Washington State Department of Transportation

Washington State
Long-Term Air Transportation Study

Phase II Technical Memos

Airport System Forecasts and Capacity Assessment

June 30, 2007

The following statement is provided as required by Paragraph 429.a of Federal Aviation Administration (FAA) Order 5100.38, Airport Improvement Program (AIP) Handbook:

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TABLE OF CONTENTS

Air Cargo Forecasts 6

Aircraft Storage Capacity Analysis 11

Airfield, Passenger Terminal, and Air Cargo Capacity Analyses 12

Airport Classification and Evaluation Criteria 59

Airspace Analysis 128

3. Methodology 133

4. Analysis 134

Commercial Service Passenger Traffic and Operations Forecasts 143

General Aviation Activity Forecasts 144

High-Speed Passenger Transportation Facilities and Services 145

AIR CARGO FORECASTS

Washington State Department of Transportation, Aviation Division
Washington State Long Term Air Transportation Study (LATS)

To: John Shambaugh, WSDOT/Aviation Division
David Hollander, SH&E

From: John Yarnish, URS Corporation

Date: May 15, 2007

Subject: *Phase II –Draft Technical Memorandum (Air Cargo) Task 26 - Compare Forecast Demand versus Capacity and Identify Facility needs by Airport/Airspace Analysis Element-Airfield, Terminal and Air Cargo*

This memorandum sets forth the approach to the Air Cargo component of the Demand/Capacity Analyses performed under Task 26 of the Phase II LATS Study scope of work and solicits guidance and direction needed to complete the analysis. The purpose of this task is to determine which Washington State airports may be unable to accommodate future demand levels that result from the forecasts of aviation demand. Forecasts of future air cargo demand were prepared by SH&E and are presented in the *Washington State Air Cargo Forecast Technical Report* (March 19, 2007).

The following subsections are provided in this memorandum:

1. Summary of Key Findings
2. Existing Data/Available Information
3. Assumptions
4. Methodology
5. Analysis

1. Summary of Key Findings

The key finding of the air cargo capacity analysis to date is that there is no consistent basis of comparison between Washington airports for generating an assessment of cargo capacity. The significant variations in the volume, aircraft equipment and processing of cargo from airport to airport makes application of any standardized methodology meaningless. The following reflects the range of facilities and circumstances found to exist at Washington airports.

- Large commercial service airports with dedicated cargo apron and on-site cargo processing facilities. (Sea-Tac International)

- Large commercial service airports with dedicated cargo apron and on-site processing facilities, however an unknown but presumably large percentage of cargo is processed off-site (King County International/Boeing Field).

- Airports with large cargo aprons but little or no on-site processing building capacity (Spokane, Grant County).

- Small airports with small cargo aprons and small processing facilities.

- Small airports with no dedicated cargo apron and no processing facilities.

Cargo aircraft in use at Washington airports range from large wide-body freighters to small single-engine aircraft used by air courier services. At some airports, cargo is transferred directly from the aircraft to the local delivery vehicle with no sorting or local "processing" taking place. Consequently, no cargo building space is required at the airport and measuring capacity by building size is not feasible.

It is believed and recommended that, in light of the variation in cargo facilities and processing scenarios at Washington airports, an alternative methodology will need to be formulated for assessing existing and future cargo capacities at these airports. It is further recommended that guidance be provided by the air cargo consultant to the Phase II study regarding a suitable methodology to be used in completing this analysis.

2. Existing Data/Available Information

The base data required for the air cargo analyses was initially compiled during the Phase I inventory process of the LATS study and included in the Phase I Report. However, during preparation of the air cargo demand forecasts under Phase II, it was determined that certain Phase I data was incorrect. As a result, the corrected data has been used in preparing this analysis under Phase II. The *Air Cargo Forecast Technical Report* cited 15 Washington airports with cargo activity in 2005 including:

- Anacortes (OTS)
- Boeing Field (BFI)
- Grant County / Moses Lake (MWH)
- Kenmore Air Harbor (KEH)
- Omak (OMK)
- Pangborn Memorial / Wenatchee (EAT)
- Pullman / Moscow (PUW)

- Richland (RLD)
- Seattle / Tacoma (SEA)
- Skagit / Mount Vernon (BVS)
- Spokane (GEG)
- Tri-Cities / Pasco (PSC)
- Vista Field / Kennewick (ZXX)
- Walla Walla (ALW)
- William R. Fairchild / Port Angeles (CLM)

Of these airports, the top 10 facilities accounted for 99.8 percent of Washington cargo as follows.

Fig 1: 2005 Washington State Top 10 Airports in Air Cargo Tonnage

Rank	Airport		Tons	Percent of Total
1	SEA	Seattle/Tacoma	373,233	62.06%
2	BFI	Seattle Boeing Field	124,620	20.72%
3	GEG	Spokane Intl Apt	93,424	15.53%
4	PSC	Pasco	3,377	0.56%
5	YKM	Yakima Municipal Apt	2,268	0.38%
6	BLI	Bellingham	1,215	0.20%
7	EAT	Wenatchee	654	0.11%
8	MWH	Moses Lake Grant County	530	0.09%
9	CLM	Port Angeles	519	0.09%
10	BVS	Mount Vernon	384	0.06%
	All Others		1,211	0.20%
	Total		601,435	100.0%

Based on the distribution of cargo at Washington airports as presented above, it was determined that the air cargo analysis should focus on the top 10 facilities.

Comparing the 2005 cargo tonnage data against airport cargo apron and processing facilities reported during the Phase I inventory process, the following calculations of tons of cargo per square foot of apron and processing building were prepared.

Fig 2: 2005 Washington Airport Cargo Processing Ratios

Airport	Cargo Apron	Cargo Building	2005 Cargo Enplaned/Deplaned Tons*	Cargo Apron Tons/Sq. Ft.*	Cargo Building Tons/Sq. Ft.*
Sea-Tac	1,300,000	1,000,000	373,233	0.29	0.37
Boeing Field	30,000	30,000	124,620	4.15	4.15
Spokane	856,000	10,000	93,424	0.11	9.34
Pasco	NR	NR	3,377	-	-
Yakima	NR	NR	2,268	-	-
Bellingham	40,000	40,000	1,215	0.03	0.03
Wenatchee (Pangborn)	10,000	24,000	654	0.07	0.03
Moses Lake	3,000,000	NR	530	0.00	-
Port Angeles	37,500	12,000	519	0.01	0.04
Mount Vernon/ Skagit Reg'l	60,000	6,000	384	0.01	0.06

Note:" "NR" = None Reported

3. Assumptions

Under the Phase II Scope of Work, it was assumed that a standardized average volume of cargo processed per square foot of facility could be applied to dedicated cargo facilities at each airport to calculate an overall cargo processing capacity. That capacity, when compared to existing and forecast future cargo tonnage, would yield the relative level of utilization at each airport. However, in light of the existing data, not all airports have both dedicated cargo apron and on-site cargo processing facilities. Furthermore, airports with off-site cargo processing or direct aircraft-to-delivery operations will yield erroneous results under this modeling approach.

4. Methodology

The typical approach to modeling air cargo capacity at an airport is to assume a ratio of one ton of cargo processed per square foot of cargo processing building. Applying Phase II cargo forecast data to the reported square footage of dedicated air cargo buildings at the top 10 Washington cargo airports, capacity calculations were generated. The results of this analysis are presented in Section 5 below.

5. Analysis

Using the methodology cited above, i.e. assuming an annual cargo processing capacity of one ton per square foot of reported on-site cargo building space, capacity utilization calculations for 2005 and 2030 were

generated for the top 10 cargo airports. These are presented in Figure 3 below.

Fig 3: Washington Airport Cargo Capacity – 2005 to 2030

Airport	Estimated Capacity (tons)	2005 Total Tons	2005 Capacity Used	Forecast 2030 Total Tons	2030 Capacity Used
Sea-Tac	1,000,000	373,233	37%	853,405	85%
Boeing Field	30,000	124,620	**415%**	333,574	**1112%**
Spokane	10,000	93,424	**934%**	199,473	**1995%**
Pasco	NR	3,377	**Unknown**	8,384	**Unknown**
Yakima	NR	2,268	**Unknown**	4,535	**Unknown**
Bellingham	40,000	1,215	3%	3,088	8%
Wenatchee (Pangborn)	24,000	654	3%	1,349	6%
Moses Lake	NR	530	**Unknown**	1,118	**Unknown**
Port Angeles	12,000	519	4%	1,272	11%
Mount Vernon/ Skagit Reg'l	6,000	384	6%	984	16%

Note:" "NR" = None Reported

In Figure 3, the capacity calculations in bold red text are considered suspect or unreliable for use in the LATS study. Furthermore, the capacity calculations of the remaining airports may also change with the use of a more refined methodology. The following factors contribute to the low level of confidence in the capacity calculations presented above.

- Although Boeing Field experiences a large number of cargo operations, cargo is generally unloaded from aircraft parked at BFI and processed at off-airport locations.

- Spokane has a large cargo apron but a relatively small cargo building. This creates the impression that the airport has limited capacity when the standardized factors are applied.

- Pasco, Yakima, Bellingham, Wenatchee Moses Lake, Port Angeles and Skagit all have small cargo operations that feed into SEA, BFI or GEG and cargo handling procedures vary from airport to airport.

At this point, no further analysis has been conducted until a methodology producing a more reliable assessment of capacity can be identified. It is recommended that the LATS Phase II cargo consultant review the current findings and provide recommendations on how to proceed with the analyses.

AIRCRAFT STORAGE CAPACITY ANALYSIS

AIRFIELD, PASSENGER TERMINAL, AND AIR CARGO CAPACITY ANALYSES

Washington State Department of Transportation, Aviation Division
Washington State Long Term Air Transportation Study (LATS)

To: John Shambaugh, WSDOT/Aviation Division
David Hollander, SH&E

From: John Yarnish, URS Corporation

Date: May 10, 2007

Subject: *Phase II –Draft Technical Memorandum*
Task 26 - Compare Forecast Demand versus Capacity and Identify Facility needs by Airport/Airspace Analysis Element-Airfield, Terminal and Air Cargo

This memorandum sets forth the approach to the Demand/Capacity Analyses performed under Task 26 of the Phase II LATS Study scope of work. The purpose of this task is to determine which Washington State airports may be unable to accommodate the aviation demand levels that result from the forecasts of aviation demand. The approach to the Airspace Analysis, a sub-element of Task 26, is addressed in a separate Technical Memorandum.

The following subsections are provided in this memorandum:

1. Summary of Key Findings
2. Existing Data/Available Information
3. Assumptions
4. Methodology
5. Analysis

1. Summary of Key Findings

- Overall operations capacity statewide is more than adequate to accommodate long-term demand.
- While airports classified Recreation/Remote and Local Community > 10 Based Aircraft contribute 50 percent of system operations capacity they only experienced 24 percent of 2005 operations.
- Approximately 75 percent of statewide operations demand occurs at the Commercial and Regional Service airports - which constitute only 32 percent of Washington operations capacity.

- No airports outside the Puget Sound Region are expected to exceed their operating capacity during the forecast period.
- The concentration of operations activity at a few key airports within the Puget Sound Region reflects the significant imbalance in the system.
- Of the 20 busiest airports in Washington, 10 are located in the Puget Sound Region and account for over 65 percent of statewide operations by 2030.
- In 2005, four of the small airports with passenger service (Anacortes, Orcas Island, Kenmore Air Harbor and Kenmore Seaplane Base) have terminal facilities operating at 100 percent capacity while Sea-Tac International, and Tri-Cities are above the 60 percent threshold to initiate planning for increased passenger capacity.
- By 2030, Washington airports requiring expanded passenger facilities include Anacortes, Orcas Island, Kenmore Air Harbor and Kenmore Seaplane Base, Sea-Tac International, Tri-Cities and Bellingham International.
- *(Cargo capacity findings pending)*

2. Existing Data/Available Information

The base data required as the first step in the analyses under this task was compiled during Phase I of the LATS study and included in the Phase I Report. The airport elements to be analyzed under Task 26, along with the associated Phase I base data to be used in their analysis are identified below.

Airfield Capacity: The capacity of an airport's runway system measures the number of operations (take-offs or landings) that can occur annually at an airport. Airfield capacity is expressed in terms of Annual Service Volume (ASV) which estimates a runway and taxiway system's theoretical capacity to accommodate annual aircraft operations without incurring unacceptable levels of delay. While it is possible for an airport to operate while exceeding its calculated ASV, aircraft delay levels will increase as the number of operations rise above ASV levels. During Phase I, each airport's ASV was calculated for the existing airfield layout. The ASV's for NPIAS airports are presented on pages 17 and 18 of Appendix B in the Phase I Report Technical Appendices document. The ASV's for Non-NPIAS airports are presented in Figure 22 of the Phase I Report document.

Figure 1 below provides an overview of 2005 statewide operations capacity, as well as the percentage of system capacity used, as allocated by WSDOT airport classifications developed under Phase II. State system operations capacity is calculated based on the aggregate Annual Service Volumes for Washington airports identified during Phase I as noted above.

Figure 1: 2005 State System Capacity by Airport Classification

Airport Classifications	Overall % of System Capacity Provided	2005 Demand % of System Capacity Used
Commercial Service	15.6%	5.7%
Regional Service	16.0%	5.0%
Local Community >10	23.1%	2.0%
Local Community <10	13.1%	0.3%
Recreation/Remote	25.4%	1.4%
Seaplane Base	6.8%	0.2%
Totals	**100.0%**	**14.6%**

As noted in Figure 1, at the State level 2005 aircraft operations utilized less than 15 percent of overall system operations capacity. However, we also know that aircraft operations are not uniformly distributed among Washington state airports. It is the airports located in and around the major population and economic centers of the state that experience the greatest demand. During Phase I, six Washington airports were identified where 2005 operations exceeded 60 percent of the airport ASV – FAA's threshold for determining when planning may need to begin for additional capacity. As evident from Figure 2, the Washington airports where 2005 operations demand exceeded the 60 percent threshold were limited to facilities located in the Puget Sound Region.

Figure 2: Washington Airports Over 60 Percent Operations Capacity as of 2005

Airport Name	NPIAS Role	WSDOT Role	2005 Operations	Annual Service Volume	2005 Operations as% of ASV	Reserve Capacity
Kenmore Air Harbor, Inc.	Primary	Commercial Service	40,000	56,250	71.1%	28.9%
Sea-Tac International	Primary	Commercial Service	341,471	533,041	64.1%	35.9%
Boeing Field/King County Int'l	Commercial	Commercial Service	300,478	380,000	79.1%	20.9%
Auburn Municipal	Reliever	Regional Service	153,618	231,000	66.5%	33.5%
Harvey Field	Reliever	Regional Service	139,859	230,000	60.8%	39.2%
Kenmore Air Harbor SPB/ Lake Union	None	Seaplane Base	73,600	60,000	122.7%	-22.7%

The impact of future aviation demand on Washington airports through 2030 is analyzed under Section 5 of this memorandum.

Terminal Capacity: The goal in measuring capacity of the terminal area is to determine how many passengers can be processed through the facility during the peak hour while maintaining an acceptable level of customer service and convenience. During Phase I, the peak hour enplaned passenger capacity of the terminal area for all commercial service airports was calculated. 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. These standards have been adapted to account for the increase in space needed for the Transportation Security Administration (TSA) and other Post 9/11 security requirements as well as for the fact that small airports require more space per passenger than do larger commercial airports. This results from the fact that at larger airports some economies of scale are available that do not exist for smaller facilities. Minimal sizes for facilities not tied to specific passenger levels add to this factor.

The existing peak hour enplaned passenger capacities for all Washington airports are presented in Figure 23 of the Phase I report document. As is shown in Figure 23, 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. Include in this category are the Anacortes Airport, Orcas Island, Kenmore Air Harbor and Lake Union 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 respective terminal facilities, 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 estimated to be operating at approximately 90 percent of capacity in 2007.

Figure 3: Statewide Airport Classifications: Passenger Capacity, 2005

Airport	Passenger Terminal Peak Hr Capacity	2005 Peak Hour Passengers	Capacity Utilization (%)	Reserve Capacity (%)
Anacortes	9	9	100%	0%
Bellingham International /[1]	149	30	20%	80%
Boeing Field/King County Int'll	160	7	4%	96%
Friday Harbor	22	8	37%	63%
Grant County International	132	15	11%	89%
Orcas Island	7	7	100%	0%
Kenmore Air Harbor SPB	8	8	100%	0%
Kenmore Air Harbor Inc. /SPB Lake Union	8	8	100%	0%
Pangborn Memorial	89	30	34%	66%
Pullman/Moscow Regional	51	30	59%	41%
Seattle-Tacoma International	8,065	5,500	68%	32%
Spokane International	2,205	746	34%	66%
Tri-Cities	271	185	68%	32%
Walla Walla Regional	206	30	15%	85%
William R. Fairchild International	29	7	24%	76%
Yakima Air Terminal	176	30	17%	83%

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.

Cargo Capacity: Air cargo capacity is commonly measured as the annual enplaned cargo tonnage that can be processed through existing air cargo buildings or dedicated cargo apron areas. The cargo capacity for Washington airports was calculated during Phase I based on the existing square footage of dedicated cargo apron at those airports reporting cargo activity (*Phase I Report, Figure 24*).

Like other categories, cargo demand within the state is concentrated in the Puget Sound Region while capacity is available at numerous airports outside the region. In fact, many of the state's airports reported the existence of large apron areas available for cargo operation but no current activity. While handling the greatest cargo volumes of any airports evaluated under this study, Sea-Tac and Boeing Field/King County International are also the two most constrained airports in the state,

relative to reserve capacity. By contrast, Spokane International has approximately 99 percent of its capacity available and Skagit Regional Airport has more than 80 percent of its cargo capacity available.

A large portion of cargo volume operates as unscheduled activity and most airports have limited access to cargo volume information. USDOT provides limited information on cargo volume from carrier filings. Cargo carriers are sensitive to disclosing information for competitive reasons. Airports are able to document cargo operations/service so estimates can be developed, however cargo volume can vary greatly within many markets.

Historical cargo data collected during the Phase II demand forecasting process provided a more comprehensive breakdown of cargo activity at Washington airports than was available during compilation of the Phase I Report. As a result, the Phase II data has been adopted as the basis for the air cargo capacity analysis. Updated calculations of the existing and future capacity of Washington airports are provided in Section 5 of this report.

Figure 4: Top Ten Washington Cargo Airports - 2005

	2005 Enplaned Cargo	2005 Deplaned Cargo	2005 Total Cargo
Seattle-Tacoma International	187,128	186,105	373,233
Boeing Field/King County Int'l[1]	43,763	80,858	124,620
Spokane International	42,787	50,636	93,424
Tri-Cities/Pasco	1,784	1,593	3,377
Yakima Air Terminal	825	1,443	2,268
Bellingham International	885	330	1,215
Wenatchee	273	381	654
Grant County Int'l/Moses Lake	393	137	530
Wm Fairchild International	219	300	519
Skagit Regional	317	68	384

Existing airspace classifications in use throughout Washington State were addressed under LATS Phase I. During Phase II, airspace interactions between individual Washington airports were analyzed. As noted above, the Airspace analysis under this task is addressed by a separate Technical Memorandum.

Aircraft Storage: See Separate Technical Memorandum.

3. Assumptions

Airfield Capacity: The operational capacity of an airport, expressed in terms of the facility's ASV, is dependent on the mix or ratio of large to small aircraft operations. Under the Phase II analysis, unless the forecast shows a significant change in the fleet mix, it will be assumed that the historical mix of activity by aircraft type will remain essentially the same and that the airport's ASV will be unchanged over the forecast period. The exception will be if new runways have been added (or are programmed for construction) at the airport or other capacity enhancement projects have been completed or are programmed**.** A programmed project is one that has been identified as required in the airport's master plan and has had funding committed to its implementation. The airport's Capital Improvement Program will be the official source of "programmed" projects. Reference will also be given to the FAAs Overall Development Objectives (ODO) reports, although inclusion on this list does not constitute a dedication of funds.

Terminal Capacity: The terminal capacity methodology established in Phase I has been applied to Phase II forecasts to measure terminal facilities. In instances where terminal expansion or improvement projects have been completed or are programmed for construction the terminal capacity will be calculated based on the new or proposed building size.

Cargo Capacity: The analysis of cargo processing capacity and future air cargo facility needs assumes that the historic ratio of enplaned cargo tonnage per square foot of dedicated cargo apron at an airport will remain constant through the end of the forecast period.

Airspace: Assumptions applied to the Airspace analysis are described under the separate Airspace analysis Technical Memorandum.

Aircraft Storage: Assumptions applied to the analysis of Aircraft Storage are described under the separate Technical Memorandum

4. Methodology

Annual Aircraft Operations and Airfield Capacity

Measuring an airport's operations capacity is an important factor in decision-making as to whether airfield improvements will be required to support any future growth in activity. It also allows the consequences of inaction to be assessed in terms of time and money lost due to operational delays. For a state system plan, it is important to assess the capacity of each individual airport to determine where excess system capacity may

exist and the feasibility of shifting regional demand away from those facilities with insufficient capacity to meet anticipated demand.

The operations capacity of the airport is a measure of the theoretical maximum number of aircraft operations that can be accommodated on the airfield, or its components, over a specified period of time. There are a variety of techniques available for determining airfield capacity. The most widely accepted methodology is described in FAA Advisory Circular 150/5060-5, Airport Capacity and Delay. The analyses employed herein reference the guidance in this circular for determining the aircraft operational throughput capacity of the airfield system.

The capacity of a runway system considers several factors. Among these are:

- Meteorology
- Runway system configuration and use
- Air Traffic Control Procedures
- Aircraft fleet mix
- Airport operations characteristics including the percent of operations that are arrivals and departures (affects hourly capacities), and the percent that are touch-and-go
- The availability and spacing of exit taxiways

For this report, airfield capacity is measured in terms of the facility's Annual Service Volume (ASV). ASV estimates an airport's annual theoretical capacity to accommodate aircraft operations. The ASV accounts for differences in runway use, aircraft mix, weather conditions, and other factors that can occur over the period of a year. The ASV for the airports was determined using calculation methodology contained in FAA AC 150/5060-5. Where there was no full-length parallel taxiway at an airport, the capacity was reduced by 25 percent. Where master plans or other studies contained a detailed examination of the capacity, these numbers were used.

Commercial Airline Passengers

The ability of an airport to accommodate airline passengers depends on the terminal facilities available including roadways, parking and passenger terminal building The capacity of an airport terminal is measured by the number of passenger boardings (or enplanements) that can be processed through the passenger terminal during the peak hour. This is an important measurement of an airport's capacity because it provides a theoretical measurement for the airport's ability to accommodate increased service levels, larger capacity aircraft or increased passenger loads. From a system perspective, if an individual airport does not have available

capacity for passenger increases, steps need to be taken to provide additional capacity or the forecast passenger increases will either not materialize or will be transferred to a different airport. Most of the commercial service airports in Washington have completed master plans or other studies that have assessed the many factors (such as access road, auto parking, curb frontage, ticketing, security, and departure gates/lounges) that are used to determine the airport's terminal area needs. These plans address facilities required to serve peak hour passengers rather than the terminal's capacity.

To evaluate the terminal capacity of the commercial service airports in Washington State for this study, 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 report is 175 square feet of passenger terminal per peak hour enplaned passenger.

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.

Air Cargo

Air cargo capacity at an airport is measured as the annual enplaned tonnage that can be processed through the existing facilities. In measuring capacity at airports it is important to measure an airport's ability to handle increased cargo loads to assess whether the system can accommodate the changing needs of the air cargo industry. It is generally accepted that air cargo is an essential ingredient in economic growth for a community and a region. Therefore, well distributed air cargo capacity throughout an aviation system can be seen as serving this vital role. This is especially true for more remote communities. Regional capacity is needed to assure that opportunities do not pass due to the lack of air cargo potential.

Where possible, cargo capacity will be adopted from Master Plans or similar recent studies. Otherwise it will be calculated at the standard of 2,000 annual enplaned pounds (one ton) per square foot of air cargo

processing building. This figure represents an industry standard and is similar to the figure used in the PSRC "Regional Air Cargo Strategy Study".

Due to the diversity in cargo service in Washington, measuring capacity by using building size does not always work. Three of the busiest cargo airports in the state, Seattle-Tacoma International (SEA), Boeing Field/King County International (BFI) and Spokane International Airport (GEG) provide apron area for loading and unloading cargo aircraft but much of the cargo processing takes place in buildings that are off-airport. Furthermore, at some of the smaller airports cargo is transferred directly from aircraft to delivery vehicle without going through any additional sorting or processing. For BFI and SEA, the data in the PSRC's "Regional Air Cargo Strategy Study" are referenced. For GEG the potential processing rates per square foot of apron area will be used.

Based on these analyses, the reserve capacity, or over-capacity condition of each facility at the airport will be identified for each demand element for each benchmark year. The forecast of demand will then be evaluated against capacity using FAA guidance. Historically, FAA has recommended that planning for future facility expansion be initiated when facilities reach 60 percent of capacity, with improvements under design by the time demand reaches 70 percent of capacity and in place by 90 percent.

When and/or where forecast demand is projected to exceed airport facility capacity, the need for new or expanded facilities will be identified. The level of facility expansion needed to accommodate anticipated shortfall in capacity will be calculated for that demand element using the same measurement criteria as applied during Phase I. Where constraints or limitations to meet the anticipated shortfall are identified, the maximum capacity of the facility will be calculated and the level of unmet demand will be quantified. Any quantified need for facility expansion or future unmet demand will be used to define future improvement projects for the airport under subsequent tasks of Phase II.

The results of the individual demand/capacity analyses will be consolidated and summarized by ESSB region as defined in Phase I, as well as at the overall Washington state level.

5. Analysis

Only those elements addressed under the Phase II demand forecasts and able to be quantified were analyzed under this task. The analyses was performed in spreadsheet format and the results presented as tabular data supported by explanatory text and narrative. Each airport analysis was

based on information from the airport database and airport planning documents collected during Phase I. Additional data collection and/or research on individual airports will not be conducted during Phase II.

Airfield Capacity

The airfield operations capacity analyses compared and contrasted the actual 2005 and projected 2030 operations levels presented in the forecasts against each airport's Annual Service Volume (ASV) as calculated and presented in Phase I. The percentage utilization of each airport's ASV was calculated for both the 2005 and 2030 benchmark years based on the existing and/or near-term configuration of the airport. As previously stated, the FAA recommends airports initiate planning of capacity improvements when activity levels exceed 60 percent of the airport's ASV, and seek to have improvements in place and operational by the time activity reaches 70 percent of operations capacity.
Once the capacity utilization calculations were completed for each airport, the findings were consolidated by State and FAA classifications, as well as ESSB regions, to provide an overall system-wide perspective. The findings of the analyses are presented on the following pages.

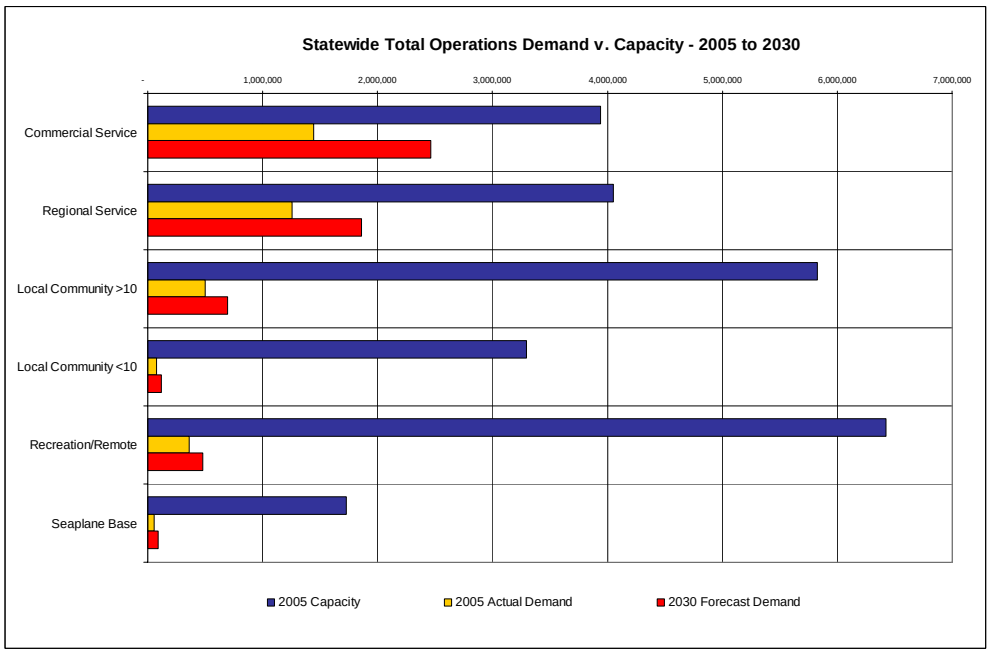
Washington State System Operations Capacity by Airport Classification

Provided below is a breakdown of the overall statewide operations capacity by airport classifications developed under Phase II. State system operations capacity is based on the aggregate Annual Service Volumes calculated for Washington airports during Phase I.

Figure 5: Allocation of State System Capacity by Classification

Airport Classifications	Overall % of System Capacity Provided	2005 Demand % of System Capacity Used	2030 Demand % of System Capacity Used
Commercial Service	15.6%	5.7%	9.7%
Regional Service	16.0%	5.0%	7.4%
Local Community >10	23.1%	2.0%	2.7%
Local Community <10	13.1%	0.3%	0.5%
Recreation/Remote	25.4%	1.4%	1.9%
Seaplane Base	6.8%	0.2%	0.3%
Totals	**100.0%**	**14.6%**	**22.5%**

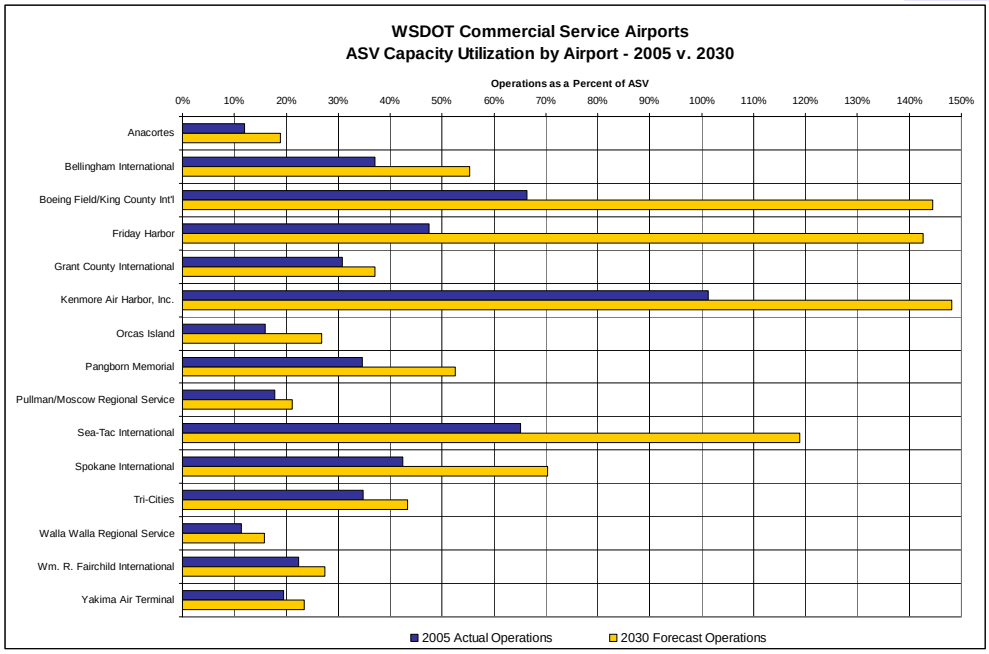
Figure 6: Allocation of State System Capacity and Activity by Classification



As is apparent from the above figure, existing and future operational activity is well below the operational capacity of the aviation system when considered from a statewide perspective. However, aircraft operations tend to concentrate around the major population centers, primarily in the Puget Sound region, and exceed FAA thresholds for the planning or development of capacity-related improvements. Presented on the following pages are figures depicting existing 2005 and future 2030 operations levels for Washington airports in each service classification. Operations are expressed as a percentage of the airport's ASV. Special attention should be given to those airports which exceed 60 percent of their Annual Service Volume within the forecast period.

Figure 7: Capacity Utilization for Commercial Service Airports

Comment [j1]: Can we emphasize the 60, 70 and 80% threshold lines??

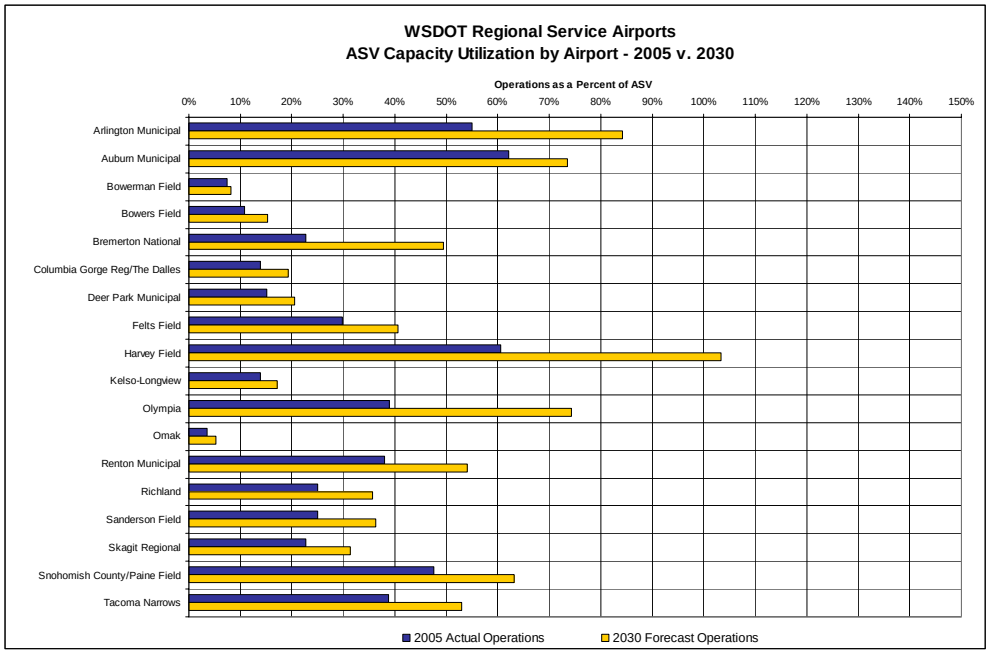


Commercial Service airports already experiencing activity levels beyond the 60 percent threshold and anticipated to require capacity-related improvements over the forecast period include:

- Boeing Field/King County International
- Kenmore Air Harbor, Inc.
- Sea-Tac International Airport

Two additional Commercial Service facilities projected to exceed FAA thresholds over the planning period are Friday Harbor and Spokane International Airport. Both Friday Harbor and Spokane International Airports are forecast to require capacity-related improvements before the end of the planning period.

Figure 8: Capacity Utilization for Regional Service Airports



Among the Regional Service airports in the state, only Auburn Municipal and Harvey Field currently exceed the FAA's 60 percent planning threshold. Long term, the following facilities are expected to require operations-related capacity improvements.

- Arlington Municipal
- Auburn Municipal
- Harvey Field
- Olympia
- Snohomish County/Paine Field

The following pages present similar charts for the Local Community Airports accommodating more and fewer than 10 based aircraft, the Recreation/Remote airports and Seaplane bases. Of the airports within these classifications only Crest Airpark and Kenmore Air Seaplane Base/Lake Union are noteworthy. Crest Airpark currently exceeds FAA's 60 percent planning threshold but slow projected growth doesn't surpass 70 percent before 2030. Kenmore Air Harbor Seaplane Base is expected to exceed both the 60 and 70 percent thresholds before the end of the forecast period.

