

CHAPTER 11: WHAT DID WE LEARN ABOUT PASSENGER TERMINAL CAPACITY?

Why is it Important?

Passenger terminal capacity is a measure of how many passengers can be processed through an airport's terminal facilities during peak periods of activity while maintaining an acceptable level of customer service and convenience. Terminal capacity takes into account all facilities required to move passengers from curb front to aircraft and gauges the minimum recommended terminal building area needed to accommodate the anticipated demand.

When passenger terminals exceed their peak hour capacity customer service levels decline, passenger crowding and congestion occurs, and passenger processing times increase along with airport and airline operating costs.

What does the current system look like?

Washington Airports with Scheduled Passenger Service

During Phase I, the peak hour enplaned passenger capacity was calculated for the terminal area of each Washington airport that offered scheduled passenger service in 2005. These capacity calculations were based on adjusted industry standards that measure the ability to efficiently process enplaned passengers against the total square footage of the terminal building. The exact formula used is discussed in detail in the technical report. The existing peak hour enplaned passenger capacities for all Washington airports are presented in Figure 166 of the Phase I report document.

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In 2005, there were 20 airports statewide reporting at least some level of scheduled passenger service. Airports with scheduled passenger service ranged from Sea-Tac International Airport serving as the Pacific Northwest's gateway to national and international destinations, to small local airports and seaplane bases feeding passengers to the large commercial facilities. Washington airports reporting scheduled passenger service in 2005 are presented in Figure 166.

Figure 166: Washington Airports with Scheduled Passenger Service, 2005

Airport	2005 Enplaned Passengers	2005 Peak Hour Passengers	Passenger Terminal Peak Hr Capacity
Anacortes	1,626	9	9
Bellingham International / ¹	103,212	30	149
Boeing Field/King County Int'l	46,799	7	160
Friday Harbor	13,017	8	22
Grant County International	12,165	15	132
Orcas Island	4,490	7	7
Kenmore Air Harbor Inc.	10,000	8	8
Kenmore Air Harbor SPB	34,000	8	8
Pangborn Memorial	38,434	30	89
Pullman/Moscow Regional	23,059	30	51
Seattle-Tacoma International	14,245,829	4,800	8,065
Spokane International	1,565,529	746	2,205
Tri-Cities	239,320	185	271
Walla Walla Regional	24,700	30	206
William R. Fairchild International	18,932	7	29
Yakima Air Terminal	57,483	30	176

Note: Kenmore Air Harbor is counted as two commercial service facilities according to the proposed State Airport Classifications; commercial scheduled service is offered at two facilities – Lake Union and Lake Washington.

¹ As of 2006, Bellingham has increased its large jet service (130-150 seat MD83/87s) operations which have resulted in a much higher utilization of the airport terminal at peak hour – approximately 80 percent capacity.

Passenger Terminal Facilities by Special Emphasis Region

Six of the 20 airports with scheduled passenger service are located within a Special Emphasis Region. These six airports accounted for 89 percent of Washington's total enplaned passengers in 2005.

Based on the Special Emphasis Regions defined under LATS Phase I, six of the 20 airports with scheduled passenger service are located within a Special Emphasis Region. These six airports accounted for 89 percent of Washington's total enplaned passengers in 2005. Of the six airports within a Special Emphasis Region, the four facilities within the PSRC Region accounted for 87 percent of 2005 statewide enplanements.

A comparison of each airport's 2005 peak hour enplanement capacity against existing peak hour demand indicated that all airports were operating at or below their capacity limits.

Figure 167: Washington Airports with Scheduled Passenger Service by Special Emphasis Region, 2005

Airport	2005 Enplaned Passengers	2005 Peak Hour Passengers	Passenger Terminal Peak Hr Capacity
PSRC Special Emphasis Region			
Boeing Field/King County Int'l	46,799	7	160
Kenmore Air Harbor, Inc.	10,000	8	8
Kenmore Air Harbor SPB	34,000	8	8
Seattle-Tacoma International	14,245,829	4,800	8,065
Southwest Special Emphasis Region			
None			
Spokane Special Emphasis Region			
Spokane International	1,565,529	746	2,205
Tri-Cities Special Emphasis Region			
Tri-Cities	239,320	185	271

Note: Kenmore Air Harbor is counted as two commercial service facilities according to the proposed State Airport Classifications; commercial scheduled service is offered at two facilities – Lake Union and Lake Washington.

