

CUSTOMER SERVICE: LEVEL OF SERVICE STANDARDS

This section describes the current level of service (LOS) standards and explains why the vehicle LOS needs to be re-established (both in terms of the measure used and the actual standards). It details a new vehicle LOS measure that is substantially different from the current measure in that it no longer focuses on the 4-hour peak period.

The revised LOS measure proposed in this Plan is a daily percent of sailings at vehicle capacity. This measure focuses on asset utilization and will help inform strategic investment decisions. This is an important change as it moves the ferry system planning away from thinking primarily about peaks and more about how to best fit the service to the overall demand and to think about filling up the space outside the peaks.

LOS standards are an important indicator of the service customers are receiving as well as how utilized the system is. Given these considerations, this section proposes preliminary standards at the route-level for August, May and January. It also outlines the process for reviewing and refining these proposed standards with affected local and regional planning agencies (cities, counties, RTPO's, etc.) before final adoption by WSDOT.

7. CURRENT STANDARDS

7.1 Current Standards

In 1994, the Washington State Transportation Commission adopted level-of-service (LOS) standards for WSF. These congestion standards were developed as part of a larger effort among local governments and modal transportation agencies to respond to requirements of Washington's Growth Management Act, with the understanding that plans for future growth would be closely tied to maintaining LOS standards.

To quantify LOS, WSF chose to measure congestion delay, expressed as the number of vessels that sail before a vehicle can board. WSF measured the average delay over the course of the busiest time of day (3 PM to 7 PM) on an average weekday and deemed this measurement "boat-wait."

For vehicles, the boat-wait standards were set to 1-boat-wait for most routes. On those routes, WSF would meet its LOS standard if the



What are the LOS current standards?

Non-motorized and High Occupancy Vehicles (HOV)

- Accommodate all pedestrians, bicyclists and registered HOVs on each sailing (0 boat-wait)

Freight and Goods Movement

- Westbound weekday traffic on Seattle-Bremerton and Edmonds-Kingston between 5 AM and 2 PM – 0 boat-wait
- Eastbound weekday traffic on Seattle-Bremerton and Edmonds-Kingston between 9 AM to 3 PM – 0 boat-wait
- San Juan Island 0 boat-wait for pre-registered commercial vehicles

General Traffic

All Routes (ex. San Juan Islands)

Avg. Boat-wait, Westbound Weekday PM Peak, 3–7 PM

- Port Townsend-Keystone – 1 boat-wait
- Mukilteo-Clinton – 2 boat-wait
- Edmonds-Kingston – 1 boat-wait
- Seattle-Bainbridge – 2 boat-wait
- Seattle-Bremerton – 1 boat-wait
- Fauntleroy-Vashon-Southworth – 1 boat-wait
- Point Defiance-Tahlequah – 1 boat-wait

average vehicle arriving for sailings between 3 PM and 7 PM saw no more than one vessel sail before it was able to board. Seattle-Bainbridge was given a 2-boat-wait standard in order to equalize its overall average trip time with Seattle-Bremerton. Mukilteo-Clinton also was given a 2-boat-wait standard because of its exceptionally short headways.

For passengers, the boat-wait standards were set to 0-boat-wait for all routes, meaning no walk-on passengers during the afternoon peak period should ever be denied entry to their first available sailing due to capacity constraints.

The service and travel patterns in the San Juan Islands do not lend themselves to the same definition of peak congestion. These routes do not serve a commuter market and, because of route length, headways are naturally longer, making a 4-hour analysis impractical and boat-wait measurement not applicable. As a result, daily and seasonal capacities are tracked for the San Juan Island routes and service growth is designed to keep up with traffic growth.

