Lummi Island Ferry System
Level of Service Alternatives Analysis

DRAFT Report

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EXECUTIVE SUMMARY

Capital assets that support the Lummi Island Ferry System are reaching the end of their useful life and must be replaced. To do so, Whatcom County Council Resolution 2017-012 directed Lummi Island Ferry Advisory Committee (LIFAC) to review alternatives for the Lummi Island Ferry System and recommend a Level of Service (LOS) Action Plan. This study includes an LOS Alternatives Analysis with recommendations to support the LOS Action Plan.

Overview of the Lummi Island Ferry System

To plan for upcoming capital improvements for the Lummi Island Ferry System, the following elements set the foundation for the LOS Alternatives Analysis:

- Whatcom County operates the Lummi Island Ferry Service that provides service to Lummi Island 365 days per year, 7 days per week. With a short crossing of about 5 minutes, ferry service is provided every 20 to 40 minutes on weekdays and every hour on the weekend. The crew collects fares on the vessel during transit.
- The Whatcom Chief is the only vessel that provides service to Lummi Island from Gooseberry Point, and provides the only vehicle connection to the island. The vessel is over 50 years old and maintenance costs have increased significantly. To keep running, the Whatcom Chief is anticipated to require a major overhaul in eight years.
- The Gooseberry Point ferry terminal area is leased from the Lummi Nation, and this lease will expire in 2046. It is anticipated that the existing bridge structure will need significant structural improvements in the next 10 years to maintain safe operations. Lummi Nation is planning to construct a marina in the current location of the ferry terminal requiring the terminal be relocated.
- During annual dry dock of the ferry, Whatcom County contracts with a passenger-only ferry to provide service with limited parking provided to passengers.
- There are limited amenities at the Gooseberry Point ferry terminal.
- The community has expressed interest in keeping operating costs low, maintaining service frequency, and improving amenities (restrooms, parking, and security at Gooseberry Point as well as ADA restrooms at Lummi Island).

Summary of LOS Alternatives Analysis

When planning for capital and asset improvements including new ferries, the planning horizon extends over the life of that asset. In this case, we anticipate the new vessel to have a useful life similar to the Whatcom Chief—over 50 years. To plan over that time horizon, the consultant team conducted a LOS Alternatives Analysis by completing a ridership forecast model, establishing a LOS, developing vessel characteristics and terminal options, assessing potential funding sources and preparing a financial forecast, and conducing public outreach and community engagement. The following summarizes findings from the analysis:

- Ridership is forecast to increase nearly 40% for passengers/pedestrians and about 16% for vehicles by 2040.
- Because labor costs are a large portion of operating costs, a vessel with capacity for up to 34 cars was the largest alternative considered because it is anticipated to retain a crew size of three.
- Based on the current capacity of the Whatcom Chief, the LOS experienced today will get significantly worse in the future. A vessel with 34-car capacity is anticipated to meet average peak weekday demand estimated through 2060.

- Conventional diesel, hybrid diesel-electric, and all-electric vessel options with capacity up to 34 cars were considered. Rough order of magnitude (ROM) costs for these vessel options range between $9 million and $16 million.
- Having a back-up vehicle ferry would require storage and maintenance of the back-up vessel when it is not in use. Additionally, maintenance of the terminal structures would still require suspending service because there is only one vehicle ferry slip. A permanent passenger-only ferry float could be installed to maintain service during periods when the vehicle ferry is being maintained or when terminal maintenance is needed (ROM cost of $1 million).
- Operational improvements could include: increasing the efficiency of fare collection by implementing online ticket purchase and installing ticket vending machines, and spreading peak demand periods by installing cameras for passengers to view the ferry queue to adjust their travel and implementing a peak congestion pricing policy.
- The existing marine structures would require modifications to increase the structural capacity for a larger vessel. The ROM costs for these modifications are $7-9 million for both terminals.
- To keep operating costs low and maintain service frequency, the Gooseberry Point ferry terminal should remain near the current Gooseberry Point ferry terminal location. Terminal options for Gooseberry Point include:
  - Remaining at the current terminal location and completing structural repairs (ROM cost $4.5 million).
  - Relocated west of the current ferry terminal and constructing a new ferry slip (ROM cost $26.5 million).
  - Potential future expansion as private property becomes available. Potential future expansion would allow for parking and amenities (ROM cost $9.5 million).
- Terminal options for Lummi Island include: reconfiguring the queuing lanes and adding ADA restrooms (ROM cost $1.5 million).
- Operating costs are anticipated to be less than current operating costs with any new vessel option based on the decreased maintenance costs.
- Capital costs for improvements will require a diverse funding portfolio of local, state and federal funds:
  - Local funds: Public Works Road Fund, general appropriations, bond issuance, local improvement districts, and recapitalization surcharge
  - State funds: Ferry Capital Improvement Program through County Road Administration Board (CRAB), Public Works Trust Fund
  - Federal funds: Federal Highway Administration (Surface Transportation Block Grant, Ferry Formula Program), U.S. Department of Transportation Better Utilizing Investments to Leverage Development grants)

Recommendations and Next Steps

Based on the alternatives analysis, we recommend the following elements to achieve the desired LOS into the future and present suggested next steps to implementation:

Recommendations

- **Measuring LOS:** Track and calculate the cars per sailing and sailings in a service window. This could be done by the crew counting manually or via monitoring cameras. Monitor performance metrics including percent capacity, on-time performance and number of vehicles left behind.
- **Vessels:** Construct a 34-car, hybrid diesel-electric vessel.
- **Terminal Improvements:** Replace the marine structures for the new vessel once designed. Install queue lane cameras and ticket vending machines. Complete structural improvements to the existing Gooseberry Point bridge structure. Initiate the environmental process for the Gooseberry Point terminal relocation. At Lummi Island, reconfigure the Lummi Island queuing and install ADA restrooms. Install an emergency passenger-only ferry float.
- **Operational Improvements:** Improve bicycle and pedestrian loading by locating the queuing area as close to the vessel as possible to reduce the time required to load onto the ferry. Implement a peak congestion pricing fare policy on cash fares.
- **Funding:** Institute a ferry district and implement a vessel replacement surcharge. Increase fares periodically with inflation to achieve the 55% farebox recovery. Seek out all grant funding options for capital projects.

