November 29, 2017

To: Matthew Lankowski
Will Moon
Glosten

From: Gary A. Norris, PE, PTOE
DN Traffic Consultants, Inc.

Subject: Guemes Island Ferry
Re: Land Facilities Impact Study

Introduction

The following report summarizes the process, findings, and conclusions of the Land Facilities Impact Study prepared for the Guemes Island Ferry located in Anacortes, Washington. The scope of work was stated and approved in a contract dated October 2, 2017 between Glosten and DN Traffic Consultants, Inc.

Key Findings

- 2060 peak hour queuing will result in an average queue of 62.9 vehicles at the Anacortes Terminal and 16.1 vehicles at the Guemes Island Terminal; and,
- An additional 523 feet of queue storage will be required at the Anacortes Terminal to accommodate the 2060 peak hour demand queue; and
- No additional queue storage is required at the Guemes Island Terminal; and,
- To accommodate the 2060 peak parking demand, an additional 59 parking stalls will be required at the Anacortes Terminal and 96 stalls at the Guemes Island Terminal; and,
- Existing "walk-on" passenger waiting area in the Anacortes Terminal is adequate to accommodate future 2060 demand. There does not appear to be any defined waiting areas for "walk-ons" at the Guemes Island Terminal; and
- 2060 parking demand at the Anacortes terminal will require the construction of new parking facilities. Construction of a new parking lot is estimated to cost approximately $1.92 million to provide 59 stalls. An interim solution would be the reconstruction and modification of the existing parking lots which could provide up to 42 additional stalls at a cost of approximately $138,000; and,
- 2060 parking demand at the Guemes Island terminal will require an additional 96 stalls at a cost of $1.3-million (2017 dollars). An interim solution to add 20 stalls, for a total of 100, and improve the existing lot will require $650,000; and,
- The existing ticketing operation is a detriment to efficient ferry loading operations. A new approach to ticketing should be adopted by the County; and,
- Staging of large vehicles create significant delay in the ferry loading process. Skagit County should consider restriping I Avenue to create an additional storage lane for large vehicles. Alternatively, a

reservation process could help address staging issues through the scheduling of large vehicle arrivals.

Recommended Improvements. (Table 4)

Terminal	Issue	Proposed Improvement	Estimated Cost
Anacortes	2060 Queue Storage	Extend existing queue storage lane – approx. 523 feet.	$3,000
	Ticketing Delay	Install ticket kiosk at the head of the storage lane (2) and in the terminal (1)	$100,000
	Staging Oversize Vehicles	Install a separate queuing lane for large vehicles	$5,000
	2060 Parking Shortage	Low Cost – Reconstruct Lot 4 to add 12 stalls and Reconfigure Lot 5 to add 30 stalls	$138,000
Guemes Island	Parking	Low Cost Interim Solution- Reconfigure and formalize existing lot to add 20 stalls for a total of 100	$650,000
Total			**$896,000**

Scope of Work

The scope of work includes the following elements:

1) Vehicular and Pedestrian Service Demand and Analysis

- Estimate future 2040 Peak Service Queuing. Using the estimated future service demand, the Consultant will project peak service queueing demand. The queuing demand will be based on the M/ M/ C queuing model. Arrival and service rates will be based on existing service rates and the existing ticketing technology. An alternative queue estimate will be based on service rates updated to reflect anticipated improvements to the existing ticketing technology. Resulting queue estimates determined from the queuing model, will be compared against existing queuing capabilities on the terminal site. The analysis will recognize the increase capacity of the ferry in the queue calculations. Necessary increases in queuing supply will be identified and documented in the deliverable. To verify the results, existing terminal queuing will be documented from the onsite field inventory study.
- Estimate future 2040 Peak Service Parking. Using the estimated future service demand, the Consultant will estimate future parking stall requirements. The estimate will be based on current parking demand consistent with the current service.
- Estimate future 2040 Peak Service Passenger Waiting Area Demand. Using the estimated future service demand, the Consultant will project ferry pedestrian volumes and the required waiting area to serve the demand. The estimate will be mitigated by area provided to serve the current demand. The demand analysis will consider possible adjustments in the mode split resulting in a greater percentage of pedestrian and bicycle traffic.
- Identify Future Facility Improvements. Using the foregoing analysis, the Consultant will document any recommended facility expansion required to serve the 2040 ferry service demand. Potential facility expansion includes queueing, parking, and pedestrian waiting areas. For each improvement, the Consultant will provide a planning level cost estimate based on current cost estimates for similar facilities.

2) Ticketing System Analysis

- Evaluate Existing Ferry Ticketing Operation. The Consultant will evaluate the existing ticketing technology and operation. The evaluation will include a determination of actual ticket service times per vehicle for the Anacortes and Guemes Island and compare to advertised service rates of new technology. The Consultant will evaluate if an upgrade in technology will provide a significant benefit to the overall service.
- Evaluate Alternative Ticketing Technologies. The Consultant will conduct an Internet search of alternative ticketing technologies to address the needs of the Guemes Island Ferry Operation. The search will focus on identifying technologies which provide service consistent with the future Guemes Island ferry demand. The Consultant will identify application issues, equipment costs, and equipment reliability. The result will be a recommended upgrade technology consistent with the needs and benefits required.
- Evaluate the ticketing system currently used by the Madeline Island and other ferry systems such as WSF, King County, and Pierce county. The consultant will conduct an Internet search of other ticketing systems.

3) Analysis of How to Improve the System Without Infrastructure

- Provide a qualitative discussion of how to improve the system without substantially changing the existing infrastructure. The focus will be to figure out how to make the existing system work by thinking outside the box. The client has suggested they would welcome suggestions that are reasonable to implement, e.g. sell tickets on the vessel, charging for parking, charging for peak travel times to level out flow, providing shuttle service. The client will provide data which shows that ticket prices and parking spots are somewhat correlated with ferry ridership.

Analysis

The following discussion summarizes the process, findings and conclusions of the research, studies, and analysis performed to address each of the scope items as follows:

Vehicle and Pedestrian Service Demand Analysis

Process

The process used to prepare an analysis of the impacts of the 2060 ferry service on vehicular queuing and pedestrian demand included a forecast of 2060 ferry ridership and 2060 peak hour ferry service demand (provided by Glosten) and a field study to document existing ferry service rates, parking demand, and ticketing operations.

2060 Ferry Volume Forecast

Glosten provided a projected 2060 ferry service demand which was used to determine the size and capacity of the proposed ferry.[1] The ferry service demand was based on 2060 population forecasts rather than 2040 forecasts as stated in this Consultant's scope of work. The 2040 forecast scenario was selected by DN Traffic as Federal Highways (FHWA) typically uses the 20-year forecast for funding transportation improvements. Glosten used the 40-year 2060 forecast scenario based on the design life of the ferry. For the purposes of this analysis, the 40-year 2060 forecast, will be used in this discussion.

