Final Report

BANDON STATE AIRPORT | AIRPORT MASTER PLAN

OREGON DEPARTMENT OF AVIATION

CENTURY WEST ENGINEERING

OREGON DEPARTMENT OF AVIATION

BANDON STATE AIRPORT | AIRPORT MASTER PLAN

FINAL REPORT, APRIL 2017

PREPARED FOR

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Glossary of Aviation Terms

Chapter 1 – Introduction & Project Overview

Chapter 1 – Introduction and Project Overview

Introduction

The Oregon State Department of Aviation has prepared an updated Airport Master Plan for Bandon State Airport (S05) in cooperation with the Federal Aviation Administration (FAA) to address the airport's needs for the next twenty years. The Airport Master Plan provides specific guidance in making the improvements necessary to maintain a safe and efficient airport that is economically, environmentally, and socially sustainable.

Study Purpose

The purpose of the Airport Master Plan is to define the current, short-term, and long-term needs of the Airport through a comprehensive evaluation of facilities, conditions and FAA airport planning and design standards. The study addresses elements of local planning (land use, transportation, environmental, economic development, etc.) that have the potential of affecting the planning, development, and operation of the airport. FAA Advisory Circular 150/5070-6B Airport Master Plans defines the specific requirements and evaluation methods established by FAA for the study.

Project Need

The FAA requires airports to periodically update their master plans as conditions change in order to maintain current planning. This project updates the 2003 Airport Layout Plan (Coffman Associates, W&H Pacific), which has provided the primary airport planning guidance for the Airport over the last ten years.

During this period, several of the airport layout plan recommendations have been implemented, changes have occurred in the local community, and FAA airport design standards have been updated. In addition, changes have occurred within the aviation industry and for both general aviation and commercial air service within the region.

Based on these factors, it was appropriate to update the long-term planning for the Airport to reflect changing local conditions, current trends, and current FAA standards. The 2014 Airport Master Plan and Airport Layout Plan (ALP) will replace the previous plan and meet the FAA's requirement to maintain current planning.

Project Funding

Funding for the Airport Master Plan Update was provided through an FAA Airport Improvement Program (AIP) grant (90%) with a local match (10%) provided by the Oregon Department of Aviation (ODA). ODA is funded through aviation user fees and does not use Oregon State General Fund dollars. The AIP is a dedicated fund administered by FAA with the specific purpose of maintaining and improving the nation's public use airports. The AIP is funded exclusively through fees paid by users of general aviation and commercial aviation and the funds can only be used for eligible aviation related projects.

Airport History

According to data contained on the Oregon Department of Aviation (ODA) website, Bandon State Airport was constructed on land that was donated by Bandon Aero Club in 1957. Bandon State Airport was established and dedicated in 1962 and has been owned and operated continuously by the Oregon Department of Transportation – Aeronautics Division, and subsequently ODA, for more than 50 years.

Study Organization

Work conducted during the Airport Master Plan Update was documented in a series of draft chapters to address each of the key study elements. The chapters reflect the FAA-approved scope of work and the content meets all FAA technical requirements.

The draft chapters and supporting documents were prepared over a period of approximately 12 months. Each draft chapter was reviewed by ODA, the planning advisory committee, and the FAA. The master plan elements were available for public review and comment throughout the project.

The 2014 Bandon State Airport Master Plan included the following chapters:

- *Chapter 1 – Introduction and Project Overview*
- *Chapter 2 – Inventory of Existing Conditions*
- *Chapter 3 – Aviation Activity Forecasts*
- *Chapter 4 – Airport Facility Requirements*
- *Chapter 5 – Airport Development Alternatives*
- *Chapter 6 – Environmental Review*
- *Chapter 7 – Financial and Development Program*
- *Chapter 8 – Airport Layout Plan*
- *Chapter 9 – Airport Land Use Compatibility*
- *Chapter 10 – Planning for Compliance and Solid Waste Recycling Plan*

Local Citizen Participation

The Oregon Department of Aviation (ODA) is committed to an inclusive, transparent planning process and ensured that project work products were available for public review. The public involvement element of the Airport Master Plan Update provided several ways for all interested individuals, organizations, or groups to participate in the project.

Draft work products developed during the project were available for public review and comment. Links to the documents were posted on ODA's webpage to allow for convenient access, review, and comment. Copies of the draft work products were available for public review and comment throughout the project. Comment forms were available for both electronic and printed versions of the draft work products.

A series of public meetings were held during the project to facilitate public participation. The project team presented information, provided updates on study progress and identified upcoming decision points in a workshop format to facilitate discussion. The project team utilized a variety of tools to encourage citizen participation, including surveys, project newsletters, and project updates were posted on the ODA's webpage.

A local planning advisory committee (PAC) was formed by ODA to assist the project team in reviewing draft technical working papers and to provide input into the planning process. The composition of the PAC was intended to provide an effective blend of airport users, neighbors, local business, local government representation, and other interests. A representative from the FAA Seattle Airports District Office served as *ex officio* member of the PAC. The PAC met throughout the project, reviewed and commented on draft

work products, discussed key project issues and provided local knowledge and expertise to the planning process. All PAC meetings were advertised and open to the public.

Summary

The FAA-defined airport master planning process requires a sequential, systematic approach which led to the selection of a preferred development option for the airport that was integrated into the Airport Layout Plan (ALP) and Airport Capital Improvement Program (ACIP). To meet this goal, the Airport Master Plan Update:

- *Provided an updated assessment of existing facilities and activity;*
- *Provided an updated forecast of airport activity measures (design aircraft, based aircraft, aircraft operations, etc.) for the current 20-year planning period;*
- *Examined previous planning recommendations (2003 Airport Layout Plan) as appropriate, to meet the current and projected airport facility needs, consistent with FAA airport design standards;*
- *Determined current and future facility requirements for both demand-driven development and conformance with FAA design standards;*
- *Provided consistency between airport planning and land use planning to promote maximum compatibility between the airport and surrounding areas;*
- *Prepared an updated Airport Layout Plan (ALP) drawing set to accurately reflect current conditions and master plan facility recommendations; and*
- *Developed an Airport Capital Improvement Program (ACIP) that prioritized improvements and estimated project development costs and funding eligibility for the 20-year planning period.*
- *Evaluated airport sponsor compliance with FAA Airport Improvement Program (AIP) grant assurances.*

The preparation of this document may have been supported, in part, through the Airport Improvement Program financial assistance from the Federal Aviation Administration as provided under Title 49, United States Code section 47104. The contents do not necessarily reflect the official views or policy of the FAA. Acceptance of this report by the FAA does not in any way constitute a commitment on the part of the United States to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable with appropriate public laws.

Chapter 2 – Inventory of Existing Conditions

Chapter 2 – Inventory of Existing Conditions

The purpose of this chapter is to document the existing facilities and conditions at Bandon State Airport (Airport Identifier Code: S05). The airport is owned and operated by the Oregon State Department of Aviation (ODA).

This project replaces the 2003 Airport Layout Plan Update, which serves as a primary source for inventory data.[1] When available, more recent information from various data sources was used to illustrate current conditions. Site visits were conducted to inspect existing airfield facilities. This chapter will support subsequent master plan tasks (forecasting, facility requirements assessments, etc.). The consultants worked closely with Oregon Department of Aviation staff to review the current facility and operational data.

Airport Locale

Bandon is located in Coos County on the southern Oregon Coast, approximately 24 miles southeast of Coos Bay on U.S. Highway 101. Bandon is one of seven incorporated cities in Coos County. Coquille is the county seat, located approximately 18 miles northeast of Bandon. The most recent (2013) population estimates for Bandon and Coos County were 3,100 and 62,860 respectively. [2]

[1] Bandon State Airport – Airport Layout Plan Report (Coffman Associates, W&H Pacific)

[2] Portland State University Population Research Center, Annual Certified Estimates

Bandon State Airport is located approximately two miles south of the city center, immediately east of U.S. Highway 101 (101), just outside the Bandon city limits but within the City of Bandon Urban Growth Boundary (UGB).

The City of Bandon is served by a rural fire district. The next closest emergency response is located in Coquille or Coos Bay. Bandon State Airport is equipped to accommodate fixed-wing and helicopter medevac flights, although the airport is not currently equipped with an instrument approach, which limits operations to visual flight rules (VFR) weather conditions.

Surface access to Bandon from the north and south is provided by U.S. Highway 101. Several state highways and county roads extend eastward from Highway 101 and connect to other communities. Coos Bay and North Bend are approximately 25 miles north via Highway 101 and Coquille is 18 miles east via State Highway 42S. Highway 42S also continues east to Winston and Roseburg (67 miles) at Interstate 5 (I-5). The Oregon-California border is approximately 107 miles south of Bandon on Highway 101.

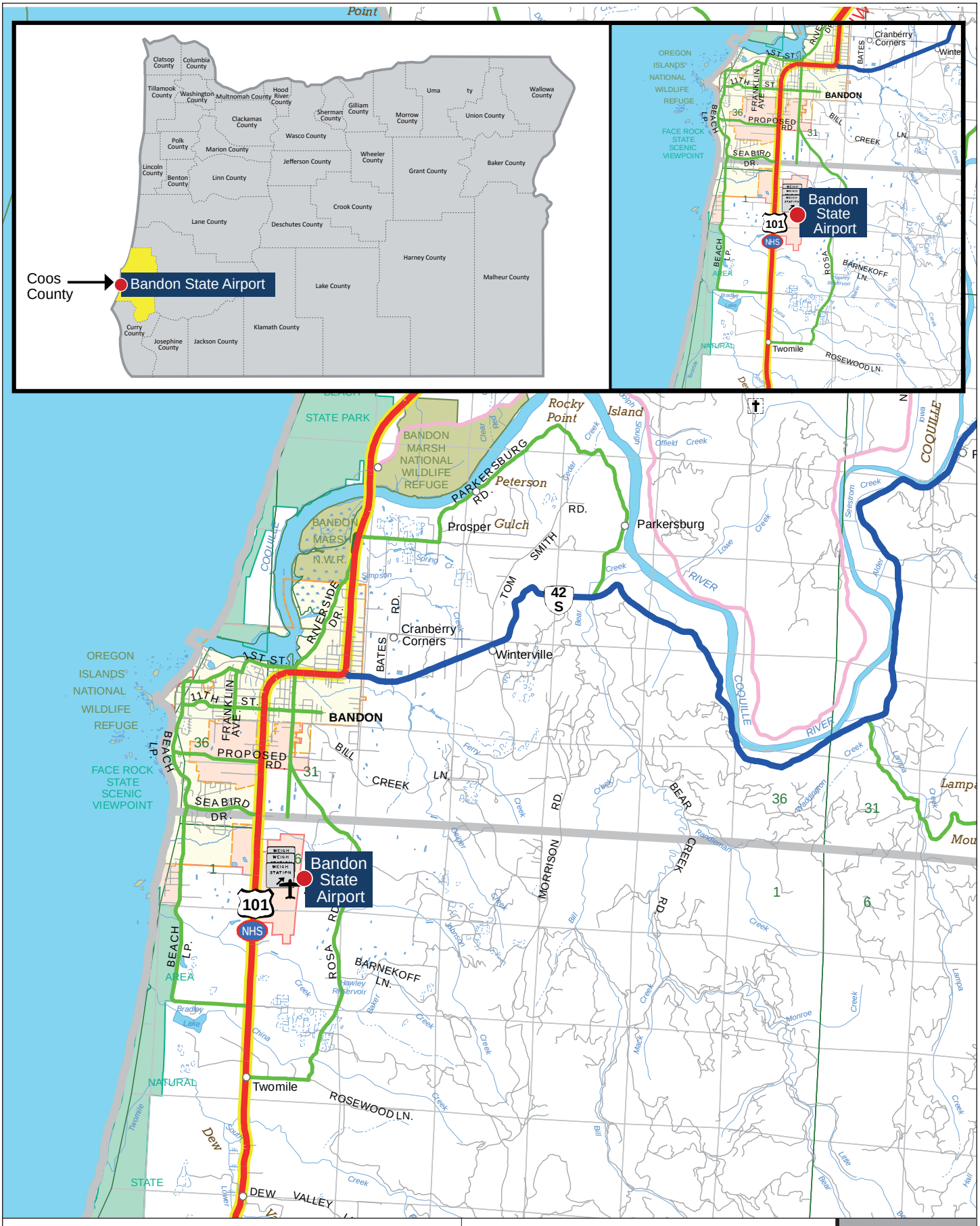
Bandon and the surrounding area provide a wide variety of recreational attractions and services for visitors to the southern Oregon Coast and seasonal or year-round residents. Bandon is home to several top rated golf courses that attract players worldwide. Bandon Dunes Golf Resort opened in 1999 with its first course, and has grown to five championship courses, the most recent opening in 2012. The resort provides a full range of guest services including lodging and a variety of amenities. Another recent addition to the area is Bandon Crossings Golf Course, a new 18-hole golf course that opened in 2007.

Bandon State Airport is one of four public use airports in Coos County; the other airports are Lakeside State Airport (14 nautical miles north), Southwest Oregon Regional (North Bend) (21 nautical miles north), and Powers Airport (20 nautical miles southeast). Cape Blanco State Airport, located 14 nautical miles south, is located in Curry County. Southwest Oregon Regional Airport is the nearest airport with scheduled commercial air service, an instrument approach, and local airport weather data.

A location and vicinity map for Bandon State Airport is provided in **Figure 2-1**.

Physical Geography

Coos County extends from the Pacific Ocean eastward into the Coast Range and the Klamath Mountains, with elevations ranging from sea level to approximately 4,600 feet above mean sea level (MSL). The western section of the county consists of marine terraces, dunes, and rolling hills. The central and eastern sections are mountainous forest lands. The Coos and Coquille Rivers are the primary drainage systems in the county. Bandon State Airport sits on a relatively level terrace with a published airport elevation (high point) of 122 feet MSL.



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LOCATION MAP | **FIG. 2-1**

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Climate

Mild temperatures and moderate precipitation characterize the marine climate of the southern Oregon Coast. Based on recorded climatic data for the period 1897 to 2013, Bandon's average maximum temperature is 66.8 degrees Fahrenheit (August) and the average minimum temperature is 38.5 degrees (January).[3] Bandon averages 55.5 inches of precipitation and less than 1 inch of snowfall annually. Approximately 48 percent of annual precipitation occurs during the three-month period of November, December, and January. Precipitation during the summer months (June, July, and August) averages just 2.6 inches. Prevailing winds in the Bandon area generally follow a north-south pattern, which is aligned with Runway 16/34.

Historical Aviation Activity

Bandon State Airport accommodates a wide variety of aeronautical activity, including small single- and multi-engine aircraft and business class turbine aircraft (small business jets and turboprops) capable of operating on the current 3,601-foot runway, and helicopters.

The 2003 Airport Layout Plan estimated that Bandon State Airport had 29 based aircraft and 15,500 annual aircraft operations (takeoffs and landings) in 2003.[4] The 2007 Oregon Aviation Plan Individual Airport Report for Bandon State Airport estimated 31 based aircraft and 15,930 general aviation aircraft operations in 2005. The current FAA 5010-1 Airport Record Form lists 38 based aircraft and 7,100 annual aircraft operations for the 12 months ending February 8, 2012. A detailed analysis of aviation activity data is presented in the updated aviation activity forecasts (Chapter 3). Recent estimates of airport activity are summarized in **Table 2-1**.

[3] Western Regional Climate Center (Bandon, Oregon Station No. 350471)

[4] W & H Pacific Airport Layout Plan (2003)

TABLE 2-1: BANDON STATE AIRPORT (S05) BASED AIRCRAFT AND OPERATIONS

ACTIVITY TYPE	ACTIVITY LEVEL
Based Aircraft *FAA Airport Record Form; current count to be verified by airport management*	
Single-Engine Piston	33
Multi-Engine Piston	5
Glider	0
Ultralight	0
Rotorcraft	0
Total Based Aircraft	**38**
Recent Annual Aircraft Operations Estimates ➢ Oregon Aviation Plan (2005) ➢ FAA Airport Record Form (2012)	 16,325 7,100

Airfield

AIRFIELD FACILITIES

Bandon State Airport consists of approximately 132 acres located east of U.S. Highway 101. The airport has one runway (16/34) that is oriented in a north/south direction (160-340 degree magnetic heading). The runway is lighted and equipped to support day and night operations in visual flight rules (VFR) weather conditions. There are no published instrument approaches at Bandon State Airport. All airfield pavements are asphalt.

The runway is served by a full-length parallel taxiway on its west side. Additional taxiways connect adjacent landside facilities (aircraft apron and hangars) to the parallel taxiway. All existing aviation use structures and landside facilities on the airport are located on the west side of the runway, including off airport buildings that access the airport via "through-the-fence" agreements with ODA. Vehicle access to the west side of the airport is provided via Kehl Lane, which connects with Highway 101.

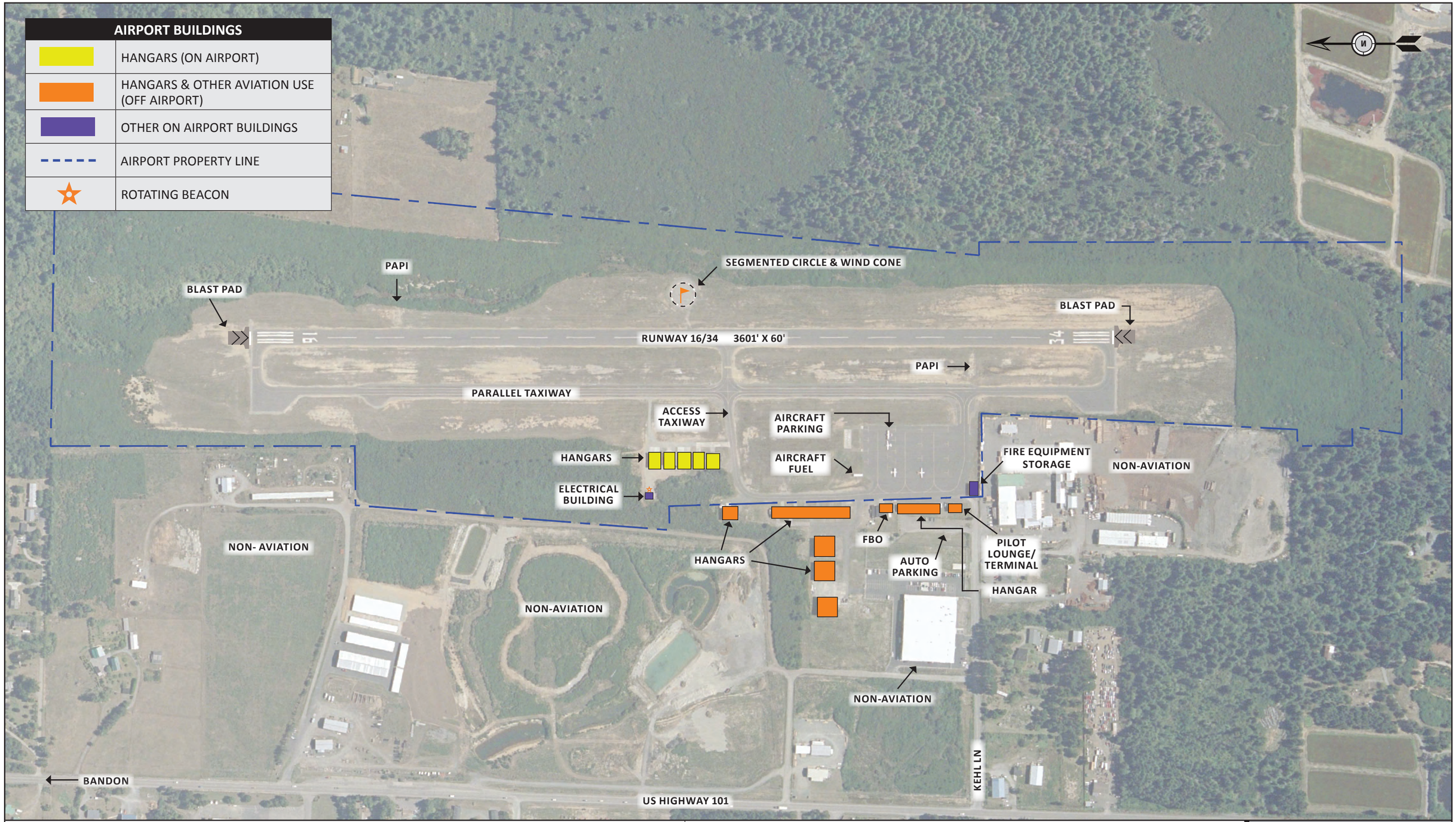
The published airfield elevation is 122 feet above mean sea level (MSL).[5] The airport traffic pattern altitude is 1,000 feet above ground level (1,122 feet MSL). The airport utilizes standard left traffic patterns for both runway ends.

[5] Airport/Facility Directory

Pilots use the airport Unicom/common traffic advisory frequency (CTAF) for communications on the ground and in the vicinity of the airport. **Table 2-2** summarizes airport data. **Figure 2-2** depicts existing airfield facilities.

TABLE 2-2: AIRPORT DATA

AIRPORT NAME/DESIGNATION	BANDON STATE AIRPORT (S05)
Airport Owner	Oregon Department of Aviation (ODA)
Date Established	1962 (per ODA historical records); 1940 activation listed in FAA records
Federal Airport Category	National Plan of Integrated Airport Systems (NPIAS): General Aviation FAA Airport Reference Code: B-I (as depicted on 2003 ALP)
State Airport Category	Category III – Regional General Aviation Airport (Oregon Aviation Plan)
Airport Acreage	132 Acres
Airport Reference Point (ARP) Coordinates	N 43° 05.19' W 124° 24.47'
Airport Elevation	122 feet Mean Sea Level (MSL)
Airport Traffic Pattern Configuration/Altitude	Left Traffic (Rwy 16/34); 1,122 feet above mean sea level (MSL) / 1,000 feet above ground level (AGL)
Airport Radio Communication	Common Traffic Advisory Frequency (CTAF) 122.8 MhZ.



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EXISTING CONDITIONS | **FIG. 2-2**

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Runway

Runway 16/34 is 3,601 feet long and 60 feet wide with paved blast pads (80 feet wide, 100 feet long) at both ends. The blast pads are designed to reduce the effects of jet or prop blast generated by aircraft at the beginning of takeoff. The runway has three 90-degree exit taxiways that connect to a full length west parallel taxiway.

The runway has an asphalt surface with an effective gradient of 0.48 percent. The high point on the runway is located at its south end (listed at 123.0' MSL on the current airport layout plan drawing). The runway is equipped with edge lighting and visual approach aids. The runway was constructed in 1994 and is in "good" condition based on a 2013 pavement inspection.

The runway has nonprecision markings, and was noted in the 2003 ALP Report, will be sufficient to support a nonprecision GPS instrument approach in the future. There are currently no published instrument approaches to the airport. The runway markings (white paint) include runway designation numbers, centerline stripe, and threshold bars at both ends indicating the end of usable runway and the beginning of the blast pads, which are marked with yellow chevrons. Yellow taxiway lead-in lines are painted on the runway at the mid-runway exit taxiway. The markings are in good condition. **Table 2-3** summarizes existing runway facilities at Bandon State Airport.

TABLE 2-3: RUNWAY 16/34 DATA

Dimensions	3,601 x 60 feet Paved blast pad (Rwy 16): 100 x 80 feet Paved blast pad (Rwy 34): 100 x 80 feet
Bearing	N 358° (True)
Effective Gradient	0.48%
Surface/Condition	Asphalt/Good[6]
Markings	Nonprecision Approach: Runway Landing Designation Numbers, Threshold End Bars, Centerline Stripe (white) Yellow Chevrons (Blast Pads)
Lighting	Runway Edge, Threshold, Visual Guidance Indicators, Runway End Identifiers
Signage	Taxiway/Runway Guidance Signs
Wind Coverage	On-site wind data not available 96.13 % at 10.5 knots (Based on North Bend wind data 2003 ALP)

[6] Oregon Department of Aviation Maintenance Report 2013

Runway Pavement Strength

Runway 16/34 has a published pavement strength rating of 12,000 pounds for aircraft equipped with single-wheel landing gear.[7] This pavement strength is consistent with runways designed to accommodate small airplanes (12,500 pounds or less).

Runway Wind Coverage

It is generally preferable for aircraft to land and takeoff directly into the wind, although varying wind conditions often require crosswind operations at airports. When wind conditions exceed the capabilities of a specific aircraft, use of a crosswind runway (when available) may occur. At airports with single runways, occasional periods of strong crosswinds often limit operations until conditions improve.

The FAA-recommended planning standard is that primary runways should be capable of accommodating at least 95 percent of wind conditions within the prescribed crosswind component. This component is based on a direct crosswind (90 degrees to the direction of flight) of 10.5 knots (12 miles per hour) for small aircraft and 13 knots (15 miles per hour) for larger general aviation aircraft. Aircraft are able to tolerate increasingly higher wind speeds as the crosswind angle is reduced and moves closer to the direction of flight.

There is no wind data available for the airport. Updated wind data was obtained for Southwest Oregon Regional Airport to create a new wind rose for use on the Airport Layout Plan (ALP). This information is provided for reference only and does not necessarily reflect local wind conditions at Bandon State Airport. Based on wind conditions in North Bend, Runway 16/34 has approximately 96 to 98 percent cross wind coverage for both large and small aircraft. The prevailing wind patterns in the area and the historic configuration of the original airfield, suggest that Runway 16/34 is aligned with the most common wind patterns and reflects the capabilities of the airport site.

Taxiways/Taxilanes

Bandon State Airport has an efficient taxiway system, including a full-length parallel taxiway on the west side of Runway 16/34 that provides access to the entire runway and adjacent landside facilities. A system of taxiways and taxilanes provide access to aircraft parking apron and hangar development areas on the airport. **Table 2-4** summarizes existing taxiway facilities. **Figure 2-2**, presented earlier in the chapter, depicts the major taxiways on the airfield. The striping and markings on the major taxiways are in good condition. The taxiways appear to be well maintained (vegetation control, crackfilling, etc.) and are generally in good condition.

[7] FAA Airport/Facility Directory, FAA 5010 Airport Record Form

PARALLEL TAXIWAY

The parallel taxiway for Runway 16/34 is located on the west side of the runway and has three 90-degree exit taxiway connections to the runway. The parallel taxiway has aircraft hold areas located adjacent to both ends of the runway. The runway to parallel taxiway centerline-to-centerline separation is 225 feet. The number and location of the exit taxiways promotes efficient aircraft movement in the runway-taxiway system.

The parallel taxiway is 25 feet wide and the exit taxiways are 30 feet wide. The taxiways have centerline stripes. The exit taxiways have aircraft hold lines (yellow) located 125 feet from runway centerline, which coincides with the outer edge of the runway object free area (OFA) and obstacle free zone (OFZ). As noted earlier, yellow lead-in lines are located on the exit taxiways to guide aircraft exiting the runway to the taxiway. The parallel taxiway and exit taxiways are equipped with stake-mounted edge reflectors and the exit locations on the runway are identified with blue lenses on the medium intensity runway edge lights.

ACCESS TAXIWAYS AND TAXILANES

The landside facilities at Bandon State Airport are connected to the runway-taxiway system by two access taxiways.

North Access Taxiway

The north access taxiway extends from the parallel taxiway (mid-runway exit taxiway) to the main apron and hangar area. The taxiway is 25 feet wide and approximately 1,000 feet long. The taxiway travels west from the parallel taxiway approximately 400 feet then heads south toward the north end of the apron, where it connects to apron and hangar taxilanes. The taxiway is in "satisfactory" condition based on a 2013 pavement inspection. The taxiway has a yellow centerline stripe (good condition).

South Access Taxiway

The south access taxiway connects the parallel taxiway to south end of the main apron. The south access taxiway is 35 feet wide and approximately 133 feet long. The taxiway has a yellow centerline strip (good condition).

Apron Taxilanes

The main apron has a primary access taxilane that connects to the north and south access taxiways. The taxilane travels around the southern and western ends of the apron and connects to three east-west taxilanes serving four small airplane tiedown rows. The taxilanes provide access to aircraft tiedowns and hangars adjacent to the apron.

Hangar Taxilanes

Two sections of taxilane extend west of the north access taxiway to serve several hangars located off airport property. The section of taxilane adjacent to the T-hangar located near the south end of the main apron was rated "very poor" in a 2013 pavement inspection; the western section of taxilane providing access to several off-airport conventional hangars was rated "satisfactory."

TABLE 2-4: TAXIWAY DATA (BANDON STATE AIRPORT)

TAXIWAY	DESCRIPTION	DIMENSIONS/CONFIGURATION
Parallel Taxiway	West Side Full Length Parallel Taxiway	3600 x 25' with three exit taxiways; Aircraft hold areas located adjacent to both runway ends. Asphalt surface w/ centerline stripe (yellow); Threshold markings; Edge reflectors
Exit Taxiways (3)	90-degree Exit Taxiways for Runway 16/34 to Parallel Taxiway	Length: 183' (Length of section between runway edge and Parallel Taxiway); North and South Exit Taxiway Width: 25 feet Mid Field Exit Taxiway Width: 30 feet Asphalt surface w/ centerline stripe; taxiway lead-in lines on runway; aircraft hold lines at each runway connection (125' from runway centerline); Edge reflectors Exit Locations (distance from runway ends 16/34): North Exit Taxiway - Rwy 16 threshold (0'/3,600') Mid field Exit Taxiway – (1,400'/1,600') South Exit Taxiway – (3,600'/0')
South Access Taxiway	Extends from Parallel Taxiway to Southernmost Apron area	133 x 35' Asphalt surface w/ centerline stripe Edge reflectors
North Hangar Taxiway	Extension of Mid Field Exit Taxiway and leads to Northernmost Apron area	920 x 25' Asphalt surface w/ centerline stripe
Main Apron Taxilanes	Taxilanes providing access to aircraft tiedowns, fueling area and hangars	Access Taxilanes within the main apron. Asphalt surface w/ centerline stripe

Aircraft Apron

Bandon State Airport has a one apron located on the west side of the runway that accommodates aircraft parking and fueling, and provides access to hangars and the general aviation terminal/fixed base operator (FBO) building. The apron has four east-west rows of aircraft tiedowns with 21 positions. The southern two rows of tiedowns (8 south facing positions) are designed to accommodate larger aircraft (multi-engine aircraft, single-engine turboprops, etc.). The northern two rows include 13 tiedowns for small airplanes in one single row (4 south facing positions) and one double row (9 north/south facing positions). **Table 2-5** summarizes the existing apron facilities at the airport.

TABLE 2-5: AIRCRAFT APRONS (BANDON STATE AIRPORT)

Main Apron	Approximately 260' by 440' Total Overall Area: Approximately 12,711 square yards - Asphalt Concrete Current Use: Small airplane parking, hangar frontage, and aircraft fueling Tiedowns: 21 small airplanes in multiple rows

Airport Lighting and Signage

The airfield lighting at Bandon State Airport accommodates day-night operations in visual flight rules (VFR) weather conditions. Airfield lighting includes runway edge/threshold lighting, runway end identifier lights (REIL), precision approach path indicators (PAPI), a lighted windsock and segmented circle, and the airport beacon. Existing lighting systems are described in **Table 2-6**. The west parallel taxiway and exit taxiways are equipped with stake-mounted blue reflective markers.

TABLE 2-6: TYPES OF AIRPORT LIGHTING USED AT BANDON STATE AIRPORT

CATEGORY	TYPE	CONDITION
Airport Lighting	Airport Rotating Beacon (white/green dual lens); Lighted Wind Cone	Good
Runway Lighting	Medium Intensity Runway Lighting (MIRL) (white lenses) Runway End Identifier Lights (REIL) (white strobes)	Good
Visual Guidance Indicators	4-Light PAPI (red/white lenses) • Rwy 16: (P4L) 4 degree glide path* • Rwy 34: (P4L) 4 degree glide path	Good* *Rwy 16 PAPI: "out of service indefinitely"
Taxiway Lighting	None (edge reflectors – fair condition)	Good
Airfield Signage	Unlighted Runway and Taxiway Location Signs	Good

Airport Lighting: The airport has a rotating beacon mounted on a tower support on the west side of the runway. Rotating beacons are used to indicate the location of an airport to pilots at night or during reduced visibility. The beacon provides sequenced white and green flashing lights (representing a lighted land airport) that rotate 360 degrees to allow pilots to identify the airport from all directions from several miles.

One internally illuminated wind cone is located on the east side of the runway, near mid-field, approximately 175 feet from the runway centerline. The wind cone is located in the segmented circle. The rotating beacon and lighted wind cone operate on dusk-dawn automatic switches and reportedly work normally.

Runway Lighting: Runway 16/34 has medium intensity runway edge lighting (MIRL) and runway end identifier lights (REIL) at both ends.

- **MIRL:** The MIRL system includes white edge lights (with blue lights located near the exit taxiways) and runway threshold lights. The threshold lights consist of two sets of four fixtures near each corner of the runway ends that a flush mounted in the runway blast pad pavement. The fixtures have split lenses (green/red) indicating the beginning and end of the useable runway.

