating costs associated with reservation system options. It analyzes the costs and benefits of the various options and identifies a preferred alternative.

6.1 Identification of Project Alternatives

For the purposes of estimating project costs, analyzing options, and conducting a cost benefit analysis, five specific reservation system alternatives have been identified. These alternatives differ in how many and which routes would receive reservations, how extensive the supporting communication network is, and the level of IT development required. To compare these alternatives and conduct a cost-benefit analysis, the following variables provide useful measures of benefits and risks:

- **Queue reduction and demand management benefits.** Queue reduction provides two primary benefits: (1) it effectively decreases wait time for customers, and (2) it reduces the negative impacts of traffic and congestion in ferry communities. All alternatives identified are expected to reduce queues to some degree, while some are expected to be more effective.

For example, alternatives that include a robust, regional communication system will have queue reduction benefits in that passengers can make better decisions about which route to take, and in many instances may choose to not to go to terminals that are already congested. Alternatives that include a reservation system have the greatest queue reduction and demand management benefits, as described previously in this report.

- **Number of riders impacted.** Some alternatives include system-wide improvements, while others are targeted at specific routes or travel sheds.
- **Implementation risk.** While all alternatives that include a reservation system component include some implementation risk associated with the new system, where terminal constraints are greatest, the risk of operational issues and contingency events that offset other system benefits become much greater.

While it is possible to think about the communications and Intelligent Transportation System (ITS) improvements as a stand-alone project, the investment options have been integrated into the broader development of logical reservations-based alternatives. This was a conscious decision which was primarily based on the fact that this is a predesign study for a potential reservation system and these communication enhancements are necessary to support reservations, though not to the same degree throughout the system. To more clearly show the relative costs and benefits of the core communications and ITS improvements, these are the focus of one of the reservations alternatives.

Five distinct demand management alternatives that include varying levels of reservation system implementation on different routes are described below, and the table presented in Exhibit 16 below assesses these alternatives against the factors described above.

For any one of these alternatives, there are a number of ways in which reservation system business rules or vehicle processing might be modified to reflect route or terminal-specific needs or help achieve better outcomes once the system has been implemented. The alternatives are intended to identify where the basic infrastructure for a reservation might be built, allowing flexibility in how (i.e. for which sailings and customer types, business rule modifications, etc.) a reservation system is implemented at any given route.

1. **Alternative 1: Industry Standard Package Upgrades to Routes that Currently Offer Reservations, ITS Enhancements for those Routes.** WSF currently operates a basic reservation system on three routes, Anacortes-Sidney, Port Townsend-Keystone, and commercial reservations for the San Juan Islands. Alternative 1 would simply upgrade the current reservation system with an industry standard reservation package linked to the current ticketing system and enhance communication around general travel-related information, to better match the service needs on these routes.
2. **Alternative 2: Alternative 1 plus Expanding Reservations to San Juan Islands vehicle trips and Commercial Reservations System-Wide.** This alternative would build on Alternative 1 by expanding reservations from just commercial customers to all service on the Anacortes-San Juan Islands routes. Commercial reservations would be made available on all routes throughout the system.
3. **Alternative 3: Alternative 2 plus Intelligent Transportation System (ITS) Communication.** This alternative would develop and build a regional ITS communication system comprised of variable messaging signage, highway advisory radio, and web cameras to notify customers of congestion at terminals and service disruptions. Alternative 3 would reduce congestion by helping customers make decisions about which routes and sailings to take and directing them to less congested terminals. This alternative will not be sufficient to reduce all congestion for all routes; however it has system-wide demand management benefits and is necessary for successful implementation of a reservation system.
4. **Alternative 4: Alternative 3 plus Reservations Extended to Seattle – Bremerton, Seattle – Bainbridge, and Edmonds - Kingston.** This alternative makes reservations available for all vehicle traffic on routes where terminal facilities are determined to be adequate to support the program rules. All Central Sound routes have been included in order to prevent a shifting of traffic that could potentially occur if one or two Central Sound routes had a reservation system and one or two routes did not. This would include Edmonds-Kingston, Seattle-Bainbridge, and Seattle-Bremerton.

As currently configured, the Edmonds terminal does not have adequate holding to support the preferred business rules identified in Section 5.3 above. Under the current configuration, a reservation system at Edmonds would only support reservation being available for approximately 70% of the spaces on the vessel, even during peak times. Options have been identified to moderately expand holding by re-aligning SR104 to make room for an additional holding lane, thus increasing the amount of reservations that could be made available. Alternative four assumes the system would be implemented without these modifications. If the reservation system is not meeting congestion reduction and customer service goals at Edmonds, terminal modifications will be re-evaluated.

5. **Alternative 5: Fully Deploy Reservations on All Routes (Alternative 4 plus remaining routes).** This option includes implementation of a reservation system for all customers on all routes in the system.

At this point in time, it is unclear to what extent reservations may be beneficial to Mukilteo-Clinton riders, particularly given the tight, 30 minute headway on that route and regular sailing frequency. Another risk factor in extending reservations to this route is the uncertainty as to WSF's continued access to the Buzz Inn property without which the Mukilteo terminal has

inadequate holding space for reservations. Alternative 2 includes reservations for commercial traffic on this route, and Alternative 3 includes ITS improvements that would benefit this route. Alternative 5 recognizes that reservations for all vehicle traffic would likely be beneficial on this route, but more outreach and feasibility testing would be required first.

On South Sound routes, where terminal and operating constraints are greatest, this alternative assumes either major terminal investment or major operational changes would be required (like connecting Southworth to Colman Dock, rather than Fautleroy). Without major investments, reservations would not be feasible at these terminals. However, the investments would have benefits that reach well beyond implementation of a reservation system and are therefore unlikely to be justifiable in the context of a reservation system alone.

Exhibit 16
Assessment of Alternatives

		Queue Reduction Potential	Number of Riders who Benefit	Risk	Capital Cost (2009\$)
1	Industry Standard Package Upgrades to Routes that Currently Offer Reservations	High (on select routes)	4% of total vehicle drivers and vehicle passengers receive maximum benefits	Low	\$4.1M
2	Alternative 1 plus Expanding All Reservations to San Juan Islands and Commercial Reservations System-Wide	High (on select routes)	13% of total vehicle drivers and vehicle passengers receive maximum benefits;	Low	\$6.2M
3	Alternative 2 plus Regional Intelligent Transport System (ITS) Communication System	Medium across the system and high on select routes	Most riders (including passengers) receive some benefits; 13% of total vehicle drivers and vehicle passengers receive maximum benefits	Low	\$17.7M
4	Alternative 3 plus Reservation Extended to Central Sound Routes	High on most routes, with medium on remaining routes	60% of total vehicle drivers and vehicle passengers receive maximum benefits; Most riders receive some benefits	Medium	\$23.7M
5	Alternative 4 and Extend Reservations System-wide	High	Most riders receive maximum benefits	High	\$26.4M

6.2 Capital Costs

The capital costs associated with each of the alternatives described above include several components:

- **Regional Communications System.** The regional communication system includes:
 - Variable Messaging Signs (VMS) in six locations throughout the Puget Sound region (see Exhibit 7, page 33) that will inform drivers of the status and expected wait times at terminals in the region.
 - Highway Advisory Radio coverage at locations throughout the Puget Sound region to alert drivers of conditions at terminals
 - A queue detection system at four terminals (Edmonds, Bainbridge, Mukilteo, and Clinton) to provide accurate wait times for drive-ups for display on VMS signs or broadcast over Highway Advisory Radio. Queue detection is intended to provide additional information on wait times for terminals not expected to implement a full reservation system (Mukilteo-Clinton). For terminals expected to implement a reservation system (Edmonds and Bainbridge), the queue detection would be intended to measure wait times for drive-ups only and so must be combined with operational changes designed to separate reservations holders from drive-ups. Other terminals with reservations have adequate holding to accommodate at least two boat loads of drive-ups during peak times (assuming 90% of the vessel is reserved), and wait time information can be generated from the reservation system's load management capabilities.
 - Web cameras where there is no queue detection or anticipated reservation system to display terminal holding areas and the road approaching the terminal, providing terminal employees, information staff, and customers another input and method for conveying congestion levels. Although Friday Harbor is proposed for the reservation system, estimates for Friday Harbor include three web cameras so that terminal staff can better manage remote holding areas.
- **Technology Investments.** The IT system and its required features and connectivity are described in detail in Section 5.4. Costs associated with the IT system include hardware and software acquisition, customization expenses, license renewal expenses, project management staff time costs, WSDOT programming staff time costs, and costs associated with the procurement process for IT systems. IT costs are presented in two phases: (1) purchase and integration of an industry standard reservation system, and (2) system build-out and additional customization needed to accommodate larger volumes and commuter requirements. Ongoing software and infrastructure support related to IT is discussed in Section 6.3 below.