Estimate Future 2060 Peak Service Queuing

Queuing is estimated based on the number of servers, the service rate, and the arrival rate. For this analysis, the server is the ferry, the service rate is the number of vehicles that are served per hour, and

[1] Guemes Island Ferry Replacement VEHICLE CAPACITY STUDY; Glosten, October 20, 2017.

the arrival rate is the hourly rate at which the vehicles desiring to ride the ferry arrive at the terminal. For the Guemes Island ferry study, the number of servers is limited to a single ferry, the demand is based on the 2060 ridership volume estimated by Glosten in its 2017 Vehicle Capacity Study.

Initially, in the absence of a forecasted 2060 peak hour demand volume, DN Traffic Consultants, Inc. prepared a forecast design volume based on the 2060 ridership forecasts provided by Glosten and historical peak hourly demand volume on a summer weekend. The result of this analysis yielded a forecast which exceeded the available hourly capacity of the future ferry service. To address this issue, Glosten subsequently prepared a 2060 design hourly volume for the Anacortes to Guemes Island and the Guemes Island to Anacortes service runs using the projected size of the vehicles served for each leg of the ferry service. The resultant 2060 peak hour demand provided by Glosten[2] is presented in Table 1.

Table 1. 2060 Peak Hour Demand Volumes

Route	Day	Time of Day	2060 Hourly Demand	Hourly Capacity
Anacortes to Guemes Island	Friday	1300 – 1400	57.5	58.4
		1400 – 1500	57.5	58.4
		1500 - 1600	57.5	58.4
		1600 – 1700	57.5	58.4
Guemes Island to Anacortes	Sunday	1100-1200	52.9	56
		1200-1300	52.9	56
		1300-1400	52.9	56
		1400 - 1500	52.9	56

In the updated analysis, Glosten indicated ferry service will provide one ferry with two (2) trips in each direction per hour throughout the day which is more aggressive than the current schedule[3].

As shown in Table 1, peak hour demand for the Anacortes to Guemes Island run is expected to occur on Friday between 1300 hours and 1700 hours or 1 PM to 5 PM with a demand volume of 57.5 vehicles per hour. For the Guemes Island to Anacortes run, the peak hour demand volume is expected to be 52.9 vehicles per hour between 1100 hours and 1600 hours, or 11 AM to 4 PM, on a Sunday afternoon. Using the vehicle dimensions of the service volume, it is estimated the hourly capacity for the Anacortes to Guemes Island run is 58.4 vehicles per hour whereas the capacity of the Guemes Island to Anacortes run is 56 vehicles per hour.

Queuing was determined using the M/M/C queuing model.

Estimate Future 2060 Peak Service Parking

A field study was conducted of the existing County owned parking facilities at the Anacortes and Guemes Island terminals on Friday, October 27, 2017 to observe existing parking demand. The process involved walking through each lot after the ferry was loaded to determine the parking demand at that time. Ferry patrons are permitted by Skagit County to park in these lots for up to 72 hours although there is no enforcement.

[2] Email from Matthew A. Lankowski, Glosten to Gary A. Norris, DN Traffic Consultants dated Monday, November 20, 2017.
[3] Ibid.

On the Anacortes side, there were five locations where vehicles were parked. First, there are three (3) "on street" stalls on the west side of the ferry access road, I Avenue (#1); secondly there are five (5) "handicapped" stalls on the south end of the terminal building on the west side of the ferry access road (#2); third, there is space for up to four (4) vehicles on the east side of the ferry loading lane where employees currently park and two (2) stalls to the north where county vehicles are parked (#3). In addition, there is a parking lot east of the terminal on the east side of the ferry loading lane (4) and another further east bordered by K Avenue on the west and 6th Street on the south (#5). The lot adjacent to the ferry loading lane (#4) has the capacity for approximately 42 vehicles although there are only 21 delineated stalls. The lot adjacent to K Avenue (#5) has the capacity to serve 74 vehicles of which four (4) are designated as "handicapped" parking. See Table 1 below.

On the Guemes Island side, there is one parking lot on the west side of Guemes Island Road, the ferry access lane, which is divided into two (2) sections. There is capacity for approximately 80 stalls although they are not all delineated. See Table 1 below.

Estimate future 2060 Peak Service Passenger Waiting Area Demand

An estimate of the required passenger waiting area for the 2060 peak service ridership was prepared using the "walk-on" ridership estimates and associated information presented in the Glosten Capacity Study.

Findings

The following is a summary of the findings for the various tasks identified above.

2060 Ferry Volume Forecast

The Glosten Vehicle Capacity Study estimated the 2060 Annual Vehicle Ridership to be 340,000 vehicular trips or 170,000 vehicular round trips. The Design Day was determined to be a summer weekend day.

Further Glosten analysis estimated the 2060 peak hour demand volume from Anacortes to Guemes Island is 57.5 vehicles per hour for the four-hour period between 1 PM and 5 PM on a Friday afternoon during the summer and 56 vehicles per hour during the five-hour period between 11 AM and 4 PM on a Sunday afternoon for the trip between Guemes Island and Anacortes. The capacity of the ferry during these time periods is 58.4 vehicles per hour for the Anacortes to Guemes Island leg and 56 vehicles per hour for the Guemes Island to Anacortes leg.

Estimate Future 2060 Peak Service Queuing

In summary, the 2060 Design Hour service volume is 114.4 (58.4 + 56 = 114.4) vehicles per hour whereas the 2060 Design Hour demand volume is 110.4 (57.5 +52.9 = 110.4) vehicles per hour. Application of the M/M/C queuing model[4] resulted in an average queue of 62.9 vehicles at the Anacortes terminal and 16.1 vehicles at the Guemes Island terminal. These queues will remain during the peak period demand.

[4] http://www.supositorio.com/rcalc/rcalclite.htm. Supositorio.com – Queuing Theory Calculator.

Glosten requested, for the purposes of this discussion, a queue analysis assuming a 10 percent increase in the projected 2060 peak hour design volumes. A 10 percent increase yields an Anacortes to Guemes Island demand volume of 63.3 vehicles per hour and 58.2 vehicles per hour for the Guemes Island to Anacortes. The result of the queuing analysis indicates the queue will "tend to infinity" as the demand exceeds the service rate.

Estimate Future 2060 Peak Service Parking

The 2060 Peak Parking Demand estimates were obtained by factoring the existing parking demand obtained from the October 27, 2017 field survey discussed above to the 2060 Design Hour. The results of the field survey are presented in Table 1 and Table 2. The Anacortes parking accumulation is presented in Table 1 and the Guemes Island data is presented in Table 2.