7.2 Need to Re-establish Vehicle LOS Standards

There are a few key reasons why LOS standards need to be re-established:

- Vehicle boat-wait depends on headway (the time between sailings), but adding another vessel to a route means a reduced headway. For example, doubling the number of boats operating on a route would cut the headway in half. It would also change the meaning of boat-wait on that route since waiting for the next sailing would involve only half the time, making the same service standard harder to achieve. An unchanged number of boat-waits would belie the fact that the customer experience had dramatically improved; a 30-minute wait is preferable to a 60-minute wait, even if the boat-wait is the same in both cases. Therefore, boat-wait is not a consistent measure of the customer experience, nor can it be compared across routes.
- Boat-wait as currently defined is only a peak period measure. For routes that have large fluctuations in travel patterns, a boat-wait measure might imply that the route is highly congested and additional service may be required even if vessels are substantially empty during other times of the day.
- A boat-wait measure is not a meaningful indicator of level of service provided to the ferry customer when combined with other strategies included in this plan, like a reservation system.

In addition to these issues, ESHB 2358 has called for the ferry system to re-establish level of service standards. The following section discusses the proposed measures and standards in detail.

8. CHANGING THE VEHICLE LOS MEASURE

8.1 Changing the Vehicle LOS Measure

Any revised measure should capture the customer experience and describe how well WSF is utilizing its assets. This could inform both when additional strategies might be needed (to improve the customer experience) and when additional service might be needed (only if existing assets are being used efficiently).

Recommended New Measure

Percent of total sailings filled to capacity in May, August, and January is the suggested measure to be used when re-establishing LOS. A version of this measure is currently being used in the San Juan Islands (though it uses total monthly sailings for March and August), and it has the following advantages:

- Greater systemwide consistency. San Juan Islands and other routes will use the same measures.
- Simplification. Standards are focusing only on vehicle LOS, as this is where capacity is most limited.
- Works with a reservation system. A reservation system is a key operational strategy evaluated in the Long-Range Plan, and it would render minutes of wait or volume to capacity ratios useless because there is no good way to measure the virtual queue that underlies these measures. A percent of sailings full measure is still relevant and may indicate times when people would like to get reservations and are not able to.
- Description of customer experience. Whether or not a customer can board his/her desired sailing is captured by this measure and is one indicator of that customer's experience.
- Identifies asset utilization. Because this measure is not solely focused on the peak, it is a better indicator of asset utilization than a standard based on wait times during the peak periods.
- Identifies peak congestion. A percent of sailings full measure will be able to identify routes where peak sailings are full, even if the rest of the day's sailings are significantly under-utilized.



8.2 A Framework for Setting LOS Standards

Previous planning efforts assumed that LOS standards defined when service needed to be added. While LOS standards should be a factor in service addition decisions, they can only be one factor given funding constraints and other options available to the ferry system (like the implementation of pricing and operational strategies).