Terminal investments include the following standard components.

- **New Tollbooths.** At terminals that don't currently have tollbooths - Friday Harbor, and Lopez – a tollbooth would be required to operationalize a reservation system at these terminals. Given significantly lower traffic volumes, Shaw would not require a tollbooth. To implement reservations on this route, a remote check-in system would be instituted instead. Edmonds would likely require an additional tollbooth on the shoulder of the road leading to the terminal, prior to the vehicle queuing that occurs there.
- **Terminal-Specific IT Investments.** New tollbooths will need to be equipped with the current Wave2Go machinery that will read reservation bar codes. New and existing tollbooths will be

upgraded with new software that provides access to reservation system information (and the ability to enter a reservation confirmation code, if necessary)

- **Reader Boards at the Terminal.** New directional signage at the terminals that helps with the staging of reserved and drive-up vehicles will be required
- **Reader Boards near the Terminal (Traffic Management Signs).** Where traffic sorting needs to occur prior to the terminal, directional signage will be installed on the road directly approaching the terminal
- **Reservation Kiosks.** To facilitate the making, changing and canceling of reservations away from the tollbooth, kiosks will be required at locations convenient to the terminals; new reservation software will be integrated with the existing ticketing kiosks installed at many terminals.
- **Ferry Advisory Radio.** Connectivity with local radio to broadcast terminal conditions is an important component of a robust communications network and assumed for each of the terminals. Ferry Advisory Radio will be used in close proximity to the terminals to broadcast terminal conditions and help with vehicle processing.
- **Public Outreach.** To facilitate local partnership groups and customer communication and education around the potential implementation of a reservation system, \$25,000 per terminal has been assumed.
- **Operations Support.** A total operations support budget of \$200,000 for the project has been assumed to cover the costs of terminal operations support staff engaged in the project. This has been distributed to terminals and the regional communications system costs based on the overall percentage of the total project cost.

In addition to the standard components, some terminals require site-specific investments.

- **Edmonds.** Cost estimates include a traffic gate to control access of these vehicles to the terminal and an additional tollbooth prior to the shoulder holding area to facilitate timely vehicle processing. Even with these improvements, modifications to the business rules to adjust for limited vehicle holding within the terminal are required. Additional improvements (widening SR 104 to create another lane of holding space, plus retaining wall and street improvements that would be required) have also been considered but are not included in the alternatives at this time.
- **South Sound Routes.** Fauntleroy, Vashon, Point Defiance, and Tahlequah would all require significant capital investment to allow for successful implementation of a reservation system at these routes. Costs of terminal expansions for these locations have not been estimated for this report, as they are expected to be high and are not included within the preferred alternative.

Exhibit 17 below identifies the capital costs associated with each of the five alternatives identified, in constant 2009 dollars.

Exhibit 17

Capital Costs of Six Alternatives (in 2009 dollars)

Alternative:	1	2	3	4	5			
	Industry Standard Reservation System (Ana-Sid, PtTown- Key, SJI commercial), some ITS	Alt. 1 + Expand to All San Juan Islands and commercial on all routes	Alt. 2 + Regional Communications (VMS signs network on major corridors)	Alt. 3 + Reservations on Sea-Bain/Brem, Ed-King	Systemwide Reservations			
Regional Communications System								
Regional VMS Signage			\$8,944,000					
Highway Advisory Radio with Queue Detection	\$263,000	\$404,000	\$2,301,000					
Web Cameras	\$0	\$196,000	\$293,000					
Technology Investments for Reservation System								
System Acquisition and Customization	\$2,320,200	\$8,400		\$3,490,500	\$1,079,200			
Terminal-specific IT investments	\$192,000	\$92,000		\$292,000	\$252,000			
	Total Annual Vehicle Ridership	Total Annual Vehicle Passenger Ridership	Total Annual Commercial Ridership	Terminal Specific Investments in Local Signage, Ferry Advisory Radio, Traffic Management, and Other Required Modifications				
Port Townsend	259,859	217,270	17,666	\$394,000	\$0			
Keystone				\$396,000	\$0			
Anacortes	39,101	21,904	1,762	\$513,000	\$0			
Friday Harbor	304,948	208,666	23,604	\$0	\$471,000			
Orcas	271,392	198,386	17,438	\$0	\$186,000			
Shaw	15,128	8,990	800	\$0	\$114,000			
Lopez	150,096	102,954	9,356	\$0	\$627,000			
Seattle/Colman				\$0	\$0			
Bainbridge	2,009,719	1,277,171	37,926	\$0	\$0			
Bremerton	699,401	390,500	5,995	\$0	\$0			
Kingston				\$0	\$0			
Edmonds *	2,234,059	938,741	76,038	\$0	\$0			
Mukilteo				\$0	\$0			
Clinton	2,194,552	1,316,090	74,309	\$0	\$0			
Fauntleroy **				\$0	\$0			
Vashon ***	1,109,980	444,296	28,734	\$0	\$0			
Southworth	518,434	199,673	4,427	\$0	\$0			
Pt Defiance				\$0	\$0			
Tahlequah ***	371,142	181,442	13,398	\$0	\$0			
				\$0	\$0			
	Total Incremental Investment By Alternative			\$4,078,200	\$2,098,400	\$11,538,000	\$6,016,500	\$2,659,200
	Total Cumulative Investment			\$4,078,200	\$6,176,600	\$17,714,600	\$23,731,100	\$26,390,300
	Total Annual Trips With Some System Improvements			589,332	2,039,521	15,683,894	15,683,894	15,683,894
	Total Annual Trips With Reservations			589,332	2,039,521	2,039,521	9,469,153	15,683,894
	Percent of Vehicle Trips with Reservation System			4%	13%	13%	60%	100%

* Edmonds estimate does not include widening of SR104

** Fauntleroy estimate does not include terminal expansion, which would be required under the current operating configuration

*** Vashon and Tahlequah assume minor upgrades (FAR and HAR) only

6.3 Ongoing Operating Costs

Based on the business rules and approach to terminal operations and enhancements to the IT infrastructure, there are likely to be implications on WSF's ongoing operating costs if a reservations system is deployed. The functional areas that have been reviewed with respect to potential increases in staffing or other operating cost impacts include:

- Terminal operations
- IT department personnel and ongoing systems maintenance requirements
- Customer service and call center staffing

In all of these areas, there has been a concerted effort to identify opportunities to use technology solutions to minimize staffing needs. For example, the conceptual design elements of the reservation system include a number of technology-oriented approaches to making or changing reservations or communicating real-time information through multiple channels. Toward this end, the following is a brief discussion of each of the potentially affected cost centers, and Exhibit 18 below shows estimated staffing impacts of the five alternatives.

Terminal operations. The development of terminal operating concepts for each of the WSF's terminals was focused on making the best use of existing assets and staffing resources. To improve terminal operations without increasing staffing, additional signage and lane identification striping would assist in separating the drive-up traffic from those with reservations. In addition, the load management system can facilitate decisions regarding accepting and processing of drive-ups, by providing ticket sellers information about the current status of the next sailings. At terminals where there is not adequate holding area, every attempt has been made to continue to manage traffic with variable message signs and other communications approaches as opposed to additional terminal staffing. However, some additional staffing will be needed.

One of the findings from the research into other ferry systems was that the terminal manager should have discretionary authority to adjust to changes in conditions at the terminal to make traffic continue to flow in an orderly and effective manner. Given that finding and the added complexity a reservation system brings to terminal operations, it is likely that several WSF-operated terminals will need additional Terminal Supervisor staffing during peak times. Assuming full deployment of reservations on all routes, these terminals would include Anacortes¹, Edmonds, Kingston, Bainbridge, Seattle, Fautleroy, Vashon, Point Defiance, Tahlequah, and Southworth.