- **REIL:** Runway 16 and 34 are equipped with runway end identifier lights (REIL), which consist of two high-intensity sequenced strobe lights that mark the end of the runway to assist pilots in establishing visual contact with the runway environment during periods of darkness or reduced visibility.

- **Visual Guidance Indicators:** Runways 16 and 34 are equipped with a 4 light precision approach path indicator (PAPI) system located on the left side of the approach end of the runway. Both PAPIs have a 4-degree glide path. The PAPI projects light along a standard glide path to a runway end from a single row of four lights indicating the aircraft's vertical position (above, below, or on glide path) relative to the glide path. The current FAA Airport/Facility Directory (A/FD) indicates the Runway 16 PAPI is out of service ("PAPI Rwy 16 OTS indef.").

- **Airfield Signage:** The runway-taxiway system has non-illuminated mandatory instruction signs at the aircraft holding positions at each of the taxiway connections with the runway. The signs are located to coincide with the painted aircraft hold lines on each taxiway that connects to the runway.

The MIRL, REIL, and PAPI lighting systems are pilot-activated using the common traffic advisory frequency (CTAF) 122.8 MHz. All airfield lighting reportedly functions normally.

Other Lighting: Overhead lighting is available in the terminal area and main aircraft parking aprons, the aircraft fueling area, and in various hangar areas. Hangars also have exterior wall-mounted flood lights.

Agricultural Aircraft Facilities

Bandon State Airport does not accommodate any locally-based aerial applicators and there are no loading or containment facilities located on the airport.

Airfield Pavement Condition

All airfield pavements at Bandon State Airport are constructed of asphaltic concrete (AC) over a crushed aggregate base/subbase. Historic pavement records indicate that the original airfield pavements were constructed in 1966. The main section of the parallel taxiway and the north access taxiway were constructed in 1966 and rehabilitated (overlay) in 1990. The original runway was replaced with new (shifted) runway in 1994. The south section of the main apron was paved in 1970 and rehabilitated (overlay) in 1990. The north section of the apron was paved in 1990. **Table 2-7** summarizes the typical section composition for each airfield pavement area.

TABLE 2-7: SUMMARY OF AIRFIELD PAVEMENT SECTIONS (BANDON STATE AIRPORT)

Runway 16/34	2" AC (1994); 6" Crushed Aggregate Base (1994); 5" Aggregate Subbase (1994)
Runway Blast Pads (both runway ends)	Not rated; Unknown section
Parallel Taxiway (north section and north AC hold area)	2" AC (1994); 6" Crushed Aggregate Base (1994); 5" Aggregate Subbase (1994)
Parallel Taxiway (middle section) and north AC hold area)	2" AC (1990); 2" AC (1966); Unknown Base
Parallel Taxiway (south section and south AC hold area)	2" AC (1994); 6" Crushed Aggregate Base (1994); 5" Aggregate Subbase (1994)
North Exit Taxiway	2" AC (1994); 6" Crushed Aggregate Base (1994); 5" Aggregate Subbase (1994)
Mid-field Exit Taxiway	2" AC (1994); 6" Crushed Aggregate Base (1994); 5" Aggregate Subbase (1994)
South Exit Taxiway	2" AC (1994); 6" Crushed Aggregate Base (1994); 5" Aggregate Subbase (1994)
Main Apron	South Section: 2" AC (1990); BST (1970) Unknown Base North Section: 2" AC (1990); 6" Aggregate Base (1990) Rear Section: 2" AC (1990); 6" Aggregate Base (1990)
North Access Taxiway	2" AC (1990); 2" AC (1966); 6" Unknown Base
South Access Taxiway (Apron)	2" AC (1990); 2" AC (1966); 6" Unknown Base
West Hangar Access	2" AC (1990); 6" Aggregate Base (1990)

As part of the Oregon Aviation System Plan, the Pavement Evaluation/Maintenance Management Program was developed and applied to all Oregon general aviation airports. The evaluation takes into account historical pavement condition index (PCI) ratings, pavement features, and current conditions. Through the use of MicroPAVER computer software, existing conditions data can be entered, and projections of future pavement condition and specific needs can be estimated. **Table 2-8** summarizes PCI ratings at Bandon State Airport based on inspections conducted in 2013 and the previous inspections conducted in 2009 and 2005. The PCI ratings are on a numerical scale of 0 to 100, which correspond to a series of qualitative conditions ranging from "Failed" to "Good."

Based on the most recent pavement inspections performed in 2013, the majority of airfield pavements were rated "satisfactory" or better. The runway, north and south sections of the parallel taxiway, aircraft hold areas and the north section of the main apron were rated "good." The center section of the parallel taxiway was rated "satisfactory". All three exit taxiways were rated "good." The south section of the main apron, north access taxiway, and west hangar access taxiway were rated "satisfactory." The north half the apron and south taxiway connection were rated "good." The western-most section of main apron located directly in front of the FBO/hangar building and the taxilanes adjacent to the T-hangar located near the northwest corner of the apron were rated "very poor."

The rate of pavement deterioration documented between the 2009 and 2013 PCI inspections does not appear unusual based on local climate conditions or type of aircraft use. ODA conducts periodic vegetation control, crackfilling, sealcoating, and marking repainting of airfield pavements. The public use airfield pavements were crack sealed in 2011. The visual inspections of the airfield pavements showed the pavements were generally consistent with the most recent PCI inspections.

TABLE 2-8: SUMMARY OF AIRFIELD PAVEMENT CONDITION RATINGS

PAVEMENT SECTION	2013 PCI [1]	2009 PCI [1]	2005 PCI [1]	CURRENT CONDITION
Runway	**98**	98	100	Good (Crack Seal in 2011)
Parallel Taxiway (North Section, AC Hold Area, North Exit Taxiway)	**100**	100	100	Good (Crack Seal in 2011)
Parallel Taxiway (Middle Section)	**77**	94	90	Satisfactory (Crack Seal in 2011)
Parallel Taxiway (South Section, AC Hold Area, South Exit Taxiway)	**99**	98	100	Satisfactory (Crack Seal in 2011)
Center Exit Taxiway	**98**	100	96	Good (Slurry Seal in 2003)
North Access Taxiway	**81**	96	91	Satisfactory (Crack Seal in 2011)
Taxiway Connection (SE corner of main apron) to Parallel Taxiway	**87**	95	86	Good (Crack Seal in 2011)
North Section of Main Apron	**86**	86	94	Good (Crack Seal in 2011)
South Section of Main Apron	**85**	93	96	Satisfactory (Crack Seal in 2011)
Main Apron (west edge of apron; hangar/FBO access)	**40**	91	64	Very Poor (Slurry Seal in 2006)
Taxilane for adjacent T-hangar (NW corner of main apron)	**39**	56	57	Very Poor
Taxilane for Private Hangar	**77**	78	65	Satisfactory

1. The Pavement Condition Index (PCI) scale ranges from 0 to 100, with seven general condition categories ranging from "failed" to "good." For additional details, see *Oregon Aviation System Plan Pavement Evaluation/Maintenance Management Program* (2014) for Bandon State Airport.

Landside Facilities

Bandon State Airport accommodates a variety of aviation-related buildings including aircraft storage hangars, commercial and mixed-use hangars, and a general aviation terminal/fixed base operator (FBO building). All airport buildings and aviation facilities are located on the west side of the runway, with the majority located off airport property. The west side of the airport abuts a variety of non-aviation buildings and associated facilities. **Table 2-9** summarizes existing airport hangars and other airport buildings. **Figure 2-2**, presented earlier in this chapter, depicts the existing buildings on the airport.

TABLE 2-9: BUILDINGS AT BANDON STATE AIRPORT

BLDG. NO.	BUILDING	OWNER	ON/OFF AIRPORT PROPERTY	EXISTING USE
1.	Terminal/Club House	Bandon Aero Club	Off	Pilot Facilities
2.	T-Hangar	Private	Off	Aircraft storage
3.	T-Hangar	Private	Off	Aircraft storage
4.	FBO Shop/Hangar	Bandon Aviation	Off	Commercial
5.	Conventional Hangar	Private	On	Aircraft storage
6.	Conventional Hangar	Private	On	Aircraft storage
7.	Conventional Hangar	Private	On	Aircraft storage
8.	Conventional Hangar	Private	On	Aircraft storage
9.	Conventional Hangar	Private	On	Aircraft storage
10.	Conventional Hangar	Private	Off	Aircraft storage
11.	Conventional Hangar	Private	Off	Aircraft storage
12.	Conventional Hangar	Private	Off	Aircraft storage
13.	Conventional Hangar	Private	Off	Aircraft storage
14.	Conventional Hangar	Private	Off	Aircraft storage
15.	Electrical Equipment Bldg.	ODA	On	Airport Operations
16.	Oregon Overseas Timber Co, Inc*	Private	Off	Industrial

*For reference only, not airport related.

Bandon State Airport has one fixed base operator (FBO) (Bandon Aviation) that offers aircraft maintenance services, aviation fueling, lounge, and restrooms.

Vehicle Access and Parking

VEHICLE ACCESS AND PARKING

Vehicle access to Bandon State Airport is provided via Kehl Road, which enters the airport near midfield directly from U.S Route 101. Kehl Road is a paved two lane roadway with centerline and edge stripes. The public portion of the roadway extends to a gravel parking area located immediately west of the general aviation terminal/fixed base operator (FBO) building. Additional unpaved areas for vehicle parking space are available adjacent to or between most individual hangars. The west aircraft tiedown apron can be accessed from the north side of the Fixed Based Operation building.

Airspace

Bandon State Airport currently operates under visual flight rules (VFR) conditions.

AIRSPACE CLASSIFICATIONS

Airspace within the United States is classified by the FAA as "controlled" or "uncontrolled" with altitudes extending from the surface upward to 60,000 feet above mean sea level (MSL). Controlled airspace classifications include Class A, B, C, D, and E. Class G airspace is uncontrolled.

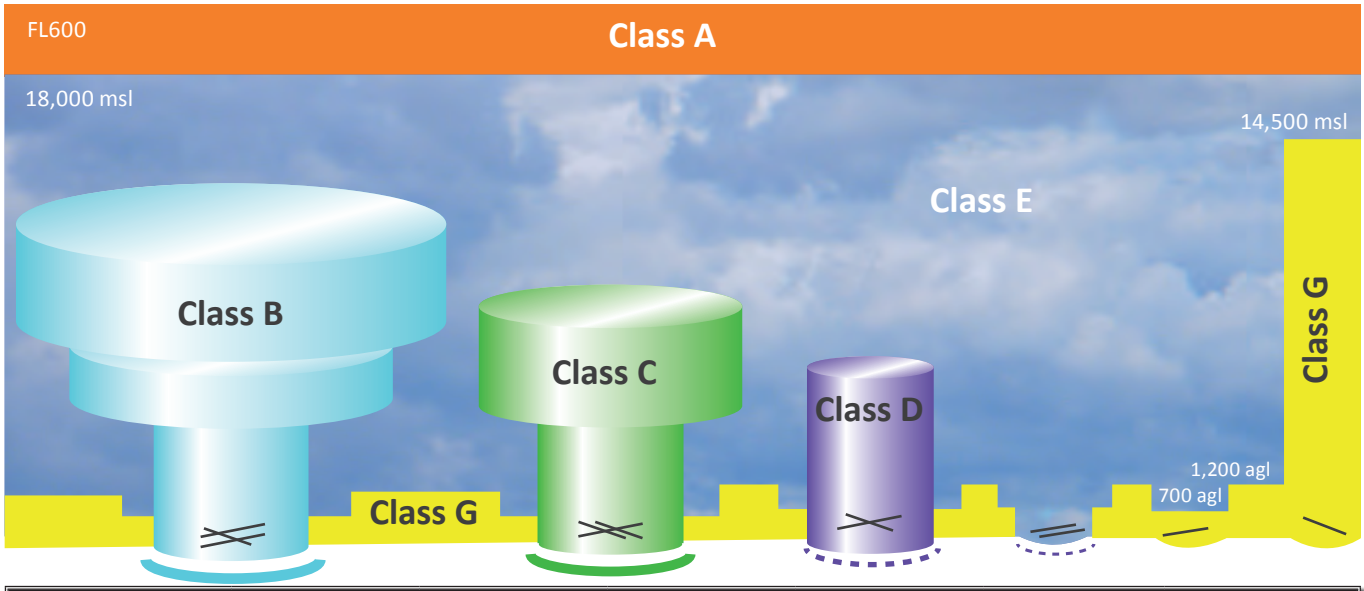
Aircraft operating within controlled airspace are subject to varying levels of positive air traffic control that are unique to each airspace classification. Requirements to operate within controlled airspace vary, with the most stringent requirements associated with very large commercial airports in high traffic areas. Uncontrolled airspace is typically found in remote areas or is limited to a 700 or 1,200-foot AGL layer above the surface and below controlled airspace. **Figure 2-3** illustrates and describes the characteristics of the airspace classifications defined by the FAA.

LOCAL AREA AIRSPACE STRUCTURE

Figure 2-4 depicts nearby airports, notable obstructions, special airspace designations and instrument flight rules (IFR) routes in the vicinity of Bandon State Airport, as identified on the Klamath Falls Sectional Chart and the IFR Enroute Low Altitude Chart (L-1/L-2).

Bandon State Airport is located in an area of Class E airspace that begins 14,500 feet above mean sea level (MSL) to 18,000 feet MSL. Class G airspace extends upward from the ground surface to the floor of the Class E airspace over the airport.

An area of Class E airspace that begins at 1,200 feet above the ground surface and extends upward to 18,000 feet MSL is located immediately adjacent (north and east) of the airport. This airspace is associated with the low altitude enroute (instrument) airway located 10 miles east of the airport and the terminal airspace for Southwest Oregon Regional Airport in North Bend. An area of Class E airspace that begins at 700 feet above the ground surface is located approximately 14 nautical miles north of the airport. This airspace also extends upward to 18,000 feet MSL and is associated with the terminal airspace at Southwest Oregon Regional Airport.



COMMUNICATION REQUIREMENTS AND WEATHER MINIMUMS

	Class A	Class B	Class C	Class D	Class E	Class G
Airspace Class De i	Generally airspace above 18,000 feet MSL up to and including FL 600.	Generally mul - layered airspace from the surface up to 10,000 feet MSL surrounding the na on's busiest airports	Generally airspace from the surface to 4,000 feet AGL surrounding towered airports with service by radar approach control	Generally airspace from the surface to 2,500 feet AGL surrounding towered airports	Generally controlled airspace that is not Class A, Class B, Class C, or Class D	Generally uncontrolled airspace that is not Class A, Class B, Class C, Class D, or Class E
Minimum Pilot Quali a ons	Instrument Ra ng	Student*	Student*	Student*	Student*	Student*
Entry Requirements	IFR: ATC Clearance VFR: Opera ons Prohibited	ATC Clearance	IFR: ATC Clearance VFR: Two-Way Communica on w/ ATC	IFR: ATC Clearance VFR: Two-Way Communica on w/ ATC	IFR: ATC Clearance VFR: None	None
VFR Visibility Below 10,000 msl**	N/A	3 Statute Miles	3 Statute Miles	3 Statute Miles	3 Statute Miles	Day: 1 Statute Mile Night: 3 Statute Miles
VFR Cloud Clearance Below 10,000 msl	N/A	Clear of Clouds	500 Below 1,000 Above 2,000 Horizontal	500 Below 1,000 Above 2,000 Horizontal	500 Below 1,000 Above 2,000 Horizontal	500 Below 1,000 Above 2,000 Horizontal***
VFR Visibility 10,000 msl and Above**	N/A	3 Statute Miles	3 Statute Miles	3 Statute Miles	5 Statute Miles	5 Statute Miles
VFR Cloud Clearance 10,000 msl and Above	N/A	Clear of Clouds	500 Below 1,000 Above 2,000 Horizontal	500 Below 1,000 Above 2,000 Horizontal	1,000 Below 1,000 Above 1 Statute Mile Horizontal	1,000 Below 1,000 Above 1 Statute Mile Horizontal

*Prior to opera ng within Class B, C or D airspace (or Class E airspace with an opera ng control tower), student, sport, and recrea onal pilots must meet the applicable FAR Part 61 training and endorsement requirements. Solo student, sport, and recrea onal pilot opera ons are prohibited at those airports listed in FAR Part 91, appendix D, sec on 4.
**Student pilot opera ons require at least 3 statue miles visibility during the day and 5 statute miles visibility at night.
***Class G VFR cloud clearance at 1,200 agl and below (day); clear of clouds.

LEGEND

○	Airports with other than hard-surface runways	- - - -	Class D Airspace
⊕	Airports with hard-surfaced runways 1,500 ft. to 8,069 ft.	▬	Class E Airspace with floor 700' above surface
⊕	Airports with hard-surfaced runways greater than 8,069 ft.	▬	Military Operations Area (MOA)
▬	Compass Rose (VOR/DME or VORTAC)	▬	Prohibited, Restricted, Warning, and Alert Areas
▬	VOR or RNAV Airways	⬡	VOR/ VORTAC
- - - -	Class E Airspace (surface)		

Radio communication is not required for visual flight rules (VFR) operations in Class E airspace, although pilots are encouraged to use the common traffic advisory frequency (CTAF) when operating at the airport. Aircraft are required to obtain an air traffic control (ATC) clearance prior to operating in Class E airspace during instrument flight rules (IFR).

The North Bend (OTH) VORTAC is located 22 miles northeast and the Crescent City (CEC) VORTAC is located 79 miles south-southeast of the airport. These navigational aids support Victor 27 (V27), a low altitude enroute instrument airway that passes within 10 nautical miles east of the airport. The minimum enroute altitude (MEA) for the section of the airway passing nearest the airport is 6,400 feet MSL.

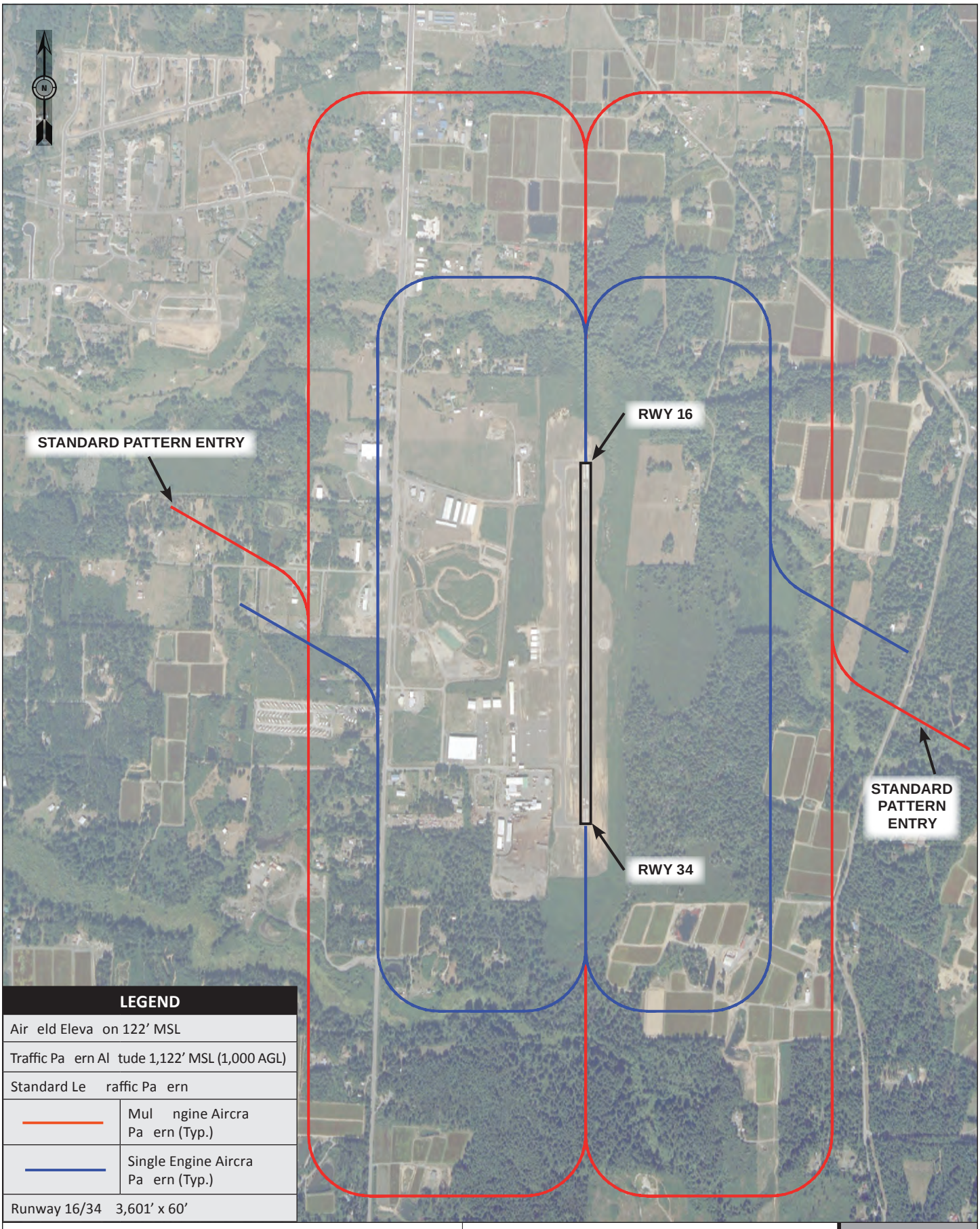
The local airport traffic pattern altitude is 1,000 feet above ground level (AGL) (1,122' MSL) with standard left traffic on Runway 16 and 34. The traffic patterns are located on the east and west sides of the runway, as depicted in **Figure 2-5**.

SPECIAL USE AIRSPACE/NEARBY OBSTACLES

The Dolphin North Military Operations Area (MOA) lies directly over Bandon and extends several miles offshore to the west near the edge of the Air Defense Identification Zone (ADIZ) for the contiguous United States, and approximately 35 nautical miles east. This MOA begins at 11,000 ft AGL and extends upward to 18,000 feet MSL. MOAs are designated to segregate VFR and IFR traffic from military operations. When a MOA is active, IFR traffic may be cleared through the area when air traffic control can ensure IFR separation; otherwise traffic will be rerouted. Although VFR operations are not restricted in an MOA, pilots are advised to exercise extreme caution while flying within, near, or below an active MOA. Prior to entering an active MOA, pilots are encouraged to contact the controlling agency for traffic advisories due to the frequently changing status of these areas.

Pilots are requested to maintain a minimum altitude of at least 2,000 feet AGL over state parks, wilderness areas, wildlife refuges, and other sensitive areas. The nearest areas of this type are the Bandon Marsh and Oregon Islands National Wildlife Refuges located within 3 miles of Bandon State Airport.

Numerous towers, radio towers, and electrical transmission lines depicted on the aeronautical chart are located in the vicinity of Bandon State Airport (<1 mile to 9 miles). The above ground heights of the towers range between 258 and 320 feet; heights for the electrical transmission lines are not provided, although tower heights exceeding 200 feet are common.



LEGEND	
Air eld Eleva on 122’ MSL	
Traffic Pa ern Al tude 1,122’ MSL (1,000 AGL)	
Standard Le raffic Pa ern	
	Mul ngine Aircra Pa ern (Typ.)
	Single Engine Aircra Pa ern (Typ.)
Runway 16/34 3,601’ x 60’	

Navigational Aids/Weather Data

There are no electronic navigational aids or instrument approach procedures located on the airport. The North Bend VORTAC 22.4 nautical miles north is the nearest conventional ground based navigational aid to Bandon State Airport. The Empire nondirectional beacon ("LOM") is located 21 miles north-northeast and the Roseburg VOR/DME is located 47 nautical miles east-northeast. The nearest instrument approach procedures available are located 21 nm north-northeast at Southwest Oregon Regional Airport. Table 2-9 summarizes existing navigational aids and related items.

Bandon State Airport does not have on-site weather observation capabilities, such as an automated weather observation system (AWOS). The nearest airport weather observation data is located in North Bend and Gold Beach (21 to 40 miles from Bandon).

TABLE 2-10: NAVIGATIONAL AIDS AND RELATED ITEMS

TYPE	FACILITIES
Electronic Navigational Aids	North Bend VORTAC (21 nm NNE) 112.1 MHz Empire NDB (LOM) (21 nm NNE) 378 LHz Roseburg (RBG) VOR/DME 47 nm ENE) 108.2 MHz
Weather Observation	None on Field OTH AWOS-3 (North Bend – 21 nm NNE) (135.075 MHz) Hazardous Inflight Weather Advisory Service (HIWAS) (North Bend – 21 nm NNE) (112.1 MHz) 4S1 AWOS-3 (Gold Beach - 40.1 nm S) (118.15 MHz)
Communication	Unicom/Common Traffic Advisory Frequency (CTAF) (122.8 MHz)

Airport Support Facilities/Services

AVIATION FUEL

100LL aviation gasoline (AVGAS) is available at the airport. Jet fuel is currently not available. A 12,000-gallon aboveground double wall storage tank (100LL) and dispensing facilities were installed near the south end of the main apron in 2000. Bandon Aviation is responsible for dispensing this fuel, and the tanks are owned by Bandon Aero Club.

Public Restrooms

A public use restroom is located in the Bandon Aero Club.

Fencing and Security

The airport has wire fencing located along portions of its property line.

Utilities

The airport has electric, water, and telephone service. The Bandon Aero Club has an individual septic system.

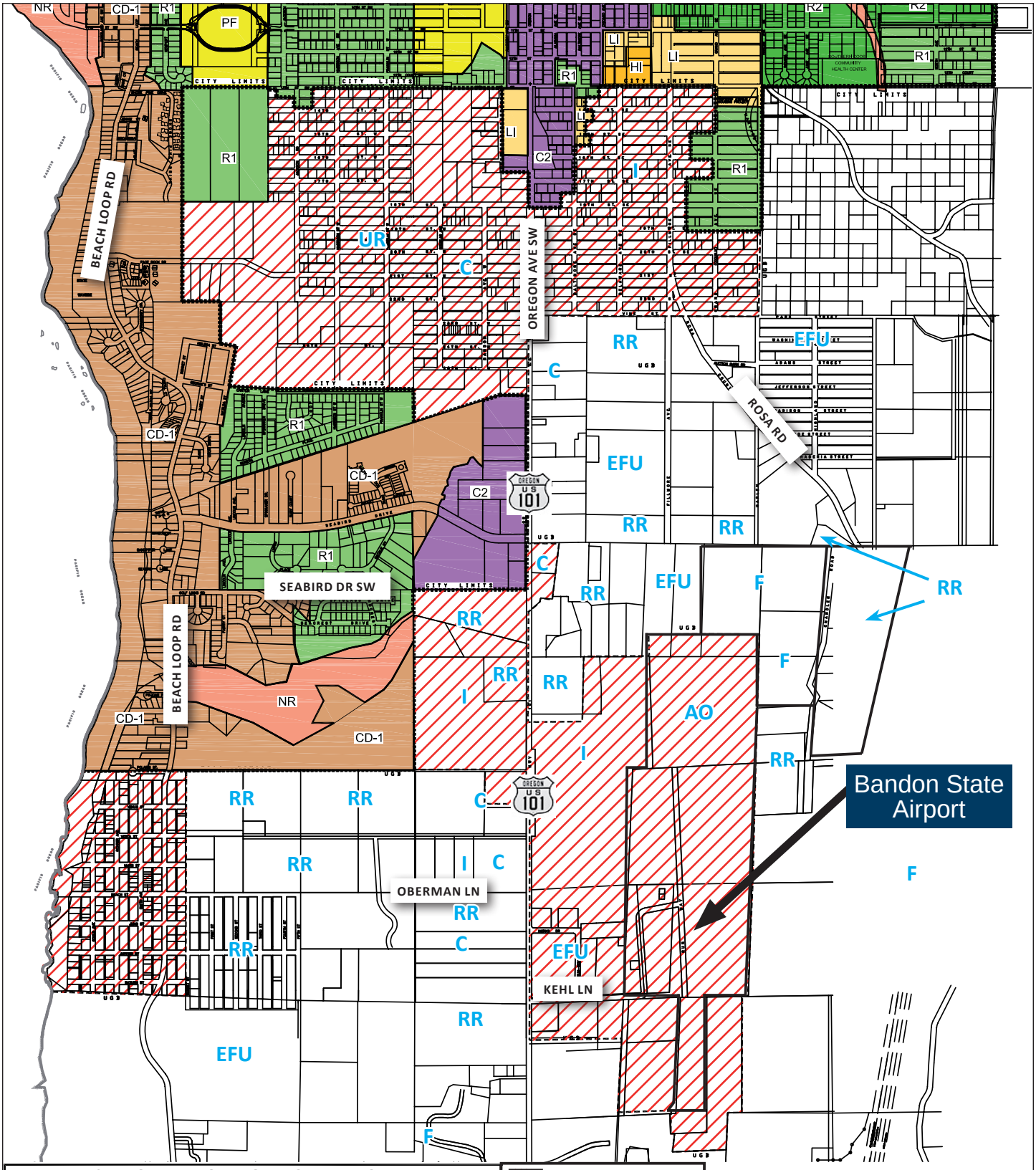
Water service is provided by the City of Bandon through local wells. Bandon Power provides the electrical power and telephone service is provided by Verizon.

Land Use Planning and Zoning

Bandon Airport is located outside the City of Bandon city limits, within the City's urban growth boundary (UGB). Land use controls and zoning for the airport and in the immediate vicinity of the airport are administered by Coos County. Bandon State Airport is zoned "Airport Operations" (AO) by Coos County. Land uses on the airport include airfield facilities, aircraft hangars and the airport fixed base operator (FBO). Coos County and the City of Bandon have also established airport overlay zoning based on the defined FAR Part 77 airspace for Runway 16/34. The current Coos County zoning ordinance for the airport and the associated overlay zones are included in **Appendix C**.

The zoning in the vicinity of the airport accommodates a variety of forest, exclusive agricultural and industrial uses. There are areas of rural residential zoning west of Runway 16 end. Land to the immediate north, south and east of the airport are not within the city limits and therefore are subject to Coos County Zoning rules. A detailed description of current zoning, airport overlay zoning and land use is presented in Chapter 9 (Land Use Planning).

Zoning for the airport and its surrounding area is depicted in **Figure 2-6**.



BANDON STATE AIRPORT | AIRPORT MASTER PLAN

BANDON ZONING | **FIG. 2-6**

Chapter 3 – Aviation Activity Forecasts

Chapter 3 – Aviation Activity Forecasts

The overall goal of aviation activity forecasting is to prepare forecasts that accurately reflect current conditions, relevant historic trends, and provide reasonable projections of future activity, which can be translated into specific airport facility needs anticipated during the next twenty years and beyond.

Introduction

This chapter provides updated forecasts of aviation activity for Bandon State Airport (S05) for the twenty-year master plan horizon (2014-2034). The forecasts presented in this chapter are consistent with Bandon State Airport's current and historic role as a community general aviation airport.

Unless specifically noted, the forecasts of activity are unconstrained and assume that Oregon Department of Aviation will be able to make the facility improvements necessary to accommodate anticipated demand. Through the evaluation of airport development alternatives later in the master plan, ODA will consider if any unconstrained demand will not or cannot be reasonably met.

The FAA-defined airport master plan forecasting process for general aviation airports is designed to address elements critical to airport planning by focusing on two key activity segments: based aircraft and aircraft operations (takeoffs and landings). Detailed breakdowns of these are also provided including aircraft fleet mix, activity peaking, distribution of local and itinerant operations, and the determination of the critical aircraft, also referred to as the design aircraft.

The design aircraft represents the most demanding aircraft type or family of aircraft that uses an airport on a regular basis (a minimum of 500 annual takeoffs & landings). The existing and future design aircraft are used to define the airport reference codes (ARC) to be used in airfield planning. FAA airport design standards are organized into several different ARC groupings, each reflecting the physical requirements of that aircraft type. The activity forecasts also provide consistency in evaluating future demand-based facility requirements such as runway and taxiway capacity, aircraft parking and hangar capacity, and other planning evaluations.

Aviation activity can be affected by many influences on the local, regional, and national levels, making it virtually impossible to predict year-to-year fluctuations of activity over twenty years with any certainty. In addition, major unexpected events such as the terrorist attacks of 9/11 2001 or the recent economic recession have the potential to render any forecast obsolete when the effects of these events are deep or prolonged. Therefore, it is important to remember that aviation activity forecasts serve only as guidelines. Planning must be flexible enough to respond to a range of unforeseen developments – either positive or negative. The use of development reserves for demand-driven facility needs such as hangar space or aircraft parking provides airport management with the ability to respond to unanticipated demand and preserve long-term aviation use areas on the airport.

The following forecast analysis for Bandon State Airport was produced following these basic guidelines. Existing forecasts were examined and compared against current and historic activity. The historical aviation activity was examined along with other factors and trends that can affect demand. The intent is to provide an updated set of aviation demand projections for Bandon State Airport that accurately assess activity and support airport management in maintaining a viable, efficient, and cost-effective facility that meets the area's air transportation needs.