Exhibit 8
Future Service Addition Decisions

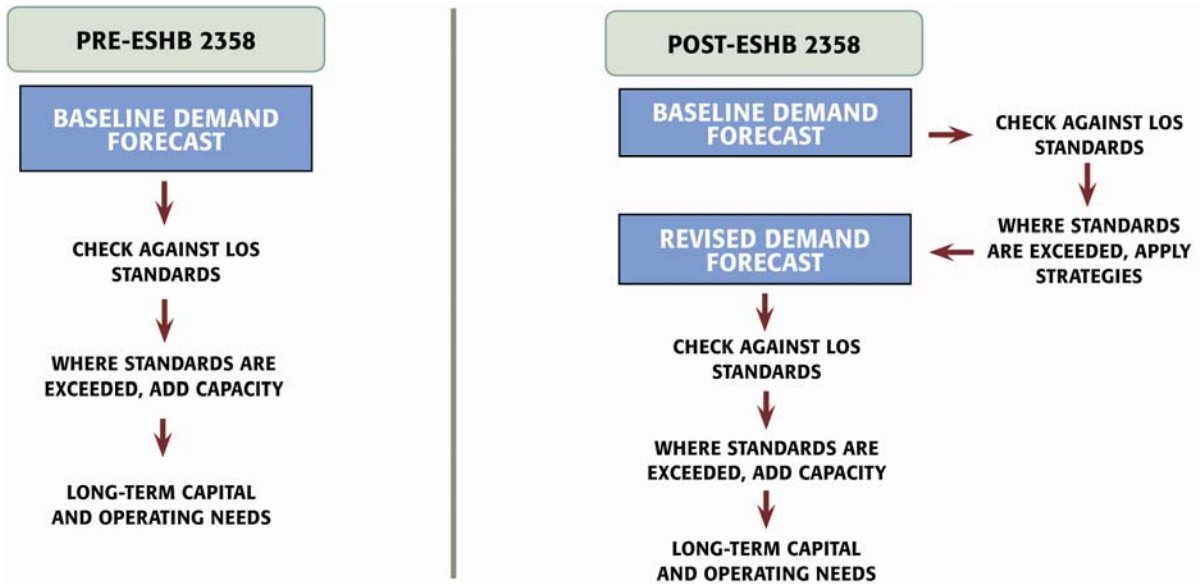


Exhibit 8 illustrates how WSF’s existing LOS standards have been used in previous planning efforts and proposes a different way to incorporate LOS standards into planning efforts that is more consistent with the intent of recent legislation.

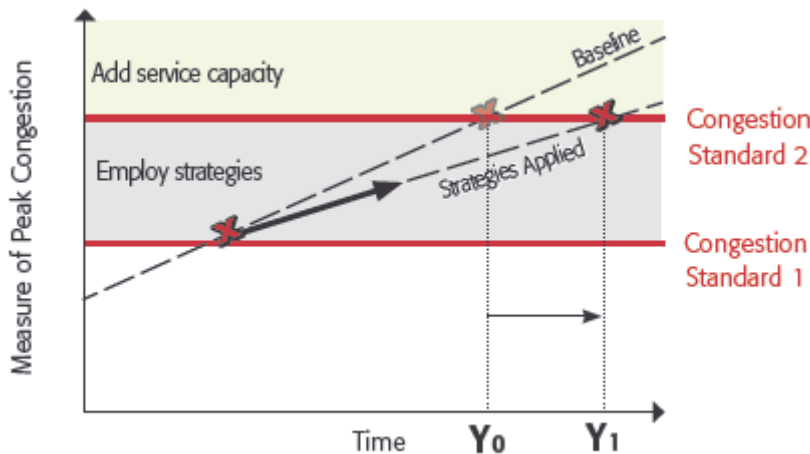
Under this paradigm, two standards are needed, one to indicate when additional pricing and operational strategies might be needed, and one to indicate when additional service might be needed. The first standard should not be viewed as a minimum criterion to be achieved before adaptive management strategies are deployed (i.e. strategies that have systemwide benefits should be considered no matter what a route’s performance against its LOS standard is). Rather, it should be an indicator of when WSF might consider more targeted, route-specific strategies to alleviate congestion and spread demand to sailings where capacity exists.

Similarly, the second standard should not automatically be a trigger for additional investment. It should be used as an indicator that

identifies when existing assets are being used most effectively and WSF might begin considering additional investment.

Exhibit 9 shows how the notion of two standards might be advantageous to the ferry system. By identifying the need for targeted adaptive management strategies on a route, WSF has the opportunity to gradually employ such strategies, minimizing potentially negative impacts to customers while forestalling the need for additional investment.

**Exhibit 9
Congestion Standards**



How Should the Standards be Set for Each Route

The following examples illustrate what a percent of sailings full measure means with respect to congestion and asset utilization and how the measure might change in response to changing conditions on or between routes.

Commuter Routes: Seattle-Bremerton

Seattle-Bremerton is primarily a commuter route that experiences substantially more traffic during daily commute times. On an average weekday, there are 14 westbound departures, 4 of which (29%) fall in the 3:00-7:00PM afternoon peak window.

Exhibit 10 shows actual volume-to-capacity ratios – the percentage of vehicle space (capacity) on a vessel that is taken up by paying vehicles (volume) – for Seattle-Bremerton in May 2006. During the weekday afternoon peak, over 80% of the vehicle deck space is filled, as opposed to other times during the day when less than 40% of the vehicle deck space is filled, on average.