Another potential impact on terminal staffing could be a reduction in traffic management needs during peak periods. As traffic backs up outside the terminal there is an increasing demand to provide additional traffic management resources to mitigate the effect of the additional congestion. Since one of the goals of the reservation system is to substantially reduce (or even largely eliminate) congestion around terminals, then it may be possible to redeploy some of the existing Washington State Patrol staffing engaged in this activity to other safety and security priorities.

IT support functions. In developing the cost estimates for the information technology investments there is an allowance for software and hardware licensing and support. In addition to these costs there will be

¹ At Anacortes, Terminal Supervisor labor would likely replace Traffic Attendant hours during the summer peak, resulting in a net staffing cost increase but no change in staffing levels.

a need for additional staff in the Ferries IT group to provide maintenance and operating support for the expanded IT infrastructure.

In the Ferries IT Business Support team, one additional FTE will be required to support and maintain the reservation system and the integration points between Reservations, Wave2Go ticketing, and the other internal systems that feed and consume Reservations data (Load Management system, Schedule, Fares, and Vessel info data bases).

In the Ferries IT Infrastructure Support team, one additional FTE will be required to support the additional devices and network that comprise the ITS (Intelligent Transportation Systems) elements in the Communications system.

Customer service and call center. It is anticipated that the function most likely to experience additional demands as a result of implementation of a reservation system is the customer service and call center at WSF. As discussed earlier, the total number of reservations is likely to be between 4 million and 7 million, with between 13,000 and 25,000 reservations on a peak, summer day. While every effort has been made to identify technology options for customers to interact with WSF without talking to a customer service representative, many additional calls are to be expected.

On a preliminary basis, it is reasonable to expect that during peak periods contacts by phone could be between 1,300 and more than 5,000 per day if reservations are implemented system-wide. The actual range will depend on the routes affected, the number of reservations that are typically made during peak periods and the portion of these reservations that will involve a customer service telephone contact.

The 1,300 – 5,000 telephone reservations per day assumes 10-20% of potential reservation holders make or change their reservation by phone and applies the assumptions that generate the low and high end ranges of total reservations discussed in Section 5.4 above. Research into the airline reservation model (a system supported by robust technology for reservations) indicated that less than 10% of all reservations are made by phone.

Currently, customer service staff working with the International route reservation system and reservations on Port Townsend-Keystone can process approximately 120 calls per day (average of 3 minutes per call). At this rate the total staffing needs in peak periods would range from 10 FTEs to as many as 35 FTEs. It is important to note that the need for additional customer service staff is primarily related to extending reservations to the high volume commuter-oriented routes.

Given this wide range, it is proposed that WSF pursue a call center strategy that is designed to minimize staffing levels by using a system of diverting calls during periods where call volumes exceed the internal staff capacity. The options for diverting the calls include:

- **Technology option.** Calls can be routed to the voice-activated phone system where customers can proceed with making, changing or canceling a reservation without the need to talk to an individual.
- **Contract call center option.** Calls can be routed to an external contract call center where WSF would be charged on a per-call basis. This would allow WSF to continue to offer a personal contact while minimizing the size of the internal support group. This would also likely be much less expensive on a per call basis than providing the additional staffing directly.
- **Call back option.** Another option would be to allow customers to request a call back when customer service representatives are available. This option has limited capacity to address truly peak period

impacts, but may be a useful addition to the technology option for certain types of calls that cannot be appropriately addressed via the touch tone or voice-activated menu system.

If these options are not feasible or are resulting in poor customer service (as measured by customer satisfaction polls), WSF might consider implementing a fee to make, change or cancel reservations by phone.

In addition to the call center support required by the reservation system, WSF anticipates the addition of a Commercial Account Manager once reservations are available to commercial customers system wide. The Commercial Account Manager will focus his or her efforts on marketing the reservations program to commercial customers and ensuring customer satisfaction among commercial users. Given the unique requirements and benefits of the commercial program (commercial account requirements, block reservations, etc.), this is expected to be a full time position.

Exhibit 18 below shows estimated staffing and staff costs (salaries and benefits) assuming call center staff at the low end of range presented here. Potential additional call center staff requirements are also shown below, though WSF will make every effort to mitigate the need for additional call center staff and will consider reservations-related revenue streams (like an extra charge for phone transactions) if the need for additional call center staff becomes apparent.

Exhibit 18 Estimated Staffing Needs and Costs by Alternative

FTE Department and Function	Average Annual Cost per FTE (\$2009)	1	2	3	4	5
		Industry Standard Reservation System (Ana-Sid, PtTowns-Key, SJI commercial), some ITS	Alt. 1 + Expand to All San Juan Islands and commercial on all routes	Alt. 2 + Regional Communications (VMS signs network on major corridors)	Alt. 3 + Reservations on Sea-Bain/Brem, Ed-King	Systemwide Reservations
IT Ongoing Support						
Reservation software support	\$100,000	1.0	1.0	1.0	1.0	1.0
Infrastructure support	\$75,000	1.0	1.0	1.0	1.0	1.0
	Total IT FTEs	2.0	2.0	2.0	2.0	2.0
	Total Annual Cost for IT FTEs (\$2009)	\$175,000	\$175,000	\$175,000	\$175,000	\$175,000
Terminal Support						
Terminal Supervisor	\$113,000	0.0	1.2	1.2	2.4	7.4
Traffic Attendant	\$69,000	0.0	(1.2)	(1.2)	(1.2)	(1.2)
Islands Terminal Agents (Contract)	\$41,000	0.0	2.5	2.5	2.5	2.5
	Total Terminal FTEs	0.0	2.5	2.5	3.7	8.7
	Total Annual Cost for Terminal FTEs (\$2009)	\$0	\$155,300	\$155,300	\$290,900	\$855,900
Customer Service Support						
Commercial Account Manager	\$100,000	0.0	1.0	1.0	1.0	1.0
Call Center Initial estimated staffing	\$76,000	0.0	1.0	1.0	6.0	10.0
	Total Customer Service FTEs	0.0	2.0	2.0	7.0	11.0
	Total Annual Cost for Call Center FTEs (\$2009)	\$0	\$176,000	\$176,000	\$556,000	\$860,000
TOTAL ESTIMATED FTEs		2.0	6.5	6.5	12.7	21.7
TOTAL ESTIMATED ANNUAL FTE COST (\$2009)		\$175,000	\$506,300	\$506,300	\$1,021,900	\$1,890,900
Potential additional call center FTEs *	\$76,000	1.0	2.5	2.5	11.0	18.0
		\$76,000	\$190,000	\$190,000	\$836,000	\$1,368,000

6.4 Cost Benefit Analysis

The alternatives are structured in a cumulative fashion, such that each alternative builds upon the one before it. In this manner, implementation begins with alternative one and can be scaled to different levels and parts of the system, as is best-suited to meet demand management and other goals.

Operational risks and total costs increase as the alternatives extend reservations to more routes, though more customers experience queue reductions in addition to the cost effectiveness benefits for WSF (i.e. IT system costs per reservation go down).

Expected Time Savings

The primary benefit of a reservation system for a customer is the sailing time certainty it provides, and the corresponding reduction in wait time. On a moderately congested route, if a customer intends to catch the 5:00pm sailing, he or she might plan to arrive at 4:00pm knowing that boarding the prior sailing is unlikely, but there is a strong chance that his position in line will get him on the 5:00pm sailing. With a reservation system, that customer now needs only to arrive 20 minutes in advance of the scheduled sailing, so he has effectively reduced his wait time by 40 minutes. Over time, these time savings can accumulate into a significant benefit for customers.

Exhibit 19 below applies this idea on a route by route basis, using average wait times based on time stamp arrival information collected in May 2006 and estimating what a similar arrival pattern would look like in 2030 (using ridership growth assumptions from the Long-Range Plan). It is important to note that there are limitations to how useful this data might be for this analysis, given that it is based on a single snapshot in time. However, the purpose of this analysis is to provide a general assessment of potential customer benefits and is not the only factor in the evaluation of alternatives or the selection of the preferred alternative.

