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PORT OF ASTORIA

Astoria Regional Airport

Master Plan Update

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A. Inventory of Existing Conditions

A Inventory of Existing Conditions

INTRODUCTION. The Astoria Regional Airport, owned and operated by the Port of Astoria, is a general aviation airport located in Warrenton, Oregon. The Airport is adjacent to the Oregon Coast Highway (US 101) and the Youngs Bay area at the mouth of the Columbia River. The natural characteristics of the area around the Airport are impressive, including forested hillsides, the pacific coastline, and the immense Columbia River. It should also be noted that the Airport is located within ten minutes of the City of Astoria, 20 minutes of the City of Seaside, and only 40 minutes of Cannon Beach and the Long Beach Peninsula.

While airport planning documents related to the layout of airport facilities have been kept up-to-date, an overall master planning study of airport facilities has not been completed since 1993. During this time, aviation issues on the local, regional, and national levels have changed. This Airport Master Plan Update is intended to provide a comprehensive evaluation of the Airport, and result in a well-conceived, long-term facilities and operational plan for accommodating the anticipated future aviation demand. The future requirements will be evaluated not only from the standpoint of aviation needs, but also in consideration of the relationship of airport facilities to the surrounding land uses and the community as a whole. This planning document will focus on a complete and comprehensive aviation facility, with the overall goal being facilities development that can accommodate future demand that is not significantly constrained by its environs.

This initial *Inventory* chapter will examine three basic elements of the Airport, which are physical facilities (runway, taxiways, aircraft parking aprons, hangars, ground access, etc.); the relationship to the airport/airspace system; and the airport environs. Subsequent chapters will detail existing aviation activity occurring at the Airport, the Airport's forecasts of aviation activity, and will evaluate the existing facility's ability to safely and efficiently meet the demands of the projected aviation activity. Alternatives will be analyzed that provide necessary facilities to meet that projected demand and the preferred future development will be recommended. Further, an implementation schedule will be provided, along with cost estimates for proposed projects, and a program for funding of proposed improvements.

The Airport provides convenient air transportation facilities for business and recreational commuters, in addition to serving as a center for aviation training and pleasure flying for area residents. The Airport also supports US Coast Guard and military missions by accommodating both fixed wing and helicopter activity, and has a military fuel contract. The Airport and its associated aviation-related businesses and facilities represent a vital and significant economic asset to the region. The Airport's relative location within the region is illustrated in Figure A1, *AIRPORT LOCATION MAP*.

Airport Role and Facilities

The Airport is owned and operated by the Port of Astoria. The Airport is classified as a general aviation airport by the Federal Aviation Administration's (FAA) National Plan of Integrated Airport Systems (NPIAS). As illustrated in Figure A2, *AIRPORT VICINITY MAP*, Astoria Regional Airport is located in northwest Oregon.

- **Airport Reference Point (ARP)[1]:**
  Latitude 46° 09' 28.7000"N
  Longitude 123° 52' 43.3000"W
- **FAA Location Identifier: AST**
- **National Plan of Integrated Airport Systems (NPIAS) Classification:**
- **GENERAL AVIATION**
- **Acreage: 870 acres**
- **Elevation: 14.9 feet above mean sea level[2]**
- **Mean Maximum Temperature of the Hottest Month: 68.8°F (July)**

Airside Facilities

Runways. Astoria Regional Airport is operated with two runways, Runway 08/26 and Runway 13/31. Figure A3, entitled *EXISTING AIRPORT LAYOUT,* provides a graphic presentation of the existing airport facilities. Runway 8/26 is 5,796 feet in length and 100 feet in width, and is generally oriented in an east/west direction. Runway 8 has a displaced threshold of 300 feet to accommodate the FAA safety area standards and Runway 26 has a displaced threshold of 715 feet to achieve proper approach slope clearances over the adjacent dike.

[1] FAA ASIS Datasheet, 3/15/06, survey 10/30/97.
[2] Ibid.

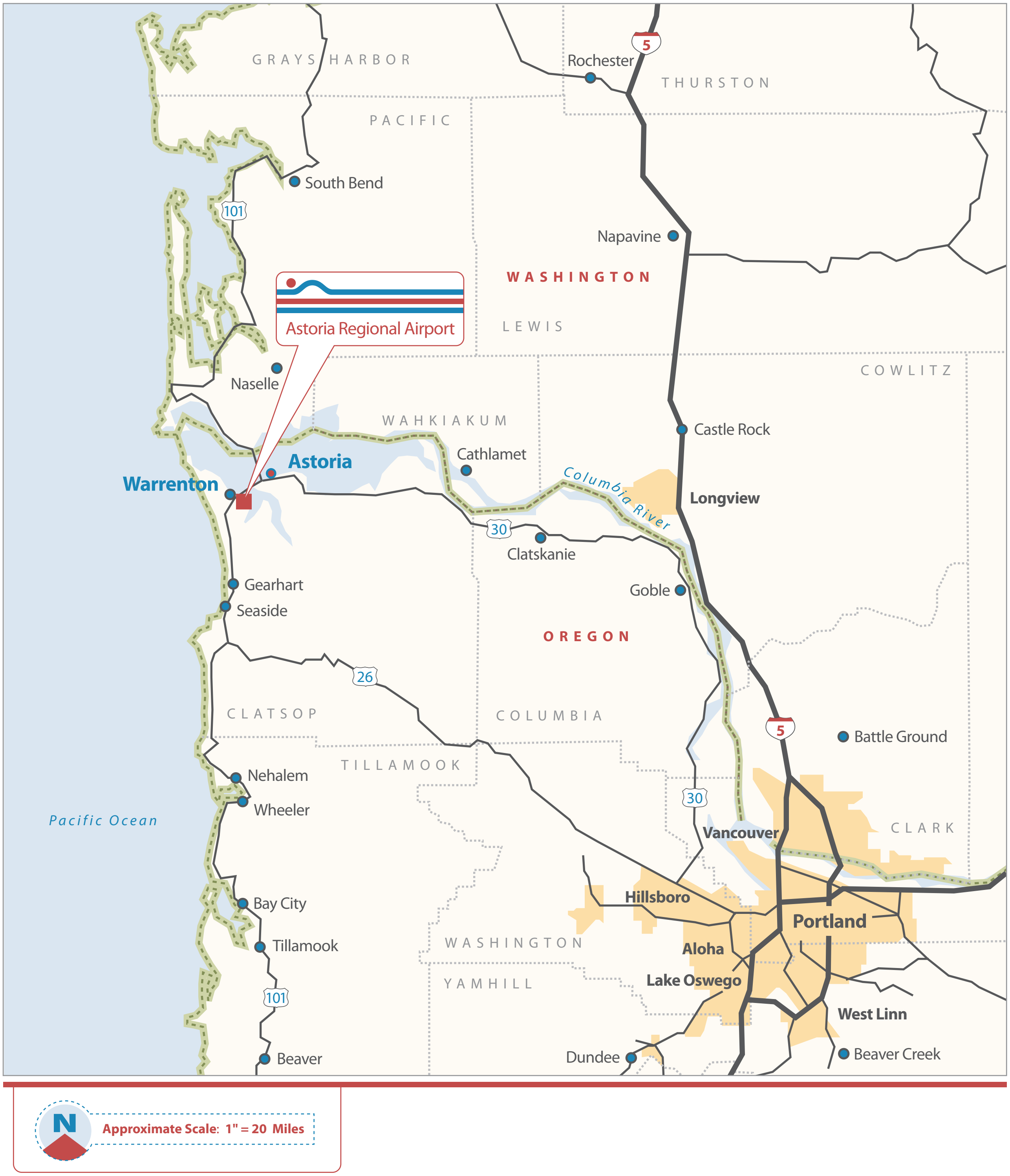

Figure A1 **Airport Location Map**

Port of Astoria
Astoria Regional Airport
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Source: Microsoft Streets and Trips, 2004.

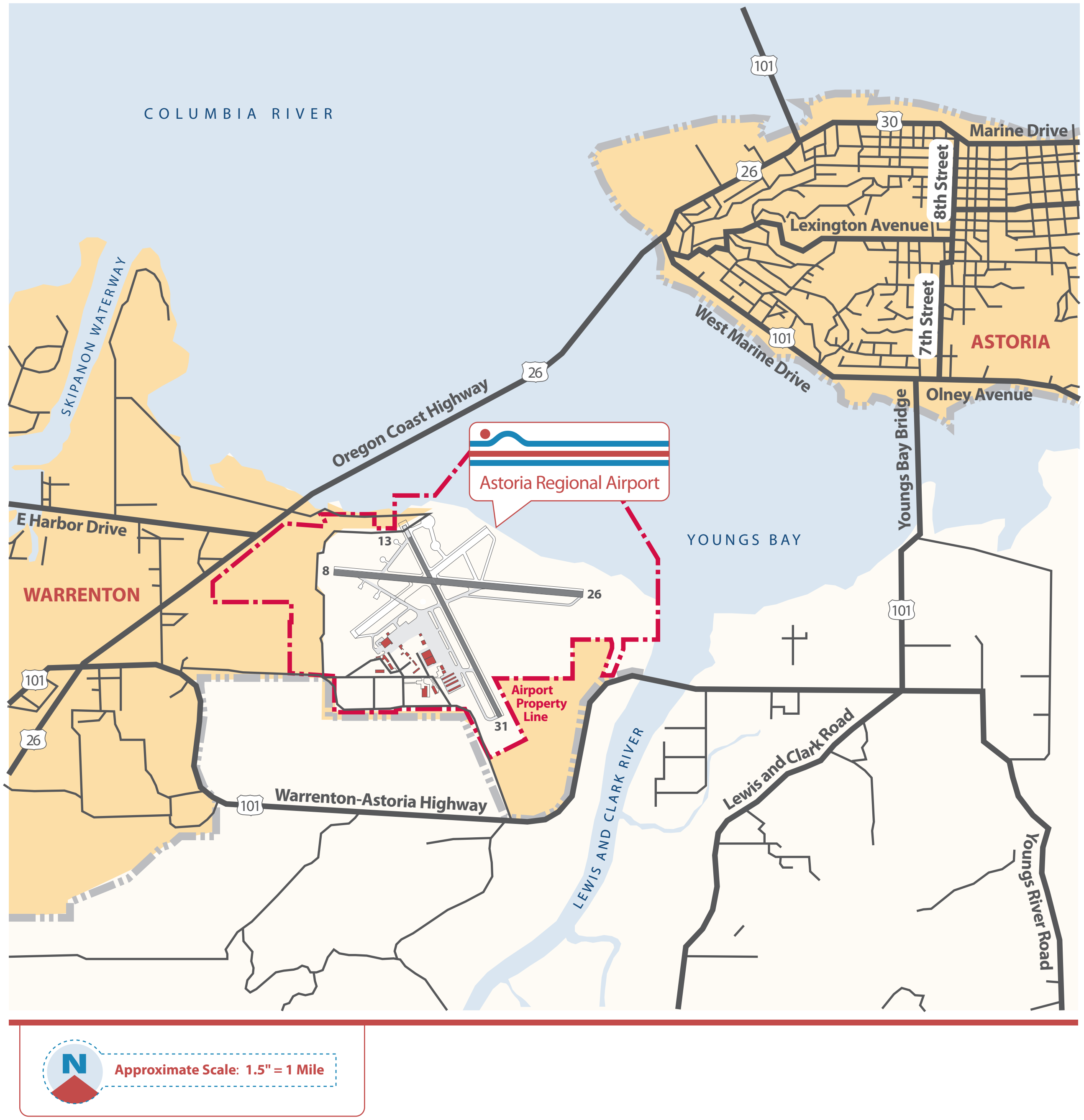

Figure A2 **Airport Vicinity Map**

Port of Astoria
Astoria Regional Airport
Master Plan Update

Source: http://maps.google.com

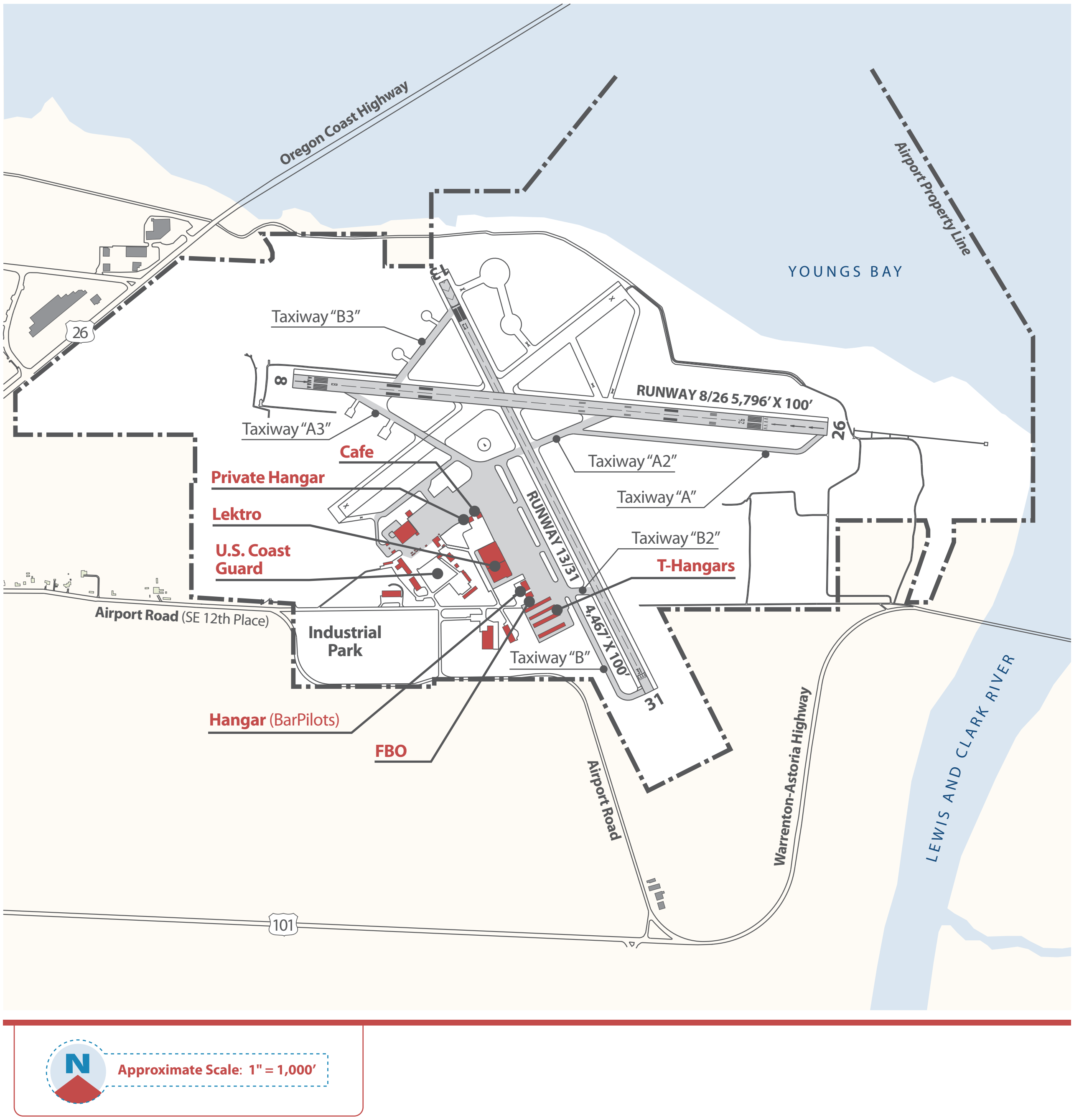

Figure A3 **Existing Airport Layout**

Runway 8 has a four-light Visual Approach Slope Indicator lighting system (VASI) and Runway End Identifier Lights (REILs). In support of its Instrument Landing System (ILS) approach capabilities, localizer and glide slope antenna, Runway 26 has a Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR).

Runway 13/31 is 4,467 feet in length and 100 feet in width, and is generally oriented in a northwest/southeast direction. The Runway 31 threshold has been relocated 304 feet from the pavement end, and Runway 13's threshold has been relocated 200 feet from the pavement end. Both runway ends have been relocated in order to achieve FAA safety area standards. Runway 13 has a four-light VASI and REILs. Runway 31 has a four-light Precision Approach Path Indicator lighting system (PAPI). All are owned and maintained by the FAA.

Both runways are equipped with Medium Intensity Runway Lights (MIRL). Both runways are constructed of asphalt and have a gross weight bearing capacity of 60,000 pounds single wheel, 76,000 pounds dual wheel, and 119,000 pounds dual tandem wheel main landing gear configuration.

Taxiway System. In addition to the runways, the airside facilities at the Astoria Regional Airport consist of a taxiway system that provides access between the runway surfaces and the landside aviation use areas. Astoria Regional Airport has a semi-parallel taxiway system, serving each runway end (see previous illustration entitled *EXISTING AIRPORT LAYOUT*). The Taxiway A system serves Runway 8/26 and the Taxiway B system serves Runway 13/31. For night use, the taxiway system is equipped with Medium Intensity Taxiway Lights (MITL).

Landside Facilities

Landside development at the Airport includes commercial passenger terminal facilities, aircraft parking aprons, Fixed Base Operator (FBO) hangars, general aviation facilities, fuel storage facilities, and access roadways.

Passenger Terminal Facilities. The Airport has historically had a terminal building that was centrally located west of Runway 13/31, and south of Runway 8/26. The terminal has been utilized for scheduled and chartered airlines, when they have operated at the Airport in the past. Since there currently is no scheduled commercial air service at the Airport, the terminal building is being used for helicopter operations in support of the Columbia River Bar Pilots.

US Coast Guard Facilities. The US Coast Guard currently has eight significant structures on the Airport, including a large helicopter maintenance hangar and an aircraft-parking apron.

Fixed Base Operator (FBO) and Commercial Aviation Businesses. The Airport is currently served with two FBOs: Twiss Air Service, and Astoria Flight Center. The FBO facilities are centrally located on the west side of Runway 13/31. Twiss Air Service provides aircraft maintenance, annual inspections and repairs, flight instruction, aircraft rentals, and meeting facilities. Astoria Flight Center is operated by the Port of Astoria and provides FBO services, including fuel, aircraft support, pilot and passenger facilities, and catering.

Several other businesses dedicated to assisting pilots and guests are located on the Airport, including Lektro (an aircraft towing equipment manufacturer that occupies the two, large World War II era hangars), Runway Café (an onsite restaurant), and United Parcel Service. An Industrial Park is also located adjacent to the Airport for light to medium industrial development or air freight distribution warehouse capacity.

General Aircraft Aprons. The main aircraft-parking apron at Astoria Regional Airport is located west of Runway 13/31 and south of Runway 8/26. This apron consists of approximately nine acres of aircraft parking and movement space.

Hangars and Aircraft Storage. Aircraft storage at the Airport is accounted for through the use of tiedowns and hangars. The general aviation aircraft apron provides 40 marked aircraft tiedown locations for use by both based and transient aircraft. This total does not account for additional apron space that could be used for similar purposes, including the apron area located in front of the FBOs. Note that outdoor storage of based aircraft at the Airport is not preferred by users due to the potential for adverse weather conditions.

General aviation hangar storage units (T-hangars) are located in the area south of the FBO facilities. These facilities are primarily comprised of four T-hangar structures that account for 40 individual T-hangar units. Additionally, there are two conventional hangars that are utilized for storage and operations by the FBOs (Twiss Air and Astoria Flight Center).

It is important to recognize that hangar facilities are in high demand at Astoria Regional Airport. As such, the Port of Astoria has programmed construction of an additional ten to 20 T-hangar units in two separate structures over the next few years (2005-2009). The most recent T-hangar facility was constructed in 2002, and was at capacity within two months of being built.

Fuel Storage Facility. Astoria Regional Airport has fuel storage facilities of one 12,000-gallon Av Gas, above-ground, double-walled fuel tank, and one 12,000 gallon Jet A above-ground, double-walled fuel tank. These facilities are located on the general aviation aircraft apron, to the south of the cafe and to the north of the terminal building.

Air Traffic Control Tower (ATCT). Astoria Regional Airport does not have an Air Traffic Control Tower.

Aircraft Rescue and Fire Fighting (ARFF) Facility. The ARFF facility, equipment, and personnel at the Airport are provided by the US Coast Guard through a mutual assistance agreement with the Port of Astoria.

Automated Surface Observation System (ASOS). Astoria Regional Airport currently maintains an Automated Service Observation System (ASOS) with a frequency of 135.375 MHz. This system is designed to provide 24-hour, minute-by-minute observations and performs the basic observing functions necessary to generate an aviation routine weather report and other aviation weather information. Information can be transmitted over a discrete VHF radio frequency or the voice portion of the VOR (frequency of 114.0 MHz).

Existing Ground Access and Parking Facilities

Ground Access. Regional ground access to the Airport is provided by the Oregon Coast Highway (US Highway 101), which is adjacent to the Airport's western edge. From US 101, the Airport is accessed using SE Marlin Avenue (US 105) and SE 12th Place (Airport Road).

Parking Facilities. Automobile parking facilities at the Airport are provided in conjunction with the needs of a specific facility.

Industrial Park. The Astoria Regional Airport Industrial Park is a 45-acre site adjacent to the Airport that is available for light to medium industrial development or air freight distribution warehouse capacity.

Airspace System/Navigation and Communication Aids

As with all airports, Astoria Regional Airport functions within the local, regional, and national system of airports and airspace. The following narrative gives a brief description of the Airport's role as an element within these systems.

Air Traffic Service Areas and Aviation Communications

Within the continental United States, some 22 geographic areas are under Air Traffic Control (ATC) jurisdiction. Air traffic controllers in Air Route Traffic Control Centers (ARTCC) provide air traffic services within each area. Astoria Regional Airport is contained within the Seattle ARTCC service area, which includes the airspace in most of Washington and Oregon, and portions of Idaho, California, and Montana. The Airport is equipped with a Common Traffic Advisory Frequency (CTAF) on frequency 122.8 MHz.

Airspace and NAVAIDS Analysis

Navigational aids (NAVAIDS) are instruments providing navigation readings to pilots in appropriately equipped aircraft. The primary navigational aid available for use by pilots near Astoria Regional Airport is the Astoria VOR-DME (frequency 114.0 MHz). A VOR-DME system is a Very High Frequency Omnidirectional Range Station (VOR) with Distance Measuring Equipment (DME) transmitting very high frequency signals, 360° in azimuth oriented from magnetic north. It is used to measure, in nautical miles, the slant range distance of an aircraft from the facility.

Other NAVAIDS within the vicinity of Astoria Regional Airport include a non-directional beacon (NDB), which is a general-purpose low- or medium-frequency radio beacon that aircraft equipped with a loop antenna can home in on or determine its bearing relative to the sending facility. The Karpen NDB (255 PEN), is located 12.2 nautical miles (NM) east of the Airport.

Local airspace surrounding Astoria Regional Airport is designated as Class E airspace. The configuration of each Class E airspace area is tailored to individual airports. Generally, Class E airspace consists of the immediate controlled airspace at airports without control towers and is intended to provide a transition area from terminal or en-route environments. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. This airspace is also configured to accommodate any existing instrument procedures. Within Class E airspace, radio communications and transponder are not required to operate under Visual Flight Rules (VFR) conditions, unless the Airport has an air traffic control tower; however, Instrument Flight Rules (IFR) flights must be capable of communicating with regional ATC (Center) and be Mode C Transponder equipped (capable of reporting altitude). Currently, there are four published instrument approach procedures at the Airport. These are listed in the following table entitled *INSTRUMENT APPROACH PROCEDURES*. The following illustration entitled *AIRSPACE/NAVAIDS SUMMARY* depicts the local airspace.

Table A1
INSTRUMENT APPROACH PROCEDURES

Approach Type	Runway Designation	Ceiling Minimums	Visibility Minimums
ILS	26	292 feet	¾ mile
VOR	8	660 feet	1 mile
GPS	8	600 feet	1 mile
COPTER LOC/DME 257°	---	500 feet	½ mile

Source*:* US Terminal Procedures. --- Data not available.

Approximate Scale: 1" = 7.5 Nautical Miles

Figure A4 **Airspace/NAVAIDS Summary**

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Source: Seattle, Sectional Aeronautical Chart, 66th Edition, December 2003.

Airport Environs

The Astoria Regional Airport is located within the limits of the City of Warrenton, Oregon. Because the operation of an airport influences surrounding land uses, and adjacent land uses have an influence on the operation of an airport, it is critical that any airport planning study gain an understanding of existing and proposed land use types in the area near that airport. The following text and illustrations describe existing land use, existing zoning, and future land use within the airport environs.

Zoning

As part of the State of Oregon's growth management law, the City of Warrenton has adopted an Urban Growth Boundary (UGB). This boundary limits land development beyond a politically designated area to protect open space, curb sprawl, or encourage redevelopment of land within the City by setting criteria for different types of land uses to be developed within certain zones. In conjunction with the zoning ordinance, the City has also adopted a zoning map that divides the city into different zones consistent with the zoning ordinance. Astoria Regional Airport, designated as a general industrial use, is located inside both Warrenton's city limits, and its Urban Growth Boundary. The shoreline areas north and east of airport property are designated with aquatic natural zoning. The land west of the Airport is designated primarily for commercial uses, along with some residential and industrial zoning. South of the Airport, the majority of the land is outside of the City of Warrenton and is rural in nature. To a great degree existing zoning patterns match existing land use patterns. Existing zoning within the vicinity of the Airport is shown in the following illustration entitled *GENERALIZED EXISTING ZONING*.

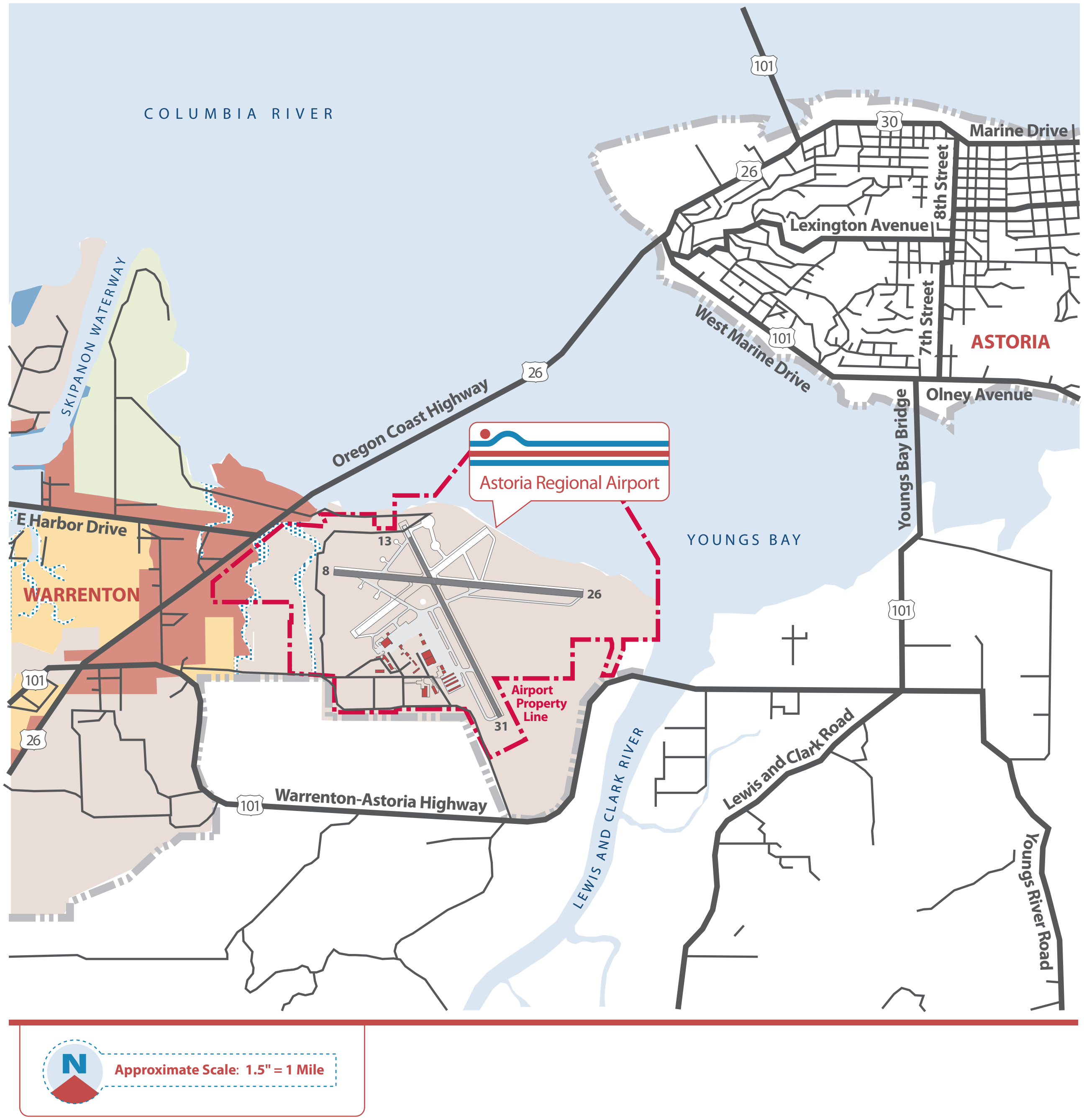

Figure A5 **Generalized Existing Zoning**

Residential
Commercial
Urban Recreation & Resort
Industrial
Aquatic Development
Lake & Freshwater Wetland

Source: Official Zoning Map for the City of Warrenton, March 19, 2003, Warrenton City Commission.