Table 2. Anacortes Parking Accumulation (October 2017)

Time	Lot 4 (42 Stalls)	Lot 5 (74 Stalls)	Street Parking (3 Stalls)	Handicapped (5 Stalls)	5 Minute (2 Stalls)	Employee (4 Stalls)	County (2 Stalls)	Total	Capacity	% Capacity
6:30 AM	42	57	3	3	0	3	2	110	130	85
7:00 AM	41	51	3	4	0	3	2	104	130	80
7:30 AM	39	53	3	3	0	3	2	103	130	79
8:00 AM	39	52	3	2	0	3	2	101	130	78
8:30 AM	35	51	3	2	0	3	2	96	130	74
9:15 AM	37	49	3	2	0	2	2	95	130	73
9:45 AM	37	47	3	2	0	2	2	93	130	72
10:15 AM	36	49	3	2	0	2	2	94	130	72
10:45 AM	38	47	3	2	0	2	2	94	130	72
11:15 AM	39	48	3	2	0	2	2	94	130	72
1:00 PM	39	47	3	3	0	0	2	94	130	72
1:30 PM	37	46	3	3	0	0	2	91	130	70
2:00 PM	37	49	3	3	0	0	2	94	130	72
2:30 PM	40	47	2	3	2	0	2	96	130	74
3:15 PM	37	48	3	5	0	2	2	97	130	75
4:00 PM	39	48	3	3	0	3	2	98	130	75
4:30 PM	37	48	3	3	0	3	2	96	130	74
5:00 PM	42	48	3	3	1	3	2	102	130	78
5:30 PM	41	48	3	3	0	3	2	100	130	77
6:15 PM	42	52	3	3	0	3	2	105	130	81
6:45 PM	43	53	3	3	0	3	2	107	130	82

Lot A – on the east side of the ferry queue lane accessed via the ferry access lane;
Lot B – upper lot bounded by 6th Street and K Avenue accessed via K Avenue;
Street parking on the west side of I Avenue;
Handicapped Stalls – located on the west side of the ferry access road adjacent to the Terminal Building;
5 Minute Parking – Stalls on the west side between Handicapped Parking and the Terminal Building;
Employee Parking – Stalls on the east side of ferry loading lane between Lot A and the County parking;
County Parking – Parking area north of employee parking on the east side of the ferry access road.

As shown in Table 2, the capacity of the parking at the Anacortes Terminal is 130 stalls. The peak demand during the day occurred at 6:30 AM (110 vehicles) observed after the initial (6:30 AM) ferry trip to Guemes Island. The last observed time was 6:45 PM with a demand of 107-stalls. The maximum demand during this period occupied 85 percent of the parking stalls. The minimum demand during the day was 70 percent capacity at 1:30 PM. The parking demand during the peak ferry demand which occurred at 5:00 PM was 102 stalls.

To estimate the 2060 parking demand for the Anacortes Terminal, the parking demand during the peak ferry ridership was compared to the 2060 peak hour demand. The 2060 peak hour demand, as discussed above, is 57.5 vehicles per hour compared to the peak volume on October 27th of 31. The peak ferry volume on this day includes the 19 vehicles served by the ferry plus the 12 unserved vehicles which were queued in the loading lane. The resultant factor is 1.85 (57.5/31 = 1.85).

Projected maximum parking demand will be 189 (102 * 1.85 = 188.7) parking stalls in the 2060 Peak Hour. This would result in a shortage of 59 (189 – 130 = 59) stalls at the Anacortes Terminal.

Table 3. Guemes Island Parking Accumulation

Time	Lot A	Lot B	Total	Capacity	% Capacity
6:45 AM	33	17	50	80	63
7:15 AM	38	17	55	80	69
7:45 AM	42	17	59	80	74
8:15 AM	45	17	62	80	78
8:45 AM	50	17	67	80	84
9:30 AM	49	18	67	80	84
10:00 AM	51	19	70	80	88
10:30 AM	50	19	69	80	86
11:00 AM	56	21	77	80	96
11:30 AM	56	24	80	80	100
1:15 PM	56	24	80	80	100
1:45 PM	54	22	76	80	98
2:15 PM	55	22	77	80	96
2:45 PM	55	22	77	80	96
3:30 PM	52	23	75	80	94
4:15 PM	50	23	73	80	91
4:45 PM	50	22	72	80	90
5:15 PM	47	21	68	80	85
5:45 PM	44	22	66	80	83
6:30 PM	41	20	61	80	76

Lot A – Lower lot on the west side of the ferry access road
Lot B – Upper lot on the west side of the ferry access road

As shown in Table 3, the capacity of the two lots on Guemes Island is estimated to be 80 stalls. In general, the stalls are not delineated so that with a more efficient layout, additional parking could be realized in the existing parking lot configuration. The peak parking demand, 100 percent capacity (80 stalls), was observed during the noon period between 11:30 AM and 1:15 PM.

During the ferry peak at 4:00 PM, the two lots on the island were occupied to 91 percent of capacity or a 73-stall demand or the estimated 80 stalls. Projecting the parking demand to the 2060-time horizon involves factoring the existing parking demand observed during the October 27th study during the peak ferry time to the 2060-time horizon. As stated above, the 2060 peak hour ferry demand is 52.9 vehicles per hour compared to the 2017 peak demand on October 27, 2017 of 22 vehicles. Of the 22 vehicles, 21 were served during the 4:15 ferry run and one (1) vehicle was left in the queue. Therefore, the ratio between the 2017-time period (22 vehicles) and the 2060 peak hour demand (53 vehicles) is 2.40 (52.9/22 = 2.40).

Using this factor to obtain the 2060 peak hour parking demand results in a demand of 175.2 (73 * 2.40 = 175.2) parking stalls in the 2060-time horizon. This results in a shortage of 95.2 (175.2-80 = 95.2) stalls at the Guemes Island Terminal in the 2060-time horizon.

Estimate future 2060 Peak Service Passenger Waiting Area Demand

According to the Vehicle Capacity Study[5] discussed above, the passenger-vehicle ratio is 2.1. This includes both passengers in the vehicle plus walk-on passengers. Applying this factor to the 2060 ferry capacity yields a total of 67 passengers per ferry trip.

Glosten determined the ratio of 1.7 passengers per vehicle from observations during the 2017 Labor Day weekend.[6] The remainder of the passengers, 0.4 (2.1 -1.7 = 0.4), were "walk-ons". Using this ratio, it is estimated there will be an average of 13 (32 * 0.4 = 12.8) "walk-on" riders during the 2060 Design Year. Glosten' s review of the existing ferry ridership indicated a peak "walk-on" ridership of 36.

The Vehicle Capacity Study indicated the new ferry will have a capacity of 150 passengers. If the ratio of vehicle passengers to "walk-ons" remains the same, it is estimated the peak "walk-on" capacity will be 55 passengers (0.4/2.1 * 150 = 54.8). According to the Glosten study, each "walk-on" passenger requires five (5) square feet of space although the Coast Guard recommends 10 gross square feet (gsf) per passenger. Application of this requirement to the maximum "walk-on" ridership requires a minimum of 275 square feet or using the Coast Guard requirement 550 square feet. Currently, the existing terminal provides approximately 925 square feet of outside pedestrian waiting area.[7] This suggests there is a surplus of 375 square feet or 75 (375/5 = 75) "walk-on" passengers. This area is adequate to accommodate the 2060 peak pedestrian demand.