Next Steps:

1. Institute a ferry district and plan for future vessel replacement surcharge.
2. Install cameras to view the ferry queue and provide a live feed for passengers to monitor the queue.
3. Determine an online ticketing approach and/or ticket vending machine option to purchase and install.
4. Begin preliminary design of the vessel.
5. Once the vessel geometry and specifications are designed, design the marine structure modifications required to fit the new vessel in the existing terminals.
6. Initiate the CRAB funding process by requesting a call for projects in spring 2021.

Resolution 2017-012 and Recommendations

The recommendations of the LOS Alternatives Analysis support the goals established by LIFAC and elements of the LIFAC Action Plan provided in Resolution 2017-012. Table EX-1 identifies each goal of the resolution and components of the Action Plan, the recommendation that addresses that goal and a timeframe for implementation.

Table EX-1: Resolution 2017-012 Goals, Recommendations and Timeframe for Implementation

	Goals of the Lummi Island LOS	Recommendation	Timeframe
1.a.	*Provide a vessel that will:*		
i.	Continue to meet and comply with current U.S. Coast Guard safety standards.	Include in vessel design standards.	At Vessel Design
ii.	Comply with the Americans with Disabilities Act (ADA).	Include in vessel design standards.	At Vessel Design
iii.	Accommodate legal loads of vehicles per WA State Commercial Vehicle Guide.	Part of Gooseberry Point terminal relocation.	Long-term / At Terminal Design
iv.	Balance capacity against operating costs (fuel, personnel, etc.) to ensure affordable fares over the long run, including needs-based fares.	34-car vessel has lowest risk of increasing crew size. Operating costs lower than the Chief.	Short-term
v.	Optimize vehicle demand, deck space and trip frequency to minimize wait times.	34-car vessel	Short-term
vi.	Accommodate all walk-on passengers during typical peak times.	Include in vessel design.	At Vessel Design
vii.	To the greatest extent possible, provide a carbon neutral vessel.	Hybrid diesel-electric provides flexibility for future electric conversion	At Vessel Design
1.b.	Provide parking spaces at both landings to accommodate dry dock times as well as peak walk-on commuters.	Parking expansion on Gooseberry Point as private property becomes available.	Long-term
1.c.	Provide an alternative location on Gooseberry Point for the current landing site.	Lummi Nation Marina site provides similar service frequency and LOS. Other sites evaluated did not maintain the desired LOS.	Long-term
1.d.	Build and maintain all infrastructures to accommodate the 100-year sea level rise prediction by NOAA.	Include in terminal design standards.	Long-term / At Terminal Design
2.b.	*Ferry System Action Plan will provide:*		
i.	Quantifiable measurements for the adopted LOS, e.g. Volume/Capacity and no more than two boat wait times as measured during weekday peak periods.	• 34-car vessel is anticipated to provide LOS of max. two boat wait during peak weekday periods. • Measure LOS through tracking capacity and vehicles left behind to monitor vehicle wait times.	• Short-term • Short-term
ii.	Specific recommendations for service facilities to include but not limited to: restrooms, off-ferry ticketing kiosk, parking area security.	• Ticket-vending machines or online ticketing • ADA restrooms on Lummi Island • Parking area expansion on Gooseberry Point	• Short-term • Short-term • Long-term
iii.	Preliminary estimated costs to complete the improvements for the adopted LOS.	• Up to $30 million • Up to $37 million	• Short-term • Long-term
iv.	Preliminary alternatives in funding the necessary improvements.	• Ferry District • Initiate CRAB Funding • Apply for grants • Plan for vessel replacement surcharge	• Short-term • Short-term • Short-term and Long-term • Short-term

Project Overview

With the Whatcom Chief and Gooseberry Point terminal infrastructure approaching the end of their useful lives, the Lummi Island Ferry Advisory Committee (LIFAC) was directed to prepare a Level of Service (LOS) Action Plan that will act as the guiding document for replacement of the Whatcom Chief and other capital asset improvements. This report provides findings and recommendations from the LOS Alternatives Analysis to support LIFAC's LOS Action Plan.

Purpose

The LOS Alternatives Analysis was conducted to provide relevant information and recommendations to inform development of the LIFAC LOS Action Plan. The recommendations fully considered Whatcom County Council Resolution 2017-012.

Approach

The LOS Alternatives Analysis included the following tasks:

- Reviewing and summarizing existing conditions including previous studies, service delivery, existing vessel characteristics, infrastructure and future upland development plans.
- Completing a ridership demand forecast.
- Establishing an existing LOS standard and comparing the existing LOS standard with potential vessel capacity options.
- Developing vessel characteristics for a replacement vessel on the Lummi Island route.
- Evaluating terminal improvement alternatives.
- Assessing potential funding sources.
- Conducting public outreach and community engagement throughout the study.

WCC Resolution 2017-012 Exhibit A

LIFAC developed the following goals and LOS Action Plan Lummi Island Ferry System which were adopted by the Whatcom County Council (WCC) as part of Resolution 2017-012:

- Provide a vessel that will:
  - Continue to meet and comply with current U.S. Coast Guard safety standards.
  - Comply with the Americans with Disabilities Act (ADA).
  - Accommodate legal loads of vehicles per Washington State Commercial Vehicle Guide.
  - Balance capacity against operating costs (fuel, personnel, etc.) to ensure affordable fares over the long run, including needs-based fares.
  - Optimize vehicle demand, deck space and trip frequency to minimize wait times.
  - Accommodate all walk-on passengers during typical peak times.
  - To the greatest extent possible, provide a carbon neutral vessel.
- Provide parking spaces at both landings to accommodate dry dock times as well as peak walk-on commuters.
- Provide an alternative location on Gooseberry Point for the current landing site.
- Build and maintain all infrastructures to accommodate the 100-year sea level rise prediction by NOAA.