Figure 9: Capacity Utilization for Local Community > 10 Based Aircraft Airports

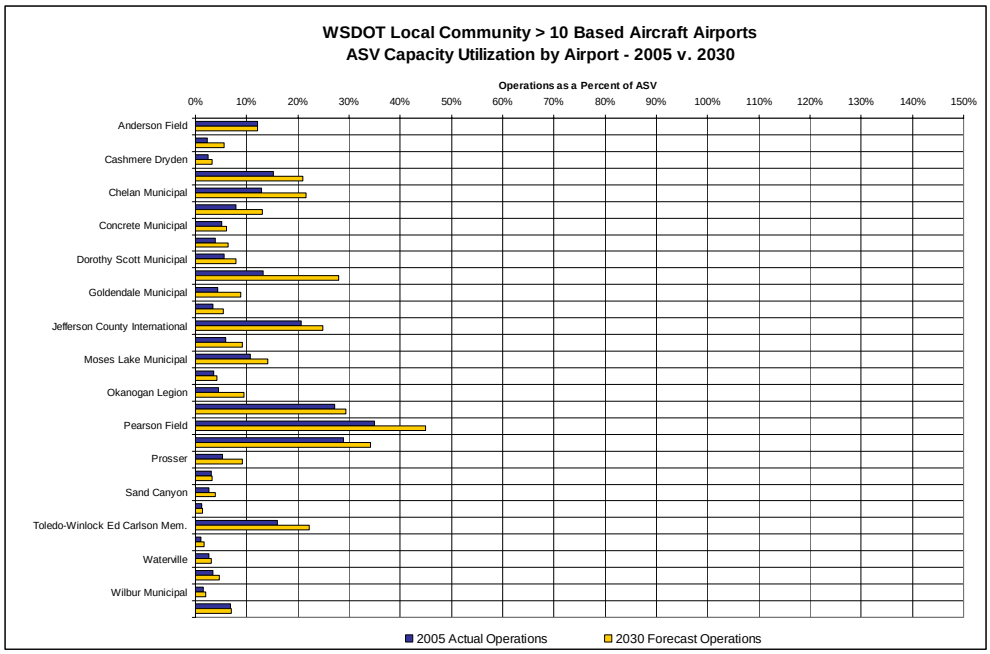


Figure 10: Capacity Utilization for Local Community < 10 Based Aircraft Airports

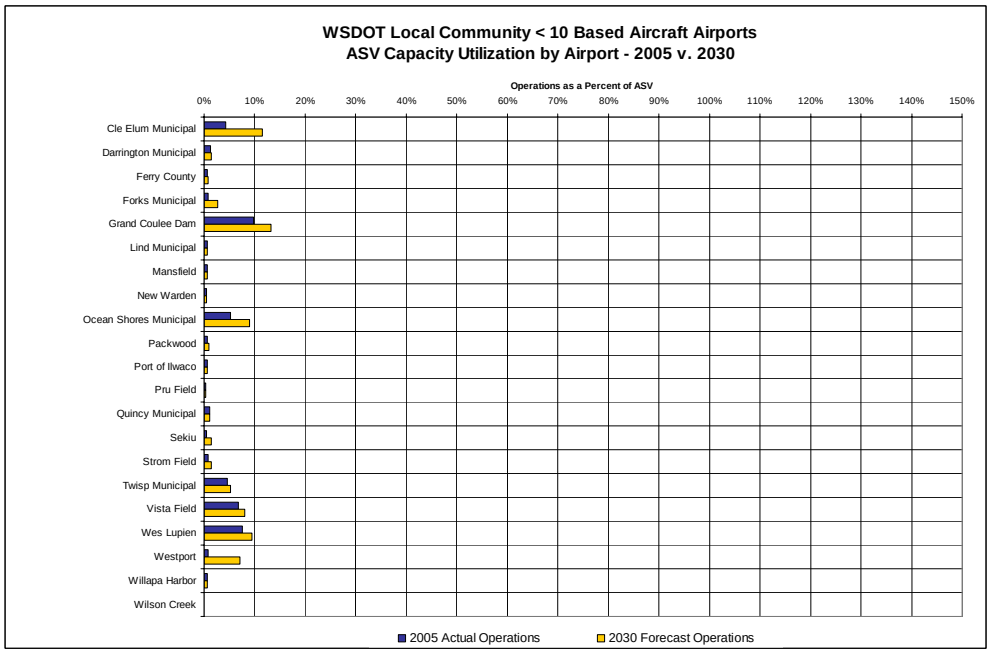


Figure 11: Capacity Utilization for Recreation/remote Airports

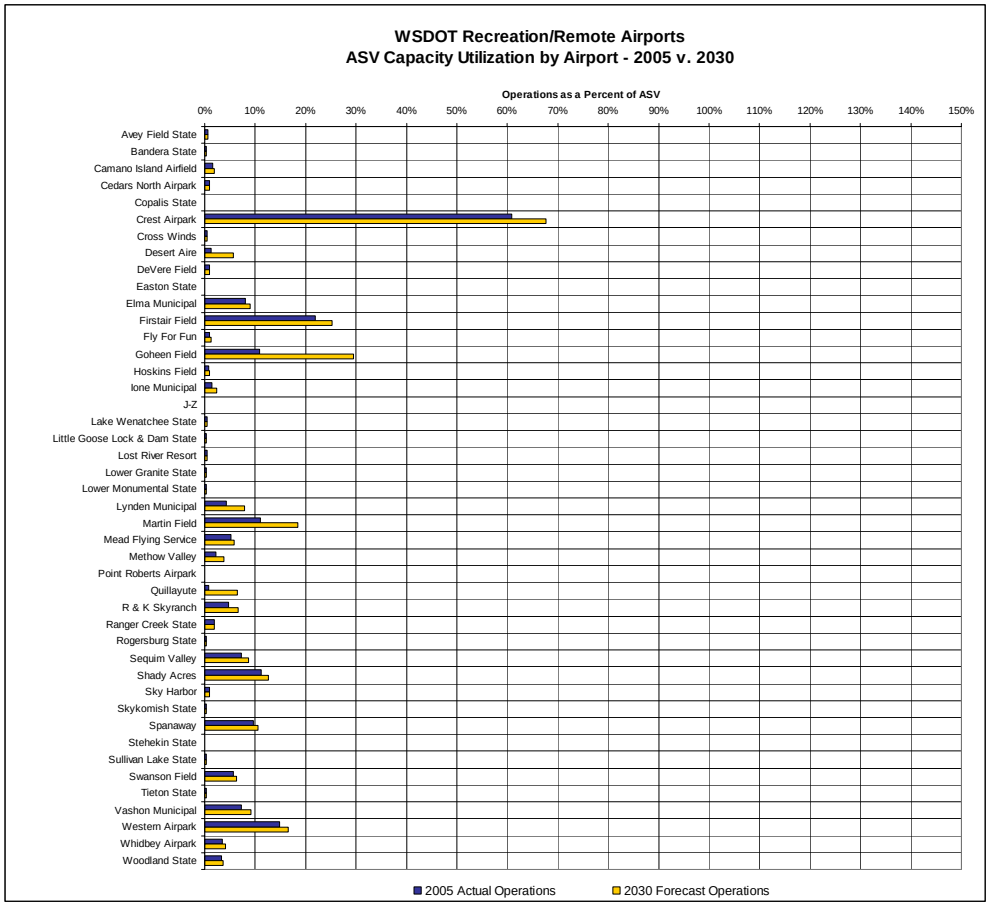
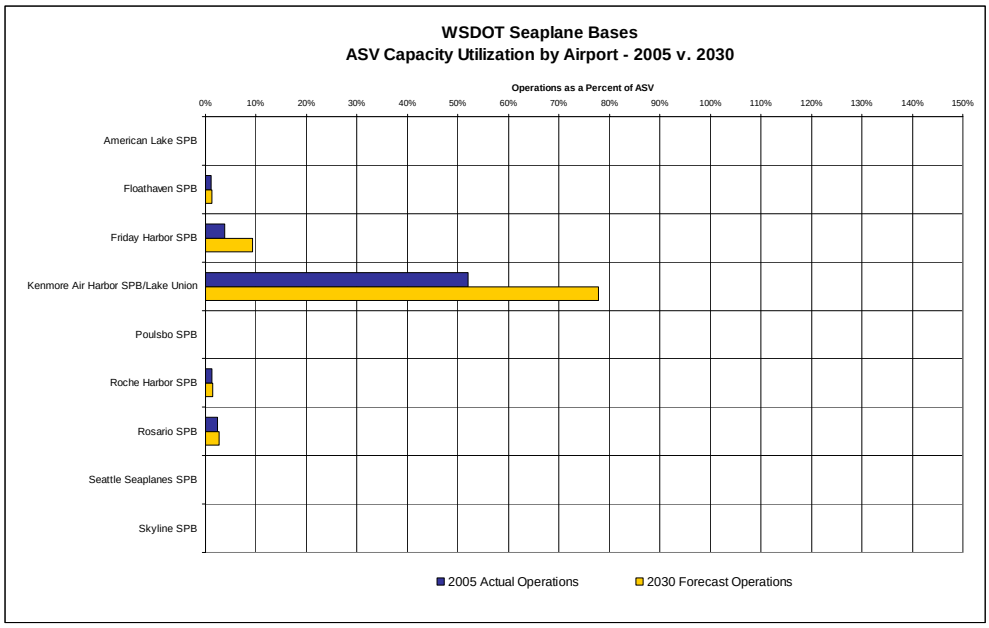


Figure 12: Capacity Utilization for Seaplane Bases



Note: Although Kenmore Air Harbor, Inc. is a seaplane base, it is classified as a Commercial Service facility and therefore listed with the Commercial Service airports.

The analysis of Washington airports included identification of the timing relative to forecast benchmark years when FAA's 60 percent capacity planning and 70 percent capacity implementation thresholds are reached. Provided below is a breakdown of the airports and anticipated scheduling of actions to be required based on the demand forecasts. In the figure, planning is assumed to be initiated during the benchmark period in which operations reach 60 percent of the airport's ASV. Implementation is assumed to begin in the benchmark period where operations are forecast to reach 70 percent of airport ASV. The length of the time period identified for planning increased capacity corresponds to the length of time operations are expected to take to increase from 60 percent to 70 percent of airport capacity.

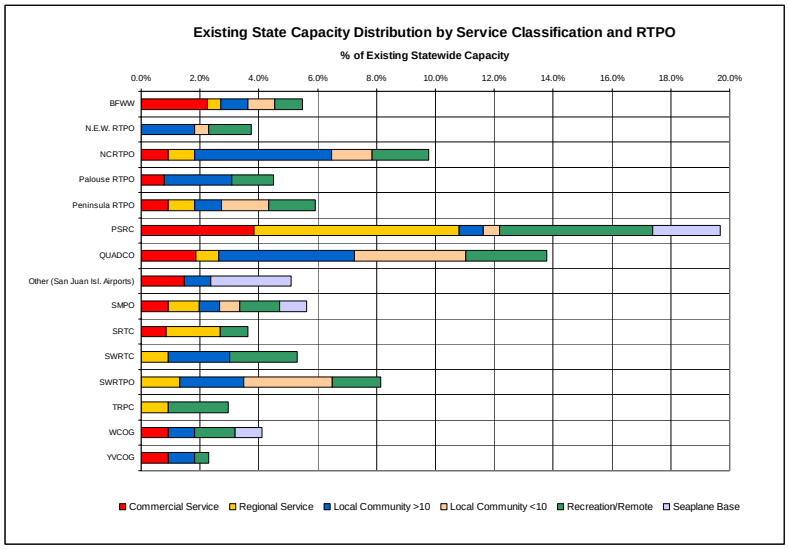
Figure 13: Airports Requiring Increased Operations Capacity – 2005 to 2030

Airport Name	WSDOT Service Level	2005	2010	2015	2020	2025	2030
Boeing Field/King Co. Int'l	Comm'l Service	Plan	Implement				
Friday Harbor	Comm'l Service				Plan		Implement
Kenmore Air Harbor, Inc.	Comm'l Service	Implement					
Sea-Tac International	Comm'l Service	Plan	Implement				
Spokane International	Comm'l Service					Plan	Implement
Arlington Municipal	Regional Service		Plan		Implement		
Auburn Municipal	Regional Service	Plan				Implement	
Harvey Field	Regional Service	Plan		Implement			
Olympia	Regional Service				Plan		Implement
Snohomish Co./Paine Field	Regional Service					Plan	
Crest Airpark	Rec./Remote	Plan					
Kenmore Air Harbor/Lake Union	Seaplane Base		Plan	Implement			

Washington State System Capacity by RTPO/MPO

During Phase I, the allocation and distribution of aviation facilities in Washington State was examined by RTPO/MPO boundaries. The following figures summarize the allocation of state system capacity by RTPO/MPO and service classifications as well as the distribution of demand in 2005.

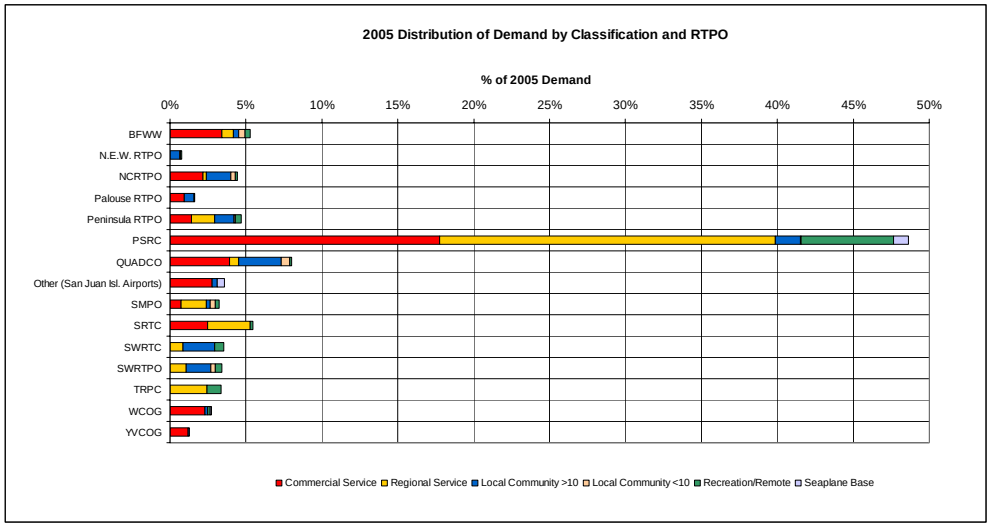
Figure 14: 2005 Washington State System Operations Capacity (ASV)



	Comm'l Service	Regional Service	Local Comm.>10	Local Comm.<10	Recreation /Remote	Seaplane Base	Total %
BFWW	2%	0%	1%	1%	1%	0%	5%
N.E.W. RTPO	0%	0%	2%	0%	1%	0%	4%
NCRTPO	1%	1%	5%	1%	2%	0%	10%
Palouse RTPO	1%	0%	2%	0%	1%	0%	5%
Peninsula RTPO	1%	1%	1%	2%	2%	0%	6%
PSRC	4%	7%	1%	1%	5%	2%	20%
QUADCO	2%	1%	5%	4%	3%	0%	14%
Other (San Juan Isl.)	1%	0%	1%	0%	0%	3%	5%
SMPO	1%	1%	1%	1%	1%	1%	6%
SRTC	1%	2%	0%	0%	1%	0%	4%
SWRTC	0%	1%	2%	0%	2%	0%	5%
SWRTPO	0%	1%	2%	3%	2%	0%	8%
TRPC	0%	1%	0%	0%	2%	0%	3%
WCOG	1%	0%	1%	0%	1%	1%	4%
YVCOG	1%	0%	1%	0%	0%	0%	2%
Total	**16%**	**16%**	**24%**	**12%**	**25%**	**7%**	**100%**

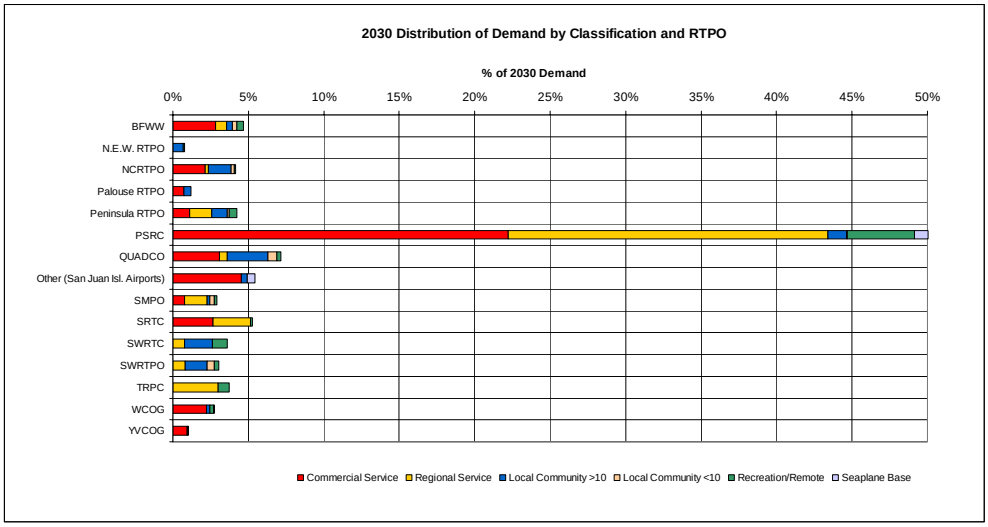
A breakdown of 2005 operations demand by airport classifications and RTPO is presented below.

Figure 15: 2005 Demand by Airport Classification and RTPO



	Comm'l Service	Regional Service	Local Comm.>10	Local Comm.<10	Recreation /Remote	Seaplane Base	Total %
BFWW	3%	1%	0%	0%	0%	0%	5%
N.E.W. RTPO	0%	0%	1%	0%	0%	0%	1%
NCRTPO	2%	0%	2%	0%	0%	0%	4%
Palouse RTPO	1%	0%	1%	0%	0%	0%	2%
Peninsula RTPO	1%	2%	1%	0%	0%	0%	5%
PSRC	18%	22%	2%	0%	6%	1%	48%
QUADCO	4%	1%	3%	1%	0%	0%	8%
Other (San Juan Isl.)	3%	0%	0%	0%	0%	0%	4%
SMPO	1%	2%	0%	0%	0%	0%	3%
SRTC	2%	3%	0%	0%	0%	0%	5%
SWRTC	0%	1%	2%	0%	1%	0%	4%
SWRTPO	0%	1%	2%	0%	0%	0%	4%
TRPC	0%	2%	0%	0%	1%	0%	3%
WCOG	2%	0%	0%	0%	0%	0%	3%
YVCOG	1%	0%	0%	0%	0%	0%	1%
Total	**39%**	**34%**	**14%**	**2%**	**10%**	**1%**	**100%**

Figure 16: 2030 Demand by Airport Classification and RTPO



	Comm'l Service	Regional Service	Local Comm.>10	Local Comm.<10	Recreation /Remote	Seaplane Base	Total %
BFWW	3%	1%	0%	0%	0%	0%	5%
N.E.W. RTPO	0%	0%	1%	0%	0%	0%	1%
NCRTPO	2%	0%	2%	0%	0%	0%	4%
Palouse RTPO	1%	0%	0%	0%	0%	0%	1%
Peninsula RTPO	1%	1%	1%	0%	1%	0%	4%
PSRC	22%	21%	1%	0%	4%	1%	50%
QUADCO	3%	1%	3%	1%	0%	0%	7%
Other (San Juan Isl.)	5%	0%	0%	0%	0%	1%	5%
SMPO	1%	1%	0%	0%	0%	0%	3%
SRTC	3%	2%	0%	0%	0%	0%	5%
SWRTC	0%	1%	2%	0%	1%	0%	4%
SWRTPO	0%	1%	1%	0%	0%	0%	3%
TRPC	0%	3%	0%	0%	1%	0%	4%
WCOG	2%	0%	0%	0%	0%	0%	3%
YVCOG	1%	0%	0%	0%	0%	0%	1%
Total	**43%**	**33%**	**12%**	**2%**	**8%**	**2%**	**100%**

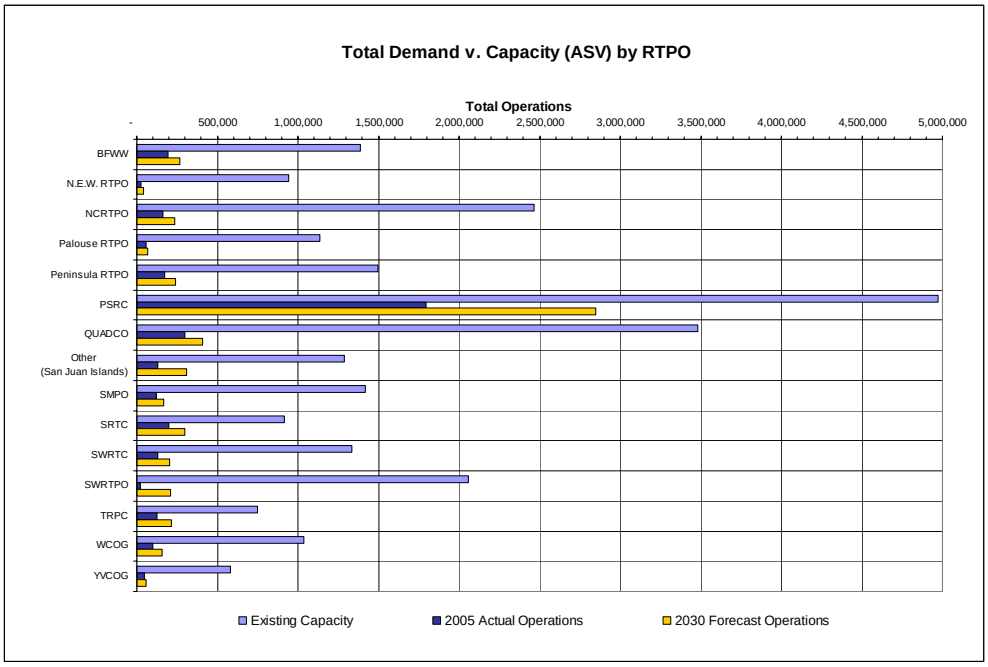
Based on airport ASV assignments developed during Phase I, approximately 50 percent of statewide operations capacity is provided by Recreation/Remote and Local Community >10 Based Aircraft airports at 25 percent and 24 percent of statewide operations capacity respectively. In contrast, Commercial and Regional Service airports provide only about one-third the State's overall system capacity while accommodating approximately 75 percent of overall statewide operations activity by 2030. A comparison of operations demand by service classification for 2005 and 2030 is presented below.

Figure 17: Existing and Forecast Operations Demand by Percent and Airport Classification

	Commercial Service	Regional Service	Local Community .>10 Aircraft	Local Community .<10 Aircraft	Recreation /Remote	Seaplane Base
2005	39.0%	34.1%	13.5%	2.1%	9.8%	1.5%
2030	43.2%	32.7%	12.1%	2.1%	8.4%	1.5%

The allocation of demand between airport classifications shows only minor changes over the 25-year period from 2005 to 2030. The Commercial and Regional Service airports are expected to continue to accommodate the vast majority of Washington aircraft operations.

Figure 18: 2005 Total Operations Demand by RTPO



The preceding figures provide an overview of existing statewide operations capacity along with the distribution of operations demand by RTPO. As is evident from the figures, the PSRC provides approximately 20 percent of overall system operations capacity, while experiencing nearly half of total operations statewide. Furthermore, the Commercial and Regional Service airports within the PSRC only provide approximately half of the RTPO's operations capacity, the balance being distributed among the smaller airports and seaplane bases. In contrast, of the 48 percent of 2005 statewide operations occurring within the PSRC, 40

percent were conducted at the Commercial and Regional Service airports with only 8 percent of statewide operations occurring at the remaining PSRC airports. Consequently, while the PSRC area may appear to have sufficient operations capacity to accommodate long-term demand, the concentration of operations at a small number of Commercial and Regional Service airports is the primary driving force in the need for additional operations capacity within the airport system.

The figures on the following pages present the 2005 and 2030 operations demand expressed as a percentage of ASV for each airport by RTPO.

Figure 19: Benton-Franklin- Walla Walla RTPO

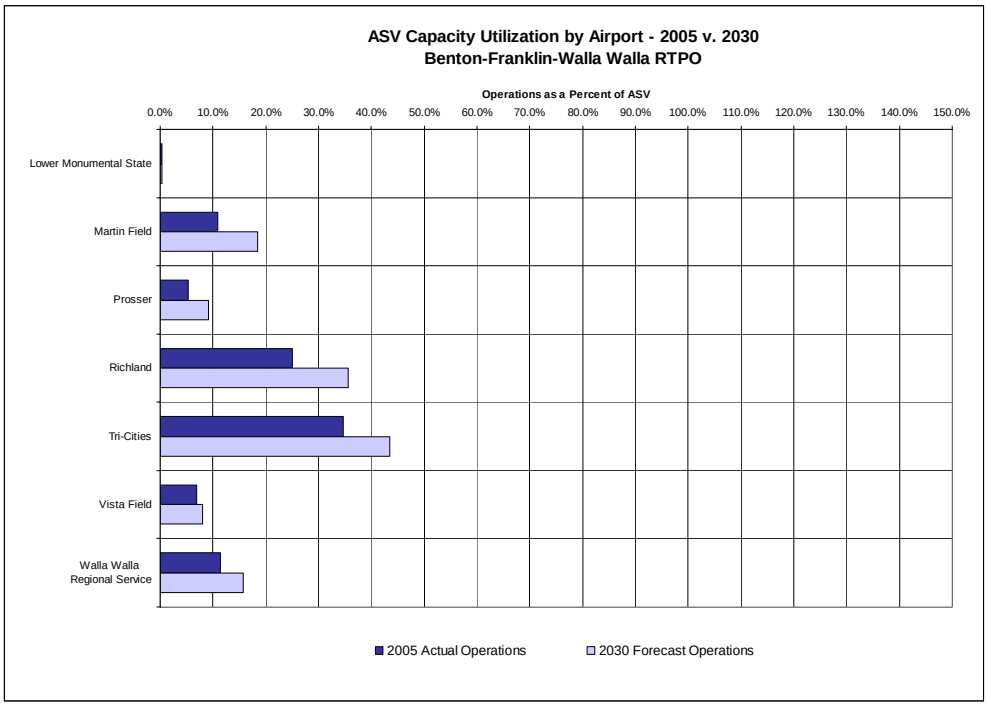


Figure 20: Northeast Washington RTPO

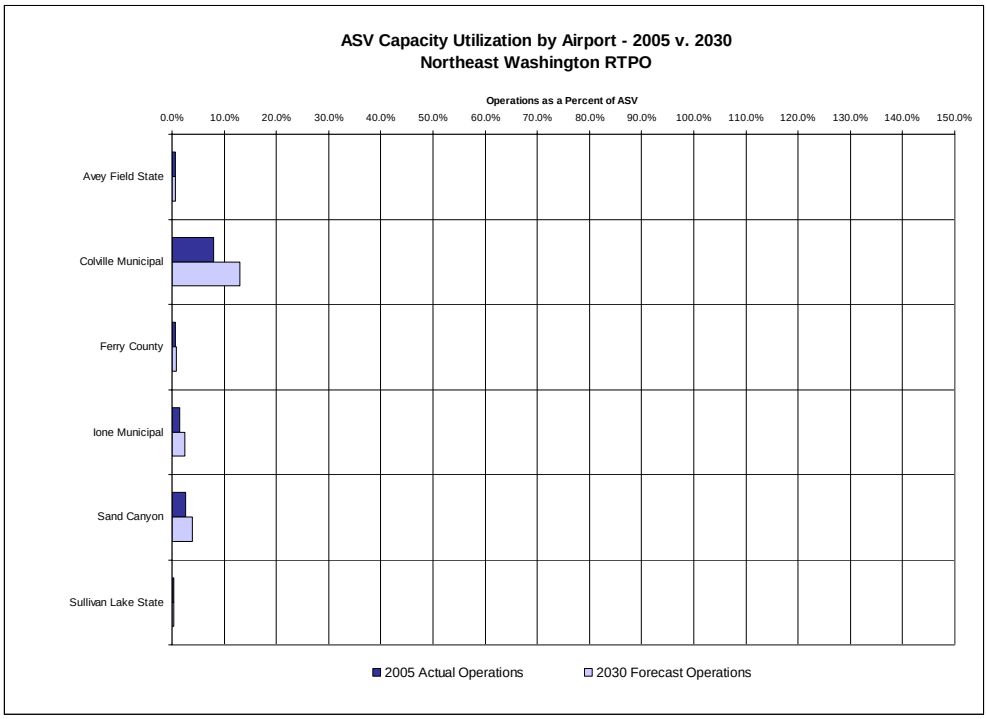


Figure 21: North Central RTPO

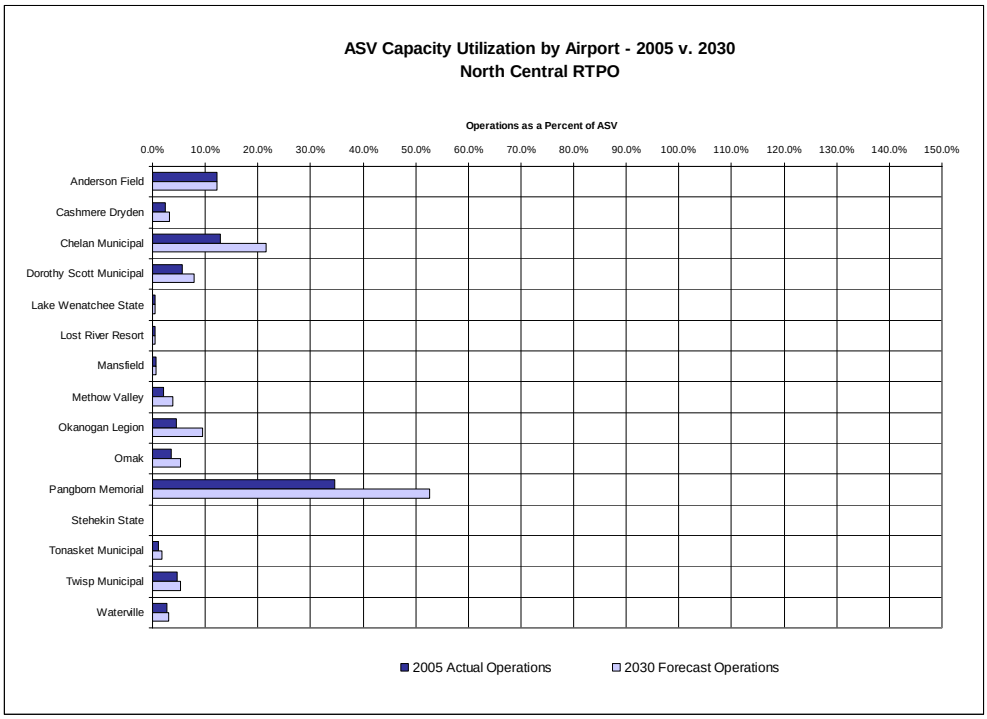


Figure 22: Other Airports (San Juan Islands)