Passenger Terminal Facilities by RTPO Area

The PSRC area, dominated by Sea-Tac International Airport, accounts for over 87 percent of all enplanements in the state.

Washington airports with scheduled passenger service are listed by RTPO area in Figure 168. The PSRC area, dominated by Sea-Tac International Airport, accounts for over 87 percent of all enplanements in the state. When the additional 9.5 percent of state passengers contributed by the Spokane RTPO are added, the two planning areas account for a combined total of 97 percent of overall Washington enplaned passengers. In 2005, although some Washington airports with scheduled passenger service operated at their theoretical limits, none actually exceeded the calculated peak hour capacity of their terminal facilities.

Figure 168: Washington Airports with Scheduled Passenger Service by RTPO Area, 2005

Airport by RTPO	2005 Enplanements	% of 2005 Washington Enplanements	2005 Peak Hour Passengers	Passenger Terminal Peak Hr Capacity
Benton-Franklin-Walla Walla				
Tri-Cities	239,320	1.46%	185	271
Walla Walla Regional	24,700	0.15%	30	206
North Central				
Pangborn Memorial	38,434	0.23%	30	89
Other (San Juan Islands)				
Friday Harbor	13,017	0.08%	8	22
Orcas Island	4,490	0.03%	7	7
Palouse				
Pullman/Moscow Regional	23,059	0.14%	30	51
Peninsula				
William R. Fairchild International	18,932	0.12%	7	29
PSRC				
Boeing Field/King County Int'l	46,799	0.28%	7	160
Kenmore Air Harbor, Inc.	10,000	0.06%	8	8
Kenmore Air Harbor SPB	34,000	0.21%	8	8
Seattle-Tacoma International	14,245,829	86.66%	5,500	8,065
Quad County				
Grant County International	12,165	0.07%	15	132
Skagit/Island				
Anacortes	1,626	0.01%	9	9
Spokane				
Spokane International	1,565,529	9.52%	746	2,205
Whatcom				
Bellingham International / ¹	103,212	0.63%	30	149
Yakima Valley				
Yakima Air Terminal	57,483	0.35%	30	176
Total Enplanements	16,438,595	100.00%		

Note: Kenmore Air Harbor is counted as two commercial service facilities according to the proposed State Airport Classifications; commercial scheduled service is offered at two facilities – Lake Union and Lake Washington.

¹ As of 2006, Bellingham has increased its large jet service (130-150 seat MD83/87s) operations which have resulted in a much higher utilization of the airport terminal at peak hour – approximately 80 percent capacity.

What Was the Scope of Our Analysis?

The passenger terminal capacity methodology established in Phase I was applied to Phase II forecasts to identify potential future terminal capacity constraints at those airports with scheduled passenger service. The project team utilized an industry standard mathematical formula developed by the FAA and outlined in Advisory Circular 150/5360-13 *Terminal Planning and Design Guidelines*. This AC suggests that approximately 150 square feet of building should be allotted for each peak hour enplaned passenger. Because this estimate was made prior to 2001, the 150 square feet per peak hour passenger ratio is understated given the increased need for security facilities that have arisen since then. The figure used in this analysis is 175 square feet of passenger terminal per peak hour enplaned

passenger. This means that more capacity constraints will be identified in LATS than in master plan studies that use the 150 square feet per peak hour passenger ratio. Additionally, the application of this planning formula to all airports offering commercial service in the state, regardless of size and service levels, can produce varying results. In the case of airports with high passenger volumes such as Sea-Tac and Spokane International, the square footage application gives a reliable estimation of the terminal needs. At smaller facilities such as Anacortes and Orcas Island, the figure may overstate the need. However, for planning purposes the formula is effective for identifying the scale of future need for expanded terminal facilities.

Forecasts of future peak hour enplaned passengers were compared against terminal peak hour capacities calculated during Phase I.

For those airports with scheduled passenger service, forecasts of future peak hour enplaned passengers were compared against terminal peak hour capacities calculated during Phase I. Increases in peak hour enplaned passenger demand over 2005 capacity levels resulted in an associated increase in the overall passenger terminal area at the ratio of 175 square feet of terminal area per peak hour enplaned passenger as cited above.

This capacity estimate does not address the adequacy of individual facilities within the terminal. Such a determination requires an in-depth terminal programming and planning effort. Rather the terminal capacities shown herein will be limited to an estimate of whether adequate square footage is available for processing passengers. The underlying assumption is that internal reassignment of spaces could occur to address any inadequacies in specific facilities.