The LOS Action Plan will include:

- Quantifiable measurements for the adopted LOS, e.g. Volume/Capacity and no more than two boat wait times as measured during weekday peak periods.
- Specific recommendations for service facilities to include but not limited to: restrooms, off-ferry ticketing kiosk, parking area security.
- Preliminary estimated costs to complete the improvements for the adopted LOS.
- Preliminary alternatives in funding the necessary improvements.

This report presents a summary of findings from the analyses conducted, as well as recommendations for LIFAC and the Whatcom County Council to support the desired and sustainable long-term LOS of the Lummi Island Ferry System. Memos from each task presenting the full analysis are included as appendices to this report.

Summary of Technical Analysis

The following sections present the findings from the technical analyses completed as part of the LOS Alternatives Analysis, including summarizing existing conditions, developing a ridership demand forecast, preparing a LOS assessment, defining vessel characteristics, presenting terminal options, identifying funding options, outlining service alternatives and conducting public outreach.

Existing Conditions

To establish a thorough understanding of the existing conditions of the Lummi Island Ferry System, a detailed review was conducted of: previous studies, current service delivery (schedule, fares, governance, and costs), existing vessel and terminal conditions, and planned development activities in the vicinity of the terminals. The complete report can be found in Appendix A – Existing Conditions. Based on this review, the following key factors or considerations were established as foundational components of the LOS Alternatives Analysis:

- Whatcom County Public Works operates the Lummi Island Ferry 365 days per year, 7 days per week. The transit time is approximately 5 minutes. Service is provided every 20-40 minutes (depending on the time of day) between 5:40 a.m. and 12:00 a.m. on weekdays and hourly service is provided between 7:00 a.m. and 12:00 a.m. on weekends.
- The MV WHATCOM CHIEF has a capacity of 100 passengers and 16-20 vehicles, was constructed in 1962, and is the only vessel that provides service to Lummi Island. Due to the vessel's age, the annual dry dock and maintenance costs have increased over time. To accomplish this work, the vessel is typically taken out of service for a period of 2 to 3 weeks annually each fall; during this time, service is provided using a contracted passenger-only ferry capable of berthing in the existing vessel slip. Limited parking availability during dry dock creates challenges for passengers.
- Operating costs are met through fares, state subsidies, and the Public Works Road Fund. The majority of capital investments are funded through the Public Works Road Fund. The Whatcom County Code (WCC 10.34.030) establishes a farebox recovery rate of 55 percent of operating costs.
- Vessel crews collect fares aboard the vessel during the five-minute crossing. Passengers can pay with cash, credit card or multi-ride paper punchcard. It can be difficult to complete the fare collection process during peak periods and when there are high levels of credit card and cash payments.
- Passengers have reported experiencing a three- to four-boat wait during the peak summer months.
- The existing Gooseberry Point ferry terminal area is leased from the Lummi Nation, possesses limited passenger amenities, and has limited parking and security. The current lease will expire in 2046 and is not expected to be renewed. The Lummi Nation has developed plans for developing a marina where the Gooseberry Point ferry terminal currently exists. It is anticipated in the next 10 years the Gooseberry Point ferry terminal will require structural repairs or replacement of the timber trestle.
- The Lummi Island ferry terminal timber dolphins, breakwater, and terminal building have reached the end of their useful life and need to be replaced. Whatcom County is currently investigating options for an interim solution for the timber dolphins until the design of the replacement vessel is approved.
- The terminals are not compliant with ADA accessibility standards and there are administrative load restrictions at both terminals that restrict some legal vehicle loads from crossing.
- Based on zoning restrictions, the 2009 Subarea Plan suggests the peak buildout population could be around 3,000 residents (compared to 1,015 in 2016).

Ridership Forecast

Based on historic ridership from 2007-2017 and fare data from 2004-2017 as well as regional population projections, a ridership demand model was developed to forecast anticipated ferry use. The model developed was unconstrained by capacity or schedule frequency, meaning the hourly demand will not change with a change in vessel capacity or changes in service schedules.

The demand model found that pedestrian/passenger ridership is forecast to increase nearly 40% for passengers/pedestrians and about 16% for vehicles by 2040. See Appendix B – Ridership and Growth Projections for complete findings and discussion of analysis. Key findings from this analysis include:

» Ridership on the Lummi Island Ferry had generally declined from 2007 to 2013, but has been rebounding since 2014.