Forecast Process

The Federal Aviation Administration (FAA) provides guidance on forecasting aviation activity in airport master planning projects. **FAA Advisory Circular (AC) 150/5070-6B, Airport Master Plans**, outlines seven standard steps involved in the forecast process:

1) **Identify Aviation Activity Measures**: The level and type of aviation activities likely to impact facility needs. For general aviation, this typically includes based aircraft and operations.
2) **Review Previous Airport Forecasts**: May include the FAA Terminal Area Forecast (TAF), state or regional system plans, and previous master plans.
3) **Gather Data**: Determine what data are required to prepare the forecasts, identify data sources, and collect historical and forecast data.
4) **Select Forecast Methods**: There are several appropriate methodologies and techniques available, including regression analysis, trend analysis, market share or ratio analysis, exponential

smoothing, econometric modeling, comparison with other airports, survey techniques, cohort analysis, choice and distribution models, range projections, and professional judgment.

5) **Apply Forecast Methods and Evaluate Results**: Prepare the actual forecasts and evaluate for reasonableness.
6) **Summarize and Document Results**: Provide supporting text and tables as necessary.
7) **Compare Forecast Results with FAA's TAF**: Follow guidance in FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems. In part, the Order indicates that forecasts should not vary significantly (more than 10 percent) from the TAF. When there is a greater than 10 percent variance, supporting documentation should be supplied to the FAA. The aviation demand forecasts are then submitted to the FAA for their approval.

Master Plan forecasts for operations and based aircraft for general aviation airports are considered to be consistent with the TAF if they meet the following criteria:

Where the 5- or 10-year forecasts exceed 100,000 total annual operations or 100 based aircraft:

a. Forecasts differ by less than 10 percent in the 5-year forecast and 15 percent in the 10-year period, or
b. Forecasts do not affect the timing or scale of an airport project, or
c. Forecasts do not affect the role of the airport as defined in the current version of FAA Order 5090.3C.

When the 5- or 10-year forecast is for less than 100,000 total annual operations or 100 based aircraft, the forecast does not need to be reviewed at FAA Headquarters, but the data should be provided to the FAA for the annual update of the TAF.

National General Aviation Activity Trends

The first decade of the 21st Century was tumultuous for General Aviation (GA) and the first half of the second decade has improved only slightly. The industry was battered by poor economic conditions and steadily rising fuel prices that slowed growth and negatively impacted elements such as aircraft manufacturing, on-demand air travel, aircraft ownership, and aircraft utilization levels. Ongoing concerns over the potential replacement and future availability of 100LL aviation gasoline (AVGAS) have also created uncertainty within general aviation. On a national level, most measures of GA activity declined sharply through the "great recession" and have only recently started to show modest signs of improvement.

In recent years, aircraft manufacturing has shown positive gains after an extended period of weak sales. Worldwide GA aircraft deliveries in 2013 totaled 3,373 units, an increase of 4.3 percent over the previous

year, but about 15 percent below recent peak of shipments in 2008.[1] Shipments of GA turbine aircraft (fixed wing and helicopters) were nearly double the number of piston engine aircraft shipments in 2013.

The adaption of both turbine and diesel engines for small general aviation aircraft by several established manufacturers is positive indication that evolving engine technology may be a significant factor in the long term future of general aviation. In addition, the resurgence of unleaded automobile gasoline powered small aircraft engines may provide a reliable power source for a growing Light Sport Aircraft (LSA) and experimental aircraft fleet. The FAA's long-term forecasts predict that the U.S. active GA aircraft fleet will grow modestly at an average annual rate of 0.5 percent between 2013 and 2034. As depicted in **Figure 3-1**, the active GA fleet is expected to increase from 202,865 aircraft in 2013 to 225,700 in 2034 (+22,835) which is an overall increase of approximately 11 percent. However, within that overall growth is a projected decline in active single engine piston aircraft (-7.9%) and multi-engine piston aircraft (-9.5%). These declines reflect attrition of an aging fleet which is not being offset by new aircraft production. Encouraging areas within the GA fleet are found in turboprops (particularly single engine) (+41%), experimental aircraft (+36%), sport aircraft (+131%), and business jets (+85%) growth through 2034.

Data maintained by the FAA show significant system-wide declines of several key general aviation activity indicators between 2000 and 2013 (AVGAS consumption -39%; piston aircraft hours flown -38%; active piston aircraft -18%; active GA pilots -7%). The FAA's updated long term forecasts[2] are tempered to reflect current and recent historic conditions. Although the FAA maintains a moderately favorable long-term outlook, many of the activity segments associated with piston engine aircraft and AVGAS consumption are not projected to return to "pre-recession" levels until the 2025 to 2034 timeframe. Although some segments of general aviation are expected to grow at moderately high rates, most measures of the general aviation industry suggest modest, sustained growth in the range of 1 to 2 percent annually is expected over the next 20 years. The FAA's annual growth assumptions for individual general aviation activity segments are summarized in **Table 3-1.**

These expectations reflect a variety of industry specific factors and broad-based measures and forecasts of economic health such as gross domestic product (GDP), consumer price index, oil prices, and interest rates. The FAA acknowledges several risks to its forecast assumptions related to rising oil prices, public perceptions of business and corporate aviation, broad national and international governmental fiscal policy concerns, and environmental concerns. The FAA notes that improvement for business aviation is largely based upon the future prospects of economic growth and corporate profits.

[1] General Aviation Manufacturers Association (GAMA), 2013 Delivery Report

[2] FAA Aerospace Forecast Fiscal Years 2014-2034

FIGURE 3-1: US ACTIVE GENERAL AVIATION AIRCRAFT FORECAST

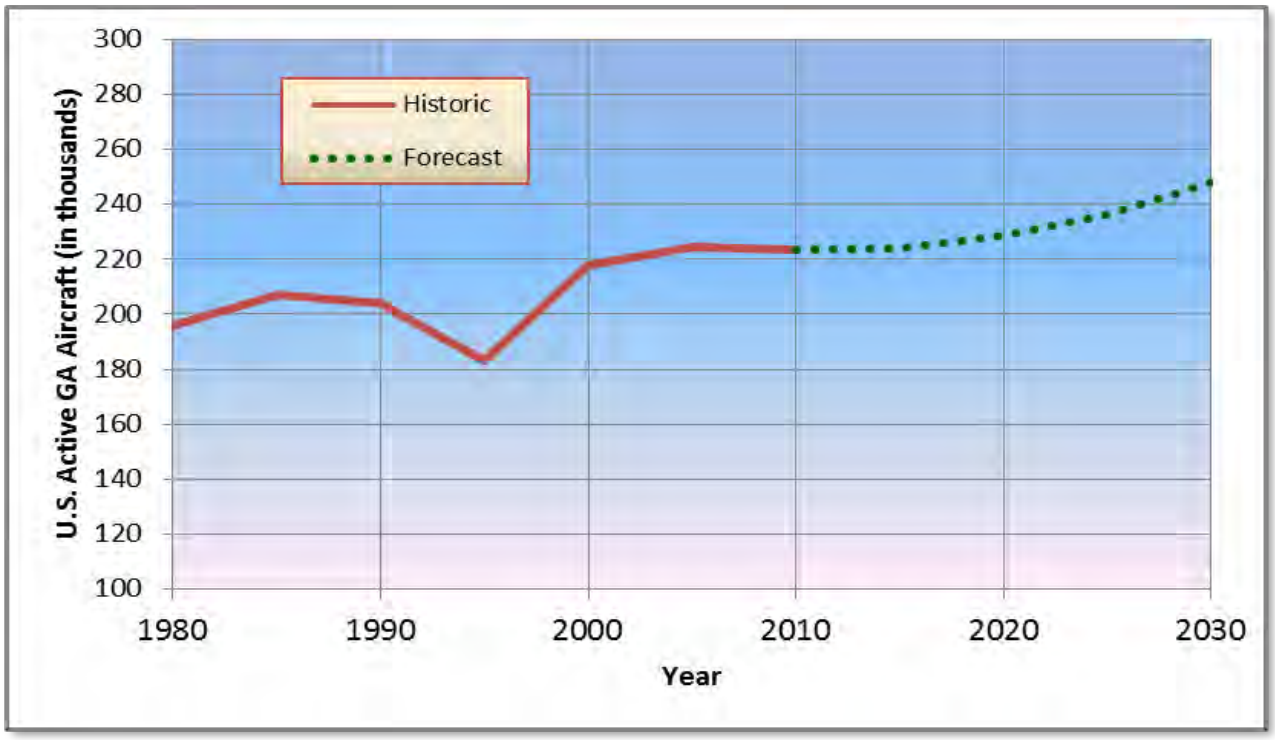


TABLE 3-1: FAA LONG RANGE FORECAST ASSUMPTIONS (U.S. GENERAL AVIATION)

ACTIVITY COMPONENT	FORECAST ANNUAL AVERAGE GROWTH RATE (2013-2034)
Components with Annual Growth Forecast < 0%	
Single Engine Piston Aircraft in U.S. Fleet	-0.4%
Multi-Engine Piston Aircraft in U.S. Fleet	-0.5%
Hours Flown - GA Fleet (Piston AC)	-0.6%
Student Pilots (Indicator of flight training activity)	-0.2%
AVGAS (Gallons consumed - GA only)	-0.2%
Components with Annual Growth Forecast < 1%	
Private Pilots	0.1%
Commercial Pilots / Airline Transport Pilots	0.6% / 0.5%
Instrument Rated Pilots	0.3%
Active Pilots (All Ratings, excluding Airline Transport)	0.4%
GA Operations at Towered Airports (all AC types)	0.5%
Active GA Fleet (# of Aircraft)	0.5%
Components with Annual Growth Forecast 1%-2%	
Experimental Aircraft in U.S. Fleet	1.5%
Turboprop Aircraft in U.S. Fleet	1.6%
Piston Helicopters in U.S. Fleet	1.7%
Components with Annual Growth Forecast >2%	
Sport Pilots	5.6%
Turbine Helicopters in U.S. Fleet	3.0%
Light Sport Aircraft in U.S. Fleet	4.1%
Turbojet Aircraft in U.S. Fleet	3.0%
Hours Flown - GA Fleet (Turbine AC)	3.3%
Hours Flown – Experimental AC	2.6%
Hours Flown – Light Sport AC	5.1%
Jet Fuel (Gallons consumed – GA only)	3.0%

Source: FAA Long Range Aerospace Forecasts (FY 2014-2034)

Airport Service Area

The airport service area refers to the geographic area surrounding an airport that defines its activity base. The population, economic characteristics, and capabilities of competing airports within an airport's service area are important factors in defining locally-generated demand for aviation facilities and services, and also influence an airport's ability to attract transient aircraft activity.

A 30- or 60-minute surface travel time is used to approximate the boundaries of a service area for a typical general aviation airport. Bandon State Airport is the only FAA funded (National Plan of Integrated Airport Systems – NPIAS) airport in Coos County, which creates a large geographic service area. **Figure 3-2** illustrates the approximate boundary of an approximate 30- and 60-minute drive from the local area, which encompasses Coos County, and areas of adjacent Lane and Curry Counties.

Competing airports located beyond a 30- or 60-minute travel time typically have less impact on local airport activity due to the redundancy provided by closer facilities. In contrast, the service area for a commercial airport often extends beyond two hours due the relatively small number of airports with scheduled airline service. With numerous airports nearby, service areas often overlap, creating competition between airports for items such as hangar space, fuel, and aviation services. These items are sensitive to cost, convenience, and the quality of facilities or services for both locally-based and transient users.

Historically, Bandon State Airport has provided general aviation access to Bandon and the south-central Oregon coast for small single-engine and multi-engine aircraft, and small/medium business class turbine aircraft (turboprops and business jets) capable of operating on its runway (currently 3,600 feet).

Southwest Regional Airport (OTH), located 30 miles north in North Bend, provides scheduled air service access to the region and is capable of accommodating both large and small general aviation aircraft. The reduction in scheduled commercial air service at OTH since 2008 has increased demand for general aviation access within local service area. In particular, the elimination of direct flights to/from Portland via Horizon Air and Skywest has significantly reduced scheduled airline access in the region.

The development and sustained success of the Bandon Dunes Golf Resort has stimulated air traffic activity (both commercial and general aviation) within the local air service area. Between 1999 and 2012, Bandon Dunes opened five courses and has become a world-class golf destination. The Resort indicates that they have experienced significant growth in business as the facility has grown and expects demand to continue to increase in the future.

According to ODA records, the number of based aircraft Bandon State Airport has increased from 29 in 2003 to 37 in 2014 (+27.6 percent overall increase; 2.24% annual average growth). The majority of these aircraft are small single-engine or multi-engine piston, with one multi-engine turboprop. The average annual growth during the period significantly outpaced both local and county population growth rates and demonstrates strong market conditions within the local airport service area. Based on the composition of

the local air service area, Bandon State Airport is ideally situated to serve aircraft owners located within 30 minutes of Bandon and transient users visiting the local area.

With the continued success and growth of Bandon Dunes Golf Resort generating air travel demand, Bandon State Airport is strategically positioned to accommodate increased general aviation activity in the future.

Looking forward, the ability to provide additional runway length, onsite weather observation, instrument approach capabilities, and adequate landside development area at Bandon State Airport will determine the Airport's ability to attract a larger share of general aviation activity within its service area. The availability of services that cater to business aircraft owners/operators such as jet fuel, aircraft servicing, ground transportation, and competitive airport user fees are also important factors in generating both locally-based and transient activity.

Table 3-2 lists the publicly-owned, public use airports within a 50 nautical mile (air miles) radius of Bandon State Airport. It is noted that some of the public use airports listed provide competitive facilities and services with master plans that provide for future facility expansion. The relevance of the nearby airports is greatest along the coast, based on typical weather conditions which often limit flights over the mountainous Coast Range.

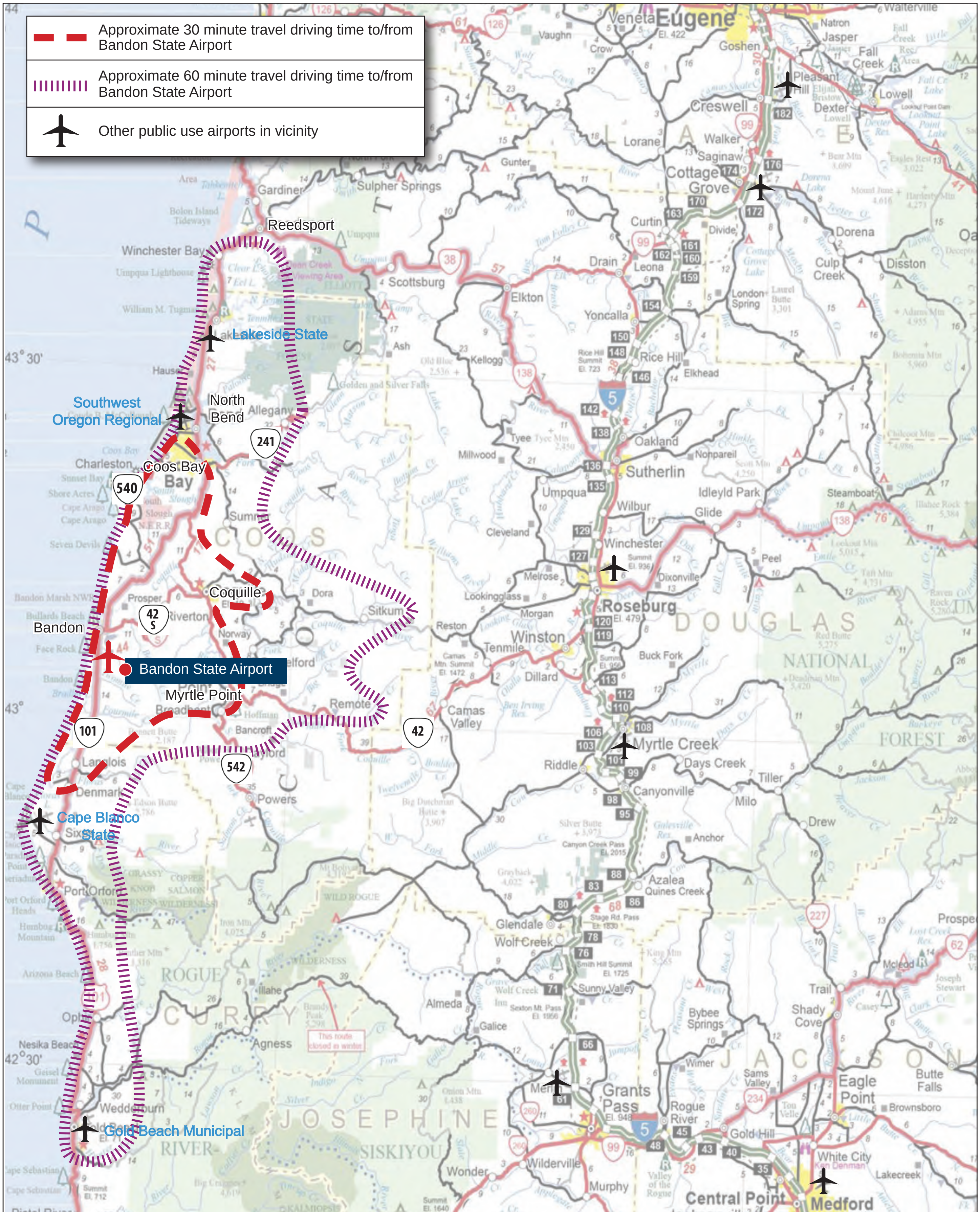

Approximate 30 minute travel driving time to/from Bandon State Airport
Approximate 60 minute travel driving time to/from Bandon State Airport
Other public use airports in vicinity
Lakeside State
Southwest Oregon Regional
Bandon State Airport
Cape Blanco State
Gold Beach Municipal
Eugene
Roseburg
Medford
Coos Bay
North Bend
Coquille
Bandon
Myrtle Point
Reedsport
Grants Pass
Myrtle Creek
Cottage Grove

TABLE 3-2: PUBLIC USE AIRPORTS IN VICINITY OF BANDON STATE AIRPORT *(WITHIN 50 NAUT. MILES)*

AIRPORT	LOCATION (AIR MILES)	RUNWAY DIMENSION (FEET)	SURFACE	LIGHTED RUNWAY?	FUEL AVAILABLE?
Cape Blanco State (5S6)	14.5 NM South	5,100 x 150	Asphalt	No	No
Gold Beach Municipal (4S1)	40.3 NM South	3,237 x 75	Asphalt	Yes	Yes
Southwest Oregon Regional (OTH)	21.0 NM North	5,980 x 150	Asphalt	Yes	Yes
Lakeside State (9S3)	31.4 NM North	2,150 x 100	Turf	No	No
Roseburg Regional (RBG)	46.9 NM East	5,001 x 100	Asphalt	Yes	Yes
Myrtle Creek Municipal (16S)	48.2 NM East	2,600 x 60	Asphalt	Yes	Yes

Several additional factors that have potential relevance to activity forecasting at Bandon State Airport are described below.

Southwest Regional Airport (OTH). Southwest Regional Airport (OTH) is the largest airport located within the service area for Bandon State Airport, accommodating both commercial and general aviation activity with a full range of facilities and services. It is assumed that OTH will continue to accommodate the region's scheduled commercial air service and a significant segment of general aviation activity based on its airfield capabilities and services.

The recently completed master plan[3] for OTH included aviation activity forecasts that projected nominal or no growth in general aviation activity (based aircraft and operations) for the 2010-2030 period. The OTH master plan did not include any original forecasts for general aviation activity, instead relying on the existing FAA Terminal Area Forecasts (TAF). The TAF projects based aircraft at OTH to increase from 51 to 62 (+11), while annual general aviation operations were projected to remain unchanged at 6,994 from 2012 through 2030 (0% annual growth). Although significant growth in activity is not projected, OTH will continue to be the primary competitor within the local airport service area for local and transient general aviation users.

Instrument Flight Rules (IFR) Activity. Bandon State Airport is not currently equipped with instrument approach capabilities, although a Global Positioning System (GPS) approach is identified as a future improvement on the 2004 Airport Layout Plan drawing.

[3] Southwest Regional Airport Master Plan (Reynolds Smith & Hill, 2013)

To support the forecast analysis for the Bandon State Airport Master Plan, a review of recent historic instrument operations at OTH was conducted to help understand the composition of general aviation flight activity occurring within the local airport service area. For relevance to Bandon State Airport, commercial (passenger and cargo/express) activity was separated.

Flight activity data for aircraft operating under instrument flight rules in the national airspace system is tracked by FlightAware, a company that developed live flight tracking services for commercial and general aviation. Instrument flight plan data for calendar year 2007 and the twelve months ending July 2014 are summarized in **Table 3-3**. The data captures all civil aircraft filing instrument flight plans listing OTH either as the originating airport or the destination airport and provides verification of business class aircraft activity (commonly operating under IFR flight plans) at OTH. Military aircraft are not included in the FAA instrument flight plan data. The two years of data provide an indication activity on both sides of the recent economic recession, although it appears that current activity is about 25 percent lower than 2007.

TABLE 3-3: GA INSTRUMENT OPERATIONS – SOUTHWEST OREGON REGIONAL AIRPORT (2007/2014)

ARC	REPRESENTATIVE AIRCRAFT	2007	2014[1]
A-I	Cessna 182/Beechcraft Baron 55/TBM700	578	902
B-I	Beechcraft Baron 58/Beechcraft King Air 90/Cessna Citation Jet (CJ1)	1,365	279
A-II	Cessna Caravan/Pilatus PC12	102	117
B-II	Cessna Citation Bravo/Beechcraft King Air 200/Falcon 50	1,028	797
B-III	Boeing BBJ	13	0
C-I	Hawker HS125, Learjet 31	53	15
C-II	Bombardier Challenger	321	239
D-I	Learjet 35	88	94
D-II	Gulfstream IV, V	20	38
D-III	Bombardier Global Express	3	6
--	Blocked (assumed to be 70% B-I/B-II Jet and 30% C-I/D-I/D-II Jet)	350	868
--	Helicopter	1	8
	Total GA Instrument Operations	**3,926**	**2,997**

Source: FlightAware 12 months ending July 3, 2014

Emergency Response. In addition to the activities typically associated with a general aviation airport, Bandon State Airport also has a potential role in emergency response planning and operations. The primary surface access route on the Oregon coast is U.S. Highway 101. In the event of a natural disaster or any event that could result in an extended closure of Highway 101 or its major bridges, Bandon State Airport is positioned to provide immediate access to the Oregon coast for coordinated response support, transportation of relief supplies, medical evacuation and other related functions. Bandon State is one of only four pubic use airports

located along the Oregon coast with an airfield elevation of at least 100 feet above mean sea level (MSL), which could be a significant factor in its ability to support emergency operations, particularly in a Tsunami event.

Socioeconomic Trends and Forecasts

AREA ECONOMY

Historically, downturns in general aviation activity often occur during periods of weak economic conditions and growth typically coincides with favorable economic conditions. It is evident that the recent economic recession and the slow recovery that followed, has constrained general aviation activity locally, statewide, and throughout the national airport system. However, as indicated in the FAA's national long term aviation forecasts, the overall strength of the U.S. economy is expected to sustain economic growth over the long-term, which will translate into modest-to-moderate growth in aviation activity.

Employment within Coos County is influenced by government, with approximately 20 percent associated with federal, state, or local government. The 2013 per capita income in Coos County was $33,816, below Oregon's per capita income level of $39,286. Coos County's economy is vulnerable to seasonal unemployment, which historically has been associated with the wood products industry and now appears to also reflect seasonal tourism.

According to Oregon Employment Department data, the leading employment sectors in Coos County include:

1) Federal Government (20%)
2) Services (37%)
3) Retail Trade (19%)
4) State & Local Government (17%)
5) Finance, Insurance & Real Estate (7%)
6) Construction (6%)
7) Manufacturing (6%)
8) Transportation/Utilities (3%)

Table 3-4 summarizes historic and forecast employment and income data for Coos County, the State of Oregon, and the United States.

TABLE 3-4: PERSONAL INCOME PER CAPITA & EMPLOYMENT DATA

	HISTORIC		FORECAST			
Area	**2000**	**2013**	**2019**	**2024**	**2029**	**2034**
Per Capita Income						
U.S.	$27,000	$43,597	$54,251	$68,829	$88,534	$114,566
State of Oregon	$25,560	$39,286	$48,694	$61,617	$79,065	$102,073
Coos County	$21,070	$33,816	$41,804	$52,888	$67,940	$87,911
Coos County % of Oregon	82%	86%	86%	86%	86%	86%
Employment (Coos County)						
# Jobs	31,039	*30,873*	31,893	32,833	33,874	35,015

Source: Woods & Poole (2014)

POPULATION

In broad terms, the population within an airport's service area affects the type and scale of aviation facilities and services that can be supported. Although a large number of airport-specific factors can affect activities at an airport, changes in population often reflect other broader economic conditions which may affect airport activity.

As noted earlier, the airport service area for Bandon State Airport extends beyond Bandon and includes other communities and unincorporated areas of Coos County and adjacent Curry and Douglas Counties. Physical geography is a significant factor in Coos County's population distribution. Beyond the urban area created by Coos Bay and North Bend, the remainder of Coos County's population is scattered among five other incorporated cities and large unincorporated areas served by the highway system along the coast and inland.

Historic Population

Certified estimates of population for Oregon counties and incorporated cities are developed annually by the Portland State University (PSU) Population Research Center. The annual PSU estimates, coupled with the U.S. Census, conducted every ten years, provide an indication of local area population trends over an extended period.[4]

The July 1, 2013 PSU certified population estimates for Bandon and Coos County were 3,100 and 62,860, respectively. Compared to the 2010 Census, Bandon's population is up 1.1 percent and Coos County's population has declined by about 0.3 percent.

[4] Portland State University Population Research Center, July 1, 2013 estimate; 1990, 2000, 2010 U.S. Census.

Since 1970, Bandon's population has increased by nearly 70 percent[5], with an average annual growth rate of 1.2 percent. During the same period, Coos County's population increased by about 11 percent, or 0.25 percent annually. In recent years, Coos County's population has fluctuated with periods of net growth and decline, and is currently 1.9 percent below a recent peak (1980 Census). Overall population growth in Coos County during this period has been consistently lower than Oregon's statewide rate, although Bandon has occasionally outpaced statewide growth.

Bandon's population has increased at a faster rate than County population in recent years. Bandon (incorporated area) accounted for 4.9 percent of Coos County's 2013 population, up from 4.5 percent in 2000. In 1970, Bandon accounted for 3.2 percent of Coos County population.

Recent historic population data and average growth rates for Bandon, Coos County, and Oregon are summarized in **Table 3-5**.

TABLE 3-5: HISTORIC POPULATION

YEAR	COOS COUNTY	CITY OF BANDON *(incorporated area only)*	BANDON SHARE (%) OF COOS COUNTY POPULATION	OREGON
1990	60,273	*2,215*	3.7%	2,842,337
2000	62,779	*2,833*	4.5%	3,421,399
2010	63,043	*3,066*	4.9%	3,831,074
2013	**62,860**	***3,100***	**4.9%**	**3,919,020**
Average Annual Rates (AAR) of Growth	Coos County	*City of Bandon*		Oregon
1990-2000	0.41%	*2.49%*		1.87%
2000-2010	0.04%	*0.79%*		1.14%
2000-2013	0.01%	*2.62%*		1.05%
2010-2013	-0.01%	*0.37%*		0.76%

Source: U.S. Census data; Portland State University certified annual estimates.

POPULATION FORECASTS

Oregon Office of Economic Analysis (OEA)

Long-term population forecasts prepared by the Oregon Office of Economic Analysis (OEA) are periodically generated to support local and statewide planning. The most recent OEA long-term forecasts

[5] Net increase in population may be attributed to both natural growth/in-migration and expansion of city incorporated area through annexation.

were released in March 2013, which project modest sustained growth for Coos County through 2050. The OEA forecasts project steady growth for Coos County through 2030, then a slight decline (< 1%) through 2050. The OEA forecasts are summarized in **Table 3-6**. Coos County population is projected to increase from 62,890 in 2012 to 64,654 in 2050. The projection reflects a net increase of 1,764 over the 38-year forecast period, with an average annual growth rate of 0.073 percent.

It is reasonable to assume that recent historic trends will continue and significant portion of the forecast population growth will occur in Bandon and the surrounding areas of unincorporated Coos County. Based on this assumption, future population growth within the airport service area is expected to be a positive factor affecting future activity at Bandon State Airport.

TABLE 3-6: COOS COUNTY & OREGON POPULATION FORECASTS

	2010	2013 PSU *July 1 Estimate*	2015	2020	2025	2030	2035
Coos County							
OEA Forecast[1] *(0.13% AAR 2010-2035)*	63,043[2]	62,860	63,299	64,098	64,816	65,210	65,172
Oregon							
OEA Forecast of State Population[1] *(1.07% AAR, 2010-2035)*	3,831,074[2]	3,919,020	4,001,600	4,252,100	4,516,200	4,768,000	4,995,200
Coos County % of Oregon Population	1.65%	1.60%	1.58%	1.51%	1.44%	1.37%	1.31%

1. Prepared by Office of Economic Analysis, Department of Administrative Services, State of Oregon (March 28, 2013)
2. 2010 U.S. Census Data

Overview of Recent Local and National Events

Between 2003 and 2014, the number of based aircraft at Bandon State Airport increased from 29 to 37[6] (+28%), which is slightly ahead of the previous master plan forecast. A review of the 2004 Airport Layout Plan and current conditions on the airport indicate that three additional conventional hangars have been constructed since 2004. Note: a new conventional hangar was constructed in summer 2015.

Airport management reports that 100LL AVGAS sales have averaged 10,000 gallons per year over the last four years, but are trending upward (14,000 gallons in 2013). Jet fuel was available at the airport when the last master plan was completed, but has since been eliminated. The increase AVGAS volume is consistent with the recent increase in based aircraft at the airport.

Nationally, AVGAS consumption levels dropped every year between 2000 and 2013, ending 39 percent below 2000 levels. Contributing factors include economic recession, rising fuel prices, the ever-increasing cost of aircraft operation, use of alternative fuels (auto gas), and a shrinking piston-engine fleet (-6.7% between 2000 and 2013). It appears that Bandon State Airport has been able to counter the national trends to some degree, which may be largely attributed to the desirability of location for residents, visitors and business.

As noted earlier, Bandon Dunes Golf Resort has emerged as a premier golfing destination that is creating significant local and regional economic impacts and is stimulating demand for air travel.

Historical & Current Aviation Activity

For Bandon State Airport, aircraft operational data (takeoffs and landings, touch and go landings, etc.) are limited to estimates. As a non-towered airport, no record of activity is regularly maintained. However, a review of estimates contained in state aviation system plans, previous airport master plans, and FAA Terminal Area Forecast (TAF) data provides a general indication of activity at the airport over time. Based aircraft counts are updated periodically either as part of a master plan or by airport management for other purposes.

HISTORIC DATA - FAA TERMINAL AREA FORECAST (TAF)

The Federal Aviation Administration (FAA) Terminal Area Forecast (TAF) is maintained for airports that are included in the National Plan of Integrated Airport System (NPIAS). The TAF is periodically updated and adjusted as more specific airport activity data are available. When reviewing FAA TAF data, it is important to note that when there is no change from year to year it often indicates a lack of data, rather than no change in activity. Similarly, a large change in data in a single year may follow updated reporting that captures changes that occurred over several years. Small changes in year-to-year activity that extend through the forecast typically reflect assumed growth rates that are not frequently updated.

[6] July 2014 Airport Management/Aero Club/FBO Count

For these reasons, the TAF should be used as general guide for comparison with other forecasts and periodic activity estimates.

A review of the historic TAF data for Bandon State Airport (1990 through 2012) shows three significant adjustments (+/- 50% or more) in annual aircraft operations totals and based aircraft totals in a single year. It is noted that the 2014 based aircraft count (37) generated for the master plan is only slightly below the TAF based aircraft estimate for 2014 (40). However, the TAF estimate of aircraft operations for 2014 is significantly lower (-60%) than the 2004 Airport Layout Plan forecasts and the 2007 Oregon Aviation Plan forecasts for comparable years. **Table 3-7** summarizes recent historic based aircraft and aircraft operations estimates for the Airport from the TAF.

TABLE 3-7: FAA TAF DATA – BANDON STATE AIRPORT

YEAR	AIRCRAFT OPERATIONS[1]	BASED AIRCRAFT[1]	RATIO: GA OPERATIONS PER BASED AIRCRAFT
2002	15,500	29	535
2003	15,775	29	544
2004	16,048	31	518
2005	16,325	31	527
2006	16,572	31	535
2007	16,805	31	542
2008	17,059	49	348
2009	17,292	49	353
2010	7,100	49	145
2011	7,100	49	145
2012	7,100	40	178

1. FAA Terminal Area Historical Activity based on estimates with periodic updates from various planning updates

CURRENT ESTIMATE OF ACTIVITY

Based Aircraft

An updated (July 2014) count of based aircraft indicates a total of 37 aircraft, including 30 single-engine piston, 2 multi-engine piston, 1 turboprop, and 4 ultralights. The addition of the turbine aircraft to the based aircraft fleet has occurred since the last master plan was completed in 2004. The turboprop (Beechcraft C90) is included in Airplane Design Group II (ADG II), while the remaining fixed wing aircraft are included in Airplane Design Group I (ADG I).