Financial Inventory

The primary goal of this task is to gather materials that summarize the financial management of the Airport. In addition, it is important to develop an understanding of the financial structure, constraints, requirements, and opportunities for airport activities as related to the development of a Capital Improvement Program (CIP). The documents that have been gathered and reviewed for this financial inventory will be used to formulate a reasonable and financially sound CIP with which to fund projects identified in the master planning process.

With this goal in mind, the Airport's budget statements have been gathered for fiscal years 2000 through 2004. In addition, Federal and state capital improvement grant information is being compiled, including current funding policies. The Airport's current five-year Capital Improvement Program will also be reviewed.

The Airport is operated as one of the cost centers of the Port of Astoria. It generally operates as a financially independent entity from other port functions; however, the Port does provide general fund support when needed. As identified in the budget documentation, major sources of revenue for the Airport include lease income, fuel sales, and grants. Major expenditures include outside repairs and services, operating materials and supplies, resale fuel, utilities, capital expense, and interest.

Summary

The goal of this chapter is to provide general background information pertaining to the Airport, its aviation-operating environment, its physical surroundings, and its financial situation. The *Inventory* chapter is vital from the standpoint that it will be used as a reference in the analysis and design process that is required to prepare the Airport's future Development Plan.

The next step in the planning process is to formulate forecasts for the quantity and type of future aviation activity expected to occur at the Airport during the forthcoming 20 years.

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B. Forecasts of Aviation Activity

B Forecasts of Aviation Activity

INTRODUCTION. Forecasting is a key element in the master planning process. The forecasts are essential for analyzing existing airport facilities and identifying future needs and requirements for these facilities. Forecasting, by its very nature, is not exact, but it does establish some general parameters for development and, when soundly established, provides a defined rationale for various development activities as demands increase. The amount and kind of aviation activities occurring at an airport are dependent upon many factors, but are usually reflective of the services available to aircraft operators, the meteorological conditions under which the Airport operates (daily and seasonally), the businesses located on the Airport or within the community the Airport serves, and the general economic conditions prevalent within the surrounding area.

Forecasting generally commences by obtaining accurate historical and existing data. Utilizing the present time as an initial point, certain quantifiable facts and trends can be identified, along with many intangible factors, which will affect the aviation activity forecasts. This has evolved from a comprehensive examination of historical airport records and recent planning documents relative to the Airport (i.e., the 2004 FAA *Terminal Area Forecasts,* the 1993 *Astoria Regional Airport Master Plan*, and the FAA *Aerospace Forecasts, Fiscal Years 2004-2015*). These documents were assembled in different years, making the data quite variable and emphasizing the need for establishing a well-defined and well-documented set of base information from which to develop forecasts of aviation activity.

Prior to an examination of current and future activity levels at the Airport, several conditions and assumptions should be noted that form the basis or foundation for the development of the forecasts contained here. These variables represent a variety of physical, operational, and socioeconomic considerations, and to varying degrees relate to and affect aviation activity at Astoria Regional Airport.

Weather Conditions

The most current and complete set of weather data available for Astoria Regional Airport was obtained and analyzed. With the exception of a few days annually, poor weather conditions do not adversely affect the Airport. VFR meteorological conditions are experienced, on average, 89.5% of the time annually. Therefore, aircraft can operate at the Airport on a regular basis throughout the year, with only limited interruption due to weather. The following chapter will examine the potential positive impacts of improved approach capabilities at the Airport.

Socioeconomic Conditions

Historically, the socioeconomic conditions of a particular area directly affect aviation activity within that region. It is usually helpful to incorporate an analysis of local and regional socioeconomic data into the forecast for future aviation demands at an airport. Typically, the most often analyzed indicators are population, employment, and income. Socioeconomic data was obtained from recognized sources, including local, regional, state, and Federal planning organizations.

Population. Astoria Regional Airport is located within the City of Warrenton, and serves the regions of Northwest Oregon and Southwest Washington State. Warrenton, and its surrounding cities (including Astoria, Cannon Beach, Geahart, Seaside, the Long Beach Peninsula and unincorporated Clatsop County) have demonstrated continued population growth from 1990 through 1999.

The following table, entitled *POPULATION INFORMATION, 1990 to 2020,* provides a summary of the population information for Clatsop County and the largest municipalities within the County. The area has recently experienced an influx of retired individuals who come to enjoy the many recreational opportunities surrounded by a mild marine climate and environment. Additionally, the region is home to many home-based entrepreneurs.

Table B1
POPULATION INFORMATION, 1990 to 2020

	2000	2010 Forecast	2020 Forecast	Average Annual Percentage Increase over 20 yr period[1]
Clatsop County	35,630	38,376	41,788	0.86%
Astoria	9,813	10,649	11,826	1.03%
Cannon Beach	1,588	1,707	1,859	0.85%
Geahart	995	1,151	1,254	1.30%
Seaside	5,900	6,546	7,337	1.22%
Warrenton	4,096	4,813	5,741	2.01%
Unincorporated	13,238	13,510	13,771	0.20%

Source: Clatsop County Department of Community Development Community Profile 2004. *1. Per Year (2000-2020).*

Employment. According to the Oregon Employment Department, the total civilian labor force for Clatsop County was 18,669 in December 2004, of which 17,454 people were employed (resulting in an unemployment rate of 6.5%). This compares to a national unemployment rate of 5.1%, and a State of Oregon unemployment rate of 6.5% (5.4% and 6.8% respectively, adjusted seasonally.)

Clatsop County, along with its neighboring counties (Columbia and Tillamook) experiences significant seasonal unemployment fluctuations. Unemployment rates are highest in the winter when tourism is low, and construction and natural-resource extraction is more difficult.

Clatsop County's industry is resource-based, although the area is working to diversify. Major employers include Georgia Pacific, Columbia Memorial Hospital, Providence Seaside Hospital, Job Corp., Weyerhaeuser (Willamette Industries was acquired by Weyerhaeuser in 2002), State of Oregon, US Coast Guard, Fred Meyer, Safeway, Clatsop County Government, and the Astoria School District.

Income. The Clatsop County Department of Community Development Profile indicates the 2001 Per Capita Income for Clatsop County was $24,664 (11th out of Oregon's 36 counties). The US and Oregon Per Capita Income in 2001 was $30,413 and $28,222 respectively.

Community Support

Astoria Regional Airport benefits from the support of the City and county governments, as well as local industry and citizens. The Airport is recognized as a vital infrastructure asset that contributes to the stability and future expansion of the area's economy. Additionally, the communities in Northwest Oregon and Southwestern Washington benefit from a quality airport facility. These communities provide an economic base that can attract additional aviation activity, as well as industrial/business development to the Airport.

Regulatory Climate

For purposes of forecasting in this Master Plan Update, it is assumed that the regulatory climate regarding the general aviation industry will not change dramatically. Specifically, it is assumed that noise and emissions requirements on business aircraft will remain within the bounds prescribed by current rules and regulations. It is also assumed that the general aviation community will not be subject to new user-fees, that access to airports and airspace will not be limited, and that general aviation airports will not be subject to security restrictions that are currently imposed on air carrier airports.

Negative or Neutral Factors

Prior to the development of aviation activity forecasts, several factors that have an influence, either positive or negative, in the planning process should be considered. As a general comment, the Astoria Regional Airport has very few negative factors and is in an enviable position due to its many positive features and conditions. However, some broad factors can have a negative impact on the Airport, and aviation in general, and these are considered in the planning process.

The first issue is the overall condition of the general aviation industry in the United States. Beginning in 1978, many sectors of the general aviation industry have been in recession, and the FAA has identified several factors that precipitated this downturn, including economic recessions, fuel crises, the termination of the GI Bill, and the repeal of the investment tax credit.

However, a number of bright spots are having a positive impact in certain segments of the general aviation industry. These include the passage of the General Aviation Revitalization Act (GARA) of 1994. This legislation has caused renewed interest and optimism among US aircraft manufacturers, who either are reentering the single engine aircraft market after several years' absence, or are increasing future production schedules to meet expected renewed demand. The growth in the amateur-built aircraft market, and the strength of the used aircraft market, indicate that demand for inexpensive personal aircraft is still relatively strong.

The FAA's efforts to aid general aviation revitalization include streamlining the certification process for new entry-level aircraft and implementing measures to provide regulatory relief and reduce user costs (i.e., reduced rules, improving the delivery of FAA services by decreasing excess layers of management, and the elimination of unneeded programs and processes). Moreover, groups such as the Aircraft Owners & Pilots Association (AOPA) are sponsoring programs that aggressively promote the benefits of general aviation and learning to fly.

On a more recent note, since the 9/11 terrorist attacks, Temporary Flight Restrictions (TFRs) and the lingering concerns of some regarding the use of general aviation aircraft in potential future acts of terrorism, have had an added short-term negative impact on the industry. On the positive side for GA, heightened airport security has had a dramatic impact on the "nuisance factor" of commercial air travel; as a result, some travelers have turned to general aviation as a more efficient means of air travel.

Historical and Existing Activity Summary

A tabulation of Astoria Regional Airport's historical aviation activity since 1990 is presented in Table B2, entitled *HISTORICAL AVIATION ACTIVITY, 1990-2004.* This table presents the number of enplaned passengers and four categories of aircraft operations (an operation is defined as either a take-off or a landing), including commercial service (air carrier), air taxi, general aviation, military, and total operations. An acoustical counter (funded by the Oregon Department of Aviation) was located at the Airport from 1992 through 2003. In general, the historical aircraft operation numbers provided in the TAF were similar to those provided by the Acoustical Counter, and therefore data from the TAF was used as the basis for the following table. Additionally, officials from the Oregon Department of Aviation have indicated that there was an error within the program between 1998 and 2002, and therefore the total number of aircraft operations the program counted is considered suspect.

Table B2
HISTORICAL AVIATION ACTIVITY, 1990-2004

Year	Passenger Enplanements	Air Carrier Operations	Air Taxi Operations	General Aviation Operations	Military Operations	Total Aircraft Operations
1990	0	0	3,100	32,100	6,000	41,200
1991	0	0	3,100	32,100	11,660	46,860
1992	0	0	0	43,000	0	43,000
1993	1,728	90	3,100	32,100	11,660	48,678
1994	4,344	50	3,100	32,100	11,660	51,254
1995	6,461	60	3,100	32,100	20,000	61,721
1996	2,576	50	2,600	40,000	0	45,226
1997	1,631	50	2,600	40,337	0	44,618
1998	2,775	0	2,650	40,635	0	46,060
1999	784	0	2,650	40,939	0	43,373
2000	0	0	2,650	41,243	0	43,893
2001	0	0	2,650	40,723	0	43,373
2002	0	0	2,650	41,028	0	43,678
2003	0	0	2,650	41,335	0	43,985
2004[1]	0	0	--- [2]	36,050	8,240	44,290

Source: FAA *Terminal Area Forecasts* (obtained January 2005).

1. Estimated existing. Total annual operations obtained from FAA Terminal Area Forecast (TAF). Breakout by type of operation extrapolated from estimates from military operators and airport records.

2. Generally, a company or individual performing air passenger and/or cargo transportation service on a non-scheduled basis over unspecified routes is classified as an air taxi operation. For purposes of this study, air taxi operations will be included in the general aviation operations category.

Passenger Enplanements

With the exception of a few years (1993-1998), there has been no recorded commercial passenger activity at Astoria Regional Airport. Horizon Airlines ceased operations in 1995 and Harbor Air ceased operations in 1998.

Aircraft Operations

At non-towered airports, the actual number of aircraft operations is very difficult to ascertain with any degree of certainty. Often, at airports like Astoria Regional, the only sources of historical data are the FAA *Terminal Area Forecasts* or past FAA Form 5010, *Airport Master Record* data. It is important to note that this information is estimated. Often times, the historic numbers are suspect as to their accuracy. Generally, airport personnel or pilots that frequent the Airport provide operations estimates to the Oregon Department of Aeronautics and/or the FAA. The 2004 estimate of aircraft operations (general aviation and military operations) was extrapolated using estimates from airport personnel, military operators, and FBOs.

Air Taxi/Commuter Operations. Generally, a company or individual performing air passenger and/or cargo transportation service on a non-scheduled basis over unspecified routes is classified as an air taxi operation. For purposes of this study, air taxi operations will be included in the general aviation operations category.

General Aviation Operations. With the absence of an Airport Traffic Control Tower (ATCT) located on the field, accurate counting measures for general aviation aircraft are not in place. The historical data provided in the proceeding table for general aviation operations are estimates compiled by the State of Oregon and the FAA. General aviation operations are typically more directly tied to economic conditions than commercial passenger operations, and this trend is often reflected in the historical operations data for a particular airport. The amount of general aviation activity at many airports around the country has remained flat or declined since the early 1990s.

The data available for Astoria Regional Airport illustrates fluctuations in general aviation activity since 1990. As demonstrated by the numbers in the *HISTORICAL AVIATION ACTIVITY* table, general aviation activity has generally remained constant over the past few years. As economic conditions in the region and nation change in the future, fluctuations in the number of general aviation operations at the Airport will likely continue although an increasing trend is expected over the long-term.

Military Operations. The data provided in the FAA *Terminal Area Forecasts* for years 1996-2003 is likely to be incorrect due to an error in recording. Local observations by military personal indicate that military operations represent a significant portion of the total operations conducted at the Airport.

The majority of military operations can be attributed to US Coast Guard activity involving helicopters and a variety of fixed wing aircraft, as well as the ferrying of military personal to and from Salem Oregon and Camp Rilea.

Local and Itinerant Operations

Aircraft operations are placed in two categories, local and itinerant. Local operations are generally reflective of flight training and touch and go operations. The *Air Traffic Control Handbook* defines a local operation as any operation performed by an aircraft operating in the local traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from flight in local practice areas, or aircraft executing practice instrument approaches at the Airport. Itinerant operations are all other aircraft operations and are more often associated with business aircraft. Historical data indicates that local operations in 2004 accounted for approximately seven percent (7%) of the total operations at the Airport.

Existing Operations by Aircraft Type

The current level of aviation activity by aircraft type is summarized in the following table entitled *EXISTING OPERATIONS BY AIRCRAFT TYPE, 2004*. Of the total annual general aviation aircraft operations, single engine aircraft are estimated to have performed approximately 60%. Approximately 14% was attributed to multi-engine aircraft, 22% was attributed to helicopters aircraft, two percent (2%) to business jet, and two percent (2%) to turbo prop activity. With respect to military operations, almost all of the operations in 2004 were conducted by helicopters, with the remaining percent of operations being fixed-wing aircraft operations of various types (C-130, Gulfstream, Falcon, etc).

Table B3
EXISTING OPERATIONS BY AIRCRAFT TYPE, 2004

Aircraft Type	Operations	Percent of Operations
General Aviation	*36,050*	*81.4 %*
Single Engine	21,385	59.3%
Multi-Engine	4,975	13.8%
Turbo Prop	712	2.0%
Business Jet	948	2.6%
Helicopter	8,030	22.3%
Military	*8,240*	*18.6%*
Helicopter	8,120	98.5%
Fixed-wing	120	1.5%
TOTAL	44,290	100.00%

Sources: Oregon Department of Aviation Acoustical Counter, airport personnel, military personnel, and the FBOs.

Operations by type were obtained from a breakdown using the 2003 Acoustical Counter located at the Airport during that year. Local observations observed more business jet activity than turbo prop activity, and those numbers have been revised upon receiving estimates from airport personnel and the FBO.

Based Aircraft

The number of aircraft that can be expected to base at any airport is dependent upon many factors, such as aircraft maintenance, storage and parking facilities, airport communication practices, services provided at the Airport, airport proximity, access, and similar factors.

Currently, there are 60 aircraft based at Astoria Regional Airport. Of this total, there are 50 single engine aircraft, six twin-engine aircraft, and four helicopters (one civilian and three US Coast Guard helicopters). A historical summary of based aircraft is provided in the following table entitled *SUMMARY OF BASED AIRCRAFT, 1990-2004*. The data was compiled from FAA records and airport tabulations.

Table B4
SUMMARY OF BASED AIRCRAFT, 1990-2004

Year	Total Based Aircraft
1990	43
1991	42
1992	42
1993	42
1994	42
1995	45
1996	45
1997	43
1998	43
1999	47
2000	47
2001	47
2002	47
2003	47
2004[1]	60

Source: FAA *Terminal Area Forecasts* (obtained January 2005).

1. Astoria Regional Airport records.

Aviation Activity Forecasts

Using the historical data and incorporating the previously stated assumptions, aviation forecasts can be developed. Several forecasting elements are pertinent to this planning effort: enplaning (boarding) passengers, commercial service operations, general aviation operations, local and itinerant operations, aircraft type, based aircraft, and peak period operations.

Passenger Enplanement Forecast and Scheduled Passenger Service Aircraft Operations Forecast

Forecasts can be utilized for various purposes, and the ultimate use of the forecast data may influence the assumptions used to develop the forecasts. For instance, if the forecasts are to be used for financial planning with the goal being to make sure the Airport can properly fund its operation and Capital Improvement Program, the assumptions that are used will tend to minimize revenue generation capabilities of the Airport. If the forecasts are to be used for facilities development planning, the assumptions will tend to maximize the operational activity expectations in order to make sure the Airport has adequate area set aside to build the facilities required to accommodate potential demand. The preferred forecast scenario may change, depending on the ultimate use of the forecast data.

Aviation activity forecasts for airports are often established using several sets of assumptions that generate different forecast scenarios. Several forecast scenarios are used in this Master Plan Update, the primary purpose of which is to provide a long-term facilities development plan for the Airport, which safely and efficiently accommodates anticipated demand. Additionally, they are used to establish an on-airport/off-airport land use compatibility program in consideration of aircraft generated noise and other environmental influences.

The forecasting of any type of future activity is as much an art as a science, particularly in the current era of airline deregulation and changing operating methodologies (legacy airline hub and spoke systems vs. low cost carrier's point-to-point systems). Any forecast represents a "best guess" or "deducted guess" at a particular point in time. It must, therefore, be revised and updated periodically to reflect new conditions and developments.

Passenger enplanement forecasts are an important part of the forecasting effort as they form the cornerstone of formulating air carrier and commuter operations projections. Scheduled commercial passenger service operations were last present at Astoria Regional Airport in 1998. Currently, Columbia Pacific Airlines is considering initiating commercial passenger service flights to Portland International Airport in the near future. They are projecting to operate a nine-passenger Piper Navajo aircraft, and will have three daily departing flights and three daily arriving flights.

The FAA *Aerospace Forecasts, Fiscal Years 2004-2015*, published in March 2004, indicates that domestic scheduled passenger service enplanements are expected to increase at a 3.5% annual rate through the year 2015. An important consideration is the fact that new commercial service will begin in the future at Astoria Regional Airport. One way to estimate existing demand for commercial passenger service is to look at historic numbers. In August 1995, Horizon Airlines enplaned almost 1,000 passengers for the month. This appears to be a reasonable estimate of the current unfulfilled demand, if an airline were to operate a reliable service with a consistent schedule and appropriate frequency of flights between Astoria Regional Airport and Portland International Airport.

The following table, entitled *PASSENGER ENPLANEMENTS AND SCHEDULED PASSENGER AIRCRAFT OPERATIONS FORECAST, 2004-2024,* projects the number of available seats, average seats per departure, boarding load factor, and scheduled passenger service aircraft operations that will be conducted at Astoria Regional Airport.

It has been assumed that the aircraft the airline will initiate service with (nine-seat Piper Navajo aircraft) would be supplanted with the gradual increased use of 19-seat aircraft, as demand increases. It is also assumed that it will take a few years (approximately five) of reliable service by a new airline to realize the estimated current demand level (1,000 enplanements per month). Following that initial growth period, passenger enplanements are forecast to increase at the FAA national growth rate of 3.5%, which is equal to the enplanements forecast nationally for commercial airlines contained in the FAA *Aerospace Forecasts, Fiscal Years 2004-2015.* This forecast reflects a steady, progressive, and realistic increase in enplanements.

Table B5
PASSENGER ENPLANEMENTS AND SCHEDULED PASSENGER AIRCRAFT OPERATIONS FORECAST, 2004-2024

Year	Passenger Enplanements	Average Number of Seats per Aircraft	Annual Number of Departures	Average Number of Daily Departures	BLF[1]	Scheduled Passenger Service Aircraft Operations
2004[2]	0	0	0	0.0	0.0%	0
2005[3]	6,376	9	1,095	3.0	64.7%	2,190
2006	7,876	9	1,355	3.7	64.6%	2,709
2007	9,376	9	1,605	4.4	64.9%	3,210
2008	10,876	9	1,853	5.1	65.2%	3,707
2009	12,376	10	1,889	5.2	65.5%	3,779
2014	14,699	13	1,688	4.6	67.0%	3,375
2019	17,456	16	1,593	4.4	68.5%	3,185
2024	20,731	19	1,559	4.3	70.0%	3,117

Source: BARNARD DUNKELBERG & COMPANY.

1. BLF – Boarding Load Factor for regional commercial service fleet from FAA Aerospace Forecasts Fiscal Years 2004-2015.
2. Estimated existing. 3. Assumes 12 months scheduled passenger service aircraft operations.

General Aviation Activity Forecast

As discussed earlier, fluctuations within the country's economic cycle historically affect general aviation operations more severely than air carrier operations. However, with more of the general aviation aircraft fleet being used for business purposes than in the past, the economy should have somewhat less of an effect upon overall general aviation activity. Because of the prevailing economic conditions in Astoria and the surrounding area, it is anticipated that itinerant traffic will become an integral part of the aviation activity at the Airport. These factors, combined with the previously mentioned General Aviation Revitalization Act legislative action, should have a positive impact on general aviation activity.

In developing the general aviation activity forecasts, several general aviation forecast scenarios and national trends were reviewed. Included in this assessment, and presented in the following table entitled *GENERAL AVIATION OPERATIONS FORECAST SCENARIOS, 2004-2024*, are several general aviation operational forecasts, including the forecast contained in the 1993 Astoria

Regional Airport Master Plan (MP), the FAA *Terminal Area Forecasts* Detail Report, and three forecast scenarios developed for this study.

Several forecast scenarios were developed to appropriately reflect current general aviation operation activity and provide realistic projections for the 20-year planning period. The forecast scenarios generated for this Master Plan Update assume, for the most part, straight-line growth. While it is recognized that straight-line (consistent) growth never occurs year after year for many years, average annual growth methodologies serve intermediate and long-range planning purposes quite well. It should be noted that it is not the actual numbers that are most important, but the reasoning, assumptions, and trends that the numbers represent.

The historic correlation between socioeconomic variables (i.e., local population, employment, and per capita income) and aircraft operations at Astoria Regional Airport are not significant. With this factor in mind, the forecasting scenarios provided below do use socioeconomic historic correlations as a predicting methodology.

Scenario One. As previously mentioned, the socioeconomic conditions of a particular area can affect aviation activity. Typically, population, employment, and income are analyzed and used as a forecast scenario. Scenario One utilizes the forecast average annual population growth for the City of Astoria and the City of Warrenton is 1.03% and 2.01% from 2000-2020 (according to the Clatsop County Department of Community Development Community Profile, 2004). This forecast growth scenario uses the average of the two growth rates, corresponding to a growth rate of 1.52 percent, which is the percentage increase for Scenario One.

Scenario Two. Projects an annual average growth rate of 0.54%, which is equal to the forecast contained in the FAA *Terminal Area Forecasts* for overall general aviation activity.

Scenario Three. This scenario utilizes the annual growth rate forecast in the FAA *Aerospace Forecasts, Fiscal Years 2004-2015* for general aviation aircraft operations (1.33%) as a basis. This scenario assumes that the local, regional, and national economies continue to improve and have a positive influence on general aviation activity. This forecast scenario is based on the assumption that general aviation operations at the Airport will grow at the same rate as that which is forecast nationally for general aviation operations (i.e., maintain its present national market share). **THIS IS THE RECOMMENDED FORECAST FOR THIS STUDY**. This scenario will be used for facilities planning to assist in determining the appropriate development objectives for the Airport.

Scenario Four. This scenario utilizes the annual growth rate forecast in the FAA *Aerospace Forecasts, Fiscal Years 2004-2015* for turbojet aircraft (6.55%) as a basis.

Scenario Five. This scenario utilizes a trend analysis (regression analysis) of the 2005 FAA *Terminal Area Forecasts* from 1990 to 2004.

Table B6
GENERAL AVIATION OPERATIONS FORECAST SCENARIOS, 2004-2024

Year	TAF1	1993 MPU2	Scenario One 1.52%	Scenario Two 0.54%	Scenario Three 1.33%	Scenario Four 6.55%	Scenario Five Trend3
2004[4]	36,050	---	36,050	36,050	36,050	36,050	36,050
2005	36,355	---	36,598	36,245	36,529	38,411	38,068
2006	36,662	---	37,154	36,441	37,015	40,927	38,768
2007	36,967	50,700	37,719	36,638	37,507	43,608	39,467
2008	37,274	---	38,292	36,836	38,006	46,464	40,167
2009	37,581	---	38,874	37,035	38,511	49,507	40,867
2012	38,500	53,600	---	---	---	---	---
2014	39,113	---	41,920	38,045	41,141	67,988	44,366
2019	40,646	---	45,205	39,084	43,950	93,369	47,866
2024	---	---	48,747	40,150	46,951	128,224	51,365

Source: BARNARD DUNKELBERG & COMPANY.

--- Data not available.
1. FAA Terminal Area Forecasts (obtained January 2005). Includes Air Taxi operations. It is important to note that the TAF incorrectly included military operations conducted at Astoria Regional Airport into the general aviation category. As a result, the TAF number was obtained by subtracting the military operations (obtained using local observations and military operations data).
2. Forecast obtained from the 1993 Astoria Regional Airport Master Plan Update.
3. Trend Analysis (regression analysis) using historical general aviation operations data from 1990 to 2004.
4. Estimated existing.