San Juan Islands routes are not included in the table as time stamp arrival data was not collected for these routes. Given the highly seasonal ridership patterns in the San Juan Islands, it is expected that a reservation system will result in significant wait time reductions during the summer peak times on those routes and no noticeable impacts during non-peak times.

Exhibit 19 Estimated Time Savings Provided by a Reservation System

Route	Expected Wait Time with Reservations (minutes)*	2006			2030 Estimated		
		Average May 2006 Wait Time (minutes)	Reduction in Wait Time (minutes)	Total Time Saved for Every 10 Trips	Estimated 2030 Wait Time	Reduction in Wait Time (minutes)	Total Time Saved for Every 10 Trips
Pt. Townsend-Keystone	30	61	31	5 hours	125	95	16 hours
							Alternative 1
Seattle-Bainbridge	30	51	21	4 hours	140	110	18 hours
Seattle-Bremerton	30	70	40	7 hours	88	58	10 hours
Edmonds-Kingston	30	20	none		50	20	3 hours
							Alternative 4
Mukilteo-Clinton	30	27	none		62	32	5 hours
Fauntleroy-Vashon	30	21	none		22	none	
Fauntleroy-Southworth	30	75	45	8 hours	218	188	31 hours
Pt. Defiance-Tahlequah	30	26	none		26	none	
							Alternative 5

* 30 minute "wait time" represents reservation requirement to arrive 20 minutes prior to departure plus an additional 10 minutes, reflecting average expected arrival time

Starting with Alternative 1, customers begin to benefit from wait time reductions. While the time benefits at the customer level are substantial, only a small portion of WSF vehicle customers (3%) receive these benefits.

By the time the system has been ramped up to the levels identified in Alternative 4, 80% of vehicle customers are expected to benefit from significant time savings, especially as ridership continues to grow over time. Alternative 5 reaches all vehicle customers, though time savings are uncertain for customers on two of the three South Sound routes added.

Environmental Benefits

All of the alternatives contain environmental benefits as they are designed to reduce wait time and queuing that currently results in idling traffic and harmful emissions that accumulate from this idling. Alternatives 1 and 2 target these environmental benefits at a few communities during peak summer times (namely Port Townsend, Keystone, and the San Juan Islands). Alternative 2 has the added benefit

of targeting commercial vehicles in all communities and therefore reducing idling emissions from those vehicles. Many of these are diesel powered and currently emit more toxic diesel particulate matter.

Alternative 3 extends some additional, though minimal, environmental benefits throughout the system as the ITS system is expected to have some demand management impact. Alternatives 4 and 5 have the greatest environmental benefits as they are expected to significantly reduce or eliminate queues at terminals that have frequent delays and are located in areas that are more densely populated.

Freight Mobility Benefits

By including commercial reservations system-wide, Alternatives 2, 3, 4, and 5 specifically address the mobility needs of freight. The commercial account's priority allotment provides greater predictability and convenience for freight and helps facilitate the smooth flow of goods through the state.

Freight mobility is critical to Washington's economy. The state's freight system is comprised of: (1) international and national trade flows; (2) movement of goods made in the state; and (3) the state's local retail and wholesale distribution system. Mobility— facilitating the movement of people and goods to contribute to strong economy and a better quality of life for citizens— is one of five stated transportation policy goals of the Washington Transportation Plan.

Other System Benefits and Costs

Alternatives 1 and 2 have many advantages, but do not bring the benefits of a reservation system to many riders – a relatively small portion of WSF ridership benefits. In Alternative 1, only Port Townsend-Keystone and Anacortes-Sidney riders benefit, and these routes currently do not experience the greatest terminal congestion and customer delay. Alternative 2 reaches a slightly higher proportion of ridership (13% versus 4% in Alternative 1), vastly improving some routes where there are extremely long delays during the summer weekend peak and improving wait times for commercial customers on all routes. However, by only reaching 13% of the vehicle traffic, the costs per rider of implementing the reservation system are still relatively high.

Alternative 3 provides system benefits on its own as it would promote more informed decision making by customers through improved communication about ferry travel options. But it would not do enough to meet the goals established for a reservation system – While routes may experience some decrease in congestion, it is not expected to be substantial enough to reduce community impact during peak times, especially as ridership grows over time.

While maintaining manageable implementation and operating risk levels, Alternative 4 would result in the greatest overall benefits in terms of the number of customers affected, time savings from reduced/eliminated multi-sailing terminal waits, and reduced congestion in host communities. Also, there are cost efficiencies in this alternative, as much of the IT investment is required for any reservation system, and IT and terminal upgrade costs can spread over a much larger base of reservations in this alternative. This alternative represents an investment level of approximately \$1.80 per vehicle trip (if total system costs were distributed over one year, and vehicles trips include riders who benefit from the regional ITS network but not necessarily reservations directly).

Risks and costs in Alternative 5 are too great to propose proceeding at this time. Exhibit 17 above does not show the full capital costs of this option (i.e. terminal expansion at Fautleroy), though they are expected to be high and would undoubtedly drive the cost per rider well above the \$2 level in Alternative 5. Furthermore, annual operating costs nearly double from Alternative 4 to Alternative 5

considering the additional Terminal Supervisor time that would be required at the South Sound terminals and the call center impacts of adding these additional reservations.

If there are future decisions regarding either expansion of the Fauntleroy Dock or moving the Southworth service to Colman Dock, then extending reservations to the South Sound could be reconsidered. However, the benefits of reservations alone do not justify these operational or terminal investment decisions.

6.5 Preferred Alternative

Given this assessment, Alternative 4 emerges as the preferred alternative because it results in the greatest overall benefits in terms of time savings and demand management. It spreads these benefits to the majority of the system while keeping capital costs per rider low, annual operating costs at a moderate level (less than the \$1 million per year anticipated in the Long Range Plan), and implementation risks manageable.

Under this alternative, 9.5 million riders per year (vehicle drivers and passengers in vehicles) would have access to a reservation system that would guarantee which sailing they could board and reduce current wait times. This represents approximately 60% of all annual vehicle driver and vehicle passenger trips.

South Sound routes and Mukilteo-Clinton (which would not receive a reservation system under this option) will still realize some benefits through an improved communication system and a reservation system for commercial traffic. An additional 6.2 million riders would see benefits from these improvements.

Furthermore, the preferred alternative retains some flexibility in how reservations might be implemented on certain routes, allowing WSF to continue to work with its customers and stakeholders to find the best possible solutions for each of its routes.

Exhibit 20 shows the improvements that implementation of the preferred alternative would bring to each of WSF's terminals and routes.

Exhibit 20
Summary of Preferred Alternative Improvements by Terminal

Terminal	Reservation Availability	Communication Improvements			Terminal-Related Improvements			
		Regional VMS Signs	Highway Advisory Radio	Queue Detection	Local VMS	Traffic Management Signs	Ferry Advisory Radio	Other
Anacortes	All Customers		X			X	X	
Bainbridge	All Customers	X	X	X	Existing	X	X	
Bremerton	All Customers	X	X		Existing	X	X	
Clinton	Commercial Only		X	X		X	X	
Edmonds	All Customers	X	X	X	Existing	X	X	Additional tollbooth, traffic gate
Faultleroy	Commercial Only	X	X					
Friday Harbor	All Customers *		X			X		3 Web cameras
Keystone	All Customers		X			X	X	
Kingston	All Customers	X				X	X	
Lopez Island	All Customers *		X			X	X	
Mukilteo	Commercial Only	X	X	X		X	X	
Orcas Island	All Customers *		X				X	
Point Defiance	Commercial Only		X			X	X	2 Web cameras
Port Townsend	All Customers		X			X	X	
Seattle	All Customers	X	X				X	
Shaw	All Customers *						X	
Sidney	All Customers							
Southworth	Commercial Only	X	X		Existing	X	X	
Tahlequah	Commercial Only		X				X	
Vashon Island	Commercial Only		X					2 Web cameras

* Excludes inter-island sailings

Life Cycle Cost Analysis

The standard predesign format for life cycle cost analysis is not a useful decision-making tool for the alternatives discussed here because these alternatives all build upon each other. Comparing the present worth cost savings of each alternative relative to another shows that each alternative is more expensive than the previous one, both in terms of total investment and life cycle costs. The cost-benefit analysis in this section has been designed to identify which alternative provides the best value to customers and WSF while mitigating implementation risks.