Aircraft Operations

The FAA provides planning guidance for estimating activity at general aviation airports without control towers, including the use of activity ratios to project aircraft operations from the number of based aircraft at the airport. In the absence of actual aircraft operations counts, the ratios of activity are generally adequate for airport planning purposes. The FAA developed "typical" operations ratios for general aviation airports based on their observations at airports throughout the United States. The recommended ratios are 250 operations per based aircraft for small airports with low activity; 350 operations per based aircraft for airports with moderate local and itinerant activity; and 450 operations per based aircraft for high activity airports in urban areas. The ratios are intended to reflect operations from both locally-based and transient aircraft. However, the presence of unique activities such as a large flight school or other commercial operations can increase traffic volumes based on significantly higher aircraft utilization levels (annual flight hours per aircraft, etc.). Conversely, the absence of aviation fuel or a fixed base operator (FBO) can contribute to lower activity levels.

The 2004 Airport Layout Plan Report forecast base year (2003) activity was 15,500 operations and 29 based aircraft, producing an operations-to-based aircraft ratio of 535. The ratio increased in each of the forecast years, ending in 2023 with 575 operations per based aircraft. The ratios appear to be on the high side for a small general aviation airport with limited commercial activities.

Based on current conditions, the airport's historic utilization levels, recent fuel data, relevant national trends, and the FAA's current guidance on estimating aircraft activity at non-towered airports, it appears that a ratio of approximately 300 operations per based aircraft would be more consistent with current operations at Bandon State Airport. This level of aircraft utilization would also provide a reasonable basis for developing forecasts of future activity. Perhaps the most significant unique activity generator at Bandon State Airport is transient activity associated with Bandon Dunes Golf Resort. Although currently limited to smaller aircraft, it appears to be a consistently strong and unique source of air traffic.

Applying the ratio of **300 operations** to **37 based aircraft** for 2014 results in a total of **11,100 annual operations**. The ratio is intended to capture both local and transient aircraft activity. A detailed distribution of current traffic is provided in the forecast of aircraft operations later in the chapter.

Airport Traffic Counts

Beginning in the 1980s, aircraft operations (takeoffs and landings) counts at non-towered airports were conducted on a semi-regular basis by the Oregon Department of Aviation (ODA) through its "RENS" automated activity counting program. The RENS program methodology relied on four brief sample periods over a 12-month period to account for seasonal variation in activity. Recorders were placed next to runways to capture distinct engine sounds for takeoffs that could be identified by aircraft type. The acoustical events were tallied and the sample data was statistically extrapolated to provide a 12-month estimate of activity. The program was phased out in 2003, but provided three annual operations estimates for Bandon State

between 1995 and 2002. The most recent activity count was conducted in 2002-2003 (October to October) with a total of 8,891 operations. By applying the 2003 based aircraft estimate from the previous master plan, the corresponding activity ratio is 307 operations per based aircraft.

The based aircraft-operations ratios associated with the historic RENS counts are generally consistent with activity ratios currently defined by FAA for estimating activity at small non-towered general aviation airports. It is also reasonable to assume that current activity ratios may increase as Bandon continues to evolve and Bandon Dunes Golf Resort continues matures and becomes even more prominent as a premier destination.

Aviation Activity Forecasting

BASED AIRCRAFT FORECASTS

Three existing aviation forecasts for Bandon State Airport are available to compare with current activity, recent historic trends, and the updated forecasts prepared for the master plan. The existing forecasts have been examined and have not been modified to reflect recent events. Minor adjustments (interpolation, extrapolation) have been made to present each projection with common forecast year intervals. Although some projections may be obsolete relative to current activity (in actual numbers), the long-term growth rates reflected in the existing forecasts are typically within the range found at many general aviation airports and provide a useful basis of comparison. The existing forecasts provide a useful gauge of future growth rates that are generally consistent with national and statewide expectations for defining general aviation activity.

Existing and updated based aircraft forecasts are summarized below and in **Tables 3-8** through **3-11.** Annual aircraft operations forecasts are described later in the chapter**.**

Existing Forecasts

2004 Airport Layout Plan (2003-2023)

The 2004 Bandon State Airport - Airport Layout Plan Report[7] forecast projected an increase from 29 to 36 based aircraft between 2003 and 2023, which reflected an average annual growth rate of **1.09 percent**. The forecasts have reached the mid-point of their projected timeline and provide an opportunity to assess the accuracy of the growth assumptions.

The current based aircraft total (37) exceeds the ALP Report forecast for both 2013 (32) and 2023 (36). The actual increase of 8 aircraft over the 11-year period equates to an average annual growth rate of **2.24 percent**, double the ALP Report forecast rate.

[7] Coffman Associates, W&H Pacific (2004)

It is evident that based aircraft growth at Bandon State Airport outperformed the forecasts in the first half of the twenty-year planning period. The remaining ten years of the forecasts are not consistent with the actual growth trend established at the Airport over the last decade and are not recommended for use in evaluating future airport planning needs.

FAA Terminal Area Forecast (TAF)

The FAA's 2014 TAF forecast update projects based aircraft at Bandon State Airport to increase from 40 to 52 (+12%) between 2012 and 2040, which represents average annual growth of **0.94 percent**. The 2014 TAF forecast for based aircraft (40) is within 10 percent of the current based aircraft count (37) and appears to provide a valid projection for comparison. On a regional level, the 2013-2040 Terminal Area Forecast projects the number of based aircraft (general aviation) in the Northwest-Mountain Region to increase at an annual average rate of 0.96 percent through 2040, which is comparable to the forecast rate applied to Bandon State Airport.

2007 Oregon Aviation Plan

The 2007 Oregon Aviation Plan (OAP) contains based aircraft forecasts for Oregon's public use airports for the 2005-2025 timeframe. For Bandon State Airport, the OAP forecasts used the 2005 FAA TAF based aircraft and annual operations estimates as the base for its forecast. Based aircraft were projected to increase from 31 to 40 (+29%) between 2005 and 2025, which represents average annual growth of **1.28 percent**. The 2015 OAP forecast (36) is within 10 percent of the current based aircraft count (37) and appears to provide a valid projection for comparison.

TABLE 3-8: SUMMARY OF EXISTING BASED AIRCRAFT FORECASTS (BANDON STATE AIRPORT)

EXISTING FORECASTS	2010	2015	2020	2025	2030	2035
2004 Airport Layout Plan Report (1.09% AAR 2003-2023)	31[1]	33[1]	35[1]	37[2]	--	--
2007 Oregon Aviation Plan (1.28% AAR 2005-2025)	34	36	38[1]	40	--	--
FAA Terminal Area Forecast (Issued Feb. 2014) (0.94% AAR 2012-2040)	--	42	48	52	52	52

1. Interpolated. 2. Extrapolated.

Updated Forecasts

Several updated projections of based aircraft at Bandon State Airport have been prepared based on a review of recent socioeconomic data, existing aviation activity forecasts, and current conditions. The updated forecasts are presented in the following section.

The 2004 Airport Layout Plan Report forecast methodology for based aircraft was reviewed and found to be appropriate for use in this update. The previous planning effort developed projections based on two common market share techniques: Bandon State Airport's share of FAA-registered aircraft in Coos County and its share of U.S. Active General Aviation Aircraft. A third population-based projection was developed for this forecast update, utilizing the number of based aircraft per 1,000 Coos County residents. Updated versions of these projections are presented below.

Coos County FAA-Registered Aircraft Market Share

There are currently 132 active aircraft registered by the Federal Aviation Administration (FAA) in Coos County.[8] Although the address of owner registration does not always indicate the physical location of an aircraft during the year, the measure provides a stable basis from which to project Bandon State Airport's share of the local market. For forecasting purposes, updated projections were developed based on *increasing, constant, and decreasing* market share. The forecasts are presented in **Table 3-9**.

The 37 based aircraft at Bandon State Airport represents 28 percent of the current Coos County FAA-registered aircraft total, up from 20 percent in 1994 and 19 percent in 2003. For forecasting purposes, future Coos County FAA-registered aircraft are projected to increase at the same rate(1.23%) used to forecast Oregon's 2005-2025 statewide general aviation fleet in the 2007 Oregon Aviation Plan.

The *decreasing* market share forecast gradually reduces Bandon State Airport's market share from 28 to 24 percent during the twenty year planning period. The projection results in an increase from 37 to 41 based aircraft at Bandon State Airport by 2034, which represents an average annual growth rate of **0.52 percent**. This projection assumes that Bandon State Airport's future market share will trend back toward its historic levels.

The *constant* market share forecast maintains Bandon State Airport's current market share at 28 percent. The projection results in an increase from 37 to 47 based aircraft by 2034, which represents an average annual growth rate of **1.2 percent**. This projection assumes that Bandon State Airport will be able to maintain the growth in market share realized over the last 20+ years in a competitive environment.

[8] FAA Registered Aircraft Database (http://registry.faa.gov/aircraftinquiry/StateCounty_Statetxt=OR&Countytxt=COOS)

The *increasing* market share forecast gradually increases Bandon State Airport's market share from 28 to 29.5 percent during the twenty year planning period. The projection results in an increase from 37 to 50 based aircraft at Bandon State Airport by 2034, which represents an average annual growth rate of **1.52 percent**. This projection assumes that Bandon State Airport's future market share will continue to grow in a manner similar to Bandon's growing proportionate share of county population over the last several decades. The aviation equivalent of this trend requires a strong underlying attraction to the area combined with the facilities and services that are in demand by aviation users.

As noted earlier in the chapter, the 2013 Airport Master Plan completed for Southwest Oregon Regional Airport anticipates nominal growth in based aircraft (+11) and new hangar demand by 2030. This suggests that Bandon State Airport is well positioned to maintain or increase local market share.

TABLE 3-9: BASED AIRCRAFT FORECAST (MARKET SHARE OF FAA REGISTERED AIRCRAFT IN COOS COUNTY)

YEAR	BASED AIRCRAFT BANDON STATE AIRPORT	FAA REGISTERED AIRCRAFT COOS COUNTY	% OF FAA REGISTERED AIRCRAFT AT BANDON STATE AIRPORT
Historic			
1994	29	147	20%
2003	29	156	19%
2014	**37**	**132**	**28%**
Forecast – Decreasing Share (0.52% AAR) [2]			
2019	38	140[1]	27%
2024	39	149[1]	26%
2029	40	159[1]	25%
2034	41	169[1]	24%
Forecast – Constant Share (1.20% AAR) [2]			
2019	39	140[1]	28%
2024	42	149[1]	28%
2029	45	159[1]	28%
2034	47	169[1]	28%
Forecast – Increasing Share (1.52% AAR) [2]			
2019	40	140[1]	28.5%
2024	43	149[1]	29.0%
2029	46	159[1]	29.0%
2034	50	169[1]	29.5%

Source: Based aircraft - airport records, 2004 ALP Report; Registered Aircraft – FAA

1. Coos County registered aircraft projections based on statewide forecast average annual growth rate (1.23%) of general aviation fleet (2007 OAP)
2. AAR: average annual rate of growth (2014-2034)

U.S. Active General Aviation Fleet Market Share

In 2013, Bandon State Airport accounted for approximately 0.018 percent of the U.S. active general aviation fleet, up from 0.016 percent in 1994 and 0.014 percent in 2003. This trend is reflective of both local population growth and the airport's ability to attract new users over time at a rate slightly higher than the national average. Projections were developed based on *increasing, constant, and decreasing* market share. The forecasts are presented in **Table 3-10**.

The FAA Aerospace Forecast 2014-2034 projects the active general aviation fleet to grow at an average annual rate of 0.5 percent between 2013 and 2034. The U.S. fleet is projected to increase from 202,865 in 2013 to 225,700 in 2034. The modest net increase of 22,835 aircraft over 21 years reflects future growth that is significantly tempered by fleet attrition.

The *decreasing* market share forecast gradually reduces Bandon State Airport's market share from 0.018 to 0.014 percent. The projection results in a decrease from 37 to 32 based aircraft at Bandon State Airport by 2034, which represents an average annual decline of -**0.69 percent**. This projection assumes that Bandon State Airport's future market share will regress, which could be caused by a combination of economic factors, competition from other airports within the local airport service area, or the inability to accommodate demand for facilities and services.

The *constant* market share forecast maintains Bandon State Airport's current market share at 0.018 percent. The projection results in an increase from 37 to 41 based aircraft by 2034, which represents an average annual growth rate of **0.49 percent**. This projection assumes that Bandon State Airport's growth in based aircraft will mirror the national average over the next twenty years and that the growth in market share realized over the last 10 to 20 years can be maintained.

The *increasing* market share forecast gradually increases Bandon State Airport's share of the active U.S. fleet from 0.018 to 0.022 percent. The projection results in an increase from 37 to 50 based aircraft by 2034, which represents an average annual growth rate of **1.52 percent**. This projection assumes that Bandon State Airport's growth in based aircraft will exceed the forecast growth for the overall fleet. As with the previous increased market share projection, the underlying strength of the local area and the Airport's ability to attract and accommodate new aircraft are key factors in outperforming broader markets.

TABLE 3-10: BASED AIRCRAFT FORECAST (MARKET SHARE OF US ACTIVE GA AIRCRAFT)

YEAR	BASED AIRCRAFT BANDON STATE AIRPORT	U.S. ACTIVE GENERAL AVIATION AIRCRAFT[1]	% OF U.S. ACTIVE GA AIRCRAFT BASED AT BANDON STATE AIRPORT
Historic			
2003	29	211,370	0.014%
2013	37	202,865	0.018%
Forecast – Decreasing Share (-0.69% AAR) [2]			
2019	35	205,140	0.017%
2024	33	209,040	0.016%
2029	32	215,840	0.015%
2034	32	225,700	0.014%
Forecast – Constant Share (0.49% AAR) [2]			
2019	37	205,140	0.018%
2024	38	209,040	0.018%
2029	39	215,840	0.018%
2034	41	225,700	0.018%
Forecast – Increasing Share (1.52% AAR) [2]			
2019	39	205,140	0.019%
2024	42	209,040	0.020%
2029	45	215,840	0.021%
2034	50	225,700	0.022%

Source: Based aircraft- airport records, 2004 ALP Report; Registered Aircraft – FAA

1. FAA Aerospace Forecasts 2014-2034

2. AAR: annual average rate of growth (2014-2034)

Bandon State Airport: Coos County Population

Available data indicate that the based aircraft fleet at Bandon State Airport has grown at a slightly faster rate than Coos County population over the last 20 years. The Oregon Office of Economic Analysis (OEA) 2010-2050 population forecast for Oregon counties was used to develop projections of Coos County population to support this evaluation. During this period, the ratio of aircraft based at Bandon State Airport to Coos County population increased from approximately 0.46 aircraft per 1,000 residents in 2003, to 0.59 aircraft per 1,000 residents in 2013. Projections were developed based on *increasing, constant, and decreasing* population ratios. The forecasts are presented in **Table 3-11**.

The *decreasing* population ratio forecast gradually decreases Bandon State Airport's based aircraft to population ratio from 0.59 to 0.55 per 1,000 Coos County residents over the next twenty years. The projection results in a decrease from 37 to 36 based aircraft by 2034, which represents an average annual decline of -**0.14 percent**. It is noted that the declining population ratio change is slight, but when applied to modest county population projections, results in a static, then slightly declining activity during the twenty-year planning period.

The *constant* population ratio forecast maintains Bandon State Airport's based aircraft to population ratio of 0.59 aircraft per 1,000 Coos County residents through the twenty year planning period. The projection results in an increase from 37 to 39 based aircraft by 2034, which represents an average annual growth rate of **0.26 percent**. This projection assumes that Bandon State Airport's based aircraft fleet will grow at the same rate as Coos County population over the next twenty years.

The *increasing* population ratio forecast gradually increases Bandon State Airport's based aircraft to population ratio from 0.59 to 0.65 per 1,000 Coos County residents over the next twenty years. The projection results in an increase from 37 to 41 based aircraft by 2034, which represents an average annual growth rate of **0.52 percent**. This projection assumes that Bandon State Airport's based aircraft fleet will continue to grow at a slightly faster rate than Coos County population over the next twenty years.

TABLE 3-11: BASED AIRCRAFT FORECAST (BASED AIRCRAFT PER 1,000 COOS COUNTY RESIDENTS)

YEAR	BASED AIRCRAFT BANDON STATE AIRPORT	COOS COUNTY POPULATION[1]	BASED AIRCRAFT PER 1,000 RESIDENTS
Historic			
1994	29	61,260	0.47
2003	29	63,260	0.46
2013	37	62,860	0.59
Forecast – Decreasing Share (-0.14% AAR) [2]			
2019	37	63,937	0.58
2024	37	64,672	0.57
2029	37	65,131	0.56
2034	36	65,180	0.55
Forecast – Constant Share (0.26% AAR) [2]			
2019	38	63,937	0.59
2024	38	64,672	0.59
2029	38	65,131	0.59
2034	39	65,180	0.59
Forecast – Increasing Share (0.52% AAR) [2]			
2019	38	63,937	0.60
2024	39	64,672	0.61
2029	40	65,131	0.62
2034	41	65,180	0.63

Source: Based aircraft - airport records, 2004 ALP Report; Registered Aircraft – FAA
1. Oregon Office of Economic Analysis 2010-2050 forecasts
2. AAR: annual average rate of growth (2014-2034)

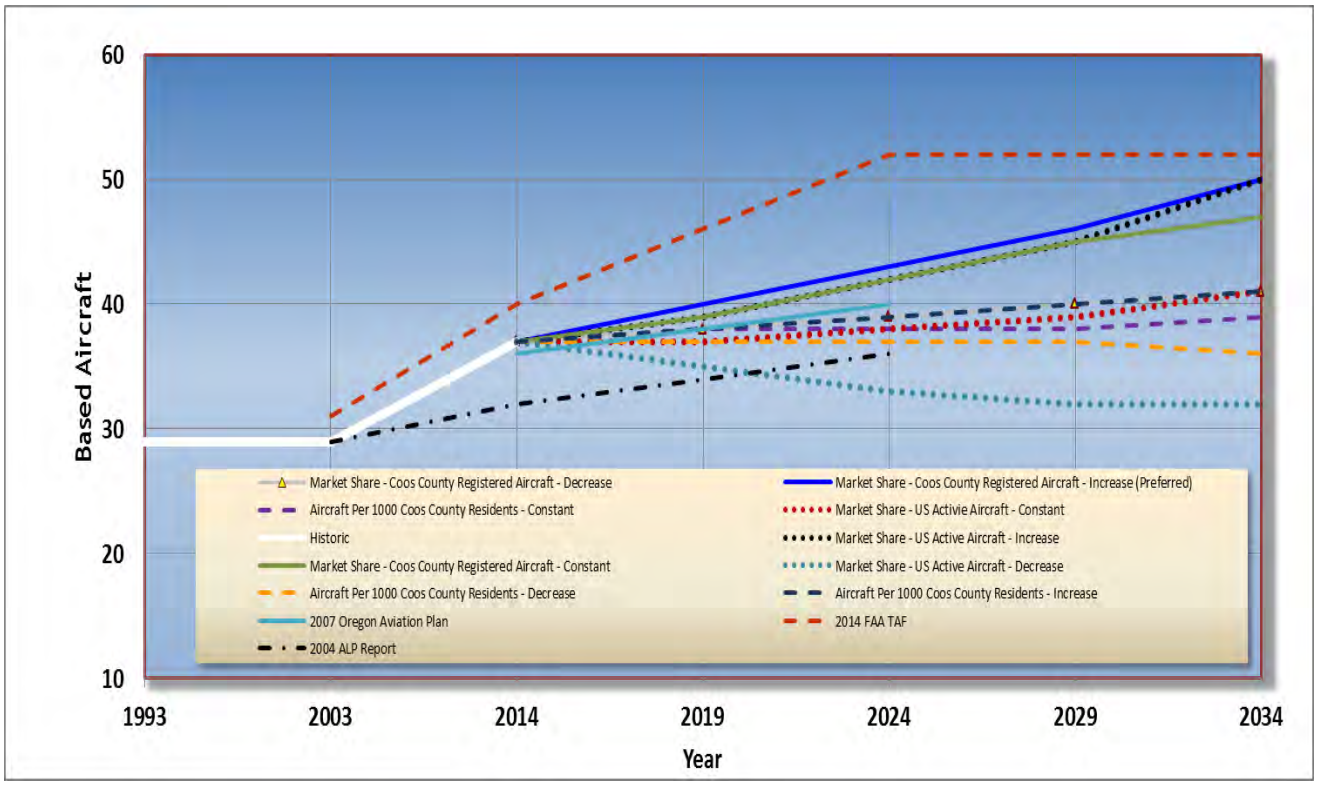
Summary (Based Aircraft)

This *Coos County FAA Registered Aircraft - Increasing Market Share* projection is recommended as the preferred based aircraft forecast for use in the airport master plan. This projection reflects the historic trend established at Bandon State Airport over the last twenty years, the expectation of continued residential growth in Bandon and the surrounding area, and expectations at other airports in the airport service area. **Table 3-12** summarizes the based aircraft forecasts. **Figure 3-3** depicts the based aircraft forecasts.

TABLE 3-12: SUMMARY OF BASED AIRCRAFT FORECASTS (BANDON STATE AIRPORT)

	2014 (ACTUAL)	2019	2024	2029	2034
Market Share of Registered Aircraft (Coos County)					
➢ Decreasing Market Share	37	38	39	40	41
➢ Constant Market Share	37	39	42	45	47
➢ **Increasing Market Share (Preferred Forecast)**	**37**	**40**	**43**	**46**	**50**
Market Share of U.S. Active GA Aircraft					
➢ Decreasing Market Share	37	35	33	32	32
➢ Constant Market Share	37	37	38	39	41
➢ Increasing Market Share	37	39	42	45	50
Aircraft Per 1,000 Residents (Coos County)					
➢ Decreasing Market Share	37	37	37	37	36
➢ Constant Market Share	37	38	38	38	39
➢ Increasing Market Share	37	38	39	40	41

FIGURE 3-3: BANDON STATE AIRPORT - BASED AIRCRAFT FORECASTS



BASED AIRCRAFT FLEET MIX

The airport's current mix of based aircraft is projected to become more diverse during the current planning period reflecting growth in turbine aircraft (turboprop, very light jet/business jet), helicopters and light sport aircraft. The projected changes in the based aircraft fleet mix at Bandon State Airport are generally consistent with broader trends identified by FAA regarding the composition of the general aviation fleet as a whole and reflect the airport's unique ability to attract a variety of aircraft types for business and personal transportation. **Figures 3-4A and 3-4B** depict the current (2014) and long-term (2034) distribution of based aircraft by type. The forecast based aircraft fleet mix is summarized in **Table 3-13**.

FIGURE 3-4A: BANDON STATE AIRPORT - BASED AIRCRAFT FLEET MIX (JULY 2014)

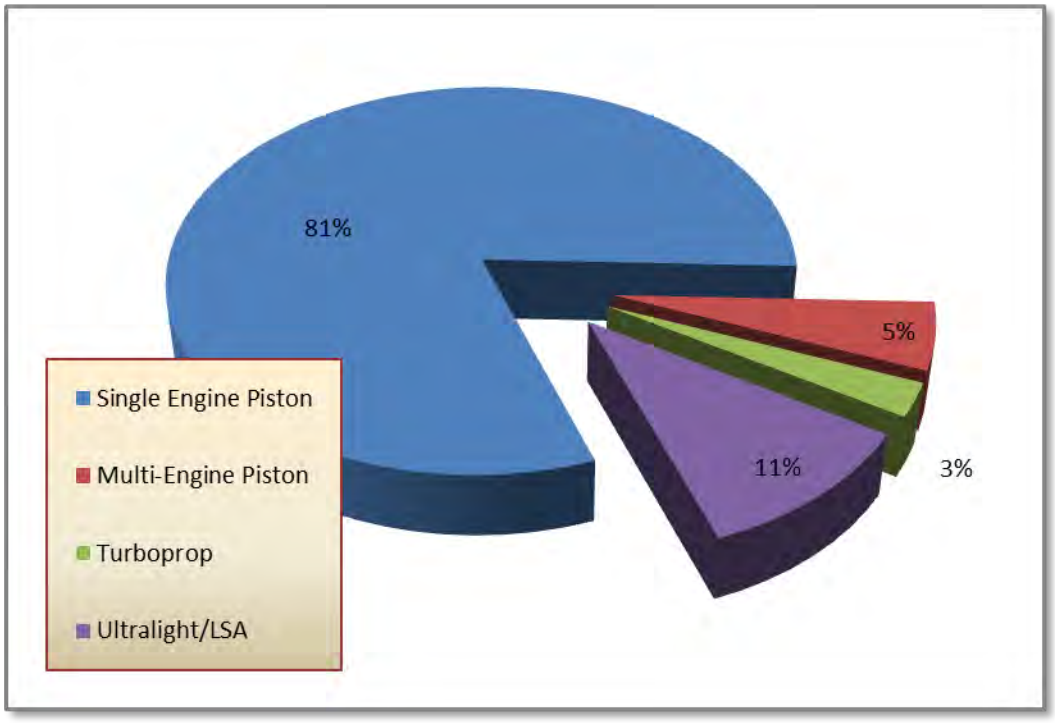


FIGURE 3-4B: BANDON STATE AIRPORT – FORECAST BASED AIRCRAFT FLEET MIX (2034)

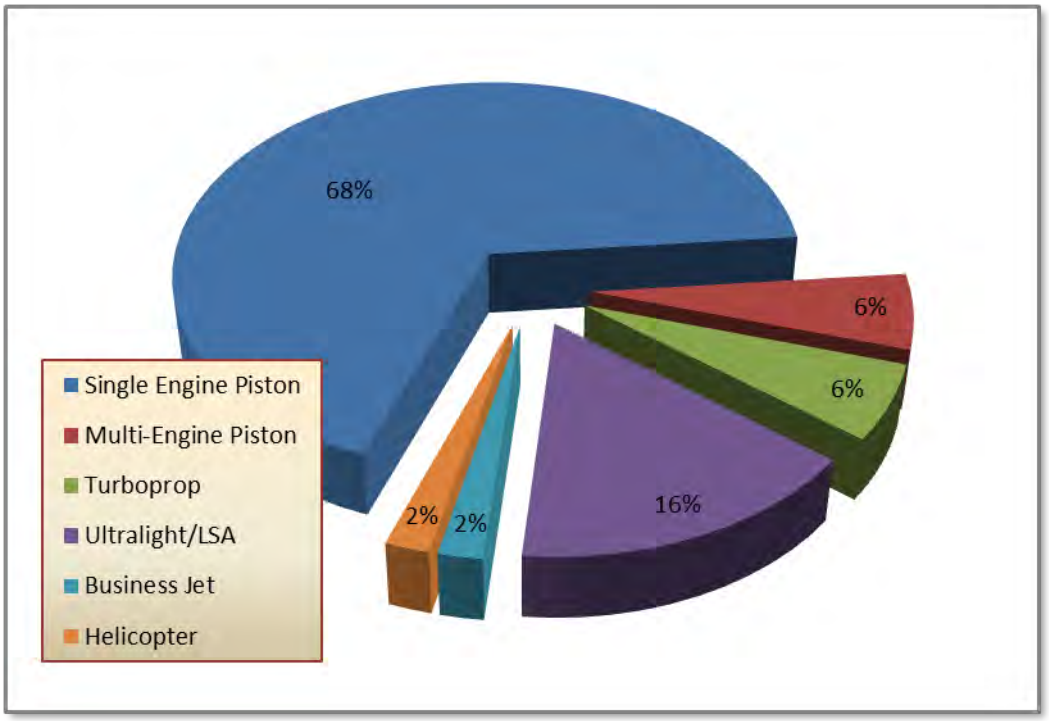


TABLE 3-13: GENERAL AVIATION FORECAST BASED AIRCRAFT FLEET MIX

ACTIVITY	2014	2019	2024	2029	2034
Single Engine Piston	30 (81%)	31 (78%)	32 (74%)	33 (72%)	34 (68%)
Multi-Engine Piston	2 (5%)	2 (5%)	2 (5%)	2 (4%)	3 (6%)
Turboprop	1 (3%)	2 (5%)	2 (5%)	2 (4%)	3 (6%)
Business Jet/VLJ	0 (0%)	0 (0%)	0 (0%)	1 (2%)	1 (2%)
Light Sport Aircraft/Ultralights	4 (11%)	5 (13%)	6 (14%)	7 (15%)	8 (16%)
Helicopter	0 (0%)	0 (0%)	1 (2%)	1 (2%)	1 (2%)
Total Based Aircraft (100%)	**37**	**40**	**43**	**46**	**50**

Note: Percentages may not sum due to independent rounding

AIRCRAFT OPERATIONS FORECASTS

General aviation operations consist of aircraft takeoffs and landings conducted by general aviation aircraft and are classified as local or itinerant. General aviation airports may accommodate limited commercial activity (cargo/express, air taxi) generated by general aviation aircraft and military activity based on their airfield capabilities.

Local operations are conducted in the vicinity of an airport and include flights that begin and end the airport. These include local area flight training, touch and go landings, flightseeing, and other flights that do not involve a landing at another airport. Itinerant operations include flights between airports, including cross country flights. Itinerant operations reflect specific travel between multiple points, often associated with business and personal travel.

As noted earlier, three existing aircraft operations forecasts have been reviewed and are summarized below. Updated aircraft operations projections have been developed and are also presented.

Existing Forecasts

2004 Airport Layout Plan (2003-2023)

The 2004 Bandon State Airport - Airport Layout Plan Report projected annual aircraft operations at Bandon State Airport to increase from 15,500 to 20,700 between 2003 and 2023, which reflected an average annual growth rate of **1.46 percent**.

The current estimate of 11,100 annual operations noted earlier is 37.5 percent below the ALP forecast (16,900) for 2013, which suggests that the projection does not provide a reasonable projection for comparison. It is also noted that the base year (2003: 15,500 operations) in the ALP forecasts does not correlate to current traffic estimates.

FAA Terminal Area Forecast (TAF)

The FAA's 2014 TAF forecast update projects aircraft operations at Bandon State Airport to increase from 7,100 to 9,797 (+38%) between 2012 and 2040, which represents average annual growth of **1.16 percent**. The TAF operations forecast for 2014 (7,280) is approximately 34 percent below the current master plan estimate of 11,100 operations noted earlier in the chapter. The TAF operations forecasts reflect slowly increasing ratios of operations (178 to 188) to based aircraft through 2040. Although the projected activity ratios appear low, the average annual growth rates are reasonable and provide valid comparison with other forecasts.

On a regional level, the 2013-2040 Terminal Area Forecast projects itinerant operations (commercial, GA, military) in the Northwest-Mountain Region to increase at an annual average rate of **1.1 percent** through 2040.

2007 Oregon Aviation Plan

The 2007 Oregon Aviation Plan (OAP) forecasts annual aircraft operations at Bandon State Airport to increase from 16,235 to 20,950 between 2005 and 2025, which represents average annual growth of **1.26 percent**. The 2015 OAP forecast (18,835) is 7,735 (+70%) higher than the current aircraft operations estimate (11,100) and does not appear to provide a valid projection for comparison.

TABLE 3-14: EXISTING AIRCRAFT OPERATIONS FORECASTS (BANDON STATE AIRPORT)

EXISTING FORECASTS	2010	2015	2020	2025	2030	2035
2004 Airport Layout Plan Report (1.09% AAR 2003-2023)	17,239	18,313	19,770[1]	21,344[2]	--	--
2007 Oregon Aviation Plan (1.28% AAR 2005-2025)	17,779	18,835	19,865[1]	20,950	--	--
FAA Terminal Area Forecast (Issued Feb. 2014) (1.16% AAR 2012-2040)	7,100	7,372	7,828	8,288	8,762	9,264

1. Interpolated. 2. Extrapolated.

Updated Forecasts

Updated aircraft operations projections have been developed for comparison with existing forecasts in order to identify a selected forecast for the master plan. The updated operations forecasts utilize the 2014 estimate (11,100) as the base for new projections. The current estimate reflects a ratio of 300 operations per based aircraft (37 x 300 = 11,100) based on the strength of the local area to attract and generate activity.

Consistent with the methodology used in the 2004 ALP Report forecasts, the updated aircraft operations forecasts utilize ratios of operations to based aircraft to reflect activity generated by locally-based and transient aircraft. The projections were developed using an FAA-recommended methodology for estimating airport operations at non-towered general aviation airports. The model was developed by FAA by using regression modeling data from all small towered and non-towered general aviation airports and incorporated several independent variables including airport characteristics, population, and geographic location.

The preferred forecast in the 2004 Airport Layout Plan Report yielded an increasing ratio of 535 to 575 general aviation operations per based aircraft. It is noted that these projections were prepared before the severe economic recession of the late 2000s. The updated operations forecasts are lower than the 2004 ALP Report forecasts, due in large part to the impact of economic conditions and the current long-term growth expectations nationally, which have been tempered significantly compared to "pre-recession" forecasts.

Based on more recent activity trends, the "typical" activity range defined by FAA for general aviation airports ranges from 250 to 450 operations per based aircraft. This range appears to provide a reasonable indication of activity that may be expected at Bandon State Airport during the current twenty year period.