Exhibit 10 Seattle-Bremerton Daily Volume-to-Capacity Ratios

Seattle - Bremerton Westbound								
May 2006 Actual Volume to Capacity Ratios								
	SAT	SUN	MON	TUES	WED	THURS	FRI	Average
Morning (Until 10:59 AM)	0.41	0.28	0.36	0.34	0.36	0.39	0.61	0.39
Midday (11:00 - 2:59 PM)	0.57	0.58	0.37	0.40	0.39	0.48	0.53	0.47
Afternoon Peak (3:00 PM - 6:59 PM)	0.57	0.52	0.83	0.84	0.81	0.81	0.89	0.75
Evening (7:00 PM and After)	0.26	0.31	0.13	0.20	0.20	0.41	0.35	0.26
Average	0.43	0.40	0.43	0.45	0.45	0.55	0.60	0.47

Exhibit 11, in comparison, shows the percent of sailings with vehicle decks that were filled to capacity. On average, one boat of the four westbound peak departures fills to capacity. During the week, 7% of westbound sailings fill to capacity.

Unlike volume-to-capacity (v/c), percent of sailings full provides some insight into the customer experience. The average weekly v/c of 0.47 would suggest that there is no congestion issue at all, whereas 7% of sailings filled indicates that while there generally is not a congestion issue, a small portion of vehicles cannot board their preferred sailing.

In total, the pattern shown in Exhibit 11 suggests that there is still room on Bremerton vessels to accommodate more vehicles. With respect to maximizing asset utilization, these exhibits suggest that while WSF may be able to shift some demand to off-peak time periods, it is unlikely that the Seattle-Bremerton route will ever be able to achieve 100% of sailings filled given the nature of the route and the low vehicle volumes on off-peak sailings.

The Bremerton example is unique in that excess vehicle capacity is expected to be filled in part by customers who can shift from Bainbridge or Kingston, especially if a reservation system is in place to facilitate this shift. The proposed LOS measure of percent of sailings full will indicate to what extent this substitution is occurring.

Exhibit 11 Seattle-Bremerton Actual Daily Percent of Sailings Filled

Seattle - Bremerton Westbound								
May 2006 Actual Percent of Sailings Filled								
	SAT	SUN	MON	TUES	WED	THURS	FRI	Average
Morning (Until 10:59 AM)	-	-	-	-	-	-	25%	4%
Midday (11:00 - 2:59 PM)	-	-	-	-	-	-	-	0%
Afternoon Peak (3:00 PM - 6:59 PM)	-	-	25%	25%	25%	-	75%	21%
Evening (7:00 PM and After)	-	-	-	-	-	-	-	0%
Average	0%	0%	7%	7%	7%	0%	29%	7%

Recreational Routes: Port Townsend-Keystone

Port Townsend-Keystone has a ridership pattern that is much different than that of Seattle-Bremerton. The larger volume of recreational riders on this route leads to a trip distribution that is less concentrated in the peak and more evenly spread throughout the day.

Exhibit 12 shows daily v/c ratios for Port Townsend-Keystone. With a couple of exceptions, weekday ridership is evenly spread, and more congestion exists on the weekends.

**Exhibit 12
Port Townsend-Keystone Daily Volume-to-Capacity Ratios**

Port Townsend - Keystone Westbound								
May 2006 Actual Volume to Capacity Ratios								
	SAT	SUN	MON	TUES	WED	THURS	FRI	Average
Morning (Until 10:59 AM)	0.68	0.52	0.90	0.83	0.65	0.73	0.68	0.71
Midday (11:00 - 2:59 PM)	0.97	1.01	0.43	0.34	0.42	0.43	0.61	0.60
Afternoon Peak (3:00 PM - 6:59 PM)	1.08	0.79	0.48	0.43	0.47	0.47	0.57	0.61
Evening (7:00 PM and After)	0.53	0.45	0.36	0.39	0.48	0.28	0.49	0.43
Average	0.87	0.81	0.54	0.48	0.50	0.51	0.60	0.59

For comparison purposes, Exhibit 13 shows percent of sailings filled. While the average of 14% is relatively low, the pattern below shows significant congestion on the weekends, with 100% of sailings overloaded during certain time periods.