Military Operations Forecast

The US Coast Guard has a presence at the Airport, primarily utilizing helicopters. While personnel who are employed at the Airport may change, it is not anticipated that Coast Guard will increase the number of aircraft based at the Airport during the planning period. No additional factors have been identified that would significantly increase the number of military operations in the future; therefore the number of military aircraft operations is projected to remain at the current level through the end of the planning period.

Operations Forecast By Aircraft Type

A further assessment of the forecasts involves the individual and collective use of the Airport by various types of aircraft. The types of aircraft expected to use the Airport assist in determining the amount and type of facilities needed to meet the aviation demand.

The following table, entitled *SUMMARY OF OPERATIONS FORECAST BY AIRCRAFT TYPE, 2004-2024*, depicts the approximate level of use by aircraft types that are projected to use Astoria Regional Airport. This table reflects the growing percentage of general aviation turbine-powered aircraft anticipated to operate at the Airport, and the decreasing percentage of piston-powered aircraft. This is indicative of the type of facility the Airport is expected to become and the prevailing local economic conditions. Military operations by type are expected to remain the same throughout the planning forecast.

Table B7
SUMMARY OF OPERATIONS FORECAST BY AIRCRAFT TYPE, 2004-2024

Operations by Type	2004[1]	2009	2014	2019	2024
Air Carrier	*0*	*3,779*	*3,375*	*3,185*	*3,117*
General Aviation	*36,050*	*38,511*	*41,141*	*43,950*	*46,951*
Single Engine	21,385	22,336	23,327	24,173	25,354
Multi Engine	4,975	5,392	5,842	6,593	7,137
Turbo prop	712	809	987	1,055	1,127
Business Jet	948	1,194	1,563	1,934	2,348
Helicopter	8,030	11,439	9,421	10,196	10,987
Military	*8,240*	*8,240*	*8,240*	*8,240*	*8,240*
Helicopter	8,120	8,120	8,120	8,120	8,120
Fixed Wing	120	120	120	120	120
TOTAL	44,290	50,530	52,756	55,375	58,308

Source: BARNARD DUNKELBERG & COMPANY.

1. *Estimated existing.*

Local and Itinerant Operations Forecast

Forecasts of operations have also been categorized accordingly into local and itinerant operations. The *Air Traffic Control Handbook* defines a local operation as any operation performed by an aircraft operating in the local traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from flight in local practice areas, or aircraft executing practice instrument approaches at the Airport. Local operations account for three percent (3%) of all Airport operations and this percentage is expected to increase (to 15% at the end of the planning period) because of increased flight training activity, and touch and go training operations. Based on this consideration, forecasts of local and itinerant operations are shown on the following table, entitled *SUMMARY OF LOCAL AND ITINERANT OPERATIONS, 2004-2024*.

Table B8
SUMMARY OF LOCAL AND ITINERANT OPERATIONS, 2004-2024

Year	Local	Itinerant	Total
2004[1]	2,458	33,592	36,050
2009	2,696	35,815	38,511
2014	3,291	37,850	41,141
2019	3,956	39,995	43,950
2024	4,695	42,256	46,951

Source: BARNARD DUNKELBERG & COMPANY. *1. Estimated existing.*

Based Aircraft Forecast

The number of general aviation aircraft, which can be expected to base at an airport facility, is dependent on several factors, such as airport radio communications, available facilities, airport operator services, airport proximity, access, as well as aircraft basing capacity available at adjacent airports and similar considerations. General aviation operators are particularly sensitive to both the quality and location of their basing facilities, with proximity of home and work often being identified as the primary consideration in the selection of an aircraft basing location.

The following table entitled *GENERAL AVIATION BASED AIRCRAFT, 2004-2024* presents the based aircraft forecast for the 20-year planning period. The relatively large forecast increase in the first five years of the forecast period is supported by the construction of two new T-hangar facilities (20 unit's total) during the first five years of the planning period (2004-2009). After the first five years (after the construction is completed), based aircraft is forecast to increase 1.33%, which corresponds to the same increase as the selected general aviation forecast scenario.

Table B9
GENERAL AVIATION BASED AIRCRAFT FORECAST, 2004-2024

Year	Based Aircraft	Operations per Based Aircraft
2004[1]	60	601
2005	60	609
2006	65	569
2007	70	536
2008	75	507
2009	80	481
2014	85	481
2019	91	481
2024	98	481

Source: BARNARD DUNKELBERG & COMPANY. *1. Estimated existing.*

The number and type of aircraft anticipated to be based at an airport are vital components in developing a plan for the Airport. Depending on the potential market and forecast, the Airport will tailor the plan in response to anticipated demand. The mix of based aircraft for incremental periods is shown in the following table entitled *BASED AIRCRAFT FORECAST BY TYPE, 2004-2024*. The percentage of turbo prop and business jet aircraft is expected to increase as a part of the total based aircraft population at the Airport, while single engine and twin-engine based aircraft are expected to decrease slightly. This is in line, with overall national trends in general aviation, but even more importantly, parallels the regional/local expectations and projections characteristic of the general aviation fleet.

Table B10
BASED AIRCRAFT FORECAST BY TYPE, 2004-2024

Aircraft Type	2004[1]	2009	2014	2019	2024
Single Engine	50 *(83.3%)*	65 *(81.3%)*	66 *(77.2%)*	68 *(74.5%)*	74 *(75.9%)*
Twin Engine	6 *(10.0%)*	8 *(10.0%)*	9 *(10.5%)*	10 *(11.0%)*	10 *(10.3%)*
Turbo prop	0 *(0.0%)*	1 *(1.3%)*	2 *(2.3%)*	3 *(3.3%)*	3 *(3.1%)*
Business Jet	0 *(0.0%)*	1 *(1.3%)*	2 *(2.3%)*	3 *(3.3%)*	4 *(4.1%)*
Helicopter	4 *(6.7%)*	5 *(6.3%)*	6 *(7.0%)*	7 *(7.7%)*	7 *(7.2%)*
TOTAL	**60** ***(100.0%)***	**80** ***(100.0%)***	**85** ***(100.0%)***	**91** ***(100.0%)***	**98** ***(100.0%)***

Source: BARNARD DUNKELBERG & COMPANY.

1. Estimated existing..

Summary

A summary of the aviation forecasts prepared for this study is presented in the following table entitled *SUMMARY OF AVIATION ACTIVITY FORECASTS, 2004-2024*. This information will be used in the following chapters to analyze the capacity of the Airport, develop facility requirements, and to determine future noise impacts and exposure. In other words, the aviation activity forecasts are the foundation from which plans will be developed and implementation decisions will be made. Two additional tables provide a comparison and summary in the FAA recommended format, for comparison purposes, entitled *COMPARISON OF AVIATION ACTIVITY FORECASTS & TAF FORECASTS, 2004-2019* and *SUMMARY OF AIRPORT PLANNING FORECASTS FAA FORMAT, 2004-2019.*

Table B11
SUMMARY OF AVIATION ACTIVITY FORECASTS, 2004-2024

Operations	**2004**[1]	**2009**	**2014**	**2019**	**2024**
Commercial Service	*0*	*3,779*	*3,375*	*3,185*	*3,117*
General Aviation	*36,050*	*38,511*	*41,141*	*43,950*	*46,951*
Single Engine	21,385	22,336	23,327	24,173	25,334
Twin-Engine	4,975	5,392	5,842	6,593	7,137
Turbo prop	712	809	987	1,055	1,127
Business Jet	948	1,194	1,563	1,934	2,348
Helicopter	8,030	11,439	9,421	10,196	10,987
Military	*8,240*	*8,240*	*8,240*	*8,240*	*8,240*
Helicopter	8,120	8,120	8,120	8,120	8,120
Fixed Wing	120	120	120	120	120
Total Aircraft Operations	44,290	50,530	52,756	55,375	58,308
Local Operations	2,458	2,696	3,291	3,956	4,695
Itinerant Operations	33,592	35,815	37,850	39,995	42,256
Passenger Enplanements	0	12,376	14,699	17,456	20,731
Based Aircraft By Type					
Single Engine	50	65	66	68	74
Twin-Engine	6	8	9	10	10
Turbo prop	0	1	2	3	3
Business Jet	0	1	2	3	4
Helicopter	4	5	6	7	7
Total Based Aircraft	60	80	85	91	98

Source: BARNARD DUNKELBERG & COMPANY. *1. Estimated existing.*

Table B12
COMPARISON OF AVIATION ACTIVITY FORECASTS & TAF FORECASTS, 2004-2019

Operations	Airport Forecast	TAF1	AF/TAF % Difference
Passenger Enplanements			
2004	0	0	0.0%
2009	12,376	0	0.0%
2014	14,699	0	0.0%
2019	17,456	0	0.0%
Commercial Operations			
2004	0	0	0.0%
2009	3,779	0	0.0%
2014	3,375	0	0.0%
2019	3,185	0	0.0%
Total Operations			
2004	44,290	44,290	0.0%
2009	50,530	45,821	10.3%
2014	52,756	47,353	11.4%
2019	55,375	48,886	13.3%

Source: BARNARD DUNKELBERG & COMPANY. *1. FAA Terminal Area Forecasts (obtained January 2005).*

Table B13
SUMMARY OF AIRPORT PLANNING FORECASTS FAA FORMAT, 2004-2019

	Forecast Levels and Growth Rates				Average Annual Compound Growth Rate		
	2004	**2009**	**2014**	**2019**	**Base Year to 2009**	**Base Year to 2014**	**Base Year to 2019**
Passenger Enplanements							
Air Carrier	0	0	0	0	*0.0%*	*0.0%*	*0.0%*
Commuter	0	12,376	14,699	17,456	*0.0%*	*0.0%*	*0.0%*
Total Enplanements	**0**	**12,376**	**14,699**	**17,456**	***0.0%***	***0.0%***	***0.0%***
Aircraft Operations							
Itinerant							
Air Carrier[1]	0	0	0	0	*0.0%*	*0.0%*	*0.0%*
Commuter/Air Taxi	0	3,779	3,375	3,185	*0.0%*	*0.0%*	*0.0%*
Total Commercial Operations	0	3,779	3,375	3,185	*0.0%*	*0.0%*	*0.0%*
General Aviation	33,592	35,815	37,850	39,995	*1.3%*	*1.2%*	*1.2%*
Military	8,240	8,240	8,240	8,240	*0.0%*	*0.0%*	*0.0%*
Local							
General Aviation	2,458	2,696	3,291	3,956	*1.9%*	*3.0%*	*3.2%*
Military	0	0	0	0	*0.0%*	*0.0%*	*0.0%*
Total Operations	**44,290**	**50,530**	**52,756**	**55,375**	***2.7%***	***1.8%***	***1.5%***
Total GA Operations	*36,050*	*38,511*	*41,141*	*43,950*	*1.3%*	*1.3%*	*1. 3%*
Instrument Operations	0	0	0	0	*0.0%*	*0.0%*	*0.0%*
Peak Hour Operations	143	163	170	179	*2.7%*	*1.7%*	*1.5%*
Cargo Enplaned/ Deplaned Tons	0	0	0	0	*0.0%*	*0.0%*	*0.0%*

Table B13 - *Continued*
SUMMARY OF AIRPORT PLANNING FORECASTS FAA FORMAT, 2004-2019

	Forecast Levels and Growth Rates				Average Annual Compound Growth Rate		
	2004	2009	2014	2019	Base Year to 2009	Base Year to 2014	Base Year to 2019
Based Aircraft							
Single Engine	50	65	66	68	2. 0%	5.4%	2.8%
Twin Engine	6	8	9	10	3.0%	5.9%	4.1%
Turbo Prop	0	1	2	3	3.0%	3.0%	3.0%
Business Jet	0	1	2	3	3.0%	3.0%	3.0%
Helicopter	4	5	6	7	0.0%	0.0%	0.0%
Total Based Aircraft	60	80	85	91	5.9%	3.5%	2.8%
Average Aircraft size (seats)							
Air Carrier	0	0	0	0	---	---	---
Commuter	0	10	13	16	---	---	---
Average Enplaning Load Factor							
Air Carrier	0.0	0.0	0.0	0.0	---	---	---
Commuter	0.0	65.5	67.0	68.5	---	---	---
OPBA	601	481	481	481	---	---	---

Source: BARNARD DUNKELBERG & COMPANY.

--- Data not available.
OPBA – Operations per based aircraft.
1. Assumes 12 months scheduled passenger service aircraft operations.

PORT OF ASTORIA

Astoria Regional Airport

Master Plan Update

C. Capacity Analysis & Facility Requirements

C Capacity Analysis and Facility Requirements

INTRODUCTION. The determination of an airport's ability to accommodate its existing and forecasted aviation activity is the critical analysis of any master plan. A thorough review of all key airport facilities in relation to the projected aviation demand described in the previous chapter must be conducted to ascertain not only how that airport is currently performing, but also if it can meet those demands throughout the planning period. This analysis focuses on the major aircraft operating surfaces, the operational capacity of the Airport, and also considers weather conditions, the surrounding airspace, the availability and type of navigational facilities, the type and arrangement of aircraft storage facilities, the supporting facilities, and the type and amount of landside access.

The capacity of an airfield is primarily a function of the major aircraft operating surfaces that compose the facility and the configuration of those surfaces (runways and taxiways). However, it is also related to and considered in conjunction with wind coverage, airspace utilization, and the availability and type of navigational aids. Capacity refers to the number of aircraft operations that a facility can accommodate on either an hourly or yearly basis. It does not refer to the size or weight of aircraft. Facility requirements are used to determine the facilities needed to meet the forecasted demand related to the existing and forecast aircraft fleet. Evaluation procedures will analyze runway length, dimensional criteria, aprons, hangars, and vehicular access.

Airport Reference Code (ARC)/Critical Aircraft Analysis

Knowledge of the types of aircraft currently using, and those aircraft expected to use, Astoria Regional Airport provides information concerning the Airport Reference Code (ARC). FAA Advisory Circular 150/5300-13, *Airport Design*, provides guidelines for this determination. The ARC is based on the "Design Aircraft" that is judged the most critical aircraft using, or projected to use, the Airport. Typically, the Design Aircraft is an aircraft or an aircraft type with the most demanding operational and physical characteristics that currently or is projected to perform a minimum of 500 annual operations at the Airport. That aircraft's resultant ARC relates those aircraft operational and physical characteristics to design criteria that are applied to various airport components. Under this methodology, safety margins are provided in the physical design of airport facilities.

The types of aircraft presently utilizing an airport and those projected to utilize the facility in the future are important considerations for planning airport facilities, since an airport should be designed in accordance with the ARC standards that are described in the aforementioned advisory circular. The ARC has two components that relate to the Airport's "Design Aircraft." The first component, depicted by a letter (i.e., A, B, C, D, or E), is the aircraft approach category and relates to aircraft approach speed (operational characteristic). The second component, depicted by a Roman numeral (i.e., I, II, III, IV, or V), is the aircraft design group and relates to aircraft wingspan (physical characteristic). Aircraft approach speed applies to runways and runway-related facilities, while aircraft wingspan is primarily related to separation criteria associated with taxiways and taxilanes.

Runway 8/26 and Runway 13/31. Both of the runways at the Airport accommodate "small aircraft" (classified as aircraft weighing 12,500 pounds or less) and "large aircraft" (classified as aircraft weighting over 12,500 pounds). The largest aircraft currently using the Airport on a regular basis are business jets such as the Cessna Citation II, Cessna Citation V and Dassault Falcon 20 (including the HU-25 flown by the Coast Guard). These aircraft (and many others in the business jet fleet) have "B" approach speeds (greater than 91 knots but less than 121 knots) and wing spans contained on airplane design group "II" (greater than 49 feet but less than 79 feet). This indicates that both of the runways should be designed using ARC B-II criteria. Note that this is consistent with the ARC that has been used in previous planning documents for the Airport. While the Airport is utilized to a lesser degree by some business jet aircraft with "C" approach speeds (greater than 121 knots but less than 141 knots), these aircraft do not use the Airport on a frequent enough basis to warrant "design aircraft" considerations.

Astoria Regional Airport will maintain its existing ARC classification of B-II.

Airfield Capacity Methodology

The evaluation method used to determine the capability of the current airside facilities to accommodate the existing and projected operational demands is described in the following narrative. Note that evaluation of this capability is expressed in terms of potential excesses and deficiencies in capacity. The methodology used for the measurement of airfield capacity in this study is described in the Federal Aviation Administration (FAA) Advisory Circular 150/5060-5, *Airport Capacity and Delay*. From this methodology, airfield capacity is defined in the following terms:

- *Hourly Capacity of Runways:* **The maximum number of aircraft that can be accommodated under conditions of continuous demand during a one-hour period.**
- *Annual Service Volume:* **A reasonable estimate of an airport's annual capacity (i.e., level of annual aircraft operations that will result in an average annual aircraft delay of approximately one to four minutes).**

The capacity of an airport's airside facilities is a function of several factors. These factors include the layout of the airfield, local environmental conditions, specific characteristics of local aviation demand, and air traffic control requirements. The relationship of these factors and their cumulative impact on airfield capacity are examined in the following sections.

Airfield Layout

The arrangement and interaction of airfield components (runways, taxiways, and ramp entrances) refer to the layout or "design" of the airfield. As previously described, Astoria Regional Airport is served by two runways, Runway 8/26 and Runway 13/31, which are both served by partial or semi-parallel taxiways. There are also several runway exit taxiways and connector taxiways that are designed to minimize aircraft runway occupancy time, thus increasing the capacity of the runway system.

Existing landside facilities, which include FBO hangars, T-hangars, aprons, industrial facilities, coast guard facilities, and other various aviation facilities, are located west of Runway 13/31 and south of Runway 8/26. These facilities are well situated to take advantage of the existing taxiway system.

Wind Coverage

Climatological conditions specific to the location of an airport not only influence the layout of the airfield, but also affect the use of the runway system. Surface wind conditions have a direct effect on the operation of an airport, in that runways not oriented to maximum efficiency with respect to prevailing winds will restrict the capacity of the Airport to varying degrees. When landing and taking off, an aircraft is able to operate properly on a runway as long as the wind component perpendicular to the direction of travel (defined as a crosswind) is not excessive in relation to the specific characteristics of that aircraft.

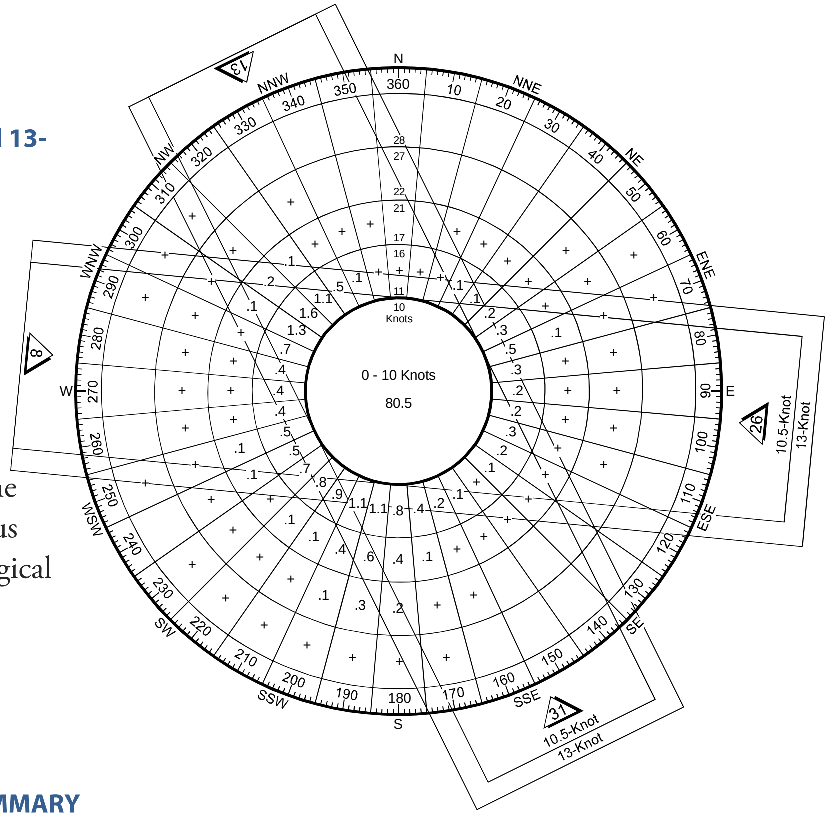
To determine wind velocity and direction at Astoria Regional Airport, wind data were obtained from observations taken at the Airport (from data gathered by the National Oceanic and Atmospheric Administration, National Climatic Data Center) for the period January 1, 1995 – December 31, 2004. This data was used to construct the all-weather wind rose for the Airport. Note that while maximum crosswind components are specific to each aircraft, the FAA has established general standards that are dependent upon the Airport Reference Code (ARC) for the type of aircraft that use the Airport on a regular basis. As stated above, the ARC for the Airport is B-II.

According to FAA AC 150/5300-13, *Airport Design*, for ARC-A-I and B-I airports, a crosswind component of 10.5-knots is considered maximum. For ARC A-II and B-II airports, a crosswind component of 13-knots is considered maximum. For ARC A-III, B-III, and C-I through D-III airports, a crosswind component of 16-knots is considered maximum. Finally, for ARC A-IV through D-VI airports, a crosswind component of 20-knots is considered maximum. In consideration of the Airport's ARC B-II classification, these standards specify that a maximum crosswind of 13-knots be considered in the analysis. In addition, it is known that the Airport will also continue to serve small, single- and twin-engine aircraft, for which the 10.5-knot crosswind component is considered maximum. Therefore, it is important that two crosswind components are analyzed for this airport (the 10.5-knot and the 13-knot). The following illustration, entitled *ALL WEATHER WIND ROSE: 10.5 and 13-KNOT CROSSWIND COMPONENT*, illustrates the all weather wind coverage provided at Astoria Regional Airport.

Figure C1

ALL WEATHER WIND ROSE: 10.5- and 13-KNOT CROSSWIND COMPONENTS

Source: National Oceanic and Atmospheric Administration, National Climatic Data Center Station 72791 Astoria, Oregon. Period of Record: 1995-2004.



The following table, Table C1, entitled *ALL WEATHER WIND COVERAGE SUMMARY*, quantifies the wind coverage offered by the various runways under all weather metrological conditions.

Table C1

ALL WEATHER WIND COVERAGE SUMMARY

Runway Designation	10.5-Knot Crosswind Component	13-Knot Crosswind Component
Runway 8	67.87%	69.66%
Runway 26	76.70%	79.86%
Runway 8/26	91.15%	94.63%
Runway 13	76.22%	79.73%
Runway 31	76.72%	78.88%
Runway 13/31	91.37%	95.58%
Combined Runways	96.13%	98.63%

Source: Wind analysis tabulation provided by BARNARD DUNKELBERG & COMPANY utilizing the FAA Airport Design Software supplied with AC 150/5300-13. Data obtained from National Oceanic and Atmospheric Administration, National Climatic Data Center Station 72791 Astoria, Oregon Period of Record 1995-2004. A maximum 5-knot tailwind component was considered in this analysis.

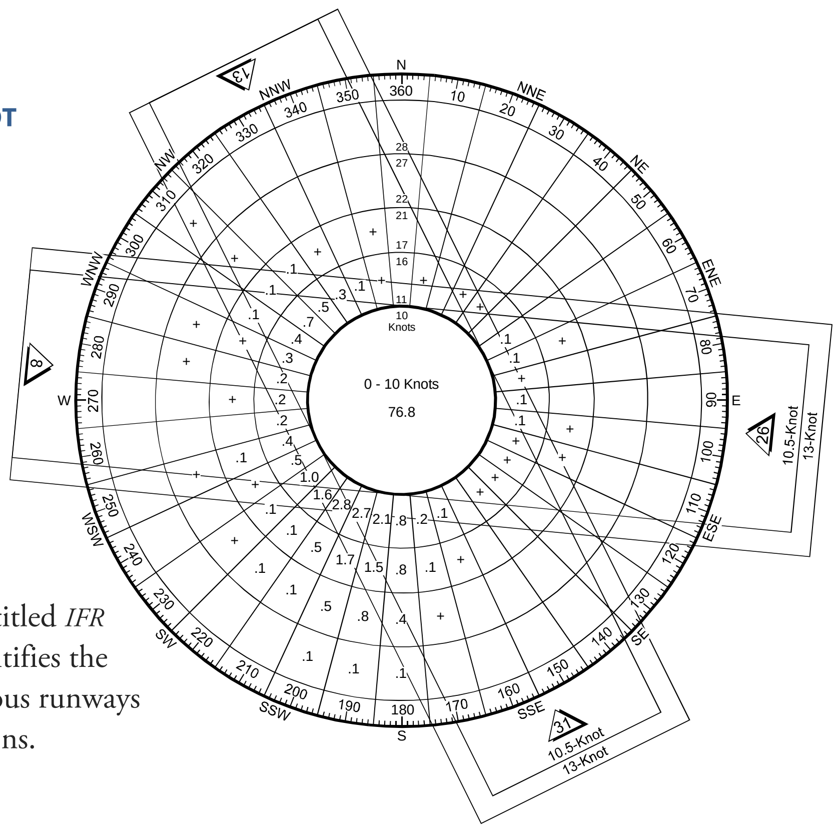
The desirable wind coverage for an airport is 95%, which means that the runway should be oriented such that the maximum crosswind component is not exceeded more than five percent (5%) of the time. Together, the two runways provide 96.13% wind coverage for the 10.5-knot crosswind component and 98.63% wind coverage for the 13-knot crosswind component. This analysis indicates that the existing runway configuration provides adequate wind coverage for the 13-knot and 10.5-knot crosswind components. No new runways will be recommended to provide additional wind coverage.

In an effort to analyze the effectiveness of the Airport's existing instrument approach capabilities, an Instrument Flight Rules (IFR) wind rose has also been constructed and is presented in the following figure. Again, wind data from Astoria Regional Airport have been used in the construction of this IFR wind rose.

Figure C2
IFR1 WIND ROSE: 10.5- and 13- KNOT CROSSWIND COMPONENTS

Source: National Oceanic and Atmospheric Administration, National Climatic Data Center Station 72791 Astoria, Oregon. Period of Record: 1995-2004.

1. Ceiling less than or equal to 1,000 feet and/or visibility less than three miles and ceiling greater than or equal to 200 feet and visibility greater than or equal to 0.50 miles. Ceiling less than or equal to 1,000 feet and/or visibility less than three miles and ceiling greater than or equal to 300 feet and visibility greater than or equal to ¾ miles.



The following table, Table C2, entitled *IFR WIND COVERAGE SUMMARY*, quantifies the wind coverage offered by the various runways under IFR meteorological conditions.

Table C2
IFR WIND COVERAGE SUMMARY

Runway Designation	IFR1 Conditions Maximum 10.5-Knot Crosswind Component	IFR1 Conditions Maximum 13-Knot Crosswind Component
Runway 8	59.59%	62.31%
Runway 26	77.68%	82.80%
Runway 8/26	82.82%	87.99%
Runway 13	75.70%	81.71%
Runway 31	72.52%	74.09%
Runway 13/31	87.02%	93.37%
Combined Runways	90.10%	95.69%

Source: Wind analysis tabulation provided by BARNARD DUNKELBERG & COMPANY utilizing the FAA Airport Design Software supplied with AC 150/5300-13. Data obtained from National Oceanic and Atmospheric Administration, National Climatic Data Center Station 72791 Astoria, Oregon Period of Record 1995-2004.

1. Ceiling less than or equal to 1,000 feet and/or visibility less than three miles and ceiling greater than or equal to 300 feet and visibility greater than or equal to ¾ miles. A 5-knot tailwind component was used.

From this analysis, it can be stated that Runway 26 offers the best wind coverage capabilities during periods of IFR weather conditions. This fact is important in that it confirms Runway 26's use as the preferential IFR runway, and re-enforces the necessity of its Instrument Landing System (ILS) precision approach capabilities.