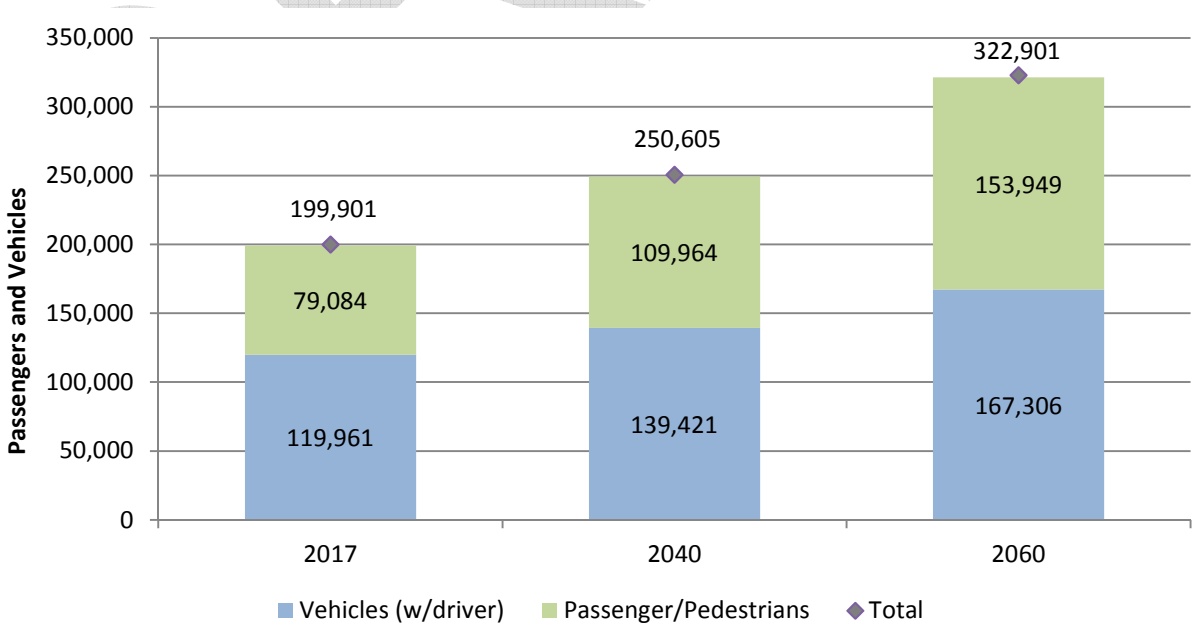
» Following strong population growth through the end of 1990s, the population of Lummi Island has continued to see a slow increase since 2000. Additionally, the population has been aging as the result of longtime residents getting older and migration to the island consisting of additional middle-aged individuals and retirees.

» Fares have increased considerably since 2004. The demographic shifts and fare policy changes have driven ridership patterns. While fare elasticities were developed based on fare changes from 2004, the relationship between fares and population dynamics were not included as part of this study.

» Statistical models based on total Lummi Island population, working age Lummi Island population, and historic fares were used to generate unconstrained ridership forecasts to 2040. Using a projected population (0.5% growth per year) and constant fares in 2017 dollars[1], pedestrian/passenger ridership is forecast to grow 1.74% per year and vehicles (with driver) at 0.87% annually to 2040 (from a 2016 base).

» To plan for a vessel with an estimated lifespan of 40 years, the forecast ridership was estimated to 2,060 using the growth rate from the 2020-2040 time period based on the model. Figure 1 illustrates the total ridership for passengers/pedestrians and vehicles for 2017, forecast for 2040 and estimated for 2060.

Figure 1: 2017, Forecast 2040 and Estimated 2060 Ridership



LOS – Existing and Projected

LOS is a function of the ferry system's capacity and service frequency and the wait time is dependent on how many vehicles the ferry system can move over a given time period. Vessel capacity and configuration impact how many cars can be carried at once. The frequency of sailings depends on the dwell time (time required to load/unload the vessel), transit time, and the service schedule. A ferry system can meet demand by either having bigger boats and less frequent service due to increased dwell time or having smaller boats with less capacity to provide more frequent service. There is a limit on the frequency, so upsizing the vessel is the best way to improved/optimize service level delivery.

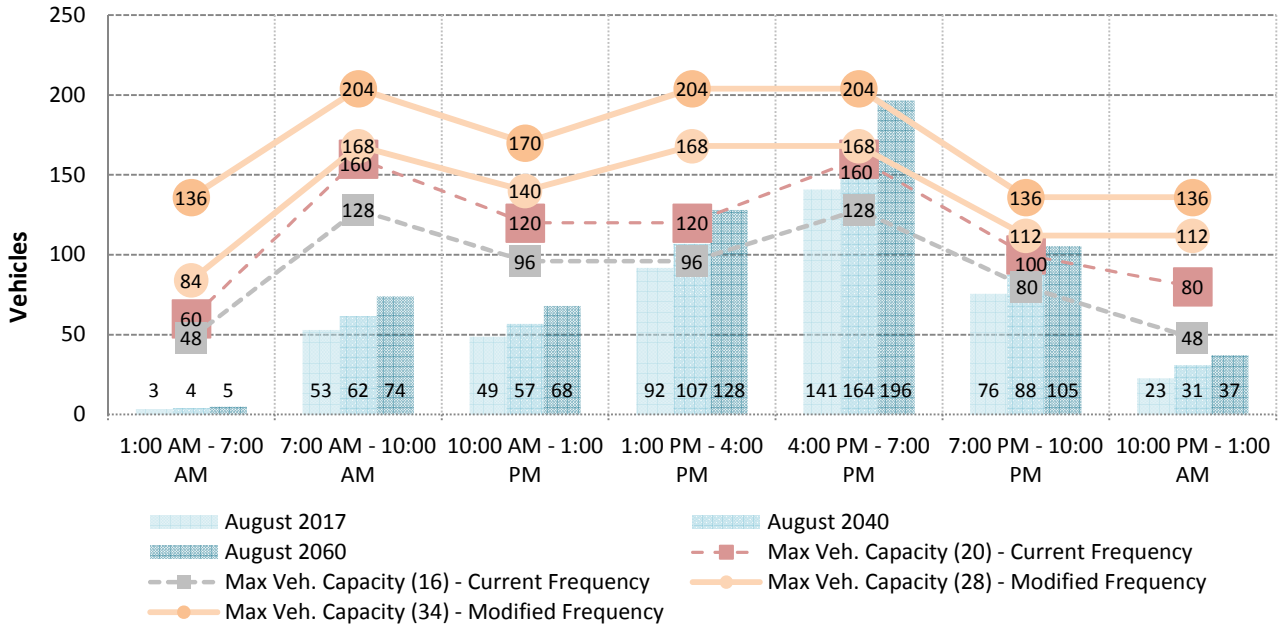
The current LOS serves as a baseline to compare replacement vessel options and their associated projected LOS, and to compare the projected LOS to what passengers currently experience. On the February 2018 passenger survey, the majority of respondents indicated that they experience longer than two-boat waits in the summer months. To compare what passengers experience to different vessel capacity, the LOS assessment reviewed current vessel capacity, frequency, and ridership demand. Next, the assessment included a comparison of projected ridership, service frequencies, and potential vessel capacity options. The assumptions and findings of this assessment are described below:

- **Vessel Capacity:** By applying an automobile equivalent (AEQ)[1] design standard, the ferry (Whatcom Chief) can carry an average maximum of 16 vehicles and 97 passengers per sailing. To keep operating costs low and maintaining comparable service frequency, the vessel capacities reviewed in this assessment include a 20-, 28-, and 34-car vessel.
- **Frequency:** Although sailings are scheduled every 20 minutes during weekday peak ridership periods, that schedule is challenging to maintain over a long period due to crew breaks and especially when dwell time is increased by heavy vehicle or pedestrian volumes. For the purposes of comparing vessel and LOS options during the peak period, the current sailing frequency was assumed to be eight sailings in a three-hour window or the equivalent of departures every 22.5 minutes on average. The 20-car vessel with straight-lane loading/unloading is the maximum capacity to maintain the current sailing frequency. While all options would maintain a similar crossing time as the Whatcom Chief (5 minutes), the increased time required for loading and unloading more vehicles for the 28-car and 34-car vessel alternatives increases the time in the dock and results in a 30-minute roundtrip in peak periods.
- **Demand:** To establish vehicle demand, current average weekday and weekend vehicle ridership was considered as well as the projected vehicle ridership for 2040 and estimated for 2060 from Gooseberry Point to Lummi Island. The current and projected average vehicle demand was compared to capacity and frequency over a three-hour service window for weekdays to assess how well the existing vessel and alternative vessel options perform. Pedestrian demand can be accommodated by all vessel sizes; therefore, pedestrian passenger demand was not a governing factor in the LOS assessment.

[1] AEQ is an industry-wide vehicle footprint based on Washington State Ferries, Alaska Marine Highways, North Carolina Department of Transportation and Texas Department of Transportation design standards to calculate vessel deck space.

In reviewing average weekday August[2] ridership for 2017, projected for 2040 and estimated for 2060 over a three-hour service window, the current vessel does not accommodate demand in the 4:00 to 7:00 p.m. period. This condition would become worse in 2040 and 2060. Although the 20-car vessel and 28-car vessels are projected to meet the current average peak demand, they would not meet projected 2040 demand. The 34-car capacity vessel would meet average demand throughout the year into 2060. Figure 2 presents the 2017, 2040, and 2060 average weekday ridership demand along with the vessel capacities.

Figure 2: 2017, 2040, 2060 Average August Weekday Vehicle Ridership Demand and Vessel Capacity Options



Based on the projected ridership and an evaluation of LOS compared to current passenger experiences, we recommend the Whatcom Chief be replaced with a 34-car vessel. This vessel size is anticipated to meet the average demand projected for 2040 and estimated for 2060 for weekdays.

Measuring and Monitoring LOS

Since LOS is a measure of demand and service capacity, we recommend tracking the service capacity on each sailing during the peak weekday period (4:00 p.m. to 7:00 p.m.) and the number of vehicles carried on each sailing. We also recommend tracking the number of vehicles in the queue over that service period. By tracking these numbers, the LOS (demand vs. capacity) can be calculated and monitored for the peak weekday period.

Recommendation

- Count the number of vehicles carried on each sailing and vehicles in the queue during the weekday peak period.

Recommendation

- Track performance metrics in both sailing directions, including percent capacity, on-time performance, and number of vehicles left behind.

[2] August typically has the highest ridership volumes and was used to forecast peak periods.

Achieving the desired LOS can be monitored through tracking performance measures on a weekly, monthly, and/or yearly basis. By tracking performance metrics, Whatcom County Public Works can observe trends and make operational adjustments if needed.

The following performance metrics can be used to measuring LOS:

» Percent capacity – this would include counting how many vehicles and passengers boarded the vessel in each sailing. This would indicate when the vessel is approaching capacity.

» On-time performance – establishing an on-time performance metric is an important strategy for monitoring service performance. A number of factors can contribute to service performance such as loading/unloading, terminal staging and transit time transit, and that these operations are consistently occurring within their allotted time.

» Number of vehicles left behind – this would involve counting the vehicles left behind on each sailing. This can be achieved by having shoreside staff or a crew member count the vehicles, monitoring the queue with cameras, or traffic counting technology to track when vehicles arrive in the queue.

Vessel Characteristics

To keep operating costs low and maintain high service frequency, vessel alternatives were limited to a maximum capacity of 34 vehicles. Three alternative vessel sizes, with capacities of 20, 28, and 34 vehicles were developed. Vessel characteristics identified in this analysis for each of the vessel options will lead to the preliminary design of a replacement vessel. For each vessel size, estimates of overall vessel dimensions, weight, and configurations were presented. See Appendix C – Vessel Alternatives Analysis for full discussion of vessel alternatives.

The new vessel alternatives have the following advantages over the Whatcom Chief:

» Decreased annual maintenance costs

» Increased efficiency by faster loading and unloading due to straight lane loading

» Increased capacity

Recommendation:

- 34-car, hybrid diesel-electric vessel is the recommended alternative to provide sufficient capacity to meet forecast demand and be potentially converted to electric as technology improves.

Propulsion Power Options

Based on the vessel sizes and the Lummi Island Ferry route conditions, this study reviewed conventional diesel, hybrid diesel-electric, and all-electric fuel propulsion systems. Because the vessel overnights on Lummi Island where there is limited power supply, the all-electric vessel is not recommended. However, the hybrid diesel-electric option would provide the opportunity for a conversion to all-electric in the future.