Constant and Increasing Operations Ratio

Based on the conditions for the local airport service described earlier in the chapter, two forecast scenarios were developed for aircraft operations. The scenarios reflect slightly different operational profiles that are facility-dependent. The updated aircraft operations forecasts are summarized in **Table 3-15** and depicted in **Figure 3-5**.

The first forecast (**constant ratio projection)** maintains the 300 operations per based aircraft ratio through the twenty-year planning period that was used to estimate current activity. The projection assumes that aircraft utilization will remain at current levels and growth in aircraft operations will be driven primarily by a net increase in based aircraft. This forecast can be sustained by the current airfield capabilities (e.g., runway length, etc.) and the current operational fleet mix would not change significantly (single- and multi-engine piston and turboprop; small/medium business jets; helicopters and sport aircraft). The future design aircraft will reflect the functional capabilities of the existing runway. The aircraft utilization level is tempered to reflect various economic factors and existing facility limitations, but is also higher than the ratios reflected in the FAA TAF, based on a local economy that has a strong visitor component, which translates into to strong transient flight activity.

The second forecast (**increasing ratio projection)** assumes a gradual increase from 300 to 400 operations per based aircraft through the planning period. The increase in aircraft utilization would be driven by capturing a larger share of the existing and future general aviation activity that is currently accommodated at Southwest Oregon Regional Airport (OTH), which that would be accomplished through several specific facility improvements (runway extension, instrument approach capability, on-site weather, etc.). The current operational fleet mix would evolve to include more transient turboprops and business jets. The future design aircraft will reflect the functional capabilities of the future runway. However, based on the footprint of the airport and its surroundings, it is assumed that facility improvements would be relatively minor and OTH would continue to accommodate large aircraft requiring more runway length or specific services.

The constant ratio projection results in general aviation aircraft operations increasing from 11,100 to 15,000 by 2034, which represents an average annual growth rate of **1.52 percent.** The increasing ratio projection results in general aviation aircraft operations increasing from 11,100 to 20,000 by 2034, which represents an average annual growth rate of **2.99 percent.**

Summary (Aircraft Operations)

The preliminary aircraft operations forecasts are presented for review. The Oregon Department of Aviation will select a preferred forecast based on its assessment of the development potential of the Airport. It is evident that the economic base that exists in the Bandon area, including the continued success of the Bandon Dunes Golf Resort, provides a solid user base that is capable of generating aviation activity throughout the current planning period and beyond. The extent to which Bandon State Airport accommodates future general aviation air traffic will depend on the capabilities of airport facilities that are provided.

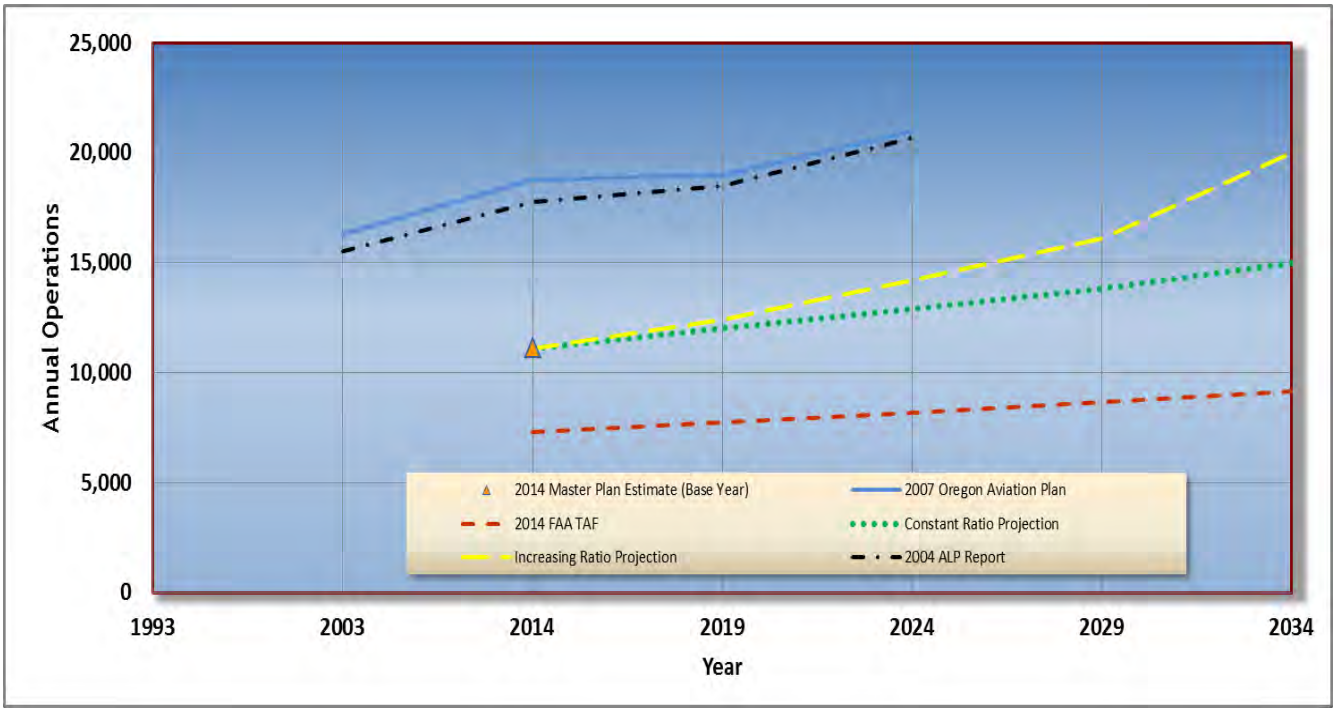
TABLE 3-15: AIRCRAFT OPERATIONS FORECASTS

YEAR	BASED AIRCRAFT	LOCAL OPERATIONS	ITINERANT OPERATIONS	TOTAL OPERATIONS	OPERATIONS PER BASED AIRCRAFT
FAA TAF					
2014	40	3,690	3,590	7,280	182
2019	46	3,921	3,815	7,736	168
2024	52	4,156	4,040	8,196	158
2029	52	4,396	4,269	8,665	167
2034	52	4,651	4,510	9,797	188
Constant Ratio Projection (1.52% AAR) [2]					
2014	37	5,660	5,440	11,100	300
2019	40	6,120	5,880	12,000	300
2024	43	6,580	6,320	12,900	300
2029	46	7,040	6,760	13,800	300
2034	50	7,650	7,350	15,000	300
Increasing Ratio Projection (2.99% AAR) [2]					
2014	37	5,550	5,550	11,100	300
2019	40	5,950	6,450	12,400	310
2024	43	6,390	7,800	14,190	330
2029	46	7,250	8,850	16,100	350
2034	50	8,000	12,000	20,000	400

Source: Based aircraft - airport records, 2004 ALP Report; Registered Aircraft – FAA

1. FAA TAF 2014 Update
2. AAR: annual average rate of growth (2014-2034)

FIGURE 3-5: BANDON STATE AIRPORT GENERAL AVIATION OPERATIONS FORECAST



Local and Itinerant Operations

The FAA TAF and the 2004 ALP Report forecasts reflect a 51 percent local and 49 percent itinerant traffic distribution for forecast operations. For forecasting purposes, the split between local and itinerant operations will be driven by the selected forecast scenario. The existing split is maintained in the constant ratio forecast. However, the split would be expected to gradually reverse to 60% itinerant/40 percent local in the increasing ratio forecasts as increased transient aircraft activity is accommodated. Local and itinerant data for each forecast year are summarized in **Table 3-15**.

AIRCRAFT OPERATIONS FLEET MIX

The aircraft operations fleet mix is expected to closely follow the selected forecast scenario, with varying levels of turbine aircraft operations that will complement the airport's based aircraft fleet. Currently, single and multi-engine piston aircraft account for approximately 82 percent of airport operations followed by helicopter operations (primarily flight training) (15 percent) and fixed wing turbine aircraft (turboprop and business jet) (2+ percent). Although single engine piston aircraft will continue to generate the majority of aircraft operations at Bandon State Airport through the planning period, their portion of overall traffic is expected to gradually decline as other aircraft types become more common. The general aviation forecast

aircraft operations fleet mix is summarized in **Table 3-16**. Air taxi and military operations forecasts are summarized in Table 3-18.

TABLE 3-16: GENERAL AVIATION FORECAST AIRCRAFT OPERATIONS FLEET MIX

CONSTANT RATIO FORECAST SCENARIO										
AIRCRAFT TYPE	**2014**	**%**	**2019**	**%**	**2024**	**%**	**2029**	**%**	**2034**	**%**
Single Engine Piston	10,100	91	10,800	90	11,480	89	12,140	88	13,200	88
Multi Engine Piston	400	4	480	4	520	4	410	3	450	3
Turboprop	300	3	360	3	510	4	830	6	900	6
Jet	40	<1	120	1	130	1	140	1	150	1
Helicopter	260	2	240	2	260	2	280	2	300	2
Total Operations (100%)	**11,100**	**100**	**12,000**	**100**	**12,900**	**100**	**13,800**	**100**	**15,000**	**100**
INCREASING RATIO FORECAST SCENARIO										
AIRCRAFT TYPE	**2014**	**%**	**2019**	**%**	**2024**	**%**	**2029**	**%**	**2034**	**%**
Single Engine Piston	10,100	91	11,040	89	12,210	86	13,810	86	16,750	84
Multi Engine Piston	400	4	500	4	570	4	480	3	600	3
Turboprop	300	3	500	4	850	6	1,130	7	1,600	8
Jet	40	<1	120	1	280	2	360	2	650	3
Helicopter	260	2	240	2	280	2	320	2	400	2
Total Operations (100%)	**11,100**	**100**	**12,400**	**100**	**14,190**	**100**	**16,100**	**100**	**20,000**	**100**

Note: Percentages may not sum due to independent rounding

Design Aircraft

As noted earlier, the selection of design standards for airfield facilities is based upon the characteristics of the aircraft that are expected to use the airport. The **design aircraft** is defined as the most demanding aircraft type operating at the airport with a minimum of 500 annual itinerant operations, as described by the Federal Aviation Administration (FAA):

"Substantial Use Threshold. Federally funded projects require that critical design airplanes have at least 500 or more annual itinerant operations at the airport (landings and takeoffs are considered as separate operations) for an individual airplane or a family grouping of airplanes. Under unusual circumstances, adjustments may be made to the 500 total annual itinerant operations threshold after considering the circumstances of a particular airport. Two examples are airports with demonstrated seasonal traffic variations, or airports situated in isolated or remote areas that have special needs."

The FAA groups aircraft into five categories (A-E) based upon their approach speeds. Aircraft Approach Categories A and B include small propeller aircraft, many small or medium business jet aircraft, and some larger aircraft with approach speeds of less than 121 knots (nautical miles per hour). Categories C, D, and E consist of the remaining business jets as well as larger jet and propeller aircraft generally associated with commercial and military use with approach speeds of 121 knots or more. The FAA also establishes six airplane design groups (I-VI), based on the wingspan and tail height of the aircraft. The categories range from Airplane Design Group (ADG) I, for aircraft with wingspans of less than 49 feet, to ADG VI for the largest commercial and military aircraft.

The combination of airplane design group and aircraft approach speed for the design aircraft creates the Airport Reference Code (ARC), which is used to define applicable airfield design standards. Aircraft with a maximum gross takeoff weight greater than 12,500 pounds are classified as "large aircraft" by the FAA; aircraft 12,500 pounds and less are classified as "small aircraft."

A list of typical general aviation and business aviation aircraft and their respective design categories is presented in **Table 3-17. Figure 3-6** illustrates representative aircraft in various design groups.

TABLE 3-17: GENERAL AVIATION AIRCRAFT & DESIGN CATEGORIES

AIRCRAFT	AIRCRAFT APPROACH CATEGORY	AIRPLANE DESIGN GROUP	MAXIMUM GROSS TAKEOFF WEIGHT (LBS)
Cessna 182 (Skylane)	A	I	3,100
Cirrus Design SR22	A	I	3,400
Cessna Corvallis TT	A	I	3,600
Cessna 206 (Stationair)	A	I	3,614
Beechcraft Bonanza A36	A	I	3,650
Socata/Aerospatiale TBM 700	A	I	6,579
Beechcraft Baron 58	B	I	5,500
Cessna 340	B	I	5,990
Cessna Citation Mustang	B	I	8,645
Embraer Phenom 100	B	I	10,472
Cessna Citation CJ1+	B	I	10,700
Beech King Air C90	B	I	11,800
Beechcraft 400A/Premier I	B	I	16,100
Piper Malibu (PA-46)	A	II	4,340
Cessna Caravan 675	A	II	8,000
Pilatus PC-12	A	II	10,450
Cessna Citation CJ2+	B	II	12,500
Cessna Citation II	B	II	13,300
Beech King Air 350	B	II	15,000
Cessna Citation Bravo	B	II	15,000
Cessna Citation CJ4	B	II	16,950
Embraer Phenom 300	B	II	17,968
Cessna Citation XLS+	B	II	20,200
Dassault Falcon 20	B	II	28,660
Dassault Falcon 900	B	II	45,503
Bombardier Learjet 55	C	I	21,500
Gulfstream 200	C	II	34,450
Cessna Citation X	C	II	36,100
Bombardier Challenger 300	C	II	37,500
Gulfstream III	C	II	69,700
Learjet 35A/36A	D	I	18,300
Gulfstream G450	D	II	73,900
Bombardier Global Express 5000	C	III	92,750

Source: AC 150/5300-13, as amended; aircraft manufacturer data.

A-I

12,500 lbs. or less (small)

Beech Baron 55
Beech Bonanza
Cessna 182
Piper Archer
Piper Seneca

B-I

12,500 lbs. or less (small)

Beech Baron 58
Beech King Air 100
Cessna 402
Cessna 421
Piper Navajo
Piper Cheyenne
Cessna Citation I

A-II, B-II

12,500 lbs. or less (small)

Super King Air 200
Pilatus PC-12
DHC Twin Otter
Cessna Caravan
King Air C90

B-II

Greater than 12,500 lbs.

Super King Air 300, 350
Beech 1900
Cessna Citation Excel
Falcon 20, 50
Falcon 200, 900
Citation II, Bravo XLS+
Citation CJ3

A-III, B-III

Greater than 12,500 lbs.

DHC Dash 7
DHC Dash 8
Q-300, Q-400
DC-3
Convair 580
Fairchild F-27
ATR 72
ATP

C-I, D-I

Lear 25, 35, 55, 60
Israeli Westwind
HS 125-700

C-II, D-II

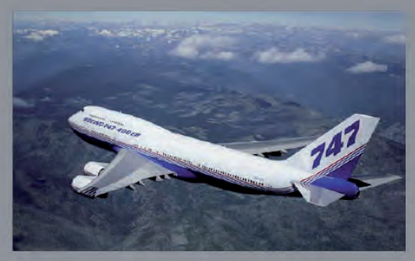
Gulfstream II, III, IV
Canadair 600
Canadair Regional Jet
Lockheed JetStar
Citation X
Citation Sovereign
Hawker 800 XP

C-III, D-III

Boeing Business Jet
Gulfstream 650
B 737-300 Series
MD-80, DC-9
Fokker 70, 100
A319, A320
Gulfstream V
Global Express

C-IV, D-IV

B-757
B-767
DC - 8-70
DC - 10
MD - 11
L 1011



D-V

B - 747 Series
B - 777

Current and Future Design Aircraft

The 2004 Airport Layout Plan identifies a Beechcraft King Air B100 as the existing and future critical aircraft for the Airport. This aircraft is representative of a smaller multi-engine turboprop included in Aircraft Approach Category B and Airplane Design Group I (ADG) I. The combination of approach speed and airplane design group results in Airport Reference Code (ARC) B-I. The King Air B100 has a maximum takeoff weight of 11,800 pounds and is classified as a "small" airplane.

Bandon State Airport currently accommodates a variety of ADG I and II aircraft including two locally-based multi-engine piston aircraft and one multi-engine turboprop (King Air C90 – ARC B-II). The Airport also accommodates transient single- and multi-engine aircraft, including turboprops and business jets that are capable of operating on the 3,600-foot runway, in some cases with limited passenger or fuel loads. The most common single-engine turboprops operating at the Airport include the Pilatus PC12 and Cessna Caravan (ARC A-II) and the Socata TBM700/850 and Piper Meridian (ARC A-I). The single engine turboprops are included in Aircraft Approach Category A (ARC A-II).

As with the operational fleet mix, the future design aircraft for Bandon State Airport will be determined by the preferred operations forecast and the corresponding runway capabilities. As noted earlier, it appears that the general aviation activity currently accommodated in the airport service area includes a substantial level of business class turboprop and business jet traffic. It is also evident that a portion of this activity is associated to Bandon as a destination, whether it is Bandon Dunes Golf Resort or other business, tourism or personal activity. Although any future runway extension will require sufficient documentation of flight activity and justification to meet FAA criteria, the absence of additional runway will dictate what aircraft can actually be accommodated.

Based on these factors, the existing and future design aircraft is defined for each forecast scenario:

Constant Ratio Forecast. Existing ARC B-I (small multi-engine turboprop), with a future ARC A-II (single engine turboprop). These aircraft are classified as a "small" aircraft based on their maximum operating weight (12,500 pounds or less).

Increasing Ratio Forecast. Existing ARC B-I (small multi-engine turboprop), with a future ARC B-II (medium business jet). These aircraft are classified as a "large" aircraft based on their maximum operating weights (more than 12,500 pounds).

Both scenarios would result in a change from ADG I to ADG II design standards and the distinction between Approach Category A and B is not significant within each ADG. The specific facility requirements will be discussed in Chapter 4.

Air Taxi and Military Operations

Air taxi activity includes operations regulated by the FAA under FAR Part 135, including on-demand passenger service (charter and fractional), small parcel transport (cargo), and air ambulance activity. The FAA surveys general aviation and air taxi activity on an annual basis. The information obtained from the survey enables the FAA to monitor the general aviation fleet so that it can:

- Track trends within the industry;
- Anticipate demand for national airspace facilities and services;
- Evaluate the impact of safety initiatives and regulatory changes;
- Improve accuracy of measures of safety in general aviation.

The data collected are also used by other government agencies, the general aviation industry, trade associations, and private businesses to pinpoint safety problems and to form the basis for critical research and analysis of general aviation issues. This data is consolidated in the annual FAA Aerospace Forecasts. The FAA forecasts air taxi operations to remain essentially flat (annual growth rate of -0.1 percent) between 2013 and 2034.

Air taxi activity at Bandon State Airport currently includes occasional charter and fractional on-demand passenger service, and occasional air ambulance flights. For 2014, the FAA TAF projects 514 air taxi operations, which is approximately 7 percent of total (TAF) general aviation (GA) operations and 5 percent of the current operations estimate (11,100). The current level of air taxi activity provides a reasonable baseline for developing future projections during the planning period. For planning purposes, air taxi operations at Bandon State Airport are projected to account for approximately 5 percent of general aviation operations through the current planning period.

Military operations at Bandon State Airport are relatively limited to Coast Guard helicopters and National Guard helicopters and smaller fixed wing aircraft. This activity is typically in support of search and rescue or emergency response operations.

Operational Peaks

It is estimated that peak month activity at Bandon State Airport occurs during the summer (typically July or August) and accounts for approximately 10 percent of annual aircraft operations. This level of peaking is consistent with the mix of airport traffic and is expected to remain relatively unchanged during the planning period. Peak day operations are defined by the average day in the peak month (design day) and the busy day in the typical week during peak month (busy day); the peak hour within the design day represents the design hour. The design day is calculated by dividing peak month operations by 30. The busy day is estimated to be 25 percent higher than the average day in the peak month (design day x 1.25). The

design hour operations are estimated to equal 15 percent of design day operations. Operational peaks for each of the forecast scenarios are summarized in **Table 3-18**.

TABLE 3-18: PEAK GENERAL AVIATION OPERATIONS FORECAST

ACTIVITY	2014	2019	2024	2029	2034
Constant Ratio Forecast					
Annual Operations	11,100	12,000	12,900	13,800	15,000
Peak Month Operations (10%)	1,110	1,200	1,290	1,380	1,500
Design Day (average day in peak month)	37	40	43	46	50
Busy Day	46	50	54	58	63
Design Hour Operations (assumed 15% of design day)	6	6	7	7	8
Increase Ratio Forecast					
Annual Operations	11,100	12,400	14,190	16,100	20,000
Peak Month Operations (10%)	1,110	1,240	1,419	1,610	2,000
Design Day (average day in peak month)	37	41	47	54	67
Busy Day	46	52	59	67	83
Design Hour Operations (assumed 15% of design day)	6	6	7	8	10

Instrument Flight Activity

Bandon State Airport is not currently equipped to accommodate instrument flight activity. The recent OTH master plan indicated that instrument operations accounted for approximately 10 percent of all airfield operations. This level of instrument weather conditions appears to be typical for Oregon coastal areas and would be a reasonable planning standard for Bandon State Airport.

Forecast Summary

The summary of based aircraft and annual aircraft operations forecasts is provided in **Tables 3-19 and 3-19**. As noted earlier, a based aircraft forecast and two scenarios for aircraft operations forecasts were developed for consideration. Based on the review of the preliminary forecasts, ODA selected the "increase ratio forecast" as the preferred aircraft operations forecast. This forecast was approved by FAA following its review.

As with any long term facility demand forecast, it is recommended that long term development reserves be protected to accommodate demand that may exceed current projections. For planning purposes, a reserve capable of accommodating a doubling of the 20-year preferred forecast demand should be adequate to

accommodate unforeseen facility needs during the current planning period. However, should demand significantly deviate from the airport's recent historical trend, updated forecasts should be prepared to ensure that adequate facility planning is maintained.

TABLE 3-19: FORECAST SUMMARY

ACTIVITY	2014	2019	2024	2029	2034
Annual Operations					
Constant Ratio Forecast					
Itinerant					
General Aviation	4,840	5,180	5,570	5,970	6,500
Air Taxi	500	600	650	690	750
Military	100	100	100	100	100
Total Itinerant	**5,440**	**5,880**	**6,320**	**6,760**	**7,350**
Local (all General Aviation)	5,660	6,120	6,580	7,040	7,650
Total Operations	**11,100**	**12,000**	**12,900**	**13,800**	**15,000**
Increase Ratio Forecast (Preferred Forecast)					
Itinerant					
General Aviation	4,840	5,730	6,990	7,950	10,900
Air Taxi	500	620	710	800	1,000
Military	100	100	100	100	100
Total Itinerant	**5,440**	**6,450**	**7,800**	**8,850**	**12,000**
Local (all General Aviation)	5,660	5,950	6,390	7,250	8,000
Total Operations	**11,100**	**12,400**	**14,190**	**16,100**	**20,000**
Based Aircraft					
Single Engine Piston	30 (81%)	31 (78%)	32 (74%)	33 (72%)	34 (68%)
Multi-Engine Piston	2 (5%)	2 (5%)	2 (5%)	2 (4%)	3 (6%)
Turboprop	1 (3%)	2 (5%)	2 (5%)	2 (4%)	3 (6%)
Business Jet/VLJ	0 (0%)	0 (0%)	0 (0%)	1 (2%)	1 (2%)
Light Sport Aircraft/Ultralights	4 (11%)	5 (13%)	6 (14%)	7 (15%)	8 (16%)
Helicopter	0 (0%)	0 (0%)	1 (2%)	1 (2%)	1 (2%)
Total Based Aircraft	**37**	**40**	**43**	**46**	**50**
Operations per Based Aircraft (Preferred Forecast)	**300**	**310**	**330**	**350**	**400**

TABLE 3-20: FORECAST SUMMARY (BY ARC)

ACTIVITY	2014	2019	2024	2029	2034
Annual Operations (Turbine Aircraft)					
Increase Ratio Forecast (Preferred Forecast)					
Airport Reference Code (A&B)					
A-I Turboprop	40	100	130	200	240
B-I Turboprop	60	100	200	240	300
B-I Business Jet	20	60	120	100	120
A-II Turboprop	80	160	220	340	520
B-II Business Jet	20	60	160	360	490
B-II Turboprop	120	140	300	350	540
C/D I & II Business Jet	0	0	0	20	40
Turbine ADG I Operations	120	260	450	540	660
Turbine ADG II Operations	220	360	680	730	1,070
Total Turbine Operations	**340**	**620**	**1,130**	**1,570**	**2,250**

Chapter 4 – Airport Facility Requirements

Chapter 4 – Airport Facility Requirements

Introduction

The evaluation of airport facility requirements uses the results of the inventory and forecasts contained in Chapters Two and Three, as well as established planning criteria, to determine the future facility needs for Bandon State Airport through the current twenty year planning period. Airside facilities include runways, taxiways, navigational aids and lighting systems. Landside facilities include hangars, fixed base operator (FBO) facilities, aircraft parking apron, aircraft fueling, surface access and automobile parking, utilities, and other related items. All airfield items are evaluated based on established standards from the Federal Aviation Administration (FAA).

The facility requirements evaluation is used to identify the adequacy or inadequacy of existing airport facilities and identify what new facilities may be needed during the planning period based on forecast demand. Potential options and preliminary costs for providing these facilities will be evaluated in the Airport Development Alternatives (Chapter Five), to determine the most cost effective and efficient means for meeting projected facility needs.

CHANGES IN AIRPORT DESIGN STANDARDS

As noted in the aviation activity forecasts, a change in design aircraft (and the corresponding airport design standards) is anticipated at Bandon State Airport during the current twenty year planning period. The airport has historically accommodated predominantly single-engine and multi-engine aircraft included in Airplane Design Group I (ADG I) (wingspans up to 49 feet) with a limited amount of Airplane Design

Group II (wingspans more than 49 feet but less than 79 feet) activity generated by turboprops and business jets capable of operating on the current 3,601-foot runway.

Based on a combination of local market conditions and current general aviation aircraft manufacturing trends, the forecasts project a gradual increase in Airplane Design Group II (ADG II) activity during the current planning period that will reach the FAA threshold of 500 annual operations (takeoffs and landings) required to define the design aircraft and the corresponding Airport Reference Code (ARC). The ARC represents a combination of Aircraft Approach Category (approach speed) and Airplane Design Group (wingspan, tail height). Additional information about the defining characteristics of ARCs is provided later in the chapter.

The aviation activity forecasts provide "constrained" and "unconstrained" projections that reflect two scenarios that are related to airport's ability to accommodate future ADG II aeronautical demand. The selection of the future design aircraft (*within* ADG II) is scenario-dependent due to the different runway length requirements associated with different types of aircraft. Although both forecast scenarios result in an increase in ADG II activity that will justify a future change in design standards, the scenarios yield future design aircraft from different approach speed categories (Aircraft Approach Category A and Category B) that also affect aircraft characteristics (weight, runway length requirements, etc.):

> Baseline Facility Forecast. ARC A-II (single-engine turboprop) with a maximum operating weight of 12,500 pounds or less. Under most conditions, these aircraft are capable of operating on the current 3,601-foot runway without operational constraints.
>
> Enhanced Facility Forecast. ARC B-II (medium business jet) with a maximum operating weight above 12,500 pounds. Under most conditions, these aircraft require an increase in the current 3,601-foot runway length to eliminate operational constraints (reduced takeoff weight; reduced fuel or passenger payload).

Based on its review of the draft forecasts, the Oregon Department of Aviation, owner and operator of Bandon State Airport, has selected the second "enhanced" facility forecast scenario which is unconstrained and reflects the assumption that an increase in runway length needed to accommodate a segment of this activity is feasible for the site.

It is important to note that the majority of FAA design standards for Approach Category A and B aircraft within ADG II are identical. However, specific design elements such as runway length and pavement strength will be driven by specific characteristics of the design aircraft, or family of aircraft.

DESIGN STANDARDS

The primary airfield facilities at Bandon State Airport are designed to meet Airplane Design Group I (ADG I) standards. The anticipated change in design aircraft will result in a change in design standards to Airplane Design Group II (ADG II) during the current planning period. As a result, several existing facilities will require upgrading to meet FAA standards during the current planning period based on forecast demand.

The current design aircraft is a multi-engine turboprop included in Airplane Design Group I and Approach Category B (approach speeds 91 knots or more but less than 121 knots), which corresponds to ARC B-I. This designation was identified for both the current and future design aircraft in the 2004 Airport Layout Plan Report and appears applicable to current conditions. The future design aircraft is a medium size business jet included in Airplane Design Group II and Approach Category B, which corresponds to ARC B-II.

Based on the growing popularity of larger single-engine turboprops (Pilatus PC12, Cessna Grand Caravan, etc.) in the general aviation fleet and their established use of Bandon State Airport, the potential exists for the FAA substantial use threshold (500 annual operations) for ADG II aircraft to be reached with ARC A-II aircraft, prior to reaching the threshold with ARC B-II aircraft. This could result in phased ADG II facility upgrades (runway width, parallel taxiway width and runway separation, runway protected areas, apron taxilanes, etc.) to meet basic ADG II standards, followed by a runway extension when demand is sufficient to meet FAA requirements for the future (B-II) design aircraft. However, as noted earlier, the common standards defined for Approach Category A and B aircraft in ADG II will minimize complications associated with phased implementation, should that be required.

Organization of Materials

This chapter evaluates facility requirements from two perspectives: (1) conformance of existing facilities with applicable Federal Aviation Administration (FAA) airport design and airspace planning standards; and (2) new demand based facility needs that reflect the updated aviation activity forecasts presented in Chapter Three.

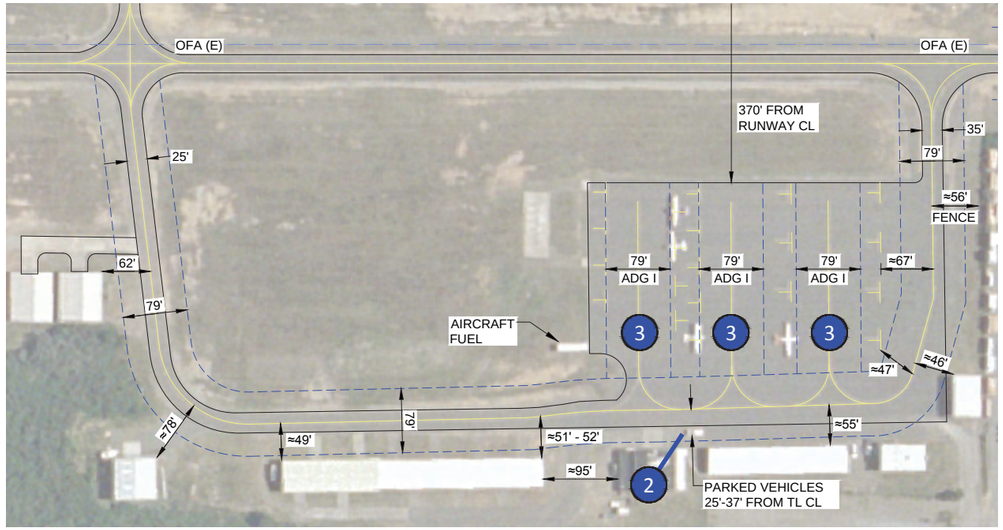
The evaluation of conformance with current (ADG I) and future (ADG II) FAA airport design standards and airspace planning criteria will support development alternatives analyses (Chapter 5), particularly as it relates to changes in current facility configurations.

Any existing nonconforming items will be identified on the updated Airport Layout Plan with recommended disposition noted. The evaluation of demand driven items will reflect in gross numbers, new facility needs such as runway length requirements, hangar spaces and aircraft parking positions based on forecast demand and the needs of the design aircraft. Items such as lighting and navigational aids are evaluated based on the type of airport activity, airport classification and capabilities.

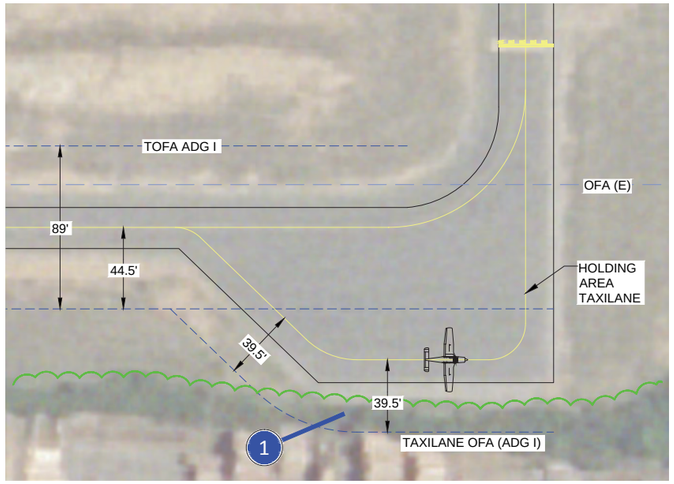
The updated inventory of existing facilities presented in Chapter 2 and site visits were used to evaluate/verify conformance with FAA standards. Figures 4-1 and 4-2 depict non-conforming items identified for both the current ADG I and the future ADG II design standards described in this chapter. It is noted that the existing runway-taxiway system and adjacent landside facilities have been designed to meet ADG I standards; the identification of non-conformance to ADG II standards is only intended to identify specific facilities that will require modification or replacement when the ADG II standards are actually implemented.