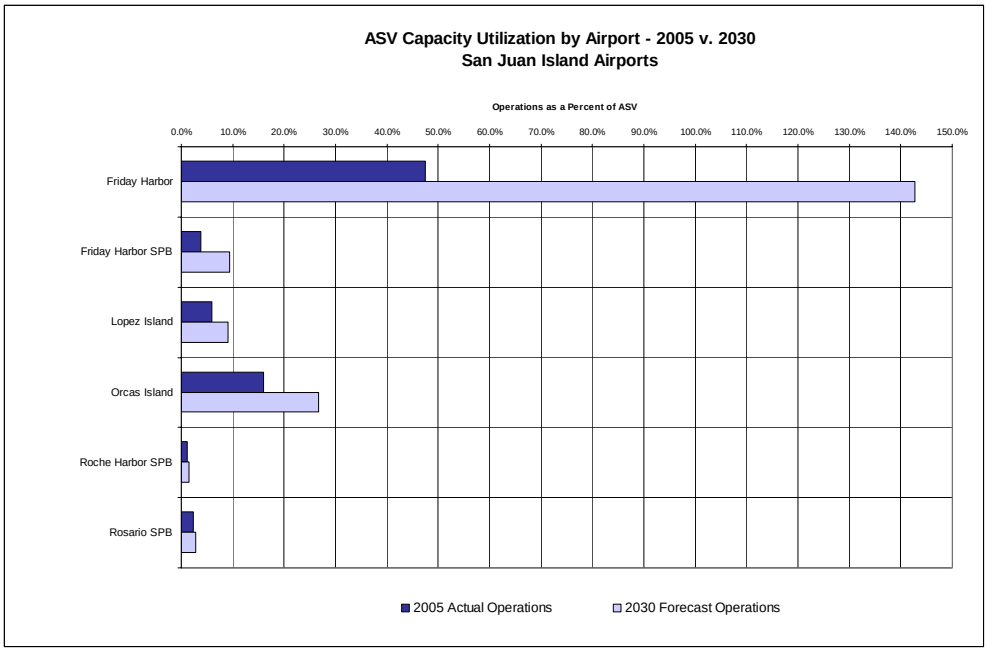


Figure 23: Palouse RTPO

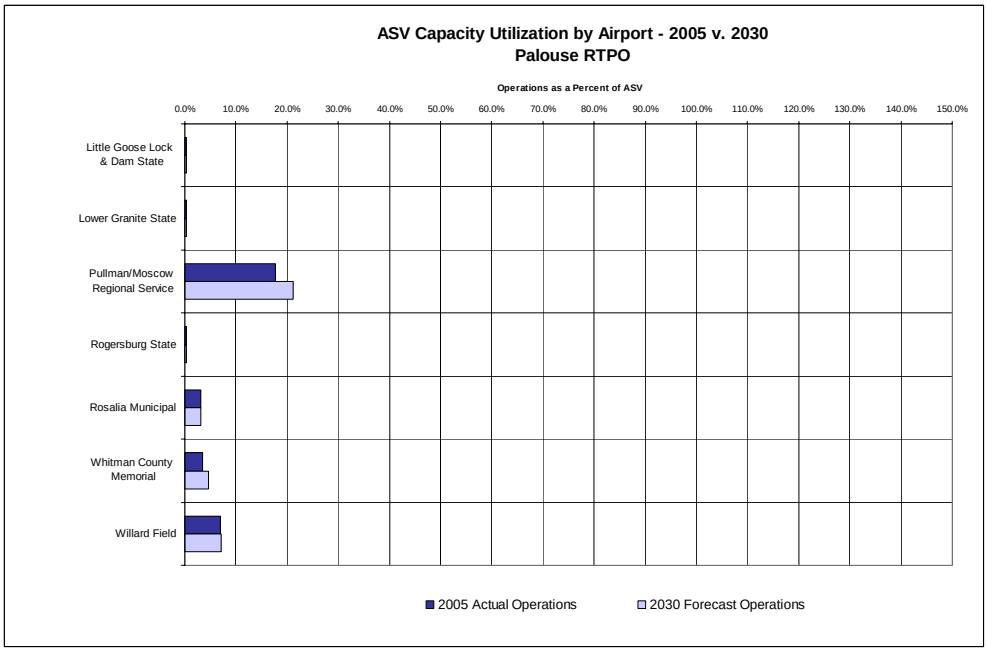


Figure 24: Peninsula RTPO

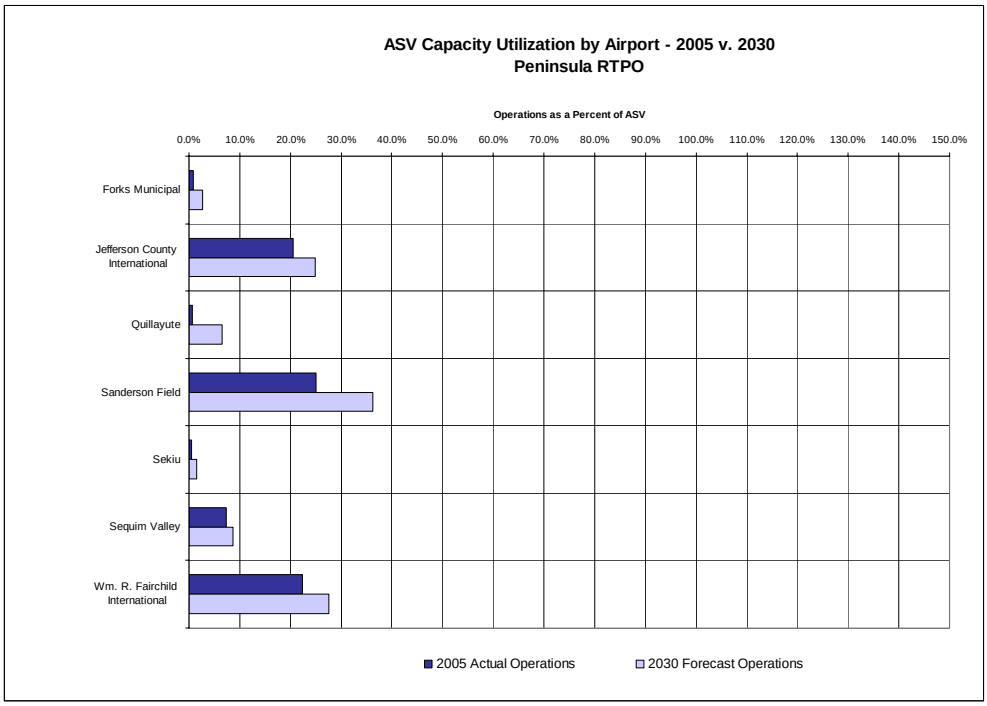


Figure 25: Puget Sound Regional Council

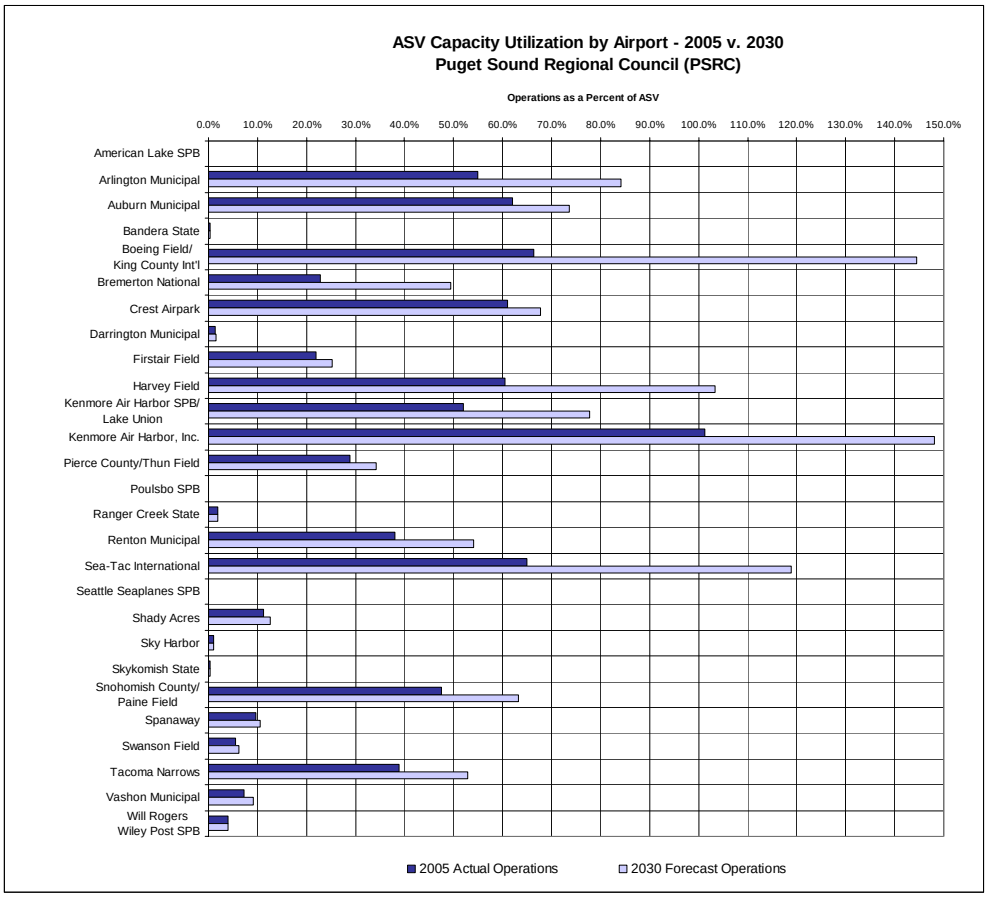


Figure 26: Quad County RTPO

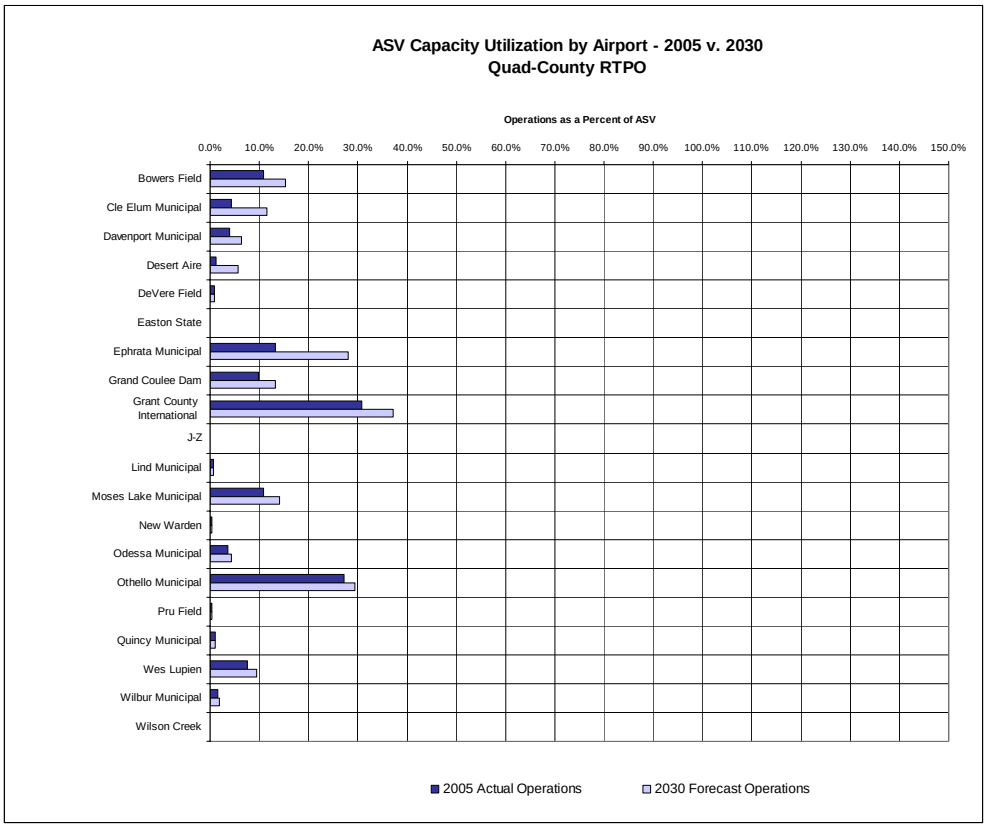


Figure 27: Skagit/Island RTPO

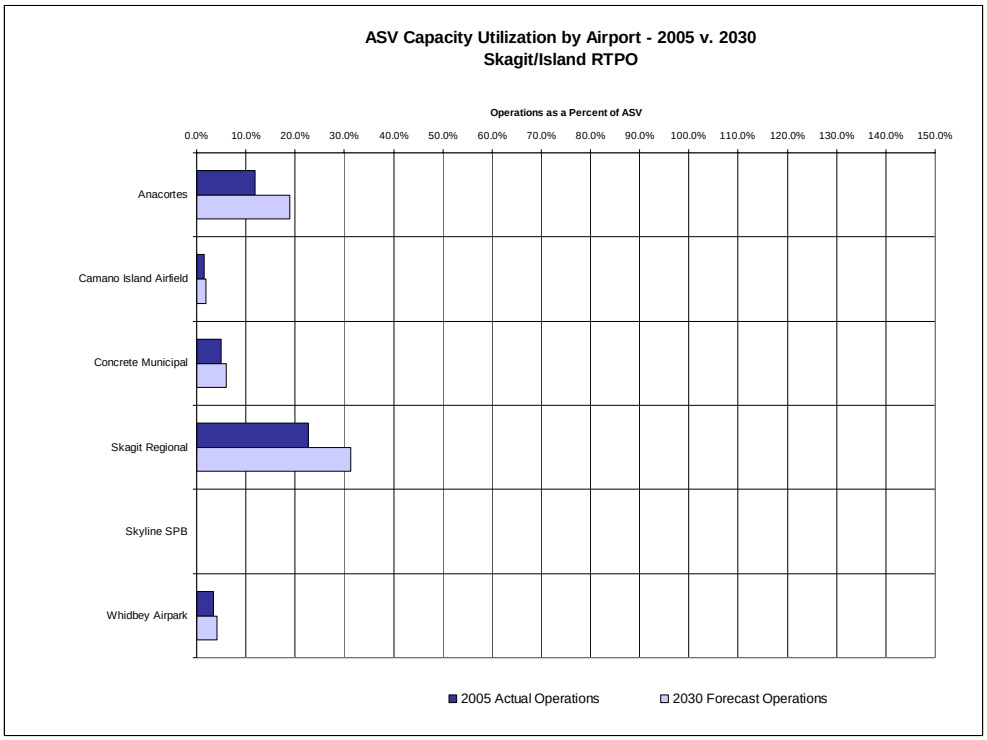


Figure 28: Southwest Washington RTC

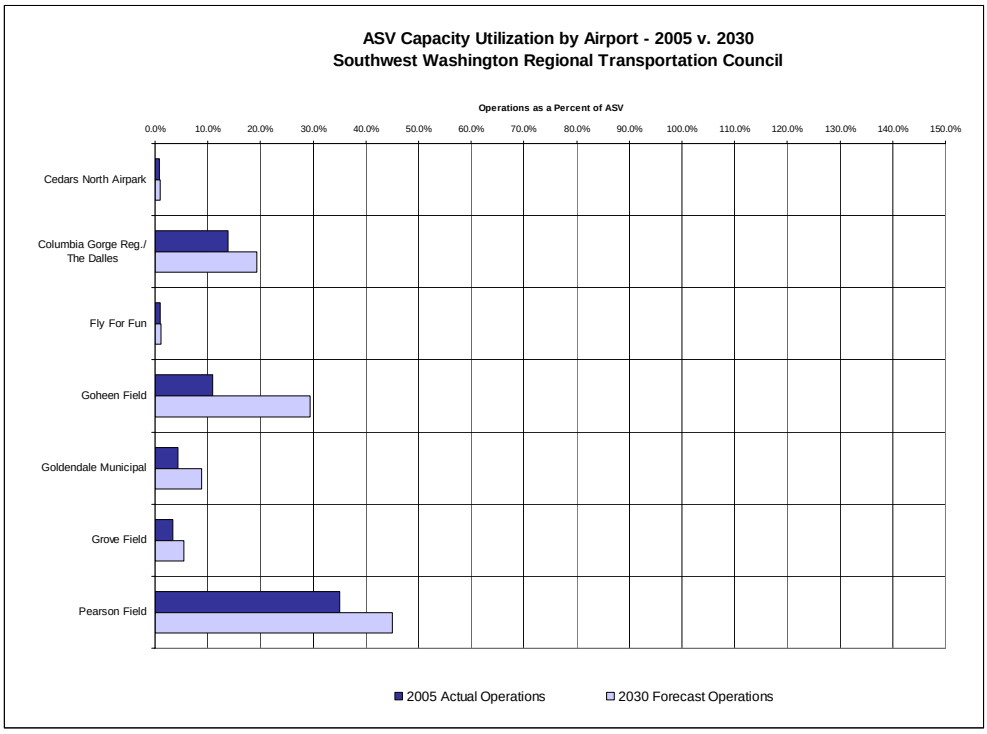


Figure 29: Southwest Washington RTPO

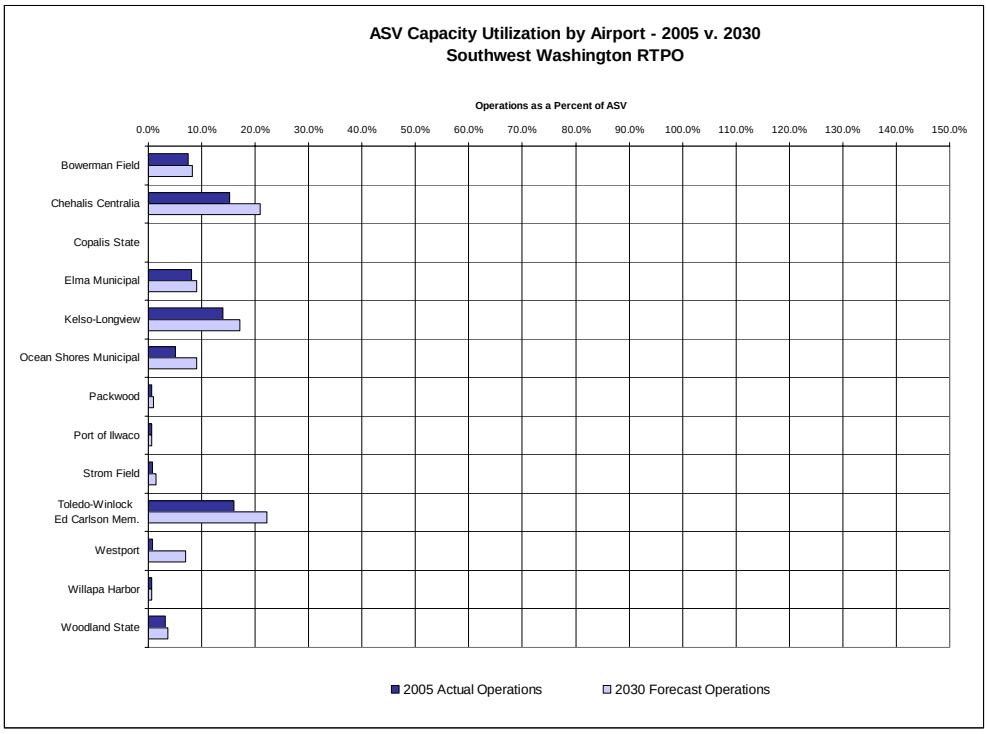


Figure 30: Spokane RTC

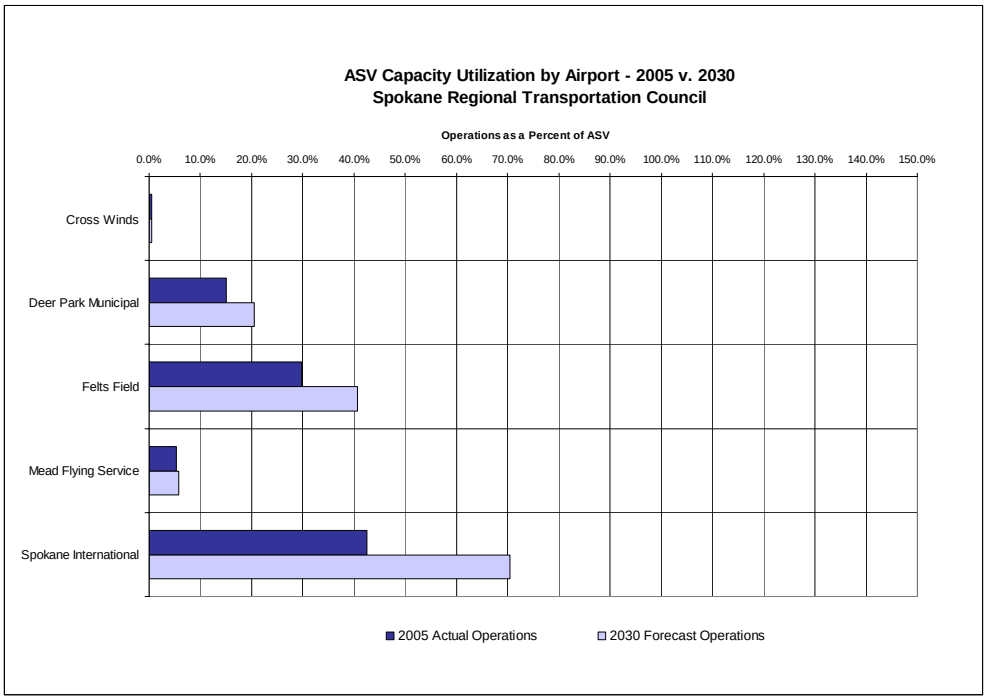


Figure 31: Thurston RPC

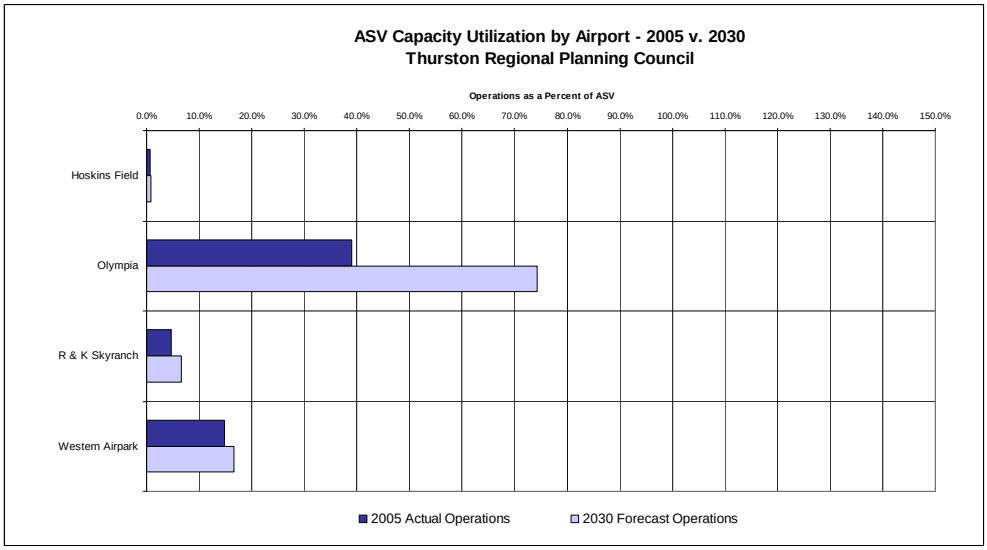


Figure 32: Whatcom COG

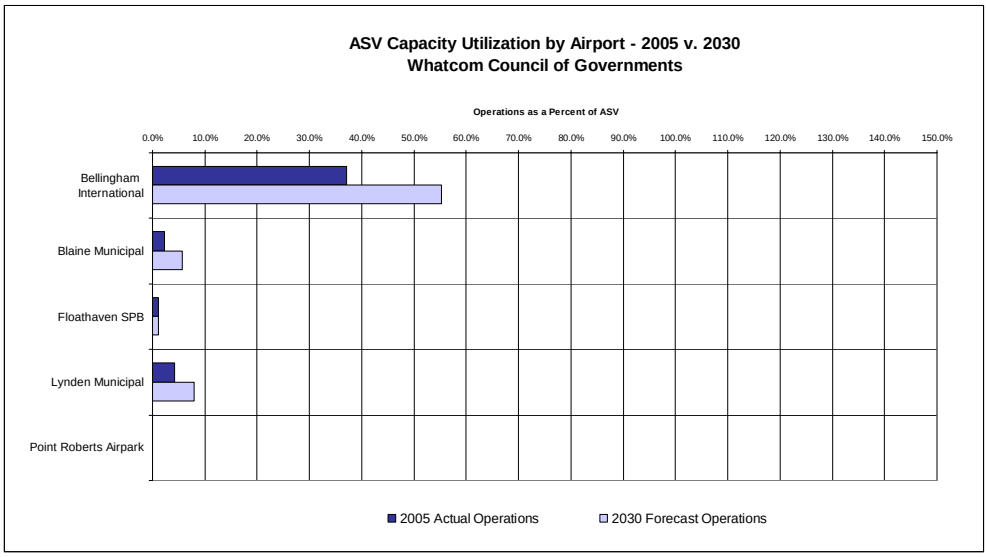
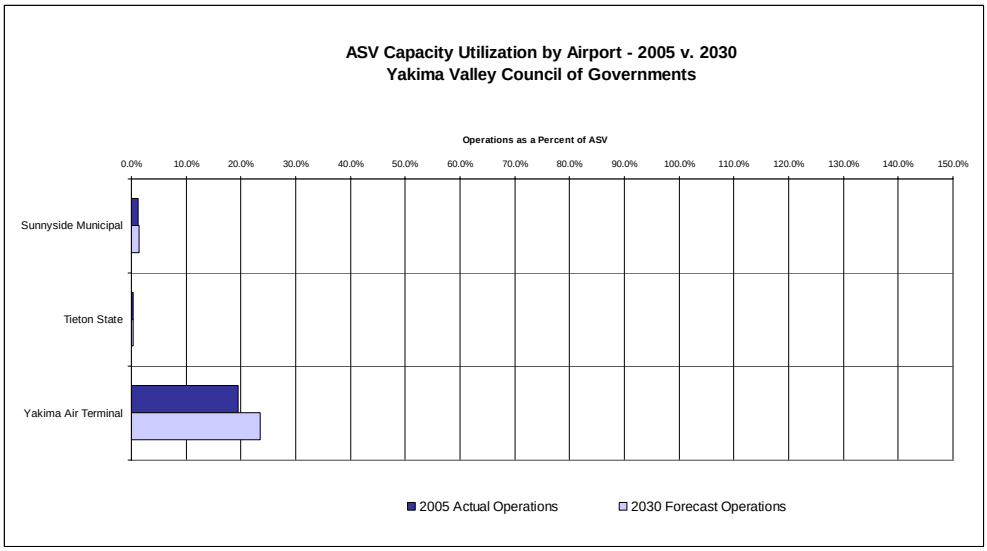


Figure 33: Yakima Valley COG



From the preceding figures, it is apparent that any future constraints in operations capacity at Washington airports is limited to a few key facilities. However, what is also apparent is that it is in the PSRC region that there is a concentration of airports expected to experience demand beyond their current operating capacity. Unlike other regions where, at most, one airport may experience high demand but other nearby facilities have substantial reserve capacity, one-third of the airports within the PSRC region may face capacity constraints by the end of the planning period. As a result, demand management alternatives such as shifting activity from one airport to another may be limited.

Special Emphasis Regions

During Phase I, four regions within the state were identified as areas of special economic significance requiring more detailed analysis. The ESSB areas and their respective airports include:

PSRC Region

- American Lake SPB
- Arlington Municipal
- Auburn Municipal
- Bandera State
- Bremerton National
- Crest Airpark
- Darrington Municipal
- Firstair Field
- Harvey Field
- Kenmore Air Harbor SPB
- Boeing Field/King County International
- Lester State (Closed)
- Pierce County/Thun Field
- Poulsbo SPB
- Ranger Creek State
- Renton Municipal
- Seattle Lake Union SPB/Kenmore Air Harbor, Inc.
- Seattle-Tacoma International
- Shady Acres
- Sky Harbor
- Skykomish State
- Snohomish County/Paine Field
- Spanaway
- Swanson Field
- Tacoma Narrows
- Vashon Municipal
- Will Rogers-Wiley Post SPB

Southwest Region

- Cedars North Airpark
- Evergreen Field
- Fly For Fun
- Goheen Field
- Grove Field
- Kelso-Longview
- Pearson Field
- Woodland State

Spokane Region

- Cross Winds
- Deer Park Municipal
- Felts Field
- Mead Airport
- Spokane International

Tri-Cities Region

- Prosser
- Richland
- Tri-Cities
- Vista Field

The following figures present the 2005 and 2030 operations demand for each ESSB area by airport classification in comparison to its total operations capacity expressed in ASV. Of the ESSB regions, only the PSRC Commercial Service airports are expected to experience demand in excess of available operations capacity. However, that is not to say that other airports won't experience capacity constraints over the forecast period. Analysis of the impact of future demand on individual airports within each ESSB has already been presented in the preceding analyses.

Figure 34: PSRC ESSB Region

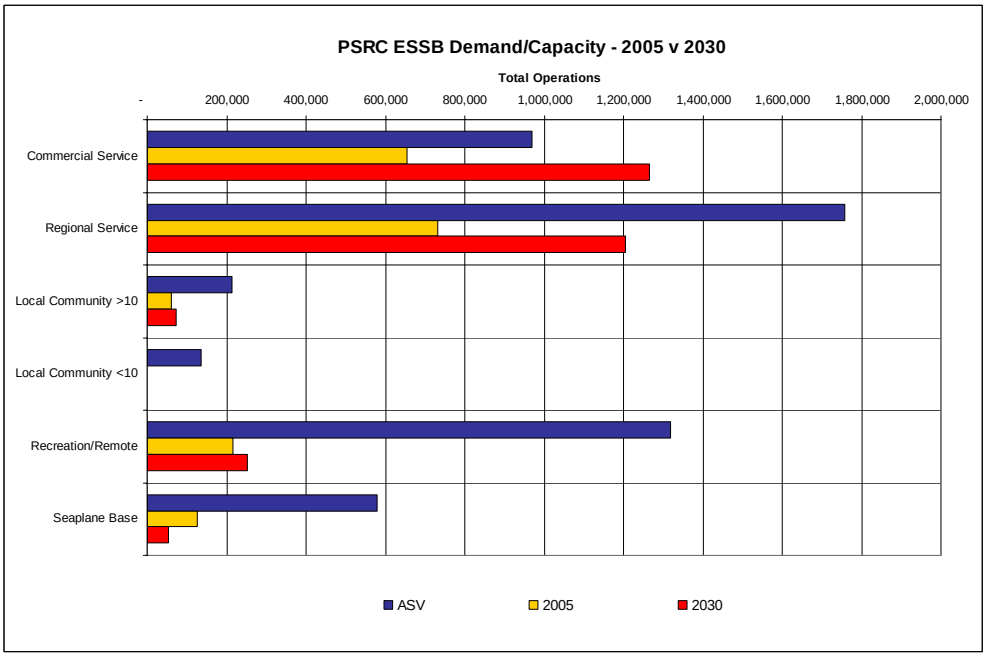


Figure 35: Southwest ESSB Region

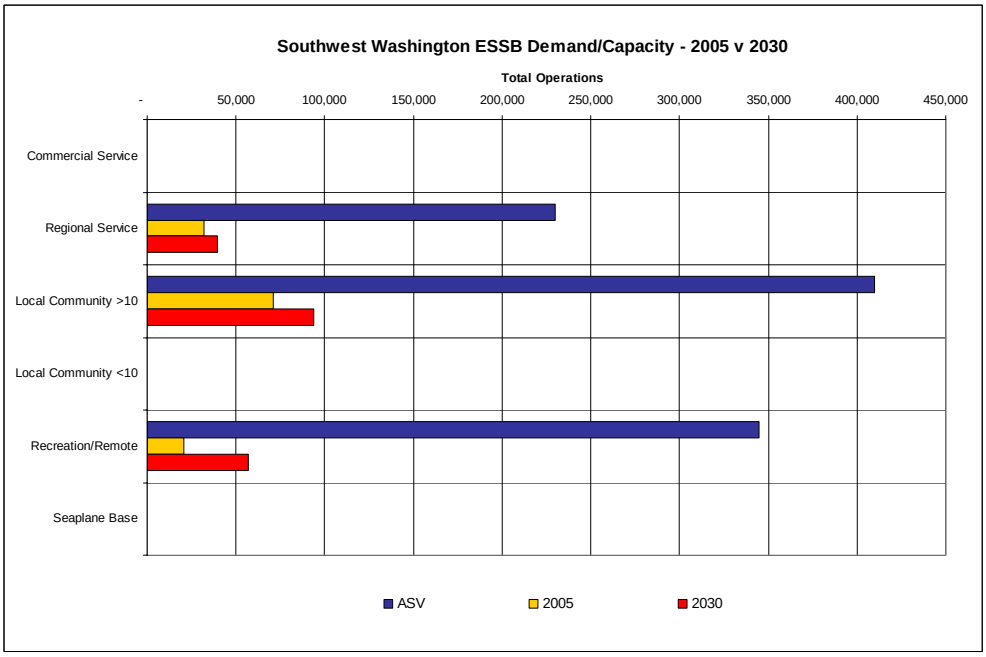


Figure 36: Spokane ESSB Region

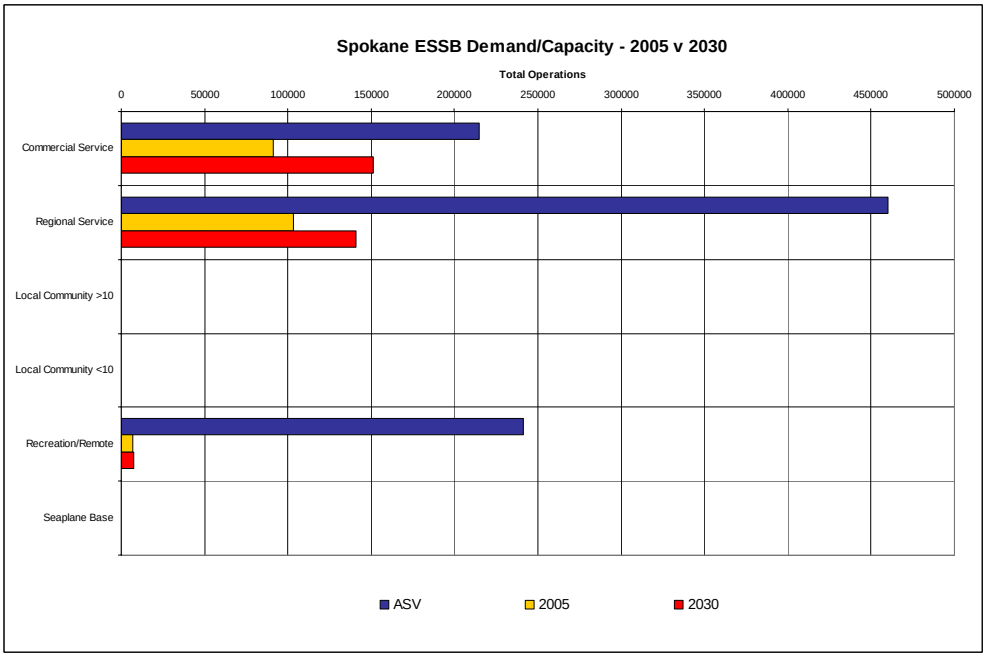
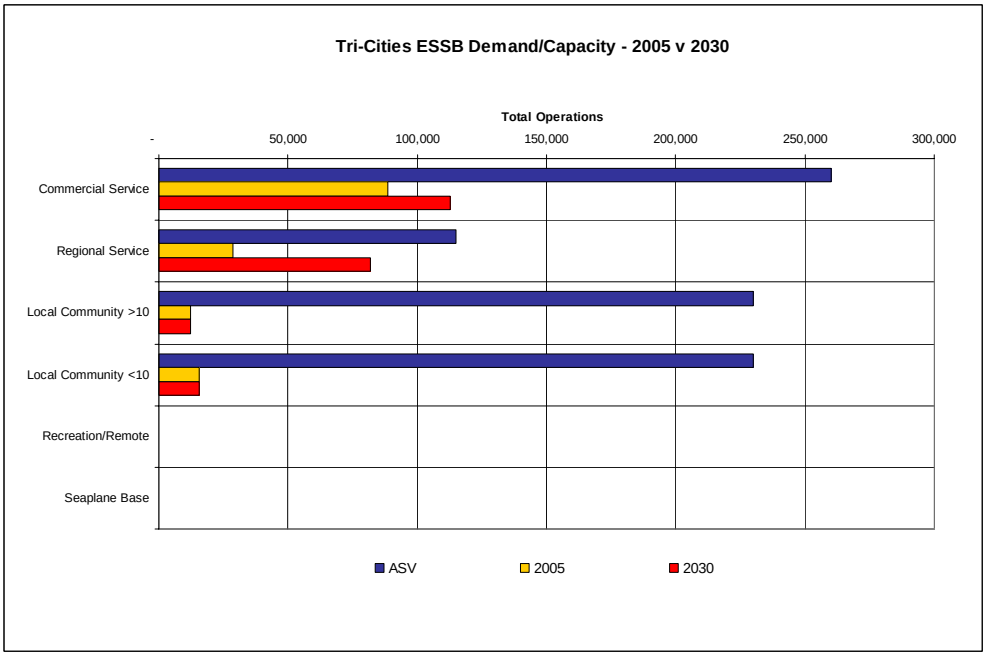


Figure 37: Tri-Cities Region



Operations Capacity Findings and Conclusions

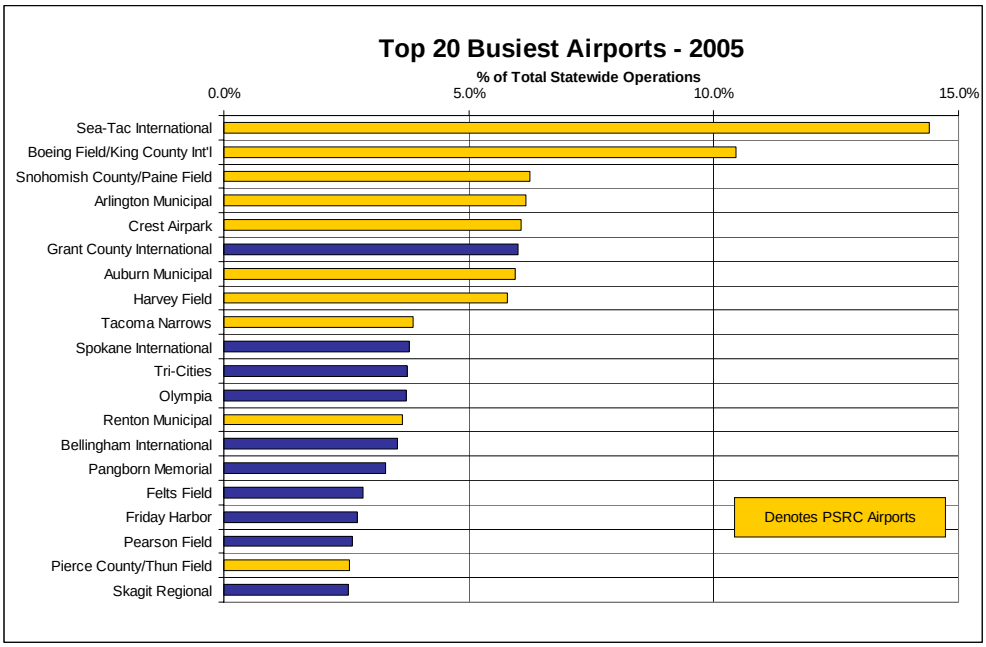
Under the Phase II demand/capacity analysis, it was determined that the total aggregate operations capacity of the Washington aviation system far exceeds the projected operations demand through 2030. However, operations demand is not uniformly distributed across the state but concentrated at a few key airports around the major population/economic centers. In 2005, operations at six Washington airports exceeded the FAA's 60 percent threshold for planning additional capacity. All six airports are located within the Puget Sound Regional Council ESSB area. One facility, the Kenmore Air Harbor seaplane base, is already at the 70 percent capacity threshold.

By 2030, ten Washington airports are projected to be at or above 70 percent capacity – the point at which capacity improvements should be underway. Seven of the 10 airports are within the PSRC area, and nine of the ten airports fall within the Puget Sound Corridor. During the same time frame, two additional PSRC airports are expected to have reached the 60 percent threshold where planning for capacity improvements should be underway. Consequently, by 2030 11 out of 12 airports in Washington state requiring planning or implementation of capacity improvements are located within the Puget Sound Corridor i.e. the region west of the

Cascade mountains and between Olympia on the south and the U.S./Canadian border on the north.

In 2005, 10 of the 20 busiest airports in Washington State were located within the PSRC boundary. These airports accommodated 65 percent of operations occurring at the 20 busiest airports and nearly 50 percent of total operations statewide.

Figure 38: Top 20 Busiest Airports - 2005



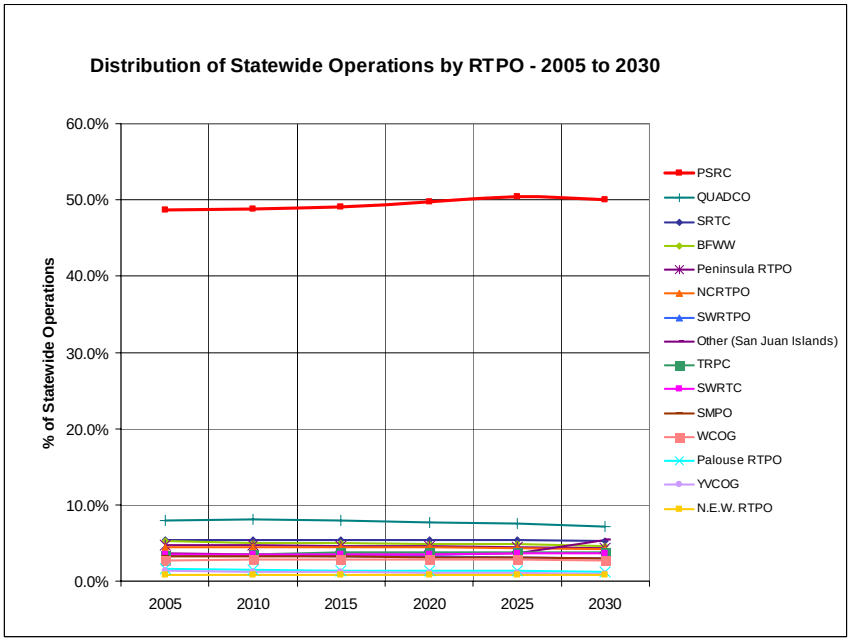
By 2030, only minor changes are expected to occur in the general relationship between the 20 busiest airports. Ten of the top 20 airports are still in the PSRC region. Although Pierce County/Thun Field has dropped from the top 20 list, Bremerton National has been added. All other PSRC airports from the 2005 top 20 remain on the list in 2030, although their relative rankings may shift somewhat. Two of the 20 busiest airports listed in both 2005 and 2030 are privately owned and operated facilities – Harvey Field and Crest Airpark. By 2030, Harvey Field is expected to be the third busiest airport in the state behind Seattle-Tacoma International and King County International/Boeing Field, in first and second place respectively.