In any case, it is important to understand the complete costs of the alternatives, both operating and capital. Exhibit 21 below includes total capital and operating costs through 2025, both in total year of expenditure dollars and in present worth dollars. For the purposes of this analysis, capital costs are incurred according to the schedule discussed in the Implementation Section, and estimates in today's dollars have been escalated at 1.7% annually. Operating costs (salaries and benefits and the O&M allowance) have been escalated at 3% annually, and a 5% discount rate was assumed.

Exhibit 21
Life Cycle Cost Analysis Summary (\$000s)

	Alternative 1		Alternative 2		Alternative 3		Preferred Alternative 4		Alternative 5	
	Estimated Cost (\$YOE)	Present Worth	Estimated Cost (\$YOE)	Present Worth	Estimated Cost (\$YOE)	Present Worth	Estimated Cost (\$YOE)	Present Worth	Estimated Cost (\$YOE)	Present Worth
Initial Costs										
IT - purchase and integration	\$2,329	\$2,261	\$2,329	\$2,261	\$2,329	\$2,261	\$6,196	\$5,129	\$7,485	\$5,915
Terminal specific enhancements	\$1,501	\$1,457	\$3,047	\$2,850	\$3,047	\$2,850	\$5,920	\$4,841	\$7,842	\$5,957
Communications:										
Queue detection and HAR	\$264	\$256	\$670	\$650	\$3,020	\$2,827	\$3,020	\$2,827	\$3,020	\$2,827
Web cameras	\$0	\$0	\$197	\$191	\$499	\$463	\$499	\$463	\$499	\$463
VMS Signs	\$0	\$0	\$0	\$0	\$9,395	\$8,064	\$9,395	\$8,064	\$9,395	\$8,064
Total Initial Cost										
Replacement Costs										
<i>N/A - Capital Components have 20-50 year life cycles</i>										
Annual Costs										
Staffing	\$2,795	\$1,753	\$8,444	\$5,388	\$8,444	\$5,388	\$14,781	\$9,083	\$21,150	\$12,474
Allowance for maintenance & utilities	\$906	\$596	\$906	\$596	\$1,360	\$894	\$1,813	\$1,192	\$2,719	\$1,789
Total Annual PW Cost	\$3,701	\$2,349	\$9,350	\$5,984	\$9,804	\$6,282	\$16,594	\$10,275	\$23,869	\$14,263
Grand Total PW Costs	\$7,795	\$2,349	\$15,593	\$5,984	\$28,094	\$6,282	\$41,624	\$10,275	\$52,110	\$14,263
PW Cost Savings		\$7,926		\$4,291		\$3,993		\$0		(\$3,988)

7.0 IMPLEMENTATION

Having identified the preferred scope of the reservation system in the previous chapter, this chapter (7) describes how the reservation system would be implemented. A general framework for implementation, as well as the route-level implementation process is discussed. Customer education and advertising options are identified. Project management and schedule are explained.

7.1 Approach to Implementation

There are many steps to implementation once the reservation system is approved. The preferred alternative, #4, includes a regional ITS network, localized communication improvements, and reservations, all of which may be applied in different ways on different routes. In addition, the introduction of reservations on the scale envisioned in this predesign will change how WSF interacts with its customers and how its customers use the ferry system. These sorts of changes cannot be implemented in one quick step.

For reservations to become an effective demand management tool and deliver benefits to customers and communities the system will need to be phased in gradually. This will allow WSF to learn as it goes and make improvements in the business rules and operational support functions to maximize the effectiveness of the system. Also, this approach offers customers the opportunity to gradually adjust to the new system and integrate reservations into their decision making process so they can get the most of the new system. It will be important to build confidence and loyalty in the new approach.

As a result, it is best to implement along two separate but connected tracks: (1) the physical development and implementation of the information technology, communications and terminal modifications necessary to support reservations; and (2) gradual implementation introduction and ramping up of reservations on a route-by-route basis, where reservations might start out modestly (e.g. limit the share of the vessel available for reservations, limit to peak periods only, summer only, commercial only) and then grow the program as customers gain confidence in the systems.

General approach and sequencing of activities. The proposed implementation program was developed based on the desire to minimize risk, build-out in a logical progression, and maximize the opportunities to learn and improve as the system is developed. Also, there are logical decision points where progress can be evaluated before the next increment of investment is committed to the project without compromising the integrity of the earlier work.

In developing an implementation sequence, the proposed progression is intended to start with the simpler element for which there are examples in other ferry systems worldwide and build up to the more challenging aspects of the preferred alternative. Additionally, routes that have longer wait times are targeted for earlier implementation where possible. The San Juan Islands have been addressed among the earlier routes to receive reservations in Phase II because of the extremely long wait times in the summer. Currently these waits discourage some tourists from traveling to the San Juan Islands in the first place. Toward this end, the following three-phase approach is proposed:

Phase I—Improve Reservations on Existing Routes

- Purchase, build-out, and integrate reservation system with existing WSF and WSDOT systems
- Terminal modifications at Anacortes, Keystone, and Port Townsend

- Begin ITS enhancements, including queue detection and HAR, system-wide
- Reservations related communication available to customers at Anacortes, Keystone, and Port Townsend

This is the least risky phase. By beginning with the routes that already have reservations and making improvements, WSF will be able to build on the experience and lessons learned from earlier reservation efforts in the same communities. This phase will also allow the entire system to benefit from improved queue detection and better communication about ferry departures and wait times. This phase should begin in spring of 2010 with the release of funding following approval of this predesign feasibility study and continue through the end of the FY 09-11 biennium. The new reservation system will be available on all of the existing reservation routes by spring of 2011.

Phase II—Partially Expand Reservations

- Terminal modifications on the San Juan Islands
- Open reservations of all kinds to San Juan Islands
- Open reservations to commercial customers system-wide
- Add VMS signs system-wide for further ITS enhancement

This second phase would expand the pilot to include all customers in the San Juan Islands. At this stage WSF would have implemented reservations on all of the routes that are most compatible with reservations (heavy recreational/tourist traffic and small commuter segment). Commercial reservations would become available system-wide and VMS signs would be built throughout the system providing further benefits to all WSF customers. While the request for funding would be made in spring 2011 the funds would not need to be released until spring 2012.

Phase III—Expand Reservations to Most of Central Sound

- Further reservation technology customization and development
- Terminal modifications at Bainbridge, Bremerton, Colman, Edmonds, and Kingston
- Open reservations on Central Sound Pilot Route
- Open reservations on all Central Sound Routes except Mukilteo-Clinton

This third phase would begin with a further build out of the reservation technology to accommodate the increased volume of reservations needed and the anticipated needs of heavy commuter routes. WSF would wait to submit a request for Phase III until 2015. This would allow for the most learning and data gathering to determine whether Phase III is necessary and worth the risks associated with implementing a reservation system for commuters on routes with short headways, something that has never been done before. If approved, Phase III would begin in summer 2015 and a pilot central sound route would open reservations for all customers in spring 2016. Assuming successful implementation on the pilot route, reservations would be rolled out to the remaining two Central Sound routes the following year.