Characteristics of Demand

Certain site-specific characteristics related to aviation use and aircraft fleet makeup impact the capacity of the airfield. These characteristics include aircraft mix, runway use, percent arrivals, touch-and-go operations, exit taxiways, and air traffic control rules.

Aircraft Mix. The capacity of a runway is dependent upon the type and size of the aircraft that use the facility. FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*, categorized aircraft into four classes based on maximum certificated takeoff weight. This differs from the Airport Reference Code (ARC) defined previously, which classifies aircraft based on aircraft approach speed (A-E). For aircraft mix, aircraft Classes A and B consist of small, single-engine and twin-engine aircraft (both prop and jet), weighing 12,500 pounds or less, which are representative of the general aviation fleet. Classes C and D aircraft are larger jet and propeller aircraft typical of the business jet fleet, along with those aircraft used by the airline industry and the military.

Astoria Regional Airport has no operations by Class D aircraft (over 300,000 pounds), nor are any expected to occur in the future. Class C aircraft operations at the Airport are primarily executive type prop and jet general aviation aircraft. Aircraft mix is defined as the relative percentage of operations conducted by each of these four classes of aircraft. The aircraft mix for Astoria Regional Airport is depicted in the following table, entitled *AIRCRAFT CLASS MIX FORECAST, 2004-2024.*

Table C3
AIRCRAFT CLASS MIX FORECAST, 2004-2024

	VFR Conditions			IFR Conditions		
Year	**Class A & B**	**Class C**	**Class D**	**Class A & B**	**Class C**	**Class D**
2004[1]	96%	4%	0%	91%	9%	0%
2009	96%	4%	0%	91%	9%	0%
2014	95%	5%	0%	90%	10%	0%
2019	94%	6%	0%	89%	11%	0%
2024	94%	6%	0%	89%	11%	0%

Source: BARNARD DUNKELBERG & COMPANY.
Class A – Small Single Engine, <= 12,500 pounds
Class B – Small Twin-Engine, <= 12,500 pounds
Class C – >12,500 - <=300,000 pounds
Class D – > 300,000 pounds
1. Actual.

Runway Use. The use configuration of the runway system is defined by the number, location, and orientation of the active runways, and relates to the distribution and frequency of aircraft operations to those facilities. Both the prevailing winds in the region and the existing runway facility at Astoria Regional Airport combine to dictate the utilization of the existing runway system.

According to observations, Runway 8/26 is the most utilized runway at the Airport (approximately 65% of total operations use this runway). With respect to Runway 13/31, Runway 31 is considered the calm wind runway, with 90% of operations occurring on Runway 31 and ten percent (10%) occurring on Runway 13. With respect to Runway 8/26, 75% of operations occur on Runway 26 and 25% of operations occur on Runway 8.

Percent Arrivals. Runway capacity is also significantly influenced by the percentage of all operations that are arrivals. Because aircraft on final approach are typically given absolute priority over departures, higher percentages of arrivals during peak periods of operations reduce the Annual Service Volume. The operations mix occurring on the runway system at Astoria Regional Airport reflects a general balance of arrivals to departures. Therefore, it was assumed in the capacity calculations that arrivals equal departures during the peak period.

Touch-And-Go Operations. A touch-and-go operation refers to an aircraft maneuver in which the aircraft performs a normal landing touchdown followed by an immediate takeoff without stopping or taxiing clear of the runway. These operations are normally associated with training and are included in local operations figures. By the end of the 20-year planning period, local operations are expected to increase slightly (up to approximately ten percent (10%) of the total aircraft operations at the Airport) due to increased training activity at the Airport.

Exit Taxiways. The capacity of a runway is greatly influenced by the ability of an aircraft to exit that runway as quickly and safely as possible. Therefore, the quantity and design of the exit taxiways can directly influence aircraft runway occupancy time and the capacity of the runway system.

In consideration of the crossing configuration of the runway system at the Airport and the efficient layout of the existing exit taxiways, the number of exit taxiways appears adequate for existing and future operational expectations.

Air Traffic Control Rules. The FAA specifies separation criteria and operational procedures for aircraft near an airport that is contingent upon aircraft size, availability of radar, and sequencing of operations, both advisory and/or regulatory, which may be in effect at the Airport. The impact of air traffic control on runway capacity is most influenced by aircraft separation requirements dictated by the mix of aircraft utilizing the Airport. Presently, there are no special air traffic control rules in effect at Astoria Regional Airport that significantly impact operational capacity, although it should be noted that the Airport does not currently have an Air Traffic Control Tower (ATCT).

Airfield Capacity Analysis

As previously described, the determination of capacity for Astoria Regional Airport uses the methodology described in the FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*, along with the Airport Design Computer Program that accompanies AC 150/5300-13, *Airport Design*.

Several assumptions are incorporated in these capacity calculations:

- **Arrivals equal departures;**
- **The percent of touch-and-go operations is between zero and 50 percent (0-50%) of total operations;**
- **There is a full-length parallel taxiway with ample exits and no taxiway crossing problems;**
- **There are no airspace limitations;**
- **The Airport has at least one runway equipped with an ILS and the necessary air traffic control facilities to carry out operations in a radar environment;**
- **IFR weather conditions occur roughly ten percent (10%) of the time; and,**
- **Approximately 80% of the time the Airport is operated with the runway use configuration that produces the greatest hourly capacity.**

Applying information generated from the preceding analyses, capacity and demand are formulated in terms of the following results:

- **Annual Service Volume (ASV)**
- **Hourly Capacity of Runways (VFR and IFR)**

Based on the methodology to determine the capacity for long-range planning purposes, the ASV for a runway configuration similar to Astoria Regional Airport's could be as high as 230,000 operations, with a VFR capacity of roughly 98 operations per hour, and an IFR capacity of approximately 59 operations per hour. It is recognized that Astoria Regional Airport does not conform to all of the assumptions listed above (i.e., the Airport does not have an ATCT facility), which results in a loss of capacity from the figures presented. However, if there were sufficient demand and ATCT facilities were operated in the future, the actual capacity could be similar to the projection for long-range planning purposes.

As can be seen, the Airport's Annual Service Volume is significantly greater than not only the existing annual operations (44,290), but also those forecasted for the end of the planning period

(58,308). These capacity computations provide guidance in evaluating the ability of airport facilities to accommodate forecast demand.

Note that even before an airfield reaches its ASV capacity, it begins to experience certain amounts of delay in aircraft operations. As an airport's operations increase toward this capacity, delay increases exponentially. Therefore, it is important to monitor the number of aircraft operations regularly and identify factors that may be acting as capacity constraints. These actions will enable airport management to react to unexpected trends before the lack of operational capacity becomes a critical issue. As a matter of good planning practices, it is considered industry standard that planning occur for capacity enhancements at an airport when it is at 60% of its ASV, and that action on those plans start when it reaches 80% of its ASV.

Facility Requirements

This section presents the requirements analysis for the airside and landside facilities necessary to meet the existing and projected aviation demand at Astoria Regional Airport. For those components determined to be deficient, the type and size of the facilities required to meet future demand are identified. Airside facilities examined include the runways, taxiways, runway protection zones, thresholds, and navigational aids. Landside facilities include such facilities as terminal buildings, hangars, aircraft apron areas, and airport support facilities.

This analysis uses the forecasts presented in the preceding chapter for establishing future development of the Airport. This is not intended to dismiss the possibility that, due to the unique circumstances in the region, either accelerated growth or consistently higher or lower levels of activity may occur. Aviation activity levels should be monitored for consistency with the forecasts. In the event of changes, the schedule of development should be adjusted to correspond to the demand for facilities rather than be set to predetermined dates of development. By doing this, "over-building" or "under-building" can be avoided.

Airfield Dimensional Criteria

The FAA Advisory Circular 150/5300-13, *Airport Design*, recommends standard widths, minimum clearances, and other dimensional criteria for runways, taxiways, safety areas, aprons, and other physical airport facilities. Dimensions are recommended with respect to the Aircraft Approach Category and Airplane Design Group designations (the Airport Reference Code), as well as the availability and type of approach instrumentation.

Airfield dimensional criteria applicable to Astoria Regional Airport are contained in the following tables entitled *RUNWAY 8/26 DIMENSIONAL STANDARDS RUNWAY,* and *RUNWAY 13/31 DIMENSIONAL STANDARDS (*one table is provided for each runway). As identified in the table, the facilities at Astoria Regional Airport meet or exceed most of the appropriate requirements, other than the minimum runway centerline to parallel taxiway centerline separation requirement of 300 feet for a B-II runway with visibility minimum requirements of lower than ¾-mile. This separation is currently at 275 feet.

Table C4
RUNWAY 8/26 DIMENSIONAL STANDARDS (in feet)

Item	Existing Dimension	ARC B-II With Visibility Minimums lower than ¾-mile
Runway 8/26:		
Width	100	100
Safety Area Width	300	300
Safety Area Length (beyond each runway end)	600	600
Object Free Area Width	800	800
Object Free Area Length (beyond runway end)	600	600
Obstacle Free Zone Width	400	400
Taxiway:		
Width	50	35
Safety Area Width	79	79
Object Free Area Width	131	131
Runway Centerline to:		
Holdline	200	200
Parallel Taxiway Centerline	275	300
Aircraft Parking Area	500+	400

Source: FAA Advisory Circular 150/5300-13, *Airport Design*, and actual airport conditions.

Runway Safety Area: An area adjacent to the runway that is cleared and graded and that has no potentially hazardous ruts, humps, depressions, or other surface variations. Under dry conditions, the safety area shall be capable of supporting aircraft rescue equipment, snow removal equipment, and the occasional passage of aircraft without causing structural damage.
Runway Object Free Area (OFA): A two dimensional ground area surrounding a runway that is clear of objects protruding above the safety area edge elevation. Objects are acceptable within the OFA if the location is required for the purpose of air navigation or aircraft ground maneuvering purposes.

Table C5
RUNWAY 13/31 DIMENSIONAL STANDARDS (in feet)

Item	Existing Dimension	ARC B-II With Visibility Minimums Greater than ¾-Mile
Runway 13/31:		
Width	100	75
Safety Area Width	150	150
Safety Area Length (beyond each runway end)	300	300
Object Free Area Width	500	500
Object Free Area Length (beyond runway end)	300	300
Obstacle Free Zone Width	400	400
Taxiway:		
Width	35	35
Safety Area Width	79	79
Object Free Area Width	131	131
Runway Centerline to:		
Holdline	200	200
Parallel Taxiway Centerline	290	240
Aircraft Parking Area	400	250

Source: FAA Advisory Circular 150/5300-13, *Airport Design*, and actual airport conditions.

Runway Safety Area: An area adjacent to the runway that is cleared and graded and that has no potentially hazardous ruts, humps, depressions, or other surface variations. Under dry conditions, the safety area shall be capable of supporting aircraft rescue equipment, snow removal equipment, and the occasional passage of aircraft without causing structural damage.

Runway Object Free Area (OFA): A two dimensional ground area surrounding a runway that is clear of objects protruding above the safety area edge elevation. Objects are acceptable within the OFA if the location is required for the purpose of air navigation or aircraft ground maneuvering purposes.

Runway Pavement Strength

Runway 8/26 and Runway 13/31 can currently support aircraft with a gross weight of 60,000 pounds single wheel, 76,000 pounds dual wheel, and 119,000 pounds tandem-wheel main landing gear configuration. In consideration of the future forecasted aircraft fleet, these runway pavement strengths are sufficient for the duration of the planning period, assuming routine maintenance is performed at regular intervals.

Runway Length

Generally, runway length requirements for design purposes at an airport like Astoria Regional Airport are premised upon the category of aircraft using the Airport. The categories are small aircraft under 12,500 pounds maximum takeoff weight and large aircraft under 60,000 pounds maximum takeoff weight.

Runway length requirements are derived from the computer based FAA Airport Design Software supplied in conjunction with Advisory Circular 150/5300-13, *Airport Design*. Using this software, three values are entered into the computer, including the airport elevation of 15 feet Above Mean Sea Level (AMSL), the Mean Normal Maximum Temperature (NMT) of 68.8 degrees Fahrenheit, and the maximum difference in runway elevation at the centerline of 4.2 feet. This data generates the general recommendations for runway length requirements at Astoria Regional Airport, which are provided in the following table.

Table C6
RUNWAY LENGTH REQUIREMENTS

Aircraft Category	**Dry Runway Length (feet)**	**Wet Runway Length (feet)**
Runway 8/26 Existing Length: 5,796 feet		
Runway 13/31 Existing Length: 4,490 feet		
Airplanes less than 12,500 lbs. with less than 10 seats		
75% of Small Aircraft Fleet	2,290	2,290
95% of Small Aircraft Fleet	2,830	2,830
100% of Small Aircraft Fleet	3,350	3,350
Airplanes less than 12,500 lbs. with 10 or more seats	*3,900*	*3,900*
Airplanes greater than 12,500 lbs. and less than 60,000 pounds		
75% of fleet at 60% useful load	4,590	5,230
75% of fleet at 90% useful load	5,790	6,620
100% of fleet at 60% useful load	4,820	5,500
100% of fleet at 90% useful load	6,890	7,000
Large Aircraft greater than 60,000 pounds [1]	5,020	5,020

Source: FAA Advisory Circular 150/5300-13, *Airport Design*.

Lengths based on 15 feet AMSL, 68.8° F NMT and a maximum difference in runway centerline elevation of 4.2 feet and 500-mile stage length.

As shown in the preceding table, the small aircraft fleet (under 12,500 pounds) requires a runway length between 2,290 and 3,900 feet, while aircraft over 12,500 pounds, but less than 60,000 pounds, require between 4,590 and 6,890 feet. Each of the runway lengths given for large aircraft under 60,000 pounds maximum certificated takeoff weight provides a runway sufficient to satisfy the operational requirements of a certain percentage of the aircraft fleet at a certain percentage of the useful load. Useful load is defined as the difference between the maximum gross takeoff weight and the empty weight of the airplane, exclusive of fuel. Examples of those aircraft that comprise 75% of the general aviation aircraft fleet between 12,500 and 60,000 pounds include Learjets, Challengers, Citations, Falcons, Hawkers, and the Westwind.

A significant factor to consider when analyzing the generalized runway length requirements given in the above table is that the actual runway length required for a particular flight is a function of elevation, temperature, aircraft stage length, and sometimes internal operational standards. As temperatures change on a daily basis, the runway length requirements change accordingly (i.e., the cooler the temperature, the shorter the runway necessary). Therefore, if a runway is designed to accommodate 75% of the fleet at 60% useful load, this does not mean that at certain times a larger or more heavily loaded aircraft cannot use the runway. However, the amount of time such operations can safely occur may be restricted.

Based on the runway length data presented, it was determined that the existing runway lengths of Runway 8/26 and Runway 13/31 are adequate to accommodate the projected aircraft operational requirements at the Airport.

Taxiways

Taxiways are constructed primarily to enable the movement of aircraft between the various functional areas on the Airport and the runway system. Some taxiways are necessary simply to provide access between aircraft parking aprons and runways, whereas other taxiways are necessary to enhance airfield safety and operational efficiency. All taxiways at the Airport currently meet or exceed the required width according to the appropriate ARC criteria.

However, from an operational perspective, there are deficiencies in this system that are due primarily to the basic taxiway layout. Originally designed to meet the specific operational requirements of a World War II era Naval Air Station, the Airport's taxiway system does not fully meet the requirements of a modern civil aviation facility. Shortcomings include the following:

- A lack of parallel taxiway access to the departing ends of Runway 8 and Runway 13;
- A lack of a straight, continuous, full-length parallel taxiway for the primary instrument runway (Runway 8/26);
- A lack of a full-length parallel taxiway for Runway 13/31;
- The lack of a runway exit taxiway stub for aircraft landing on Runway 8 prior to the runway end; and,
- The lack of hold aprons at all runway ends.

While the system currently operates adequately given the existing service levels, the deficiencies inherent in the basic taxiway configuration will likely contribute to increasing inefficiencies as operational demands increase over the long term.

Runway Protection Zones (RPZs)

The function of the RPZ is to enhance the protection of people and property on the ground beyond the runway ends. This safety enhancement is ideally achieved through airport control of the RPZ areas. The RPZ itself is trapezoidal in shape and centered about the extended runway centerline. It begins 200 feet beyond the end of the area usable for takeoff or landing. The RPZ dimensions are functions of the type of aircraft operating at the Airport and the approach visibility minimums associated with each runway end.

In consideration of the existing instrument approach minimums and the type of aircraft each runway is designed to accommodate, the following table, entitled *RUNWAY PROTECTION ZONE DIMENSIONS*, lists existing RPZ dimensional requirements, along with the requirements for improved approach capabilities.

Table C7
RUNWAY PROTECTION ZONE DIMENSIONS

	Width at Runway End (feet)	Length (feet)	Width at Outer End (feet)	Airport Controls Entire RPZ
Existing RPZ Dimensional Requirements:				
Runway 8	1,000	2,500	1,750	Yes
Runway 26	1,000	2,500	1,750	Yes
Runway 13	500	1,000	700	No
Runway 31	500	1,000	700	Yes
Required RPZ Dimensions for Various Visibility Minimums:				
Visual and not lower than 1-mile, Small Aircraft Only	250	1,000	450	---
Visual and not lower than 1-mile, Approach Categories A & B	500	1,000	700	---
Visual and not lower than 1-mile, Approach Categories C & D	500	1,700	1,010	---
Not lower than ¾-mile, all aircraft	1,000	1,700	1,510	---
Lower than ¾-mile , all aircraft	1,000	2,500	1,750	---

Source: FAA Advisory Circular 150/5300-13, *Airport Design*. --- Not applicable. TBD – To be determined.

As the above table highlights, it appears that the Airport owns all of the areas associated with the Runway 8/26 RPZ. Recent studies at the Airport with respect to declared distance and runway threshold relocations require additional analysis before firm conclusions can be drawn with regard to these issues.

The potential for providing improved instrument approaches at airports throughout the country at a reduced cost is increased with the continued development of Global Positioning System (GPS) technology. This indicates that planning for enhanced approach capabilities, and the impact of the RPZs, should be incorporated in this study.

Threshold Siting

Each runway threshold should be evaluated for deficiencies regarding approach obstacle clearance requirements, according to guidelines contained in FAA Advisory Circular 150/5300-13. Like the RPZ criteria, the threshold siting criteria is a function of the type of aircraft and approach visibility minimums associated with each runway end.
Extensive work and analysis has recently been completed at the Airport with regard to threshold locations and obstruction surveying. The Master Plan Update will further review the findings of this surveying to ensure that appropriate actions have been taken to provide clear, obstruction free approach surfaces.

Navigational and Landing Aids

Airport navigational aids, including instrument approaches and associated equipment, airport lighting, and weather/airspace services, were detailed in the *Inventory* chapter of this document. The Airport is currently equipped for an ILS instrument approach to Runway 26, VOR and GPS instrument approaches to Runway 8, and a COPTER/ LOC/DME approach for helicopters.

Within the near future, Global Positioning System (GPS) approaches are expected to be the FAA's standard approach technology. As noted previously, with GPS, the cost of establishing improved instrument approaches should be significantly reduced. Because of the expected increased use of sophisticated business and corporate aircraft at Astoria Regional Airport, and to increase safety and operational use of the Airport during adverse weather conditions, the ability to implement improved instrument approaches will be analyzed in the next chapter.

Airport Lighting

Presently, all Runways are equipped with Medium Intensity Runway Lights (MIRL). A Precision Approach Path Indicator (PAPI) is located on Runway 31 and a Visual Approach Slope Indicator (VASI) is located on Runways 8 and 13. Runway 8 and 13 are equipped with Runway End Identifier Lights (REILs). Additionally, Runway 26 is equipped with a Medium Intensity Approach Light System with Runway Alignment Indicator Lights (MALSR). In conjunction with the examination of improved instrument approaches described above, improved airport lighting will also need to be evaluated. The type of airport lighting will be dependent on the type of instrument approach capabilities and will be examined in the next chapter. For increased safety purposes, PAPIs should be programmed for all runways, and REILs should be planned for all runways not equipped with approach lights.

Landside Facilities

Landside facilities are those facilities that support the airside facilities, but are not actually part of the aircraft operating surfaces. These consist of such facilities as passenger terminal facilities, aprons, storage hangars, Fixed Base Operators (FBOs), fuel storage facilities, access roads, support facilities, and terminal buildings. Following an analysis of existing facilities, current deficiencies can be noted in terms of accommodating both existing and future needs.

Terminal Building

With the potential for scheduled passenger service at the Airport, definition of an appropriately sized space for passenger terminal functions will be an important outcome produced by this Master Plan Update. Additional information will be provided in this section, as more is understood about the type of service, which is likely to be offered. In addition, improvements and costs will be outlined in the following chapters to provide an understanding of the capital expenses that are likely to be encountered with the initiation of commercial passenger service activity.

Aircraft Storage

Aircraft based at Astoria Regional Airport are currently stored in multi-aircraft hangars, individual hangars, and T-hangars, or on the apron. There are 60 existing based aircraft at the Airport, almost all of which are being stored in hangars. Note that hangar storage of aircraft is typically very desirable at most airports, since it protects aircraft from adverse weather conditions. This is of particular concern at Astoria where the combinations of fog, rain, and salty air can have detrimental effects on aircraft airframes.

Over the course of the 20-year planning period, the number of based aircraft is forecast to increase to 98, indicating that an increase in storage facilities to accommodate approximately 38 new aircraft will be required. In addition, there is a known existing demand for additional aircraft hangar facilities. The trend of increasing general aviation aircraft size also plays a role in defining future development needs. It is assumed that future storage spaces will reflect the characteristics of current storage patterns, with most aircraft owners preferring some form of hangar storage.

Perhaps the most important influence contributing the need for a comprehensive analysis of the future development needs for general aviation is the configuration of the existing facilities in consideration of space currently available for development. Two key issues that will be considered in the development of a plan for the configuration of future general aviation facilities at Astoria Regional Airport as follows:

- The existing development area for conventional hangars (corporate, FBO, etc.) is minimal. This area is located on the south side of the Airport adjacent to the main apron. The Master Plan Update will define where on the Airport additional conventional hangars can be built. In addition, the new development areas will be identified that can accommodate commercial and industrial aviation development.
- The T-hangar development area can be expanded to the south as demands dictate.

It should be noted that the issues above are more "qualitative" than "quantitative," but each is an important facility development consideration and are important to recognize as part of this facility requirement review.

Tie-down Storage Requirements/Based Aircraft. Aircraft tie-downs are provided for those aircraft that do not require, or are able to secure hangar storage. Because of the great value of even small, unsophisticated general aviation aircraft, most aircraft owners prefer some type of indoor storage. While demand for based aircraft tie-down areas will continue, it is anticipated that the Airport has enough area on the existing aprons to accommodate future demand. Note that additional tie-down areas will be created as a result of providing required taxiway access areas for new hangar construction.

Tiedown Storage Requirements/Itinerant Aircraft. In addition to the needs of the based aircraft tie-down areas, transient aircraft also require apron parking areas. This storage is provided in the form of transient aircraft tie-down space. In calculating the area requirements for these tie-downs, an area of 400 square feet per aircraft can be used for planning purposes; however, it is known that during high demand periods, the currently available area for transient aircraft parking is adequate.

Hangars. The development plan for future hangars at the Airport will include identifying potential parcels, in consideration of the ability to provide roadway and taxiway access in a manner that is efficient and secure. The number of based aircraft at the Airport is forecast to increase by almost 40 during the next 20 years; therefore, the proposed plan will accommodate indoor storage space for a minimum of 40 additional aircraft.

Air Cargo. At this time, air cargo is not a significant component of the activity at Astoria Regional Airport. However, it is anticipated that the demand for air cargo capabilities will increase similarly to national, regional and local trends during the next two decades. It is also anticipated that air cargo requirements will increase at the Airport once commercial air service is restored. Additional area to accommodate air cargo landside operations will be identified.

Support Facility Requirements.

In addition to the facilities described above, there are several airport support facilities that have quantifiable requirements and that are vital to the efficient and safe operation of the Airport.

Air Traffic Control Tower (ATCT). It is not anticipated that the number of aircraft operations will increase to a point that the construction of an ATCT will justified at the Airport in the near future.

Aircraft Rescue and Fire Fighting (ARFF) Facility. As stated previously, the Coast Guard provides ARFF facilities at the Airport though a mutual assistance agreement with the Port of Astoria. If scheduled passenger service activity commences at the Airport, the requirement for ARFF equipment, along with the hours of operation and staffing requirements could be impacted. According to Code of Federal Regulations (CFR) Part 139.317, ARFF equipment and staff requirements are based upon the length of the largest air carrier aircraft that serves the Airport with an average of five or more daily departures. Therefore, there is presently no FAA requirement concerning the number of fire fighters or the amount of fire fighting equipment that should be available at Astoria Regional Airport. These requirements will have to be reviewed in relation to the standard ARFF operations in place at the Airport at the point when scheduled commercial passenger service is restored.

Fuel Storage Facility. The Airport currently has facilities adequate to serve existing aircraft operations. The capacity of the existing storage area can be increased as needed in the future; however, its expansion will likely reduce the area available for aircraft parking apron. It should also be noted that if future aviation facilities are constructed on other areas of the Airport, additional fuel storage units may be required.

Service Roads. An important consideration at Astoria Regional Airport is programming for an appropriate service road system that will accommodate the need for maintenance, emergency, security (including wildlife management observations), and fueling vehicles to access all areas on airport property without the need to drive on public roads or the taxiway/runway surfaces. An adequate service road system is a great asset in minimizing the potential for runway incursions by ground vehicles. This will become even more critical if aviation use facilities are developed on other areas of airport property.

Summary

The information provided in this chapter provides the basis for understanding what facility improvements at the Airport might help in the effort to safely and efficiently accommodate future demands. Following are the major airport development considerations:

- The Airport's runway layout and capacity is well structured to accommodate forecast operational activity. No recommendations will be made with regard to the need for additional runways or for the need to lengthen the existing runways.
- The largest aircraft using the Airport on a regular basis are medium sized business jets such as the Cessna Citation II, Cessna Citation V and Dassault Falcon 20. These aircraft are included in using ARC B-II criteria. This is the same ARC as has been used in previous planning documents. The Airport is utilized to a lesser degree by some business jet aircraft with "C" approach speeds (greater than 121 knots but less than 141 knots); however, these aircraft do not use the Airport on a frequent enough basis to be warrant "design aircraft" considerations.
- The dimensional standards related to pavement widths, safety setbacks and object-clearing standards, are driven by the ARC for individual runways and taxiways. There are no known dimensional standard deficiencies at the Airport.
- The taxiway system at the Airport functions well to provide access between the landside and airside. Improvements can be made by programming for full parallel taxiway systems to serve both runways; however, the priority for construction of these improvements will remain low until aircraft operational levels increase.
- The instrument approach capabilities currently available at the Airport (including the precision ILS approach to Runway 26) will be maintained and the potential to improve the approach capabilities to all runways, for both fixed wing and helicopters, will be considered in the formulation of the Development Plan for the Airport.

- Improvements related to the terminal building location, size, and function will be explored in the formulation of the Development Plan for the Airport. This could involve the relocation of the terminal facility to another area of the Airport.

- Additional area will be needed to accommodate future general aviation storage facilities, maintenance and FBO facilities. This will likely include the recommendation to construct hangar facilities on some areas on the Airport that are currently undeveloped.

- Landside access and automobile parking will be an important consideration in programming for future facility development at the Airport. This will include provisions for an access roadway system that is separate and secure from the aircraft operating areas.

- The Master Plan for the Airport must be formulated in a manner to make efficient use of the limited amount of property associated with the Airport, while also providing the flexibility to construct needed facilities in response to evolving and sometimes unanticipated needs.