As shown in the figures below, the overall distribution of aircraft operations throughout the state is projected to change little between 2005

and 2030. The Puget Sound Regional Council area is expected to retain a 50 percent share of total statewide aircraft operations.

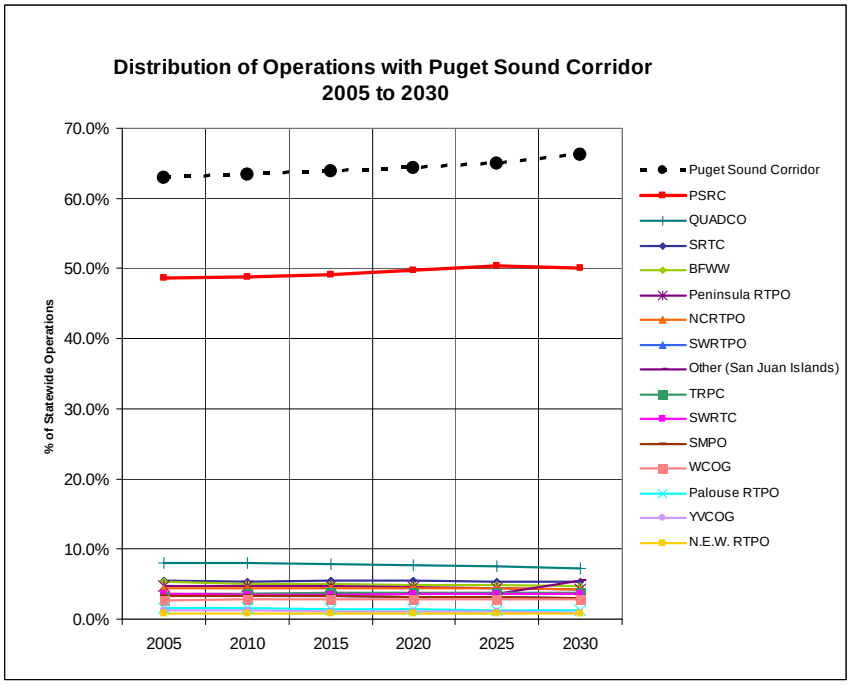
Figure 39: Top 20 Busiest Airports - 2030

Figure 40: Distribution of Operations by RTPO - 2030



The following figure depicts the distribution of statewide aircraft operations if all airports within the Puget Sound Corridor are taken into consideration. As previously stated, the Puget Sound Corridor is defined as those airports located west of the Cascade mountains and between Olympia on the south and the U.S. /Canadian border on the north. Aircraft operations activity at these airports amounts to, on average, approximately 65 percent of total aircraft operations statewide over the planning period. Spokane International Airport is the only facility outside of the Puget Sound Corridor forecast to experience capacity constraints by 2030. All other Washington airports anticipated to experience capacity and delay problems are located within the Puget Sound Corridor.

Figure 41: Distribution of Operations by RTPO - 2030



Passenger Terminal Capacity

During Phase I, peak hour passenger capacities were calculated for those Washington airports supporting scheduled passenger service. Reported 2005 passengers were translated into calculations of peak hour demand compared to existing passenger terminal peak hour capacities. The results of this analysis are presented below.

Figure 42: Statewide Airport Peak Hour Passenger Capacity, 2005

Comment [BC2]: As best I can determine, 2005 Peak Hour Passengers were determined based on existing flight schedules, aircraft type and assumed load factors.

Airport	Passenger Terminal Peak Hr Capacity	2005 Peak Hour Passengers	Capacity Utilization (%)	Reserve Capacity (%)
Anacortes	9	9	100%	0%
Bellingham International	149	30	20%	80%
Boeing Field/King County International	160	7	4%	96%
Friday Harbor	22	8	37%	63%
Grant County International	132	15	11%	89%
Orcas Island	7	7	100%	0%
Kenmore Air Harbor SPB	8	8	100%	0%
Kenmore Air Harbor Inc. /SPB Lake Union	8	8	100%	0%
Pangborn Memorial	89	30	34%	66%
Pullman/Moscow Regional	51	30	59%	41%
Seattle-Tacoma International	8,065	5,500	68%	32%
Spokane International	2,205	746	34%	66%
Tri-Cities	271	185	68%	32%
Walla Walla Regional	206	30	15%	85%
William R. Fairchild International	29	7	24%	76%
Yakima Air Terminal	176	30	17%	83%

Using forecasts of future passenger enplanements prepared under Phase II, it is possible to project peak hour passenger demand anticipated the above airports through the end of the forecast period.

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

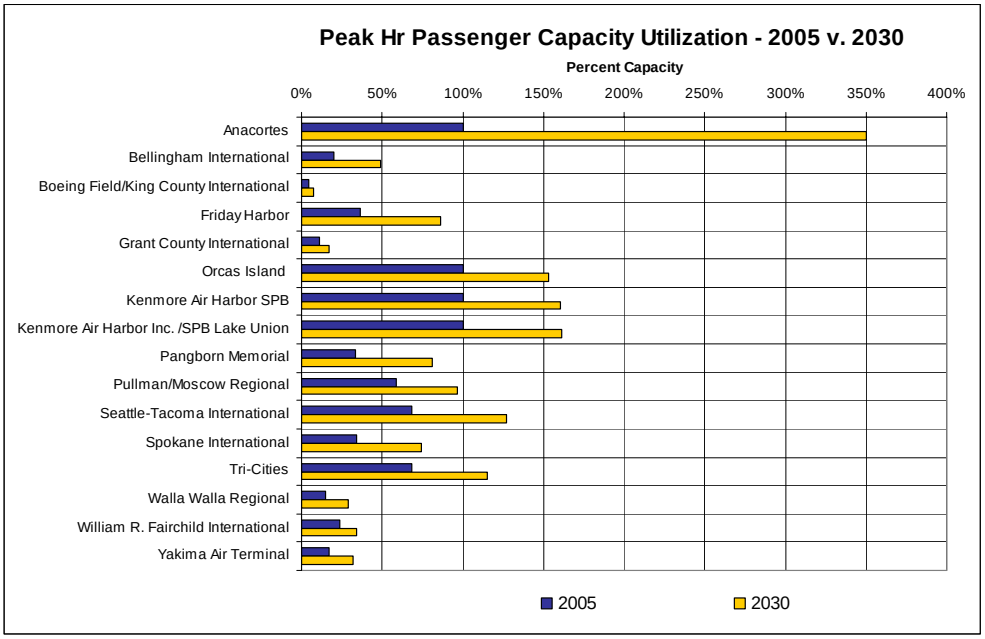
in 2005 will remain constant over the forecast period. As overall enplaned passenger levels increase, peak hour passengers will also increase. This assumes either larger aircraft will be added to the air carrier's flight schedule or additional aircraft departures will occur during the peak hour – likely 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.

Figure 43: Peak Hour Passenger Forecasts

Airport	2005 Terminal Peak Hr Capacity	2005		2030	
		Peak Hour Passengers	Capacity Utilization (%)	Peak Hour Passengers	Capacity Utilization (%)
Anacortes	9	9	100%	32	350%
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%
Kenmore Air Harbor SPB	8	8	100%	13	161%
Kenmore Air Harbor Inc. /SPB Lake Union	8	8	100%	13	161%
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%
Spokane International	2,205	746	34%	1,637	74%
Tri-Cities	271	185	68%	313	115%
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%

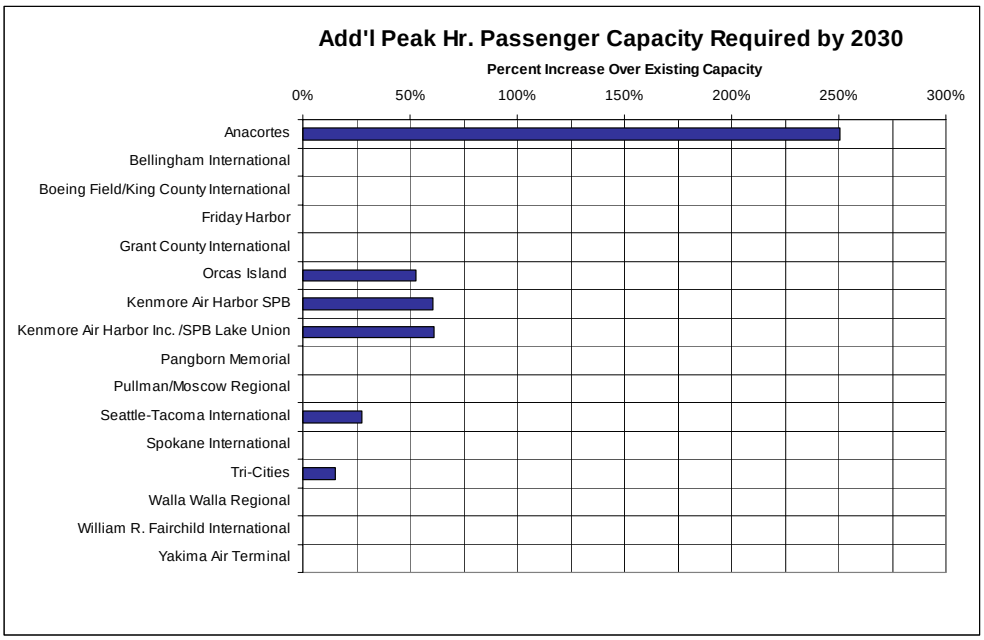
Note: [1]Ongoing passenger carrier activity and studies at Bellingham suggest that BLI needs further review and analysis vis a vis long-term forecasts and capacity calculations.

Figure 44: Peak Hour Passengers – Terminal Capacity Utilization



Applying the planning factor of 175 square feet of terminal area per peak hour enplaned passenger as used in Phase I, the percentage increase in terminal area needed at those airports expected to exceed their existing peak hour passenger capacity are presented in the following figure. Those airports with passenger service not expected to require expansion of their existing facilities are reflected in the figure but show zero increase in enplanement capacity by 2030.

Figure 45: Airports Requiring Expanded Peak Hour Passenger Capacity



AIRPORT CLASSIFICATION AND EVALUATION CRITERIA

Washington State Department of Transportation, Aviation Division
Washington State Long Term Air Transportation Study (LATS)

To:	Sonjia Murray, SH&E David Hollander, SH&E
From:	David Williams, W&H Pacific John Yarnish, URS Corporation
Date:	May 13, 2007
Subject:	*Phase II - Technical Memorandum Number One* *Tasks 23, 24, & 25* *Airport Classification and Evaluation Criteria*

Purpose

The airport classification/evaluation criteria analysis determines the **type** of aviation that the airport system needs to serve, instead of the **amount** of aviation activity that the airport system needs to serve, which is the aim of capacity analyses.

Why use a State Classification?

- Identify roles of airport facilities within the state system
- Complement FAA's service levels, but focus more on general aviation (GA) airports
- Use population, facilities and driving time to measure access to the state air transportation system
- Allow measuring of system performance by facility "objectives"
- Identify needs significant to the system and prioritize investment

This memorandum is accomplished as part of the Phase II LATS study and corresponds to Tasks 23, 24 and 25 of the Phase II scope of work. This memorandum follows the format for technical memorandum for other tasks conducted by W&H Pacific and URS.

Purposes of this memorandum include:

- Describe the state airport classification system (revised from Phase I)
- Describe performance objectives related to those classifications (revised from Phase I)
- Identify gaps/overlaps in airport coverage

- Identify airports that do not meet performance objectives (revised from Phase I).
- Identify potential future changes in airport classifications
- Document the technical analysis (process, assumptions, calculations, etc.) done to reclassify airports and evaluate them for performance.
- Provide information for WSDOT review and approval at timely points in the LATS process, to avoid wasted time and surprises late in the project. An incomplete draft outlining methodology was submitted March 27, 2007, and WSDOT feedback has been incorporated in this version.

Audience

This memorandum is intended to be read and reviewed by the LATS Technical Advisory Committee, WSDOT Aviation, and the consultant team for the LATS project. Key findings of the memorandum are reported in a chapter of the Phase II LATS Report.

Content

The following subsections are provided in this memorandum:

1. Basis for Reevaluation in Phase II
2. Assumptions
3. Methodology
4. Narrative
    - 4.1 Revised State Classifications
    - 4.2 Revised Evaluation Criteria
    - 4.3 Compliance with Performance Objectives
    - 4.4 Possible Future Changes in Classification
5. Appendix – Analysis of Regional Service Airports in the I-5/I-405/I-205 Corridor

Excel files submitted separately to WSDOT also document in more detail the classification and evaluation of Washington's airports:

- "Classification Changes.xls" contains lists of Washington's airport classifications in Phase I and Phase II, along with based aircraft numbers (2005 and 2030), highlighting each airport that changed classification, and reasons.

- "Regional and Comparable Catchments REVISED.xls" contains the 2005 populations within the service areas of Regional Service Airports and comparable Commercial Service Airports.

- "Performance Objective Queries except PCI.xls" and "PCI query.xls" contain the results of database queries and research for all the airport regarding all performance objectives.

- “Perf Obj Compliance Charts.xls” contains the spreadsheets from which came the bar graphs in this memorandum that show percentages of airports meeting various performance objectives.

1. Basis for Reevaluation in Phase II

The Phase I report included an initial draft of State Airport Classifications, assignments of airports to classifications, and performance criteria for all airports and for each classification. The Phase I report also measured the airports for compliance with the criteria.

Why are classifications being reevaluated?

The explanation of why public use airports should be classified has not changed from Phase I, nor has the potential use of the classification system. However:

- The names of State Airport Classifications in the Phase I Report seem to be adequate (except Local Community), but criteria for each classification and some assignments of airports need revision.
- Minimum criteria/performance objectives/benchmark criteria presented in the Phase I Report for all airports and for some airport classifications need revision.
- Service area driving time criteria was not analyzed.
- The criteria are given several different names (e.g., minimum standards, performance objectives, benchmark criteria), which is confusing. There is also confusing inconsistency in the Phase I report concerning whether the classifications are called classifications or service levels.
- Having criteria for all airports plus criteria for each classification is confusing.
- Comments received from Jeff Winter (FAA), from Kerri Woehler and John Shambaugh (WSDOT), and from Sara Funk and David Williams (W&H Pacific) have prompted proposed changes. No additional comments were received from the public.
- The database update of early 2007 included information that changed some airport classifications and compliance with performance objectives.
- WSDOT, URS, and W&H Pacific met 2/6/07, which resulted in some additional changes in airport assignment thresholds and performance objectives.

2. Assumptions

- If it can't be measured, it should not be used as a performance objective.
- To determine the classification of Commercial Service, Recreation/Remote, and Seaplane Base Airports, driving time analysis is not required.
    - Commercial Service Airport service area analysis depends on the air service available (for example, Sea-Tac and Yakima do not have the same service area driving time). Commercial Service Airport service area analysis is part of the Phase II report, but not part of the airport classification and evaluation criteria analysis. Airports outside of Washington are part of the LATS Market Study, but not part of the state airport classification analysis.
    - Recreation/Remote and Seaplane Base Airports are located because of a particular feature (e.g., recreational destination, suitable water body for floatplanes); there is no need for a Washington resident to be located within a certain driving distance of these airports.
- Task 24 requires updating airport classifications based on forecast demand. This analysis is limited to 2030 forecast demand for based aircraft and passenger enplanements. Future airport improvements (such as runway length beyond 4000'), driving times, and populations within service areas are not considered in the reclassification of airports for 2030.
- The shortfalls in meeting objectives are presented in a manner similar to Phase I Report (see pages 154-156 for the Regional Service Airport analysis as an example). These shortfalls are not presented according to RTPO or Special Emphasis Region.

3. Methodology

3.1 Classification Methodology:

To determine/verify the classifications, the database was reviewed for those criteria that relate to activity (2005 based aircraft) and runway length.

To confirm the airports in the Commercial Service Airport classification, the 2007-2011 National Plan of Integrated Airport Systems and the Air Carrier Activity Information System (ACAIS) database were consulted.

Airports that would change classification due to forecast demand in 2030 (Task 24) were identified based upon a review of the based aircraft forecast and the enplaned passenger forecast.

Changes in state classification criteria and assignments are presented in Section 4 of this Tech Memo.

The most complicated methodology was applied to the Regional Service Airport classification. We examined where Regional Service Airports are located relative to each other and relative to the population served using a geographic information system (GIS). Regional Service Airports should have a service area of 60- to 90-minutes driving time. Stated another way, most of the state should have a corporate jet-capable airport within 90 minutes, to support economic development, possible future air service, and emergency services. However, it is not reasonable to apply this principle of airport coverage to low-density population areas. Consequently, we used GIS to identify the population within areas lacking regional airport coverage. If that population is below a certain threshold, a Regional Service Airport would not be justified. On the other hand, in the high population areas of the state, it is probable that Regional Service Airports should be located closer together than 60 minutes. In those areas, we identified maximum population. In areas with inadequate Regional Service Airport coverage, we considered the upgrade of a Local Community Airport, the conversion of a private airport to public use, or the construction of a new airport. In areas with overlapping coverage that is not justified by actual driving time or high population in the service area, we considered “downgrading” the airport to a lower classification.

The following describes the steps taken to determine objectively the airports that should be in the Regional Service Airport classification.

Step One. Most Commercial Service Airports provide the facilities and services needed at a Regional Service Airport and serve high volumes of GA. However, the Commercial Service Airports that have NPIAS-

designated relievers should be eliminated from consideration (Sea Tac and Spokane). Facilities for scheduled passenger and cargo service are higher priority uses of their land than GA hangars.

Step Two. Include all NPIAS-designated relievers in the Regional Service Airport classification (Auburn, Harvey Field, Renton, Snohomish County, and Felts Field). The fact that they are designated relievers demonstrates they are regionally significant.

Step Three. Eliminate seaplane bases from consideration because they do not support land-based GA.

Step Four. Identify all other airports, including Commercial Service Airports, which have at least 40 based aircraft and a runway at least 4,000 feet long:

Arlington Municipal
Auburn Municipal
Bellingham International*
Boeing Field/King County International*
Bowers Field
Bremerton National
Chehalis Centralia
Columbia Gorge Regional/The Dalles
Deer Park Municipal
Ephrata Municipal
Felts Field
Grant County International*
Harvey Field
Kelso-Longview
Olympia
Pangborn Memorial*
Pullman/Moscow Regional*
Renton Municipal/Clayton Scott Field*
Richland
Sanderson Field
Skagit Regional
Snohomish County/Paine Field
Tacoma Narrows
Toledo-Winlock Ed Carlson Memorial
Tri-Cities*
Walla Walla Regional*

Wm. R. Fairchild International*
Yakima Air Terminal*
*Commercial Service Airport

Step Five. Using GIS analysis, determine which of the 28 airports listed above are less than 30 minutes from each other. Then, determine if the overlapping service areas are justified by large service area populations. From an examination of the airports and population along the I-5/ I-405/I-205 corridor, it appears there is justification for Arlington, Auburn, Boeing Field, Harvey Field, Olympia, Renton, Snohomish County/Paine Field, and Tacoma Narrows to be included as Regional Service Airports or comparable Commercial Service Airports, even though they are close together. The appendix presents the justification on the grounds of high population density. The following table presents the results of analyzing airports less than 30 minutes apart.

ID	Airport	Airport(s) less than 30 minutes away	Include as Regional Service (or Comparable Commercial Service) Airport?
AWO	Arlington Municipal	S43, PAE	Yes, justified by population
S50	Auburn Municipal	BFI, RNT, TIW	Yes, justified by population
BFI	Boeing Field/King County International	RNT, S50	Yes, justified by population
CLS	Chehalis Centralia	TDO, OLM	No, not justified by population in 2005
EPH	Ephrata Municipal	MWH	No, not justified by population
MWH	Grant County International	EPH	Yes, as a Commercial Service Airport it adequately serves regional GA needs
S43	Harvey Field	PAE, AWO	Yes, justified by population
OLM	Olympia	CLS	Yes, justified by population
RNT	Renton Municipal/Clayton Scott Field	BFI, S50	Yes, justified by population
RLD	Richland	PSC	No, not justified by population
PAE	Snohomish County/Paine Field	S43, AWO	Yes, justified by population
TIW	Tacoma Narrows	S50	Yes, justified by population
TDO	Toledo-Winlock Ed Carlson Memorial	CLS	No, not justified by population in 2005
PSC	Tri-Cities	RLD	Yes, as a Commercial Service Airport it adequately serves regional GA needs

Step Five eliminated four airports from further consideration, leaving a list of 24 airports, including 10 Commercial Service Airports.

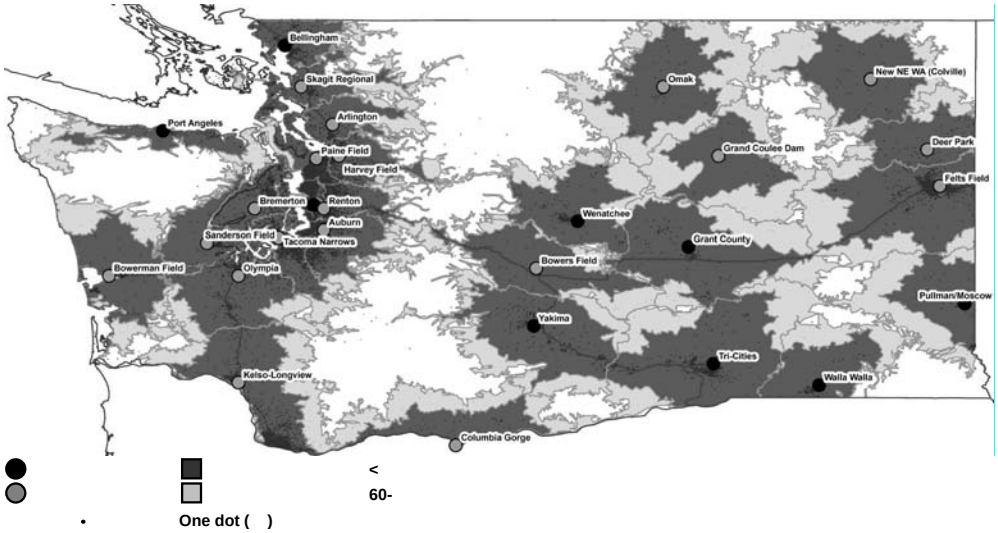
Step Six. Check airport coverage to see that nearly all of Washington residents live within a 90-minute drive of a Regional Service or comparable Commercial Service Airport.

This was accomplished using GIS analysis and then revised to add four airports needed for adequate coverage. The list of 28 analyzed airports includes 19 recommended Regional Service Airports and nine Commercial Service Airports with comparable facilities:

Arlington Municipal
Auburn Municipal
Bellingham International*
Boeing Field/King County International*
Bowerman Field
Bowers Field
Bremerton National
Columbia Gorge Regional/The Dalles
New Northeast Washington (near Colville)
Deer Park Municipal
Felts Field
Grand Coulee Dam
Grant County International*
Harvey Field
Kelso-Longview
Olympia
Omak
Pangborn Memorial*
Pullman/Moscow Regional*
Renton Municipal/Clayton Scott Field
Sanderson Field
Skagit Regional
Snohomish County/Paine Field
Tacoma Narrows
Tri-Cities*
Walla Walla Regional*
Wm. R. Fairchild International*
Yakima Air Terminal*

*Commercial Service Airport

The following map shows the coverage of the 28 airports. The darker shading represents area within a 60-minute driving time of the analyzed airports, and the lighter shading shows the area within 60- to 90-minutes' driving time. Each black dot represents 500 people. This analysis found that 96% of the population and 43% of the land area is within 60 minutes of the mapped airports. Within 90 minutes are 99% of the population and 69% of the land area.



	60 minutes		90 minutes		Uncovered		WA
	Area	% of Total	Area	% of Total	Area	% of Total	Total
Population	6,076,387	96.2%	6,221,566	98.5%	97,689	1.5%	6,319,255
Area	29,117	43.1%	46,297	68.5%	21,316	31.5%	67,613
Density 1/	209		134		5		93

Areas more than 90 minutes from the Regional Service and comparable Commercial Service airports are discussed below.

- San Juan Islands. The GIS program includes time spent on a ferry in the driving time, but does not account for the time spent waiting for a ferry. Actual ferry waiting time would likely place even more of the Islands beyond the 90-minute service area of a mainland airport with a 4,000 foot long runway (Skagit Regional). However, the physical constraints to extending existing Island runways would be hard to overcome. In case of emergency, the Islands could be accessible by boat or helicopter. Designating a Regional Service Airport in the San Juan Islands is not recommended.

- North Cascade Mountains. Population outside the 90-minute driving time to a candidate airport is very low. Upgrading any existing airports, such as Darrington or Concrete, to have a long runway with instrument approach would be very difficult due to the mountainous terrain. Designating a Regional Service Airport in the North Cascade Mountains is not recommended.

- Okanogan County. Designating Omak a Regional Service Airport is recommended and is consistent with the Phase I classification. For about 38,000 people, it is the closest Regional Service Airport within a 90-minute drive.

- Northeast Corner of State. Designating an airport in the vicinity of Colville as a Regional Service Airport is recommended. Colville Municipal Airport is used to represent a new Northeast Washington Airport, although that particular airport is not where the new Regional Service Airport would be located. For approximately 31,000 people, a Northeast Washington airport around Colville would be the closest Regional Service Airport. Northeast Washington is a large area of the state that lacks the level of emergency access and economic development support that a Regional Service Airport would provide. Financial and political support might be difficult and slow to happen, yet planning for such an airport expansion and land use compatibility around it could occur long before financial implementation is feasible.

- Grand Coulee Dam. Designating this airport as a Regional Service Airport is recommended to provide access to a population of 11,000. (This is the population for which Grand Coulee Dam would be the closest regional Service Airport within 90 minutes.)

- Olympic Peninsula. Population outside the 90-minute service area of the airport in Port Angeles is very low, and the Olympic Mountains, National Park, and sensitive natural environment would make development of another airport difficult. Designating a Regional Service Airport in areas outside the 90-minute coverage of Wm R. Fairchild International (Port Angeles) is not recommended.

- Grays Harbor County. Designating Bowerman Field a Regional Service Airport is recommended and is consistent with the Phase I classification. For about 68,000 people, it is the closest Regional Service Airport within a 90-minute drive.

- Long Beach Area. The southwest corner of the state includes populated areas more than 90 minutes from a Washington airport with a runway at least 4,000 feet long. However, the airport in Astoria, OR, provides access to a long runway and precision instrument approach. Designating a Regional Service Airport in the Long Beach Area is not recommended.

- South Cascade Mountains. The situation is very similar to the North Cascades and Olympic Peninsula. It is not recommended to designate an existing airport,

such as Packwood, as a Regional Service Airport or to develop a new airport in this area.

- Klickitat County. The portion of this county in south-central Washington that is outside the 90-minute service area of a candidate airport is virtually unpopulated. Consequently, the designation of a Regional Service Airport in this area is not recommended.

- Adams County. The area lacking candidate airport coverage appears to be very lightly populated, so the designation of a Regional Service Airport there is not recommended.

- Southeast Corner of the State. Populated areas appear to be within the service area of the airport in Lewiston, ID, which provides a long runway and instrument approach. Consequently, the designation of a Regional Service Airport in this area is not recommended.

3.2 Evaluation Methodology:

Evaluation factors were simplified by calling them all "performance objectives." Instead of having some that are minimums for all airports and some that are benchmarks for individual classifications, we determined a list of performance objectives for each classification; some were applicable to all classifications. In Phase III, policy decisions can be made about whether some objectives are minimum standards or a higher priority than others.

Performance objectives were measured using the database updated in 2007, information researched in Phase I, interviews, information from ALPs, the 2003 database, 5010 forms, and AirNav.com, as applicable.

Changes in performance objectives are presented in Section 4 of this Tech Memo.

4. Narrative

The following narrative is divided into four parts:

- Revised State Classifications
- Revised Evaluation Criteria
- Compliance with Performance Objectives
- Possible Future Changes in Classification

4.1 Revised State Classifications

In this section, differences from the Phase I Report are emphasized by underlining.

A total of 139 airports are classified, including Columbia Gorge Regional/The Dalles, which has an Oregon sponsor, but is located in Washington. Changes in the list of public use airports since Phase I include the deletion of Evergreen (closed), the deletion of Hillcrest (now limited to private use), and the addition of Seattle Seaplanes SPB.

Six classifications are proposed:

- Commercial Service Airports
- Regional Service Airports
- Community Service Airports
- Local Service Airports
- Recreation or Remote Airports
- Seaplane Bases

The first two classifications, Commercial Service Airports and Regional Service Airports, have the largest service areas, in terms of driving time and population. Airports in both classifications accommodate high levels of activity and are typically capable of handling high performance aircraft (regional/corporate jets and turboprops).

The Community Service and Local Service Airports serve small- to medium-sized communities. An airport in one of these two classifications accommodates a fairly wide range of general aviation that is important to the community's economic well-being and quality of life, including medical evacuation.

The Recreation or Remote Airports and Seaplane Bases serve narrower scopes of general aviation. An airport in one of these two classifications typically owes its existence to geographic circumstances (*e.g.*, a residential airpark, recreational destination, or body of water), rather than to demand from the population within its service area.

The following sections discuss each of the six airport classifications individually.

4.1.1 Commercial Service Airports

Commercial Service Airports provide scheduled passenger air carrier and/or commuter service to in-state, domestic, and (in some cases) international destinations. Some of these airports also serve regional air cargo demand and many accommodate significant levels of general aviation. Commercial Service Airports are mostly located in large population centers. The extent of a Commercial Service Airport's service area, as defined by driving time and population, depends upon the type of air service provided. See the LATS Market Study for more analysis of the service areas of Washington's airports with scheduled passenger service. Typically, these airports are classified as primary or commercial service airports in the National Plan of Integrated Airport Systems (NPIAS).

Commercial Service Airports meet the following threshold criterion:

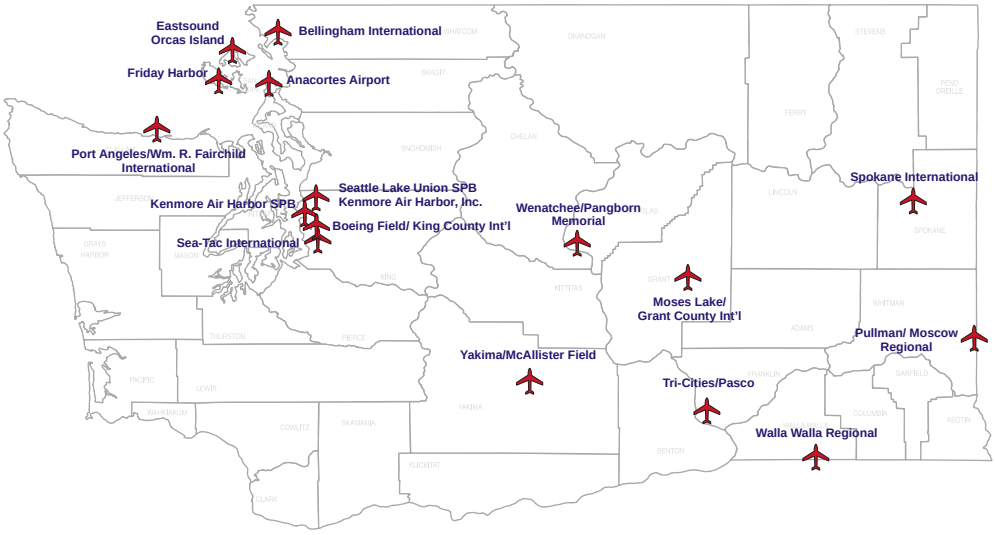
- Accommodate at least 2,500 scheduled passenger boardings[1] per year for at least three years.

The two Kenmore Air Harbor facilities are privately owned and are not classified as primary or commercial service airports in the NPIAS. However, each has a history of more than 2,500 annual passenger boardings, so are included in the State's Commercial Service Airport classification. Although Olympia is included as Commercial Service Airports in the 2007-2011 NPIAS, it did not have at least 2,500 passenger boardings in 2005, 2004, and 2003. Consequently, Olympia is not included in the State's Commercial Service Airport classification.

[1] The source of annual passenger boarding data is the Air Carrier Activity Information System (ACAIS).

State Classification – Commercial Service Airports

Name	City
Anacortes	Anacortes
Bellingham International	Bellingham
Boeing Field/King County International	Seattle
Friday Harbor	Friday Harbor
Grant County International	Moses Lake
Kenmore Air Harbor SPB	Kenmore
Kenmore Air Harbor, Inc.	Seattle
Orcas Island	Eastsound
Pangborn Memorial	Wenatchee
Pullman/Moscow Regional	Pullman/Moscow,Id
Seattle-Tacoma International	Seattle
Spokane International	Spokane
Tri-Cities	Pasco
Walla Walla Regional	Walla Walla
William R Fairchild International	Port Angeles
Yakima Air Terminal	Yakima



Explanation of Changes from Phase I:
Some of these airports are not located in large population areas. Service area is mentioned for consistency with other classifications. The importance to air cargo and general aviation is mentioned because most of these airports also fill the role of Regional Service Airports. Rewording limited the bulleted "threshold" criteria to the minimum, objective

criterion and moved the more subjective, generalized criteria to the paragraph above the bulleted list.

4.1.2 Regional Service Airports

Regional Service Airports serve the general aviation needs of multiple communities or are located in large metropolitan areas where multiple airports are warranted. They include all airports classified as Relievers by the NPIAS. Most Regional Service Airports accommodate unscheduled air taxi/charter flights, and some have air cargo service. Regional Service Airports can accommodate high aviation activity levels. Except for Reliever airports that are designed for small aircraft, they can accommodate nearly all types of general aviation aircraft, including corporate and air ambulance jets. Their ability to accommodate jet traffic makes them vital assets for regional economic development and quality of life.

These airports could accept emergency passenger and cargo flights in large[2] aircraft, in case Commercial Service Airports or ground transportation modes are incapacitated by natural or manmade disaster. Regional Service Airports include the airports most likely to grow into new Commercial Service Airports in the future.

A Regional Service Airport has a 60- to 90-minute (driving time) service area, unless high population density necessitates a smaller service area. In the Seattle metropolitan area, most of the population is located less than 60 minutes from a Regional Service Airport. In other urbanized parts of the state, a Regional Service Airport draws from a service area of about 60 minutes, while Regional Service Airports in lightly populated areas draw population from as far away as 90 minutes.

The principle for access behind the Regional Service Airport classification is:

Nearly every Washington resident should be able to reach a "jet-capable" Regional Service or comparable Commercial Service Airport within 90 minutes.[3]

This principle recognizes that most of the Commercial Service Airports in Washington also have the capacity for and provide the facilities and services needed for high levels of GA activity and for jet aircraft.

---

[2] Aircraft with maximum takeoff weight over 12,500 pounds

[3] For determining criteria for assigning the Regional Service classification, "jet capable" means a runway at least 4,000 feet long and a "comparable Commercial Service Airport" is one with a runway at least 4,000 feet long. Performance objectives for Regional Service and Commercial Service Airports include objectives that enhance jet capability, such as a 5,000-foot runway length, low visibility instrument approach, and jet fuel sales.