The most common nonstandard items identified in this evaluation are aircraft (wingtip) obstruction clearances defined for taxilanes in the terminal area and along the outer edge of the aircraft hold area adjacent to the Runway 34 threshold. Although the clearances vary, most aircraft movements occur without incident. However, as facilities are updated or replaced (aircraft parking or hangars), new facilities should be designed to conform with the appropriate design standards. It is also observed that vehicles are routinely parked adjacent to taxilanes, within taxilane object free areas (OFA), which is not consistent with FAA clearance standards for taxiing aircraft. Restricting vehicle parking adjacent to defined taxilanes should be considered to address this non-conforming item. The runway and parallel taxiway meet all applicable ADG I design standards.

Detailed definitions of the standards and their application at the airport are provided throughout the chapter. The reader is encouraged to consult the Glossary of Aviation Terms provided previously to clarify technical information.



TERMINAL AREA VIEW



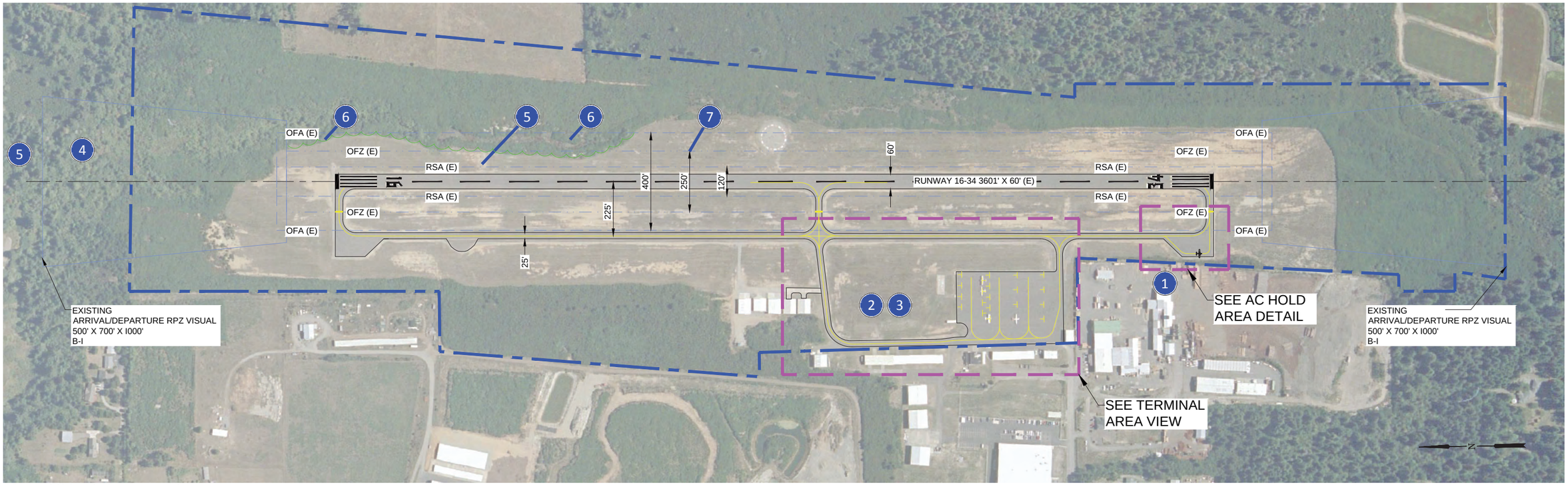
AC HOLD DETAIL

LEGEND

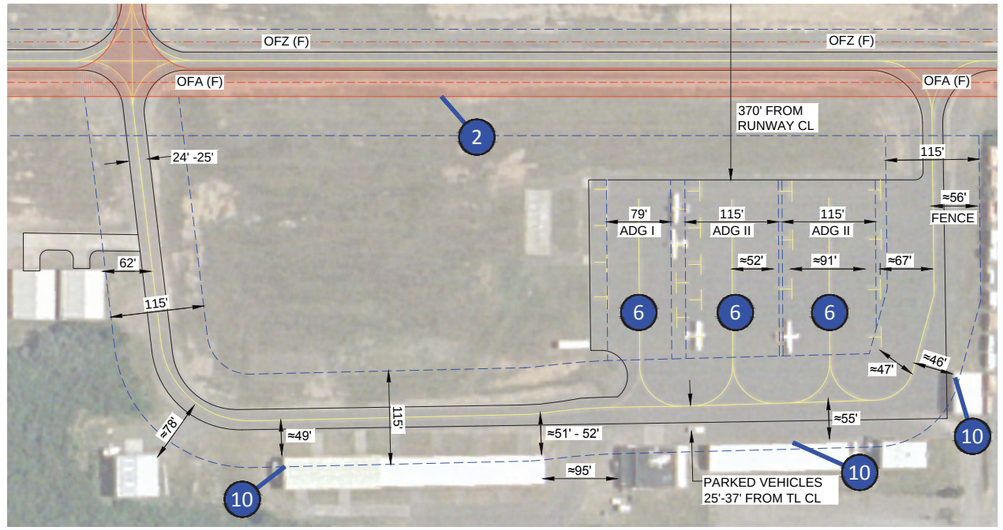
1. HOLD AREA TAXILANE OFA (WINGTIP CLEARANCES -BUSHES, FENCE)
2. TAXILANE OFA (PARKED VEHICLES)
3. TAXILANE OFA (AIRCRAFT PARKING/TIEDOWNS)
4. RPZ (PROPERTY CONTROL)
5. PAPI (VISUAL GLIDE PATH OBSTRUCTED (TREES))
6. RUNWAY OFA, OFZ (BRUSH)
7. RUNWAY OFZ (400' WIDTH)

NOTE:

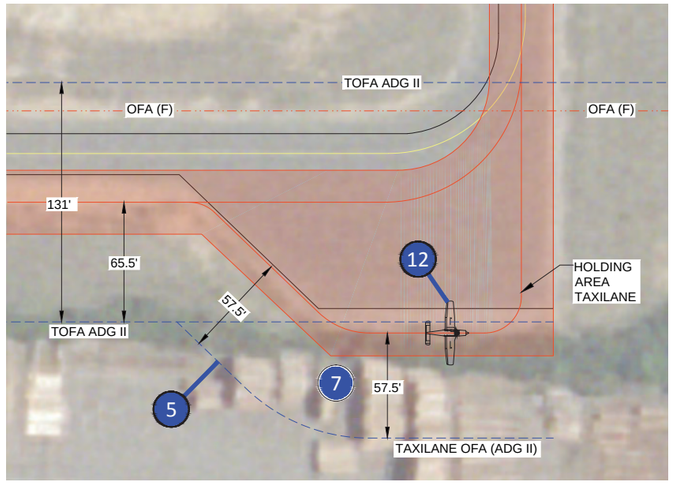
1. AN UPGRADE TO ADG II STANDARDS MAY REQUIRE RUNWAY EXTENSION TO ACCOMMODATE DESIGN AIRCRAFT, WHICH WOULD EXTEND PROTECTED AREAS ASSOCIATED WITH THE RUNWAY. ACTUAL CONFIGURATION TO BE DETERMINED IN ALTERNATIVES ANALYSIS.



Note: additional airport owned property



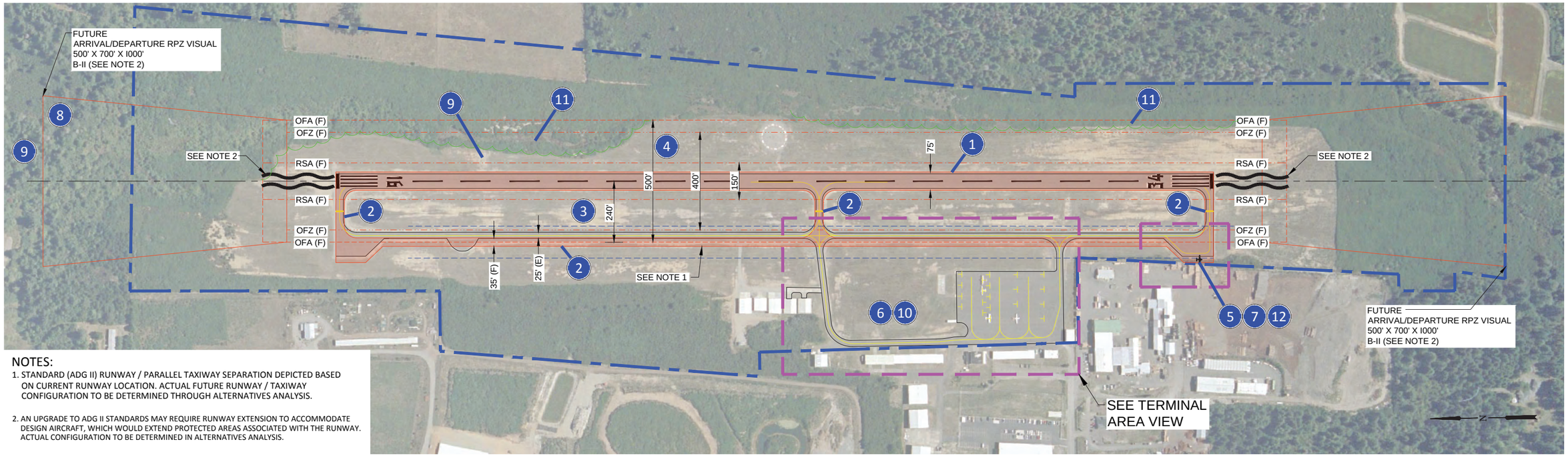
TERMINAL AREA VIEW



AC HOLD DETAIL

LEGEND

1. RUNWAY (WIDTH INCREASED TO 75')
2. PARALLEL & EXIT TAXIWAYS (WIDTH INCREASED TO 35')
3. RUNWAY CENTERLINE TO PARALLEL TAXIWAY SEPARATION INCREASES TO 240'
4. RUNWAY OBJECT FREE AREA (WIDTH INCREASES TO 500'; LENGTH EXTENDS 300' BEYOND RWY ENDS)
5. TAXIWAY OBJECT FREE AREA (WIDTH INCREASES TO 131')
6. TAXILANE OFA ADG I/II (AIRCRAFT PARKING/TIEDOWNS)
7. HOLD AREA (WINGTIP CLEARANCE FENCE, LUMBER STORAGE)
8. RPZ (PROPERTY CONTROL)
9. PAPI (VISUAL GLIDE PATH OBSTRUCTED (TREES))
10. TAXILANE OFA (BUILDINGS, PARKED VEHICLES)
11. RUNWAY OFA, OFZ (BRUSH, TERRAIN)
12. TAXIWAY OFA (HOLDING AIRCRAFT)



NOTES:

1. STANDARD (ADG II) RUNWAY / PARALLEL TAXIWAY SEPARATION DEPICTED BASED ON CURRENT RUNWAY LOCATION. ACTUAL FUTURE RUNWAY / TAXIWAY CONFIGURATION TO BE DETERMINED THROUGH ALTERNATIVES ANALYSIS.
2. AN UPGRADE TO ADG II STANDARDS MAY REQUIRE RUNWAY EXTENSION TO ACCOMMODATE DESIGN AIRCRAFT, WHICH WOULD EXTEND PROTECTED AREAS ASSOCIATED WITH THE RUNWAY. ACTUAL CONFIGURATION TO BE DETERMINED IN ALTERNATIVES ANALYSIS.

2004 Airport Layout Plan Report Recommendations

The 2004 Airport Layout Plan Report for Bandon State Airport provided recommendations for airport facility improvements for a twenty-year planning period that extended to 2022. Table 4-1 provides a summary of the recommended projects and their current status. These facility recommendations will be reviewed to determine their current relevance or the need for modification, revision or replacement as part of the updated facility recommendations in the master plan.

TABLE 4-1: CURRENT STATUS OF THE PREVIOUS AIRPORT LAYOUT PLAN RECOMMENDED PROJECTS

COMPLETED? YES/NO	PROJECTS
No	Tree obstruction removal (2004)
Yes	Restripe hold lines (2004)
No	Easement acquisition-Westside access roadway (2004)
No	Taxilane extension (20,000 lbs., 20' x 165') (2004)
No	Access roadway (2005)
No	Vehicle parking area (2005)
Yes	Executive hangars (2 at 3,601 square feet in 2005) (3 new hangars constructed since 2005)
No	Apron overlay (per PCI-private property) (2005)
No	Install ASOS (2005)
No	Apron expansion and taxiway extension (2006)
No	Taxiway lighting (MITL) and lighted directional and runway hold signs (2006)
Yes	General airfield pavement maintenance (2006) (Crack Seal Runway, Parallel Taxiway and Main Apron in 2011)
No	Obtain GPS approach for Runway 34-FAA facilities (2006)
No	Runway and parallel taxiway overlay/strength upgrades to 20,000lbs (2008)
Note: Blast Pads (100 ft. by 80 ft.) were installed on both ends of RWY 16/34	

Design Aircraft

As noted in Chapter 3 (Aviation Activity Forecasts), the current and future design aircraft at Bandon State Airport are business class multi-engine turbine aircraft. The current design aircraft is identified as a multi-engine turboprop (typical: Beechcraft King Air 90/100) included in Aircraft Approach Category B and Airplane Design Group I (Airport Reference Code – ARC B-I). The future design aircraft is a medium business jet (typical: Cessna Citation Bravo), included in Aircraft Approach Category B and Airplane

Design Group II (Airport Reference Code – ARC B-II). The design aircraft represents the most demanding aircraft operating at the airport on a regular basis in sufficient numbers to satisfy the FAA's "substantial use" threshold of 500 annual itinerant operations (takeoffs and landings). At Bandon State Airport, the design aircraft activity includes both locally-based and transient aircraft. In addition to this segment of activity, the airport accommodates a variety of single engine and multi-engine aircraft (both piston and turbine) and helicopters. Figure 3-6 (see Chapter 3, page 29) depicts common aircraft for each ARC.

Airport Design Standards

Federal Aviation Administration (FAA) Advisory Circular 150/5300-13A, Airport Design serves as the primary reference in planning airfield facilities. The design standards are based on Airport Reference Code, Airplane Design Group and Taxiway Design Group. The physical dimensions and required setbacks for facilities typically increase with each incremental step in ARC (larger or faster aircraft) and when reduced approach visibility minimums are provided with instrument approaches. A description of ARC criteria is provided in Chapter 3.

Federal Air Regulations (FAR) Part 77.25, Objects Affecting Navigable Airspace, defines airport imaginary surfaces for runways which are used by aircraft during flight operations in the airport environment. The airspace surfaces begin at runway elevation and extend upward and outward along the approaches and from the sides of the runway/helipad. The defined airspace should be free of obstructions (e.g., structures and other built items, parked aircraft, terrain, trees, etc.) to the greatest extent possible to provide a safe operating environment for aircraft. Part 77 surface dimensions and slopes are determined by the category of runway (utility or larger than utility) and approach capabilities (visual, nonprecision instrument, precision instrument).

The FAA design standards for ARC A/B-I include a sub-category for runways used by "small aircraft exclusively" (aircraft weighing 12,500 pounds or less), which may be used in lieu of the standards defined for runways used by both large and small aircraft. The 2004 Airport Layout Plan for Bandon State Airport identifies the existing and future ARC as B-I and does not appear to utilize "small aircraft exclusively" criteria. The B-I designation is consistent with existing facilities (runway-parallel taxiway separation) and is represented by several planning elements including runway protection zone (RPZ) dimensions and the future runway pavement design strength (20,000 pounds). The 2004 Airport Layout Plan report noted that the current runway obstacle free zone (OFZ) width was 250 feet did not meet the FAA standard (400 feet) for "runways used by large airplanes."

The 2004 Airport Airspace Plan depicts ultimate Part 77 airspace surfaces consistent with "larger than utility" runways with visual approaches. These standards apply to runways that accommodate aircraft weighing more than 12,500 pounds. The airspace configuration is compatible with both standard visual approaches and instrument approaches with a "circling" procedure, where the pilot must establish and

maintain visual contact with the runway environment prior to reaching the missed approach point while preparing to land.

The future design standards for Bandon State Airport are based on Airplane Design Group II and Approach Category B, which corresponds to ARC B-II. Future airspace planning for Runway 16/34 is based on "larger than utility" standards, consistent with runways that accommodate aircraft weighing more than 12,500 pounds. Based on the operational profile of the airport and the composition of forecast air traffic, airspace planning will be based on future nonprecision instrument approach capabilities. The addition of instrument approach capabilities was identified in the 2004 Airport Layout Plan Report as a priority facility improvement. For planning purposes, it is assumed that a future nonprecision instrument approach would be developed as a "straight-in" procedure to a runway end if feasible (based on FAA airspace evaluation), which requires slightly more demanding nonprecision instrument airspace surfaces. This would also require designating Runway 16/34 as nonprecision instrument rather than visual. As noted in the inventory chapter, the existing runway threshold markings are nonprecision instrument although the runway currently has visual approaches only.

A comparison of existing conditions for Runway 16/34, current (ARC B-I) and future (ARC B-II) design standards are summarized in Table 4-2. A summary of Bandon State Airport's current conformance with these various standards is presented in Table 4-3. As noted earlier, most airfield facilities at Bandon State Airport currently meet ARC B-I standards and will require upgrading to meet B-II standards. The evaluation of design standards in this chapter will address both current and future standards.

TABLE 4-2: AIRPORT DESIGN STANDARDS SUMMARY (DIMENSIONS IN FEET)

FAA STANDARD	RUNWAY 16/34 *EXISTING CONDITIONS*[1]	AIRPLANE DESIGN GROUP A/B-I[2] *APPROACH VISIBILITY ≥ 1 MILE*	AIRPLANE DESIGN GROUP A/B-II[2] *APPROACH VISIBILITY ≥ 1 MILE*
Runway Length	3,601	3,320[7]	5,250[10]
Runway Blast Pad - Width Runway Blast Pad - Length	80 100	80 100	95 150
Runway Width	60	60	75
Runway Shoulder Width	10	10	10
Runway Safety Area • Width • Beyond RWY End • Prior to Landing Threshold	 120 240 240	 120 240 240	 150 300 300
Obstacle Free Zone • Width • Beyond RWY End • Prior to Landing Threshold	 250 200 200	 400 200 200	 400 200 200
Object Free Area • Width • Beyond RWY End • Prior to Landing Threshold	 400 240 240	 400 240 240	 500 300 300
Primary Surface Width	500	500	500
Primary Surface Length (Beyond RWY End)	200	200	200
Runway Protection Zone Length	1,000[2]	1,000	1,000
Runway Protection Zone Inner Width	500[2]	500	500
Runway Protection Zone Outer Width	700[2]	700	700
Runway Centerline to: Parallel Taxiway/Taxilane Centerline Aircraft Parking Line (APL) Building Restriction Line (BRL)	 2256 365[3] 480[4]	 225 306[8] 376[9]	 240 306[8] 376[9]
Taxiway Width	25	25	35
Taxiway Shoulder Width	10	10	10
Taxiway Safety Area Width	> 49[5]	49	79
Taxiway Object Free Area Width	89	89	131
Taxiway Centerline to Fixed / Movable Object	44.5	45.5	65.5
Taxilane OFA Width	< 79[6]	79	115
Taxilane CL to Fixed/Movable Object	< 39.5[6]	39.5	57.5

Table 4-2 Notes:

1. Airfield dimensions as depicted on 2004 Airport Layout Plan (ALP).
2. Larger Than Utility Visual Approach Runway (Per FAR Part 77). Runway Protection Zone dimensions based on approach visibility minimums not lower than 1-mile (Per AC 150/5300-13A) as depicted on 2004 ALP.
3. No Aircraft Parking Line (APL) depicted on 2004 ALP . The nearest aircraft parking position is located approximately 365 feet from runway centerline.
4. No BRL depicted on the 2004 ALP drawing. The nearest hangar on the west side of the runway is approximately 480 feet from runway centerline. The nearest off airport structure is located approximately 360 feet from runway centerline (south end, west side).
5. The main section of parallel taxiway is located on former runway (Apprx. 50' wide); the paved surface serves as the taxiway safety area.
6. The wingtip clearance provided on the south aircraft hold area measured from 12.5 feet from outer edge of pavement (½ ADG I taxiway width standard) is less than 39.5 feet (bushes, fence). Apron taxilane clearances parked aircraft vary (See figure 4-1).
7. Per FAA Runway Length Model: Runway lengths required to accommodate 100 percent of small airplanes (12,500 pounds or less) at Bandon State Airport. 63.1 degrees F, 17-foot change in runway centerline elevation.
8. Distance from runway centerline required to accommodate an 8-foot aircraft tail height without penetrating the 7:1 Transitional Surface extending from a 500 foot wide Primary Surface. This distance also clears the existing parallel taxiway OFA and the runway OFA. Setbacks for larger aircraft types (i.e., larger turboprops or business jets, etc.) would be based on tail height clearance of Transitional Surface slope. Example: parking setback required for Pilatus PC12 (14' tail height) is approximately 348 feet from runway centerline.
9. Distance required to accommodate 18-foot structures (typical small/medium conventional hangar roof heights) without penetrating the 7:1 Transitional Surface extending from a 500 foot wide Primary Surface when ground elevation is the same for the runway and building. Setbacks for larger hangars or for hangars constructed in areas with terrain elevated above runway elevation would depend on roof elevation and actual clearance of Transitional Surface slope.
10. Per FAA Advisory Circular 150/5325-4B Runway Length Planning, the runway length required to accommodate 75 percent of large airplanes (under 60,000 pounds) at 60 percent useful load at Bandon State Airport.

TABLE 4-3: BANDON STATE AIRPORT CURRENT CONFORMANCE WITH FAA DESIGN STANDARDS

ITEM	AIRPLANE DESIGN GROUP I *A&B AIRCRAFT* *APPROACH VISIBILITY 1 MILE*	AIRPLANE DESIGN GROUP II *A&B AIRCRAFT* *APPROACH VISIBILITY 1 MILE*
Runway Safety Area	Yes	No[3]
Runway Object Free Area	Yes	No[3]
Runway Obstacle Free Zone	No[1]	No[3]
Taxiway Safety Area	Yes	No[3]
Taxiway Object Free Area	Yes	No[3]
Taxilane Object Free Area	No[2]	No[3]
Building Restriction Lines	Yes	Yes
Aircraft Parking Lines	Yes	Yes
Runway Protection Zones	Yes	Yes
Runway - Parallel Taxiway Separation	Yes	No[3]
Runway Width	Yes	No[3]
Runway Length	Yes	No[3]
Taxiway Width	Yes	No[3]

Table 4-3 Notes:

1. Several apron taxilane object free area clearances (to parked aircraft, etc.) are less than standard.
2. Existing OFZ (250 feet wide) does not meet dimensional standard for runways that accommodate larger aircraft (>12,500#), although the width is consistent with existing runway pavement strength (12,500#).
3. Requires upgrade to meet future ARC B-II standards; runway length determined by requirements of design aircraft or family of aircraft.

Airport Planning & Design Standards Note:

The following FAA standards are recommended for use in evaluating Runway 16/34 and its taxiway system:

Runway 16/34 (Existing) – Airport Reference Code (ARC) B-I. Runway design standards for aircraft approach category A & B runways with not lower than 1 statute mile approach visibility minimums. The existing Runway Protection Zone (RPZ) for Runway 16/34 is based on not lower than 1 mile approach visibility minimums.

Runway 16/34 (Future) – Airport Reference Code (ARC) B-II. Runway design standards for aircraft approach category A & B runways with not lower than 1 statute mile approach visibility minimums. No change in future RPZ dimensions.

FAR Part 77 airspace planning criteria based on existing "larger than utility runways" with nonprecision approaches with not less than 1 mile visibility.

All references to the "standards" are based on these assumptions, unless otherwise noted (Per FAA Advisory Circular 150/5300-13A and FAR Part 77.25)

RUNWAY SAFETY AREA (RSA)

The FAA defines runway safety area (RSA) as "A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway." Runway safety areas are most commonly used by aircraft that inadvertently leave the runway environment during landing or takeoff.

By FAA design standard, the runway safety area "shall be:

1. *cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations;*
2. *drained by grading or storm sewers to prevent water accumulation;*
3. *capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft; and*
4. *free of objects, except for objects that need to be located in the runway safety area because of their function. Objects higher than 3 inches above grade should be constructed on low impact resistant supports (frangible mounted structures) of the lowest practical height with the frangible point no higher than 3 inches. Other objects such as manholes should be constructed at grade. In no case should their height exceed 3 inches."*

Based on a recent visual inspection conducted during the master plan inventory, the current RSA is cleared and graded and appears to meet B-I dimensional standards and surface condition (gradient and compaction) requirements. An upgrade to B-II standards and any future runway extension(s) will require RSA improvements. Items located within the RSA required by function (runway edge lights, etc.) must be installed with break-away mounts.

Runway Safety Area (RSA)	
Existing Standard	**Future Standard**
ARC B-I (Approach Visibility ≥ 1 mile)	**ARC B-II (Approach Visibility ≥ 1 mile)**
120 feet wide and extends 240 feet beyond each departure end of runway.	150 feet wide and extends 300 feet beyond each departure end of runway.
The RSA appears to be free of built items except those with locations fixed by function on break-away mounts. The RSA surface appears to meet gradient and compaction standards. Periodic maintenance and clearing is required.	The RSA's dimensions would increase to meet standards. The RSA surface would need to meet gradient and compaction standards. The area needs to be free of built items except those with locations fixed by a function on break-away mounts. Periodic maintenance and clearing is required.

RUNWAY OBJECT FREE AREA (OFA)

Runway object free areas are two dimensional surfaces intended to be clear of ground objects that protrude above the runway safety area edge elevation. Obstructions within the object free area may interfere with aircraft flight in the immediate vicinity of the runway. The FAA defines the object free area clearing standard:

"The object free area clearing standard requires clearing the object free area of above ground objects protruding above the runway safety area edge elevation. Except where precluded by other clearing standards, -it is acceptable to place objects that need to be located in the object free area for air navigation or aircraft ground maneuvering purposes and to taxi and hold aircraft in the object free area. Objects non-essential for air navigation or aircraft ground maneuvering purposes are not to be placed in the object free area. This includes parked airplanes and agricultural operations."

Based on a recent visual inspection conducted during the master plan inventory, the current OFA is free of built items and parked aircraft and is relatively level. Areas of vegetation (brush, small bushes, etc.) were observed in the northeast section that appear to exceed the standard height limitations (> 3" above grade). Vegetation located in the OFA should be removed and the area graded. As with the RSA noted earlier, any future runway extensions or an upgrade to B-II standards will require corresponding OFA improvements. Items located within the OFA required by function (PAPI, wind cones, etc.) require break-away mounts.

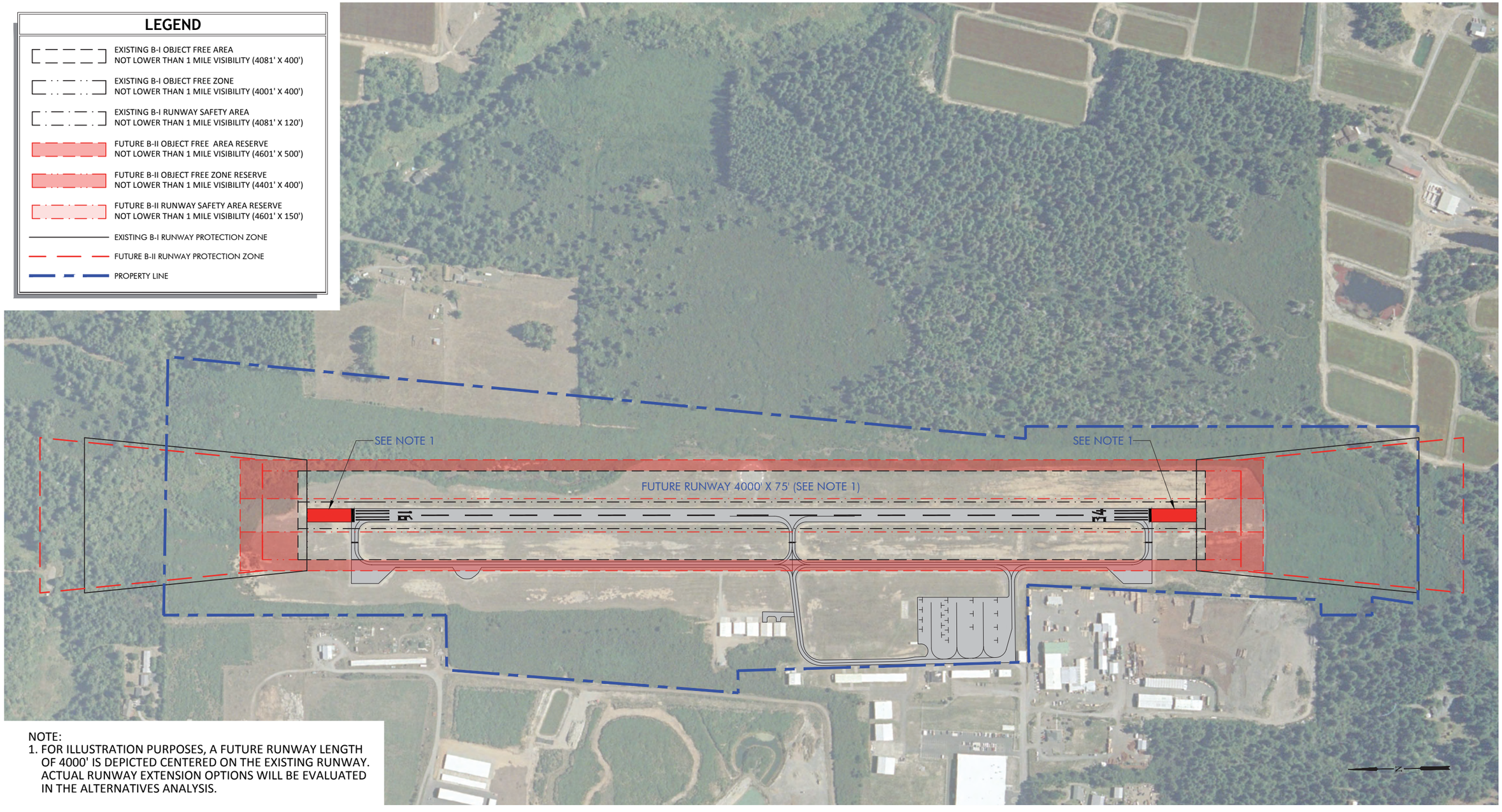
An increase in OFA width will require approximately 50 additional feet of vegetation removal and grading along the east side of the runway and additional clearing/grading beyond the runway ends. The future OFA along the west side of the runway is clear and contains the west parallel taxiway. A summary of the OFA requirements based on the existing B-I and future B-II standards are presented below:

Runway Object Free Area (OFA)	
Existing Standard	**Future Standard**
ARC B-I (Approach Visibility ≥ 1 mile)	**ARC B-II (Approach Visibility ≥ 1 mile)**
400 feet wide and extends 240 feet beyond each departure end of runway.	500 feet wide and extends 300 feet beyond each departure end of runway.
The OFA appears to meet FAA grading standards, although encroaching vegetation is observed in the northeast section that appears to exceed the 3" above grade height limit. Vegetation removal and grading is recommended.	The OFA footprint would need to be expanded to meet the dimensional requirements of B-II for either the current or extended runway and appropriate grading and obstruction clearing will be required.

Figure 4-3 depicts the footprint of the runway object free area and runway safety area that are associated with both the current ARC B-I and future ARC B-II based on the existing 1-mile approach visibility minimums. An upgrade in design standards requires a lateral and longitudinal (length beyond the ends of the runway) expansion of the protected areas for the existing runway and any future extensions.

LEGEND

- EXISTING B-I OBJECT FREE AREA NOT LOWER THAN 1 MILE VISIBILITY (4081' X 400')
- EXISTING B-I OBJECT FREE ZONE NOT LOWER THAN 1 MILE VISIBILITY (4001' X 400')
- EXISTING B-I RUNWAY SAFETY AREA NOT LOWER THAN 1 MILE VISIBILITY (4081' X 120')
- FUTURE B-II OBJECT FREE AREA RESERVE NOT LOWER THAN 1 MILE VISIBILITY (4601' X 500')
- FUTURE B-II OBJECT FREE ZONE RESERVE NOT LOWER THAN 1 MILE VISIBILITY (4401' X 400')
- FUTURE B-II RUNWAY SAFETY AREA RESERVE NOT LOWER THAN 1 MILE VISIBILITY (4601' X 150')
- EXISTING B-I RUNWAY PROTECTION ZONE
- FUTURE B-II RUNWAY PROTECTION ZONE
- PROPERTY LINE



NOTE:
1. FOR ILLUSTRATION PURPOSES, A FUTURE RUNWAY LENGTH OF 4000' IS DEPICTED CENTERED ON THE EXISTING RUNWAY. ACTUAL RUNWAY EXTENSION OPTIONS WILL BE EVALUATED IN THE ALTERNATIVES ANALYSIS.