Identify Future Facility Improvements.

Based on the foregoing analysis the following elements of the terminal facilities will require expansion to address future ferry demand in the 2060-time horizon: queue capacity and parking demand.

Queue Capacity

Anacortes Terminal

The result of the queuing analysis yielded an average queue of 62.9 vehicles in the 2060 peak hour at the Anacortes Terminal. Assuming 25 feet per vehicle, a total distance of 1,573 (62.9 * 25 = 1572.5) feet should be provided to accommodate at a minimum the peak hour queue.

Existing delineated queue storage on I Avenue and 6th Street is approximately 1050 feet or 42 (1050/25 = 42) vehicles. To accommodate the 2060 peak hour queue demand, an additional 523 (1573 – 1050 = 523) lineal feet will be required. The additional distance will extend the ferry queue lane to M Avenue.

Extension of the ferry queue lane to M Avenue will require restriping of 6th Street to delineate the ferry queue lane. The cost of the restriping is approximately $3,000.

Guemes Island Terminal

The queuing analysis yielded an average queue of 16.1 vehicles. Assuming an average of 25 feet per vehicle, a total distance of 403 (16.1 * 25) feet should be provided to accommodate the projected queue. Existing delineated queue storage on Guemes Island Road is 1532 feet. Therefore, the existing 2060 peak hour demand queue is easily accommodated within the existing queue lane.

Parking Demand

Anacortes Terminal

The estimated additional parking stalls required to meet the 2060 peak hour demand at the Anacortes Terminal in the 2060 Peak Hour is 59 stalls for a total of 189 parking stalls. Each stall is estimated to

[5] Op. Cit. page 6.
[6] Op. Cit. page 11
[7] Calculated from measurements taken from Google Maps – Aerial View. Dimension of 37 feet x 25 feet = 925 SF

require approximately 478 square feet, including aisle width, which results in a total of 90,342 (189 * 478 = 90,342) square feet or 2.1 (90342/43560 = 2.07) acres of land.

The cost for the additional parking is estimated to be $6500 per stall for ground level parking[8]. Applying this cost to the Anacortes facility, the estimated cost for 59 stalls is $383,500 (59 stalls* 6500 = 383,500). This estimate does not include the cost of land or the cost of clearing the property. Adding the cost of property acquisition in the vicinity of the terminal[9] would increase the cost by approximately $1.54 Million for a total of $1.92 (1.54 Million + 383,500 = 1.92).

Guemes Island Terminal

At the Guemes Island Terminal, the required additional parking stalls to meet the 2060 peak hour demand is 96 stalls for a total of 176 parking stalls in the 2060-time horizon. This results in a total area required for parking of 84,128 (478 * 176 = 84,128) square feet or 1.93 acres (84,128 / 43560 = 1.93). Currently the existing parking lot provides 51,626 square feet or 1.19 (51626/43560 = 1.185) acres. Therefore, an additional 32,502 square feet or 0.75 (32502/43560 = 0.746) acres is required to meet the future parking demand.

The cost of providing the additional parking stalls at the Guemes Island Terminal is $624,000(96 stalls * 6500 = 624,000) for the construction of the stalls. The cost of land adjacent to the existing parking lot is approximately $509,200 per acre[10]. Assuming an additional 0.75 acres is required to provide the additional 96 stalls the cost for land would be approximately $381,900 (509,200 * 0.75 = 381,900). The cost to remove the structure (existing home) would be approximately $281,900[11] for a total of $1.3 (381,900 + 281,900 + 624,000 = 1,287,800) million.

Ticketing System Analysis

The following is an excerpt from the TRB[12]Source

Fare collection influences all aspects of terminal operation. How fares are collected determines the speed of terminal operations, the speed of passenger boarding, and the design of the terminal facilities.

There are three types of fare collection/terminal design (Multisystems, Inc., et al., 2003):

Pay as you enter.

This is the traditional fare collection system used in most North American transit systems. In this system, passengers give a ticket to an employee while boarding the vessel. The advantages of this system include simple operations and simple terminal design; for example, payment can be in cash, eliminating the need for a ticket office or ticket vending machines. Additional advantages include the default inspection of passengers as they board (since they are surrendering their ticket). The disadvantages include delays to sailings as passenger fares are collected while the vessel is at dock (when it could have been already in motion).

Barrier system.

This is a common system for subways and many ferry operations. Fares are collected at a designated point inside the terminal and away from the vessel. Fare control barriers, gates, and

[8] How to Estimate the Cost of a Parking Lot at the Conceptual Level; Internet Search.
[9] Based on Skagit County Assessor estimate of land value for the parcel located at 511 6th Street of $16.85 per gsf
[10] Skagit County Assessor's Appraisal of the property at 5478 S Shore Drive, Guemes Island, Washington
[11] Ibid.
[12] TRB – Guidelines for Ferry Transportation Services = EXCERPT – Pages 120-122; Fare Collection, Barriers, Gates, and Turnstiles

turnstiles are typically used to control access into the "paid area" and ensure revenue control. The advantages of this system include very fast passenger boarding on the vessel (since the fare control queuing occurs outside the boarding apron), good revenue control through a barrier system, and control of passenger capacity (since the gates can count passengers per sailing and lock when the limit is reached). Downsides include high capital cost for equipment and a reduction in passenger flow at the terminals.

Proof of payment.

In this system, either the terminal or the vessel becomes a "paid area" and the passenger is required to possess a valid ticket or pass on the vessel and is subject to random inspection by roving ticket inspectors (or the vessel crew at random times). If the passenger does not have a valid fare, the inspector issues a citation (depending on the state law, it can be either a civil violation or a criminal infraction). The advantages of this approach are that it combines the vessel boarding efficiency of the barrier system with the low-cost approach of the pay-as-you-enter systems. The disadvantages are less control over the number of passengers entering the vessels, and the costs of inspection (especially within the terminal, where the maritime crew cannot do the inspections). Fines for fare evasions usually do not compensate for the cost of inspection where a dedicated inspection force is needed. Research indicates that in high-volume transportation systems that experience crowding, a barrier system is usually more efficient because the cost per "inspected" passenger is less (the capital costs of fare gates are spread over a higher volume, resulting in lower overall costs).

In the barrier and proof-of-payment systems, ticket dispensing is required, and, even in pay as-you-enter systems, it is preferred. At a terminal, waiting passengers can pay their fares at ticket machines or pay booths or to ticket collectors. At an automobile ferry, passengers can pay their tariffs at a toll booth or in the staging area. At larger terminals, several ticket machines are typically provided to handle peak passenger demand for tickets.