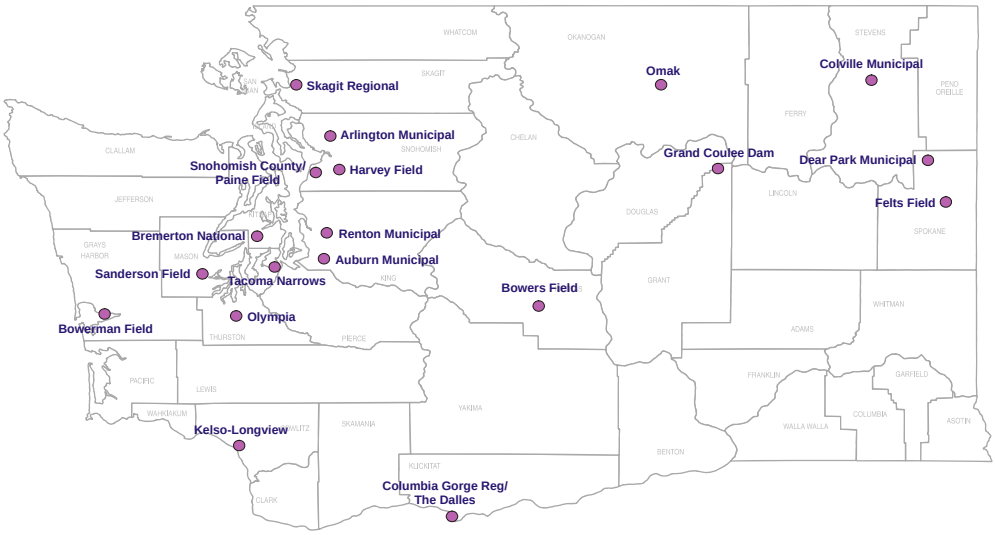
Regional Service Airports meet the following threshold criteria:

- Have at least 40 based aircraft, unless the airport is required for coverage of lower density population areas.
- Have a runway at least 4,000 feet long, unless the airport is designated as a NPIAS Reliever.
- Be separated from another Regional Service Airport or a comparable Commercial Service Airport by at least 30 minutes driving time, unless closer airports are justified by the large population numbers within the service area.
- Have a minimum service area population of approximately 5,000 (90-minute driving time) and a maximum service area population of approximately 400,000 (60-minute driving time).[4]

State Classification – Regional Service Airports

Name	City
Arlington Municipal	Arlington
Auburn Municipal	Auburn
Bowerman Field	Hoquiam
Bowers Field	Ellensburg
Bremerton National	Bremerton
Columbia Gorge Regional/The Dalles	The Dalles
Colville Municipal	Colville
Deer Park Municipal	Deer Park
Felts Field	Spokane
Grand Coulee Dam	Electric City
Harvey Field	Snohomish
Kelso-Longview	Kelso
Olympia	Olympia
Omak	Omak
Renton Municipal	Renton
Sanderson Field	Shelton
Skagit Regional	Burlington/Mount Vernon
Snohomish County/Paine Field	Everett
Tacoma Narrows	Tacoma

[4] The minimum population threshold represents a population density between one and two persons per square mile. The maximum population of 400,000 is explained in the appendix.



Explanation of Changes from Phase I:
The description was reworded to add information about possible growth into Commercial Service Airports and emergency use. Driving time was changed to a range to provide more flexibility, and service area population information added. The threshold criterion "Accommodate aircraft in inclement weather" was deleted, since this is a performance objective. Rewording limited the bulleted "threshold" criteria to the minimum, objective criteria and moved the more subjective, generalized criteria to the paragraph above the bulleted list.

The steps involved in determining the Regional Service Airports were outlined in the Methodology section of this Technical Memorandum. The resulting change in airports assigned to this classification follow.

Exclusion from Phase I Regional Service Airport classification:

- Richland, because it is less than a half hour from Tri-Cities/Pasco

Inclusions to Phase I Regional Service Airport classification:

- Grand Coulee Dam, because it serves a populated area not covered by another Regional Service Airport
- New Northeast Washington Airport (around Colville), because it serves a populated area not covered by another Regional Service Airport

4.1.3 Community Service Airports

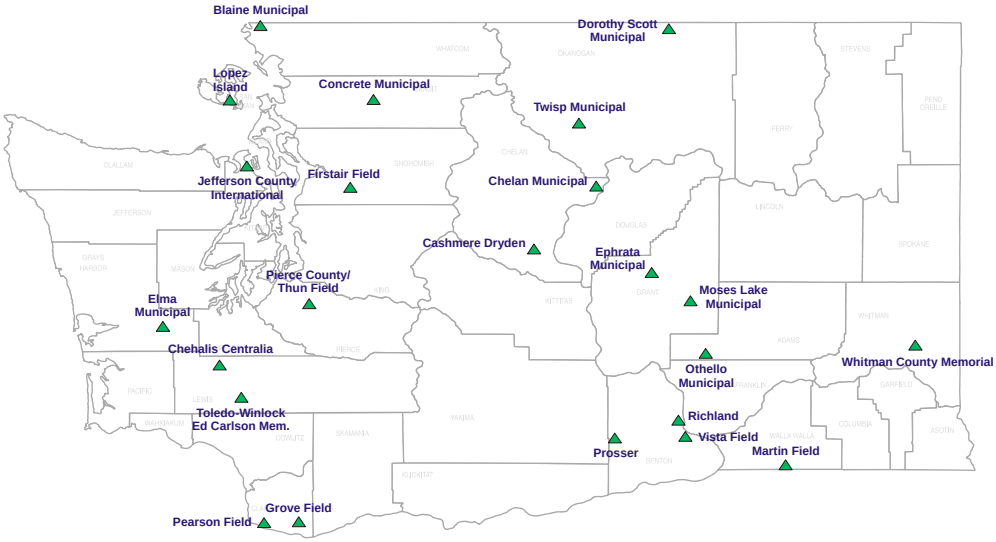
Community Service Airports serve small to medium-sized communities. Primarily used by piston-driven general aviation aircraft, these airports are busy enough to warrant aviation services such as fuel sales. Typically, Larger Community Airports are owned by a public entity and have 30-minute (driving time) service area coverage.

Community Service Airports meet the following threshold criteria:

- Have at least 20 based aircraft.
- Have a paved runway.

State Classification – Community Service Airports

Name	City
Blaine Municipal	Blaine
Cashmere Dryden	Cashmere
Chehalis Centralia	Chehalis
Chelan Municipal	Chelan
Concrete Municipal	Concrete
Dorothy Scott Municipal	Oroville
Ed Carlson Memorial	Toledo
Elma Municipal	Elma
Ephrata Municipal	Ephrata
Firstair Field	Monroe
Grove Field	Camas
Jefferson County International	Port Townsend
Lopez Island	Lopez
Martin Field	College Place
Moses Lake Municipal	Moses Lake
Othello Municipal	Othello
Pearson Field	Vancouver
Pierce County/Thun Field	Puyallup
Prosser	Prosser
Richland	Richland
Twisp Municipal	Twisp
Vista Field	Kennewick
Whitman County Memorial	Colfax



Explanation of Changes from Phase I:
The Local Community (10 or more based aircraft) classification name was changed and the threshold for inclusion was increased from 10 to 20 based aircraft. The name change was for simplification. The based aircraft threshold change was to better identify the point at which an airport is busy enough to have aviation services and warrant a higher level of facilities. Rewording limited the bulleted "threshold" criteria to the minimum, objective criterion and moved the more subjective, generalized criteria to the paragraph above the bulleted list. A paved runway was added to distinguish these airports from some of those in the Recreation or Remote Airports. Aircraft damage from gravel and debris is lessened on a paved runway, compared to an unpaved runway. The provision of a paved runway denotes that the Community Service Airports are typically used by more expensive aircraft for more business purposes (including air ambulance service) than Recreation or Remote Airports.

Additions to the classification are Elma, Firstair, Martin Field, Twisp, and Vista. Deletions from the classification are Anderson, Davenport, Goldendale, Odessa, Okanogan, Rosalia, Sand Canyon, Waterville, Wilbur Field, and Willard Field.

4.1.4 Local Service Airports

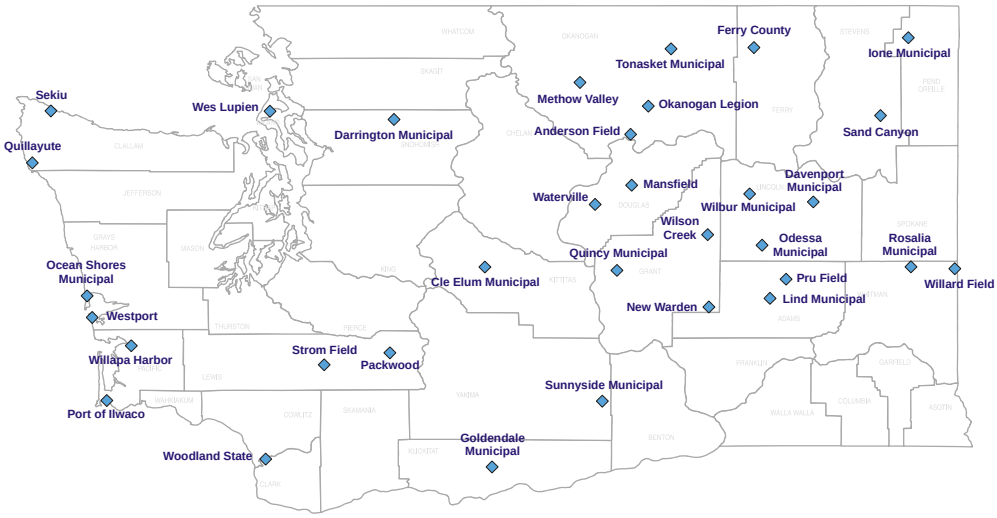
Like the Community Service Airports, Local Service Airports serve small to medium-sized communities and are primarily used by piston-driven general aviation aircraft. However, Local Service Airports host lower levels of aviation activity and typically have fewer, if any, pilot or aircraft services. Typically, these airports are owned by a public entity and have 30-minute (driving time) service area coverage.

Local Service Airports meet the following threshold criteria:

- Have fewer than 20 based aircraft
- Have a paved runway.

State Classification – Local Service Airports

Name	City
Anderson Field	Brewster
Cle Elum Municipal	Cle Elum
Darrington Municipal	Darrington
Davenport Municipal	Davenport
Ferry County	Republic
Goldendale Municipal	Goldendale
Ione Municipal	Ione
Lind Municipal	Lind
Mansfield	Mansfield
Methow Valley	Winthrop
New Warden	Warden
Ocean Shores Municipal	Ocean Shores
Odessa Municipal	Odessa
Okanogan Legion	Okanogan
Packwood	Packwood
Port of Ilwaco	Ilwaco
Pru Field	Ritzville
Quillayute	Quillayute
Quincy Municipal	Quincy
Rosalia Municipal	Rosalia
Sand Canyon	Chewelah
Sekiu	Sekiu
Strom Field	Morton
Sunnyside Municipal	Sunnyside
Tonasket Municipal	Tonasket
Waterville	Waterville
Wes Lupien	Oak Harbor
Westport	Westport
Wilbur Municipal	Wilbur
Willapa Harbor	South Bend (Raymond)
Willard Field	Tekoa
Wilson Creek	Wilson Creek
Woodland State	Woodland



Explanation of Changes from Phase I:
The Local Community (fewer than 10 based aircraft) classification name was changed and the number of based aircraft was changed to 20, for reasons described above under Community Service Airports. The public owner and paved runway comments were added to help distinguish this classification from Recreation or Remote Airports. Rewording limited the bulleted "threshold" criteria to the minimum, objective criteria and moved the more subjective, generalized criteria to the paragraph above the bulleted list.

The requirement for a paved runway indicates that the airport is probably used for business and air ambulance purposes and not just for recreational purposes.

Quillayute is included as a Local Service Airport while Forks Municipal is listed as a Recreation or Remote Airport. Currently, Forks Municipal is functioning more as the community's airport. However, the airports are too close to each other for both to be located in the NPIAS. The community of Forks has decided that Quillayute is the airport to be included in the NPIAS. Because it has the potential for AIP funding to allow it long term viability, Quillayute has been included as a Local Service Airport and Forks Municipal is listed as a Recreation or Remote Airport. Other "promotions" from Phase I Recreation or Remote Airports are Ione, Methow Valley, and Woodland State.

4.1.5 Recreation or Remote Airports

<u>This classification includes all land-based airports that are open to public use but do not meet the threshold criteria for Commercial Service,</u>

Regional Service, Larger Community, or Smaller Community Airports. These airports typically serve recreation communities or leisure destinations and remote backcountry locations. These airports may also be strategically located for emergency and firefighting access in mountainous or other remote areas. Recreation or Remote Airports include airparks, which combine residential housing with an airport. Many of these airports have private owners, are located in unpopulated areas or small unincorporated communities, lack paved runways, and/or are only used seasonally.

Some of the Recreation or Remote Airports are very busy airparks. For example, Crest Airpark has over 300 based aircraft. Nevertheless, an airpark is by definition an airport surrounded by residences. Except where residents are aircraft owners, residential land uses are not compatible with airports. Residences at an airpark could be sold to persons who do not own aircraft or are not aviation enthusiasts, which could affect the long-term viability of the airport.

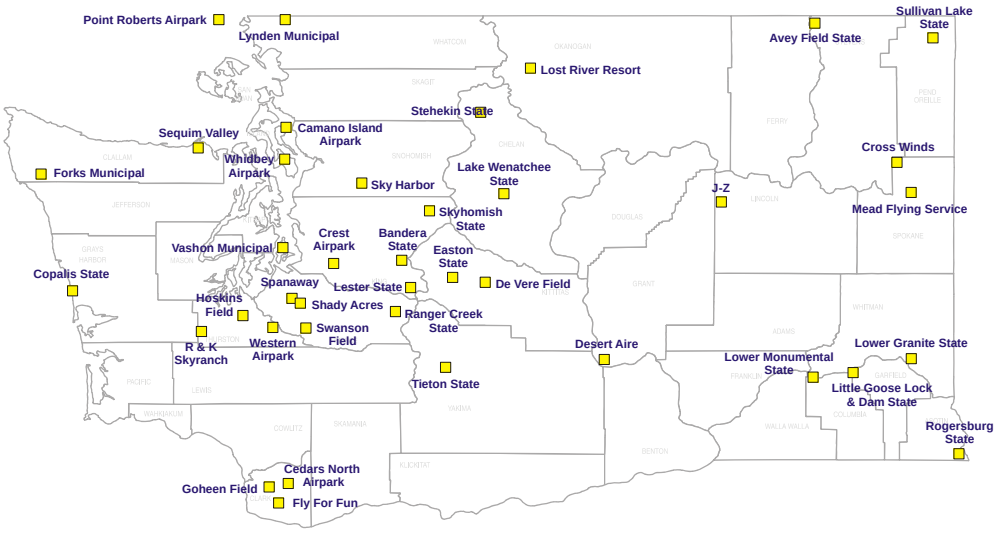
State Classification – Recreation or Remote Airports

Name	**City**
Avey Field State	Laurier
Bandera State	Bandera
Camano Island Airfield	Stanwood
Cedars North Airpark	Battle Ground
Copalis State	Copalis
Crest Airpark	Kent
Cross Winds	Clayton
Desert Aire	Mattawa
DeVere Field	Cle Elum
Easton State	Easton
Fly For Fun	Vancouver
Forks Municipal	Forks
Goheen Field	Battle Ground
Hoskins Field	Olympia
J-Z	Almira
Lake Wenatchee State	Leavenworth
Lester State	Lester
Little Goose Lock & Dam State	Starbuck
Lost River Resort	Mazama
Lower Granite State	Colfax
Lower Monumental State	Kahlotus
Lynden Municipal	Lynden
Mead Flying Service	Mead
Point Roberts Airpark	Point Roberts

R & K Skyranch	Rochester
Ranger Creek State	Greenwater
Rogersburg State	Anatone
Sequim Valley	Sequim

State Classification – Recreation or Remote Airports (continued)

Shady Acres	Spanaway
Sky Harbor	Sultan
Skykomish State	Skykomish
Spanaway	Spanaway
Stehekin State	Stehekin
Sullivan Lake State	Metaline Falls
Swanson Field	Eatonville
Tieton State	Rimrock
Vashon Municipal	Vashon
Western Airpark	Yelm
Whidbey Airpark	Langley



Explanation of Changes from Phase I:
"Threshold" criteria were deleted because this is the classification that includes everything left over—the only minimum is that it is a public-use airport, which is inherent in the definition of the airport system. More description was added based on the 2/6/07 meeting.

4.1.6 Seaplane Bases

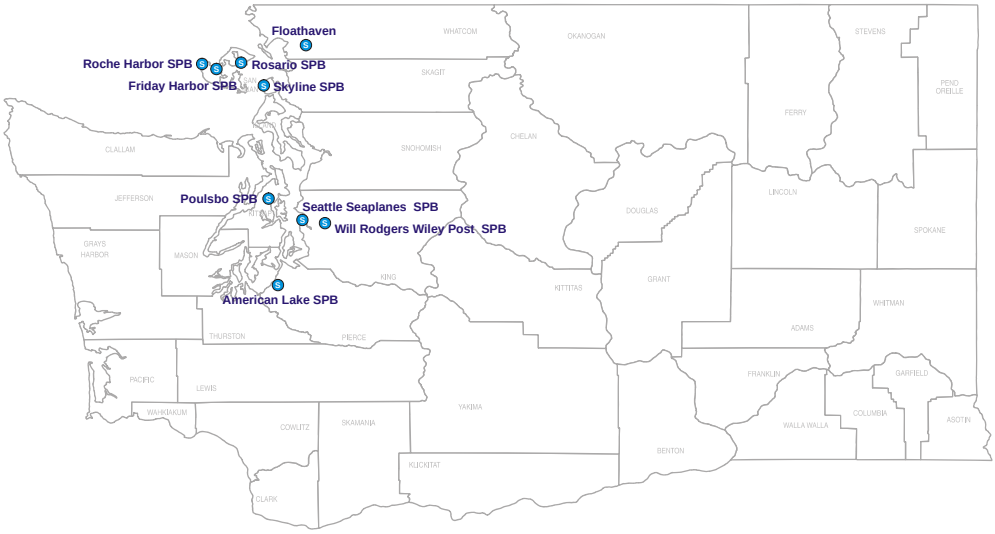
Seaplane bases serve amphibious and float-equipped aircraft and may have some upland facilities. Most seaplane bases in Washington are located in the Puget Sound area.

Seaplane Bases meet the following threshold criterion:

- Are reported as seaplane bases in the Airport Facility Directory (based on FAA Form 5010 reports), except for those providing at least 2,500 annual scheduled passenger boardings.

State Classification – Seaplane Bases

Name	City
American Lake SPB	Tacoma
Floathaven SPB	Bellingham
Friday Harbor SPB	Friday Harbor
Poulsbo SPB	Poulsbo
Roche Harbor SPB	Roche Harbor
Rosario SPB	Rosario
Seattle Seaplanes SPB	Seattle
Skyline SPB	Anacortes
Will Rogers Wiley Post SPB	Renton



Explanation of Changes from Phase I:
Minor rewording was done for clarity. Seattle Seaplanes SPB was added. Kenmore Air Harbor SPB was reclassified a Commercial Service Airport.

4.2 Revised Evaluation Criteria

Two types of performance objectives are proposed: those that relate to all classifications and those that are customized for the facilities and services appropriate to each classification.

4.2.1 Performance Objectives for All Classifications

The performance objectives relating to all classifications include operational factors, up-to-date plan, and land use compatibility:

- The airport provides an appropriate aircraft operating environment, measured by the following:
  - Runway safety areas are in compliance with FAA standards
  - Airfield pavements are in good or excellent condition, measured by the following minimum Pavement Condition Indices (PCI):
    - 75 for runways
    - 70 for taxiways and aprons
  - No obstacles are in the runway threshold siting surfaces or obstacle free zones

- The Airport Layout Plan (ALP) and narrative airport plan (Master Plan or ALP Report) are not more than seven years old.

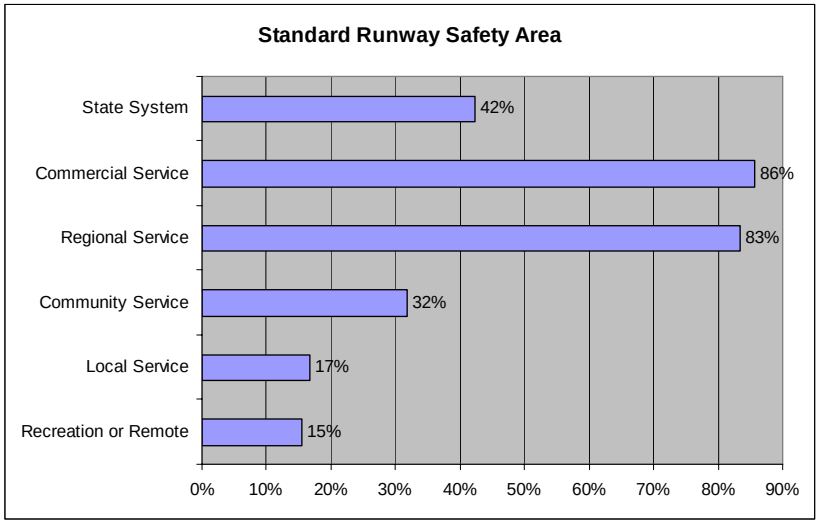
- Comprehensive plan policies and development regulations aid in ensuring compatible land use adjacent to the airport, determined by meeting the following:
  - Compatible land use policies are in the comprehensive plan.
  - Airport zoning designation is appropriate (*i.e.*, Airport, Industrial, or Public Use).
  - Runway protection zones (RPZ) are on airport property, or compliance with FAA's land use standards for RPZs is ensured by easement or development regulation.
  - Zoning is in place to regulate height hazards or regulations prohibit penetrations of FAR Part 77 surfaces.

A runway safety area meeting FAA standards is an objective that has been a high FAA priority in recent years. The runway safety area is the one FAA airport design standard for which the FAA cannot approve a modification of standards.[5] The purpose of the runway safety area is to minimize injuries and damage and to facilitate recovery if an aircraft overshoots or undershoots the runway. The runway safety area is centered on the runway, with a size defined in FAA Advisory Circular 150/5300-13, *Airport Design.* The size depends upon the design aircraft and level of instrument approach for the runway. The runway safety area is cleared,

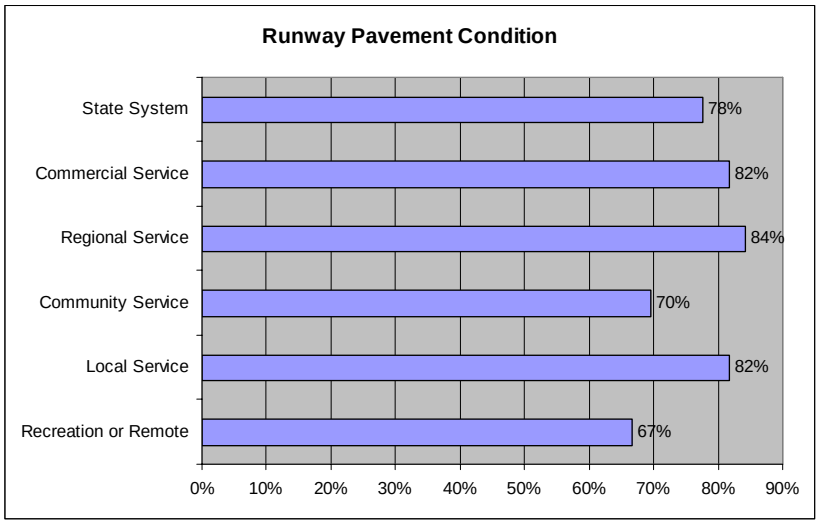
[5] Approval of a modification of standards is possible in most other circumstances if the nonstandard feature provides equivalent level of safety.

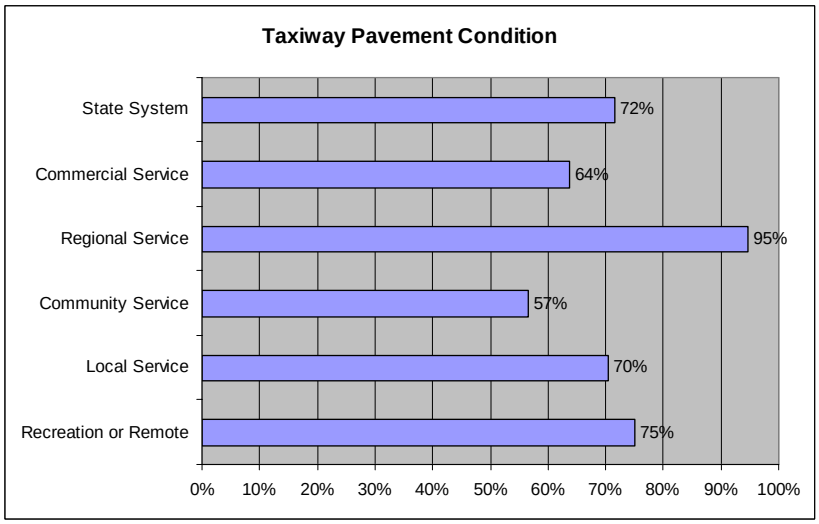
graded, and capable of supporting snow removal equipment, aircraft rescue and firefighting equipment; and the occasional passage of aircraft without causing structural damage to the aircraft. The runway safety area objective does not apply to Seaplane Bases because water is the surface for takeoff and landing.

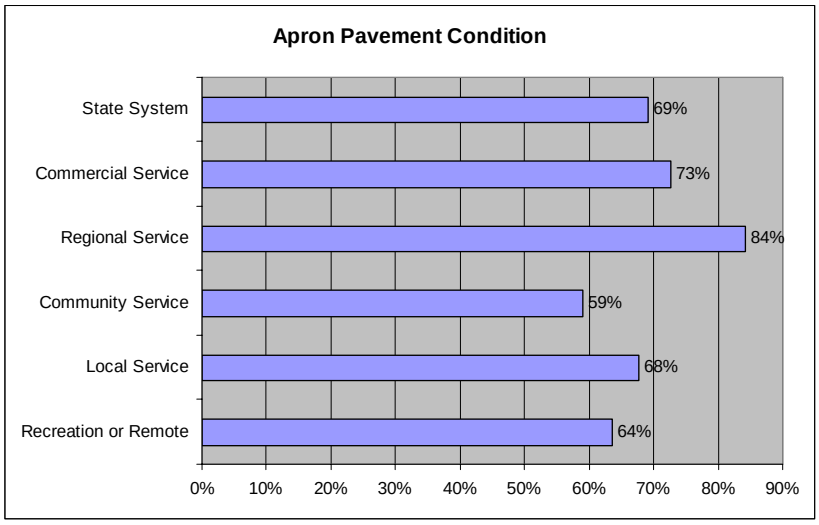
The chart below shows the percentage of airports by classification that meet the Standard Runway Safety Area objective. Nearly all the Commercial and Regional Service airports meet the objective, but statewide, less than half the airports do. The source of information is the 2003 database that came from field measurements, updating for projects since 2002, and information provided by the FAA and some airport sponsors. Several airports lack data to determine if the safety areas are standard. Individual airports lacking data or having nonstandard safety areas are listed by classification, later in this Technical Memorandum.



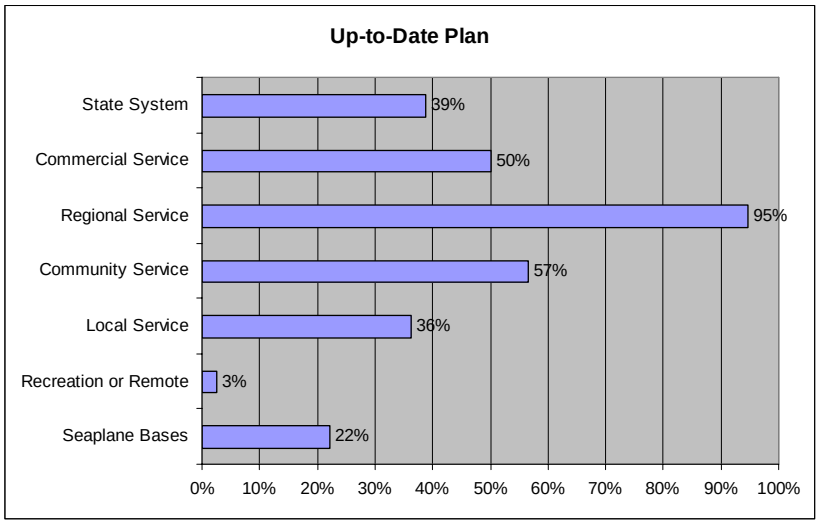
Pavement condition is another objective that aligns well with FAA priorities. A PCI of 100 represents brand new pavement, while a PCI of 0 represents completely failed pavement. Washington's airports with airfield pavements perform well for the pavement condition objectives, as shown in the next three charts. Airports that lack pavement condition information or do not meet the objectives are listed by classification later in this Technical Memorandum.


Runway Pavement Condition
State System
Commercial Service
Regional Service
Community Service
Local Service
Recreation or Remote
78%
82%
84%
70%
82%
67%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%


Taxiway Pavement Condition
State System
Commercial Service
Regional Service
Community Service
Local Service
Recreation or Remote
72%
64%
95%
57%
70%
75%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%



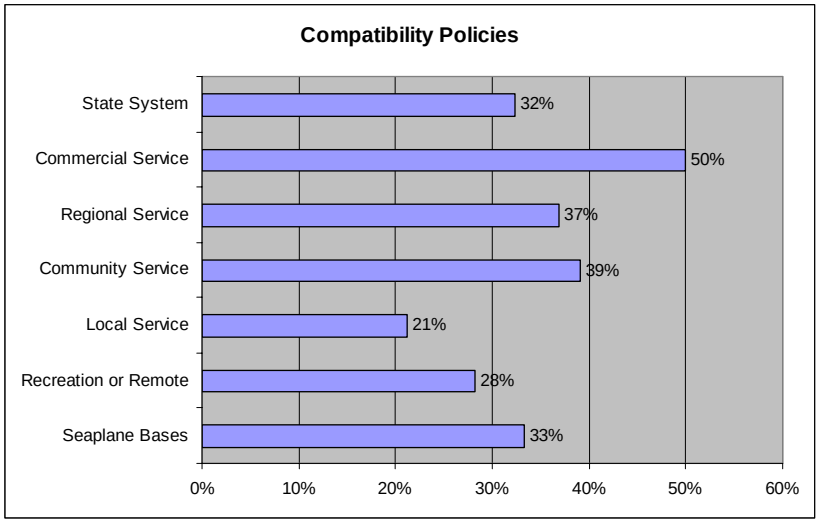
Having an up-to-date plan is important for airports to adjust to changing conditions both on- and off-airport and to ensure the long-term viability of the airport. Seven years is an interval for updating that matches the Growth Management Act requirement for updating comprehensive plans. If there has been little change since the last publication of planning documents for the airport, a full update may not be warranted. The following chart shows that very few Recreation or Remote Airports have up-to-date plans, while nearly all the Regional Service Airports do. The percentage of Commercial Service Airports meeting the objective seems surprising low (50%), but may be due to a number of factors. These airport plans are sometimes controversial and can take several years and large budgets to complete. Two of the 16 Commercial Service Airports are privately owned seaplane bases that lack published planning documents. Finally, some sponsors of Commercial Service Airports engage in continuous planning and ALP updates with in-house staff. Individual airports lacking up-to-date plans are listed by classification, later in this Technical Memorandum.

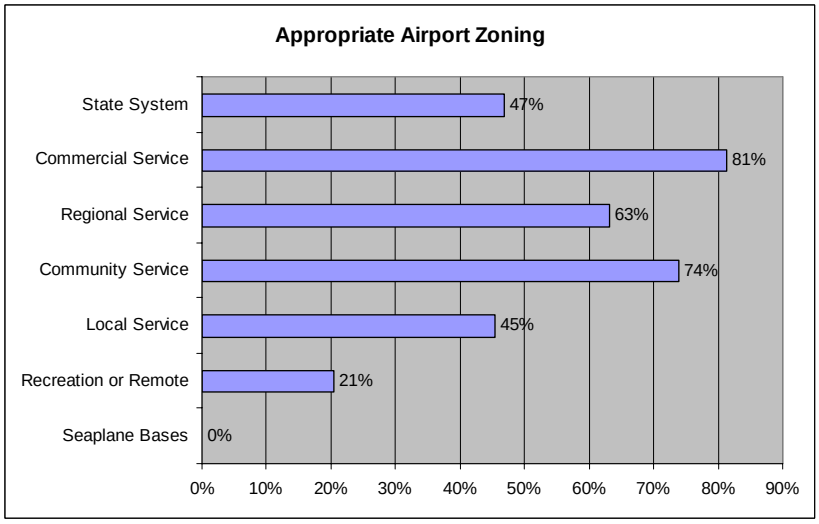


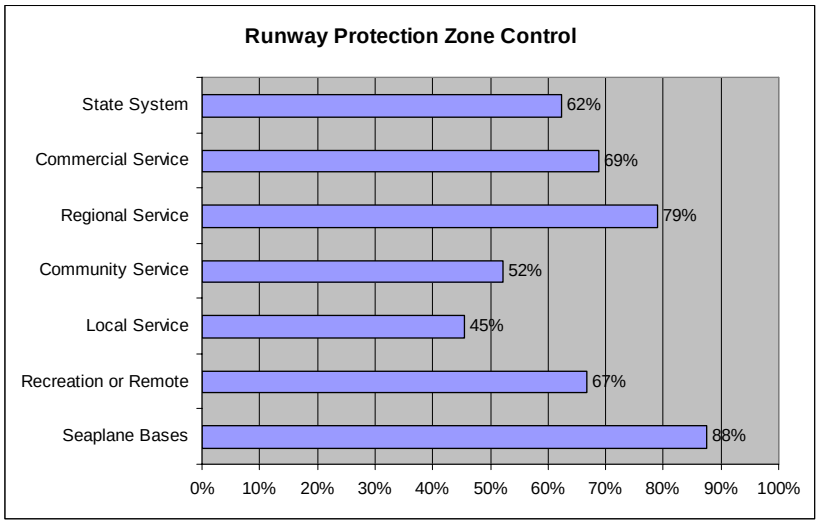
Having unobstructed airspace for aircraft arrivals and departures is another important objective applicable to all airport classifications. FAR Part 77 defines various imaginary surfaces that should be cleared around an airport and is the basis for most height hazard zoning and regulations around airports. However, an obstruction, or object that penetrates an imaginary surface, is not always a hazard to aviation. The FAA determines if an obstruction is a hazard through an airspace study. *Airport Design* contains requirements for runway end siting and obstacle free zones that are better aligned with the criteria that determine if an obstruction is a hazard to aviation. The threshold siting surface is a surface similar to the approach surface defined in FAR Part 77, but is generally narrower, shorter, and has a higher slope. Any penetrations to this surface must be removed or operational penalties will result—either the shortening of the useable runway surface through threshold displacement or the raising of approach visibility minimums for instrument approaches. Obstacle Free Zones (OFZ) are primarily around the runway, similar to Part 77's primary surface. Transitional and approach OFZ are also applicable for instrument runways. As with objects in the threshold siting surface, operational penalties can result when objects penetrate the OFZ. Since Airport Layout Plans typically show Part 77 obstructions and not threshold siting surface or OFZ obstructions, there are few airports that have the data available to assess these performance objectives. None of the Recreation or Remote Airports and none of the Seaplane Bases have data available. Additional effort to measure this performance objective is recommended. WSDOT is launching a pilot program in 2009 to survey obstructions, a program focused on adding instrument approaches to visual runways. This program provides a means for measuring more airports for compliance

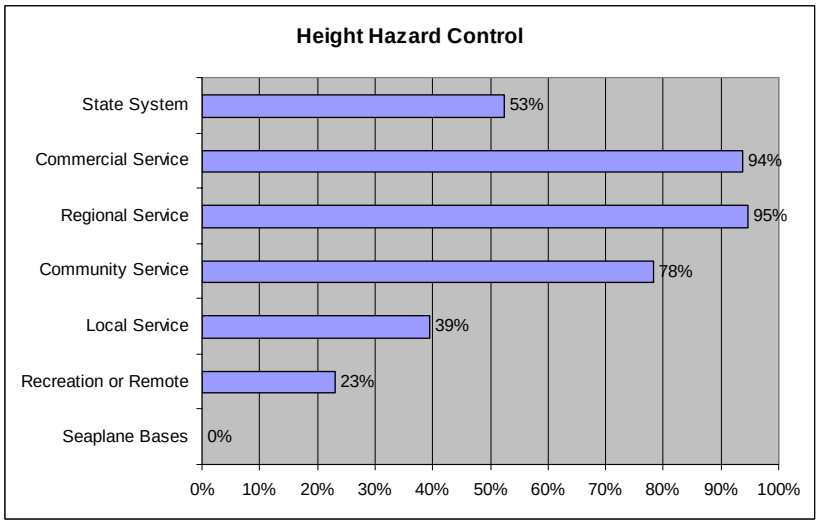
with the objective to have clear threshold siting surfaces and obstacle free zones.

The next charts show how well Washington's airports comply with the land use compatibility objectives. Land use compatibility objectives in Phase II are similar to Phase I objectives, but additional effort to collect data in 2007 resulted in more comprehensive results than in the Phase I report. Individual airports not meeting these objectives are listed by classification, later in this Technical Memorandum.