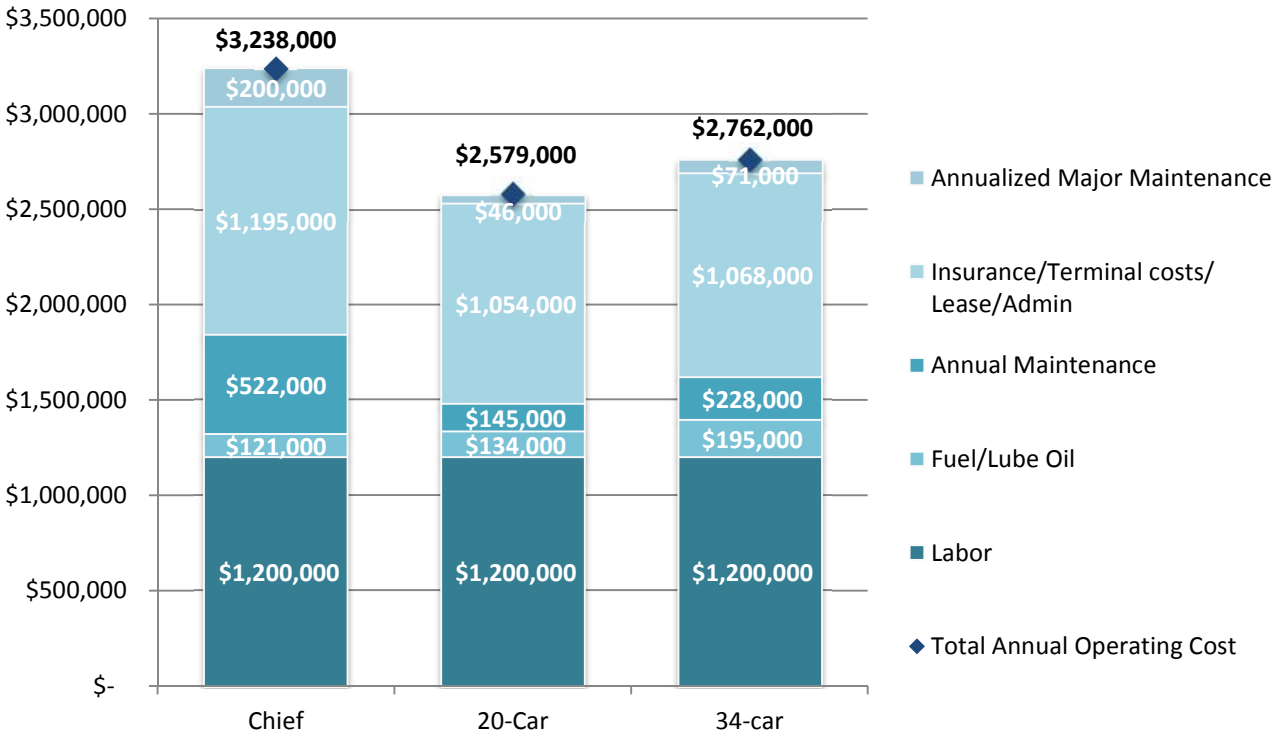
ROM Costs

The new vessel is estimated to cost from $9 million to $16 million. Actual cost will depend on the size and configuration of the vessel once a design is developed.

Operating costs were estimated for the vessel options. Any new vessel is anticipated to have lower operating costs based on the decreased maintenance. The difference in operating costs between a 20-car vessel and a 34-car vessel is estimated to be under $200,000 annually. The difference in operating costs associated with the 20-car vessel and 34-car vessel and the Whatcom Chief are about $475,000 to $650,000, respectively.

Figure 3 illustrates the current operating costs of the Whatcom Chief as well as the estimated operating costs for the 20-car vessel and 34-car vessel.

Figure 3: Current Annual System Operating Costs and Estimated System Operating Costs using the Existing 20-car and 34-car Vessels[3]



Terminal Options

Terminal and operational improvements were considered for the Gooseberry Point ferry terminal and the Lummi Island ferry terminal. The following sections summarize the operational improvements and terminal options considered as well as ROM cost estimates for these options. See Appendix E for more detail on terminal options.

Operational Improvements

Whatcom County currently collects fares while in transit. During periods of heavy traffic, this can slow service as the crew has to hold traffic from offloading while they complete fare collection. Moving the fare collection off the vessel by using pre-purchased tickets online and installing ticket vending machines can reduce the time for fare collection.

Recommendations for Operational Improvements:

- Provide online ticket purchase and on-site ticket vending machines to move fare collection off of the vessel.
- Install cameras for passengers to view the queue and the captain to monitor traffic.

[3] Costs estimates are provided for the hybrid diesel-electric options and have been rounded to the nearest thousand.

Additionally, passengers have expressed interest in the ability to view the ferry queue via live camera feeds in order to plan their travel around busy periods. Cameras would also provide a way to count the vehicles left in the queue and provide the captain with a view of the queue.

Gooseberry Point

Based on the findings of the 2010 Gooseberry Point Ferry Dock Relocation Feasibility Study and the continued interest to keep operating cost low and provide frequent service, the Gooseberry Point ferry terminal is recommended to remain near its current location to maintain a similar LOS as the Whatcom Chief. Site alternatives reviewed included remaining in the current location at Gooseberry Point and relocating west of the current location within the proposed Lummi Nation marina. The study also outlined the potential for future upland expansion of queuing and parking on up to eight private parcels northwest of the existing marina. Figure 4 indicates where these three locations are located on Gooseberry Point.

Figure 4: Gooseberry Point Terminal Improvement Option Locations

Relocating the terminal will require an extensive environmental process involving significant time to complete. Therefore, we recommend a phased approach to development that includes structurally supporting the existing trestle structure in the next 10 years and beginning the environmental review process for relocating the terminal in the future. The environmental documents would include relocating the terminal to the Lummi Nation Marina site and potential upland expansion as properties become available. Moving forward with the terminal relocation would allow for dual-lane loading/unloading and reduce the time required to load and unload the vessel. While future expansion has the most significant challenges in acquiring private property as well as regulatory requirements, this future alternative would provide the most queuing and dedicated ferry parking off Haxton Way to improve safety, and it provides the maximum flexibility for sustainability of the ferry system.