In all terminals, turnstiles are preferred (as in Vancouver) to ensure that accurate passenger counts are performed for the crew's reporting requirements. Staffed ticket booths are used at more heavily traveled terminals or at major intermodal connections. Passengers can purchase tickets in several ways, including at ticket vending machines and staffed ticket booths, onboard the vessel, or online in the form of multiple tickets or annual passes. Transit and ferry systems are increasingly using either electronic fare media or web-based ticketing (usually combined with reservations). Fare purchase methods are set by the individual operator according to what best fits the operation. Operators that are integrated with a transit agency or part of a regional coordination effort may offer universal fare cards such as Seattle's ORCA card or the San Francisco Bay Area Clipper card (Multisystems, Inc., et al., 2002).

Access Requirements for Persons with Disabilities

U.S. Ferries have generally not been subject to overall guidance on access for persons with disabilities, although some jurisdictions have instituted local design practices and formal federal guidance is expected soon. As with any commercial activity, reasonable accommodations must be made for persons with disabilities. In some locations, gangways are designed for maximum slope with flat, rest areas at designated intervals. In tidal areas, there can be conflicts between designs that accommodate persons with disabilities and regulatory policies that limit overwater coverage. Coverage (and cost) can be reduced through more flexible design criteria, such as "gangway slopes will not exceed [stated objective] 97 percent of the time." This prevents minus

tides and other infrequent events from dictating overdesign. On vessels, width requirements for various areas should take into account access for persons with disabilities, and concession area design should also provide access for persons with disabilities.

Evaluate Existing Ferry Ticketing Operation

During the ferry operation survey on October 27, 2017, the following ticketing operation was observed:

- The ticketing operation begins just prior to the ferry loading operation;
- The ticket agent approaches the "walk-on" passengers waiting to load the ferry, either in the terminal or in the pedestrian/bicycle area on the north side of the terminal, and collects the "walk-on fare";
- After collecting the fare from the "walk on" passenger, the ticket agent begins the process of collecting vehicle fares;
- Collection of vehicle fares is interrupted as additional "walk-on" riders approach the ticket agent to pay the fare. The "walk-on" passenger approaches the ticket agent in the ferry loading lane;
- Collection of fares is also interrupted when a ferry patron wants to pay by credit card. In this case, the ticket agent and driver must go to the terminal building to use the credit card machine. Although this occurs on a random basis, it has a significant impact on the fare collection process.
- The ticket agent carries a "handful" of cash to provide change for cash patrons. This appears to be a security risk.
- After the ferry is loaded, the ticket agent returns the cash and receipts to the terminal office and then boards the ferry.

Overall, the ticketing and fare collection procedures appear to be very inefficient. In addition to the noted interruptions to the ticketing operation, there is also considerable delay realized during the loading process as the deck hand attempts to maximize the ferry capacity by "fitting" trucks, recreational vehicles, and passenger cars with boats and trailers on to the ferry. However, the delay incurred by the ticketing and large vehicle loading process does not significantly impact the ferry schedule. This results from surplus time generally required to load/unload the ferry and complete the crossing. In the future, if additional runs are required to meet the 2060 demand this delay will create an adverse condition with significant impact to the trip time.

Madeline Island Ferry Ticketing Operation

The following information was obtained from the Madeline Island ferry operation.

1. Madeline Island does not sell tickets online or over the phone. All tickets are purchased at a ticket booth, either in Bayfield or on Madeline Island when a walk-on, car & driver arrive at either booth. Once the ticket is sold, cars/trucks/RV's get in line and then board the ferry being guided on by the crew. The crew then collects the ticket from the vehicle or passenger.
2. Madeline Island does not take reservations for cars/trucks/campers/RV's although they do for semi's and motor coaches, as well as dump trucks, redi mix trucks, and bigger trucks (moving vans and the like).
3. When the ticket booths close for the season (early Nov.) the boat crew then sells tickets. Everyone have the proper fare (cash, check or credit card for payment; we also sell something we call a mag card which is a discount fare card for those who travel back and forth frequently).

4. Patrons must pay to ride the ferry. Never have people who don't have the appropriate fare - sometimes employees of businesses on the Island must charge their trip to the business if they don't have the money themselves, but this happens very infrequently.
5. There is sufficient time after a boat lands for a crew member to sell tickets to the line of cars/people that want to get on the next departure.
6. Each boat shift has a log sheet where the crew records the number of adults, children, vehicles on each trip they make (by counting what is listed on the boarding ticket they collected when they loaded a vehicle on the boat, or a walk-on ticket). They also call a message machine to state the number of passengers on the vessel. This message machine knows the time of the call so, in the event we need to get this data, it is easy to do so.
7. Our ticketing system allows for cash/cc/mag card sales. Whether it's at the ticket booths or on the boats, the person collecting has a hand-held computer (a reprogrammed cell phone) and a hand-held printer. When a customer pays with a credit card or a mag card, the data is entered into the hand-held computer and then the card is swiped to then connect to a credit card processing company (we use Nationwide) or our database of mag cards to deduct the fare off the card. A ticket is then generated and given to the customer. Credit cards or mag cards can be refused that do not have a sufficient balance and the seller then tells the customer we need another form of payment.

The Madeline Island system[13] has several similarities to Guemes Island and some significant differences which, if employed, could benefit the Guemes Island service. These items include:

- Madeline Island takes reservations for large vehicles; i.e. semi's, motor coaches, dump trucks, redi mix trucks, etc.; and,
- Tickets can be sold at the booths or on-board the ferry. Tickets are sold on-board when the ticket booths close in early November.

Evaluate Existing Ticketing Technology and Operation

The existing ticketing operation is very basic and rudimentary. Significant delay is added to the ferry loading process because of the ticketing operation. This delay is acceptable because it does not adversely impact the ferry schedule. In the future, because of the significant increase in demand reduction of the ticketing delay may be imperative to minimize the need for major capital improvements.

During the October 27, 2017 ferry survey, ticketing times were observed and recorded at the Anacortes terminal, only location where tickets are purchased, to document the extent of the delay. The following summarizes the findings:

- Approximately 53 percent of vehicles riding the ferry pay using the pre-purchased punch tickets. The average time for the ticket agent to punch the ticket and release the vehicle to load is 6 seconds.
- Approximately 44 percent of the vehicles riding the ferry pay using cash. The average time for the ticket agent to process a cash transaction is approximately 21 seconds.
- Approximately 4 percent of the vehicles riding the ferry pay using a credit card. The process for a credit card transaction requires the driver and the ticket agent to go into the terminal building to use the credit card machine. The average time required for these transactions is approximately 6 minutes.
- The vehicle ticketing operation is interrupted to process ticket sales for "walk-on" passengers.

[13] Email from Mary Ross – Madeline Island Ferry

It is obvious the current ticketing operation creates significant delays in the ferry loading operation. The offsetting factor is there is generally a significant amount of surplus time in the ferry schedule between the time the loading operation begins, and the ferry is required to depart per the documented schedule.