Route-level implementation measures. As reservations are introduced on a new route, the business rules will also be phased in to support orientation and building customer knowledge and comfort with the new system. To support the introduction and early implementation phase on a new route, WSF would organize a Partnership Group for that route as a mechanism to engage key local stakeholders in the decision making process. These Partnership Groups will be modeled on the successful process used

for the Port Townsend-Keystone terminal and vessel studies and the Edmonds-Kingston group used to assist in the development of this predesign report. These groups would meet to:

- Work through how the system will operate and how it will work on their own routes
- Discuss opportunities to tailor the system to unique features of the route
- Review and comment on terminal modification/vehicle processing changes
- Discussion of the route-specific phasing in of business rules
- Assist WSF with public information materials and outreach to customers and communities served by the route

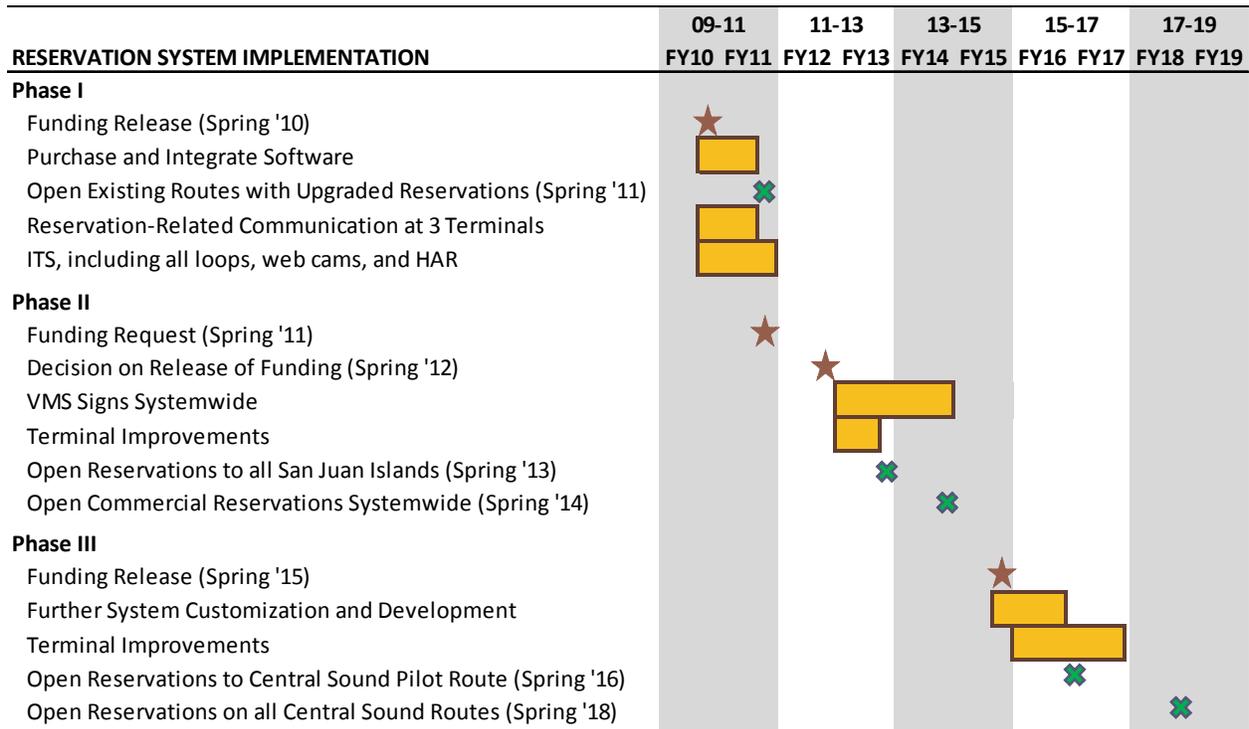
7.2 Proposed Schedule for Implementation

The preferred alternative has identified a system of improvements that will provide congestion relief and customer benefits on every route in the system. This alternative deploys two key active management strategies where these strategies can be the most effective and where the costs and benefits support implementation. These are:

- **Communication system improvements.** WSF customers would greatly benefit from a significantly expanded communication system to provide real-time information about traffic and sailing conditions. With better information, terminal congestion can be reduced and customer experience and predictability improved. These investments are an extension of the WSDOT Active Management System approach to managing congestion on state highways. These improvements would be developed system-wide and benefit all routes.
- **Reservations.** On most routes in the system, a reservation system is a cost effective enhancement to the demand management challenge and would provide significant customer and community benefits. The details for how reservations will be implemented on these routes will be determined in cooperation with local community stakeholders. On the routes where no reservations are proposed, the operational impacts and capital cost requirements were too great to justify the investment. On these routes, the travel demand benefits will be limited to possible schedule modifications and the improvements in real time information and communications.

Exhibit 22 presents a proposed schedule for how implementation of these system improvements might be deployed. The schedule and phasing allows for different decision points regarding whether or not to continue with reservation implementation. The Legislature would have information about implementation progress and the benefits of reservations before releasing the funds for phase II and phase III.

Exhibit 22 Proposed Schedule for Implementation



7.3 Project Management

All phases of the Reservations project will be actively managed by the WSDOT Office of Information Technology with appropriate oversight as determined by the Information Services Board guidelines.

Roles and responsibilities. A Project Manager will be assigned and dedicated to all phases of the project, from completion of an investment plan, requirements definition and needs assessment, through risk assessment, request for proposals, vendor selection, and project delivery.

Decision-making process. After approval of the investment plan, broad responsibility for decisions will be handled by an Executive Project Committee, comprising the WSDOT Assistant Secretary for Ferries, the Director of Ferries Operations, and the WSDOT Deputy Director of the Office of Information Technology for Ferries. Technology changes will be submitted through the Change Management and Control structure established within the WSDOT Office of Information Technology.

Management qualifications. The project will be managed by staff accredited by the Project Management Institute.

Project team organization. At this time, specifics of the project team are being developed to assure adequate staffing, decision making purview and quality assurance.

WSDOT has adopted as a standard practice a process to manage projects and provide a method to meet the WSDOT Management Principles. WSDOT's project management process requires the application of skills, knowledge, tools, and techniques to deliver the project on time, within budget, and according to specifications. There are proven industry standards for project management, such as the Project

Management Body of Knowledge (PMBOK) through the Project Management Institute. The project management process, as adopted by WSDOT, is based upon those industry standards.

Appendix G contains more details about WSDOT's standard management practices, including the Secretary of Transportation's Executive Order Number E 1032.01 related to project management.

7.4 Coordination with Other Efforts

The Reservations project has connections to WSF initiatives that are currently underway. As WSF begins implementation of a reservation system, it will ensure coordination with these initiatives:

Schedule Review and Re-alignment. Consistent, on-time performance is a necessary condition to ensure successful implementation of a reservation system. To improve customer service, WSF is currently reviewing sailing schedules and may make adjustments where needed to improve performance.

New Marketing Program. WSF is currently developing a marketing plan to help target marketing and customer service efforts and increase ridership. As a new service with distinct customer benefits, the reservation system is being incorporated into the marketing plan. Assuming legislative approval, the reservation system may become a key piece of the marketing plan, particularly with respect to commercial customers and the desire to develop and grow new market niches.

New Boats on Port Townsend-Keystone. WSF is scheduled to receive two new Island Home vessels (one in 2010 and one in 2011) for the Port Townsend-Keystone route. As this route is envisioned to be one of the first that receives a reservation system, sailing schedules and operating procedures that need to be updated for the addition of a second vessel on the route will also be designed to work with a vehicle reservations system.

8.0 BUDGET

Having identified the capital and operating costs as well as a potential implementation schedule, this Chapter discusses the project budget for the duration of the 16-year Legislative financial plan, highlighting funding sources, existing budget, and cost risks.

8.1 Project Budget Analysis

Based on the implementation schedule presented in Exhibit 22 above, the following table shows how capital expenditures would be distributed by biennia. This expenditure pattern is based on the project phases described in Section 7.1 above.

The VMS sign portion of the preferred alternative has been distributed evenly across the 2011-13 and 2013-15 biennia. In fact, WSF has some flexibility in this piece of the project as long as a regional communications network is in place prior to deployment of reservations on any Central Sound routes. It could start these efforts as soon as fiscal year 2011, and scheduling may be dependent, in part, on the availability of any federal grant money for ITS projects.

Exhibit 23
Proposed Capital Expenditures by Biennia for Preferred Alternative

	2009-11	2011-13	2013-15	2015-17	2017-19	2019-21	2021-23	2023-25
Phase I								
Purchase and Integrate Software	\$2,320,200							
Terminal-specific enhancements	\$1,495,000							
Regional Communication Network	\$1,725,875	\$1,731,125						
Phase II								
Terminal-specific enhancements		\$1,498,400						
Regional Communication Network: VMS Signs		\$4,472,000	\$4,472,000					
Phase III								
IT System Development				\$3,490,500				
Terminal-specific enhancements				\$745,800	\$1,780,200			
Total Capital Budget Requirements (\$2009)	\$5,541,075	\$7,701,525	\$4,472,000	\$4,236,300	\$1,780,200	\$0	\$0	\$0
Total Capital Budget Requirements (\$YOE)	\$5,563,239	\$7,946,048	\$4,780,568	\$4,692,338	\$2,047,230	\$0	\$0	\$0

In a similar fashion, operating costs have been distributed by biennium in the table below. With respect to operating expenses, larger increases corresponding to call center staffing are scheduled for later biennia, when reservations are rolled out to more routes. It is important to note that WSF will have gone through testing and implementation at a smaller scale before this point, providing the Legislature a few key decision points along the way before requesting the operating (and capital) funding shown in the 2015-17 and 2017-19 biennia.