It is also noted that, although many airports differentiate between terminal facilities and airline gates, this methodology does not.

Results

Statewide Perspective

Peak hour passenger demand is driven to a large degree by airline flight schedules, aircraft seating capacity and enplaned passenger levels – all factors which cannot be predicted with any high degree of accuracy over the next 25 years. Consequently, it is assumed that the relationship of peak hour enplaned passengers to annual enplaned passengers experienced in 2005 will remain constant over the forecast period. As overall enplaned passenger levels increase, peak hour passengers will also increase. This assumes either larger aircraft will be added to the air carrier's flight schedule or additional aircraft departures will occur during the peak hour – likely driven by competing carriers entering the market as passenger levels grow. Based on these assumptions and the Phase II forecasts of

future passenger enplanements, 2030 peak hour passenger demands are presented below in comparison to existing demand.

As is shown in Figure 169, several airports are operating from terminals that are at or near capacity. These are mostly commercial service airports with low passenger levels but correspondingly small terminals. Included in this category are the Anacortes Airport, Orcas Island, Kenmore Air Harbor, Inc. and Kenmore Air Harbor SPB. Among the larger commercial service facilities, Sea-Tac and Tri-Cities passenger levels each constitute 68 percent of the theoretical peak hour capacity of their forecast terminal capacity, above FAA's 60 percent threshold to initiate planning for increased capacity. In 2005, Pullman-Moscow at 59 percent capacity is barely below the 60 percent capacity mark. The remaining airports have no current issues concerning terminal capacity with the exception of Bellingham International (BLI) where airline service increases have occurred since 2005. BLI is currently estimated to be operating at approximately 90 percent of capacity as of 2007.

Figure 169: Peak Hour Enplaned Passenger Forecasts v. Terminal Capacity

Airport	2005 Terminal Peak Hr Capacity	2005		2030		Additional Terminal Area Required (sq. ft.)
		Peak Hour Passengers	Capacity Utilization (%)	Peak Hour Passengers	Capacity Utilization (%)	
Anacortes	9	9	100%	32	350%	4,025
Bellingham International ¹	149	30	20%	73	49%	
Boeing Field/King County International	160	7	4%	11	7%	
Friday Harbor	22	8	37%	19	86%	
Grant County International	132	15	11%	22	17%	
Orcas Island	7	7	100%	11	153%	700
Kenmore Air Harbor, Inc.	8	8	100%	13	161%	875
Kenmore Air Harbor SPB	8	8	100%	13	161%	875
Pangborn Memorial	89	30	34%	72	81%	--
Pullman/Moscow Regional	51	30	59%	49	96%	--
Seattle-Tacoma International	8,065	5,500	68%	10,274	127%	386,575
Spokane International	2,205	746	34%	1,637	74%	--
Tri-Cities	271	185	68%	313	115%	7,350
Walla Walla Regional	206	30	15%	59	29%	--
William R. Fairchild Int'l	29	7	24%	10	34%	--
Yakima Air Terminal	176	30	17%	56	32%	--

Note: ¹Ongoing passenger carrier activity and studies at Bellingham suggest that BLI needs further review and analysis vis a vis long-term forecasts and capacity calculations.

Passenger Terminal Capacity by Special Emphasis Regions

Six of the 20 Washington airports with scheduled passenger service fall within the four Special Emphasis Regions. Four of the Special Emphasis Region passenger airports are expected to exceed their current peak hour enplaned passenger capacities by 2030, with three of the four facilities located in the PSRC Region. Spokane International, on the verge of expansion at 74 percent capacity, would constitute the fifth airport requiring terminal expansion. However, citing the number of airports requiring terminal expansion alone can be misleading given the wide variation in the extent of expansions needed. The demand for additional peak hour enplaned passenger capacity at Sea-Tac International Airport exceeds all the remaining Special Emphasis Region airports combined.