OBSTACLE FREE ZONE (OFZ)

The obstacle free zone (OFZ) is a plane of clear airspace extending upward above runway elevation that are intended to protect close-in obstructions that may create hazards for aircraft. The FAA defines the following clearing standard for the OFZ:

"The obstacle free zone clearing standard precludes taxiing and parked airplanes and object penetrations, except for frangible visual NAVAIDs [navigational aids] *that need to located in the obstacle free zone because of their function."*

The FAA defines the Runway Obstacle Free Zone (ROFZ) as:

"The ROFZ is a defined volume of airspace centered above the runway centerline. The ROFZ is the airspace above a surface whose elevation at any point is the same as the elevation of the nearest point on the runway centerline. The runway OFZ extends 200 feet beyond each end of the runway."

The current and future FAA standard OFZ width for Runway 16/34 is 400 feet wide based on operations by large aircraft (weighing more than 12,500 pounds). The 2004 Airport Layout Plan Report noted that the current 250 foot wide OFZ should be upgraded to meet the width standard for the large airplanes, although the standard is not reflected on the 2004 Airport Layout Plan (ALP) drawing.

Based on a recent visual inspection conducted during the master plan inventory, the current (250 feet wide) OFZ appears to be level and is free of built items, vegetation, and parked or taxiing aircraft. Runway lights, precision approach path indicator (PAPI) units, runway end identifier lights (REIL), and directional signage have locations fixed by function within the OFZ and meet the FAA frangibility (break away) standard. The current aircraft hold lines on the three exit taxiways are located 125 feet from runway centerline, which coincides with the outer edge of the OFZ.

The increase in width to 400 feet coincides with the width dimension of the current runway OFA. As a result, the improvements recommended earlier within the current OFA will also apply to the expanded OFZ. The existing aircraft hold lines on the three exit taxiways will require shifting to the edge of the expanded OFZ (200 feet from runway centerline). Any future runway extension(s) will require corresponding extensions of the OFZ, although no increase in width beyond 400 feet is required.

TAXIWAY SAFETY AREA

Taxiway safety areas serve a similar function as runway safety areas and use the same design criteria for surface condition (see description of runway safety area provided earlier in this chapter), with varying dimensions based on airplane design group. The taxiway safety area dimensions increase when the design group changes from ADG I to ADG II.

It is noted that safety area standards do not apply to *taxilanes* typically located within hangar developments or aircraft parking aprons. Taxilanes provide aircraft access within a parking or hangar area; taxiways provide aircraft access between points on the airfield and serve runways (e.g. parallel taxiways and exit taxiways).

The parallel taxiway and exits taxiways are designed to accommodate the same design aircraft as the runway (Airplane Design Group I). The current ADG-I taxiway safety area standard is 49 feet (24.5 feet from taxiway centerline). The main section of the parallel taxiway (25 feet wide) is located on the former runway (approximately 50 feet wide); the outer 12.5 feet of paved area is located entirely within the ADG I taxiway safety area footprint. Based on a recent visual inspection conducted during the master plan inventory, all existing taxiway safety areas appear to meet the surface condition and obstruction clearing standards.

The future ADG II taxiway safety area standard is 79 feet wide (39.5 feet from taxiway centerline). It is noted that the ADG II parallel taxiway-runway separation increases to 240 feet from the existing 225 feet. A relocation of the parallel taxiway (or runway) would be required to meet standards and the ADG II taxiway safety area standards would be applied. Taxiway edge reflectors, edge lights, signs, etc. must be mounted on frangible (break away) mounts.

As with runway safety areas, the ground surface located immediately adjacent to the taxiways periodically requires maintenance or improvement to adequately support the weight of an aircraft or an airport vehicle. Grading and/or soil compaction within taxiway safety areas should be completed as needed, and grass, brush or other debris should be regularly cleared to maintain FAA standards. Taxiway pavement edges should be periodically inspected to ensure that grass, dirt or gravel build ups do not exceed 3 inches.

Taxiway Safety Area (TSA)	
Existing Standard	**Future Standard**
ADG-I	**ADG-II**
49 feet wide, 24.5 feet from taxiway centerline	79 feet wide, 39.5 feet from taxiway centerline
The TSA appears to be free of built items except those with locations fixed by function on break-away mounts. The TSA surface (paved) appears to meet gradient and compaction standard. Periodic maintenance and vegetation removal is required.	The future TSA dimensions would increase to meet design group II standards. The TSA needs to be free of built items except those with locations fixed by function on break-away mounts. The TSA surface needs to meet gradient and compaction standards.

TAXIWAY/TAXILANE OBJECT FREE AREA

Taxiway and taxilane object free areas (OFA) are intended to provide unobstructed taxi routes (adequate wingtip clearance) for aircraft. The outer edge of the OFA defines the recommended standard distance from taxiway or taxilane centerline to a fixed or moveable object. The FAA clearing standard prohibits service vehicle roads, parked aircraft, and above ground objects (hangars, other built items, etc.), except for objects with locations that are fixed by function (navigational aids, airfield signs, etc.). The applicable design standard (ADG-I or ADG-II) is determined by the largest size of aircraft that may be accommodated in aircraft parking areas or hangars served by that taxiway/taxilane.

TAXIWAYS AND TAXILANES

The taxiways and taxilanes at Bandon State Airport are currently designed to be meet ADG I standards. These include taxilanes within the main apron area and in the various aircraft hangar areas on the airport as well as a parallel taxiway and runway exit taxiways. The ADG I OFA standard is 89 feet wide (44.5 feet from centerline) for taxiways and 79 feet wide (39.5 feet from centerline) taxilanes. The future ADG-II standards are 131 feet wide taxiway OFA, (65.5 feet from centerline) and the taxilane OFA 115 feet wide (57.5 feet from centerline).

The main apron taxilane clearances located between tiedown rows vary, with approximately 79 feet provided between small airplane tiedowns anchors. However, when aircraft are located in the tiedowns, portions of the aircraft protrude into the adjacent taxilane, which reduces the taxilane OFA clearance. The apron currently accommodates both ADG I and ADG II aircraft, with several larger parking positions located in the southern two rows on the apron. Reconfiguration of the main apron taxilanes and aircraft parking rows to meet the applicable standard should be incorporated into future facility upgrades or apron expansion.

Since the type of aircraft located within a particular hangar can change over time, the appropriate method for determining hangar taxilane clearance standards is based on the largest aircraft that can be physically accommodated within the hangar. ADG-II standards are applied to taxilanes serving larger hangars (door openings 50 feet and larger) and ADG-I standards are applied to taxilanes serving small individual hangars or T-hangars.

Taxiway/Taxilane OFA	
Existing Standard	**Future Standard**
ADG-I	**ADG-II**
Taxiway Object Free Area 89 feet wide (44.5 feet from centerline) Taxilane Object Free Area 79 feet wide (39.5 feet from centerline)	Taxiway Object Free Area 131 feet wide (65.5 feet from centerline) Taxilane Object Free Area 115 feet wide (57.5 feet from centerline)
Some taxilanes on the main apron do not meet the current OFA standards.	Some taxilanes and aircraft parking areas on the main apron area require reconfiguration to meet the future standard.

BUILDING RESTRICTION LINE (BRL)

A building restriction line (BRL) identifies the minimum setback required to accommodate a typical building height such as a T-hangar or large conventional hangar, based on the ability to remain clear of all runway and taxiway protected areas on the ground, and the protected airspace surrounding a runway. BRL locations are directly associated with the primary surface width, which determines where the lateral 7:1 transitional surface slope begins. The current (visual) and future (nonprecision instrument) Runway 16/34 requires a 500-foot wide primary surface based on standards defined for "Larger than Utility Runways."

The 2004 Airport Layout Plan does not depict existing or future BRLs for Runway 16/34, although the nearest on-airport building (hangar) is located approximately 480 feet from runway centerline. At this location, a building height of approximately 32 feet (above runway elevation) could be accommodated without penetrating the runway transitional surface.

There is no absolute dimensional standard for establishing BRL locations other than avoiding conflicts with defined runway-taxiway setbacks. BRLs are commonly defined by the type of buildings to be accommodated (T-hangars, small conventional hangars, large conventional hangars, etc.). An 18-foot BRL is commonly used to accommodate both T-hangars and small conventional hangars. For Runway 16/34, an 18-foot BRL would be located 376 feet from runway centerline:

Example: 18-foot BRL = (18 X 7) + 250 = 376 feet from runway centerline

The calculation reflects the rising 7:1 slope for the transitional surface multiplied by the building height (18 feet), added to one-half (250 feet) of the 500-foot primary surface width. This building setback is compatible with both B-I and B-II runway-parallel taxiway configurations. Larger structures would require increased setbacks to avoid penetrating the runway transitional surface.

AIRCRAFT PARKING LINE

Similar to a BRL, the aircraft parking line (APL) represents the minimum setback required for locating aircraft parking in order to be clear of all runway and taxiway protected areas on the ground, and the protected airspace surrounding a runway. The location of the APL is generally determined by the more demanding of runway airspace clearance and parallel taxiway obstruction clearance.

The 2004 Airport Layout Plan does not depict existing or future APL for Runway 16/34, although the nearest aircraft parking (front edge of main apron) is located approximately 365 feet from runway centerline. At this location, an aircraft tail height of approximately 16 feet (above runway elevation) could be accommodated without penetrating the runway transitional surface.

A tail height of 8 feet is typical of most small single-engine aircraft and is often used to determine the APL for small airplane tiedowns. A variety of small and medium business aircraft including single-engine

turboprops, multi-engine turboprops and business jets have tails heights ranging from 8 to 15 feet. Parking areas for larger aircraft require additional setbacks to avoid penetrating the runway transitional surface. The Pilatus PC-12NG, an ADG II aircraft commonly operated at Bandon State Airport, has a tail height of 14 feet. Using the same calculation method described for the BRL, the minimum parking setback for this aircraft is approximately 348 feet from runway centerline, compared to 306 feet for an aircraft with an 8-foot tail height. Both setbacks are compatible with B-I and B-II parallel taxiway OFA clearances. Future apron planning should ensure that appropriate parking setbacks are observed for the different sizes of aircraft being accommodated.

RUNWAY PROTECTION ZONES (RPZ)

The FAA provides the following definition for runway protection zones:

"The RPZ's [runway protection zone] *function is to enhance the protection of people and property on the ground. This is best achieved through airport owner control over RPZs. Control is preferably exercised through the acquisition of sufficient property interest in the RPZ and includes clearing RPZ areas (and maintaining them clear) of incompatible objects and activities. The RPZ is trapezoidal in shape and centered about the extended runway centerline. The RPZ's begins 200 feet beyond the end of the area useable for takeoff or landing." The central portion and controlled activity area are the two components of the RPZ. The central portion of the RPZ extends from the beginning to the end of the RPZ, centered on the* [extended] *runway centerline and is equal to the width of the runway OFA.*

Runway protection zones (RPZ) with buildings, roadways, or other items are not fully consistent with FAA standards. In October 2012, the FAA released interim guidance regarding RPZs and incompatible land uses, particularly roads. The policy directs airport sponsors to evaluate any planned changes to existing RPZs that introduce or increase the presence of roads or other incompatible land uses in RPZs. Existing roads or land uses within RPZs are also to be evaluated during master planning to determine if feasible alternatives exist for realignment of roads outside RPZs or to modify the land uses. Any proposed increase in the length of Runway 16/34 that increases the presence of incompatible land uses in the RPZs is subject to review by FAA headquarters in Washington D.C. The evaluation of the RPZ configuration will be included in all runway evaluation options to be addressed in the alternatives analysis. The FAA recommends that airport sponsors control the RPZs through ownership whenever possible, although avigation easements[1] are commonly used when outright purchase is not feasible.

The current RPZ dimensions are compatible with approach visibility minimums of not lower than 1-statute mile, which is compatible with both visual approaches and most nonprecision instrument

1 An avigation easement (avigation = aviation + navigation) involves the purchase of airspace rights over a particular defined ground area. The easement normally limits the maximum height of any natural or built items (to coincide with the runway approach surface slope) and may include provisions restricting the type of activities permitted. Compensation is negotiated between the airport owner and property owner.

approaches (without an approach lighting system) for both B-I and B-II runways. Approximately 363 feet of the outer end of the Runway 16 RPZ extends off airport property. The entire RPZ for Runway 34 is located on airport property. The location of one or both of the existing RPZs may change if the runway is extended in the future (see runway length section).

Runway Protection Zones (RPZ)	
Existing Standard	**Future Standard**
ARC B-I (Approach Visibility ≥ 1 mile)	**ARC B-II (Approach Visibility ≥ 1 mile)**
Runway Protection Zone (RPZ) Length- 1,000 feet Inner Width- 500 feet Outer Width- 700 feet	Runway Protection Zone (RPZ) Length- 1,000 feet Inner Width- 500 feet Outer Width- 700 feet
Current runway protection zone dimensions meet standards.	No change in current RPZ dimensions.

RUNWAY - PARALLEL TAXIWAY SEPARATION

Runway 16/34 has a full-length west parallel taxiway (Taxiway A) with a runway centerline to centerline separation of 225 feet, which meets the current B-I dimensional standard. The future B-II standard runway-taxiway separation is 240 feet. It is noted that B-II runway and taxiway widths also increase which may affect centerline locations and lateral separations. Based the current runway centerline location, it appears that a shifted and widened parallel taxiway can be accommodated within airport property without impacting existing hangars or aircraft parking. However, a lateral shift of the south aircraft hold area cannot be accommodated in its current location or further south within the current airport property boundary (SW corner of airport property). Current and future parallel taxiway separation standards based are presented below:

Runway-Parallel Taxiway Separation	
Existing Standard	**Future Standard**
ARC B-I (Approach Visibility ≥ 1 mile)	**ARC B-II (Approach Visibility ≥ 1 mile)**
Runway-Parallel Taxiway Separation is 225 feet	Runway-Parallel Taxiway Separation is 240 feet
The current runway-parallel taxiway separation meets the existing standard.	An increase in runway to parallel taxiway separation is required to meet the future standard.

FAR Part 77 Surfaces

Airspace planning for U.S. airports is defined by Federal Air Regulation (FAR) Part 77.25, Objects Affecting Navigable Airspace. FAR Part 77 defines imaginary surfaces (airspace) which are established to protect the area the vicinity of a runway or helipad. The defined airspace surfaces should be free of obstructions (e.g., structures, parked aircraft, trees, terrain, etc.) to the greatest extent possible to provide a safe operating environment for aircraft. Built items that penetrate protected airspace that cannot be

removed or lowered are often identified with red obstruction lights to provide a affirmative visual recognition of the potential hazard to pilots.

Figures 4-4 and 4-5 on the following pages illustrate plan and isometric views of generic Part 77 surfaces. Table 4-4 summarizes the airspace surface dimensions for Bandon State Airport based on current and future approach/visibility options.

The Part 77 surfaces identified on the 2004 Airport Airspace Plan are consistent with "Larger than Utility" runways with visual approaches (20:1 approach slope). The 2004 Airport Airspace Plan identified 32 obstructions (31 trees and 1 frangible wind cone) to the Part 77 airspace surfaces. No areas of terrain penetration are identified.

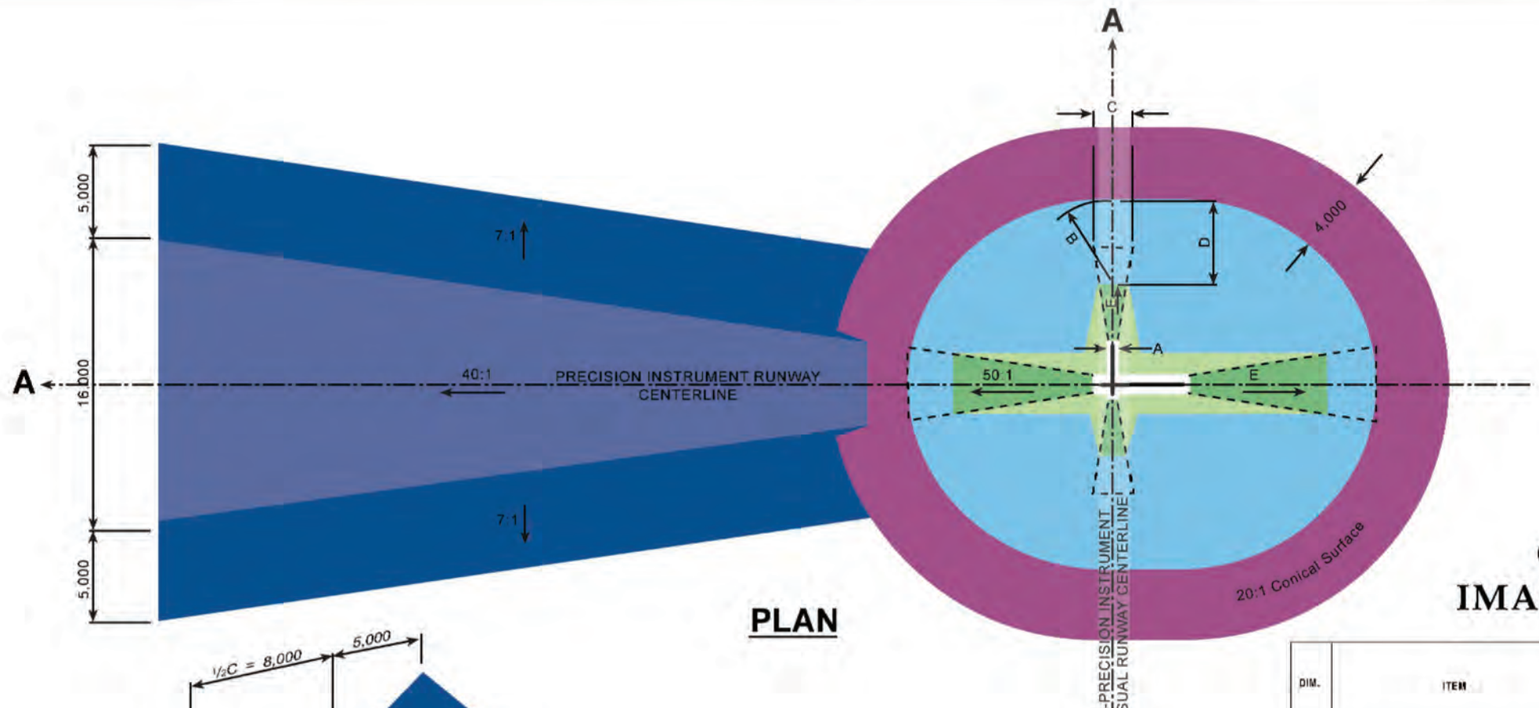
The recommended future airspace planning criteria for Runway 16/34 maintains the "Larger than Utility" designation but changes the approach classification to nonprecision instrument (34:1 approach slope). This recommendation reflects previous and current facility planning and the potential for developing a straight-in instrument approach to the runway based on relatively flat terrain in the vicinity of the airport. In the event that the FAA's design criteria for a straight-in approach cannot be met, a circling procedure would be considered that is compatible with the current 20:1 visual approach surfaces.

The recommended change in planning criteria will affect several airspace surfaces for Runway 16/34 and may increase the number of tree obstructions, particularly for the runway approach surfaces. The updated airspace plan developed for the master plan will depict the airspace surfaces and adjust existing obstruction data accordingly. An updated obstruction survey is required by FAA for developing a new instrument approach procedure. Once the obstruction survey is completed, FAA will conduct an airspace evaluation to determine the feasibility of available approach design options. The updated obstruction data, including any changes related obstruction removal, can be incorporated into the airspace plan.

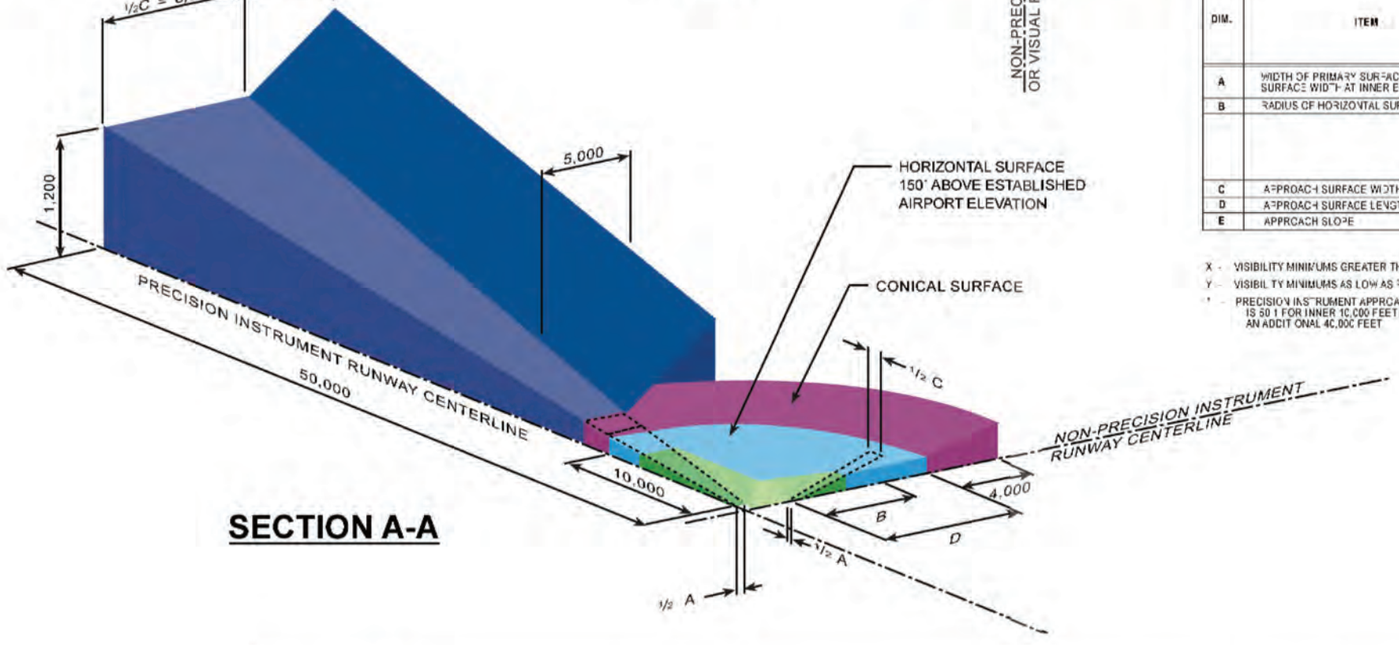
All new construction on or in the immediate vicinity of the airport should routinely involve FAA review for airspace compatibility. FAA Form 7460-1, Notice of Proposed Construction or Alternation, should be prepared and submitted to FAA at least 60 to 90 days prior to planned construction. 7460 forms should be submitted by Oregon Department of Aviation (ODA) for projects located on the Airport and submitted by the applicant for any projects located off airport property. The FAA reviews all proposed development to determine if the proposed action would create any obstructions to FAR Part 77 airspace surfaces. In general, the FAA will object to proposals that result in a penetration to any FAR Part 77 airspace surfaces on the basis of safety.

TABLE 4-4: FAR PART 77 AIRSPACE SURFACES

ITEM	EXISTING RUNWAY 16/34 *Larger than Utility* *Visual*	FUTURE RUNWAY 16/34 *Larger than Utility* *Non-Precision Instrument*
Width of Primary Surface	500 feet	500 feet
Transitional Surface	7:1 Slope to 150 feet above runway	7:1 Slope to 150 feet above runway
Horizontal Surface Elevation/Radius	150 feet above airport elevation/5,000 feet	150 feet above airport elevation/10,000 feet
Conical Surface	20:1 for 4,000	20:1 for 4,000
Approach Surface Length	5,000	10,000
Approach Surface Slope	20:1	34:1
Approach Surface Width at End	1,500	3,500



PLAN



SECTION A-A

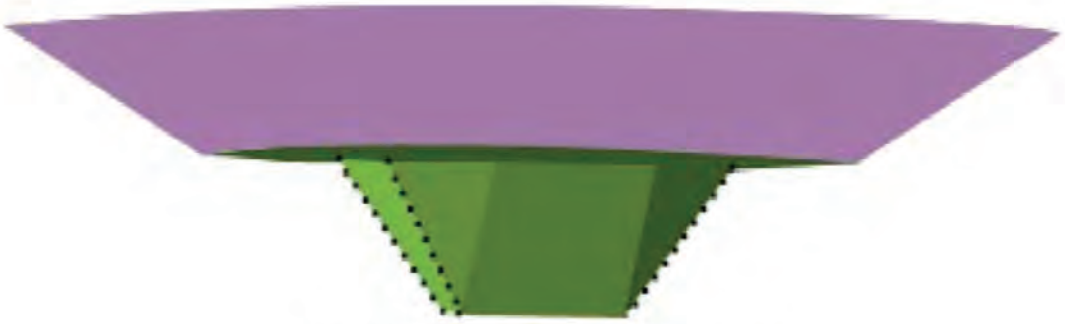
SURFACE SLOPE KEY

- HORIZONTAL SURFACE
- 20:1
- 7:1
- 7:1
- VARIES (SEE "E" VALUE IN TABLE BELOW)
- 40:1 (PRECISION INSTRUMENT RUNWAY ONLY)

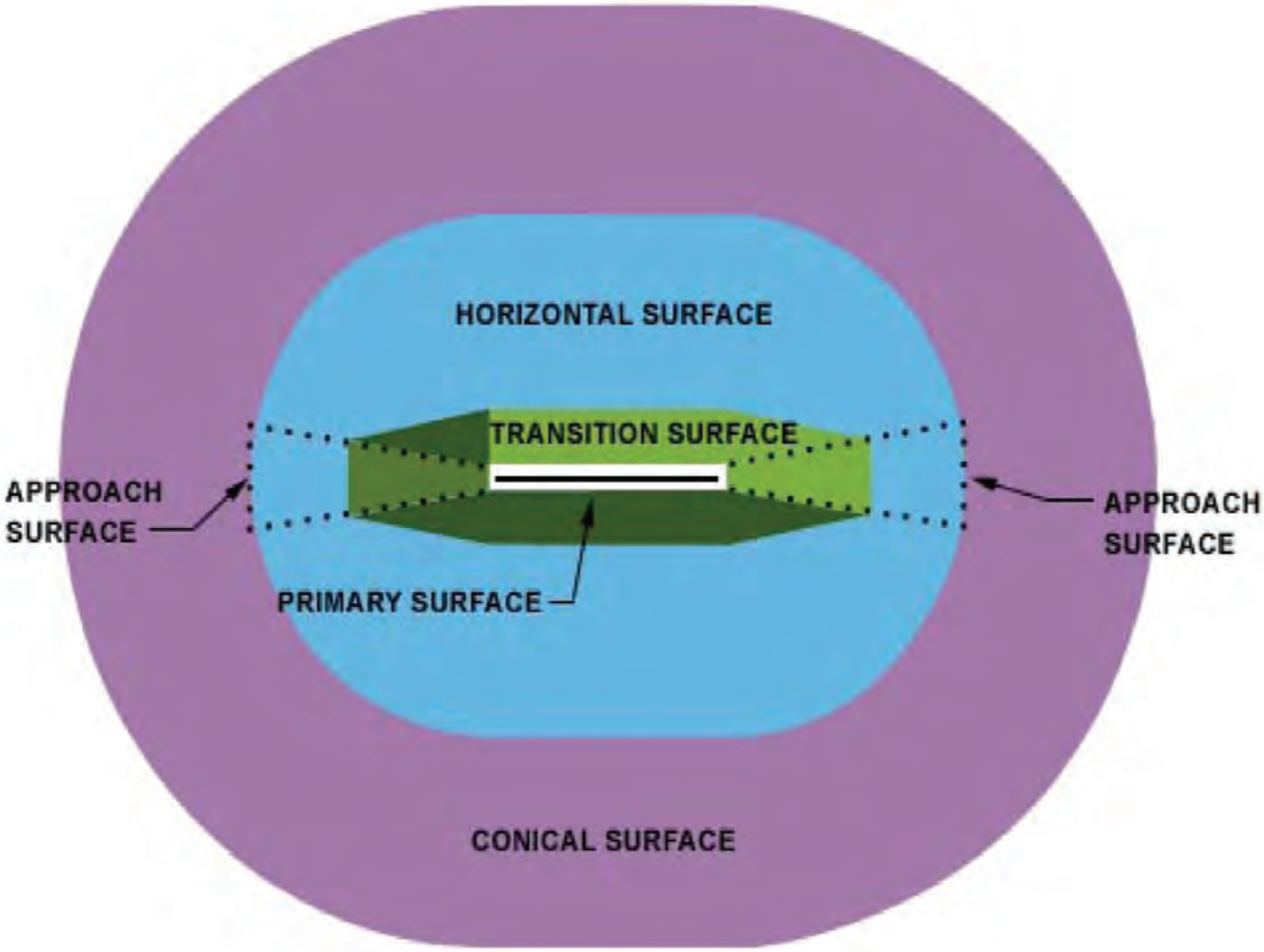
CIVIL AIRPORT IMAGINARY SURFACES

DIM.	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
		UTILITY	LARGER THAN UTILITY	UTILITY	LARGER THAN UTILITY		
					X	Y	
A	WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WIDTH AT INNER END	250	500	500	500	1,000	1,000
B	RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
		VISUAL APPROACH		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT APPROACH
		UTILITY	LARGER THAN UTILITY	UTILITY	LARGER THAN UTILITY		
					X	Y	
C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500	4,000	15,000
D	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	*
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	*

X - VISIBILITY MINIMUMS GREATER THAN 3/4 MILE
Y - VISIBILITY MINIMUMS AS LOW AS 3/4 MILE
* - PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET



PROTECTED AIRSPACE



PRIMARY SURFACE

The primary surface is a flat plane of airspace longitudinally centered on the runway and extends 200 feet beyond the runway end. The primary surface elevation is established by the elevation of the runway centerline along the length of the surface. The existing primary surface width for Runway 16/34 is 500 feet and is contained entirely within airport property. The primary surface should be free of any penetrations, except items with locations fixed by function (i.e., PAPI, runway or taxiway edge lights, etc.). The primary surface end connects to the inner portion of the runway approach surface.

The 2004 Airport Airspace Plan identified the wind cone located in the segmented circle on the east side of the runway as a primary surface penetration (23.5'). The item is identified as a frangible NAVAID with "no action" recommended.

APPROACH SURFACES

Runway approach surfaces extend outward and upward from each end of the primary surface, along the extended runway centerline. As noted earlier, the dimensions and slope of approach surfaces are determined by the type of aircraft intended to use the runway and most demanding approach planned for the runway.

The 2004 Airport Airspace Plan depicts ultimate 20:1 approach surfaces for Runway 16/34 (in plan view) based on the current 3,600-foot runway length. The approach surfaces are consistent with the current runway category, approach capabilities, and approach visibility minimums. The approach surfaces extend 5,000 feet from the end of the runway primary surface. 7 tree obstructions were identified in the 20:1 runway approach surfaces (4 in Runway 16 approach and 3 in Runway 34 approach) with penetrations ranging from 6.5 to 44 feet. The recommended disposition identified on the plan for the tree obstructions is "remove." An accompanying drawing (Runway 16/34 Protection Zone Profiles) depicts profile views for the existing and future FAR Part 77 approach surfaces and existing/future "obstruction clearance approach slopes" for the runway. The current FAA 5010 Airport Record Form identifies trees as obstructions to both runway approaches:

Runway 16: Trees; 132 feet above ground level; 1,649 feet north of Runway 16 threshold; 75 feet left; obstruction clearance of 11:1.

Runway 34: Trees; 92 feet above ground level; 1,430 feet south of Runway 34 threshold; on centerline; obstruction clearance of 13:1.

As noted in Table 4-4, an upgrade from a visual to a nonprecision instrument approach capability will change the size and slope of runway approach surfaces. The amount of penetration of items in the current 20:1 approach surfaces will increase with the flatter 34:1 nonprecision instrument approach surface. Additional obstructions may also exist based on the flatter and longer approach surface.

TRANSITIONAL SURFACE

The transitional surface is located at the outer edge of the primary surface, represented by a plane of airspace that rises perpendicularly at a slope of 7 to 1, beginning 250 feet from either side of runway centerline. The 2004 Airport Airspace Plan identified 24 tree obstructions in the runway transitional surface, with the heaviest concentration located near the south end of the runway (east side). The transitional surface penetrations ranged from 5.3 to 69.7 feet. The recommended disposition identified on the plan for the tree obstructions is "remove."

The configuration and slope of the existing transitional surface is not affected by a future upgrade to nonprecision approach capabilities due to the existing "Larger than Utility" runway category. However, any increase in runway length will extend the transitional surface along the runway, which may capture additional obstructions.

HORIZONTAL SURFACE

The horizontal surface is a flat plane of airspace located 150 feet above runway elevation with its boundaries defined by the radii that extend from each runway end. The outer points of the radii for each runway are connected to form an oval, which is defined as the horizontal surface.

The 2004 Airport Airspace Plan depicts a horizontal surface with 5,000-foot radii, which is consistent with visual approach capabilities for the runway. No obstructions were identified in the horizontal surface on the 2004 Airport Airspace Plan. An upgrade to nonprecision instrument capabilities will extend the radius of the horizontal surface to 10,000 feet. Topographical mapping will be examined for potential area of terrain penetration as part of the preparation of the updated FAR Part 77 Airspace Plan.

CONICAL SURFACE

The conical surface is an outer band of airspace, which abuts the horizontal surface. The conical surface begins at the elevation of the horizontal surface and extends outward 4,000 feet at a slope of 20:1.