It is important to note that the recommendations in this Master Plan Update are provided to best understand what facilities improvements might be needed at the Airport, and where those facilities might be best placed. In other words, the Master Plan Update provides recommendations on how various parcels of the Airport might be best developed, in consideration of potential demand and community/environmental influences. One of the basic assumptions for a master plan, for a complex facility like an airport, is that if a future improvement is identified on the recommended Development Plan; it will only be built if there is actual demand, if the project is financial feasible, and if environmental impacts are insignificant.

PORT OF ASTORIA

Astoria Regional Airport

Master Plan Update

D. Development Plan

D Development Plan

INTRODUCTION. The purpose of this chapter is to present the Development Plan for Astoria Regional Airport. This chapter provides a description of the various factors and influences that form the basis for the ultimate future plan and program for the Airport.

The Port of Astoria developed a mission statement in 2002 stating that it "*seeks to generate economic growth and prosperity, in a safe and environmentally responsible manner, for its citizens through creation of family wage jobs and prudent management of its assets*". In addition, several goals and objectives were developed, including a goal to improve and strengthen the Port's transportation infrastructure by developing the Airport's potential as an air freight hub, establishing free trade zones, and identifying and encouraging commercial and industrial opportunities.

In conjunction with the status of the Airport, some basic assumptions have been established, which are intended to direct the future development of the Airport. The aviation activity forecasts and various considerations on which the forecasts have been based support these assumptions. These assumptions also focus on continued airport development, in response to community needs and economic growth stimulation.

Assumption One. The Airport will be developed and operated in a manner that is consistent with local ordinances and codes, Federal and state statutes, Federal grant assurances, and Federal Aviation Administration (FAA) regulations.

Assumption Two. This assumption recognizes the role of the Airport. The Airport will continue to serve as a facility that accommodates general aviation activity and military activity, along with anticipated future commercial passenger service activity.

Assumption Three. This assumption relates to the size and type of aircraft that utilize the Airport and the resulting setback and safety criteria used as the basis for the layout of airport facilities. Both Runway 8/26 and 13/31 accommodate small aircraft (aircraft weight less than 12,500 pounds) and large aircraft (aircraft weighting over 12,500 pounds). The largest aircraft using the Airport on a regular basis are business jets such as the Cessna Citation II, Cessna Citation V and Dassault Falcon 20. These aircraft (and many others in the business jet fleet) have category "B" approach speeds (greater than 91 knots but less than 121 knots) and wing spans contained on airplane design group "II" (greater than 49 feet but less than 79 feet). This indicates that both of the runways should be designed using ARC B-II criteria.

It is also recognized that the Airport is utilized by some business jet aircraft with "C" and "D" approach speeds (greater than 121 knots but less than 166 knots); however, these aircraft do not use the Airport on a frequent enough basis to warrant design aircraft considerations.

Assumption Four. The fourth assumption relates to the need for the Airport to continue to accommodate aircraft operations safely and reliably. This indicates that the Airport's runway system should be developed with instrument approach guidance capabilities, adequate runway length, and adequate crosswind coverage to accommodate the forecast aircraft operations safely and efficiently under most weather conditions.

Assumption Five. Because landside development area at any airport is typically always at a premium, the fifth assumption is that the plan for future airport development should strive to make most efficient use the available area for aviation related activities, including general aviation facilities and terminal facilities.

Assumption Six. The sixth assumption focuses on the relationship of the Airport to off-airport land uses and the compatible and complementary development of each. This is inherent in the design considerations and placement of facilities so as to complement, to the maximum extent possible, off-airport development, and to ensure the continued compatibility of the airport environs with the operation of the Airport.

Goals for Development

Accompanying these assumptions are several goals, which have been established for purposes of directing the plan and creating continuity in the future for airport development. These goals take into account several categorical considerations relating to the needs of the Airport, both in the short-term and the long-term, including safety, capital improvements, on-airport land use, land acquisition, land use compatibility, financial and economic conditions, and public interest/investment.

As reflected in the following goals, the Airport is recognized for the vital role it plays, both as a transportation facility and an industrial/commercial economic center:

- Accommodate forecast aircraft operations in a safe and efficient manner by providing adequate aviation facilities and services.
- Plan and develop the Airport to be capable of accommodating the future aviation needs and requirements of the City of Warrenton, and the surrounding communities in Northwest Oregon and Southwest Washington. The Airport will continue to serve as a regional general aviation facility, while also supporting future commercial passenger service, as well as military and US Coast Guard activity.
- Program for taxiway and instrument approach improvements to allow for efficient aircraft operations.
- Identify the best uses for landside development areas at Astoria Regional Airport, with particular emphasis on future general aviation facilities, industrial activities and passenger terminal facilities, as well as continued support for the Coast Guard's mission and facilities development needs.
- Enhance the self-sustaining capability of the Airport and ensure the financial feasibility of airport development.
- Encourage the protection of existing public and private investment in land and facilities, and advocate the resolution of existing and potential land use conflicts, both on- and off-airport property.
- Plan and develop the Airport to be environmentally compatible with the community.
- Ensure the Airport will continue to provide a friendly environment for airport businesses, tenants and visitors.

Airfield Development Considerations and Alternatives

Introduction

When developing ideas for the future airfield development of the Airport, the forecast operations and previously stated goals relative to aviation development and economic enhancement were considered. These generalized alternatives are outlined and discussed in the following narrative. Following a review of these airside development alternatives, the purpose of which is to fulfill *major* facility requirements (basic runway and taxiway configuration), recommendations for landside development are presented. The conclusion of this chapter presents a generalized conceptual airport development plan, which will include recommendations for major runway and taxiway improvements, along with an on-airport land use plan. Details related to the exact alignment and configuration of the runway/taxiway system and the layout of landside development areas will be presented in the last chapter.

To best accommodate the projected operational demand at Astoria Regional Airport through the year 2024, several fundamental development considerations have been identified. These fundamental development considerations are identified below, along with an analysis of potential alternative options associated with each consideration.

Because all airport functions relate to and revolve around the basic runway layout, runway development alternatives must first be carefully examined and evaluated. Specific considerations include runway length, as well as runway orientation and approach protection criteria needed to support forecast use through the planning period. The recommendations are described in the following text and in the illustration at the end of this chapter, entitled *CONCEPTUAL DEVELOPMENT PLAN*.

Runway, Taxiway, and Instrument Approach Considerations

Runway Capacity and Orientation. Chapter C, *Capacity Analysis and Facility Requirements,* indicates that the Airport's existing runway system provides excellent operational capacity and will accommodate the forecasted number of aircraft operations without excessive delay. Additionally, using FAA analysis criteria, it has been determined that the orientation of the Airport's runways provides adequate crosswind coverage for the entire fleet of aircraft forecasted to use the Airport. Therefore, there is no justification to support the need to program a new runway or a runway extension. Additionally, the existing runway lengths provided at Astoria Regional Airport (5,796 feet for Runway 8/26 and 4,467 feet for Runway 13/31) are adequate to accommodate the projected aircraft operational requirements.

While the preceding paragraph indicates that no new runways are needed at the Airport, input received from various Airport stakeholders indicated that there are other specific runway needs that should be considered apart from the previous analysis. These needs are reflected in the two development concepts described below and shown in the following illustration entitled *AIRSIDE DEVELOPMENT OPTIONS* – RUNWAYS.

1. **Runway 3/21**. The first development concept is based on the construction of a new Runway 3/21 that would be developed on the footprint of the former runway. This new runway, which is viewed as a "reopening" of the former runway, would be a maximum length of 3,550 feet in order to comply with FAA's safety and object clearing setback criteria for "small aircraft only" development standards.

Positive Qualities of Runway 3/21 Concept

- Local observations indicate that when strong winds occur at the Airport, while infrequent, are often aligned with the former Runway 3/21. Therefore, re-commissioning Runway 3/21 would provide an additional factor of safety for aircraft operating at the Airport during high wind conditions.
- Because a runway existed in this location in the past, development costs for the "re-opened" runway would likely be reduced.

Negative Qualities of Runway 3/21 Concept

- From the FAA's perspective, even though the site was previously used as a runway, having a well defined footprint and existing pavement, the Federal process to "re-open" the runway would be no different from that of developing an entirely new runway from scratch. Additionally, the new runway would be required to meet and be maintained in compliance with all current FAA design criteria and standards.
- Recent discussions with FAA personnel indicate that no Federal funds would be made available to either re-commission Runway 3/21, or bring it up to FAA design and maintenance standards since it has been determined that the existing runway system adequately provides crosswind coverage using FAA's analysis methods. The Airport would be wholly responsible for all costs associated with this runway.
- As will be discussed in a subsequent section, the establishment of this runway has the potential to preclude valuable landside development opportunities west of the existing terminal area.

It is also recommended that Taxiway A comply with the minimum centerline separation requirement of 300 feet for a Group II runway with lower than ¾-mile approach visibility minimums, as per FAA AC 150/5300-13, *Airport Design*. Therefore, all new parallel taxiway construction related to Runway 8/26 would have to comply with this standard, as will the existing Taxiway A at the time of its next reconstruction. Additionally, it is recommended that Taxiway B remain at its current 300-foot centerline separation from Runway 13/31.

Note that additional taxiway improvements not discussed in this section could result from long-term landside development concepts. These will be discussed in a subsequent section.

Landside Development Considerations, Alternatives, and Recommendations

Introduction

As the framework of the Airport's ultimate airside development is defined, concepts involving the placement of landside facilities must also be analyzed. The overall objective of the landside development at the Airport is the provision of aviation facilities that are conveniently located and accessible to the community, and that will accommodate the specific requirements of airport users within the planning period. It is also important to take a strategic level look at the potential for airport development opportunities that may lie beyond the planning period or may be realized only for non-demand driven purposes, such as economic growth or private development initiatives.

This section presents the first of those development outlooks. The *Aviation Use Facility Development Areas* narrative below presents the concepts for landside development at the Airport that would be appropriate and reasonable for the fulfillment of the aviation demands as presented in this Master Plan. The following section, *Long-Term Landside Development Considerations*, addresses the long-term development opportunities at the Airport.

Aviation Use Facility Development Areas

Concepts for the development of other aviation use areas at the Airport include considerations for passenger terminal facilities, various types of general aviation aircraft storage facilities (i.e., T-hangars, executive hangars, corporate hangars, FBO hangars, etc.), and aircraft maintenance facilities. The following provides an explanation of the development considerations for each of these functions.

Terminal Building. With the potential for scheduled passenger service at the Airport, the definition of an appropriately sized and located passenger terminal facility and its related functions is an important outcome of this Master Plan Update. Initially, due to the relatively low levels of enplanements anticipated, commercial passenger service operations will likely have to operate out of an existing or temporary structure within the general aviation area on the west side of the Airport. This area already has ramp space, auto access, auto parking, and is consistent with where commercial air service operations had previously been handled at the Airport. Utilizing terminal planning standards and based on the forecasted levels of enplanements, it is projected that Astoria could ultimately require at least a 5,000 square foot facility by the end of the planning period (2024). However, at the inception of the commercial air service and until that service is firmly established and economically viable, the requirements for that facility are significantly less.

Options for utilizing an existing airport facility to accommodate projected scheduled passenger service are limited to the existing airport restaurant building, located on the north end of the current aviation development area, and the former commercial service terminal building and hangar, located just north of the existing T-hangar units. The latter of these is currently occupied by a helicopter operation that transports bar pilots onto ships navigating the Columbia River. Neither facility is currently available; both would likely require that existing tenants be relocated to undetermined locations. Additionally, either facility would require extensive renovations to accommodate the passenger service operation. Although it could be possible for such a commercial service operation to be co-located with the bar pilots, it should be noted that the location of this facility within the current aviation development area is less than desirable. Specifically, the available apron space is limited due to the close proximity of Lektro, Twiss Air Service, general aviation tiedowns, and the T-hangar units.

The other short-term alternative for meeting the demands for commercial service accommodations is to construct or install a temporary, modular facility that would likely be located on or near the existing concrete pad of the former FBO hangar, immediately south of the existing restaurant. This site offers many advantages including existing utilities; level, compacted soils; excellent apron accessibility and capacity; existing auto access; and close proximity to the airport restaurant. This option would afford the Airport the flexibility to reasonably accommodate the inception of air service on relatively short notice with a minimal investment. Given an appropriate configuration, it is also large enough to adequately accommodate these operations for a significant period of time, allowing the Airport time to grow its commercial air service market and ensure the long-term viability of this air service. Note that such a facility in this location could also be developed in such a manner as to allow for the construction of a permanent terminal building, as well as an airline maintenance hangar that will likely be required.

Ultimately, if commercial passenger service is dramatically successful at the Airport and enplanements far exceed those projected within this plan, this location may not be able to meet those long-term demands. If this occurs, it is recommended that a new passenger terminal development area be established elsewhere on the Airport. An analysis of candidate locations is provided in the following section, *Long-Term Landside Development Considerations.* Note that such an action could also be driven by other factors beyond pure demand. These factors could include private development, or economic development initiatives, where a local community invests in a facility to spur economic growth.

Aircraft Storage Hangars and Other General Aviation Facilities. Aircraft based at Astoria Regional Airport are currently stored either on the ramp tiedowns, or in the conventional hangars and T-hangars in the southwest quadrant of airport property, adjacent to the main aircraft parking area. There are approximately 60 aircraft currently based at the Airport, with almost all being stored in hangars. As such, these facilities are currently at capacity.

Over the course of the 20-year planning period, the number of based aircraft is forecasted to increase to 98, indicating that an increase in storage facilities to accommodate approximately 38 new aircraft will be required. For the purposes of this planning effort, it is assumed that these additional aircraft will require accommodations within hangar facilities. This reflects the characteristics of current airport patterns, with most aircraft owners preferring some form of indoor storage for reasons of weather and security. Additionally, there is currently a known latent demand for additional indoor aircraft storage facilities. Note that the trend of increasing general aviation aircraft size will also play a role in defining future development needs.

Specifically, in the short-term, the area south of the existing T-hangars can be developed with three additional T-hangar structures that will result in a gain of 30 hangar positions, assuming similar design specification to the existing hangars. There is also the potential to construct two additional T-hangar structures to the west of the existing site that could add up to 18 hangar units. The practicality of this would depend on the potential environmental implications of building on the site. Additionally, conventional hangars to be developed as infill facilities north of the Lektro hangars. However, this potential will be impacted by the future commercial air service operational facility demands identified previously. That being said, it should be emphasized that there are very few additional development opportunities within the existing general aviation area.

In the long-term, as this general aviation area reaches capacity, new areas on the Airport will need to be developed to accommodate demand. An analysis of candidate locations is provided in the following section, *Long-Term Landside Development Considerations*.

Vehicular Access. The potential for an improved main entrance to the Airport (connecting US Highway 101 with Airport Road (SE 12th Place) has been identified in previous planning documents. In the short-term, US Highway 101 and Airport Road will continue to provide excellent access to the Airport.

Long-Term Landside Development Considerations

Introduction

The purpose of this section is to provide a long-term look at overall airport development strategies beyond that which have been defined in the previous alternatives sections. Given the amount of space available on the Airport with development potential, it is critical that this strategic look be taken in order to ensure that short- or mid-term development initiatives do not run contrary to any long-term development goals.

This section will review long-term development strategies for the Airport, define critical development issues, and identify any areas on the Airport that may be surplus to those long-term airport development needs.

Aviation Use Facility Development Areas

A general review of the Airport was conducted to define those areas that could be available for future landside development. In general, the criteria utilized for determining what areas are deemed to be available for future development include:

- On airport property;
- Clear of all existing and potential runway safety areas, object free areas, and runway protection zones;
- Clear of all existing and potential taxiway object free areas;

- Clear of the runway visibility zone;
- Clear of established airport operational uses; and,
- Capable of having reasonable potential for airside taxiway access.

Following these criteria, four potential development areas were identified and are shown in the following figure entitled *LANDSIDE DEVELOPMENT OPTIONS - DEVELOPMENT AREAS AND ACCESS*. A summary description of each development area and their primary site considerations are included in the following sections.

Northwest Development Area (Area A)

The Northwest Development Area, also termed Area A, is a 30-acre site located between the approach ends of Runway 8 and Runway 13. It is bounded to the north by a levee, to the west by an on-airport drainage slough, and to the south and east by the airfield.

Positive Qualities of Area A

- The area is a completely undeveloped site.
- The site has excellent proximity to the airfield.
- The site has sufficient space to be developed as a dedicated commercial service facility.
- The site would be segregated from all other airport activities, including general aviation and Coast Guard.

Negative Qualities of Area A

- Development of the site would have environmental impacts (including wetlands and floodplains).
- Access to site would require the construction of a new frontage road, located immediately east of the Oregon Coast Highway (US Highway 101), that would start at either SE Marlin Avenue and incorporate either SE 9th Avenue or SE 10th Avenue. This frontage road would also require bridges to cross on-airport streams.

- There is currently inadequate taxiway infrastructure available for airside access to the site that would likely require the construction of at least a partial parallel taxiway to the north of Runway 8/24. This taxiway would likely start at the approach end of Runway 8 and terminate at the extended Taxiway B.
- There are no utilities (including water, electric, telephone, gas, stormwater, and wastewater) on or near the site.
- Unstable soil conditions will require that special construction techniques be employed for buildings and pavement structures, thereby increasing costs.

Recommendations for Area A

Area A is viewed by the Airport as having potential as a development site for a long-term commercial air service terminal area. It is therefore recommended that this area be reserved for the possible development of a commercial air service terminal area as passenger demand or local economic development initiatives warrant. Note that development of this area for this purpose could also result from general aviation demand for the use of the current terminal area.

PORT OF ASTORIA

Astoria Regional Airport

Master Plan Update

E. **Airport Plans**

E Airport Plans

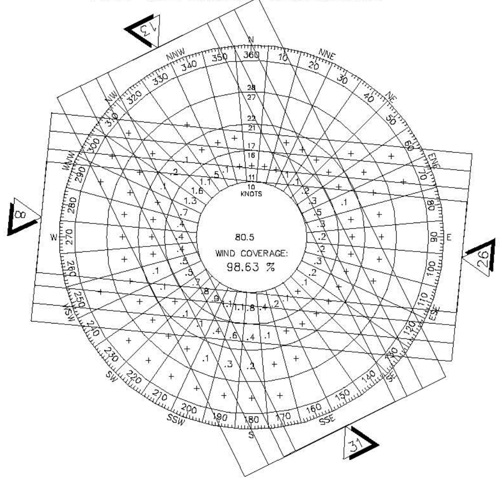
INTRODUCTION. The plan for the future development of Astoria Regional Airport has evolved from an analysis of many considerations, including the following: aviation demand forecasts and facility requirements; aircraft operational characteristics; environmental considerations; and as characterized in the previously noted statement of goals, the general direction of airport development prescribed by airport management. Forecasts are utilized as a basis for planning; however, facilities are only to be constructed to meet actual demand.

Previous chapters have established and quantified the future development needs of the Airport. In this chapter, the various elements of the plan are categorically reviewed and detailed in summary and graphic format. A brief written description of the individual elements, represented in the set of *Airport Plans* for Astoria Regional Airport, is accompanied by a graphic description presented in the form of the *Airport Layout Plan (ALP)*, the *Airport Airspace Drawings*, the *Inner Portion of the Approach Surface Drawings,* the *Terminal Area Plan,* the *Airport Property Map,* and the *Land Use Drawing*.

Airport Layout Plan

The Airport Layout Plan (ALP) is a graphic depiction of existing and ultimate airport facilities that will be required to enable the Airport to properly accommodate the forecasted demand. In addition, the ALP also provides detailed information on both airport and runway design criteria, which is necessary to define relationships with applicable standards. The following illustration, entitled *AIRPORT LAYOUT PLAN,* and the following paragraphs describe the major components of the future Airport Development Plan.

ALL WEATHER WINDROSE

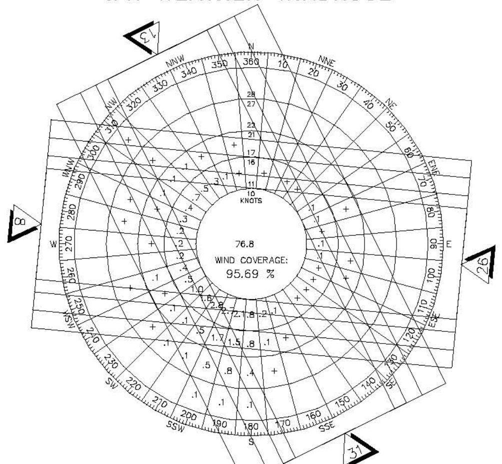


ALL WEATHER WIND COVERAGE SUMMARY

RUNWAY DESIGNATION	10.5-KNOT CROSSWIND COMPONENT	13-KNOT CROSSWIND COMPONENT
RUNWAY 8	57.67%	62.66%
RUNWAY 26	75.70%	72.66%
RUNWAY 8/26	91.15%	94.63%
RUNWAY 13	76.22%	72.73%
RUNWAY 31	75.72%	76.66%
RUNWAY 13/31	91.37%	93.56%
COMBINED RUNWAYS	96.13%	98.63%

SOURCE: WIND ANALYSIS TABULATION PROVIDED BY BARNARD DUNKELBERG & COMPANY UTILIZING THE FAA AIRPORT DESIGN SOFTWARE SUPPLIED WITH AC 150/5300-13. DATA OBTAINED FROM NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, NATIONAL CLIMATIC DATA CENTER STATION 72791 ASTORIA OREGON PERIOD OF RECORD 1995-2004. A MAXIMUM 5-KNOT TAILWIND COMPONENT WAS CONSIDERED IN THIS ANALYSIS.

IFR WEATHER WINDROSE



IFR WIND COVERAGE SUMMARY

RUNWAY DESIGNATION	IFR CONDITIONS MAXIMUM 10.5-KNOT CROSSWIND COMPONENT	IFR CONDITIONS MAXIMUM 13-KNOT CROSSWIND COMPONENT
RUNWAY 8	59.59%	62.31%
RUNWAY 26	77.68%	82.80%
RUNWAY 8/26	82.82%	87.99%
RUNWAY 13	75.70%	81.71%
RUNWAY 31	72.52%	74.09%
RUNWAY 13/31	87.02%	93.37%
COMBINED RUNWAYS	90.10%	95.69%

SOURCE: WIND ANALYSIS TABULATION PROVIDED BY BARNARD DUNKELBERG & COMPANY UTILIZING THE FAA AIRPORT DESIGN SOFTWARE SUPPLIED WITH AC 150/5300-13. DATA OBTAINED FROM NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, NATIONAL CLIMATIC DATA CENTER STATION 72791 ASTORIA OREGON PERIOD OF RECORD 1995-2004.
* CEILING LESS THAN OR EQUAL TO 1,000 FEET AND/OR VISIBILITY LESS THAN THREE MILES AND CEILING GREATER THAN OR EQUAL TO 200 FEET AND VISIBILITY GREATER THAN OR EQUAL TO 3/4-MILES.
A 5-KNOT TAILWIND COMPONENT WAS USED.

REVISIONS

NO.	DESCRIPTION	DATE

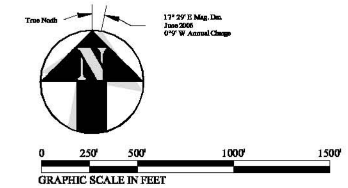
SOURCES: AERIAL PHOTOGRAPHY (OCT. '05) PROVIDED BY CLATSOP COUNTY, PORT OF ASTORIA.
AIRPORT OBSTRUCTION SURVEY BY HLB ASSOCIATES, INC. FEB. 6, 2004.
AIRPORT LAYOUT PLAN BY WH PACIFIC AVIATION SERVICES, 1993.
FAA AC 150/5300-13 CHANGE 10.

SPONSOR APPROVAL

NAME/TITLE DATE

MODIFICATION TO STANDARDS

ITEM	AIRPORT REFERENCE CODE EXISTING	AIRPORT REFERENCE CODE FUTURE	STANDARD EXISTING	STANDARD FUTURE	NON-STANDARD CONDITION EXISTING	NON-STANDARD CONDITION FUTURE	COMMENTS
TAXIWAY 'A' - RW 8/26 CENTERLINE SEPARATION	B-II	B-II	300'	300'	275'	300'	APPROVED 5/19/80
TAXIWAY 'B' - RW 13/31 CENTERLINE SEPARATION	B-II	B-II	240'	240'	300'	300'	PROPOSED
TAXIWAY 'A' WIDTH	B-II	B-II	35'	35'	50'	50'	PROPOSED



AIRPORT DATA

	EXISTING	FUTURE
AIRPORT ELEVATION (AMSL) NGVD 29	14.9	SAME
AIRPORT REFERENCE POINT (ARP) NAD 83	LAT. 46°09'26.7"N LON. 123°52'43.3"W	SAME SAME
AIRPORT REFERENCE CODE	B-II	SAME
NPIAS CATEGORY	GA	SAME
MEAN DAILY MAX. TEMPERATURE	69°F	SAME
TAXIWAY LIGHTING	MITL	SAME
TAXIWAY MARKING	C/L	SAME
AIRPORT & TERMINAL NAVAIDS	GPS, VOR	SAME

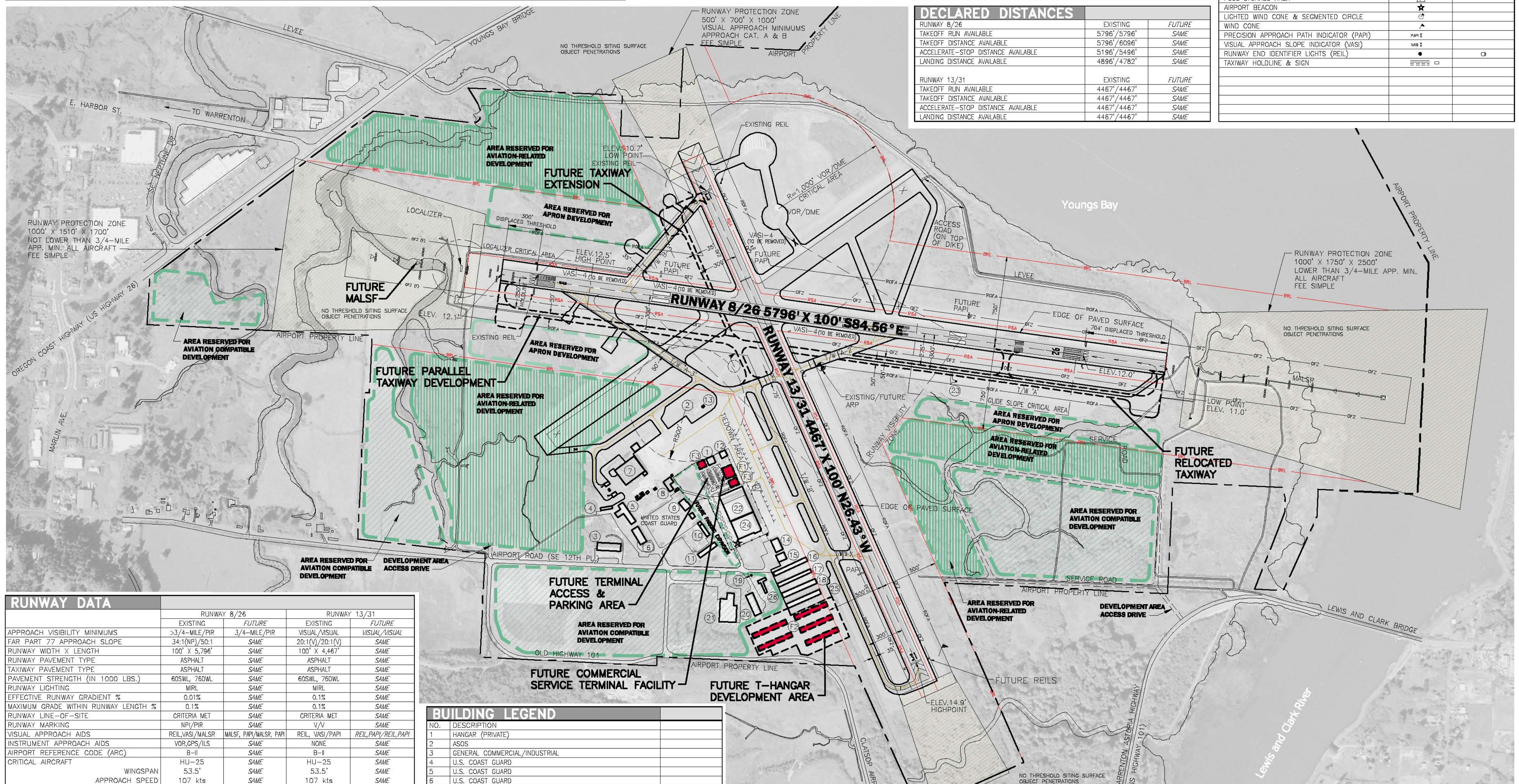
NOTE: 1. COORDINATES AND ELEVATIONS NGS 405 SURVEY DATED 10/30/97 (NAD83, NAVD88).