4.2.2 Classification-Specific Performance Objectives for Facilities and Services

Performance objectives related to classification-specific facilities and services address runway length, parallel and turnaround taxiways, instrument approaches, visual glide slope indicators (VGSI), automated weather reporting, fuel sales, and aircraft maintenance service. Most of these were objectives in Phase I, and the Phase I Report explains what they are and their importance. This section explains changes in the objectives from Phase I. FAA criteria and individual airport conditions

may override the objectives for facilities and services; nevertheless the objectives are a useful way to measure how well the system is performing.

Runway length objectives and how and why they changed from Phase I are summarized below.

Classification	**Phase I**	**Phase II**
Commercial Service	5,500 feet	5,000 feet*
Regional Service	5,000 feet	5,000 feet
Community Service (In Phase I, Local Community >10 Based Aircraft)	3,200 feet	3,200 feet**
Local Service (In Phase I, Local Community <10 Based Aircraft)	2,800 feet	2,400 feet***
Recreation or Remote	2,400 feet	No objective***
Seaplane Bases	No objective	No objective

*Because the needs for commercial and corporate jets are similar, it was decided to make the objectives the same for Commercial Service and Regional Service Airports. The 5,000-foot length is recommended for medium jets by the National Business Aircraft Association (NBAA) at standard conditions (59 degrees F and sea level).
**Appendix 16 of *Airport Design* lists 3,200 feet as the minimum required for an instrument approach without penalizing approach visibility minimums. Appendix 16 also states that runways less than 3,200 feet are protected by Part 77 to a lesser extent. The 3,200-foot length is generally adequate for air ambulance aircraft like King Air and B200 (Wenatchee Executive Flight) and is approximately the length required for Very Light Jets (VLJ).
***Runway length objectives were lessened to reduce potential funding needs for runway extensions. The minimum length for an instrument approach is 2,400 feet according to Appendix 16 of *Airport Design*, and this length is adequate for 75 - 95% of the small aircraft fleet, using 65 – 85 degrees F for the design temperature.

A full-length parallel taxiway for the primary runway is the objective for Commercial Service, Regional Service, and Community Service Airports. This is the same as in the Phase I Report. The need for a full-length parallel taxiway is related primarily to instrument approach and activity level. A parallel taxiway is recommended for an instrument approach with visibility minimums as low as 1 mile and is required for lower approach visibility minimums. While a parallel taxiway is considered fundamental airport development,[6] it is sometimes hard to justify the expense at a low activity airport.[7]

The other land-based airports have an objective to have turnaround taxiways at both ends of the primary runway if they lack a full parallel taxiway. While Phase I reported on turnaround taxiways, it neglected to

[6] Table 3-1, FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*
[7] According to FAA Order 5100.38C, *Airport Improvement Program Handbook*, "A full-length parallel taxiway connected to each end of an eligible runway is eligible. A partial parallel taxiway may be considered at general aviation airports where cost to construct the full length is excessive and the benefits do not warrant it."

qualify that the turnaround taxiway must be deep enough to allow the aircraft to be behind the holding position. The required holding position locations are as shown in the following table. Additional telephone interviews in 2007 sought to determine if airports without parallel taxiways have turnarounds compliant with this objective.

Location Distances for Holding Position Markings
(Perpendicular distance from runway centerline to intersecting runway/taxiway centerline)

Aircraft Approach Category and (Airplane Design Group)	Visual and Nonprecision Instrument	Precision Instrument
A & B (I and II) small airplanes only	125 feet*	175 feet
A & B (I, II, and III)	200 feet	250 feet
A & B (IV)	250 feet	250 feet
C & D (I through IV)	250 feet	250 feet
C&D (V)	250 feet	280 feet
C&D (VI)	250 feet	280 feet

Source: FAA Advisory Circular, 150/5340-18D

Note: These distances are for planning purposes only. Hold position markings must be placed to restrict the largest aircraft expected to use the runway from penetrating the OFZ. Also, the distances increase to account for elevation at airports in Airplane Design Group III and larger.

*Requirement applicable to most Washington airports lacking a full-length parallel taxiway.

Instrument approach objectives were changed to eliminate visual approach as an objective, since every runway has a visual approach. Also, the advances in GPS approaches have made the terms nonprecision and precision inadequate to describe the full range of instrument approaches possible with GPS, so these terms have been eliminated. Because they are tied to FAA airport design standards, the approach visibility minimums of instrument approaches are used to identify objectives for Commercial Service, Regional Service and Community Service Airports.

The main change in runway edge lighting objectives was to reduce the requirement for Commercial Service and Regional Service Airports. In Phase I, high intensity runway lights (HIRL) was listed the objective for these airports. Since HIRL is only required for runway visual range (RVR)-based minimums, the objective was changed to medium intensity runway lights (MIRL). MIRL is the minimum required for approach visibility minimums lower than 1 mile.

4.2.2.1 Commercial Service and Regional Service Airport Performance Objectives

The objectives for Commercial Service and Regional Service Airports are the same, based on the similarity of needs for commercial passenger and corporate jet service:

- The airport provides an appropriate aircraft operating environment, measured by the following:
    - Runway safety areas are in compliance with FAA standards
    - Airfield pavements are in good or excellent condition, measured by the following minimum Pavement Condition Indices (PCI):
        - 75 for runways
        - 70 for taxiways and aprons
    - No obstacles are in the runway threshold siting surfaces or obstacle free zones

- The Airport Layout Plan and narrative airport plan (Master Plan or ALP Report) are not more than seven years old.

- Comprehensive plan policies and development regulations aid in ensuring compatible land use adjacent to the airport, determined by meeting the following:
    - Compatible land use policies are in the comprehensive plan.
    - Airport zoning designation is appropriate (*i.e.*, Airport, Industrial, or Public Use).
    - Runway protection zones (RPZ) are on airport property, or compliance with FAA's land use standards for RPZs is ensured by easement or development regulation.
    - Zoning is in place to regulate height hazards or regulations prohibit penetrations of FAR Part 77 surfaces.

- The primary runway is at least 5,000 feet long.

- The primary runway has a full-length parallel taxiway.

- At least one runway end has an instrument approach with approach visibility minimums lower than ¾ mile.

- Runway edge lighting is medium or high intensity (MIRL or HIRL).

- Both ends of the primary runway have visual glide slope indicators (VGSI).

- The airport has an automated weather reporting system (AWOS or ASOS).

- 100LL and Jet A fuel sales are available.

- Full-service FBO and major maintenance services are available.

4.2.2.2 Community Service Airport Performance Objectives

Performance objectives for Community Service Airports are focused on providing airports not just adequate for a variety of GA aircraft, but able to accommodate air taxi operations, including potential operations in very light jets (VLJ):

- The airport provides an appropriate aircraft operating environment, measured by the following:
  - Runway safety areas are in compliance with FAA standards
  - Airfield pavements are in good or excellent condition, measured by the following minimum Pavement Condition Indices (PCI):
    - 75 for runways
    - 70 for taxiways and aprons
  - No obstacles are in the runway threshold siting surfaces or obstacle free zones

- The Airport Layout Plan and narrative airport plan (Master Plan or ALP Report) are not more than seven years old.

- Comprehensive plan policies and development regulations aid in ensuring compatible land use adjacent to the airport, determined by meeting the following:
  - Compatible land use policies are in the comprehensive plan.
  - Airport zoning designation is appropriate (*i.e.*, Airport, Industrial, or Public Use).
  - Runway protection zones (RPZ) are on airport property, or compliance with FAA's land use standards for RPZs is ensured by easement or development regulation.
  - Zoning is in place to regulate height hazards or regulations prohibit penetrations of FAR Part 77 surfaces.

- The primary runway is at least 3,200 feet long.

- The primary runway has a full-length parallel taxiway.

- At least one runway end has an instrument approach with approach visibility minimums of 1 mile or less.

- Runway edge lighting is medium or high intensity (MIRL or HIRL).

- Both ends of the primary runway have visual glide slope indicators.

- The airport has an automated weather reporting system (Superunicom, AWOS, or ASOS).

- 100LL fuel sales are available.

- Minor maintenance service is available.

4.2.2.3 Local Service Airport Performance Objectives

Performance objectives for Local Service Airports are as follows:

- The airport provides an appropriate aircraft operating environment, measured by the following:
  - Runway safety areas are in compliance with FAA standards
  - Airfield pavements are in good or excellent condition, measured by the following minimum Pavement Condition Indices (PCI):
    - 75 for runways
    - 70 for taxiways and aprons
  - No obstacles are in the runway threshold siting surfaces or obstacle free zones

- The Airport Layout Plan and narrative airport plan (Master Plan or ALP Report) are not more than seven years old.

- Comprehensive plan policies and development regulations aid in ensuring compatible land use adjacent to the airport, determined by meeting the following:
  - Compatible land use policies are in the comprehensive plan.
  - Airport zoning designation is appropriate (*i.e.*, Airport, Industrial, or Public Use).
  - Runway protection zones (RPZ) are on airport property, or compliance with FAA's land use standards for RPZs is ensured by easement or development regulation.
  - Zoning is in place to regulate height hazards or regulations prohibit penetrations of FAR Part 77 surfaces.

- The primary runway is at least 2,400 feet long.

- The primary runway has a full-length parallel taxiway or turnarounds at both ends that are deep enough for the design aircraft to stop beyond the hold line.

- The primary runway has edge lighting, low intensity LIRL or better.

- Both ends of the primary runway have visual glide slope indicators.

4.2.2.4 Remote or Recreation Airport Performance Objectives

Performance objectives for Recreation or Remote Airports are as follows:

- The airport provides an appropriate aircraft operating environment, measured by the following:
  - Runway safety areas are in compliance with FAA standards
  - Airfield pavements are in good or excellent condition, measured by the following minimum Pavement Condition Indices (PCI):

        - 75 for runways
        - 70 for taxiways and aprons
    - No obstacles are in the runway threshold siting surfaces or obstacle free zones

- The Airport Layout Plan and narrative airport plan (Master Plan or ALP Report) are not more than seven years old.

- Comprehensive plan policies and development regulations aid in ensuring compatible land use adjacent to the airport, determined by meeting the following:
    - Compatible land use policies are in the comprehensive plan.
    - Airport zoning designation is appropriate (*i.e.*, Airport, Industrial, or Public Use).
    - Runway protection zones (RPZ) are on airport property, or compliance with FAA's land use standards for RPZs is ensured by easement or development regulation.
    - Zoning is in place to regulate height hazards or regulations prohibit penetrations of FAR Part 77 surfaces.

- The primary runway has a full-length parallel taxiway or turnarounds at both ends that are deep enough for the design aircraft to stop beyond the hold line.

- The primary runway has reflectors or better (LIRL, MIRL, or HIRL)

4.2.2.5 Seaplane Base Performance Objective

Performance objectives for Seaplane Bases are as follows:

- The airport provides an appropriate aircraft operating environment, measured by the following:
    - No obstacles are in the runway threshold siting surfaces or obstacle free zones

- The Airport Layout Plan and narrative airport plan (Master Plan or ALP Report) are not more than seven years old.

- Comprehensive plan policies and development regulations aid in ensuring compatible land use adjacent to the airport, determined by meeting the following:
    - Compatible land use policies are in the comprehensive plan.
    - Airport zoning designation is appropriate (*i.e.*, Airport, Industrial, or Public Use).
    - Runway protection zones (RPZ) are on airport property, or compliance with FAA's land use standards for RPZs is ensured by easement or development regulation.
    - Zoning is in place to regulate height hazards or regulations prohibit penetrations of FAR Part 77 surfaces.

- The seaplane base has a dock for passenger loading.

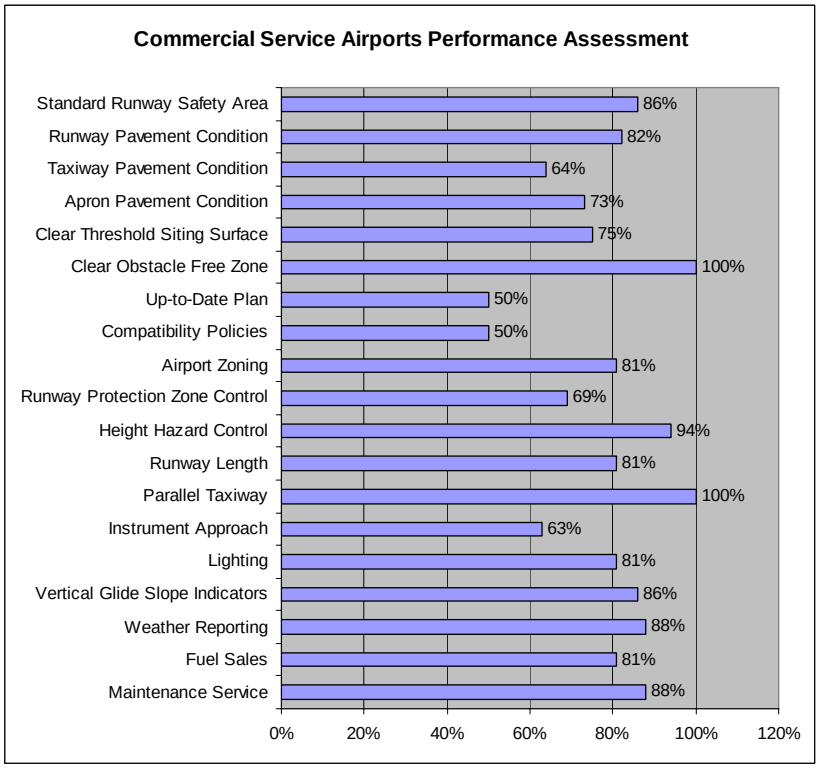
4.3 Compliance with Performance Objectives

In this section, all the objectives for each classification are measured and the airports not meeting the objectives are listed. For each classification there is a commentary on the shortfalls and any plans to remedy them. If the FAA's Overall Development Objectives (ODO) list includes a project that would bring the airport into compliance with the objective, that fact is noted. However, the ODO list is not a capital improvement program and does not reflect that the projects are justified or that the FAA will fund them.

4.3.1 Commercial Service Airports' Compliance with Performance Objectives

Objectives	Explanation
Operational Factors	Standard runway safety area (RSA)
	Runway Pavement Condition Index (PCI) of 75 or better
	Taxiway PCI of 70 or better
	Apron PCI of 70 or better
	No obstacles in threshold siting surface
	No obstacles in obstacle free zone (OFZ)
Up-to-Date Plan	Airport Layout or Master Plan Reports less than 7 years old
Land Use Compatibility Protection	Compatibility policies in comprehensive plan
	Appropriate zoning designation for airport
	Land use controlled in runway protection zones (RPZ)
	Height hazard zoning or regulations
Runway Length	At least 5,000 feet*
Taxiway	Parallel
Instrument Approach	Visibility minimum lower than ¾ mile
Lighting	Runway edge lighting is medium or high intensity (MIRL or HIRL)

Objectives	Explanation
Visual Glide Slope Indicators	Yes
Weather Reporting	AWOS or ASOS
Fuel Sales	100LL and Jet A
Maintenance Service	Full-service FBO & major maintenance available



Commercial Service Airports Not Meeting Performance Objectives

Standard runway safety area (RSA)*	Sea-Tac International, Yakima Air Terminal
Runway Pavement Condition Index (PCI) of 75 or better**	Boeing Field/King County International, Walla Walla Regional
Taxiway PCI of 70 or better**	Grant County International, Wm. R. Fairchild International, Bellingham International, Walla Walla Regional

*Not included because not applicable for waterlanes-Kenmore Air Harbor, Inc., Kenmore Air Harbor SPB

** Not measured-Sea-Tac International, Spokane International, Tri-Cities

Commercial Service Airports Not Meeting Performance Objectives (continued)

Apron PCI of 70 or better**	Yakima Air Terminal, Wm. R. Fairchild International, Walla Walla Regional
No obstacles in threshold siting surface***	Pangborn Memorial
No obstacles in obstacle free zone (OFZ)****	None
Airport Layout or Master Plan Reports less than 7 years old	Anacortes, Friday Harbor, Kenmore Air Harbor SPB, Kenmore Air Harbor, Inc., Orcas Island, Pullman/Moscow Regional, Sea-Tac International, Wm. R. Fairchild International
Compatibility policies in comprehensive plan	Anacortes, Boeing Field/King County International, Grant County International, Kenmore Air Harbor SPB, Kenmore Air Harbor, Inc., Pullman/Moscow Regional, Sea-Tac International, Wm. R. Fairchild International
Appropriate zoning designation for airport	Friday Harbor, Kenmore Air Harbor SPB, Kenmore Air Harbor, Inc.
Land use controlled in runway protection zones (RPZ)	Anacortes, Friday Harbor, Kenmore Air Harbor SPB, Sea-Tac International, Walla Walla Regional
Height hazard zoning or regulations	Kenmore Air Harbor, Inc.
Runway Length	Anacortes, Friday Harbor, Orcas Island
Taxiway	None
Instrument Approach	Anacortes, Friday Harbor, Kenmore Air Harbor SPB, Kenmore Air Harbor, Inc., Orcas Island, Pangborn Memorial
Lighting	Kenmore Air Harbor SPB, Kenmore Air Harbor, Inc., Orcas Island
Visual Glide Slope Indicators	Pangborn Memorial, Walla Walla Regional
Weather Reporting	Anacortes, Kenmore Air Harbor SPB
Fuel Sales	Friday Harbor, Kenmore Air Harbor, Inc., Orcas Island
Maintenance Service	Friday Harbor, Kenmore Air Harbor, Inc.

** Not measured-Sea-Tac International, Spokane International, Tri-Cities

***Not measured-Anacortes, Boeing Field/King County International, Friday Harbor, Kenmore Air Harbor SPB, Kenmore Air Harbor, Inc., Orcas Island, Pullman/Moscow Regional, Seattle Tacoma International, Tri-Cities, Walla Walla Regional, Wm. R. Fairchild International, Yakima Air Terminal

****Not measured-Anacortes, Friday Harbor, Kenmore Air Harbor SPB, Kenmore Air Harbor, Inc., Orcas Island, Seattle Tacoma International, Walla Walla Regional, Wm. R. Fairchild International

Commentary:

- According to the FAA's 2007 Regional Airport Plan, there are projects in 2007 and 2008 to bring the nonstandard safety areas at Sea-Tac International and Yakima Air Terminal into compliance with design standards. At Sea-Tac, the Runway 16C end safety area will be completed in 2007 and the Runway 16L end safety area will be completed in 2008. Yakima's Runway 27 end safety area will be completed in 2008.

- The FAA's ODO list includes runway, taxiway, and apron pavement rehabilitation projects for Bellingham. The ODO for Boeing Field/King County International includes runway rehabilitation. Taxiway rehabilitation is included in Grant County International's ODO. Taxiway and apron rehabilitation is in the ODO list for Tri-Cities. Apron rehabilitation is in the ODO lists for Wm. R Fairchild International and Walla Walla Regional.

- The FAA's ODO list includes airport master plan updates for Anacortes, Friday Harbor, and Pullman/Moscow Regional.

- Walla Walla Regional's ODO list includes land acquisition for the Runway 2 approach (mobile home park).

- Obstruction removal is on the ODO list for Anacortes.

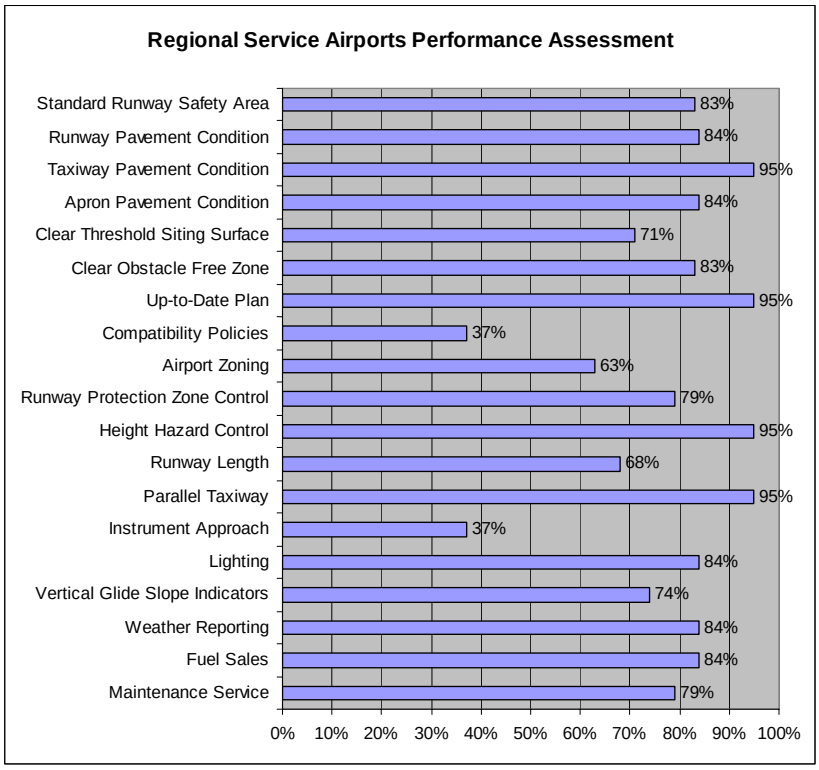
- The airports that do not meet the runway length objective are all island airports. The shortfalls in meeting 5,000-foot runway length are 1,985 feet at Anacortes, 1,600 feet at Friday Harbor, and 2,100 feet at Orcas Island. It is likely that these runways have adequate length for the type of short-haul airplanes using them.

- Of the airports that do not meet the instrument approach objective, two have instrument approaches, but the visibility minimums are higher than ½ mile. At Friday Harbor, the visibility minimum is 1 mile and at Pangborn Memorial, the lowest visibility minimum is 1-1/4 mile. The FAA's ODO list for Friday Harbor includes installation of an instrument landing system (ILS) approach and the acquisition of land for approaches. Pangborn Memorial's ODO list includes land acquisition for approaches.

- Both airports lacking VGSI on the primary runway are deficient at only one runway end. Walla Walla Regional's ODO list includes a VGSI system for Runway 2/20.

4.3.2 Regional Service Airports' Compliance with Performance Objectives

Objectives	Explanation
Operational Factors	Standard runway safety area (RSA)
	Runway Pavement Condition Index (PCI) of 75 or better
	Taxiway PCI of 70 or better
	Apron PCI of 70 or better
	No obstacles in threshold siting surface
	No obstacles in obstacle free zone (OFZ)
Up-to-Date Plan	Airport Layout or Master Plan Reports less than 7 years old
Land Use Compatibility Protection	Compatibility policies in comprehensive plan
	Appropriate zoning designation for airport
	Land use controlled in runway protection zones (RPZ)
	Height hazard zoning or regulations
Runway Length	At least 5,000 feet*
Taxiway	Parallel
Instrument Approach	Visibility minimum lower than ¾ mile
Lighting	Runway edge lighting is medium or high intensity (MIRL or HIRL)
Visual Glide Slope Indicators	Yes
Weather Reporting	AWOS or ASOS
Fuel Sales	100LL and Jet A
Maintenance Service	Full-service FBO & major maintenance available



Regional Service Airports Not Meeting Performance Objectives

Standard runway safety area (RSA)**	Columbia Gorge Regional/The Dalles, Colville Municipal,* Tacoma Narrows
Runway Pavement Condition Index (PCI) of 75 or better	Bremerton National, Bowers Field, Skagit Regional
Taxiway PCI of 70 or better	Harvey Field
Apron PCI of 70 or better	Harvey Field, Felts Field, Deer Park Municipal
No obstacles in threshold siting surface***	Bremerton National, Grand Coulee Dam

*Colville Municipal is a "placeholder' for a New Northeast Washington Airport
**Not measured-Harvey Field
***Not measured-Auburn Municipal, Bowerman Field, Columbia Gorge Regional/The Dalles, Colville Municipal, Felts Field, Harvey Field, Kelso-Longview, Olympia, Renton Municipal, Sanderson Field, Skagit Regional, Tacoma Narrows

Regional Service Airports Not Meeting Performance Objectives (continued)

No obstacles in obstacle free zone (OFZ)****	Grand Coulee Dam, Olympia
Airport Layout or Master Plan Reports less than 7 years old	Bowerman Field
Compatibility policies in comprehensive plan	Arlington Municipal, Auburn Municipal, Bowerman Field, Bremerton National, Columbia Gorge Regional/The Dalles, Colville Municipal,* Grand Coulee Dam, Harvey Field, Kelso-Longview, Omak, Renton Municipal, Skagit Regional
Appropriate zoning designation for airport	Bowers Field, Columbia Gorge Regional/The Dalles, Colville Municipal,* Felts Field, Grand Coulee Dam, Omak, Sanderson Field
Land use controlled in runway protection zones (RPZ)	Colville Municipal,* Harvey Field, Olympia, Snohomish County/Paine Field
Height hazard zoning or regulations	Colville Municipal*
Runway Length	Auburn Municipal, Colville Municipal,* Grand Coulee Dam, Harvey Field, Kelso-Longview, Omak
Taxiway	Grand Coulee Dam
Instrument Approach	Auburn Municipal, Bowers Field, Columbia Gorge Regional/The Dalles, Colville Municipal,* Deer Park Municipal, Grand Coulee Dam, Harvey Field, Kelso-Longview, Omak, Renton Municipal, Sanderson Field, Skagit Regional
Lighting	Harvey Field. Kelso-Longview, Renton Municipal
Visual Glide Slope Indicators	Bowers Field, Columbia Gorge Regional/The Dalles, Colville Municipal,* Grand Coulee Dam, Sanderson Field
Weather Reporting	Colville Municipal,* Grand Coulee Dam, Harvey Field
Fuel Sales	Auburn Municipal, Colville Municipal,* Grand Coulee Dam
Maintenance Service	Auburn Municipal, Bowers Field, Columbia Gorge Regional/The Dalles, Colville Municipal*

*Colville Municipal is a “placeholder’ for a New Northeast Washington Airport
****Not measured-Bowerman Field, Colville Municipal, Harvey Field, Renton Municipal, Sanderson Field, Skagit Regional, Tacoma Narrows

Commentary:

- Tacoma Narrow's ODO list includes a project to improve the Runway 17/35 safety area.

- The FAA's ODO list includes runway rehabilitation for Bowers Field, Bremerton, and Skagit Regional.

- Apron rehabilitation is on the ODO list for Deer Park.

- The FAA's ODO list includes acquisition of land and easements for Runway 34L at Snohomish County/Paine Field. Olympia's ODO includes land acquisition for Runway 35 approach and easement acquisition for Runway 17 approach.

- The ODO list for Bowerman Field includes a master plan update.

- The zoning for Bowers Field and Omak is Agricultural. For Columbia-Gorge Regional/The Dalles, it is Mixed-Use. For Colville, Felts Field, and Grand Coulee Dam it is Unknown or Others.

- The ODO list for Kelso-Longview includes a runway extension. Runway length shortfalls for the airports not meeting the runway length objective of 5,000 feet are:

Auburn Municipal	02/15	1,600 feet
Colville Municipal	01/19	2,305 feet
Grand Coulee Dam	03/21	801 feet
Harvey Field	14L/32R	2,329 feet
Kelso-Longview	12/30	609 feet
Omak	17/35	328 feet

  Auburn Muncipal and Harvey Field are Reliever airports with runway length adequate for their using aircraft. Since there are other airports with 5,000-foot long runways in the same service area, runway extensions are not warranted at these two airports. The significant shortfall at Colville helps illustrate why it is not an adequate site for a Regional Service Airport.

- A parallel taxiway is on the ODO list for Grand Coulee Dam.

- Bowers Field, Deer Park, Renton, Sanderson Field, and Skagit Regional have instrument approaches with visibility minimums as low as 1 mile. Columbia Gorge Regional/The Dalles, Kelso-Longview, and Omak have instrument approaches with visibility minimums as low as 1-1/4 mile. Auburn, Colville, Grand Coulee Dam, and Harvey Field do not have any instrument approaches. The FAA's ODO list includes land acquisition for approaches for Auburn Municipal, Kelso-Longview, and Skagit Regional. Omak's ODO list includes installation of a MALSR approach lighting system, which would lower its

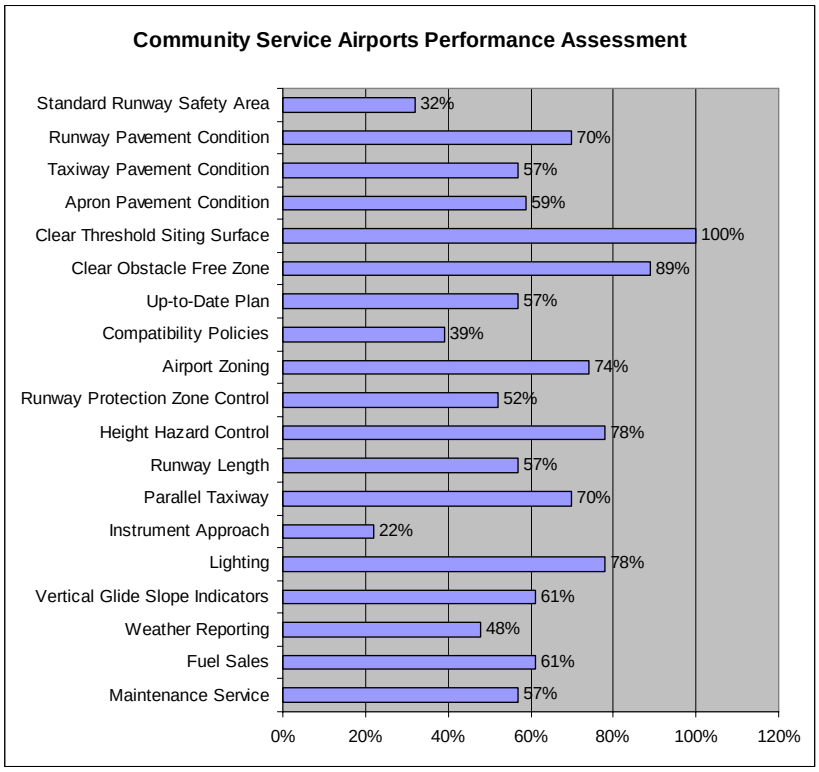
approach visibility minimums. Sanderson Field's ODO list includes acquiring land for future RPZs.

- The three airports not meeting the Lighting objective all have lighting systems that are non-standard. Kelso-Longview's ODO list includes MIRL rehabilitation for Runway 12/30.

- For the airports not meeting the VGSI objective, all but one (Columbia Gorge Regional/The Dalles) has a VGSI on one runway end. The FAA's ODO list includes VGSI systems for Runway 11/29 at Bowers Field, Runway 5/23 at Sanderson Field, Runway 10/28 at Skagit Regional.

4.3.3 Community Service Airports' Compliance with Performance Objectives

Objectives	Explanation
Operational Factors	Standard runway safety area (RSA)
	Runway Pavement Condition Index (PCI) of 75 or better
	Taxiway PCI of 70 or better
	Apron PCI of 70 or better
	No obstacles in threshold siting surface
	No obstacles in obstacle free zone (OFZ)
Up-to-Date Plan	Airport Layout or Master Plan Reports less than 7 years old
Land Use Compatibility Protection	Compatibility policies in comprehensive plan
	Appropriate zoning designation for airport
	Land use controlled in runway protection zones (RPZ)
	Height hazard zoning or regulations
Runway Length	At least 3,200 feet*
Taxiway	Parallel
Instrument Approach	At least one runway end has an instrument approach with approach visibility minimums of 1 mile or less
Lighting	The primary runway has edge lighting, medium intensity MIRL or better.
Visual Glide Slope Indicators	Yes
Weather Reporting	Superunicom, AWOS or ASOS
Fuel Sales	100LL
Maintenance Service	Minor maintenance available



Community Service Airports Not Meeting Performance Objectives

Standard runway safety area (RSA)*	Blaine Municipal, Cashmere Dryden, Chehalis Centralia, Concrete Municipal, Dorothy Scott Municipal, Elma Municipal, Firstair Field, Grove Field, Jefferson County International, Moses Lake Municipal, Othello Municipal, Pearson Field, Pierce County/Thun Field, Twisp Municipal, Whitman County Memorial
Runway Pavement Condition Index (PCI) of 75 or better	Moses Lake Municipal, Martin Field, Ephrata Municipal, Richland, Othello Municipal, Firstair Field, Twisp Municipal

*Not measured-Martin Field

Community Service Airports Not Meeting Performance Objectives (continued)

Taxiway PCI of 70 or better	Ephrata Municipal, Firstair Field, Whitman County Memorial, Dorothy Scott Municipal, Cashmere Dryden, Twisp Municipal, Martin Field, Othello Municipal, Blaine Municipal, Toledo-Winlock Ed Carlson Memorial
Apron PCI of 70 or better**	Ephrata Municipal, Othello Municipal, Martin Field, Dorothy Scott Municipal, Grove Field, Toledo-Winlock Ed Carlson Memorial, Firstair Field, Whitman County Memorial, Elma Municipal
No obstacles in threshold siting surface***	None
No obstacles in obstacle free zone (OFZ)****	Grove Field
Airport Layout or Master Plan Reports less than 7 years old	Chehalis Centralia, Chelan Municipal, Elma Municipal, Firstair Field, Lopez Island, Martin Field, Prosser, Richland, Toledo-Winlock Ed Carlson Memorial, Twisp Municipal
Compatibility policies in comprehensive plan	Chelan Municipal, Elma Municipal, Ephrata Municipal, Firstair Field, Grove Field, Martin Field, Moses Lake Municipal, Pearson Field, Prosser, Richland, Toledo-Winlock Ed Carlson Memorial, Twisp Municipal, Vista Field, Whitman County Memorial
Appropriate zoning designation for airport	Chehalis Centralia, Chelan Municipal, Elma Municipal, Pierce County, Twisp Municipal, Whitman County Memorial
Land use controlled in runway protection zones (RPZ)	Cashmere Dryden, Dorothy Scott Municipal, Grove Field, Lopez Island, Martin Field, Othello Municipal, Pearson Field, Toledo-Winlock Ed Carlson Memorial, Twisp Municipal, Whitman County Memorial

**Not measured-Cashmere Dryden

***Not measured-Blaine Municipal, Cashmere Dryden, Chehalis Centralia, Chelan Municipal, Concrete Municipal, Dorothy Scott Municipal, Ed Carlson Memorial, Elma Municipal, Firstair Field, Grove Field, Jefferson County International, Lopez Island, Martin Field, Moses Lake Municipal, Othello Municipal, Pearson Field, Prosser, Richland, Twisp Municipal, Vista Field

****Not measured-Blaine Municipal, Chelan Municipal, Concrete Municipal, Ed Carlson Memorial, Elma Municipal, Firstair Field, Jefferson County International, Lopez Island, Martin Field, Moses Lake Municipal, Othello Municipal, Richland, Twisp Municipal, Vista Field

Community Service Airports Not Meeting Performance Objectives (continued)

Height hazard zoning or regulations	Chehalis Centralia, Elma Municipal, Toledo-Winlock Ed Carlson, Twisp Municipal, Whitman County Memorial
Runway Length	Blaine Municipal, Cashmere Dryden, Concrete Municipal, Elma Municipal, Firstair Field, Grove Field, Jefferson County International, Lopez Island, Moses Lake Municipal, Twisp Municipal
Taxiway	Chelan Municipal, Concrete Municipal, Toledo-Winlock Ed Carlson Memorial, Elma Municipal, Firstair Field, Martin Field, Othello Municipal
Instrument Approach	Blaine Municipal, Cashmere Dryden, Chelan Municipal, Concrete Municipal, Dorothy Scott Municipal, Ed Carlson Memorial, Elma Municipal, Firstair Field, Grove Field, Jefferson County International, Lopez Island, Martin Field, Moses Lake Municipal, Othello Municipal, Prosser, Twisp Municipal, Vista Field, Whitman County Memorial
Lighting	Concrete Municipal, , Elma Municipal, Firstair Field, Lopez Island, Martin Field
Visual Glide Slope Indicators	Cashmere Dryden, Chelan Municipal, Concrete Municipal, Dorothy Scott Municipal, Elma Municipal, Firstair Field, Othello Municipal, Twisp Municipal, Whitman County Memorial
Weather Reporting	Cashmere Dryden, Concrete Municipal, Dorothy Scott Municipal, Lopez Island, Martin Field, Moses Lake Municipal, Othello Municipal, Prosser, Toledo-Winlock Ed Carlson, Twisp Municipal, Vista Field, Whitman County Memorial
Fuel Sales	Cashmere Dryden, Concrete Municipal, Elma, Firstair Field, Grove Field, Lopez Island, Moses Lake Municipal, Twisp Municipal, Whitman County Memorial
Maintenance Service	Blaine Municipal, Elma Municipal, Firstair Field, Lopez Island, Othello Municipal, Prosser, Toledo-Winlock Ed Carlson Memorial, Twisp Municipal, Vista Field, Whitman County Memorial

Commentary:

- The FAA's ODO list includes a runway safety area project for Cashmere Dryden, Grove Field, and Whitman County Memorial. Othello Municipal's ODO list includes relocation/construction of Runway 7/25.