The 2004 Airport Airspace Plan depicts a conical surface that extends from the 5,000-foot horizontal surface radii, which is consistent with visual approach capabilities for the runway. No obstructions were identified in the conical surface on the 2004 Airport Airspace Plan. An upgrade to nonprecision instrument capabilities will alter the location of the conical surface to match the 10,000-foot radius of the horizontal surface. Topographical mapping will be examined for potential area of terrain penetration as part of the preparation of the updated FAR Part 77 Airspace Plan.

Airside Requirements

Airside facilities are those directly related to the arrival and departure and movement of aircraft:

- Runways
- Taxiways
- Airfield Instrumentation and Lighting

Runways

The adequacy of the existing runway system at Bandon State Airport was analyzed from a number of perspectives including runway orientation, airfield capacity, runway length, and pavement strength.

RUNWAY ORIENTATION & WIND COVERAGE

The orientation of runways for takeoff and landing operations is primarily a function of wind velocity and direction, combined with the ability of aircraft to operate under adverse wind conditions. A runway's wind coverage is measured by an aircraft's ability to operate with a "direct" crosswind, which is defined as 90 degrees to the direction of travel. For runway planning purposes, the maximum direct crosswind for small aircraft is 12 miles per hour (10.5 knots); for larger general aviation aircraft, a 15-mile per hour (13 knot) direct crosswind is used. Aircraft are able to operate safely in progressively higher wind speeds as the crosswind angle decreases and the wind direction turns more closely to the direction of flight. In addition, some aircraft are designed to safely operate with higher crosswind components. Ideally, an aircraft will take off and land directly into the wind or with light crosswind. The FAA recommends that primary runways accommodate at least 95 percent of local wind conditions; when this level of coverage is not provided, the FAA recommends development of a secondary (crosswind) runway.

As noted earlier, on-site wind data are not available at Bandon State Airport. A review of wind data from nearby Southwest Oregon Regional Airport indicated that the Runway 16/34 alignment provides approximately 95.66 percent wind coverage for small aircraft (based on a 10.5 knot crosswind component) and 97.78 percent for large aircraft. It appears that the current runway alignment provides adequate wind coverage based on the FAA's 95 percent threshold. It is recommended that an updated wind rose be prepared for Runway 16/34 when on-airport data become available through future on-site weather observation.

RUNWAY LENGTH

Runway length requirements are based primarily upon airport elevation, mean maximum daily temperature of the hottest month, runway gradient, and the critical aircraft type expected to use the runway.

The updated forecasts of aviation activity anticipate a gradual increase in business class aircraft activity during the current planning period and change in design aircraft. The activity will initially include a variety of smaller business class turboprops and jets capable of operating on the existing 3,600 foot runway in either a reduced payload or unconstrained mode. This is expected to include single- and multi-engine turboprops, light jets and conventional business jets. At sea level, these aircraft routinely operate on runways of 4,000 to 4,500 feet long (400 to 900 feet longer than the current 3,600-foot runway) when unconstrained.

For Bandon State Airport, the future design aircraft identified in the updated aviation activity forecasts is a medium size business jet (above 12,500 pounds), such as a Cessna Citation Bravo. This aircraft is representative of a segment of small/medium business jets that currently operates at the airport on a limited basis, but is constrained by facility limitations (runway length, width, pavement strength, no instrument approach, etc.). Currently, most of this type of activity is accommodated at Southwest Oregon Regional Airport in North Bend. However, local attractions, including Bandon Dunes Golf Resort, are expected to contribute to a gradually increasing share of local air traffic at Bandon State Airport during the current planning period, while continuing to rely on Southwest Oregon Regional Airport to accommodate the majority of traffic, particularly larger or high performance business jets.

As noted earlier in this chapter, the anticipated growth in single-engine turboprop activity during the planning period may be sufficient to justify an upgrade to ADG II standards before demand generated by multi-engine aircraft requiring additional runway length reaches the FAA "substantial use threshold." Upgrading the existing runway-taxiway system to ADG II standards, particularly increasing runway width to 75 feet, may encourage increased use by multi-engine aircraft that could benefit by increased runway length.

For general aviation airport runways used by large aircraft (aircraft with maximum takeoff weights between 12,500 pounds and 60,000 pounds), the FAA recommends an evaluation based on the "family of aircraft" approach which captures the most common aircraft within a particular category. FAA Advisory Circular (AC) 150-5324-4B, Runway Length Requirements for Airport Design identifies a group of "airplanes that make up 75 percent of the fleet." Table 4-5 summarizes representative aircraft within this "family of aircraft," which includes the design aircraft for Bandon State Airport. The FAA indicates that the selection of the 60- or 90-percent of useful load curves is based on the haul lengths and service needs of critical design aircraft. Assuming a typical haul length of 500 miles or less, it appears that 60 percent of useful load profile for the 75 percent of the fleet is most consistent with current and forecast activity.

TABLE 4-5: AIRPLANES THAT MAKE UP 75% OF THE FLEET (LARGE AIRPLANES LESS THAN 60,000 POUNDS)

- British Aerospace – Bae 124-700
- Beechcraft/Mitsubishi/Raytheon - Beechjet – 400A, Premier I
- Bombardier – Challenger 300
- Cessna – Citation I/II/III/V/VII, CJ-2, Bravo, Excel, Encore, Sovereign
- Dassault – Falcon 10, 20, 50
- Israel Aircraft Industries – Jet Commander 1121, 1123, 1124
- Learjet - 20 series, 30 series, 40, 45
- Raytheon Hawker – Hawker 400, 600
- Rockwell - Saberliner 75

Based on the FAA-recommended methodology, planning for Runway 16/34 should be consistent with the requirements of this segment of activity. It is recognized however, that the feasibility of increasing runway length at Bandon State Airport will reflect the limits of existing airport property or adjacent parcels that could be acquired through purchase. Zoning and land use regulations for adjacent parcels could also affect development feasibility, particularly for parcels that are zoned Exclusive Farm Use (EFU). The alternatives analysis will examine these issues to identify potential options for consideration. Based on current airport property ownership, it appears feasible to incrementally increase runway length without property acquisition and improve the airport's ability to accommodate a segment of business aviation demand.

A summary of FAA recommended runway lengths for planning based on the requirements of small aircraft and large general aviation aircraft in a variety of load configurations is presented in Table 4-6. The runway length requirements for a variety of business aircraft are summarized in Table 4-7 for comparison to the output from the FAA model.

TABLE 4-6: FAA RECOMMENDED RUNWAY LENGTHS FOR PLANNING (FROM FAA COMPUTER MODEL)

Runway Length Parameters for Bandon State Airport • Airport Elevation: 123 feet MSL • Mean Max Temperature in Hottest Month: 63.0 F • Maximum Difference in Runway Centerline Elevation: 17 Feet • Wet Runway • Existing Runway Length: 3,601'	
Small Airplanes with less than 10 seats	
75 percent of these airplanes	2,270 feet
95 percent of these airplanes	2,800 feet
100 percent of these airplanes	3,320 feet
Small airplanes with 10 or more seats	3,820 feet
Large Airplanes of 60,000 pounds or less	
75 percent of these airplanes at 60 percent useful load	5,250 feet
75 percent of these airplanes at 90 percent useful load	6,630 feet
100 percent of these airplanes at 60 percent useful load	5,410 feet
100 percent of these airplanes at 90 percent useful load	7,000 feet

TABLE 4-7: TYPICAL BUSINESS AIRCRAFT RUNWAY REQUIREMENTS

AIRCRAFT	PASSENGERS (TYPICAL CONFIGURATION)	MAXIMUM TAKEOFF WEIGHT	RUNWAY LENGTH REQUIRED FOR TAKEOFF[1]	RUNWAY LENGTH REQUIRED FOR LANDING[2]
Pilatus PC24	4	17,560	2,690	2,525
Cessna Citation Mustang	6	8,645	3,110	2,390
Cessna Citation CJ1+	4-6	10,700	3,530	2,660
Cessna Citation CJ2+	6-7	12,500	3,590	3,060
Cessna Citation CJ3	6-7	13,870	3,610	3,140
Cessna Citation CJ4	6-7	16,950	3,440	2,740
Cessna Citation Bravo	6-9	14,800	3,920	3,310
Cessna Citation Excel	7-8	20,000	3,750	3,260
Cessna Citation VII	7-8	22,450	4,950	3,000
Citation Sovereign	9-12	30,300	3,750	2,710
Cessna Citation X	8-12	36,100	5,340	3,530
Learjet 45	7-9	20,500	4,350(a)	2,660(a)
Challenger 300	8-15	37,500	4,950(a)	2,600(a)
Gulfstream 100 (Astra)	6-8	24,650	5,395(a)	2,920(a)
Gulfstream 200 (G-II)	8-10	35,450	6,080(a)	3,280(a)
Gulfstream 300 (G-III)	11-14	72,000	5,100(a)	3,190(a)

1. FAR Part 25 or 23 Balanced Field Length (Distance to 35 Feet Above the Runway); Sea Level, 77 degrees F; Zero Wind, Dry Level Runway, 15 degrees flaps, except otherwise noted.
2. Distance from 50 Feet Above the Runway; Flaps Land, Zero Wind. Dry Level Runway

(a) For general comparison only. Manufacturer runway length data based on sea level and standard day temperature (59 degrees F) at maximum takeoff/landing weight; higher airfield temperatures will require additional runway length and/or reduction in aircraft operating weight.

Source: Aircraft manufacturers operating data, flight planning guides.

The runway length requirements summarized in Table 4-7 confirms that a number of popular small and medium business jets are capable of operating on runways with lengths around 4,000 feet without significant operational limits in the most common local weather conditions. During higher temperatures some operational constraints may occur. Larger or more complex business jets would be limited in most conditions.

As noted earlier, the FAA establishes a "substantial use threshold" of 500 annual itinerant takeoffs and landings for the design aircraft or family of design aircraft. To pursue implementation of a planned runway extension, ODA would need to document sufficient activity (either aircraft currently using the airport that are regularly constrained by current runway length or new aircraft unable to operate at the airport due to runway length) to meet the FAA substantial use threshold.

Runway Width

Runway 16/34 is 60 feet wide, which meets the current ARC B-I dimensional standard based on approach visibility minimums of not lower than 1 mile. The future ARC B-II dimensional standard for runway width is 75 feet based on the same approach visibility criteria.

Airfield Pavement

As noted in Chapter Two, the airfield pavement at Bandon State Airport is designed to accommodate small aircraft and has a pavement strength rating of 12,000 pounds for aircraft equipped with single-wheel landing gear. Based on the future design aircraft, the weight bearing capacity of the runway, major taxiways and portions of the aircraft parking apron pavement should be increased to 30,000 pounds (single wheel) to accommodate typical business class aircraft.

A regular program of periodic maintenance is required to maximize the useful life of the pavement, including vegetation control, crack filling and fog/slurry seals.

In Chapter Two (Table 2-8), the pavement conditions at the airport from the past three inspections were summarized. Table 4-8 shows the current and predicted pavement conditions for current pavement sections from the 2013 pavement plan, assuming no maintenance is performed. Some of the sections of pavement inspected are off airport property (privately owned) and not eligible for FAA funding.

TABLE 4-8: FORECAST PAVEMENT CONDITION INDICES

PAVEMENT SECTION	2013 PCI [1]	2018 PCI [1]	2023 PCI [1]	CURRENT CONDITION
Runway	98	95	91	Good (Crack Seal in 2011)
Parallel Taxiway (North Section, AC Hold Area, North Exit Taxiway)	100	84	72	Good (Crack Seal in 2011)
Parallel Taxiway (Middle Section)	77	71	66	Satisfactory (Crack Seal in 2011)
Parallel Taxiway (South Section, AC Hold Area, South Exit Taxiway)	99	83	71	Satisfactory (Crack Seal in 2011)
Center Exit Taxiway	98	82	71	Good (Slurry Seal in 2003)
North Access Taxiway	81	75	70	Satisfactory (Crack Seal in 2011)
Taxiway Connection (SE corner of main apron) to Parallel Taxiway	87	81	76	Good (Crack Seal in 2011)
North Section of Main Apron	86	75	63	Good (Crack Seal in 2011)
South Section of Main Apron	85	79	74	Satisfactory (Crack Seal in 2011)
Main Apron (west edge of apron; hangar/FBO access)	40	39	37	Very Poor (Slurry Seal in 2006)
Taxilane for adjacent T-hangar (NW corner of main apron) - *Off Airport*	39	38	36	Very Poor
Taxilane for Private Hangar- *Off Airport*	77	68	62	Satisfactory

1. The Pavement Condition Index (PCI) scale ranges from 0 to 100, with seven general condition categories ranging from "failed" to "good." For additional details, see *Oregon Aviation System Plan Pavement Evaluation/Maintenance Management Program* (2014) for Bandon State Airport.

Taxiways

Taxiways are constructed primarily to facilitate aircraft movements to and from the runway system. Some taxiways are necessary simply to provide access between apron and runways, while other taxiways become necessary as activity increases and safer and more efficient use of the airfield is needed. The existing taxiway system at Bandon State Airport provides aircraft access to the runway and all landside facilities.

PARALLEL TAXIWAY AND EXIT TAXIWAYS

As noted earlier, the parallel taxiway and exit taxiways meet all B-I standards, taxiway access is provided to the full runway and aircraft hold areas are provide at both ends of the runway. A parallel taxiway extension is recommended in conjunction with any future runway extension.

Application of the future ADG II standard will require significant changes to the existing taxiway including widening (35 feet) and an increase in runway separation (240 feet). The existing aircraft hold areas will also require modification/replacement to meet ADG II standards.

TAXILANES

The main apron is configured with a primary access taxiway that travels through the apron and three stub taxilanes that serve four rows of aircraft tiedowns. The apron is connected to the parallel taxiway by a short access taxiway (35 feet wide) at the south end and a long access taxilane (25 feet wide) at the north end. Several off-airport hangars are accessed from a connecting taxilane that extends south of the main apron.

The configuration of aircraft tiedowns and adjacent taxilanes on the main apron was identified earlier as nonstandard for taxilane object free area. Although the small tiedown anchors are installed along the edges of the 79-foot taxilane OFA in the northern rows, portions of aircraft parked in these positions extend into the OFA. The FAA clearing standard for taxilane OFAs is measured as the distance from taxilane centerline to a fixed or movable object (parked aircraft). The southern aircraft tiedown positions used by larger aircraft have similar clearance issues. The configuration of the existing parking on the main apron will be examined in the alternatives analysis in conjunction with evaluating future parking requirements.

The ADG I taxilane OFA width standard is 79 feet (39.5 feet from centerline); the ADG II width standard is 115 feet (57.5 feet from centerline. The main access taxilanes and taxilanes used to access business aircraft parking located within the main aircraft apron should be configured to accommodate ADG II aircraft. Taxilanes used to access small airplane tiedowns are typically designed to accommodate ADG I aircraft.

Airfield Instrumentation, Lighting and Marking

NAVIGATIONAL AIDS

There are no navigational aids (NAVAID) at Bandon State Airport. The nearest NAVAID is the Very High Frequency Omnidirectional Range (VOR) for Southwest Oregon Regional Airport (North Bend VORTAC) approximately 21 NM north.

Future instrument approach capabilities would be provided by GPS-based systems that do not require ground-based navigational aids. The FAA NextGen program is currently being implemented which represents the evolution from the ground-based system of air traffic control to a satellite-based system. The integration of NextGen technology with satellite based instrument approach capabilities is expected to allow small airports to access instrument flight capabilities with minimal onsite facility investment.

AIRFIELD LIGHTING AND SIGNAGE

The lighting systems associated with the runway include Medium Intensity Runway Lighting (MIRL), Runway End Identifier Lights (REIL) and Precision Approach Path Indicators (PAPI). Other airfield lighting includes the rotating beacon and lighted wind cone. All lighting systems are reported to operate normally and are in good condition. However, replacement of these items should be anticipated during the planning period based on typical useful life of the systems and the local coastal marine climate.

The Runway 16 PAPI is currently out of service indefinitely due to obstructions (trees) that are interfering with the glide path. It appears that the PAPI can be activated once the glide path is cleared of obstructions.

The parallel taxiway and exit taxiways are is equipped with edge reflectors that require periodic replacement. The addition of taxiway edge lighting may be considered in the future depending on the level of night operations, although edge reflectors are generally adequate and economical.

It is anticipated that existing airfield signage on the airport will need to be replaced or upgraded during the planning period.

RUNWAY MARKINGS

Both ends of Runway 16/34 have non-precision instrument (NPI) markings which include designation numbers, centerline stripe and threshold bars indicating the end of usable runway. The blast pads located at each end of the runway are marked with yellow chevrons. These marking currently exceed standards for a visual runway and meet standards for the future A/B-II non-precision instrument runway. Any future runway extension(s) will require new non-precision instrument markings to accommodate instrument approach capabilities to that runway end.

On Field Weather Data

Bandon State Airport does not have on-site weather observation capabilities such as an automated weather observation system (AWOS) or automated surface observation system (ASOS). The nearest airport weather is available at Southwest Oregon Regional Airport in North Bend, 21 miles north- northeast. The 2004 Airport Layout Plan identified an ASOS as a high priority (2005) project in the airport's 20-year capital improvement program (CIP). The availability of on-site weather data at Bandon will benefit both local and regional visual flight rules (VFR) activity and also support future instrument approach capabilities.

Landside Facilities

For general aviation airports, landside facilities are generally defined as those that serve aircraft, passenger needs and their related functions. At Bandon State Airport, landside facilities include aircraft aprons, hangars, fixed base operator (FBO), and aircraft fueling facilities.

AIRCRAFT PARKING AND TIEDOWN APRON

Aircraft aprons provide parking for both locally based aircraft that are not stored in hangars and for transient aircraft visiting the airport. Bandon State Airport has a single main apron (approximately 14,666 square yards) configured with 21 aircraft parking positons in four rows. The apron has 13 small aircraft tiedowns and 8 tiedowns for larger airplanes.

As noted earlier, the current configuration of the main apron taxilanes and adjacent aircraft parking areas does not fully conform to FAA taxilane object free area standards. Options for addressing the apron configuration and the current and future (ADG I and ADG II) FAA standards will be evaluated in the alternatives analysis, in addition to planning for future demand and fleet mix.

For planning purposes, it is assumed that 10 percent of current and forecast based aircraft will utilize apron parking and 90% will utilize hangar storage. While the percentage of hangared based aircraft may occasionally be close to 100 percent, this planning metric reflects the potential to attract and accommodate based aircraft when hangar space is unavailable.

As indicated in the aviation activity forecasts, the number of based aircraft at Bandon State Airport is projected to increase from 37 to 50 during the twenty-year planning period. Assuming 10 percent of based aircraft will require apron parking demand for locally based aircraft tiedowns will range from 4 to 5 during the twenty year planning period. The FAA planning criterion of 300 square yards per based aircraft was used to determine future itinerant ramp requirements for small airplane parking.

FAA AC 150/5300-13 suggests a methodology by which itinerant parking requirements can be determined from knowledge of busy day operations (takeoffs and landings).[2] Based on seasonal travel demand and the remoteness of the area, it is assumed that a relatively high percentage of busy day (the average day in the peak month) aircraft will need to be accommodated simultaneously. For planning purposes, future demand for itinerant parking spaces was estimated based on 50 percent of design day itinerant operations (50% of design day itinerant operations divided by two, to identify peak parking demand). Itinerant aircraft parking requirements are estimated to range from 6 to 10 during the twenty year planning period and will include a variety of aircraft types. The FAA planning criterion of 360 square yards per itinerant (small) aircraft was used to determine future itinerant ramp requirements. Larger space allocations are used to determine parking requirements for multi-engine or business class aircraft and helicopters. Projected aircraft parking requirements are summarized in Table 4-9.

It is recognized that forecast growth in based and transient aircraft activity is modest and could be exceeded if conditions are favorable. Individual aircraft owner needs vary and demand can be influenced by a wide range of factors beyond the control of an airport. Based on the potential for higher demand, it is recommended that a development reserve equal to 100 percent of forecast demand be used in future apron planning.

OTHER DESIGN CONSIDERATIONS

When evaluating apron requirements, it is important to note that approximately 71 percent of the current apron area is configured with taxilanes and the associated object free areas. These areas used for

[2] Busy Day Operations is defined as the average number of daily operations during the peak month (peak month operations divided by 30 days).

aircraft movement and are not available to accommodate aircraft parking or fueling. As noted earlier, the current apron configuration does not fully meet FAA taxilane OFA clearance standards for ADG I aircraft. In addition, the future ADG II design aircraft will require increased taxilane OFA setbacks for the main access taxilanes and adjacent to large aircraft parking positions. The need to increase clearances between parked aircraft and adjacent taxilanes will require changes to the existing apron configuration, which may result in a loss of existing parking capacity or potentially require apron expansion/reconfiguration to meet standards. Other design considerations include the need to provide a dedicated aircraft fueling area that is clear of adjacent taxilane OFAs and aircraft parking positions, and helicopter parking that provides adequate separation from fixed wing aircraft parking to minimize rotor wash damage.

AIRCRAFT HANGARS

Bandon State Airport accommodates a variety of hangars including commercial hangars and hangars used primarily for aircraft storage (conventional hangars and T-hangars). It is estimated that 90 percent of the airport's based aircraft are stored in hangars. For planning purposes, it is assumed that existing hangar space is committed and all additional (forecast) demand would need to be met through new construction.

As indicated in the aviation activity forecasts, the number of based aircraft at Bandon State Airport is projected to increase by 13 aircraft during the twenty year planning period. Based on a projected 90 percent hangar utilization level, additional demand for new hangar space is estimated to be 12 spaces (approximately 18,000 square feet). A planning standard of 1,500 square feet per based aircraft stored in hangars is used to project gross space requirements. The projected hangar requirements for aircraft storage at Bandon State Airport are presented in Table 4-9.

Individual aircraft owners needs vary and demand can be influenced by a wide range of factors beyond the control of an airport. In addition, the moderate forecast growth in based aircraft may be exceeded if conditions are favorable. For this reason, it is recommended that hangar development reserves be identified to address the uncertainty of hangar market conditions and demand factors. Conservative development reserves should be established to accommodate a combination of conventional hangars and T-hangars, roughly equal to 50 to 100 percent of the twenty year forecast (net) demand. The location and configuration of the development reserves will be addressed in the alternatives analysis.

In addition to aircraft storage, additional demand for business related and commercial hangar needs may be required. Specialized aviation service businesses such as fixed base operators (FBO), engine & airframe repair, etc. generally prefer locations that provide convenient aircraft access and public access. While there is no specific formula to predict demand for general aviation service businesses at a particular airport, reserving space for larger commercial hangars is recommended.

TABLE 4-9: APRON AND HANGAR FACILITY REQUIREMENTS SUMMARY

ITEM	BASE YEAR 2014	2019	2024	2029	2034
Based Aircraft Forecast	**37**	**40**	**43**	**46**	**50**
Aircraft Parking Apron *(Note: capacities reflect current configuration of existing public use apron areas, actual capacity when reconfigured may be different.)*					
Small Aircraft Tiedowns (SE/ME)	13				
Large Aircraft Tiedowns (ME/TP)	8				
Small Helicopter Parking Spaces	0*				
Total Designated Parking Spaces Available	21				
Total Apron Area *(main apron area including taxilanes)*	14,666 SY (Apprx.)				
Projected Needs (*Gross Demand*) [1]					
Transient Small Airplane Tiedowns (@ 360 SY each)		3 1,080 SY	3 1,080 SY	3 1,080 SY	4 1,440 SY
Locally-Based Tiedowns (@ 300 SY each)		4 1,200 SY	4 1,200 SY	5 1,500 SY	5 1,500 SY
Transient Business Aircraft Parking Positions (@ 625 SY each)		2 1,250 SY	3 1,875 SY	4 2,500 SY	5 3,125 SY
Transient Small Helicopter Parking Positions (@ 380 SY each)		1 380 SY	1 380 SY	1 380 SY	1 380 SY
Total Apron Needs (Aircraft Parking)		10 3,910 SY	11 4,535 SY	13 5,460 SY	15 6,445 SY
Aircraft Hangars					
Existing Hangar Spaces T-Hangar Conventional Hangar	22 9-18[3]				
(New) Hangar Demand[2] (@ 1,500 sf per space) *(Cumulative twenty year projected demand 12 spaces / 18,000 sf)*		3 spaces/ 4,500 sf	3 spaces/ 4,500 sf	3 spaces/ 4,500 sf	3 spaces/ 4,500 sf

* These aircraft are accommodated on the main apron (open areas)

1. Aircraft parking demand levels identified for each forecast year represent total gross demand
2. Hangar demand levels current hangar capacity (assume 1,500 sf per space)
3. Conventional hangars may accommodate multiple aircraft (assumed capacity 1 to 2 aircraft per hangar)

AIRCRAFT WASH DOWN FACILITIES

Wash down facilities are recommended to accommodate general aviation aircraft with a catch basin and hard piping to divert wash residue into a sanitary sewer or stormwater treatment system. Wash facilities are typically sized to accommodate one aircraft on a pad approximately 50 feet by 50 feet. The wash pad may be located adjacent to existing parking apron or hangars; close access to utility systems is a key siting factor.

SURFACE ACCESS AND VEHICLE PARKING

Access to Bandon State Airport is provided by Kehl Road, which enters the west side of the airport near midfield, directly from U.S. Route 101. The current public access to the airport appears to be adequate, although it currently terminates on privately owned land (gravel parking lot) abutting the west side of the airport. Public or tenant access to the aircraft parking apron and existing hangars is limited and requires driving on taxilanes or taxiways. An undeveloped landside area in the northwest section of the airport is not currently served with vehicle access. Upgrades to the existing vehicle access within the west landside areas should be evaluated as part of the alternatives analysis when considering future development options.

The existing vehicle parking lot is located off airport property on the west side of the buildings located along the west side of the main apron. Vehicle parking on the airport is limited to areas adjacent to hangars located north of the main apron. Vehicles routinely park along the west edge of the main apron, partly within the main access taxilane OFA. Options for relocating this activity out of the taxilane OFA should be considered in the alternatives analysis.

AGRICULTURAL AIRCRAFT FACILITIES

There are currently no aerial applicator loading or containment facilities at Bandon State Airport and no known demand for facilities.

Support Facilities

AVIATION FUEL STORAGE

A 12,000 gallon above ground double wall storage tank with 100LL (AVGAS) including a dispensing facility were installed near the south end of the main apron in 2009. Frank's Flight Service is responsible for dispensing this fuel, and the tanks are owned by Bandon Aero Club.

Based on the projected increase in turbine aircraft activity at the airport, terminal area planning should include adequate space to accommodate a second tank for jet fuel (Jet A). With the future of 100LL aviation gasoline uncertain at this time, demand for additional fuel grades, including automobile gasoline and the eventual 100LL replacement may require multiple tanks. Local market conditions normally dictate decisions on private investment in aircraft fuel storage.

GENERAL AVIATION TERMINAL/FIXED BASE OPERATOR BUILDING

Existing facilities consist of the Bandon Aero Club building located adjacent to the main apron. The building includes public restrooms, telephone and meeting areas. The forecast growth in transient business aircraft activity at the airport is expected to generate increased demand for transient passenger services, public access and vehicle parking. Future demand for additional fixed base operator (FBO) facilities or a general aviation terminal should be considered in the terminal area planning.

UTILITIES

The airport's landside facilities are located on the west side of the runway, which is served by electricity, water and telephone services located along the Highway 101 corridor. The City of Bandon provides sanitary sewer and waste water treatment plan services within Bandon's city limits and urban growth area, although the airport is not currently connected to City services. Buildings on the airport are served by individual septic systems. Water on the airport is provided by the City of Bandon through local wells.

Extension of City water and sewer service to the airport is recommended to support current and future development needs. Electricity for the airport is supplied by Bandon Power. New electrical service on the airport should be placed underground where feasible to reduce overhead hazards to aircraft operation. Natural gas is not currently available in Bandon but may be provided in the future. Extending natural gas service to the airport is recommended to support future development.

Security

The airport currently has wire fencing located along portions of its property line. Although fencing is not required at general aviation airports such as Bandon State, it is recommended that the airport installs new fencing to increase security and to protect the airfield from wildlife concerns. Typical airport fencing consists of six to eight feet high chain link with three strand barbed wire. Flood lighting is recommended in aircraft fueling locations, aircraft parking and hangar areas. The use of full or partial cutoff light fixtures is recommended for all exterior lighting on airports to limit upward glare.

Facility Requirements Summary

The projected twenty year facility needs for Bandon State Airport are summarized in Table 4-10. As noted in the table, maintaining existing pavements represents a significant, ongoing facility need. The updated forecast of aviation activity anticipates growth activity that will generate airside and landside facility demands beyond existing capabilities. The anticipated change from airplane design group I to II during the planning period will require significant upgrades to the existing runway-taxiway system. Existing terminal area facilities will require reconfiguration and/or expansion to accommodate forecast activity and the change in design aircraft. Demand for new or expanded facilities, such as aircraft hangars, will be market driven. However, significant improvements in surface access, utility extensions, site preparation and taxiway construction will be required to facilitate new development on the west side of the airfield.

TABLE 4-10: FACILITY REQUIREMENTS SUMMARY

ITEM	SHORT TERM	LONG TERM
Runway 16/34	Pavement maintenance	Pavement maintenance Overlay existing runway AGIS Survey Runway Extension (approximately 400 feet or based on specific design aircraft) Increase pavement strength to 30,000 pounds single wheel Upgrade runway to ADG II standards • Widen to 75 feet Expand OFA, OFZ and RSA
Taxiways	Pavement maintenance Replace Edge Reflectors	Pavement maintenance Increase pavement strength to 30,000 pounds single wheel Install taxiway edge lighting Upgrade parallel taxiway to ADG II standards • Increase runway separation to 240 feet • Widen to 35 feet • Expand TSA, OFA
Hangar/Access Taxilanes	Pavement maintenance Reconfigure main apron taxilanes to meet ADG II/I OFA standards Evaluate off-airport pavement maintenance	Pavement maintenance Taxilane access to new hangar sites
Aircraft Apron	Pavement maintenance Reconfigure main apron tiedowns, large aircraft parking and fuel area to meet taxilane OFA clearance standards	Pavement maintenance Overlay main apron Apron expansion /reserve
Hangars	Define development areas for T-hangars, Conventional Hangars and Commercial Hangars.	Hangar development reserves
Navigational Aids and Lighting	Reactivate Runway 16 PAPI (obstruction removal) Instrument approach development and obstruction/AGIS survey	Replace MIRL, REiL and PAPI (at end of useful life) Install AWOS
Fuel Storage	Define fueling area (clear of taxilane OFA clear areas) Provide space for additional fuel tanks/grades	Develop mobile fuel parking/containment area (as fuel trucks are used at airport)
FBO	Address vehicle parking and access	General aviation terminal (reserve) FBO facilities expansion (reserve)
Utilities	Identify areas and utilities needed to support future development.	Same
Roadways & Vehicle Parking	Evaluate public access requirements to terminal area and other landside facilities. Extend roads to new development areas. Add vehicle parking area in existing and future hangar areas. Pave primary parking area adjacent to main apron and FBO.	Same
Security	Identify fencing, access gates and lighting needs and locations.	Install new perimeter fencing and automated gates for landside areas. Install flood lighting in hangar and apron areas.
Note: Vegetation control, crackfill, sealcoat, slurry seal, localized patching, joint rehabilitation, etc., as required.		

Airfield Capacity

Annual service volume (ASV) is a measure of estimated airport capacity and delay used for long-term planning. ASV, as defined in FAA Advisory Circular (AC) 150/5060-5, Airport Capacity and Delay, provides a reasonable estimate of an airport's operational capacity. The ratio between demand and capacity helps to define a timeline to address potential runway capacity constraints before they reach a critical point. If average delay becomes excessive (greater than 3 minutes per aircraft), significant congestion can occur on a regular basis, which significantly reduces the efficient movement of air traffic. ASV is calculated based on the runway and taxiway configuration, percent of VFR/IFR traffic, aircraft mix, lighting, instrumentation, the availability of terminal radar coverage and the level of air traffic control at an airport.

The 2004 ALP Report did not analyze annual airfield capacity. However, for long-term planning purposes, the FAA estimates annual capacity (ASV) for a single runway with no air carrier traffic is approximately 230,000 operations; hourly capacity is estimated to be 98 operations during visual flight rules (VFR) conditions and 59 operations during instrument flight rules (IFR) conditions. Although these estimates assume optimal conditions (air traffic control, etc.), they provide a reasonable basis for approximating existing and future capacity:

Existing Capacity: 11,100 Annual Operations / 230,000 ASV = 4.8% (demand/capacity ratio)

Future Capacity: 20,000 Annual Operations / 230,000 ASV = 8.7% (demand/capacity ratio)

Based on these ratios, the average delay per aircraft would be expected to remain below one minute through the planning period. The FAA recommends that airports proceed with planning to provide additional capacity when 60 percent of ASV is reached. As indicated in the updated aviation activity forecasts, peak hour activity is projected to remain well below the 60 percent threshold during the planning period.