Evaluate Alternative Ticketing Technologies

To meet future demand, new technologies should be implemented to reduce the delay and create a more efficient ticketing and loading operation. Specific actions to be considered which are anticipated to dramatically reduce the time required for the ticketing operation are:

- Complete the ticketing operation prior to the beginning of the ferry loading process. Currently, ticketing takes while the ferry is in the active loading process. Significant time delays were identified which have an adverse impact on efficient ferry loading. Completing the ticketing operation prior to the beginning of the loading process will eliminate any ticketing related delay as part of the ferry loading process.
- Eliminate the need for the ticket agent to carry cash to facilitate cash transactions during the ticketing process. Walking around with a handful of cash, particularly late at night when ferry activity is not robust, the ticket agent is subject to theft. Eliminating the need to facilitate cash purchase during ferry loading will improve agent safety and security.
- Eliminate the need for patrons using credit cards to exit their vehicle and enter the terminal to process credit card payments. Currently, both the ticket agent and the ferry patron are required to proceed to the terminal building to process credit card payments. This process requires a significant amount of time and delays the loading process. Eliminating the need for ferry patrons to exit their vehicle and enter the terminal for credit card purchases during the ferry loading operation will eliminate significant delay to the ferry loading process.
- Separate trucks, RV's and cars with trailers from passenger cars in the waiting area. Currently, all vehicles wait in a single line. Separation of the vehicles will allow the loading agent to request different sizes of vehicles to address the ferry loading requirements.

Other issues to consider in evaluation of alternative ticket technologies include[14]:

- **Operations:** How will the new technology impact dwell time, driver enforcement, and fare evasion?
- **Planning:** Are there new opportunities for ridership and revenue data because of the technology? Provide the ability to produce a passenger manifest of ferry patrons for each ferry crossing.
- **Distribution:** How will the fare media be distributed? What are the options for fare card outlets, ticket vending machines, online portals, etc.?
- **Maintenance**: What is the cost to maintain fareboxes and supportive networks?
- **Costs/Revenues**: What is the cost of fare collection? Are there opportunities to increase revenue?
- **Customer Experience**: What's the quality of the customer experience in terms of ease of payment, convenience, and customer support? Ensure the technology is viable for all users. Person who are not technology savvy may have difficulty or refuse to use smart phones or other process which require computer interaction.

To address these issues, the Consultant conducted an internet search of existing ticketing technologies. The ticketing technologies focus on three basic approaches:

- Magnetic Stripe Media
- Smart Cards

[14] http://nmotion2015.com/wp-content/uploads/2015/12/nMotion-Fare-Technology_151120_FINAL.pdf

- Smartphone

The benefits and disadvantages of these technologies are identified below[15].

BENEFITS AND DRAWBACKS OF MAGNETIC STRIPE TECHNOLOGY

Benefits

- Collection of basic fare data
- Reduces operator interactions/fare enforcement
- Reduces cash in system
- Accommodates cash (stored value), passes, and transfers (cannot necessarily do all at once on the same card)
- Can be purchased pre-loaded (encoded)

Drawbacks

- Fare media can be damaged/deactivated
- Limited uses of fare media (cannot combine passes and stored value on same card)
- Reloading can only occur at designated locations (cannot be done automatically)

BENEFITS AND DRAWBACKS OF SMARTCARDS

Benefits

- Enhanced data collection capabilities
- Loading balance online or over the telephone
- User features like “autoload” and “balance protection”
- Lower on-board transaction times (reduced dwell times)
- Permanence of cards (single card can be used for months

Drawbacks

- Higher cost of implementation (back-end systems, value loading terminals, new equipment, need for on-board vehicle communications equipment)
- Greater range of fare options may lead to greater levels of confusion for customers and complexity for agency staff

BENEFITS AND DRAWBACKS OF SMARTPHONE-ENABLED FARE PAYMENT

Benefits

- Fare products can be accessed through one’s smartphone; there is no need for separate fare distribution outlets
- Various means to validate media (visual, scan, proximity)
- Customers can purchase fare products at any time and at any location

Drawbacks

- Visual validation of fare products could add dwell time; however, some studies suggest that flash passes may be faster than processing individual magnetic cards or smartcards
- Access issue for those who do not have a smartphone with data plan or a linked credit card/bank account
- Need to supplement existing fare payment options (smartcard or magnetic stripe)

[15] Ibid.

Other Ferry Service Fare Collection Guidance

Other ferry service agencies in the region have identified goals and objectives for adopting new fare collection technologies. One such agency is Kitsap Transit (KT). KT recently completed a business plan[16] for their passenger only ferry which identified goals and objectives for evaluating fare collection technologies. They include:

The primary goal of the Kitsap Transit fare system is to provide convenient and equitable fare collection options for customers that encourage ridership, minimize vessel loading and turn-around time, and are efficient to operate and maintain. Key objectives include:

- Provide an Efficient and Cost-Effective Fare Collection System: From a customer perspective, a fast, efficient ferry system that competes (time- and price-wise) with other modes is important. From an operations perspective, the service must be efficient and cost effective to be sustainable.
- Provide Fare Products and Pricing to Serve All Customer Markets: Different customer markets have different requirements for fare products and different price sensitivities. Commuters and other frequent riders, in addition to being price sensitive, are usually time sensitive and demand an efficient and reliable fare system. Occasional riders (e.g. tourists and other infrequent travelers) are typically not as sensitive to price as commuters and are more interested in convenience and easy to understand fare options. Additionally, fare products and pricing must offer equitable options for low-income riders.
- Provide Fast and Efficient Boarding: A key component of operating efficiency is rapid passenger loading/unloading, both in terms of minimizing staff requirements to validate passenger fares and reduce dwell times at the terminals.
- Integrate as Appropriate with Other Modes, Technologies, and Agencies: Where appropriate, the fare collection system should support door-to-door pricing of a trip and integrate with other fare collection technologies used on connecting services.
- Provide Appropriate Infrastructure: Terminal infrastructure is a key determinant of what fare collection technologies may be most appropriate—technologies deployed at a large terminal such as Bremerton may be different than those at either an isolated dock or shared terminal. The fare collection system must be flexible enough to work with different terminal infrastructure.

The result of the internet search identified the following technologies:

Self Service Kiosks (Magnetic Stripe)

This technology requires the installation of self-service kiosks at select locations to allow ferry patrons to purchase tickets. The system dispenses tickets on the spot or can provide printing on line from a remote location. The kiosks allow purchase with cash and credit card processing. Credit card purchases can be processed in two (2) seconds.