Lummi Island Ferry Terminal

Proposed improvements at the Lummi Island ferry terminal include expanding the queuing capacity at the terminal, expanding the terminal building to include ADA-compliant restrooms, and adding a passenger-only ferry float for use during emergencies and when the vehicle ferry is out of service. To accommodate a larger

vessel, the Lummi Island ferry terminal will require minor modifications to the existing structures. While major marine structure improvements are not proposed in this study, we recommend that when major repairs are necessary in the future, the work include widening the Lummi Island transfer span to accommodate dual-lane loading and unloading to decrease dwell time.

Recommendations to Terminal Improvements Short-term:

- Complete in-water modifications to the terminals necessary for the new vessel ($7-9 M)
- Complete structural improvements to the Gooseberry Point trestle ($4.5 M)
- Initiate environmental process for Gooseberry Point terminal relocation
- Install cameras and TVMs
- Complete Lummi Island upland improvements ($1.5 M)

Recommendations to Terminal Improvements Long-term:

- Install emergency passenger-only ferry float ($1 M)
- Relocate Gooseberry Point terminal ($26.5 M)
- Acquire properties as they become available on Gooseberry Point for upland expansion ($9.5 M)

Financial Forecast and Funding

A ten-year financial forecast was prepared incorporating replacement of the Chief Whatcom with a 34-car vessel and the recommended terminal improvements.

Operating Cost Funding

Taking into account the Whatcom County Road Fund subsidy and the State Deficit Reimbursement fund allocation and without any increase in fares, the operating program shows a modest net operating income gain through 2021 with farebox recovery declining overtime if fares are not increased to maintain the pace of inflation. With an inflation level fare increase, the operating program shows a positive net operating income throughout the planning period. In 2026, when the replacement vessel comes online, operating expenses drop reflecting the lower cost of maintenance of the new vessel. The reduction in maintenance is offset slightly by the increased fuel consumption of the larger vessel. See Appendix F for the detailed financial forecast.

Because operating costs increase each year with inflation, we recommend that fares be periodically adjusted to account for this increase to maintain the required farebox recovery level. Another option to increase farebox recovery without increasing fares for Lummi Island residents would be to apply a surcharge on non-prepaid fares.

Recommendations for Operating Cost Funding

- Increase fares periodically with inflation.

Recommendations for Capital Cost Funding

- Phase improvements over time to build a diverse funding portfolio.
- Implement a ferry district to increase grant opportunities.
- Implement a fare surcharge for recapitalization of a future ferry.

Capital Cost Funding

Vessel replacement and terminal improvements require significant capital investments. Investment costs, for the vessel beginning in 2024 and terminal improvements beginning in 2026, create significant unmet funding needs. Phasing the improvements over time will allow Whatcom County to build a complete funding portfolio leveraging a variety of funding sources and mechanisms. Capital projects can be funded in a variety of ways, often through a combination of funding mechanisms. The complete funding portfolio will likely draw on a number of local, state and federal financing options.

When considering grant options, it is important to consider that various grant sources may cover part of the cost, but grants must be matched with local funds typically in the range of 20 to 50%. For some grant programs, state funds can be used as matching funds for federal grants. Additionally, competition for grant funds can be stiff and it is likely that no single grant source will cover all of the costs.

Appendix F provides a matrix of potential funding options, eligibility, and a funding outlook for the following options:

Local Funds

- County Bond Issuance
- Special District Levies (such as Ferry District, Local Improvement District, Road Improvement District)
- Road fund
- General appropriation
- Vessel replacement surcharge

Competitive Grants

- State
  - State CRAB Funding
  - Washington State Department of Ecology Volkswagen Settlement Funds
- Federal
  - Federal grants (such as BUILD)
  - Federal Highway Administration grants (such as Ferry Boat Program, Surface Transportation Block Grant Program)
  - Bridge Replacement Advisory Committee (BRAC) funds

Public Outreach

As the desired LOS is driven by what experience the ferry passengers would like to have, receiving community input was necessary to conduct the LOS Alternatives Analysis. Community involvement and public outreach was conducted throughout this study. Outreach efforts included:

- Monthly LIFAC meetings where members provided input on the LOS Alternatives Analysis and received consultant updates. In addition, LIFAC held open public work-sessions to have focused discussions on the LOS Alternatives Analysis and manage the process to work toward a recommendation.
- Three public meetings were conducted during this study:
  - **November 16, 2017: Ferry System Improvements Input Gathering** with round table discussions addressing LIFAC questions to prioritize ferry system improvements.
  - **March 14, 2018: Existing and Future LOS and Alternatives Overview** included a discussion of the existing LOS, and how it compares to other vessel capacities along with projected ridership.
  - **May 22, 2018: Options and Costs** outlined the terminal and vessel options, ROM costs, funding options, and projected operating costs.
- LIFAC conducted two public surveys in February 2018 and May 2018 to understand how people use the ferry and which proposed ferry system improvements they would like to prioritize.
- Public comments were collected throughout the project.

Recommendations and Next Steps

Based on the analysis conducted and the input received from the community, we recommend the following vessel characteristics, terminal improvements, implementation schedule and operational improvements to achieve the desired and sustainable LOS in the long term as well as next steps for implementation. Additionally, we have included a summary of how these recommendations meet the goals of Resolution 2017-012.

Recommendations

Measuring and Monitoring LOS

» To measure the LOS, we recommend calculating the maximum service capacity (cars per sailing and sailings in service period), as well as the amount of vehicles carried in the service period. Performance metrics like percent capacity, on-time performance, and number of vehicles left behind can be documented and tracked on a weekly, monthly, and/or annual basis to inform operations and planning.