Together, these exhibits show a pattern that indicates Port Townsend-Keystone should be able to achieve a higher percent of sailings full than Seattle-Bremerton, particularly with implementation of a reservation system. Because ridership is more spread out during the day, as ridership grows all sailings can achieve greater utilization, not just those in and around the peak.

**Exhibit 13
Port Townsend-Keystone Actual Daily Percent of Sailings Filled**

Port Townsend - Keystone Westbound								
May 2006 Actual Percent of Sailings Filled								
	SAT	SUN	MON	TUES	WED	THURS	FRI	Average
Morning (Until 10:59 AM)	-	-	33%	33%	-	-	-	10%
Midday (11:00 - 2:59 PM)	67%	100%	-	-	-	-	-	24%
Afternoon Peak (3:00 PM - 6:59 PM)	100%	33%	-	-	-	-	-	19%
Evening (7:00 PM and After)	-	-	-	-	-	-	-	0%
Average	50%	50%	7%	7%	0%	0%	0%	14%

To further illustrate the difference between patterns on commuter and recreational routes, take the example of a typical Friday in May. Both Port Townsend-Keystone and Seattle-Bremerton have a daily v/c of 0.6 on Friday (i.e. on average, 60% of the vehicle deck space is filled). Because ridership is more spread out during the day on Port



Townsend-Keystone, 0% of the sailings are filled to capacity. By contrast, 29% of Bremerton's sailings are filled to capacity.

Choosing LOS Standards by Route

To determine where LOS standards might be appropriately set, an analysis was undertaken using 2006 actual ridership data adjusted to reflect the 2030 demand forecasts. The following table shows projected percent of sailings full (of vehicles) by route, assuming no additional services are added, no strategies are employed, and prices are not raised above inflationary levels.

**Exhibit 14
Estimated Percent Sailings Full by Route**

Route	2006 Westbound Weekly Averages			2030 Expected Westbound Weekly Averages		
	January	May	August	January	May	August
Pt. Defiance - Tahlequah	0%	0%	1%	1%	0%	1%
Pt. Townsend - Keystone	12%	14%	37%	89%	84%	97%
Mukilteo - Clinton	22%	32%	39%	30%	51%	62%
Fauntleroy - Vashon	15%	19%	10%	50%	41%	54%
Fauntleroy - Southworth	29%	24%	24%	46%	45%	47%
Seattle - Bremerton	4%	7%	12%	8%	15%	21%
Edmonds - Kingston	6%	22%	32%	34%	58%	82%
Seattle - Bainbridge	15%	29%	36%	39%	61%	67%
Anacortes - San Juan Islands	10%	31%	36%	24%	48%	45%
Anacortes - Sidney	N/A	0%	7%	N/A	0%	100%

With respect to asset utilization, the analysis of ridership patterns on commuter and recreational routes would indicate that recreational routes might expect to be able to achieve a higher percent of sailings filled due to customer flexibility in travel times. The projections for Seattle-Bremerton and Port Townsend-Keystone shown in Exhibit 14 above illustrate this notion.

With respect to the customer experience, once a large portion of sailings are filled it indicates congestion and overloaded sailings, especially if the portion of sailings filled represents more than just the typical peak.

Proposed Standards by Route

The proposed LOS Standards will ultimately need to reflect the strategies and investments prescribed in the plan. Based on the 2030 LOS expectations detailed above (which assume today’s baseline service levels and sailing schedules), the following proposed standards are being put forth for further review and comment.