- Ephrata's ODO list includes runway rehabilitation and construction of a new parallel taxiway. Runway rehabilitation is on the ODO list for Richland. Taxiway and apron rehabilitation are on Toledo-Winlock Ed Carlson Memorial's ODO list.

- The FAA's ODO list includes taxiway rehabilitation for Cashmere Dryden and a new taxiway for Whitman County Memorial.

- Apron rehabilitation is on the FAA's ODO list for Whitman County Memorial.

- The FAA's ODO list includes acquisition of land and easements for approaches at Chehalis-Centralia, Chelan Municipal, Lopez Island, and Toledo-Winlock Ed Carlson Memorial. Ephrata's ODO list includes a survey for an LPV instrument approach.

- Three of the ten airports not meeting the objective for an up-to-date plan do not have a master plan or ALP. Those three airports are Firstair Field, Martin Field, and Twisp Memorial. The FAA's ODO list includes a master plan update for Chehalis-Centralia, Lopez Island, and Prosser.

- Five of the six airports lacking appropriate zoning designations are Unknown or Other. Whitman County Memorial is zoned Commercial.

- The FAA's ODO list includes a runway lengthening and widening project for Blaine Municipal. It includes a new runway for Cashmere Dryden. Runway extensions of the following lengths would be needed to reach 3,200 feet:

Blaine Municipal	14/32	661 feet
Cashmere Dryden	07/25	1,400 feet
Concrete Municipal	07/25	597 feet
Elma Municipal	07/25	920 feet
Firstair Field	07/25	1,113 feet
Grove Field	07/25	490 feet
Jefferson County International	09/27	200 feet
Lopez Island	16/34	296 feet
Moses Lake Municipal	16/34	687 feet
Twisp Municipal	10/28	499 feet

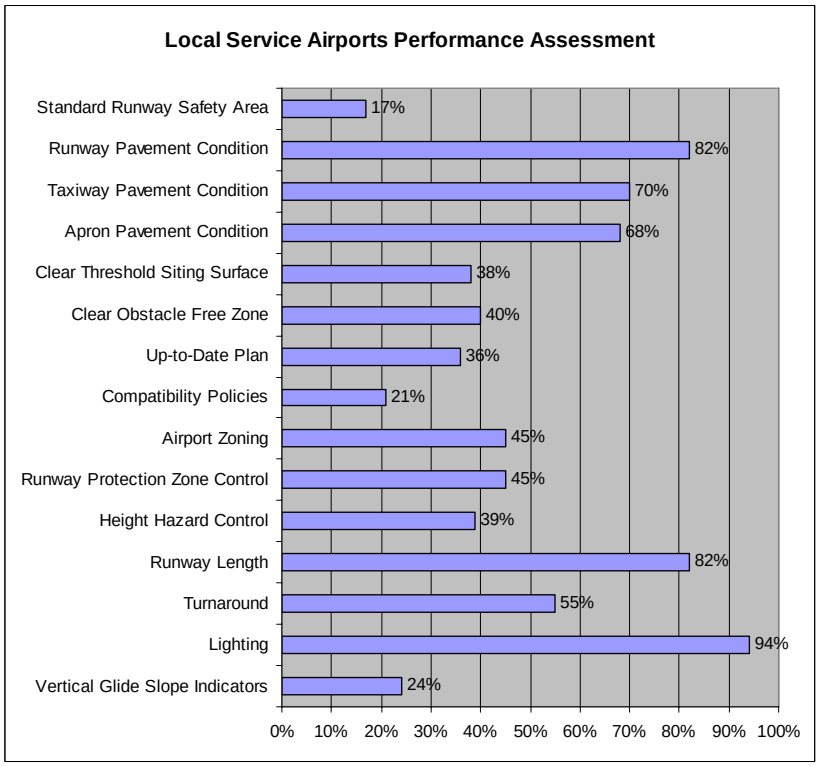
- All of the airports not meeting the instrument approach criteria have runways limited to visual operations.

- Of the airports not meeting the lighting objective, two (Concrete Municipal and Firstair Field) have no runway edge lighting. Elma Municipal has non-standard MIRL. Lopez Island has LIRL. Martin Field has 1,240 feet of MIRL and the remainder is non-standard LIRL. The FAA's ODO list includes a MIRL system for Blaine Municipal.

- Of the nine airports not meeting the VGSI objective, five have a VGSI serving one end (Cashmere Dryden, Chelan Municipal, Dorothy Scott Municipal, Othello Municipal, and Twisp Municipal). The FAA's ODO list includes a VGSI for Runway 7 at Cashmere Dryden, a VGSI system for Runway 7/25 at Whitman County Memorial, and a VGSI system for Runway 7/25 at Othello Municipal

4.3.4 Local Service Airports' Compliance with Performance Objectives

Objectives	Explanation
Operational Factors	Standard runway safety area (RSA)
	Runway Pavement Condition Index (PCI) of 75 or better
	Taxiway PCI of 70 or better
	Apron PCI of 70 or better
	No obstacles in threshold siting surface
	No obstacles in obstacle free zone (OFZ)
Up-to-Date Plan	Airport Layout or Master Plan Reports less than 7 years old
Land Use Compatibility Protection	Compatibility policies in comprehensive plan
	Appropriate zoning designation for airport
	Land use controlled in runway protection zones (RPZ)
	Height hazard zoning or regulations
Runway Length	At least 2,400 feet*
Taxiway	Parallel or turnaround at both ends
Instrument Approach	Visibility minimum lower than ¾ mile
Lighting	The primary runway has edge lighting, low intensity LIRL or better.
Visual Glide Slope Indicators	Yes



Local Service Airports Not Meeting Performance Objectives

Standard runway safety area (RSA)*	Cle Elum Municipal, Darrington Municipal, Davenport Municipal, Goldendale Municipal, Ione Municipal, Lind Municipal, Mansfield, Methow Valley, New Warden, Ocean Shores Municipal, Odessa Municipal, Packwood, Port of Ilwaco, Pru Field, Quincy Municipal, Rosalia Municipal, Sand Canyon, Sekiu, Strom Field, Sunnyside Municipal, Waterville, Westport, Wilbur Municipal, Willapa Harbor, Willard Field
Runway Pavement Condition Index (PCI) of 75 or better	Quillayute, Rosalia Municipal, Woodland State, Cle Elum, Sekiu, Wes Lupien

*Not measured-Wes Lupien, Wilson Creek, Woodland State

Local Service Airports Not Meeting Performance Objectives (continued)

Taxiway PCI of 70 or better**	Sunnyside Municipal, Quillayute, Sand Canyon, Rosalia Municipal, Willapa Harbor, Cle Elum Municipal, Ione Municipal, Strom Field
Apron PCI of 70 or better***	Packwood, Sand Canyon, Cle Elum Municipal, Goldendale Municipal, Quincy Municipal, Strom Field, Rosalia Municipal, Mansfield, Wes Lupien, Sekiu
No obstacles in threshold siting surface****	Cle Elum Municipal, Ocean Shores Municipal, Odessa Municipal, Quillayute, Rosalia Municipal
No obstacles in obstacle free zone (OFZ)*****	Cle Elum Municipal, Ocean Shores Municipal, Odessa Municipal, Okanogan Legion, Pru Field, Westport
Airport Layout or Master Plan Reports less than 7 years old	Darrington Municipal, Davenport Municipal, Ferry County , Ione Municipal, Lind, Mansfield, Methow Valley, New Warden, Packwood, Quincy Municipal, Sand Canyon, Sekiu, Strom Field, Sunnyside Municipal, Tonasket Municipal, Waterville, Wes Lupien, Willapa Harbor, Wilson Creek, Woodland State
Compatibility policies in comprehensive plan	Anderson Field, Cle Elum Municipal, Darrington Municipal, Davenport Municipal, Ferry County, Goldendale Municipal, Ione Municipal, Lind Municipal, Mansfield, Methow Valley, New Warden, Ocean Shores Municipal, Odessa Municipal, Packwood, Port of Ilwaco, Pru Field, Quillayute, Quincy Municipal, Sand Canyon, Sekiu, Tonasket Municipal, Waterville, Westport, Wilbur Municipal, Wilson Creek, Woodland State

**Not measured or not applicable-New Warden, Packwood, Port of Ilwaco, Sekiu, Wilson Creek, Woodland State

***Not measured or not applicable-Odessa Municipal, Woodland State

****Not measured-Darrington Municipal, Davenport Municipal, Ferry County, Goldendale, Ione Municipal, Lind Municipal, Mansfield, Methow Valley, New Warden, Okanogan Legion, Packwood, Port of Ilwaco, Pru Field, Quincy Municipal, Sand Canyon, Sekiu, Strom Field, Sunnyside Municipal, Tonasket Municipal, Waterville, Wes Lupien, Willapa Harbor, Willard Field, Wilson Creek, Woodland State

*****Not measured-Darrington Municipal, Davenport Municipal, Ferry County, Goldendale Municipal, Ione Municipal, Lind Municipal, Mansfield, Methow Valley, New Warden, Packwood, Port of Ilwaco, Quincy Municipal, Sand Canyon, Sekiu, Strom Field, Sunnyside Municipal, Tonasket Municipal, Waterville, Wes Lupien, Willapa Harbor, Willard Field, Wilson Creek, Woodland State

Local Service Airports Not Meeting Performance Objectives (continued)

Appropriate zoning designation for airport	Cle Elum Municipal, Ione Municipal, Lind Municipal, New Warden, Ocean Shores Municipal, Odessa Municipal, Packwood, Port of Ilwaco, Pru Field, Quillayute, Rosalia Municipal, Sand Canyon, Sekiu, Sunnyside Municipal, Tonasket Municipal, Westport, Wilbur Municipal, Wilson Creek
Land use controlled in runway protection zones (RPZ)	Anderson Field, Cle Elum Municipal, Darrington Municipal, Ione Municipal, Mansfield, Ocean Shores Municipal, Odessa Municipal, Okanogan Legion, Packwood, Port of Ilwaco, Pru Field, Rosalia Municipal, Sunnyside Municipal, Tonasket Municipal, Waterville, Westport, Willard Field, Wilson Creek
Height hazard zoning or regulations	Cle Elum Municipal, Davenport Municipal, Ferry County, Ione Municipal, Lind Municipal, Mansfield, New Warden, Packwood, Port of Ilwaco, Pru Field, Quillayute, Quincy Municipal, Sekiu, Strom Field, Tonasket Municipal, Waterville, Wes Lupien, Willapa Harbor, Wilson Creek, Woodland State
Runway Length	Packwood, Port of Ilwaco, Strom Field, Westport, Willard Field, Woodland State
Taxiway or Turnaround	Cle Elum Municipal, Davenport Municipal, Ferry County, Goldendale Municipal, Ione Municipal, Lind Municipal, Methow Valley, New Warden, Packwood, Port of Ilwaco, Sekiu, Strom Field, Westport, Willard Field, Wilson Creek
Lighting	Quillayute, Wilson Creek
Visual Glide Slope Indicators	Anderson Field, Darrington Municipal, Davenport Municipal, Ferry County, Goldendale Municipal, Ione Municipal, Lind Municipal, Mansfield, Methow Valley, New Warden, Okanogan Legion, Packwood, Port of Ilwaco, Pru Field, Quillayute, Quincy Municipal, Rosalia Municipal, Sekiu, Strom Field, Waterville, Wilbur Municipal, Willapa Harbor, Willard Field, Wilson Creek, Woodland State

Commentary:

- The FAA's ODO list includes a runway safety area project for Ione Municipal and Odessa Municipal. It includes construction of Runway 7/25 and acquisition of land for approaches and RPZ easements at Cle Elum. It also includes RPZ land acquisition at Ione Municipal. It includes runway reconstruction, extension, and widening for Packwood, along with acquisition of land for approaches and obstruction removal. Rosalia Municipal's ODO list includes reconstruction of Runway 2/20. The ODO for Sunnyside Municipal includes constructing and extending Runway 7/25.

- Runway rehabilitation is on the ODO list for Quillayute.

- Pru Field's ODO list includes obstruction removal.

- The FAA's ODO list includes an airport master plan for Packwood.

- The zoning designations for airports that do not meet the objective are Agricultural, Unknown, Commercial, Mixed-Use, and Other.

- The FAA's ODO list includes land acquisition for Runway 7 approach for Anderson Field, and 24 acres of land for approaches at Davenport Municipal.

- Runway extensions of the following lengths would be needed to reach 3,200 feet:

Packwood	01/19	44 feet
Port of Ilwaco	10/28	320 feet
Strom Field	07/25	590 feet
Westport	12/30	83 feet
Willard Field	04/22	140 feet
Woodland State	14/32	447 feet

- The FAA's ODO list includes taxiway construction for Davenport Municipal and Methow Valley.

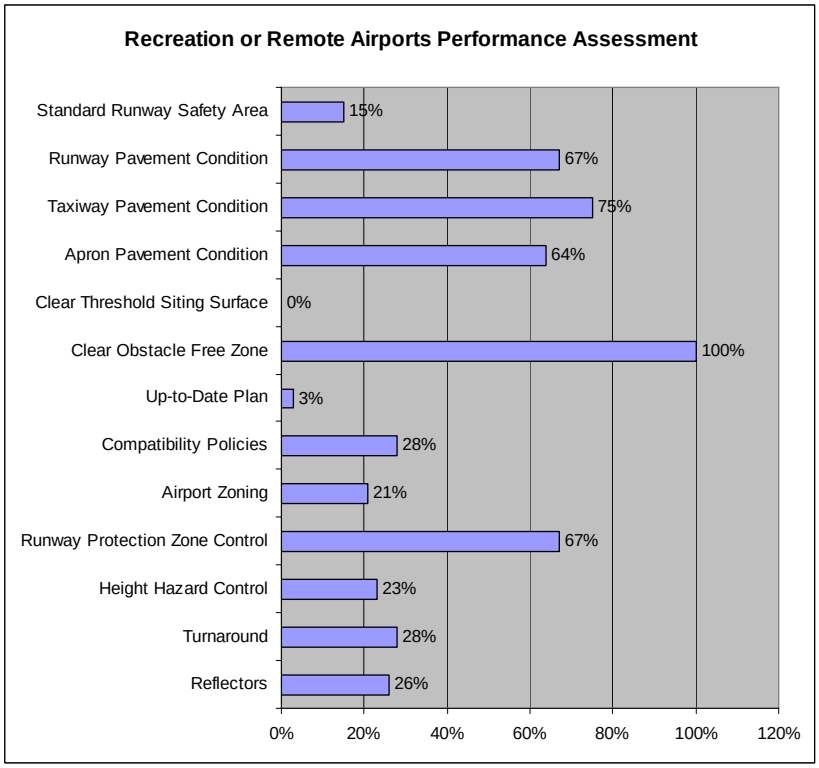
- Quillayute's ODO list includes MIRL lighting installation for Runway 4/22.

- The FAA's ODO list includes VGSI for Anderson Field, Davenport Municipal, Ione Municipal, Pru Field, Quillayute, and Wilbur Municipal

4.3.5 Recreation or Remote Airports' Compliance with Performance Objectives

Performance Objectives for Recreation or Remote Airports

Objectives	Explanation
Operational Factors	Standard runway safety area (RSA)
	Runway Pavement Condition Index (PCI) of 75 or better
	Taxiway PCI of 70 or better
	Apron PCI of 70 or better
	No obstacles in threshold siting surface
	No obstacles in obstacle free zone (OFZ)
Up-to-Date Plan	Airport Layout or Master Plan Reports less than 7 years old
Land Use Compatibility Protection	Compatibility policies in comprehensive plan
	Appropriate zoning designation for airport
	Land use controlled in runway protection zones (RPZ)
	Height hazard zoning or regulations
Taxiway	Parallel or turnaround at both ends
Lighting	The primary runway has reflectors or better



Recreation or Remote Airports Not Meeting Performance Objectives

Standard runway safety area (RSA)*	Crest Airpark, DeVere Field, Fly For Fun, Goheen Field, Lynden Municipal, Mead Flying Service, Sequim Valley, Spanaway, Swanson Field, Vashon Municipal, Whidbey Airpark
Runway Pavement Condition Index (PCI) of 75 or better**	Crest Airpark, Spanaway, Ranger Creek State, DeVere Field
Taxiway PCI of 70 or better***	Crest Airpark, Spanaway
Apron PCI of 70 or better****	Sequim Valley, Crest Airpark, Spanaway, DeVere Field
No obstacles in threshold siting surface*****	None
No obstacles in obstacle free zone (OFZ)******	None
Airport Layout or Master Plan Reports less than 7 years old	All except Desert Aire

*Not measured-Avey Field State, Bandera State, Camano Island Airfield, Cedars North Airpark, Copalis State, Cross Winds, Easton State, Hoskins Field, J-Z, Lake Wenatchee State, Lester State, Little Goose Lock & Dam State, Lost River Airport, Lower Granite State, Lower Monumental State, Point Roberts Airpark, R & K Skyranch, Ranger Creek State, Rogersburg State, Shady Acres, Sky Harbor, Skykomish State, Stehekin State, Sullivan Lake State, Tieton State, Western Airpark

**Not measured or not applicable-Avey Field State, Bandera State, Cedars North Airpark, Copalis State, Cross Winds, Easton State, Fly For Fun, Goheen Field, Hoskins Field, J-Z, Lake Wenatchee State, Lester State, Little Goose Lock & Dam State, Lost River Airport, Lower Granite State, Lower Monumental State, Point Roberts Airpark, R & K Skyranch, Rogersburg State, Sky Harbor, Skykomish State, Stehekin State, Sullivan Lake State, Tieton State, Vashon Municipal, Camano Island Airfield, Shady Acres

***Not measured or not applicable-Avey Field State, Bandera State, Camano Island Airfield, Cedars North Airpark, Copalis State, Cross Winds, Easton State, Fly For Fun, Goheen Field, Hoskins Field, J-Z, Lake Wenatchee State, Lester State, Little Goose Lock & Dam State, Lost River Airport, Lower Granite State, Lower Monumental State, Mead Flying Service, Point Roberts Airpark, R & K Skyranch, Ranger Creek State, Rogersburg State, Shady Acres, Sky Harbor, Skykomish State, Stehekin State, Sullivan Lake State, Tieton State, Vashon Municipal, Whidbey Airpark, DeVere Field

****Not measured or not applicable-Avey Field State, Bandera State, Cedars North Airpark, Copalis State, Cross Winds, Easton State, Fly For Fun, Goheen Field, Hoskins Field, J-Z, Lake Wenatchee State, Lester State, Little Goose Lock & Dam State, Lost River Airport, Lower Granite State , Lower Monumental State, Point Roberts Airpark, R & K Skyranch, Ranger Creek State, Rogersburg State, Shady Acres, Sky Harbor, Skykomish State, Stehekin State, Sullivan Lake State, Tieton State, Vashon Municipal, Camano Island Airfield

*****Not measured-All Recreation or Remote airports

******Not measured-All Recreation or Remote airports except Desert Aire, which meets the objective

Recreation or Remote Airports Not Meeting Performance Objectives (continued)

Compatibility policies in comprehensive plan	Avey Field State, Bandera State, Cedars North Airpark, Copalis State, Cross Winds, Easton State, Fly For Fun, Goheen Field, Hoskins Field, J-Z, Lake Wenatchee State, Lester State, Little Goose Lock & Dam State, Lost River Airport, Lower Granite State, Lower Monumental State, Point Roberts Airpark, R & K Skyranch, Ranger Creek State, Rogersburg State, Shady Acres, Sky Harbor, Skykomish State, Stehekin State, Sullivan Lake State, Tieton State, Vashon Municipal, Camano Island Airfield
Appropriate zoning designation for airport	Avey Field State, Bandera State, Copalis State, Crest Airpark, Cross Winds, Desert Aire, DeVere Field, Easton State, Forks Municipal, Hoskins Field, J-Z, Lake Wenatchee State, Lester State, Lost River Airport, Lower Granite State, Lower Monumental State, Lynden Municipal, Point Roberts Airpark, R & K Skyranch, Ranger Creek State, Rogersburg State, Sequim Valley, Shady Acres, Sky Harbor, Skykomish State, Spanaway, Stehekin State, Sullivan Lake State, Tieton State, Vashon Municipal, Western Airpark
Land use controlled in runway protection zones (RPZ)	Cedars North Airpark, Cross Winds, Easton State, Fly For Fun, Lake Wenatchee State, Lester State, Lost River Airport, Lower Granite State, Lynden Municipal, Sequim Valley, Shady Acres, Sullivan Lake State, Swanson Field

Recreation or Remote Airports Not Meeting Performance Objectives (continued)

Height hazard zoning or regulations	Bandera State, Camano Island Airfield, Cedars North Airpark, Copalis State, Cross Winds, DeVere Field, Easton State, Fly For Fun, Forks Municipal, Goheen Field, Hoskins Field, J-Z, Lester State, Little Goose Lock & Dam State, Lower Granite State, Lower Monumental State, Lynden Municipal, Mead Flying Service, Point Roberts Airpark, R & K Skyranch, Ranger Creek State, Rogersburg State, Sequim Valley, Sky Harbor, Skykomish State, Spanaway, Sullivan Lake State, Vashon Municipal, Western Airpark, Whidbey Airpark
Taxiway or Turnaround	Camano Island Airfield, Copalis State, Cross Winds, Easton State, Fly For Fun, Goheen Field, Hoskins Field, J-Z, Lake Wenatchee State, Lester State, Little Goose Lock & Dam State, Lost River Resort, Lower Granite State, Lower Monumental State, Point Roberts Airpark, R & K Skyranch, Ranger Creek State, Rogersburg State, Sequim Valley, Shady Acres, Sky Harbor, Skykomish State, Stehekin State, Sullivan Lake State, Tieton State, Vashon Municipal, Western Airpark, Whidbey Airpark
Lighting	Avey Field State, Bandera State, Camano Island Airfield, Cedars North Airpark, Copalis State, Cross Winds, Cross Winds, Fly For Fun, Goheen Field, Goheen Field, Hoskins Field, J-Z, Lake Wenatchee State, Lester State, Little Goose Lock & Dam State, Lost River Airport, Lower Granite State, Lower Monumental State, Mead Flying Service, Point Roberts Airpark, R & K Skyranch, R & K Skyranch, Ranger Creek State, Rogersburg State, Sequim Valley, Sky Harbor, Skykomish State, Stehekin State, Sullivan Lake State, Swanson Field, Tieton State, Whidbey Airpark

Commentary:

- Many of the Recreation or Remote Airports were excluded from the 2003 database. In addition, the majority of the airports do not have an ALP. These facts account for the lack of information about runways safety areas, threshold siting surfaces, and obstacle free zones.

- Many of the Recreation or Remote Airports have turf runways, so the runway pavement condition objective is not applicable. The airports with turf runways are Avey Field State, Bandera State, Cedars North Airpark, Copalis State, Cross Winds, Easton State, Fly For Fun, Goheen Field, Hoskins Field, J-Z, Lake Wenatchee State, Lester State, Little Goose Lock & Dam State, Lost River Airport, Lower Granite State, Lower Monumental State, Point Roberts Airpark, R & K Skyranch, Rogersburg State, Sky Harbor, Skykomish State, Stehekin State, Sullivan Lake State, Tieton State, and Vashon Municipal.

- Many of the airports with paved runways lack paved taxiways and aprons, so the taxiway and apron condition objective is not applicable.

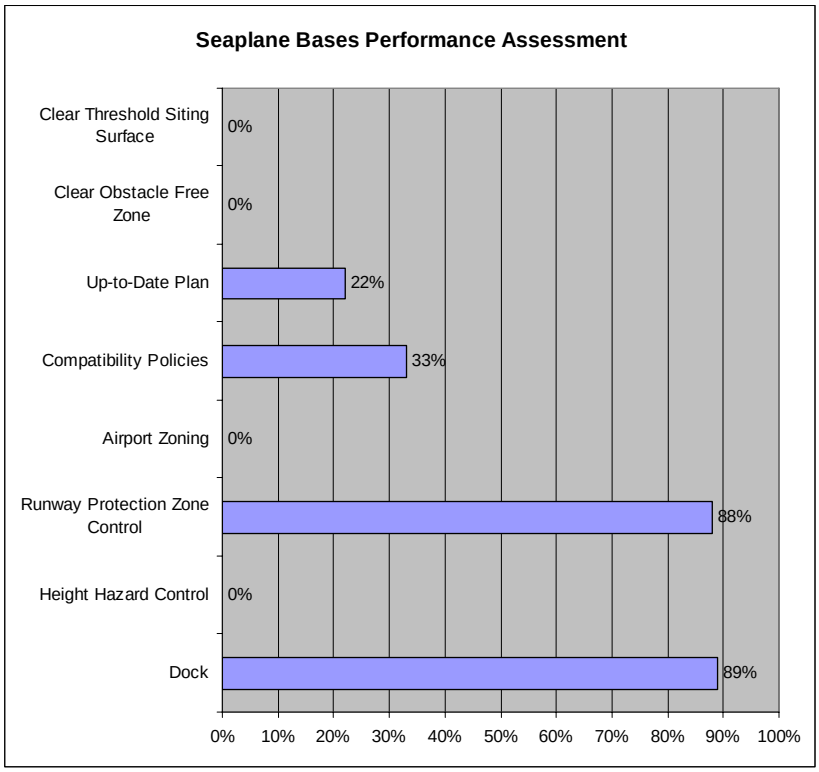
- The airports that do not comply with the performance objective for zoning are zoned Unknown, Other, Agricultural, and Mixed-Use.

- Very few of the Recreation or Remote Airports are included in the National Plan of Integrated Airport Systems, which accounts for the lack of ODO projects that would remedy any of the shortfalls listed above.

4.3.6 Seaplane Bases' Compliance with Performance Objectives

The all-classification performance objectives were modified to be relevant to Seaplane Bases. Only one facility objective is measured, whether or not the facility has a dock to facilitate passenger loading and unloading.

Objectives	Explanation
Operational Factors	No obstacles in threshold siting surface
	No obstacles in obstacle free zone (OFZ)
Up-to-Date Plan	Airport Layout or Master Plan Reports less than 7 years old
Land Use Compatibility Protection	Compatibility policies in comprehensive plan
	Appropriate zoning designation for airport
	Land use controlled in runway protection zones (RPZ)
	Height hazard zoning or regulations
Dock Facility	Yes



Seaplane Bases Not Meeting Performance Objectives

No obstacles in threshold siting surface*	None
No obstacles in obstacle free zone (OFZ)*	None
Airport Layout or Master Plan Reports less than 7 years old	American Lake SPB, Floathaven SPB, Poulsbo SPB, Roche Harbor SPB, Skyline SPB, Will Rogers Wiley Post SPB, Seattle Seaplanes SPB
Compatibility policies in comprehensive plan**	American Lake SPB, Floathaven SPB, Poulsbo SPB, Skyline SPB, Will Rogers Wiley Post SPB
Appropriate zoning designation for airport**	All except Seattle Seaplanes SPB
Land use controlled in runway protection zones (RPZ)**	Floathaven SPB
Dock Facility	Skyline SPB

*Not measured-All Seaplane Bases
**Not measured-Seattle Seaplanes SPB

4.4 Possible Future Changes in Classification

As aviation activity grows in the future, it is likely that airports will change classification. Changes in scheduled passenger service and in the type and quantity of airport facilities and services may also lead to future changes in classification.

Based upon passenger forecasts for 2030, the following airports would be classified as Commercial Service Airports because their annual passenger boardings on scheduled flights would significantly exceed 2,500:

- Lopez Island
- Roche Harbor
- Rosario SPB
- Wes Lupien

Potential additions to the Regional Service Airport category might be:

- Chehalis Centralia
- Toledo-Winlock Ed Carlson Memorial
- Richland

As population along the I-5/I-405/I-205 corridor grows, the airports in Chehalis and Toledo would increasingly be needed to serve as Regional Service Airports. Both have runways over 4,000 feet and more than 40 based aircraft. Being located at approximately half hour increments between Olympia and Kelso-Longview along I-5 means they are well situated for the Regional Service Airport role.

Richland may become a NPIAS Reliever for Tri-Cities in the future, and thus automatically meet the threshold criteria for a Regional Service Airport. According to airfield capacity analysis, demand on Tri-Cities, without Richland, will be near 60% of capacity, which is one of the requirements for a Reliever.

Airports that are projected to surpass 20 based aircraft by 2030, the threshold for Community Service Airports, include the following Local Service Airports:

- Davenport Municipal
- Goldendale Municipal
- Othello Municipal
- Quillayute
- Sand Canyon

Another way that an airport might change classification would be if it replaces one that cannot feasibly meet its performance objectives, due to cost, environmental concerns, political concerns, or some other reason. An example would be if Grand Coulee Dam Airport's runway could not

be expanded to the 5,000-foot performance objective, an airport with a similar service area, Wilbur Municipal, might become a Regional Service Airport instead.

To account for these potential changes and other changes that are unforeseen, it is recommended that WSDOT reevaluate the airport classifications and performance objectives every three years.

5. APPENDIX – ANALYSIS OF REGIONAL SERVICE AIRPORTS IN THE I-5/I-405/I-205 CORRIDOR

The majority of Washington residents live near the I-5/I-405/I-205 corridor. As population grows along this corridor, so will general aviation activity. Located along this corridor are 28 public use airports with 4,578 based aircraft:

Airport	County	NPIAS Service Level	Based Aircraft (2005)
Arlington Municipal	Snohomish	GA	592
Auburn Municipal	King	Reliever	305
Bellingham International	Whatcom	Primary	190
Blaine Municipal	Whatcom	GA	27
Boeing Field/King County International	King	Primary	501
Chehalis Centralia	Lewis	GA	78
Grove Field	Clark	GA	67
Harvey Field	Snohomish	Reliever	326
Kelso-Longview	Cowlitz	GA	85
Olympia	Thurston	GA	170
Pearson Field	Clark	GA	175
Pierce County/Thun Field	Pierce	GA	233
Renton Municipal/Clayton Scott Field	King	Reliever	290
Seattle Tacoma International	King	Primary	12
Skagit Regional	Skagit	GA	166
Snohomish County/Paine Field	Snohomish	Reliever	571
Tacoma Narrows	Pierce	GA	169
Toledo-Winlock Ed Carlson Memorial	Lewis	GA	75
		Subtotal:	4,032
Airports not included in the NPIAS			
Cedars North Airpark	Clark	None	6
Crest Airpark	King	None	325
Evergreen Field	Clark	None	60
Fly For Fun	Clark	None	9
Goheen Field	Clark	None	42
Hoskins Field	Thurston	None	5
R & K Skyranch	Thurston	None	23
Shady Acres	Pierce	None	30
Spanaway	Pierce	None	30
Woodland State	Cowlitz	None	16
		Subtotal:	546
		Total:	4,578

These 28 airports serve a population of 4.3 million.

To assess the number of high-capacity Regional Service Airports needed in this high population corridor, it is useful to estimate an average ratio of population per airport. The maximum capacity for an airport with one runway or with intersecting runways is about 230,000 annual aircraft operations. Based on the ratio of 450 operations per based aircraft at a busy reliever airport, the theoretical maximum capacity of an airport with one or intersecting runways is 511 based aircraft (230,000 divided by 450). Statewide, the ratio of population per based aircraft is 772 (6,319,255 people divided by 8,189 based aircraft). Consequently, the maximum service area population for an average airport is approximately 400,000 (772 multiplied by 511). Dividing 4.3 million by 400,000 results in a need for 11 high-capacity GA airports along the I-5/I-405/I-205 corridor.

Excluding Sea Tac and airports with runways shorter than 4,000 feet that are not Relievers, there are 13 airports along the I-5/I-405/I-205 corridor that might qualify as Regional Service Airports or are comparable Commercial Service Airports:

Arlington Municipal
Auburn Municipal
Bellingham International
Boeing Field/King County International
Chehalis Centralia
Harvey Field
Kelso-Longview
Olympia
Renton Municipal/Clayton Scott Field
Skagit Regional
Snohomish County/Paine Field
Tacoma Narrows
Toledo-Winlock Ed Carlson Memorial

Considering the low populations for which they are the closest airport (see next table), Chehalis Centralia and Toledo-Winlock are the two airports not needed as Regional Service Airports along the I-5/I-405/I-205 corridor. However, their capacities and locations about a half hour from each other and from Olympia or Vancouver make them good candidates for future designation as Regional Service Airports.

Airport Name	Total Population		"Closest Facility" Population	
	60 min	90 min	60 min	90 min
Auburn Municipal	3,481,417	3,888,157	628,065	628,799
Boeing Field	3,335,568	3,904,474	626,199	627,357
Renton	3,405,680	3,886,142	573,684	573,684
Snohomish County/Paine Field	2,867,670	3,954,447	562,839	563,083
Tacoma Narrows	3,193,128	3,797,293	520,245	520,245
Kelso-Longview	546,195	901,059	483,247	495,199
Olympia	1,760,203	3,693,420	219,367	219,367
Harvey Field	2,640,186	3,888,376	216,054	218,965
Bellingham	350,207	1,619,598	178,419	179,394
Arlington Municipal	2,214,445	3,463,313	130,634	134,990
Skagit Regional	997,961	2,610,610	79,348	81,058
Chehalis-Centralia	929,268	3,173,205	63,037	63,037
Toledo-Winlock	336,413	1,701,112	18,241	22,245
Total Service Area Population			4,299,379	4,327,423

AIRSPACE ANALYSIS

Washington State Department of Transportation, Aviation Division
Washington State Long Term Air Transportation Study (LATS)

To: Sonjia Murray, SH&E
David Hollander, SH&E

From: John Yarnish, URS Corporation

Date: May 16, 2007

Subject: *Phase II - Technical Memorandum Task 26 - Compare Forecast Demand versus Capacity and Identify Facility needs by Airport/Airspace Analysis Element*

The purpose of this memorandum is to set forth the approach to the airspace analysis and to identify potential constraints on the Washington State Aviation System as a result of airspace conflicts between airports.

The purpose of this section of the Long-term Air Transportation Study (LATS) is to analyze the airspace associated with the 141 airports in the State of Washington and identify areas where interactions or overlaps in airspace occur. Additionally, this section will examine whether such interactions or overlaps need to be addressed when analyzing future system improvements.

While a variety of mathematical techniques are available to measure the physical capacity of airport facilities to accommodate a set number of operations, passengers or air cargo tonnage, with airspace there are no such formulas. Airspace capacity is a function of "fixed" and "flexible" elements that interact in a constantly changing pattern. Fixed elements contributing to the airspace associated with individual airports include:

- Airport geographic location
- Airport runways and their orientation
- Level of approach precision by runway end
- Physical terrain and obstructions in the airport vicinity
- FAR Part 77 Surfaces

Flexible elements contributing to airspace capacity include:

- Weather, including wind direction, visibility, and ceiling
- Number and type of aircraft operating in the local airspace system
- Special airspace allocations and operating areas

- Air traffic management procedures applicable to each airport
- Air traffic management procedures as applied to the overall local system

Although airspace conflicts can exist without adversely impacting operations at any given airport, active air traffic management must be in place to permit this. To measure airspace capacity and model air traffic modeling is very complex and beyond the scope or needs of this study. Consequently, this analysis will focus on those "fixed" elements of the Washington airport system.

The Airspace analysis is a subcomponent of Task 26 of the Phase II LATS study scope of work. The following subsections are provided in this discussion:

1. Existing Data/Available Information
2. Assumptions
3. Methodology
4. Analysis

1. Existing Data/Given Information

During Phase I of the LATS study, an overview of existing airspace within the state was provided. Also included was a discussion of the application and implications that the conditions within the airspace have on the individual airports within the state. Under the Phase II analysis, a more detailed investigation of the airspace associated with the individual airports has been conducted. This investigation includes an airport-by-airport analysis of the reserved airspace associated with each of the system's airports as well as military and airports in other states and an identification of the overlaps or potential areas of conflict between airports.