In addition to staff costs, WSF is assuming ongoing maintenance and utilities costs related to the ITS components and terminal improvements required to support reservations in addition to ongoing software licensing and support costs. These costs begin in the 2011-13 biennium, after installation of several capital components. For the preferred alternative, the maintenance and utilities allowance is estimated at \$100,000 per year in 2009 dollars. The software licensing and support costs are estimated at \$132,500 per year beginning in 2015 (initial licensing and support costs are included in the capital budget).

Exhibit 24 Proposed Operating Expenditure by Biennia (Preferred Alternative)

	2009-11	2011-13	2013-15	2015-17	2017-19	2019-21	2021-23	2023-25
Staffing								
IT - Maintenance and Support	\$0	\$0	\$350,000	\$350,000	\$350,000	\$350,000	\$350,000	\$350,000
Terminals	\$0	\$155,300	\$310,600	\$367,100	\$581,800	\$581,800	\$581,800	\$581,800
Customer Service	\$0	\$176,000	\$352,000	\$732,000	\$1,112,000	\$1,112,000	\$1,112,000	\$1,112,000
Total Staffing	\$0	\$331,300	\$1,012,600	\$1,449,100	\$2,043,800	\$2,043,800	\$2,043,800	\$2,043,800
Operations & Maintenance								
Allowance for maintenance, utilities, software licensing and support, etc.	\$0	\$200,000	\$200,000	\$465,000	\$465,000	\$465,000	\$465,000	\$465,000
Total O&M Allowance	\$0	\$200,000	\$200,000	\$465,000	\$465,000	\$465,000	\$465,000	\$465,000
Total Operating Budget Requirements (\$2009)								
	\$0	\$531,300	\$1,212,600	\$1,914,100	\$2,508,800	\$2,508,800	\$2,508,800	\$2,508,800
Total Operating Budget Requirements (\$YOE)								
	\$0	\$572,111	\$1,385,264	\$2,319,819	\$3,225,744	\$3,422,192	\$3,630,603	\$3,851,707

8.2 Risk Assessment of All Costs

The project budget information presented here has been prepared based on cost estimates. Cost estimates, by their nature, contain risks, and these risks are higher during this predesign stage of the project where complete scoping has not been undertaken in most instances. WSF has used estimating techniques to mitigate this risk, some of which are discussed below. For more detail on the cost estimates and specific contingencies, please see Appendix E.

Capital costs are discussed according to their major function:

- Capital IT Costs.** A large IT system acquisition and integration project such as this has inherent risk of scope changes and unforeseen issues. Based on WSF experience with the Electronic Fare System, and given the complexity of this project with respect to information technology, contingencies have been built into the IT budget of approximately \$1,300,000 to address this risk. Furthermore, implementation and funding requests for the IT components of this project have been spaced over multiple biennia to allow for logical, step-wise implementation of different IT components, as well as adequate testing and reassessment of costs, if necessary.
- Capital Terminal Costs.** The terminal capital estimates contain less risk than the IT components as they are primarily for acquisition of standard items that WSDOT has bid histories for. Furthermore, the terminal improvements will not involve any shoreline permitting, which might otherwise drive costs up. Standard WSDOT engineering and design contingencies have been included in the estimates (see Appendix E for more detail).

Operations and Maintenance (O&M). The O&M estimates include two additional IT staff starting in the 2013-15 biennium and 3.7 Terminal FTEs to be hired incrementally as reservations are rolled out to additional terminals. Call Center staffing has been budgeted at the lowest end of a range, and there is risk in this number. As WSF doesn't have experience with this type of system yet, it is difficult to predict call center needs. However, there are a number of steps that WSF intends to take to keep staffing increases minimal (see Section 6.3). Furthermore, larger increases in call center staffing are not expected until later biennia (phase 3 when reservations are fully deployed in the Central Sound), by which time WSF will have some experience with the reservation system and supporting technology to

make more informed decisions about call center staffing and other technology-based options that might be able to better substitute for additional call center staff.

8.3 Funding Sources

Based on Long Range Plan estimates, the 2009 Legislature allocated funding for a reservation system in the 16-year plan.

**Exhibit 25
Reservations Capital Estimates and 16-Year Plan Estimates**

	Capital	16-Year Plan Estimates	Difference
2009-11	\$5,563,000	\$5,557,000	\$6,000
2011-13	\$7,946,000	\$6,180,000	\$1,766,000
2013-15	\$4,781,000	\$1,399,000	\$3,382,000
2015-17	\$4,692,000	\$1,119,000	\$3,573,000
2017-19	\$2,047,000	\$3,746,000	-\$1,699,000
2019-21	\$0	\$0	\$0
2021-23	\$0	\$0	\$0
2023-25	\$0	\$0	\$0
Total	\$25,029,000	\$18,001,000	\$7,028,000

In the 2009-11 biennium, there is adequate capital funding to begin work on the reservation system as described here. In future biennia, additional capital funding will be needed. Much of the difference in current estimates relative to estimates in the 16-year plan is related to the Regional ITS network that has been proposed. As federal funding for ITS projects has increased in recent years, WSF will make every effort to explore federal funding opportunities for this aspect of the program. If successful, this could fund a portion of the difference shown above.

**Exhibit 26
Estimated Operating Costs and 16-Year Plan Estimate**

	Estimated Total Operating Costs	Program X Operating Costs	Program C Operating Costs	Program X		Program C		Total Difference
				16-Year Plan Estimates	Difference	16-Year Plan Estimates	Difference	
2009-11	\$0	\$0	\$0	\$515,000	-\$515,000	\$0	\$0	-\$515,000
2011-13	\$572,111	\$572,111	\$0	\$538,407	\$33,704	\$0	\$0	\$33,704
2013-15	\$1,385,264	\$985,427	\$399,837	\$571,196	\$414,231	\$0	\$399,837	\$814,068
2015-17	\$2,319,819	\$1,574,461	\$745,357	\$605,982	\$968,480	\$0	\$745,357	\$1,713,837
2017-19	\$3,225,744	\$2,434,994	\$790,750	\$642,886	\$1,792,109	\$0	\$790,750	\$2,582,858
2019-21	\$3,422,192	\$2,583,285	\$838,906	\$682,038	\$1,901,248	\$0	\$838,906	\$2,740,154
2021-23	\$3,630,603	\$2,740,608	\$889,996	\$723,574	\$2,017,034	\$0	\$889,996	\$2,907,029
2023-25	\$3,851,707	\$2,907,511	\$944,196	\$767,639	\$2,139,871	\$0	\$944,196	\$3,084,068
Total	\$18,407,439	\$13,798,397	\$4,609,042	\$5,046,720	\$8,751,677	\$0	\$4,609,042	\$13,360,719

The Long-Range Plan assumed \$1 million in operating and maintenance costs per biennium. As a major component of the operating costs are associated with information technology, these are budgeted within Program C (versus Program X for WSF operations). For budgeting purposes, it was assumed that half of the \$1 million costs per biennium (\$500,000) would fall under each program.

Inflated at 3% per year, this comprises the 16-year plan estimates shown in Program X in Exhibit 26 above. Program C costs associated with the reservation system were not included in the WSDOT budget. Cumulatively for the first two biennia, WSF is estimating operating costs below the levels assumed in the Long-Range Plan. By the 2013-2015 biennium, when IT support staff are funded in the operating budget, and by the 2017-19 biennium as reservations are rolled out to Central Sound routes and the call center and terminal support staff assumptions take effect, biennial operating cost estimates rise above those assumed in the Long-Range Plan.

9.0 POLICY AND REGULATORY COORDINATION

This chapter describes how the reservation system will align with State policy goals and WSF policies and procedures. Changes to the WAC are suggested.