Figure 170: Peak Hour Enplaned Passenger Forecasts v. Terminal Capacity by Special Emphasis Region

Airport	2005 Terminal Peak Hr Capacity	2005		2030		Additional Terminal Area Required (sq. ft.)
		Peak Hour Passengers	Capacity Utilization (%)	Peak Hour Passengers	Capacity Utilization (%)	
PSRC Special Emphasis Region						
Boeing Field/King County International	160	7	4%	11	7%	
Kenmore Air Harbor, Inc.	8	8	100%	13	161%	875
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Seattle-Tacoma International	8,065	4,800	68%	10,274	127%	386,575
Southwest Special Emphasis Region						
None						
Spokane Special Emphasis Region						
Spokane International	2,205	746	34%	1,637	74%	--
Tri-Cities Special Emphasis Region						
Tri-Cities	271	185	68%	313	115%	7,350

Note: Kenmore Air Harbor is counted as two commercial service facilities according to the proposed State Airport Classifications; commercial scheduled service is offered at two facilities – Lake Union and Lake Washington.

Passenger Terminal Capacity by RTPO Area

Under the RTPO Area analysis, one additional airport is projected to need passenger terminal expansion by 2030 over those cited under the ESSB Special Region analysis. The airport is Anacortes in the Skagit Island RTPO. The Bellingham International passenger terminal is also expected to require expansion as well; however, the extent of additional capacity needed is currently under review. As noted in Figure 171 on the following page, with the exception of Seattle-Tacoma International Airport, the majority of passenger terminal expansions are modest given the low level of peak hour passenger activity at the smaller airports.

**Figure 171: Peak Hour Enplaned Passenger Forecasts
v. Terminal Capacity by RTPO Area**

Airport	2005 Terminal Peak Hr Capacity	2005		2030		Additional Terminal Area Required (sq. ft.)
		Peak Hour Passengers	Capacity Utilization (%)	Peak Hour Passengers	Capacity Utilization (%)	
Benton-Franklin-Walla Walla						
Tri-Cities	271	185	68%	313	115%	7,350
Walla Walla Regional	206	30	15%	59	29%	--
North Central						
Pangborn Memorial	89	30	34%	72	81%	--
Other (San Juan Islands)						
Friday Harbor	22	8	37%	19	86%	
Orcas Island	7	7	100%	11	153%	700
Palouse						
Pullman/Moscow Regional	51	30	59%	49	96%	--
Peninsula						
William R. Fairchild Int'l	29	7	24%	10	34%	--
PSRC						
Boeing Field/King County International	160	7	4%	11	7%	
Kenmore Air Harbor, Inc.	8	8	100%	13	161%	875
Kenmore Air Harbor SPB	8	8	100%	13	161%	875
Seattle-Tacoma International	8,065	4,800	68%	10,274	127%	386,575
Quad County						
Grant County International	132	15	11%	22	17%	
Skagit/Island						
Anacortes	9	9	100%	32	350%	4,025
Spokane						
Spokane International	2,205	746	34%	1,637	74%	--
Whatcom						
Bellingham International ¹	149	30	20%	73	49%	
Yakima Valley						
Yakima Air Terminal	176	30	17%	56	32%	--

Note: ¹Ongoing passenger carrier activity and studies at Bellingham suggest that BLI needs further review and analysis vis a vis long-term forecasts and capacity calculations.

Key Findings

Provided below is a summary of key findings resulting from the passenger terminal capacity analysis.

- The need for passenger terminal expansion is driven by increased peak hour demand.
- The four smallest airports with scheduled passenger service (Anacortes, Orcas Island, Kenmore Air Harbor, Inc. and Kenmore Air SPB) operate at 100 percent of their current capacity. This causes these facilities to be very congested during peak conditions.
- Sea-Tac International and Tri-Cities are operating at greater than 60 percent capacity – the FAA threshold at which planning for additional capacity should be initiated.
- Bellingham International is operating above its capacity due to recent service increases that have occurred since 2006.
- Six out of the 20 Commercial Service Airports will need to address terminal capacity before 2030 including:
 - Anacortes
 - Kenmore Air Harbor, Inc.
 - Kenmore Air Harbor SPB
 - Orcas Island
 - Sea-Tac International
 - Tri-Cities
- Of these, four will need to actively expand their terminal buildings, while two will reach 60 percent of their capacity and will need to begin planning for expansion.
- Although not shown as requiring expansion in this analysis due to the fact that the base year, 2005, preceded the airports growth increases and forecasts were based on this number, Bellingham International experienced rapid passenger growth in 2006 and 2007. This growth included new airlines offering service and large increases in the number of peak hour passengers. Studies done by the Port of Bellingham to address this issue have revealed that the airport will need passenger terminal expansion by 2009.
- By 2030, Spokane International Airport is expected to exceed FAA's 60 percent threshold to initiate planning for additional capacity.

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