LAYOUT PLAN LEGEND

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
AIRPORT SECURITY FENCE	X	
AIRPORT BUILDINGS		
AIRFIELD PAVEMENT		
PAVED ROADS		
RUNWAY PROTECTION ZONE		
BUILDING RESTRICTION LINE	BRL	
OBSTACLE FREE ZONE	OFZ	OFZ (F)
RUNWAY SAFETY AREA	RSA	
RUNWAY OBJECT FREE AREA	ROFA	
FUEL STORAGE AREA		
AIRPORT BEACON		
LIGHTED WIND CONE & SEGMENTED CIRCLE		
WIND CONE		
PRECISION APPROACH PATH INDICATOR (PAPI)	PAPI	
VISUAL APPROACH SLOPE INDICATOR (VASI)	VASI	
RUNWAY END IDENTIFIER LIGHTS (REIL)		
TAXIWAY HOLDLINE & SIGN		

DECLARED DISTANCES

RUNWAY 8/26	EXISTING	FUTURE
TAKEOFF RUN AVAILABLE	5796'/5796'	SAME
TAKEOFF DISTANCE AVAILABLE	5796'/6096'	SAME
ACCELERATE-STOP DISTANCE AVAILABLE	5196'/5496'	SAME
LANDING DISTANCE AVAILABLE	4896'/4782'	SAME
RUNWAY 13/31	**EXISTING**	**FUTURE**
TAKEOFF RUN AVAILABLE	4467'/4467'	SAME
TAKEOFF DISTANCE AVAILABLE	4467'/4467'	SAME
ACCELERATE-STOP DISTANCE AVAILABLE	4467'/4467'	SAME
LANDING DISTANCE AVAILABLE	4467'/4467'	SAME



RUNWAY DATA

	RUNWAY 8/26 EXISTING	RUNWAY 8/26 FUTURE	RUNWAY 13/31 EXISTING	RUNWAY 13/31 FUTURE
APPROACH VISIBILITY MINIMUMS	>3/4-MILE/PIR	3/4-MILE/PIR	VISUAL/VISUAL	VISUAL/VISUAL
FAR PART 77 APPROACH SLOPE	34:1(NP)/50:1	SAME	20:1(V)/20:1(V)	SAME
RUNWAY WIDTH X LENGTH	100' X 5,796'	SAME	100' X 4,467'	SAME
RUNWAY PAVEMENT TYPE	ASPHALT	SAME	ASPHALT	SAME
TAXIWAY PAVEMENT TYPE	ASPHALT	SAME	ASPHALT	SAME
PAVEMENT STRENGTH (IN 1000 LBS.)	60SWL, 76DWL	SAME	60SWL, 76DWL	SAME
RUNWAY LIGHTING	MIRL	SAME	MIRL	SAME
EFFECTIVE RUNWAY GRADIENT %	0.01%	SAME	0.1%	SAME
MAXIMUM GRADE WITHIN RUNWAY LENGTH %	0.1%	SAME	0.1%	SAME
RUNWAY LINE-OF-SITE	CRITERIA MET	SAME	CRITERIA MET	SAME
RUNWAY MARKING	NPI/PIR	SAME	V/V	SAME
VISUAL APPROACH AIDS	REIL,VASI/MALSR	MALSF, PAPI/MALSR, PAPI	REIL, VASI/PAPI	REIL,PAPI/REIL,PAPI
INSTRUMENT APPROACH AIDS	VOR,GPS/ILS	SAME	NONE	SAME
AIRPORT REFERENCE CODE (ARC)	B-II	SAME	B-II	SAME
CRITICAL AIRCRAFT	HU-25	SAME	HU-25	SAME
WINGSPAN	53.5'	SAME	53.5'	SAME
APPROACH SPEED	107 kts	SAME	107 kts	SAME
MAX T/O WEIGHT	28,860 lbs.	SAME	28,860 lbs.	SAME
RUNWAY SAFETY AREA (RSA) WIDTH	300'	SAME	150'	SAME
RSA LENGTH BEYOND STOP END	600'	SAME	300'	SAME
RUNWAY OBJECT FREE AREA (OFA) WIDTH	800'	SAME	500'	SAME
OFA LENGTH BEYOND STOP END	600'/600'	SAME	300'/300'	SAME
OBSTACLE FREE ZONE (OFZ) WIDTH	400'	SAME	250'	SAME
OFZ LENGTH BEYOND STOP END (NOTE 3)	200'/2840'	1640'/2840'	200'	SAME
RUNWAY END COORDINATES AIRPORT SURVEY	LAT. N 46° 09' 35.40" LON. W 123° 53' 23.08" / LAT. N 46° 09' 29.93" LON. W 123° 52' 01.14"	SAME SAME / SAME SAME	LAT. N 46° 09' 43.3500" LON. W 123° 52' 58.37" / LAT. N 46° 09' 02.08" LON. W 123° 52' 28.92"	SAME SAME / SAME SAME
DISPLACED THRESHOLD COORDINATES AIRPORT SURVEY	LAT. N 46° 09' 35.13" LON. W 123° 53' 18.82" / LAT. N 46° 09' 30.59" LON. W 123° 52' 11.09"	SAME SAME / SAME SAME		
RUNWAY ELEVATIONS END	12.1'/11.0'	SAME	10.7'/14.9'	SAME
DISPLACED THRESHOLD ELEVATIONS END	12.5'/12.0'	SAME	N/A	SAME
HIGH POINT	13.7'	SAME	14.9'	SAME
LOW POINT	11.0'	SAME	10.7'	SAME
TOUCHDOWN ZONE ELEVATION	13.7'/13.7'	SAME	13.7'/14.9'	SAME

NOTES:
1. This drawing reflects current planning standards applicable to Astoria Regional Airport. This drawing is not intended to be used for construction documentation or navigation.
2. All coordinates and elevations from NGS 405 Survey, Dated 10/30/97 (NAD83, NAVD88).
3. Obstacle Free Zone extends 200' beyond runway end or approach lighting system end.

BUILDING LEGEND

NO.	DESCRIPTION
1	HANGAR (PRIVATE)
2	ASOS
3	GENERAL COMMERCIAL/INDUSTRIAL
4	U.S. COAST GUARD
5	U.S. COAST GUARD
6	U.S. COAST GUARD
7	U.S. COAST GUARD HANGAR
8	U.S. COAST GUARD
9	U.S. COAST GUARD
10	U.S. COAST GUARD
11	U.S. COAST GUARD
12	AIRPORT RESTAURANT (RUNWAY CAFE)
13	AIRPORT ELECTICAL VAULT
14	HANGAR (BAR PILOTS)
15	FBO (TWISS AIR SERVICE)
16	T-HANGAR 'A' (10 HANGAR UNITS)
17	T-HANGAR 'B' (10 HANGAR UNITS)
18	T-HANGAR 'C' (10 HANGAR UNITS)
19	TELEPHONE VAULT
20	STORAGE BUILDING
21	MANUFACTURING BUILDING
22	HANGAR (NON-AVIATION USE) (LEKTRO)
23	GLIDE SLOPE
24	HANGAR (NON-AVIATION USE) (LEKTRO)
25	T-HANGAR 'D' (10 HANGAR UNITS)
26	UNITED PARCEL SERVICE (UPS)
F1	FUTURE TERMINAL
F2	FUTURE T-HANGARS (10 HANGAR UNITS PER BUILDING)
F3	FUTURE HANGAR (PRIVATE)

FAA APPROVAL

MANAGER, SEATTLE AIRPORTS DISTRICT OFFICE

APPROVAL LETTER DATED

Figure E1 **Airport Layout Plan**

Port of Astoria
Astoria Regional Airport
Astoria, Oregon

Barnard Dunkelberg & Company
1616 East 15th Street
Tulsa, Oklahoma 74120
918.585.8844

DATE: October 2007

Runway System

The Airport's runway configuration will remain structured around its two existing runways. Runway 8/26 will be maintained as the Airport's primary instrument runway at the existing length of 5,796 feet and a width of 150 feet. Runway 13/31 will remain as the Airport's crosswind runway at a length and width of 4,467 feet and 100 feet, respectively.

It is anticipated regular maintenance of the runway pavements will include crack sealing every three years, fog sealing every six years, and reconstruction or overlay every 15 to 20 years, depending on pavement condition. Note that reconstruction of the runway would also include all required drainage and electrical improvements.

Of primary consideration when maximizing the usability of runways are the existing and planned instrument approach systems.

- Runway 26 currently has CAT I ILS approach capabilities that will be maintained. This approach has approach minimums of a 292-foot Height Above Touchdown (HAT) requirement and ¾-mile visibility, while the standard minimums for such an approach are 200 feet and ½-mile. The Airport is coordinating with the FAA to pursue a reduction of its current minimums to the standard levels. The current ILS will be ultimately supplemented with precision GPS capabilities, when available.
- Runway 8 currently has non-precision instrument approach capabilities with a not-lower-than one mile visibility minimum and a 600-foot HAT requirement. While this runway has not been programmed for a precision approach, its existing approaches could be improved to a ¾-mile visibility and possibly a reduced HAT (250-foot HAT is the minimum for this approach). The visibility improvement would be derived from the installation of an approach lighting system for the runway. The Airport should protect for such an eventuality.
- It should be anticipated that both Runway 13 and Runway 31 will ultimately be served by GPS approaches that could result in non-precision instrument capabilities of not-lower-than one mile visibility minimum and a 250-foot HAT requirement. As such, the Airport should protect for this possibility.

Land Acquisition. Runway approach protection zone and approach lighting requirements that result from the improved approaches identified above, are nearly completely located on Airport property. Any amount of land that lies off-airport is located in protected areas, over water, or considered to be negligible.

Runway Approach Instrumentation and Lighting. The existing instrument approach capabilities to Runway 26 are to be maintained with the existing approach lighting system and ground based NAVAID system. GPS or ground-based instrument approach capabilities will be utilized to provide improved instrument approach procedures to Runway 8. GPS instrument approach capabilities will be utilized to provide improved instrument approach procedures to both Runway 13 and Runway 31.

The Medium Intensity Runway Lights (MIRL) edge lighting serving each runway will be maintained. All runway ends should be programmed for Precision Approach Path Indicator (PAPI) lights in the future. This includes replacing the Visual Approach Slope Indicator (VASI) lights that serve Runway 8 and Runway 13. Both Runway 8 and Runway 13 have Runway End Indicator Lights (REIL) that should be maintained. The installation of REILs is recommended for Runway 31.

Runway 26 has an existing approach lighting system (MALSR) that will be retained. Runway 8 should be programmed for a simplified approach lighting system (ODALS or MALS) in the future in order to reduce the visibility minimums, as described above.

Taxiway System

The taxiway systems serving Runway 8/26 (Taxiway A) and Runway 13/31 (Taxiway B) will be the subject of a variety of improvements in order to establish a full length parallel taxiway system for both runways. The existing partial parallel Taxiway A will be relocated to meet the current airport design standard of a 300-foot taxiway centerline to runway centerline offset, and an additional stub taxiway will be constructed connecting the runway with the taxiway. Taxiway A will also be extended to the threshold end of Runway 8, completing the full length parallel taxiway.

Existing partial parallel Taxiway B will remain at its current 300-foot separation from Runway 13/31, and will be extended to the relocated threshold of Runway 13. This will also complete the full length parallel taxiway for this runway. It is also anticipated that upon the completion of this parallel taxiway system, existing Taxiways A3 and B3 will be decommissioned. That segment of Taxiway A2 that runs from Taxiway A perpendicular into Taxiway B should be retained and maintained. This taxiway segment provides very good flexibility for aircraft operating on Runway 8/26.

Landside Development

As discussed in the previous chapters, the ALP also allocates various development areas for landside facilities, including the following, among others: terminal facilities, aircraft parking aprons, hangars, aircraft maintenance facilities, automobile access and parking, support facilities, etc. A detailed illustration of the landside development proposal is provided in the *Terminal Area Plan* section of this chapter. As provided on the Airport Layout Plan, the proposed landside development elements are identified in the following.

- **Commercial passenger service terminal development area;**
- **Automobile access and parking areas;**
- **General aviation T-hangar development area;**
- **Areas reserved for aviation-related development, including supporting apron; and,**
- **Areas reserved for aviation compatible development.**

Airspace Plan

The Airport Airspace Drawing is based upon Federal Aviation Regulations (FAR) Part 77, *Objects Affecting Navigable Airspace*. In order to protect the Airport's airspace and approaches from hazards that could affect the safe and efficient operation of aircraft, Federal criteria contained in the FAR Part 77 document have been established to provide guidance in controlling the height of objects in the vicinity of airports. FAR Part 77 criteria specify a set of imaginary surfaces, which, when penetrated, identify an object as being an obstruction.

The *AIRPORT AIRSPACE DRAWINGS*, which are illustrated in the following figures, provide plan and profile views depicting these criteria as they specifically relate to Astoria Regional Airport. The plan is based on the ultimate planned runway lengths, along with the ultimate planned approaches to each runway end. For Runway 8/26, it is based on larger-than-utility criteria with a precision instrument approach to Runway 26 and a non-precision instrument approach with visibility minimums as low as ¾-statute mile for Runway 8. For Runway 13/31, it is based on larger-than-utility criteria with non-precision instrument approach with visibility minimums greater than ¾-statute mile for both runway ends.

Inner Portion of the Approach Surface Drawings

To provide a more detailed view of the inner portions of the Part 77 imaginary approach surfaces and the Runway Protection Zone (RPZ) areas, the following drawings are provided. An RPZ is trapezoidal in shape, centered about the extended runway centerline and typically begins 200 feet beyond the end of the runway. The RPZs are safety areas within which it is desirable to clear all objects (although some uses are normally acceptable). The size of the RPZ is a function of the design aircraft and the visibility minimums associated with the runway's instrument approach capabilities.

The *INNER PORTION OF THE APPROACH SURFACE DRAWINGS*, which are depicted in the following illustrations, provide large-scale drawings with both plan and profile delineations. They are intended to facilitate identification of the roadways, utility lines, railroads, structures, and other possible obstructions that may lie within the confines of the inner approach surface area associated with each runway end. As with the *AIRPORT AIRSPACE DRAWINGS*, the *INNER PORTION OF THE APPROACH SURFACE DRAWINGS* are based upon the ultimate planned runway length, along with the ultimate planned approaches to each runway.

OBSTRUCTIONS

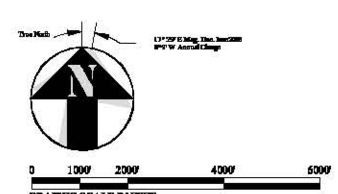
NO.	DECSCRIPTION	ELEV.	PENETRATION	SURFACE	DISPOSITION
OB1	LEVEE	15.6	4	PRIMARY	NONE
OB2	TREE	29.6	18	TRANS.	TRIM OR REMOVE
OB3	TREE	45.6	33	TRANS.	TRIM OR REMOVE
OB4	TREE	41.6	29	TRANS.	TRIM OR REMOVE
OB5	OL ON GS	55.6	43	PRIMARY	NONE
OB6	TREE	30.6	19	PRIMARY	TRIM OR REMOVE
OB7	BUSH	19.6	8	PRIMARY	TRIM OR REMOVE
OB8	BUSH	29.6	18	PRIMARY	TRIM OR REMOVE
OB9	TREE	28.6	16	PRIMARY	TRIM OR REMOVE
OB10	SIGN	18.6	5	PRIMARY	NONE
OB11	OL AMOM	34.6	21	TRANS.	NONE
OB12	SIGN	17.6	5	PRIMARY	NONE
OB13	SIGN	17.6	5	PRIMARY	NONE
OB14	BUSH	23.6	12	PRIMARY	TRIM OR REMOVE
OB15	TREE	23.6	11	PRIMARY	TRIM OR REMOVE
OB16	BUSH	22.6	10	PRIMARY	TRIM OR REMOVE
OB17	BUSH	19.6	7	PRIMARY	TRIM OR REMOVE
OB18	BUSH	19.6	7	PRIMARY	TRIM OR REMOVE
OB19	BUSH	23.6	10	8 APP.	TRIM OR REMOVE
OB20	OL ON LOC	15.6	0	8 APP.	NONE
OB21	ANT ON OL BLDG	22.6	6	8 APP.	NONE
OB22	TREE	97.6	33	8 APP.	TRIM OR REMOVE
OB23	TREE	125.6	28	8 APP.	TRIM OR REMOVE
OB24	TREE	125.6	19	8 APP.	TRIM OR REMOVE
OB25	TREE	119.6	6	8 APP.	TRIM OR REMOVE
OB26	TREE	121.6	−3	8 APP.	TRIM OR REMOVE
OB27	TREE	132.6	2	8 APP.	TRIM OR REMOVE
OB28	TREE	26.6	15	26 APP.	TRIM OR REMOVE
OB29	TREE	24.6	12	26 APP.	TRIM OR REMOVE
OB30	TREE	30.6	27	26 APP.	TRIM OR REMOVE
OB31	TREE	29.6	14	26 APP.	TRIM OR REMOVE
OB32	TREE	35.6	13	26 APP.	TRIM OR REMOVE
OB33	TREE	36.6	13	26 APP.	TRIM OR REMOVE
OB34	TREE	83.6	7	26 APP.	NONE
OB35	OL TRMSN TWR	205.6	−49	26 APP.	NONE
OB36	BUSH	18.6	−3	31 APP.	TRIM OR REMOVE
OB37	BUSH	19.6	5	13 APP.	TRIM OR REMOVE
OB38	BUSH	19.6	−8	13 APP.	TRIM OR REMOVE
OB39	BUSH	25.6	−4	13 APP.	TRIM OR REMOVE
OB40	BUSH	21.6	−8	13 APP.	NONE
OB41	TREE	28.6	−4	13 APP.	TRIM OR REMOVE
OB42	TREE	29.6	10	13 APP.	TRIM OR REMOVE
OB43	TREE	31.6	−14	13 APP.	NONE
OB44	ROAD(N)	32.6	−80	13 APP.	NONE
OB45	BUSH	27.6	−1	31 APP.	TRIM OR REMOVE
OB46	TREE	33.6	−3	31 APP.	TRIM OR REMOVE
OB47	TREE	92.6	0	31 APP.	NONE
OB48	TREE	124.6	−4	31 APP.	NONE
OB49	TREE	157.6	−11	31 APP.	NONE
OB50	TREE	46.6	5	TRANS.	TRIM OR REMOVE
OB51	TREE	34.6	15	TRANS.	TRIM OR REMOVE
OB52	OL VOR/DME	41.6	−26	TRANS.	NONE
OB53	TREE	55.6	1	TRANS.	TRIM OR REMOVE
OB54	APBN	85.6	−49	TRANS.	NONE
OB55	TREE	35.6	−1	TRANS.	TRIM OR REMOVE
OB56	ANT	76.6	−77	TRANS.	NONE
OB57	TREE	47.6	3	TRANS.	TRIM OR REMOVE
OB58	TREE	31.6	7	TRANS.	TRIM OR REMOVE
OB59	TREE	45.6	17	TRANS.	TRIM OR REMOVE
OB60	TREE	53.6	−8	TRANS.	TRIM OR REMOVE
OB61	BUSH	21.6	−1	13 APP.	TRIM OR REMOVE
OB62	BUSH	26.6	6	TRANS.	TRIM OR REMOVE
OB63	TREE	40.6	1	TRANS.	TRIM OR REMOVE
OB64	TREE	31.6	−1	13 APP.	TRIM OR REMOVE
OB65	TREE	38.6	16	TRANS.	TRIM OR REMOVE
OB66	LEVEE	16.6	−24	13 APP.	NONE
OB67	TREE	68.6	−7	TRANS.	NONE
OB68	WSK	28.6	0	PRIMARY	NONE
OB69	TREE	43.6	−12	TRANS.	TRIM OR REMOVE
OB70	TREE	51.6	32	TRANS.	TRIM OR REMOVE
OB71	TREE	70.6	19	TRANS.	TRIM OR REMOVE
OB72	TREE	36.6	−9	TRANS.	TRIM OR REMOVE
OB73	TREE	90.6	−4	TRANS.	NONE
OB74	TREE	107.6	−19	TRANS.	NONE
OB75	TREE	47.6	7	31 APP.	TRIM OR REMOVE
OB76	TREE	81.6	−2	TRANS.	NONE
OB77	TREE	90.6	−28	TRANS.	NONE
OB78	TREE	124.6	−17	TRANS.	NONE
OB79	TREE	123.6	−2	31 APP.	NONE
OB80	TREE	212.6	47	HORIZ.	NONE
OB81	TREE	118.6	19	TRANS.	NONE
OB82	TREE	182.6	17	HORIZ.	NONE
OB83	TREE	164.6	0	HORIZ.	NONE
OB84	TREE	163.6	9	HORIZ.	NONE
OB85	TREE	203.6	38	HORIZ.	NONE
OB86	TREE	270.6	105	HORIZ.	NONE
OB87	TREE	255.6	90	HORIZ.	NONE
OB88	OL TWR	210.6	45	HORIZ.	NONE
OB89	OL TWR	212.6	47	HORIZ.	NONE
OB90	STACK	210.6	45	HORIZ.	NONE
OB91	TREE	328.6	163	HORIZ.	NONE
OB92	TREE	388.6	150	CONICAL	NONE
OB93	TREE	340.6	175	HORIZ.	NONE
OB94	TREE	276.6	70	CONICAL	NONE
OB95	ANT ON TANK	500.6	299	CONCIAL	NONE
OB96	TREE	415.6	225	CONICAL	NONE
OB97	TREE	485.6	284	CONICAL	NONE
OB98	TREE	326.6	146	CONICAL	NONE
OB99	TREE	401.6	36	CONICAL	NONE
OB100	OL ON BRIDGE	364.6	52	CONICAL	NONE
OB101	TREE	418.6	134	CONICAL	NONE
OB102	TOWER	108.6	−52	26 APP.	NONE
OB103	TOWER	141.6	−23.3	HORIZ.	NONE
OB104	CATENARY	201.6	−22.4	26 APP.	NONE

OBSTRUCTIONS TAKEN FROM NOAA/NOS OC 24 (SURVEYED 6/96). ELEVATIONS CONVERTED TO NAVD88.

OBSTRUCTIONS 100-104 TAKEN FROM FAA DIGITAL OBSTRUCTION FILE.

OBSTRUCTING TREES/BUSHES WITHIN RUNWAY PRIMARY, APPROACH, AND ASSOCIATED TRANSITIONAL SURFACES TO BE TRIMMED OR REMOVED.

OBSTRUCTING TERRAIN, TREES, OR BUILDING AREA.



AIRPORT DATA

	EXISTING	FUTURE
AIRPORT ELEVATION (AMSL) NGVD29	14.9'	SAME
AIRPORT REFERENCE POINT (ARP) NAD 83	LAT. 46°09'28.7"N LON. 123°52'43.3"W	SAME SAME
AIRPORT REFERENCE CODE	B–II	SAME
NPIAS CATEGORY	GA	SAME
MEAN DAILY MAX. TEMPERATURE	69°F	SAME
TAXIWAY LIGHTING	MITL	SAME
TAXIWAY MARKING	C/L	SAME
AIRPORT & TERMINAL NAVAIDS	GPS, VOR	SAME

REMARKS

SOURCE:
1. USGS QUADRANGLE MAPS: ASTORIA, WARRENTON, GEARHART, OLNEY, CATHLAMET BAY, OR.
2. FAA FAR PART 77.25, OBJECT AFFECTING NAVIGABLE AIRSPACE, CIVIL AIRPORT IMAGINARY SURFACES.
3. RUNWAY COORDINATES AND ELEVATIONS FROM HLB & ASSOCIATES, INC. SURVEY 2004.

REVISIONS

NO.	DESCRIPTION	DATE
.		

NOTES

Figure E2 **Airport Airspace Plan - Conical Surface**

Port of Astoria

Astoria Regional Airport
Astoria, Oregon

Barnard Dunkelberg & Company
1616 East 15th Street
Tulsa, Oklahoma 74120
918.585.8844

DATE: OCT. 2007

OBSTRUCTIONS

NO.	DECSCRIPTION	ELEV.	PENETRATION	SURFACE	DISPOSITION
OB1	LEVEE	15.6	4	PRIMARY	NONE
OB2	TREE	29.6	18	TRANS.	TRIM OR REMOVE
OB28	TREE	26.6	15	26 APP.	TRIM OR REMOVE
OB29	TREE	24.6	12	26 APP.	TRIM OR REMOVE
OB30	TREE	40.6	27	26 APP.	TRIM OR REMOVE
OB31	TREE	29.6	14	26 APP.	TRIM OR REMOVE
OB32	TREE	35.6	13	26 APP.	TRIM OR REMOVE
OB33	TREE	36.6	13	26 APP.	TRIM OR REMOVE
OB34	TREE	83.6	7	26 APP.	NONE
OB35	OL TRMSN TWR	205.6	−49	26 APP.	NONE
OB70	TREE	51.6	32	TRANS.	TRIM OR REMOVE
OB87	TREE	255.6	90	HORIZ.	NONE
OB88	OL TWR	210.6	45	HORIZ.	NONE
OB89	OL TWR	212.6	47	HORIZ.	NONE
OB90	STACK	210.6	45	HORIZ.	NONE
OB93	TREE	340.6	175	HORIZ.	NONE
OB94	TREE	276.6	70	CONICAL	NONE
OB95	ANT ON TANK	500.6	299	CONCIAL	NONE
OB96	TREE	415.6	225	CONICAL	NONE
OB97	TREE	485.6	284	CONICAL	NONE
OB98	TREE	326.6	146	CONICAL	NONE
OB101	TREE	418.6	134	CONICAL	NONE
OB104	CATENARY	201.6	−22.4	26 APP.	NONE

OBSTRUCTIONS TAKEN FROM NOAA/NOS OC 24 (SURVEYED 6/96). ELEVATIONS CONVERTED TO NAVD88.

OBSTRUCTIONS 100–104 TAKEN FROM FAA DIGITAL OBSTRUCTION FILE.

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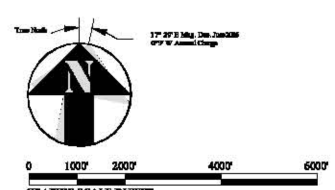
OBSTRUCTING TERRAIN, TREES, OR BUILDING AREA.