For the Guemes Island operation, kiosks can be located at the entrance to the ferry loading lane and inside the terminal to serve the “walk-on” patrons. This will allow ticketing to be complete before the ferry loading process begins. Ticketing agents would not be required to carry around handfuls of cash to facilitate cash transactions. Credit card transactions can be completed simply and timely without interrupting the loading process. Current programming does not have ability to produce a passenger manifest. Kiosks are common and should not provide any challenge for “technology challenged” patrons.

[16] http://kitsaptransit.com/uploads/pdf/projects/ferryappendixfinal.pdf. See page 190.

Universal Fare Cards (Smart Card)

Universal Fare Cards, are a plastic credit card size card, which are becoming popular in the United States. The typical way Americans book and pay for transportation services has worked the same for decades. The process of buying physical tickets to access public transportation comes from a distantly pre-digital era, yet it continues across the country. Many cities are moving ahead with modern updates which allow a rider to use the same "card" to purchase all sorts of public transit options to include buses, ferries, trains as well as parking meters. In this area many agencies have adopted the "ORCA" card to provide access to buses, ferries, and commuter trains.

Once you have a card, you can add between $5 and $300 onto the card's E-purse, which works similarly to a pre-paid debit card and deducts the correct fare each time you tap. When the card's E-purse balance gets low, just add additional value.

If you are a frequent rider, you can add a regional monthly pass good for an unlimited number of trips on designated transit agencies during the valid calendar month.

You can have E-purse and a monthly pass on the same ORCA card. The E-purse can be used in combination with a pass in the event the pass value is less than the fare for a ride.

For the Guemes Island operation, a kiosk with a card reader would be required at key access points for the ferry. The kiosks could be placed in the terminal building as well as at the head of the ferry loading lane. Although the card addresses most of the issues with the current ticketing technology, it does not produce a passenger manifest and could present some issues with "technology challenged" individuals.

Good to Go Pass (Smart Card)

Good to Go is the Washington electronic tolling system used for tolling on state facilities. Currently the system is limited to roads and bridges but WSDOT is moving forward to allow access to the Washington State Ferry System as well. The system offers several "pass" options to include a "windshield sticker" or a "flex pass". The electronic pass is read by overhead readers which record pertinent information which allows the system to deduct the appropriate amount from the identified account. In the event, there is no money in the account, a toll bill is sent to your address. Good to Go passes can be purchased on line at the Good to Go site, at a "walk-in" Customer Service Center or at a participating retail store.

For the Guemes Island operation, the Good to Go pass would require electronic pass readers be located at select locations. The application would need to be modified to address "walk-on" fares. It is expected, WSDOT will address this issue as they develop the Good to Go program for ferry operation. It is assumed Washington State Ferry system would address this issue as well.

http://www.wsdot.wa.gov/GoodToGo/default.htm

WAVE2GO

WAVE 2GO is the current Washington State ferries ticketing system. In this system, you can purchase a ticket in three different ways.

Buy Online - A credit card or a WSF Business Account is required to complete an online purchase. Tickets are generally received within minutes of purchase, but spam blockers may cause delays. Youth and senior or disabled tickets are not available online or at the kiosk due to required proof of eligibility.

Buy at Kiosk- A credit card is required to complete a purchase at the kiosk. Wave2Go kiosks are located at all ferry terminals and offer single and multi-ride tickets for all routes. Youth and senior or disabled tickets are not available online or at the kiosk due to required proof of eligibility.

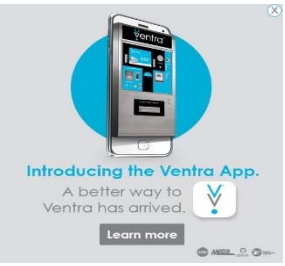
Buy at Tollbooth - Tollbooths can sell tickets for the route where the tollbooth is located. Tickets may be paid for with any payment type except checks. Youth, senior, or persons with disabilities should purchase their fare at the tollbooth and provide proof of age or disability to receive the discounted fare.

For the Guemes Island operation, the WAVE2GO pass would provide ferry patrons the option to purchase tickets on line or at select kiosks. This process appears to be more extensive than is necessary to meet the objectives and scale of the Guemes Island ferry.

http://www.wsdot.wa.gov/ferries/wave2go/

Ferry Ticketing System – Software Requirements Specifications (Smartphone)

The internet produced a link to a report that was prepared to identify software specifications for a ferry ticketing system to serve the TCI Ferry in the Caicos Islands in the Caribbean. The document outlines the high-level functionality that is desire for a new Ticketing System. The software specification allows for the following:



- Sell tickets for trips on specific dates and times;
- Passenger tracking by name to allow for accurate passenger manifest;
- Scanning of pre-purchased tickets;
- Real time vessel occupancy when selling tickets and while boarding;
- Sell tickets for cargo;
- Selling tickets online via secure Web Site
- Send e-tickets to passenger's smart phone

The software specification is for future software development and not currently available.

The software specifications appeared to address key issues at the Guemes Island operation such as passenger tracking by name to provide an accurate manifest; scanning of pre-purchased tickets; real time vessel occupancy when selling tickets; and selling tickets for cargo. However, it is limited to smart phone technology and not universally available to all ferry patrons who are "technology challenged."

https://www.edsd.com/public/files/Ferry%20Ticketing%20System.pdf

Transit GO Ticket.

An example of the smartphone application is the Bytemark[17] TransitGO Mobile App currently employed by Seattle's Metro Transit, Sound Transit, Seattle Streetcar and the Seattle Water Taxi. The service is offered for riders who do not wish to pay cash. This is how it works:

Riders who don't want to pay cash or purchase an ORCA pass can:

- Download the Transit GO Ticket app for Android, Apple or Windows mobile devices.
- Create an account
- Purchase one or more tickets through the app using a credit card or debit card.
- Activate the tickets needed just prior to boarding, there is no limit to the number of tickets that can be activated at one time.
- Show the mobile display to a transit operator, a water taxi fare collector, or have it available if requested by a fare inspector on RapidRide, Link light rail or Sounder.
- Transfers are allowed between Metro buses within a two-hour window.

The Transit GO Ticket app pilot project was created under contract by Bytemark[18], which has similar systems in use in Austin, Texas; New York Waterway; Massachusetts DOT, Atlanta, Toronto and York.

[17] https://www.bytemark.co/news/2016/12/12/king-county-metro-launches-transit-go-ticket-mobile-app
[18] Ibid.

With its partners at Sound Transit, the City of Seattle and King County Marine Division, Metro will evaluate the performance of the app and gather rider feedback through November 2017. The results also will guide further developments of mobile ticketing.

Analysis of How to Improve the System Without Infrastructure Modifications

The Guemes Island Land Facilities Impact Study identified four specific issues of concern in the 2060 Design Year. They are:

- Average queues during the 2060 peak hour demand will be 62.9 vehicles at the Anacortes Terminal and 16.1 vehicles on Guemes Island. These queues will overload the system in the short term but should be accommodated in the overall daily ferry service; and,
- Significant expansion of the existing parking facilities will be required if current parking policies are maintained; and,
- Extensive delay is incurred during the ticketing process which occurs while the ferry is loading.
- Extensive delay is incurred while ticket agents attempt to stage the vehicle loading to maximize the number of vehicles on the ferry. This is particular to the loading activity when large trucks are served.