9.1 Relation to Washington State Policy Goals

Greenhouse Gas Emissions Goals

In March 2008, Washington was the fourth state in the nation to adopt statewide limits on greenhouse gas emissions. According to RCW 70.235.020, the state's reduction of greenhouse gas emission goals are as follows:

- By 2020, reduce overall emissions of greenhouse gases in the state to 1990 levels;
- By 2035, reduce overall emission of greenhouse gases in the state to 25% below 1990 levels;
- By 2050, the state will do its part to reach global climate stabilization levels by reducing overall emission to 50% below 1990 levels, or 70% below the state's expected emissions that year.

Connection to the Reservation System. In Washington, transportation accounts for almost half of all total greenhouse gas emissions (WSDOT). The WSF reservation system supports the State's goals of greenhouse gas reductions by significantly reducing vehicle congestion at and around ferry terminals. By spreading demand more evenly across peak times, the reservation system reduces the number of vehicles queuing outside of ferry terminals.

Growth Management Act

The Growth Management Act, passed by the Washington Legislature in 1990, is a policy framework for local comprehensive planning and land use regulation. The Act identifies 14 state planning goals, including sprawl reduction, regional transportation, and environmental protection.

WSF cooperates with local planning processes in its setting of level-of-service (LOS) standards. Local and regional planning organizations make policy decisions to shape growth and development in their jurisdictions; the resulting pattern of future trips is a consideration in ferry service planning, with the understanding that future growth is closely tied to maintaining LOS standards. WSF must balance local needs with its role as a state agency, as described in state law: "Although [WSDOT] shall consult with local governments when setting level of service standards, the department retains authority to make final decisions... [The] department shall consider the necessary balance between providing for the free inter-jurisdictional movement of people and goods and the needs of local communities using these facilities" (RCW 47.06.140). WSF LOS standards are measured in average minutes of wait time, as outlined in the *WSF Draft Long Range Plan 2006-2030*.

For Highways of Statewide Significance (HSS), which are arterials identified as connecting major communities in the state, LOS is set by law. Ferry routes to Whidbey Island (Clinton/Mukilteo and Port Townsend/Keystone), Seattle/Bainbridge Island, and Seattle/Bremerton are designated as HSS.

Connection to the Reservation System. The introduction of the reservation system may affect the provision of LOS on some routes. The general intent is to improve LOS on all routes, and where planning impacts may be anticipated, WSF will work with local partners, to incorporate any required changes into local planning documents.

Clean Air Act

The U.S. Clean Air Act is a federal law protecting and improving the nation's air quality through regulation of air pollutants. Originally passed in 1963, Congress's last overhaul and major expansion of the Act occurred in 1990. The Act identifies and regulates air pollutants that cause harm to human health and the environment.

The Clean Air Act gives the Environmental Protection Agency (EPA) the authority to set limits on certain air pollutants and regulate some sources of air pollutants. State, local, and tribal governments take the lead in implementing the Clean Air Act through monitoring air quality, inspecting facilities in their jurisdiction, and enforcing Clean Air Act regulations. All states have to develop State Implementation Plans (SIPs) outlining how they will control air pollution. The EPA works with state, tribal, and local agencies to approve plans for reducing air pollution and provides technical and funding assistance.

In 1967, the Washington State Legislature adopted its own Clean Air Act (RCW 70.94), which acts as the basis for state and local air pollution regulations. State regulations must be as protective as or more protective than the federal Clean Air Act. The Washington State Department of Ecology and seven local clean air agencies monitor and enforce air quality regulations. Because automotive traffic is a major source of air pollutants, the development and implementation of transportation demand management is a component of the State's Clean Air (RCW 70.94.52).

Connection to the Reservation System. By reducing vehicle queuing and traffic congestion at and around ferry terminals, the reservation system helps Washington comply with federal and state Clean Air Act air pollutant regulations to achieve better air quality.

Freight Mobility Goals

Freight mobility is critical to Washington's economy. The state's freight system is comprised of: (1) international and national trade flows; (2) movement of goods made in the state; and (3) the state's local retail and wholesale distribution system. Mobility— facilitating the movement of people and goods to contribute to strong economy and a better quality of life for citizens— is one of five stated transportation policy goals of the Washington Transportation Plan.

As the steward of the state's interstate, highway, and ferry system, WSDOT is responsible for preserving, maintaining, and improving the state's highway and ferry system to meet freight transportation and general mobility needs.

Connection to the Reservation System. The reservation system specifically addresses the mobility needs of freight through its priority access program and by including system-wide commercial reservations early in the sequencing of reservations implementation. Commercial freight would be allotted a certain percentage of space on peak and off-peak sailings, based on a route's historical freight space usage; the percentage space reserved for freight is higher on off-peak sailings. Freight customers would be eligible to sign up for a priority access commercial account, which enables customers to set up an online reservation account and access the reserved commercial space. The commercial account's priority allotment and early implementation of reservation provides greater predictability and convenience for freight and helps facilitate the smooth flow of goods through the state. Furthermore, increased benefits for commercial customers, which in turn might yield increased commercial ridership, could provide additional revenue to WSF, reducing pressure on the farebox.

9.2 Relation to WSF Policies and Regulations

Tariff

WSF's tariff policy is the set of fares, fees, and fare structures that outline the price for every specific trip and fare category system-wide. The reservation system proposed in this final report will be separate from the tariff, but tariff changes will need to be made to accommodate some of the business rules included in this proposal. Since the proposed reservation system does not require an additional fee to make a reservation, changes to the Tariff will be minor, and may include the following:

- **Change and Cancellation Fees.** This final report proposes a reservation system that may charge change and cancellation fees, depending on customer type and advance notice given to WSF. The preferred option for these charges is included in Section 5.2. If these charges become part of a final reservation system, the tariff will need to be modified to include the amount of each charge, and the rules governing it.
- **Priority Access Account Discounts.** The current proposal for the priority access accounts does not include any volume-based discount for members, except those paying with a linked multi-ride card. In the future, based on ridership trends, volume-based discounts may become part of these programs. In that scenario, the tariff will need to be modified to formally incorporate those discounts.

For either of these changes to be implemented, they will have to be considered through the annual tariff review process, which includes analysis and review by WSF, the Washington State Transportation Commission (WSTC), Ferry Advisory Committees, and the public. The WSTC has the final authority to implement changes to the tariff.

Washington Administrative Code

The reservation system is likely to require multiple changes to the Washington Administrative Code (WAC), all of which would be subject to the public rule-making process. The WAC was already modified during the 2009 Tariff Review cycle to give WSF permission to take a 25% - 100% deposit to hold a reservation on any route. This language was written to include any future routes on which reservations will be offered, and will not need to be modified to implement the proposed reservation system in this final report.

Other significant WAC changes may include the following:

- **Preferential Load WAC.** The Preferential Load WAC currently allows registered carpools and vanpools, motorcycles, transit vehicles, emergency vehicles, and customers who cannot medically wait in line to receive preferential loading on WSF ferries. This means that regardless of when they arrive at the terminal, they will be loaded onto the next sailing.

Under a reservation system, carpools, vanpools, and motorcycles would be required to make a reservation in order to provide WSF with accurate information about how much space is available on any given sailing. WSF will work with carpools and vanpools to schedule these reservations in blocks, which would not be subject to any of the allotments defined by priority access programs.

The Preferential Load WAC would likely need to be modified to remove these three types of vehicles from the preferential load list, though operationally, very little would change for carpools and vanpools.

- **Priority Loading for Reservation Holders.** Under the reservation system, customers arriving at the terminal who have reservations will be loaded prior to customers without reservations, regardless of arrival time. The WAC currently allows for vehicles to be loaded on a first-come, first-served basis, and will likely need to be modified to give WSF the authority to load vehicles in order of reservation status.
- **Reservation System Business Rules.** Many of the specific program and reservation system business rules may need to be incorporated in some fashion within the WAC. As a point of reference, many of the rules governing WSDOT's *Good to Go!* program are defined within the WAC.

Security and Coast Guard

A review of the requirements of the Alternate Security Plan (ASP) and WSF's Coast Guard obligations under sub chapter W reveals no conflicts with a vehicle reservations system. The agency shall continue to meet all screening requirements regarding vehicles within our holding lanes, as well as maintain our ability to count passengers on each required departure as well as monitor passengers in all public access areas, as is done currently.