AIRPORT DATA

	EXISTING	FUTURE
AIRPORT ELEVATION (AMSL) NGVD29	14.9'	SAME
AIRPORT REFERENCE POINT (ARP) NAD 83	LAT. 46°09'28.7"N LON. 123°52'43.3"W	SAME SAME
AIRPORT REFERENCE CODE	B–II	SAME
NPIAS CATEGORY	GA	SAME
MEAN DAILY MAX. TEMPERATURE	69°F	SAME
TAXIWAY LIGHTING	MITL	SAME
TAXIWAY MARKING	C/L	SAME
AIRPORT & TERMINAL NAVAIDS	GPS, VOR	SAME

REMARKS

SOURCE:
1. USGS QUADRANGLE MAPS: ASTORIA, WARRENTON, GEARHART, OLNEY, CATHLAMET BAY, OR.
2. FAA FAR PART 77.25, OBJECT AFFECTING NAVIGABLE AIRSPACE, CIVIL AIRPORT IMAGINARY SURFACES.
3. RUNWAY COORDINATES AND ELEVATIONS FROM HLB & ASSOCIATES, INC. SURVEY 2004.

REVISIONS

NO.	DESCRIPTION	DATE
.		

NOTES

Figure E3 **Airport Airspace Plan - Runway 26 Extended Approach**

Port of Astoria

Astoria Regional Airport

Astoria, Oregon

Barnard Dunkelberg & Company
1616 East 15th Street
Tulsa, Oklahoma 74120
918.585.8844

DATE: OCT. 2007

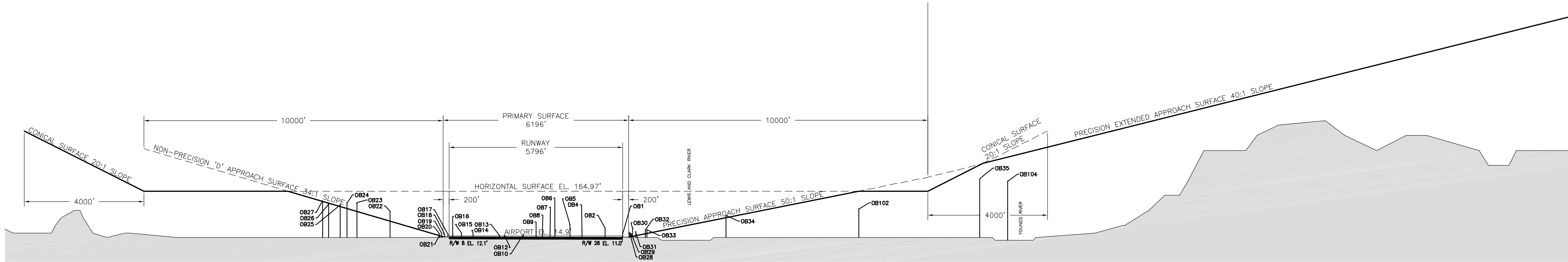
OBSTRUCTIONS

NO.	DECSCRIPTION	ELEV.	PENETRATION	SURFACE	DISPOSITION
OB1	LEVEE	15.6	4	PRIMARY	NONE
OB2	TREE	29.6	18	TRANS.	TRIM OR REMOVE
OB4	TREE	41.6	29	TRANS.	TRIM OR REMOVE
OB5	OL ON GS	55.6	43	PRIMARY	NONE
OB6	TREE	30.6	19	PRIMARY	TRIM OR REMOVE
OB7	BUSH	19.6	8	PRIMARY	TRIM OR REMOVE
OB8	BUSH	29.6	18	PRIMARY	TRIM OR REMOVE
OB9	TREE	28.6	16	PRIMARY	TRIM OR REMOVE
OB10	SIGN	18.6	5	PRIMARY	NONE
OB12	SIGN	17.6	5	PRIMARY	NONE
OB13	SIGN	17.6	5	PRIMARY	NONE
OB14	BUSH	23.6	12	PRIMARY	TRIM OR REMOVE
OB15	TREE	23.6	11	PRIMARY	TRIM OR REMOVE
OB16	BUSH	22.6	10	PRIMARY	TRIM OR REMOVE
OB17	BUSH	19.6	7	PRIMARY	TRIM OR REMOVE
OB18	BUSH	19.6	7	PRIMARY	TRIM OR REMOVE
OB19	BUSH	23.6	10	8 APP.	TRIM OR REMOVE
OB20	OL ON LOC	15.6	0	8 APP.	NONE
OB21	ANT ON OL BLDG	22.6	6	8 APP.	NONE
OB22	TREE	97.6	33	8 APP.	TRIM OR REMOVE
OB23	TREE	125.6	28	8 APP.	TRIM OR REMOVE
OB24	TREE	125.6	19	8 APP.	TRIM OR REMOVE
OB25	TREE	119.6	6	8 APP.	TRIM OR REMOVE
OB26	TREE	121.6	−3	8 APP.	TRIM OR REMOVE
OB27	TREE	132.6	2	8 APP.	TRIM OR REMOVE
OB28	TREE	26.6	15	26 APP.	TRIM OR REMOVE
OB29	TREE	24.6	12	26 APP.	TRIM OR REMOVE
OB30	TREE	40.6	27	26 APP.	TRIM OR REMOVE
OB31	TREE	29.6	14	26 APP.	TRIM OR REMOVE
OB32	TREE	35.6	13	26 APP.	TRIM OR REMOVE
OB33	TREE	36.6	13	26 APP.	TRIM OR REMOVE
OB34	TREE	83.6	7	26 APP.	NONE
OB35	OL TRMSN TWR	205.6	−49	26 APP.	NONE
OB36	BUSH	18.6	−3	31 APP.	TRIM OR REMOVE
OB37	BUSH	19.6	5	13 APP.	TRIM OR REMOVE
OB38	BUSH	19.6	−8	13 APP.	TRIM OR REMOVE
OB39	BUSH	25.6	−4	13 APP.	TRIM OR REMOVE
OB40	BUSH	21.6	−8	13 APP.	NONE
OB41	TREE	28.6	−4	13 APP.	TRIM OR REMOVE
OB42	TREE	29.6	10	13 APP.	TRIM OR REMOVE
OB43	TREE	31.6	−14	13 APP.	NONE
OB44	ROAD(N)	32.6	−80	13 APP.	NONE
OB45	BUSH	27.6	−1	31 APP.	TRIM OR REMOVE
OB46	TREE	33.6	−3	31 APP.	TRIM OR REMOVE
OB47	TREE	92.6	0	31 APP.	NONE
OB48	TREE	124.6	−4	31 APP.	NONE
OB49	TREE	157.6	−11	31 APP.	NONE
OB61	BUSH	21.6	−1	13 APP.	TRIM OR REMOVE
OB64	TREE	31.6	−1	13 APP.	TRIM OR REMOVE
OB66	LEVEE	16.6	−24	13 APP.	NONE
OB68	WSK	28.6	0	PRIMARY	NONE
OB75	TREE	47.6	7	31 APP.	TRIM OR REMOVE
OB102	TOWER	108.6	−52	26 APP.	NONE
OB104	CATENARY	201.6	−22.4	26 APP.	NONE

OBSTRUCTIONS TAKEN FROM NOAA/NOS OC 24 (SURVEYED 6/96). ELEVATIONS CONVERTED TO NAVD88.

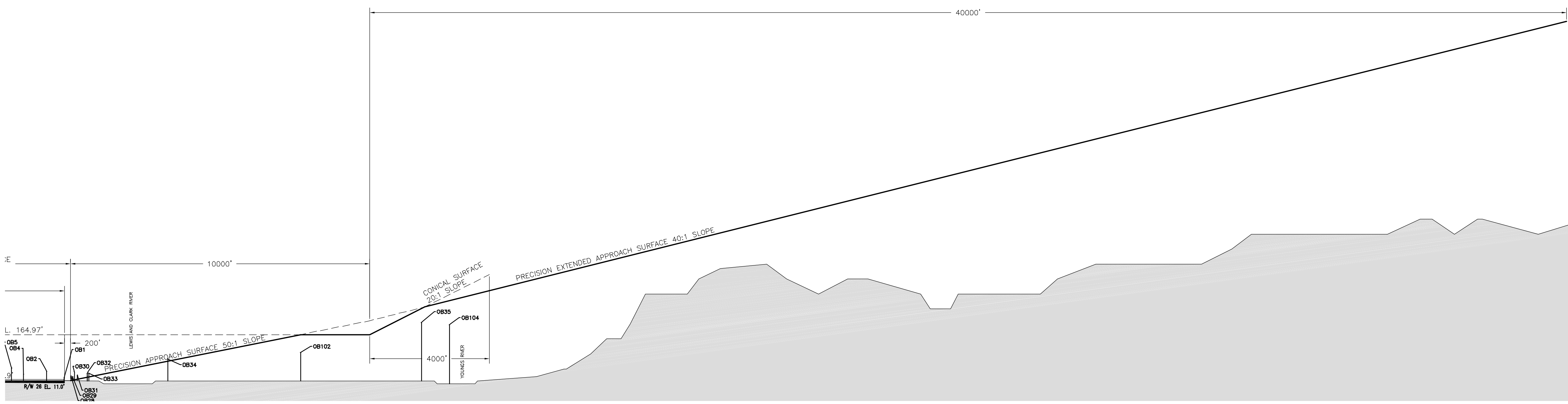
OBSTRUCTIONS 100–104 TAKEN FROM FAA DIGITAL OBSTRUCTION FILE.

OBSTRUCTING TREES/BUSHES WITHIN RUNWAY PRIMARY, APPROACH, AND ASSOCIATED TRANSITIONAL SURFACES TO BE TRIMMED OR REMOVED.



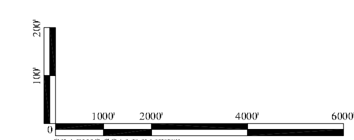
RUNWAY 8/26 PROFILE

1" = 2000' HORIZONTALLY
1" = 200' VERTICALLY



RUNWAY 26 EXTENDED APPROACH PROFILE

1" = 2000' HORIZONTALLY
1" = 200' VERTICALLY

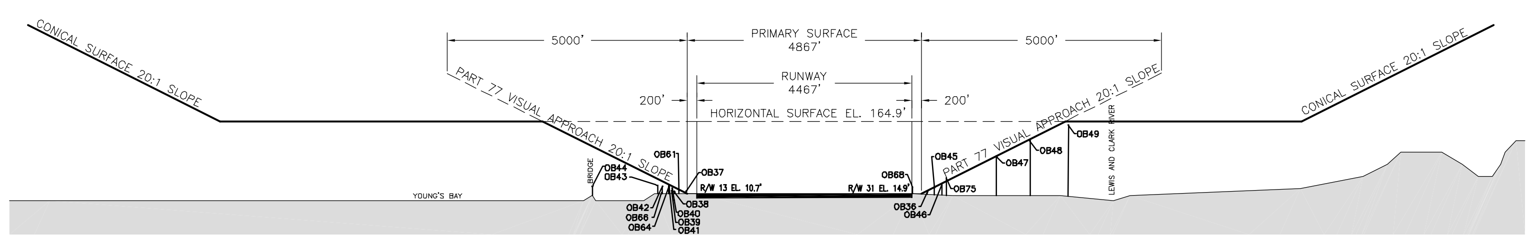


AIRPORT DATA

	EXISTING	FUTURE
AIRPORT ELEVATION (AMSL) NGVD29	14.9'	SAME
AIRPORT REFERENCE POINT (ARP) NAD 83	LAT. 46°09'28.7"N LON. 123°52'43.3"W	SAME SAME
AIRPORT REFERENCE CODE	B–II	SAME
NPIAS CATEGORY	GA	SAME
MEAN DAILY MAX. TEMPERATURE	69°F	SAME
TAXIWAY LIGHTING	MITL	SAME
TAXIWAY MARKING	C/L	SAME
AIRPORT & TERMINAL NAVAIDS	GPS, VOR	SAME

REMARKS

SOURCE:
1. USGS QUADRANGLE MAPS: ASTORIA, WARRENTON, GEARHART, OLNEY, CATHLAMET BAY, OR.
2. FAA FAR PART 77.25, OBJECT AFFECTING NAVIGABLE AIRSPACE, CIVIL AIRPORT IMAGINARY SURFACES.
3. RUNWAY COORDINATES AND ELEVATIONS FROM HLB & ASSOCIATES, INC. SURVEY 2004.



RUNWAY 13/31 PROFILE

1" = 2000' HORIZONTALLY
1" = 200' VERTICALLY

REVISIONS

NO.	DESCRIPTION	DATE

NOTES

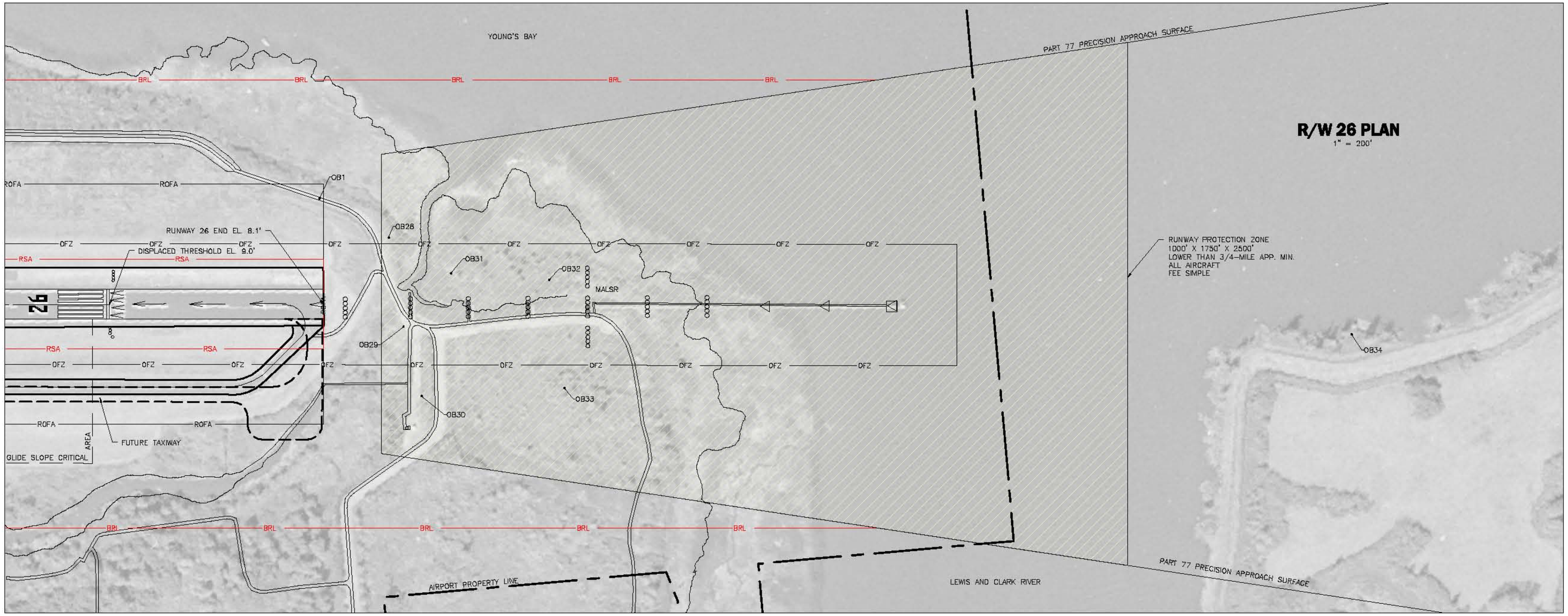
1. TERRAIN PROFILE REPRESENTS THE HIGHEST POINT ACROSS THE WIDTH AND ALONG THE LENGTH OF THE APPROACH SURFACE AND PRIMARY SURFACE.

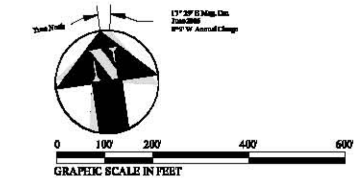
Figure E4 **Airport Airspace Profiles - Runway 08/26 & Runway 13/31**

Port of Astoria
Astoria Regional Airport
Astoria, Oregon

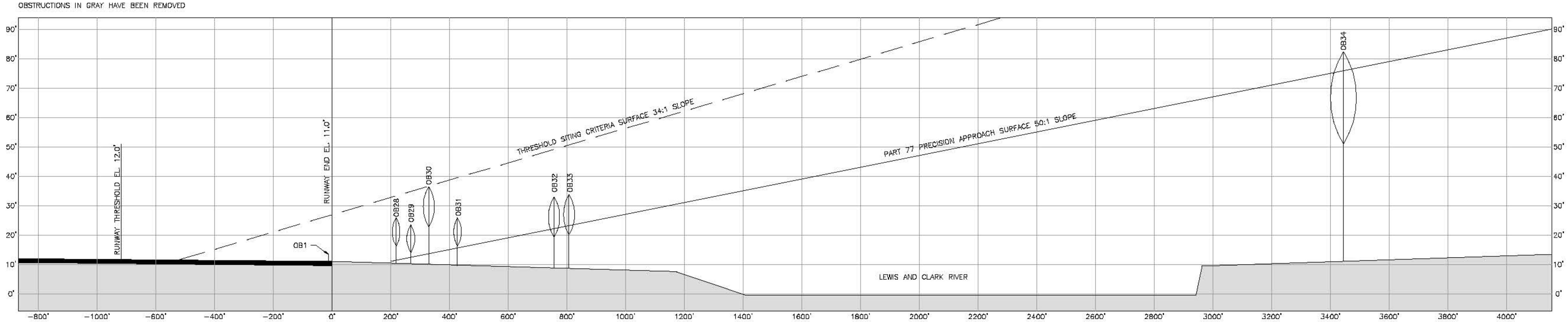
Barnard Dunkelberg & Company
1616 East 15th Street
Tulsa, Oklahoma 74120
918.585.8844

DATE: OCT. 2007





OBSTRUCTIONS IN GRAY HAVE BEEN REMOVED



TERRAIN PROFILE REPRESENTS THE HIGHEST POINT ACROSS THE WIDTH AND ALONG THE LENGTH OF THE APPROACH SURFACE

1" = 200' HORIZONTALLY
1" = 20' VERTICALLY

RUNWAY DATA

	RUNWAY 8/26	
	EXISTING	FUTURE
APPROACH VISIBILITY MINIMUMS	>3/4-MILE/PIR	3/4-MILE/PIR
FAR PART 77 APPROACH SLOPE	34:1(NP)/50:1	SAME
RUNWAY WIDTH X LENGTH	100' X 5,796'	SAME
RUNWAY PAVEMENT TYPE	ASPHALT	SAME
TAXIWAY PAVEMENT TYPE	ASPHALT	SAME
PAVEMENT STRENGTH (IN 1000 LBS.)	60s, 76D	SAME
RUNWAY LIGHTING	MIRL	SAME
EFFECTIVE RUNWAY GRADIENT %	0.01%	SAME
MAXIMUM GRADE WITHIN RUNWAY LENGTH %	0.1%	SAME
RUNWAY LINE-OF-SITE	CRITERIA MET	SAME
RUNWAY MARKING	NPI/PIR	SAME
VISUAL APPROACH AIDS	REIL,VASI/MALSR	MALSF, PAPI/MALSR, PAPI
INSTRUMENT APPROACH AIDS	VOR,GPS/ILS	SAME
AIRPORT REFERENCE CODE	B-II	SAME
CRITICAL AIRCRAFT	HU-25	SAME
WINGSPAN	53.5'	SAME
APPROACH SPEED	107 kts	SAME
MAX T/O WEIGHT	28,860 lbs.	SAME
RUNWAY SAFETY AREA (RSA) WIDTH	300'	SAME
RSA LENGTH BEYOND STOP END	600'	SAME
RUNWAY OBJECT FREE AREA (OFA) WIDTH	800'	SAME
OFA LENGTH BEYOND STOP END	600'/600'	SAME
OBSTACLE FREE ZONE (OFZ) WIDTH	400'	SAME
OFZ LENGTH BEYOND STOP END	200'/2840'	1640'/2840'
RUNWAY END COORDINATES NGS 405 SURVEY 10/97 (NAD 83)	LAT. N 46° 09' 35.452" LON. W 123° 53' 23.186"	SAME SAME
	LAT. N 46° 08' 29.977" LON. W 123° 52' 01.244"	SAME SAME
DISPLACED THRESHOLD COORDINATES NGS 405 SURVEY 10/97 (NAD 83)	LAT. N 46° 09' 35.167" LON. W 123° 53' 18.934"	SAME SAME
	LAT. N 46° 08' 30.5900" LON. W 123° 52' 11.0900"	SAME SAME
RUNWAY ELEVATIONS END	12.1'/11.0'	SAME
DISPLACED THRESHOLD ELEVATIONS END	12.5'/12.0'	SAME
HIGH POINT	13.7'	SAME
LOW POINT	11.0'	SAME
TOUCHDOWN ZONE ELEVATION	13.7'/13.7'	SAME

NOTES:
1. This drawing reflects current planning standards applicable to Astoria Regional Airport.
This drawing is not intended to be used for construction documentation or navigation.
2. All coordinate data is NAD83/NAVD88.

OBSTRUCTIONS

NO.	DECSCRIPTION	ELEV.	PENETRATION	SURFACE	DISPOSITION
OB1	LEVEE	15.6	4	PRIMARY	NONE
OB28	TREE	26.6	15	26 APP.	TRIM OR REMOVE
OB29	TREE	24.6	12	26 APP.	TRIM OR REMOVE
OB30	TREE	40.6	27	26 APP.	TRIM OR REMOVE
OB31	TREE	29.6	14	26 APP.	TRIM OR REMOVE
OB32	TREE	35.6	13	26 APP.	TRIM OR REMOVE
OB33	TREE	36.6	13	26 APP.	TRIM OR REMOVE
OB34	TREE	83.6	7	26 APP.	TRIM OR REMOVE

OBSTRUCTIONS TAKEN FROM NOAA/NOS OC 24 (SURVEYED 6/96). ELEVATIONS ARE NAVD88.

LAYOUT PLAN LEGEND

	EXISTING	FUTURE
AIRPORT PROPERTY LINE	— — —	
AIRPORT SECURITY FENCE	—X—	
AIRPORT BUILDINGS	▭	▬
AIRFIELD PAVEMENT	═	═
PAVED ROADS	═	— — —
RUNWAY PROTECTION ZONE	▭	
BUILDING RESTRICTION LINE	— BRL —	
OBSTACLE FREE ZONE	— OFZ —	— OFZ (F) —
RUNWAY SAFETY AREA	— RSA —	
RUNWAY OBJECT FREE AREA	— ROFA —	
FUEL STORAGE AREA	△F	
AIRPORT BEACON	★	
LIGHTED WIND CONE & SEGMENTED CIRCLE	⊙	
WIND CONE	↗	
PRECISION APPROACH PATH INDICATOR (PAPI)	PAPI	
VISUAL APPROACH SLOPE INDICATOR (VASI)	VASI	
RUNWAY END IDENTIFIER LIGHTS (REIL)	●	
TAXIWAY HOLDLINE & SIGN	≡ ▭	

AIRPORT DATA

	EXISTING	FUTURE
AIRPORT ELEVATION (AMSL) NAVD 88	14.9'	SAME
AIRPORT REFERENCE POINT (ARP) NAD 83	LAT. 46°09'28.7"N LON. 123°52'43.3"W	SAME SAME
AIRPORT REFERENCE CODE	B-II	SAME
NPIAS CATEGORY	GA	SAME
MEAN DAILY MAX. TEMPERATURE	69°F	SAME
TAXIWAY LIGHTING	MITL	SAME
TAXIWAY MARKING	C/L	SAME
AIRPORT & TERMINAL NAVAIDS	GPS, VOR	SAME

REMARKS

SOURCES: AERIAL PHOTOGRAPHY (OCT. '05) PROVIDED BY CLATSOP COUNTY, PORT OF ASTORIA.
AIRPORT SURVEY BY HLB ASSOCIATES, INC. FEB. 6, 2004.
AIRPORT LAYOUT PLAN BY WH PACIFIC AVIATION SERVICES, 1993.
FAA AC 150/5300-13 CHANGE 10.
OBSTRUCTIONS TAKEN FROM NOAA/NOS OC 24 (SURVEYED 6/96). ELEVATIONS ARE NAVD88.

REVISIONS

NO.	DESCRIPTION	DATE
.		

NOTES

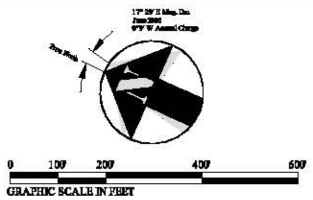
1. TERRAIN PROFILE REPRESENTS THE HIGHEST POINT ACROSS THE WIDTH AND ALONG THE LENGTH OF THE APPROACH SURFACE AND PRIMARY SURFACE.