Vessels

» Based on the projected ridership and evaluation of LOS compared to what passengers experience today, we recommend the Whatcom Chief be replaced with a 34-car vessel. This vessel size is anticipated to accommodate the average demand projected for 2040 and estimated for 2060 for weekdays.

» The vessel design should incorporate a hybrid diesel-electric fuel propulsion system to reduce emissions and fuel consumption as well as streamline conversion to all-electric propulsion in the future.

» Up to $15 M to design and build.

Terminal Improvements

» Short-term (over next 10 years):
- Complete in-water modifications to the terminals necessary for the new vessel (up to $9 M)
- Complete short-term structural improvements to the Gooseberry Point trestle (up to $4.5 M)
- Initiate environmental process for Gooseberry Point terminal relocation
- Install cameras as well as TVMs and/or online ticketing systems
- Complete Lummi Island upland improvements ($1.5 M)

» Long-term (over next 20-30 years):
- Install emergency passenger-only ferry float ($1 M)
- Relocate Gooseberry Point terminal ($26.5 M)
- Acquire properties as they become available on Gooseberry Point for upland expansion ($9 M)

Operational Improvements

» Passenger and bicycle throughput time can be decreased by providing a separated lane, allowing them to load and unload simultaneously with vehicles. If this option is not feasible, allowing passengers and bicycles to queue as short a distance as possible from where they will load on the vessel will reduce load/unload time.

» Consider congestion pricing that increases the full fare during peak periods (such as peak seasons or peak times of day). This pricing structure can shift passengers' travel patterns to travel at less congested time periods of the day, thus saving time and money.

» Implement an online and on-site ticketing system to speed up the onboard fare collection process and reduce the risk of holding the ferry during busy sailings while fares are collected.

» Provide a live camera feed of the queuing lanes to give customers an idea of anticipated wait times.

Funding Approach

» Implement a vessel replacement surcharge.

» Increase fares periodically at the rate of inflation to achieve the specified farebox recovery of 55%.

» Seek out all grant funding opportunities for capital projects.

» Institute a ferry district to expand dedicated ferry revenues and to become eligible for greater levels of grant funding from CRAB.

Next Steps

1. Institute a ferry district and plan for future vessel replacement surcharge.
2. Install cameras to view the ferry queue and provide a live feed for passengers to monitor the queue.
3. Determine an online ticketing approach and/or ticket vending machine option to purchase and install.
4. Begin preliminary design of the vessel.
5. Once the vessel geometry and specifications are designed, design the marine structure modifications required to fit the new vessel in the existing terminals.
6. Initiate the CRAB funding process by requesting a call for projects in spring 2021.

Aligning Recommendations with Resolution 2017-012

Each recommendation listed above addresses goals established by LIFAC and elements of the LIFAC Action Plan provided in Resolution 2017-012. Table 1 identifies each goal of the resolution and components of the Action Plan, the recommendation that addresses that goal and a timeframe for implementation.

Table 1: Resolution 2017-012 Goals, Recommendations and Timeframe for Implementation

	Goals of the Lummi Island LOS	Recommendation	Timeframe
1.a.	*Provide a vessel that will:*		
viii.	Continue to meet and comply with current U.S. Coast Guard safety standards.	Include in vessel design standards.	At Vessel Design
ix.	Comply with the Americans with Disabilities Act (ADA).	Include in vessel design standards.	At Vessel Design
x.	Accommodate legal loads of vehicles per Washington State Commercial Vehicle Guide.	Part of Gooseberry Point terminal relocation.	Long-term / At Terminal Design
xi.	Balance capacity against operating costs (fuel, personnel, etc.) to ensure affordable fares over the long run, including needs-based fares.	34-car vessel has lowest risk of increasing crew size. Operating costs lower than the Chief.	Short-term
xii.	Optimize vehicle demand, deck space and trip frequency to minimize wait times.	34-car vessel	Short-term
xiii.	Accommodate all walk-on passengers during typical peak times.	Include in vessel design.	At Vessel Design
xiv.	To the greatest extent possible, provide a carbon neutral vessel.	Hybrid diesel-electric provides flexibility for future electric conversion	At Vessel Design

	Goals of the Lummi Island LOS	Recommendation	Timeframe
1.b.	Provide parking spaces at both landings to accommodate dry dock times as well as peak walk-on commuters.	Parking expansion on Gooseberry Point as private property becomes available.	Long-term
1.c.	Provide an alternative location on Gooseberry Point for the current landing site.	Lummi Nation Marina site provides similar service frequency and LOS. Other sites evaluated did not maintain the desired LOS.	Long-term
1.d.	Build and maintain all infrastructures to accommodate the 100-year sea level rise prediction by NOAA.	Include in terminal design standards.	Long-term / At Terminal Design
2.b.	*Ferry System Action Plan will provide:*		
v.	Quantifiable measurements for the adopted LOS, e.g. Volume/Capacity and no more than two boat wait times as measured during weekday peak periods.	• 34-car vessel is anticipated to provide LOS of no more than two boat wait during peak weekday periods. • Measure LOS through tracking capacity and vehicles left behind to monitor vehicle wait times.	• Short-term • Short-term
vi.	Specific recommendations for service facilities to include but not limited to: restrooms, off-ferry ticketing kiosk, parking area security.	• Ticket-vending machines or online ticketing • ADA restrooms on Lummi Island • Parking area expansion on Gooseberry Point	• Short-term • Short-term • Long-term
vii.	Preliminary estimated costs to complete the improvements for the adopted LOS.	• Up to $30 million • Up to $37 million	• Short-term • Long-term
viii.	Preliminary alternatives in funding the necessary improvements.	• Ferry District • Initiate CRAB Funding • Apply for grants • Plan for vessel replacement surcharge	• Short-term • Short-term • Short-term and Long-term • Short-term