How can these issues be addressed without major infrastructure improvements? The following provides a brief overview of what can be done.

Extensive queuing will occur in the 2060 design peak hour

As stated above, the anticipated 2060 peak hour demand queuing can be mitigated with an increase in daily ferry service which is currently proposed. Short term queues may exist but will be accommodated within the daily schedule. The anticipated queue will be somewhat mitigated as ferry riders gain an understanding of peak demand times and change their schedule to avoid the peak demand. In addition, establishing a reservation service would assist in balancing the load throughout the day and minimize the potential for excessive queuing.

Significant expansion of the existing parking facilities will be required if current parking policies are maintained

If the current parking policies are continued, extensive expansion of the existing parking facilities will be required. What policies create this issue?

- No payment is required; and,
- Vehicles can park for up to 72 hours (3 days); and,
- Parking stalls are provided on both sides which allow “walk-on” passengers to park a vehicle on each side; and,
- There is no verification that parking patrons use the Guemes Island Ferry. It was noted Guemes Island Ferry parking at the Anacortes Terminal is used by patrons of the Washington State Ferry System to avoid parking fees.

On the Anacortes side, it is believed significant additional parking can be achieved by reconfiguring[19]/reconstructing[20] the existing parking lots. For Lot 4, the lower lot, up to 12 additional stalls could be added by changing the parking configuration to provide 90-degree parking on both sides of the aisle. This would require widening of the lot to the south to provide sufficient width

[19] Reconfiguring – changing the stall configuration and layout. May require elimination of physical obstructions to achieve the new design.
[20] Reconstruction – complete redesign and construction of a new facility within the same area.

(approximately 60 feet) to provide a full 90-degree parking stall and a two-way aisle[21]. The cost of this work would be approximately $6,500[22] per stall or $78,000 (12 * 6,500 = 78000). For the upper Lot 5, it is believed up to 30 additional stalls could be achieved by reconfiguration and minor design modifications to the existing lot including removal of some landscaping islands. The estimated cost of the modifications to Lot 5 is $50,000. Overall this would net approximately 42 additional stalls. While it is recognized this does not meet the expected 2060 demand of 59 additional stalls although it would be a low cost interim solution.

On the Guemes Island side, clearing and grading the existing parking lots could add approximately 20 stalls for a total of 100 parking stalls. The cost of constructing these stalls is estimated to be $6500 per stall or $650,000. Again, this isn't sufficient to address the future demand but would be a reasonable low cost interim solution.

It is expected that introducing a parking fee would reduce parking demand and increase vehicular demand on the ferry. The benefit of a fee in terms of reducing parking demand may place an increased demand for ferry service. Parking fees could help fund necessary parking improvements.

Extensive delay is incurred during the ticketing process which occurs while the ferry is loading

As discussed above, ticketing creates significant delays during the ferry loading process. The ticketing process should be completed prior to the ferry loading process. To achieve this, the ticketing technology needs to be changed. The low-cost approach would be to place fare kiosks at the head of the ferry loading lane for vehicles and in the terminal for "walk-on" passengers. Additionally, on line purchasing would help eliminate the delays which currently exist. Estimated cost for the hardware and software is approximately $100,000 for three units[23].

Extensive delay is incurred while ticket agents attempt to stage the vehicle loading to maximize the number of vehicles on the ferry

Loading delay is created while the ticket agent attempts to load large vehicles, i.e. RV, trucks, car and trailers etc. If the large vehicles could be stored in a separate approach which would allow the ticket agent to send those vehicles on an as need basis.

There is sufficient roadway cross-section width to provide three lanes inbound and one lane outbound. Two of the inbound lanes would be used for ferry queuing. One could be allocated to larger vehicles and the other to passenger cars.

The cost of this action would be simply the cost of restriping the roadway which would be approximately $5000.

Conclusions and Recommendations

Significant improvements in the ferry service operation are required to eliminate the issues anticipated with the increase ferry demand anticipated in the 2060 Design Year. These improvements include:

[21] http://www.uh.edu/facilities-services/departments/fpc/design-guidelines/09_parking.pdf
[22] Op. cit; How to Estimate the cost of a parking stall.
[23] https://www.olea.com/

- an increase in ferry service to address the expected queuing, improvements to the ticketing technology to improve fare processing; and,
- increased parking supply, and improved ferry queuing lanes; and,
- Interim low-cost solutions have been discussed which have the potential to mitigate these issues in the short-term future, but they are not the ultimate answer.

It is recommended Skagit County develop a course of action which can address each issue to include:

- Expand existing ferry schedule to provide service throughout the day; and,
- Extend queue storage 523 feet on 6th Street to address anticipated queues. This works should be done by restriping the existing 6th Street cross section at a cost of approximately $3,000; and,
- Improve ticketing service through adoption of a new ferry ticketing technology and ticket taking policies:
  - Ticket agents should have the ability to process credit card transactions in line rather than only in the terminal.
  - "Walk-on" fares should not be allowed to interrupt the vehicle loading process to pay the fare. "Walk on" fares could be accommodated with a kiosk in the terminal or on-board the ferry.
  - Cash transactions should require exact fare and not require ticket agent to provide change.
- Eliminate unnecessary ferry loading delay created by the loading of large vehicles; i.e. RV's, boats, and trucks. This can be accomplished through;
  - Restriping I Avenue to provide a queueing lane for large vehicles;
  - Introduce a reservation system for large vehicles to schedule their arrival.
- Increase parking supply at both the Anacortes and Guemes Island terminals;
  - Increased parking supply at Anacortes can be achieved by reconstructing Lot 4 to provide additional stalls and reconfigure Lot 5 to provide additional stalls;
  - Increased parking supply at Guemes Island will require major improvements to the existing parking facility and the acquisition of additional property to the north to provide required parking.

Table 4. Recommended Improvements.

Terminal	Issue	Proposed Improvement	Estimated Cost
Anacortes	2060 Queue Storage	Extend existing queue storage lane – approx. 553 feet.	$3,000
	Ticketing Delay	Install ticket kiosk at the head of the storage lane (2) and in the terminal (1)	$100,000
	Staging Oversize Vehicles	Install a separate queuing lane for large vehicles	$5,000
	2060 Parking Shortage	Low Cost – Reconstruct Lot 4 to add 12 stalls and Reconfigure Lot 5 to add 30 stalls	$138,000
Guemes Island	Parking	Low Cost Interim Solution- Reconfigure and formalize existing lot to add 20 stalls for a total of 100	$650,00
Total			**$896,000**

These improvements should be provided to maintain safe and efficient ferry service from Anacortes to Guemes Island.