**Exhibit 15
Proposed LOS Standards by Route**

Route	Level 1 Standards (Consider Targeted Strategies to Spread Demand and Improve Customer Experience)			Level 2 Standards (Assets are Being Used Efficiently, Consider Additional Investment)		
	January	May	August	January	May	August
	Pt. Defiance - Tahlequah	25%	25%	30%	50%	50%
Pt. Townsend - Keystone	25%	30%	35%	75%	75%	85%
Mukilteo - Clinton	25%	25%	30%	65%	65%	75%
Fauntleroy - Vashon	25%	25%	30%	50%	50%	60%
Fauntleroy - Southworth	25%	25%	30%	50%	50%	60%
Seattle - Bremerton	25%	25%	30%	50%	50%	60%
Edmonds - Kingston	25%	25%	30%	65%	65%	75%
Seattle - Bainbridge	25%	25%	30%	65%	65%	75%
Anacortes - San Juan Islands	25%	30%	35%	65%	75%	85%
Anacortes - Sidney	N/A	50%	50%	N/A	100%	100%

Exhibit 15 above proposes two levels of LOS standards by route and season. In general, standards are higher in the summer months to reflect additional recreational ridership on all routes and standards are higher on recreational routes to reflect an increased feasibility of spreading ridership to under-utilized sailings.

The following specific considerations have also been incorporated:

Level 1 Standards

- The 25% standard reflects a situation in which all peak sailings are filled to capacity, but other sailings are not, indicating opportunities to spread demand through adaptive management strategies
- Anacortes-San Juan Islands and Port Townsend-Keystone have standards that increase to 30% in May and 35% in August to reflect greater seasonality in recreational ridership
- All other routes have a 30% standard in August to reflect some increased seasonal ridership
- Anacortes-Sidney currently has only two departures per day, suggesting a 50% level 1 standard



Level 2 Standards

- Routes with very pronounced peak trends have standards at 50% in January and May, reflecting a situation in which all peak sailings are filled and demand has been spread to fill half of the sailings in time blocks surrounding the peak (essentially doubling the length of the peak period)
- Although the actual and projected performance against the proposed standard for Bremerton is much lower than other routes, Bremerton has proposed standards consistent with other commuter routes under the assumption that a reservation system will help to shift excess demand from Bainbridge and Kingston to Bremerton
- Routes with very pronounced peak trends have standards at 60% in August to reflect additional seasonal ridership
- Routes that have a mix of peak and commuter traffic have standards at 65% in January and May (75% in August) to reflect an increased ability to spread demand throughout the day (due to more time flexibility amongst customers)
- Port Townsend-Keystone has January and May standards at 75% (85% in August) to maximize utilization amongst a customer base that has the greatest time flexibility
- Anacortes-San Juan Islands standards reflect seasonality amongst recreational riders but have been adjusted downwards from Port Townsend-Keystone due to a unique sailing schedule that accommodates several destinations (i.e. a 50% standard could indicate that sailings to Orcas are 100% full while sailings to Friday Harbor have additional capacity, for example).

While these LOS standards may seem high, indicating degradation in service, it is important to consider them in conjunction with a reservation system (discussed in more detail in following sections) and other adaptive management strategies. Furthermore, they reflect the financial situation of WSF, and help ensure that assets are fully utilized before significant capital investments are considered.

9. LOS IMPLEMENTATION ISSUES

The proposed LOS standards will be reviewed and possibly refined based on work with locally affected jurisdictions after the completion of the final Long-Range Plan. WSF would have preferred to go through this process before the final plan is finished, but it was not possible given several factors affecting the timing of the work.

In particular, it was necessary to consider the LOS implications of potential operational and pricing strategies on the potential design of a new standard. Also, the last time that WSF adopted a revised LOS standard for a route (Mukilteo-Clinton) in 1996, the process of working with the local jurisdiction took more than a year.

There are two factors that largely mitigate concerns with the approach to finalizing LOS standards after the final Long-Range Plan has been completed.

1. The revised approach to LOS standards makes the standard just one of several factors that will influence possible service changes. As a result, the LOS standards no longer have as direct an impact on the proposed service levels in the Long-Range Plan.
2. For all jurisdictions, except Whidbey Island, the ferry LOS standards do not have an impact on local growth management concurrency plans. In the case of Whidbey Island, WSF will work closely with the County to establish an LOS standard that fits with local land use and transportation planning goals.