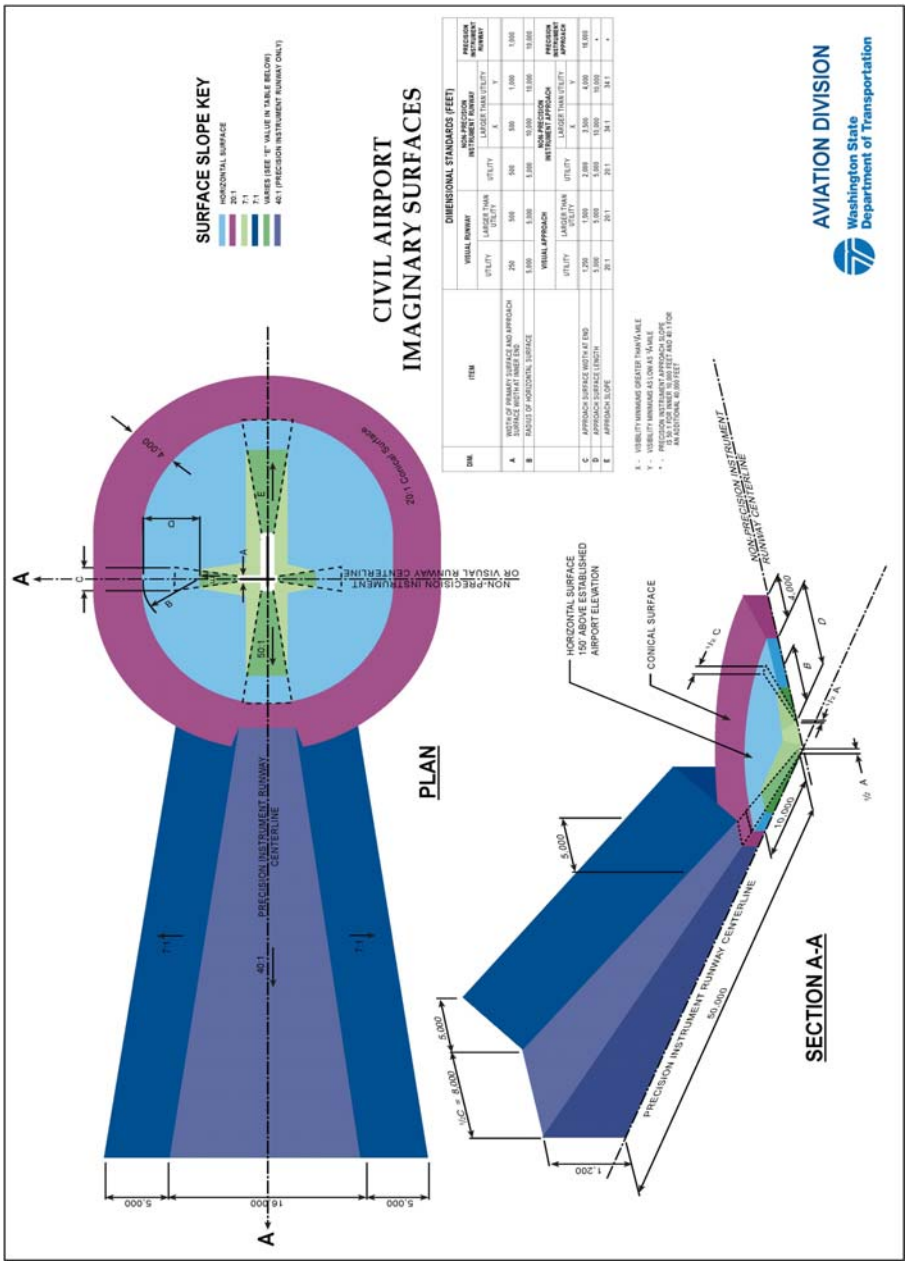
The following data was used to prepare the analysis;

- Obstruction Identification Surfaces as defined in the Federal Aviation Regulations (FAR) Part 77 - Objects Affecting Navigable Airspace.
- Washington Aviation System airports identified during Phase I.
- Current available 5010 form records of active runways, runway location and orientation, level of approach precision by runway (visual, non-precision, precision) and/or runway FAR Part 77 classification.
- Current airport approach plate information.
- Current airport sectional charts and the information shown on them regarding airport location and runway orientation.
- ESSB area boundaries.

2. Assumptions

The airspace surrounding each airport is defined by the FAR Part 77 Surfaces. These surfaces delineate the geographic area surrounding an airport that is critical to safe aircraft movement and that must be preserved free and clear of obstructions and activities that might prove hazardous to aircraft operating into and out of the facility. The airport traffic pattern is assumed to fall within each airport's Horizontal and Conical Surface. Most importantly, the runway approach surfaces delineate the flight path of aircraft to each runway and are therefore critical to the determination of potential airspace conflicts between airports. The FAR Part 77 Surfaces for a typical single-runway airport are depicted in Figure 46 and described below.

Figure 46: FAR Part 77 Surfaces[8]



[8] Washington State Department of Transportation, Aviation Division

Primary Surface

The primary surface is longitudinally centered on the runway, extending 200 feet beyond the threshold in each direction. The width of the Primary Surface is dependent upon the type of approach procedure available for the runway according to the following;

1. 250 feet for utility runways having only visual approaches
2. 500 feet for utility runways having non-precision instrument approaches
3. 500 feet for other than utility runways having visual approaches
4. 500 feet for non-precision instrument runways having visibility minimums greater than ¾ statute miles.
5. 1,000 feet for a non-precision instrument runway having non-precision instrument approach with visibility minimums lower than ¾ mile, and for precision instrument runways.

In cases where there are differing approaches to the runway ends, the width of the primary surface is that prescribed for the most precise approach.

Approach Surface

The approach surface is an inclined slope or plane going outward and upward from the ends of the primary surfaces.

1. For utility runways having only visual approaches these slopes have an inner width of 250 feet and extend outward and upward at 20:1 for 5,000 feet to a width of 1,250 feet.
2. For other than utility runways having only visual approaches the slope has an inner width of 500 feet and extends upward and outward for 5,000 feet at a slope of 20:1 to an outer width of 1,500 feet.
3. For runways classified as utility with non-precision instrument approaches the inner width of the surface is 500 feet extending outward and upward at a slope of 34:1 for 10,000 feet having an outer width of 3,500 feet.
4. For runways classified as other than utility with non-precision instrument approaches the inner width of the surface is 1,000 feet extending outward and upward at a slope of 34:1 for 10,000 feet having an outer width of 4,000 feet.
5. For precision approaches these slopes have an inner width corresponding to that of the Primary Surface, typically 1,000 feet and a slope of 50:1 for the first 10,000 feet. At this point the slope changes to 40:1 for an additional 40,000 feet, ending with an outer width of 16,000 feet.

Horizontal Surface

The horizontal surface is a horizontal plane 150 feet above the established airport elevation. The shape of the plane is determined by striking arcs from the center of each end of the primary surface. The radius of the arcs is dependent upon the

most demanding type of approach procedure for that runway; 5,000 feet for visual approaches and 10,000 feet for non-precision and precision approaches. The individual arcs are then connected by lines tangent to the arcs.

Transitional Surface

The transitional surface is an inclined plane with a slope of 7:1 extending upward and outward from the primary and approach surfaces, terminating at the point where they intersect with the horizontal surface or any other surface with more critical restrictions.

Conical Surface

The conical surface is an inclined plane at a slope of 20:1 extending upward and outward from the periphery of the horizontal surface for a distance of 4,000 feet.

As noted above, the Airspace analysis did not evaluate dynamic elements such as air traffic management procedures, arrival/departure routes, TERPS, or airport specific approach or missed approach or departure procedures. Whereas Part 77 Surfaces are fixed by the geographic location of the airport and runway orientation, air traffic management procedures are subject to manipulation and change from time to time. As a result, FAR Part 77 Imaginary Surfaces were used as a surrogate analytical tool under LATS Phase II.

3. Methodology

The airspace analysis was performed using FAR Part 77 Surfaces to define an “airspace block” surrounding each airport. The “airspace block” identifies that area that is most critical to aircraft operations at the airport. The individual Part 77 Surfaces were aggregated into a single “airspace block” outline overlaid on each airport. The approach surfaces used to define each airport’s “airspace block” are based on the actual orientation and level of precision for the approaches to each runway.

The “airspace block” for each airport in the State System is depicted on a base map of airports within each ESSB region as defined during LATS Phase I. The overall statewide map of airport airspace allocations is show in Figure 47 at the end of this section. For each of the ESSB areas as well as other areas where airspace overlaps were identified, enlargements have been prepared at a scale sufficient to support meaningful interpretation and analysis.

The airspace analysis was performed by overlaying each airport’s “airspace block” on a base map and identifying overlaps between airports. No specific quantitative measure of one airport’s impact on the Airport

Service Volume (ASV) or operational capacity of another was generated. A rigorous quantitative model of the State's "airspace capacity" would require extensive analysis of a wide variety of factors including but not limited to airspace, the character of aviation activity, weather patterns, air traffic management at all levels (i.e. enroute control to local airport operations), as well as consideration of the national air traffic environment.

The airspace analysis under LATS Phase II provides a qualitative assessment of the State system from an airspace standpoint and identifies conflicts and problems that could serve to reduce system capacity as well as impact demand reallocation scenarios should atc measures not allow for independent operations at the affected facilities.

4. Analysis

Puget Sound Airspace

In the Puget Sound Region, 29 airports and seaplane bases were identified; including McChord Air Force Base. Of these, 12 show airspace overlaps. These overlaps occur in two groupings along the I-5 Flight Corridor between Seattle and Tacoma and are represented in Figure 48 at the end of this section.

The first group includes Seattle-Tacoma International Airport (SEA), Boeing Field/King County International Airport (BFI), Renton Municipal Airport/Clayton Scott Field (RNT) and Will Rogers Wiley Post SPB (W36), Seattle Seaplanes SPB (0W0), Kenmore Air Harbor SPB/Lake Union (W55), and Auburn Municipal Airport (S50).

The largest airspace overlap occurs between Seattle-Tacoma International and Boeing Field where BFI is directly under the northern approach to SEA. The two airports do not share the same runway alignment and as such, do not share the same final approach. However, the proximity still requires specific aircraft separation procedures.

Slightly to the east, Will Rogers Wiley Post SPB is entirely contained within the footprint of Renton Municipal's airspace block. However, is should be noted that operations for both airports are controlled by the RNT airport traffic control tower. RNT and W36 also overlap with SEA and BFI.

North of Boeing Field, Seattle Seaplanes and Kenmore Air share the waters of Lake Union with slightly different published waterways. Due to the close proximity of these two seaplane bases, they almost entirely share the same airspace footprint. In addition, the outer approach to BFI overlaps this airspace combination.

The final overlap is between the southern approach to SeaTac and Auburn Municipal Airport. This is a minor overlay and does not appear to conflict with operations at either airport.

The second group includes McChord Air Force Base (TCM), Tacoma Narrows Airport (TIW), American Lake SPB (W37), Spanaway Airport (S44), Pierce County/Thun Field (1S0), and Shady Acres (3B8).

In this group, all airport airspace blocks overlay with that for McChord Air Force Base. The only airspace overlays that occur between civilian airports are that of Thun Field and Shady Acres.

It would appear that the biggest issue of overlap is with Spanaway Airport and McChord since S44 is located just off of the southeastern side of the base.

Southwest Region Airspace

In the Southwest Region, eight airports were identified for this study (Figure 49). In addition to those located in the state of Washington, Portland International Airport (PDX) was included since its airspace footprint reaches into Clark County. The airports in this region do not overlap one another; however, two do intersect the airspace of PDX.

Pearson Field (VUO) lies entirely under the northwestern approach to PDX. As a result, VUO is under significant influence and control from FAA airport traffic control located at PDX.

Spokane Region Airspace

Out of a total of six airports analyzed, airspace within the Spokane Region (Figure 50) shows three airports with overlaps. The Fairchild Air Force Base (SKA) airspace block overlaps that of Spokane International Airport (GEG). The northeastern approaches to both airports intersect and as such, aircraft separation procedures are required.

In addition, GEG's northeast approach overlaps a portion of Felt Field's airspace block. However, the interaction at this point is not significant.

Tri-Cities Region Airspace

There are five airports that were analyzed in the Tri-Cities Region (Figure 51). Although there is a slight overlap between the Tri-Cities Airport (PSC) and Vista Field (S98), this appears to not be of significance.

Other Airspace Overlaps

In addition to the regions discussed above, the rest of the state was analyzed for other airports that might have overlapping airspace blocks. Figure 52 shows these areas.

Along the I-90 flight corridor, Cle Elum Municipal Airport (S93) and DeVere Field (2W1) both overlap almost half of the other's airspace block. Also, farther east along the corridor, the southern approach to Grant County International Airport (MWH) slightly overlaps Moses Lake Municipal Airport's airspace.

There are two areas in the Puget Sound, but not included within the Puget Sound ESSB, that have airspace overlaps. The first is in the north sound. Friday Harbor (FHR) and Friday Harbor SPB (W33) have airspace blocks that overlap, the northern approach to Bellingham International Airport (BLI) slightly overlays Lynden Municipal (38W) airspace, and the airspace block for Whidbey Island Naval Air Station (NUW) overlays Wes Lupien Airport (76S) to the south, and Anacortes Airport (74S) and Skyline SPB (21H) to the north. Anacortes and Skyline's airspace blocks also overlay each other.

The second Puget Sound area is in the south sound. Olympia Airport (OLM) and Hoskins Field (44T) have airspace blocks that overlap.

Findings and Conclusions

Although airspace overlaps do occur between certain airports in the state, whether those overlaps impact the operational capacity of the affected airports is more a function of the "flexible" elements of the capacity equation. For example, capacity constraints that may exist during periods of low visibility when airports are operating under instrument conditions may be non-existent during VFR conditions. The variability of local weather conditions in the Pacific Northwest may mean that while one airport is experiencing reduced visibility and operating limitations another nearby airport is operating without constraints. The interaction of air traffic between the two airports is an on-going challenge for ATC staff.

Figure 47: Statewide Airspace Overview

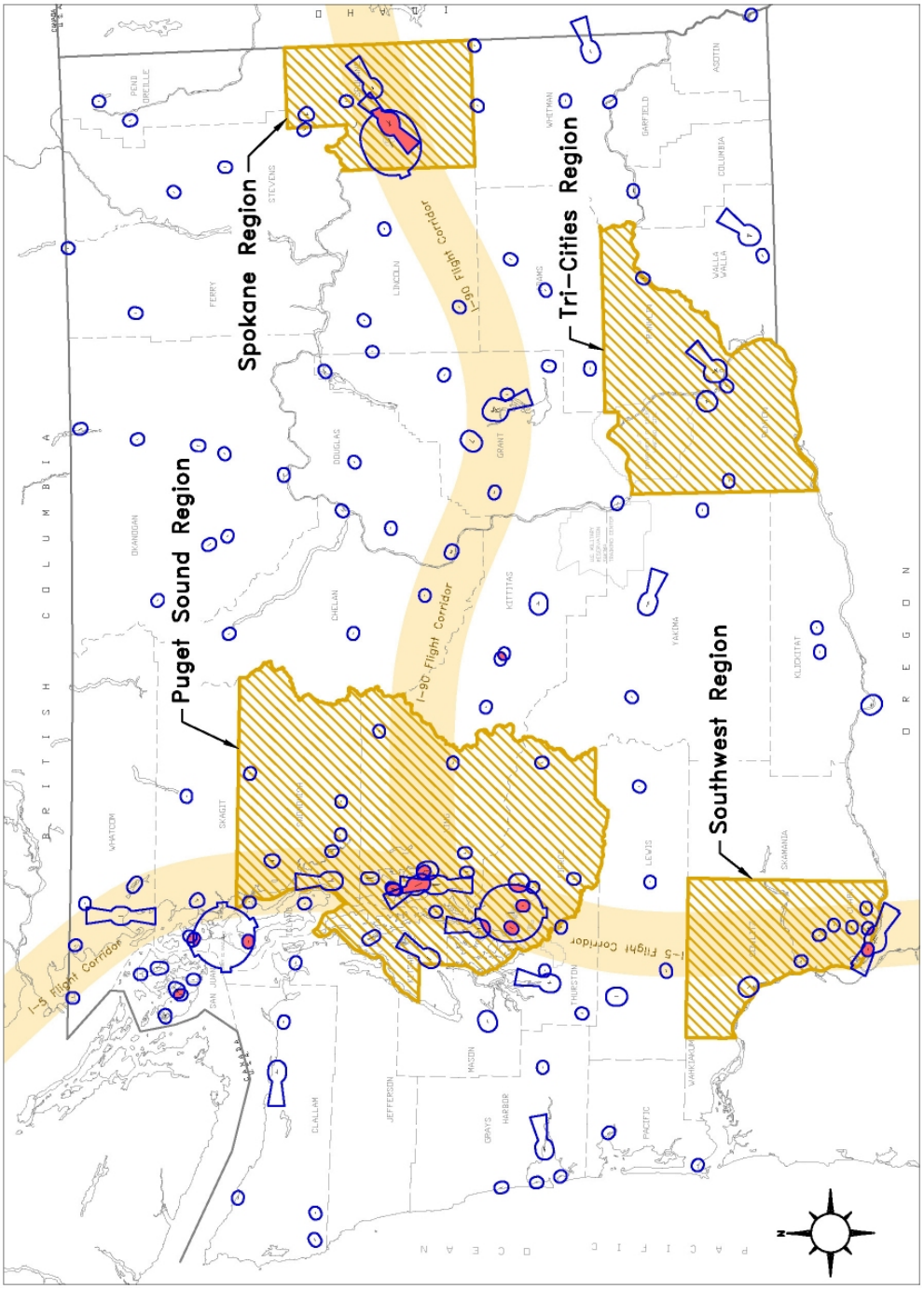


Figure 48: Puget Sound ESSB

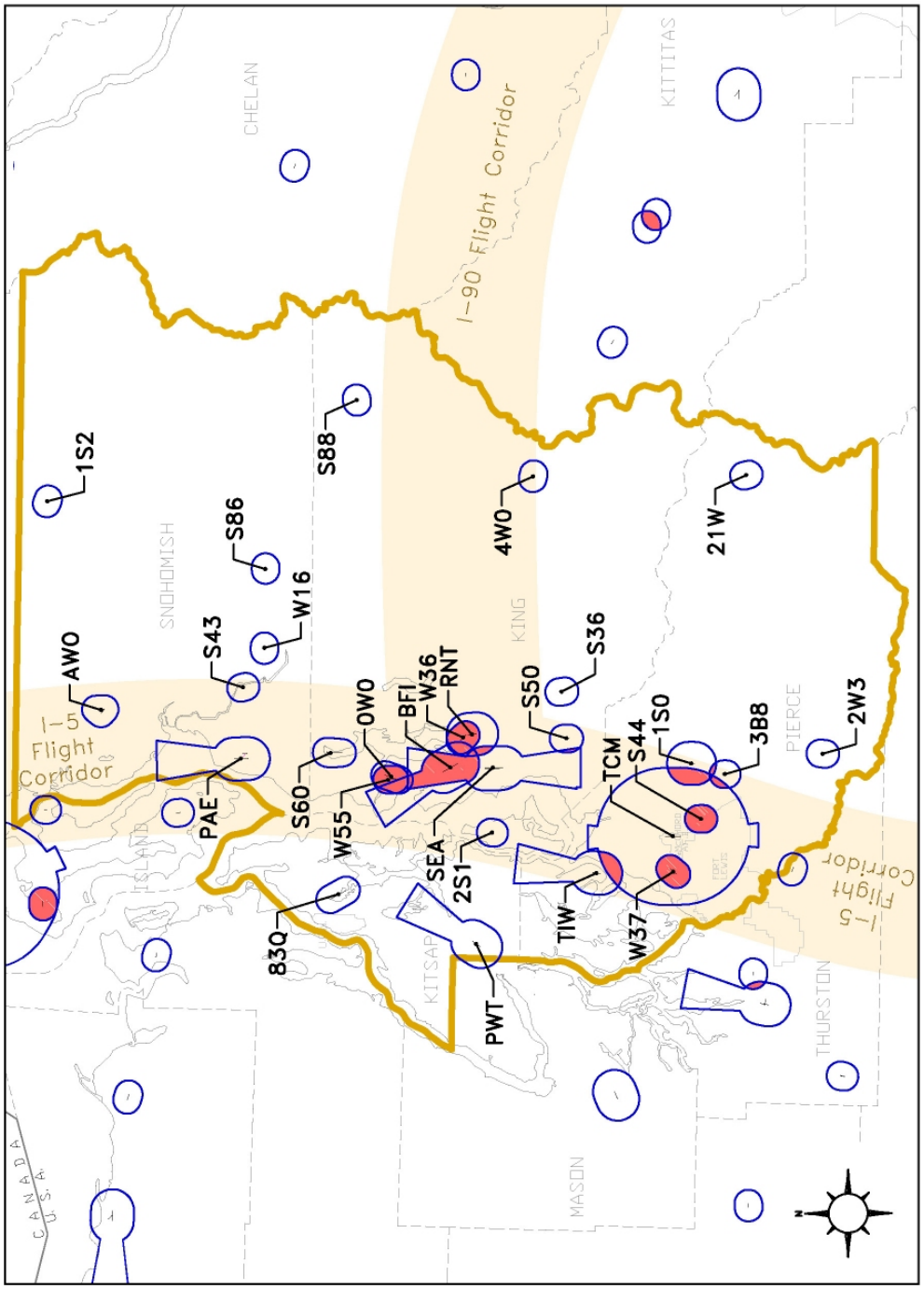


Figure 49: Southwest Region ESSB

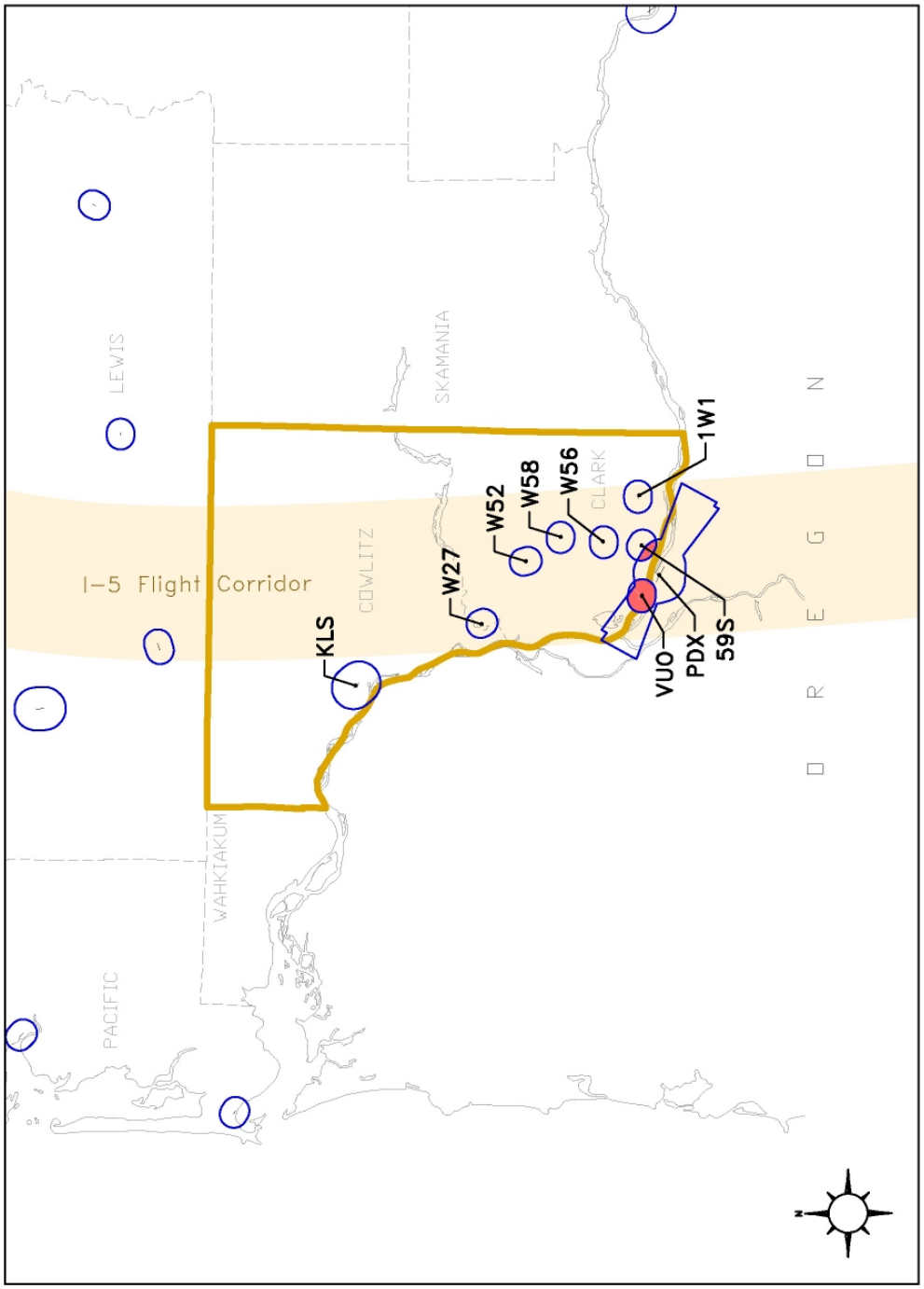


Figure 50: Spokane Region ESSB

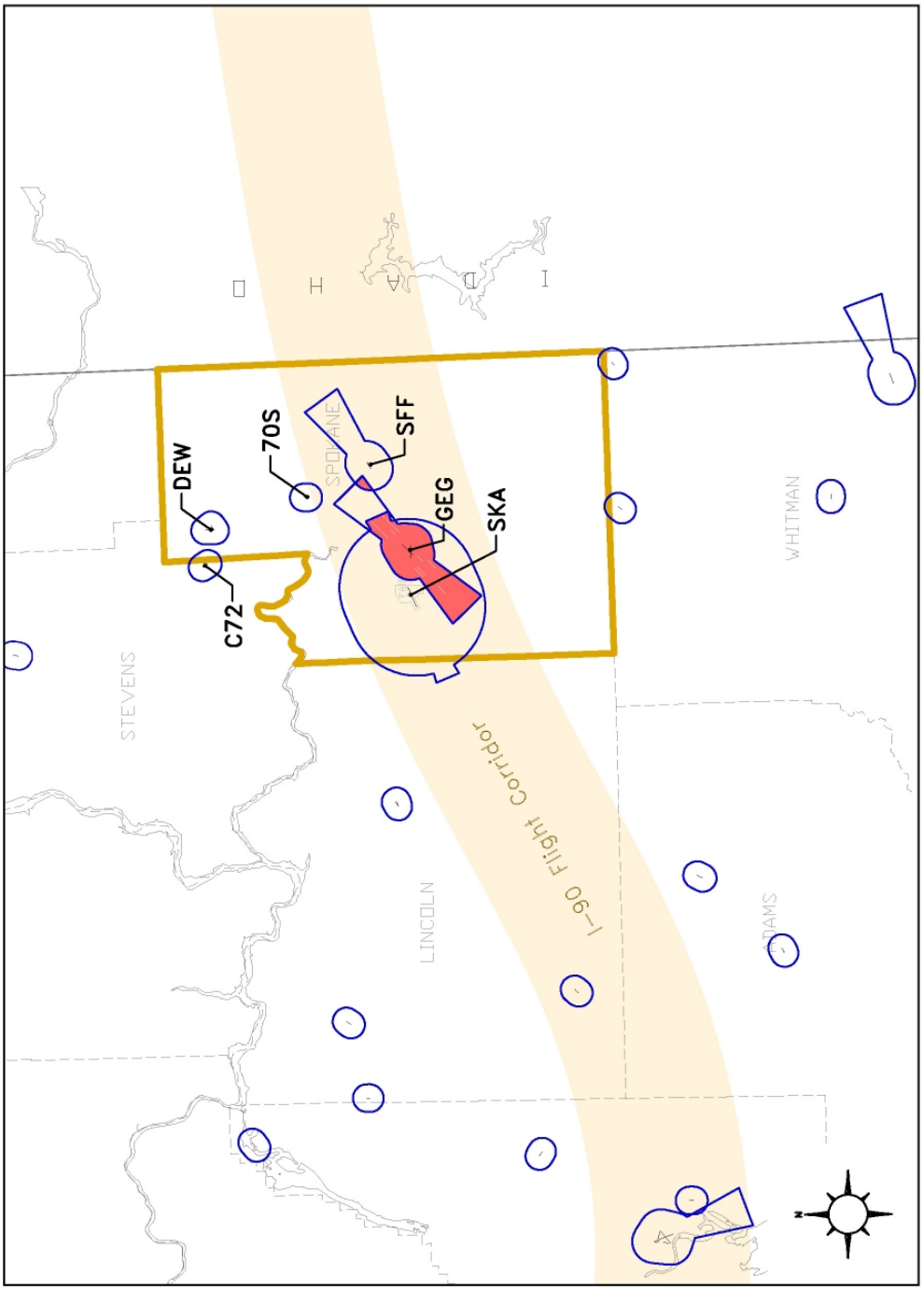


Figure 51: Tri-Cities ESSB

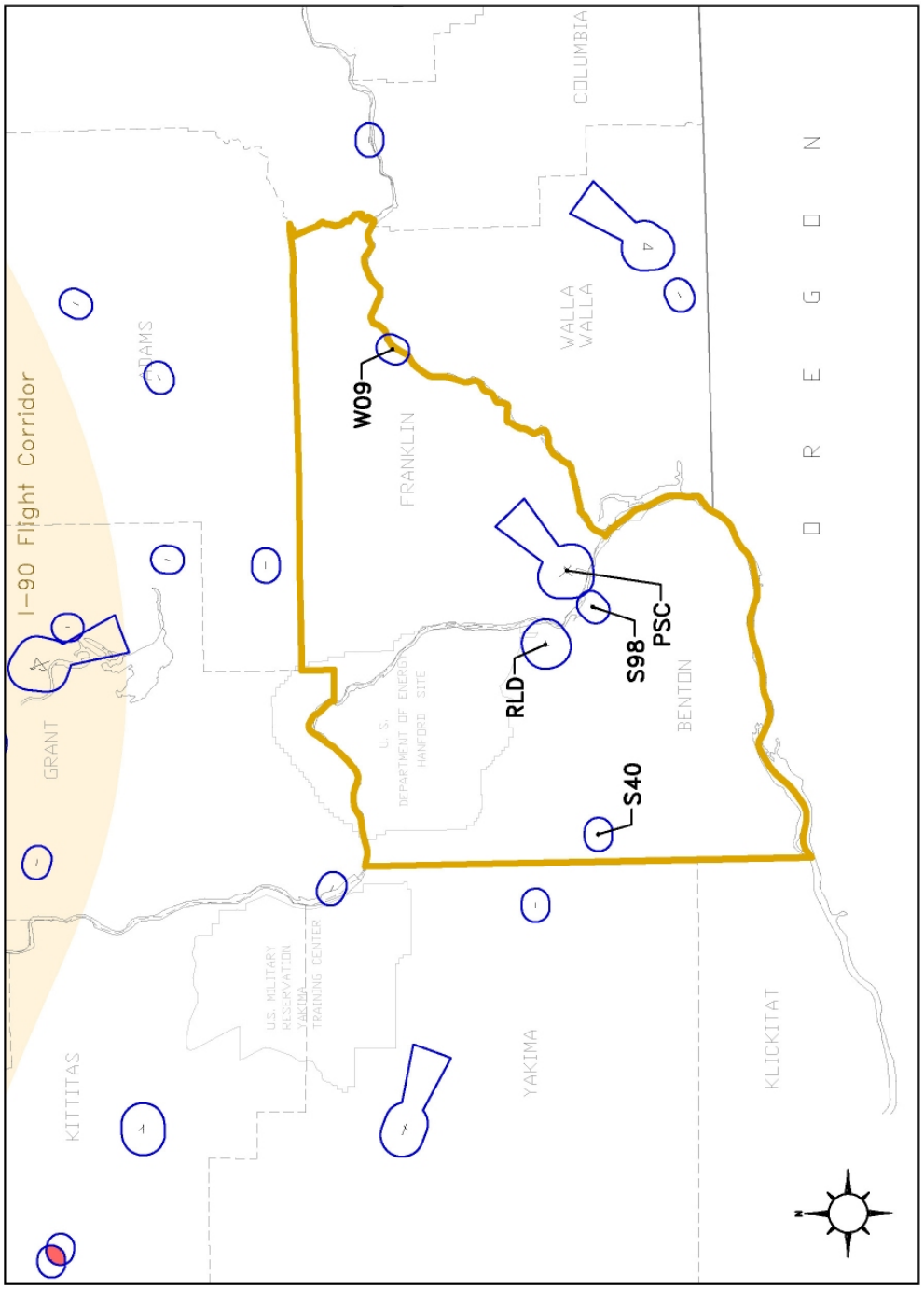
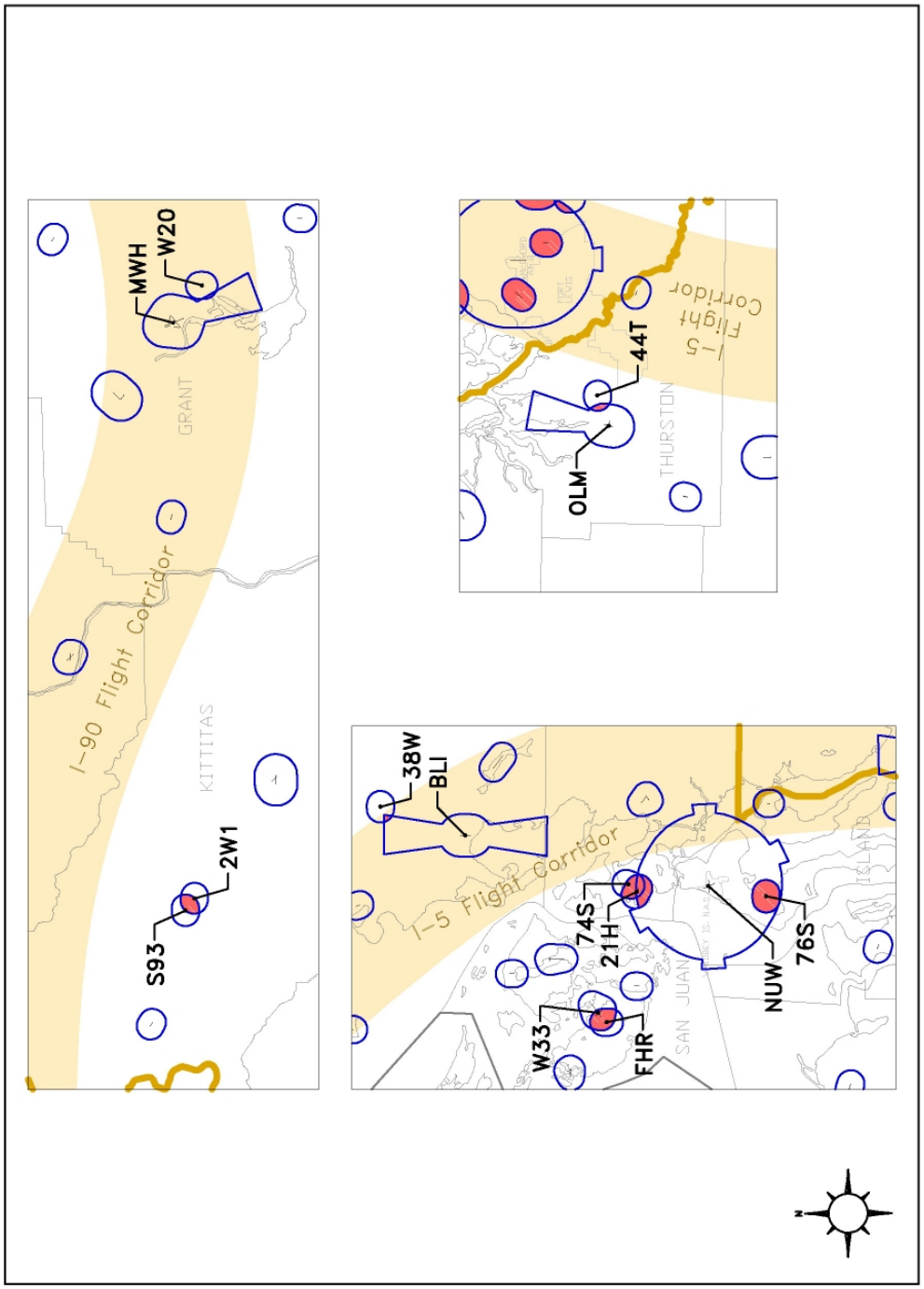


Figure 52: Other Airspace Overlaps



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