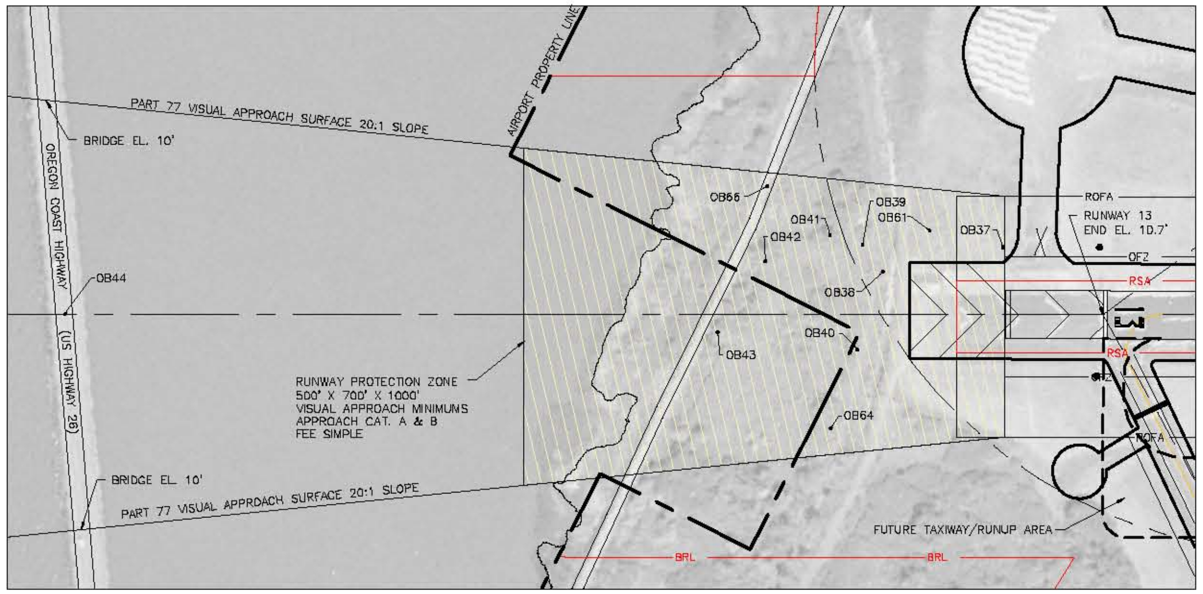
Figure E6 Inner Portion of the Approach Surface Drawing - Runway 26 Plan & Profile

Port of Astoria
Astoria Regional Airport
Astoria, Oregon

Barnard Dunkelberg & Company
1616 East 15th Street
Tulsa, Oklahoma 74120
918.585.8844

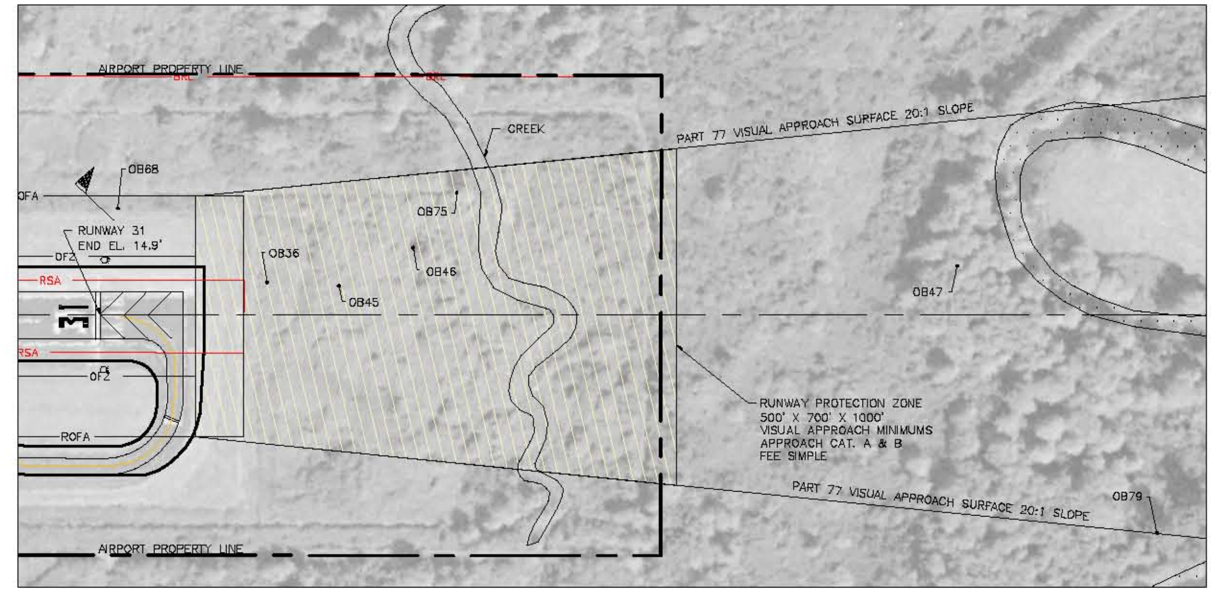
DATE: SEPT. 2006





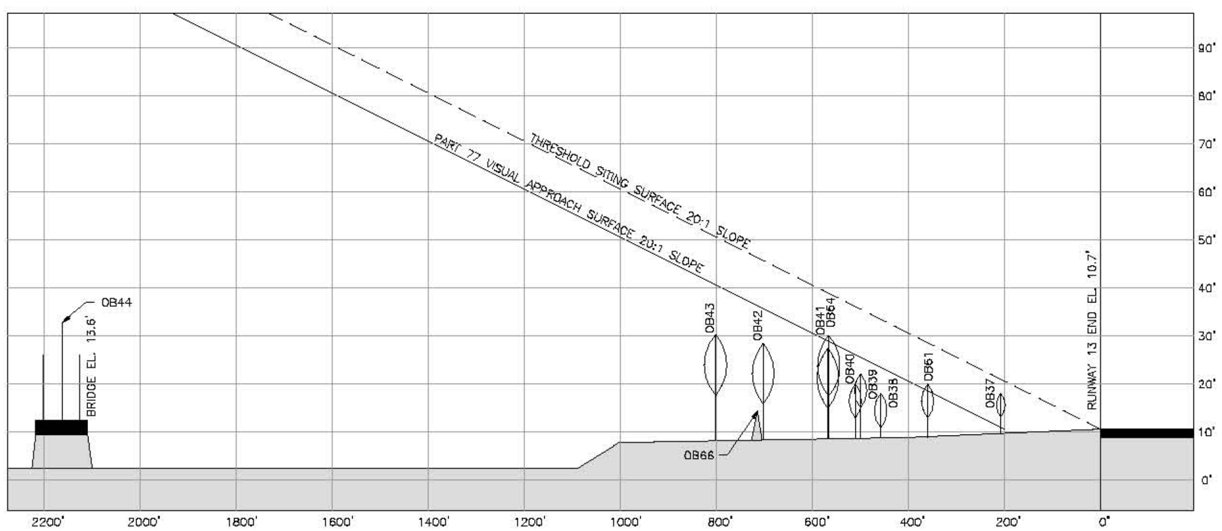
R/W 13 PLAN

1" = 200'



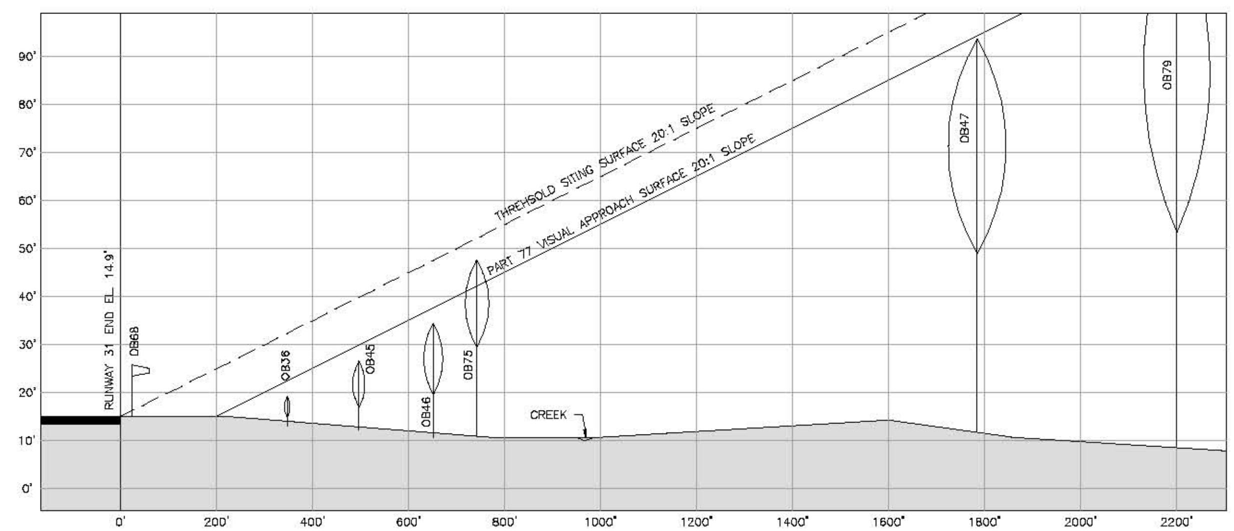
R/W 31 PLAN

1" = 200'



R/W 13 PROFILE

1" = 200' HORIZONTALLY
1" = 20' VERTICALLY



R/W 31 PROFILE

1" = 200' HORIZONTALLY
1" = 20' VERTICALLY

RUNWAY DATA

	RUNWAY 13/31	
	EXISTING	FUTURE
APPROACH VISIBILITY MINIMUMS	VISUAL/VISUAL	VISUAL/VISUAL
FAR PART 77 APPROACH SLOPE	20:1(V)/20:1(V)	SAME
RUNWAY WIDTH X LENGTH	100' X 4,467'	SAME
RUNWAY PAVEMENT TYPE	ASPHALT	SAME
TAXIWAY PAVEMENT TYPE	ASPHALT	SAME
PAVEMENT STRENGTH (IN 1000 LBS.)	60s, 76D	SAME
RUNWAY LIGHTING	MIRL	SAME
EFFECTIVE RUNWAY GRADIENT %	0.1%	SAME
MAXIMUM GRADE WITHIN RUNWAY LENGTH %	0.1%	SAME
RUNWAY LINE-OF-SITE	CRITERIA MET	SAME
RUNWAY MARKING	V/V	SAME
VISUAL APPROACH AIDS	REIL, VASI/PAPI	REIL,PAPI/REIL,PAPI
INSTRUMENT APPROACH AIDS	NONE	SAME
AIRPORT REFERENCE CODE	B-II	SAME
CRITICAL AIRCRAFT	HU-25	SAME
WINGSPAN	53.5'	SAME
APPROACH SPEED	107 kts	SAME
MAX T/O WEIGHT	28,860 lbs.	SAME
RUNWAY SAFETY AREA (RSA) WIDTH	150'	SAME
RSA LENGTH BEYOND STOP END	300'	SAME
RUNWAY OBJECT FREE AREA (OFA) WIDTH	500'	SAME
OFA LENGTH BEYOND STOP END	300'/300'	SAME
OBSTACLE FREE ZONE (OFZ) WIDTH	250'	SAME
OFZ LENGTH BEYOND STOP END	200'	SAME
RUNWAY END COORDINATES NGS 405 SURVEY 10/97 (NAD 83)	LAT. N 46° 09' 43.400" LON. W 123° 52' 58.467" / LAT. N 46° 09' 03.893" LON. W 123° 52' 30.272"	SAME SAME / SAME SAME
DISPLACED THRESHOLD COORDINATES NGS 405 SURVEY 10/97 (NAD 83)		
RUNWAY ELEVATIONS END	10.7'/14.9'	SAME
DISPLACED THRESHOLD ELEVATIONS END	N/A	SAME
HIGH POINT	14.9'	SAME
LOW POINT	10.7'	SAME
TOUCHDOWN ZONE ELEVATION	13.7'/14.9'	SAME

NOTES:
1. This drawing reflects current planning standards applicable to Astoria Regional Airport.
This drawing is not intended to be used for construction documentation or navigation.
2. All coordinate data is NAD83/NAVD88.

OBSTRUCTIONS

NO.	DECSCRIPTION	ELEV.	PENETRATION	SURFACE	DISPOSITION
OB36	BUSH	18.6	-3	31 APP.	TRIM OR REMOVE
OB37	BUSH	19.6	5	13 APP.	TRIM OR REMOVE
OB38	BUSH	19.6	-8	13 APP.	TRIM OR REMOVE
OB39	BUSH	25.6	-4	13 APP.	TRIM OR REMOVE
OB40	BUSH	21.6	-8	13 APP.	NONE
OB41	TREE	28.6	-4	13 APP.	TRIM OR REMOVE
OB42	TREE	29.6	10	13 APP.	TRIM OR REMOVE
OB43	TREE	31.6	-14	13 APP.	NONE
OB44	ROAD(N)	32.6	-80	13 APP.	NONE
OB45	BUSH	27.6	-1	31 APP.	TRIM OR REMOVE
OB46	TREE	33.6	-3	31 APP.	TRIM OR REMOVE
OB47	TREE	92.6	0	31 APP.	NONE
OB61	BUSH	21.6	-1	13 APP.	TRIM OR REMOVE
OB64	TREE	31.6	-1	13 APP.	TRIM OR REMOVE
OB66	LEVEE	16.6	-24	13 APP.	NONE
OB68	WSK	28.6	0	PRIMARY	NONE
OB75	TREE	47.6	7	31 APP.	TRIM OR REMOVE
OB79	TREE	123.6	-2	31 APP.	NONE

OBSTRUCTIONS TAKEN FROM NOAA/NOS OC 24 (SURVEYED 6/96). ELEVATIONS ARE NAVD88.

LAYOUT PLAN LEGEND

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
AIRPORT SECURITY FENCE	X	
AIRPORT BUILDINGS		
AIRFIELD PAVEMENT		
PAVED ROADS		
RUNWAY PROTECTION ZONE		
BUILDING RESTRICTION LINE	BRL	
OBSTACLE FREE ZONE	OFZ	OFZ (F)
RUNWAY SAFETY AREA	RSA	
RUNWAY OBJECT FREE AREA	ROFA	
FUEL STORAGE AREA		
AIRPORT BEACON		
LIGHTED WIND CONE & SEGMENTED CIRCLE		
WIND CONE		
PRECISION APPROACH PATH INDICATOR (PAPI)	PAPI	
VISUAL APPROACH SLOPE INDICATOR (VASI)	VASI	
RUNWAY END IDENTIFIER LIGHTS (REIL)		
TAXIWAY HOLDLINE & SIGN		

AIRPORT DATA

	EXISTING	FUTURE
AIRPORT ELEVATION (AMSL) NAVD 88	14.9'	SAME
AIRPORT REFERENCE POINT (ARP) NAD 83	LAT. 46°09'28.7"N LON. 123°52'43.3"W	SAME SAME
AIRPORT REFERENCE CODE	B-II	SAME
NPIAS CATEGORY	GA	SAME
MEAN DAILY MAX. TEMPERATURE	69°F	SAME
TAXIWAY LIGHTING	MITL	SAME
TAXIWAY MARKING	C/L	SAME
AIRPORT & TERMINAL NAVAIDS	GPS, VOR	SAME

REMARKS

SOURCES: AERIAL PHOTOGRAPHY (OCT. '05) PROVIDED BY CLATSOP COUNTY, PORT OF ASTORIA.
AIRPORT SURVEY BY HLB ASSOCIATES, INC. FEB. 6, 2004.
AIRPORT LAYOUT PLAN BY WH PACIFIC AVIATION SERVICES, 1993.
FAA AC 150/5300-13 CHANGE 10.
OBSTRUCTIONS TAKEN FROM NOAA/NOS OC 24 (SURVEYED 6/96). ELEVATIONS ARE NAVD88.

REVISIONS

NO.	DESCRIPTION	DATE
.		

NOTES

1. TERRAIN PROFILE REPRESENTS THE HIGHEST POINT ACROSS THE WIDTH AND ALONG THE LENGTH OF THE APPROACH SURFACE AND PRIMARY SURFACE.

Figure E7 Inner Portion of the Approach Surface Drawing - Runway 13/31 Plan & Profile

Port of Astoria
Astoria Regional Airport
Astoria, Oregon

Barnard Dunkelberg & Company
1616 East 15th Street
Tulsa, Oklahoma 74120
918.585.8844

DATE: OCT. 2007

Terminal Area Plan

The following illustration, entitled *TERMINAL AREA PLAN,* presents a detailed view of the existing developed landside use area on the Airport.

Landside Facilities

Passenger Terminal Facilities. There are currently no commercial passenger terminal facilities at Astoria Regional Airport. While several options exist for short-term development of facilities should a commercial passenger service be initiated, it is assumed that a temporary, modular structure will be employed in the short-term. This structure will be sited just west of the former FBO concrete foundation that will be the site of the permanent terminal building. This will be done so as to allow the modular facility to remain in operation when the ultimate terminal is constructed. Additionally, the access drive and auto parking will be phased as needed.

Aircraft Rescue and Fire Fighting (ARFF) Facility. The ARFF facility, equipment, and personnel at the Airport are provided by the US Coast Guard through a mutual assistance agreement with the Port of Astoria. The existing facility is adequate for current and projected airport needs.

Air Traffic Control Tower (ATCT). Astoria Regional Airport does not currently have an Air Traffic Control Tower. It is also not forecasted within the planning period that Airport operations would rise to a level that would meet the FAA cost-benefit standard to warrant the development of a new tower.

Aircraft Storage and Maintenance Faculties. These facilities are to be located within the current aviation-use development area. The area on the north of the development area contains one private general aviation hangar, soon to be increased to two. The area on the south of the development area contains two large general aviation hangars as well as four banks for T-hangars. Up to five additional banks of T-hangars are programmed for construction. Taxilane access improvements are also programmed in conjunction with the development of new general aviation facilities.

PORT OF ASTORIA

Astoria Regional Airport

Master Plan Update

F. Implementation Program

F Implementation Program

INTRODUCTION. The improvements necessary to efficiently accommodate the forecast aviation demands for Astoria Regional Airport have been placed into three phases: Phase One (0-5 years), Phase Two (6-10 years), and Phase Three (11-20 years). The proposed improvements are illustrated graphically by time period on the *PHASING PLAN* (see Figure F1), along with the project cost estimates that are presented on the following pages.

Implementation Schedule and Project List

A list of capital improvement projects has been assembled from the facility requirements documentation previously presented. The project list has been coordinated with the Airport Layout Plan (ALP) drawing set and the Capital Improvement Program (CIP) that is continuously updated by airport management and the Federal Aviation Administration (FAA). The projects for the first five years are listed in priority order by year. In the second and third phases (years 6-20), the projects are listed in priority order with general year designators. It is anticipated that the project phasing will change as local and Federal priorities evolve.

Phasing Plan

To supplement the project list and project cost estimates, an illustration has been prepared. This graphic, entitled *PHASING PLAN*, will indicate the suggested phasing for improvement projects throughout the 20-year planning period. These are suggested schedules and variance from them may be necessary, especially during the latter time periods. Attention has been given to the first five years because the projects outlined in this time frame include many critical improvements. The demand for certain facilities, especially in the latter time frame, and the economic feasibility of their development, are to be the prime factors influencing the timing of individual project construction. Care must be taken to provide for adequate lead-time for detailed planning and construction of facilities in order to meet aviation demands. It is also important to minimize the disruptive scheduling where a portion of the facility may become inoperative due to construction and to prevent extra costs resulting from improper project scheduling.

Cost Estimates

Cost estimates for individual projects, based on current dollars (2006), have been prepared for improvements that have been identified as necessary during the 20-year planning period. Facility costs have been formulated to reflect current market prices for materials and labor based on published construction cost averages (RSMeans construction cost guide or similar) and on historical records of previous similar contractor project bid tabulations. They are also cost adjusted for project location, accessibility and quantity of materials all of which can dramatically affect project costs. Other design considerations include climate, local and regional building codes and Federal regulations. That being said, these estimates are intended to be used for planning purposes only and should not be construed as construction cost estimates, which can only be compiled following the preparation of detailed design documentation.

Capital Improvement Program (CIP)

To assist in preparation of the Capital Improvement Program which the Port of Astoria keeps on file and up to date with the FAA, the first phase of the project/cost list, *PHASE I (0 - 5 YEARS) DEVELOPMENT PLAN PROJECTS*, has been organized by year, in a format similar to that used by the FAA and is shown in Table F1. The two subsequent phases, *PHASE II (6-10 YEARS) DEVELOPMENT PLAN PROJECTS* and *PHASE III (11-20 YEARS) DEVELOPMENT PLAN PROJECTS*, are shown in Table F2 and Table F3, respectively.

The projects, phasing, and costs presented in this Master Plan Update are the best projections that can be made at the time of formulation. The purpose of the project list, phasing, and costs listed here is to provide a reasonable projection of capital needs, which can then be utilized in local and Federal financial programming. In reality, as soon as this long-range planning document is published, the project list starts to be out of date and; therefore, it will always differ to some degree with the Airport's five-year CIP on file with the FAA.

Note that it should not be inferred that the inclusion of a project on the CIP and the allocation of AIP funding to that project is an endorsement of that project or a commitment of funding by the FAA. AIP grants, especially discretionary funding, are established and allocated annually based on a complicated system that weighs factors of need and priority. Projects listed on the CIP could reasonably be shifted, added or eliminated annually, based on funding and eligibility considerations.

Financial Plan

Funding sources for the capital improvement program depend on many factors, including Airport Improvement Program (AIP) project eligibility, the ultimate type and use of facilities to be developed, debt capacity of the Airport, the availability of other financing sources, and the priorities for scheduling project completion. For planning purposes, assumptions were made related to the funding source of each capital improvement. The project costs provided in the Development Plan Project tables are identified with likely funding sources.

Sources of Capital Funding

Airport Improvement Program (AIP). The Airport Improvement Program supports maintenance and improvement of eligible airports throughout the United States in the form of AIP grants from the Aviation Trust Fund. The Aviation Trust Fund, in its present general form, was originally established in 1970 and has since been amended on numerous occasions. The purpose of the Aviation Trust Fund is to establish a source of funding collected only from the users of the nation's airport system that can be used to finance airport improvements at system airports. The current AIP legislation provides both entitlement funds and discretionary funds for projects that are eligible according to FAA Order 5100.38C, *Airport Improvement Program Handbook*. General types of projects that are eligible to be funded with AIP grants include those projects that:

- **Preserve or enhance safety, security, or capacity of the national air transportation system;**
- **Reduce noise or mitigate noise impacts resulting from aircraft; and,**
- **Furnish opportunities for enhanced competition between or among air carriers, if applicable.**

Grants from the Aviation Trust Fund support development/improvement needs at both commercial service and general aviation airports.

AIP Entitlement Grants. The Airport Improvement Program provides entitlement grants for eligible commercial and general aviation airports. Funding for commercial service airports is based on a formula using the airport's passenger enplanements and cargo weight reported two years prior to the current grant year. Specifically, commercial service airports are given entitlement funding based on a graduated method developed by the FAA that equates to a lower per enplanement or cargo entitlement for an airport as the total enplanement/cargo level increases. This process is used to offset funding disparity, to the extent possible, resulting from the vastly different levels of enplanements that occur at US airports, from less than 10,000 enplanements per year at small airports to tens of millions of enplanements at major hub airports. AIP provides eligible primary commercial service airports (those with at least 10,000 annual enplanements) with a minimum amount for of $1,000,000 per year.

The FAA evaluates airport grant requests using a published priority ranking system that is weighted toward safety, airfield pavement and airfield capacity projects, although other non-airfield projects, such as terminal buildings and main access/entrance roads, are also eligible. Within the entitlement amount granted, up to 95% of eligible project costs are funded, with the remaining 5% provided from other non-Federal, local airport sources. Astoria Regional Airport will be eligible to receive AIP commercial service entitlement grants if commercial passenger service can be re-established on a regular basis.

Additionally, AIP funding is made available to eligible general aviation airports through non-primary entitlements and state apportionments. Astoria Regional Airport receives a general aviation non-primary entitlement of $150,000 annually. Note that these grants can only be rolled over for a maximum of three years and $450,000. The Airport can also realize some limited apportionment funding through specific applications to the State of Oregon, discussed below.

AIP Discretionary Grants. The FAA also provides discretionary grants (on a 95%/5% basis), over and above entitlement funding, to airports for projects that have a high Federal priority, such as for enhancing safety, security, and capacity of the airport, and would be difficult to fund otherwise. The amount that individual grants vary can be significant in comparison to entitlements and are awarded at the FAA's total discretion. Discretionary grant applications are evaluated based on need, the FAA's project priority ranking system, and the FAA's assessment of a project's significance within the national airport and airway system.

FAA Facilities & Equipment Funds. Within the FAA's budget appropriation, funding is available in the Facilities and Equipment (F&E) Fund to purchase navigational aids and air safety-related technical equipment for use at commercial service airports in the national airport system. F&E funds are provided on a discretionary basis by the FAA.

State Grants. The Oregon Department of Aviation (ODA) is dedicated to developing and improving Oregon's aviation system. ODA's goals include:

- **Developing aviation as an integral part of Oregon's transportation network;**
- **Creating and implementing strategies to protect and improve Oregon's aviation system;**
- **Encouraging aviation-related economic development;**
- **Supporting aviation safety and education; and,**
- **Increasing commercial air service and general aviation in Oregon.**

The ODA Pavement Maintenance Program (PMP) provides funding for pavement maintenance and associated improvements (crack filling, repair, sealcoats, etc.), which have not traditionally been eligible for FAA funding. The PMP uses a revenue stream devoted specifically to address the pavement deficiencies revealed through the statewide FAA-funded Pavement Evaluation Program (PEP). The program divides Oregon into three geographic regions and performs evaluations on a rotating basis every third year. This program has historically provided Astoria Regional Airport with funding for 75% of such projects, with the Airport funding the remaining 25%.

ODA also provides limited funding assistance through its Financial Assistance to Municipalities (FAM) grant program. The FAM Grant Program offers financial assistance to Oregon airports for airport planning, development, and capital improvement projects. FAM grants are currently limited to a maximum of $25,000 per fiscal year per airport. These grants are awarded to airports on a discretionary basis according to the priorities established by the ODA and limited by available funding authorized by the Oregon legislature.

Private Third Party Financing. Many airports use private, third-party financing for planned, revenue producing improvements that will be primarily used by private business or other organizations. Such projects are not ordinarily eligible for federal funding, although limited elements could be (i.e. taxiways, aprons, etc.). Projects of this kind typically include aircraft hangars, FBO facilities, fuel storage, air cargo facilities, exclusive aircraft parking aprons, industrial development areas, non-aviation commercial areas, and various other revenue producing projects.

Airport Revenues. It is assumed that airport revenues over and above that utilized to cover airport operating and maintenance expenses will be the primary source of the "local" capital improvement dollars.

Table F1
PHASE I (0-5 YEARS) DEVELOPMENT PLAN PROJECTS
Astoria Regional Airport Master Plan Update

	Project Description	Note	Total Costs	Recommended Financing Method Local a)	State	Federal c)
	Year 1 (FY 07)					
A.1	Vegetative Obstructions Removal (within RVZ)		$124,872.00	$6,243.60	$0.00	$118,628.40
A.2	Construct T-Hangar "F" & Ramp	b)	$533,159.88	$383,159.88	$0.00	$150,000.00
	YEAR 1 TOTAL		**$658,031.88**	**$389,403.48**	**$0.00**	**$268,628.40**
	Year 2 (FY 08)					
A.3	Airfield Drainage System Evaluation		$43,200.00	$2,160.00	$0.00	$41,040.00
A.4	Apron Panel Replacement (Sag areas)		$139,101.60	$6,955.08	$0.00	$132,146.52
A.5	Install Temporary Modular Terminal Facilities (on old FBO site)	d)	$350,064.00	$350,064.00		$0.00
A.6	Airfield Pavement Maintenance (State Program)	e)	$26,862.00	$6,715.50	$20,146.50	$0.00
A.7	Upgrade Electrical Vault		$74,052.00	$3,702.60	$0.00	$70,349.40
	YEAR 2 TOTAL		**$633,279.60**	**$369,597.18**	**$20,146.50**	**$243,535.92**
	Year 3 (FY 09)					
A.8	Runway 13/31 Rehab (incl Drainage & Elect.)		$1,732,381.20	$86,619.06	$0.00	$1,645,762.14
A.9	Construct T-Hangar "G" & Ramp	f)	$533,159.88	$266,579.94	$0.00	$266,579.94
	YEAR 3 TOTAL		**$2,265,541.08**	**$353,199.00**	**$0.00**	**$1,912,342.08**
	Year 4 (FY 10)					
A.10	Install Terminal Apron Area Lighting		$93,654.00	$4,682.70	$0.00	$88,971.30
A.11	Extend TW A from TW A3 to Runway 8 (incl Drainage & Elect.)		$521,268.00	$26,063.40	$0.00	$495,204.60
	YEAR 4 TOTAL		**$614,922.00**	**$30,746.10**	**$0.00**	**$584,175.90**
	Year 5 (FY 11)					
A.12	Misc Airfield Drainage Improvements		$205,022.40	$10,251.12	$0.00	$194,771.28
A.13	Construct T-Hangar "H" & Ramp	f)	$540,419.88	$270,209.94	$0.00	$270,209.94
A.14	Fog Seal Coat Pavement	e)	$194,568.00	$48,642.00	$145,926.00	$0.00
	YEAR 5 TOTAL		**$940,010.28**	**$329,103.06**	**$145,926.00**	**$464,981.22**
	Sub-Total/Phase I		**$5,111,784.84**	**$1,472,048.82**	**$166,072.50**	**$3,473,663.52**

Notes
Cost estimates, based upon 2006 data, are intended for preliminary planning purposes and do not reflect a detailed engineering evaluation.

a) Local Funding - Private, current revenues, cash reserves, bonds, etc.
b) FAA AIP (Airport Improvement Program) funding currently allocated
c) FAA AIP (Airport Improvement Program) (95% Federal / 5% Local) - Unless Otherwise Noted
d) Assumes 100% Local Funding (low AIP priority)
e) State Sponsored Program - (75% State / 25% Local split)
f) Assumes 50% Federal (Taxilane/Apron) / 50% Local (Site/Facilities)
g) Assumes FAA F&E Project and Funding (five year lead time)

Table F2
PHASE II (6-10 YEARS) DEVELOPMENT PLAN PROJECTS
Astoria Regional Airport Master Plan Update

	Project Description	Note	Total Costs	Recommended Financing Method Local a)	State	Federal c)
B.1	Master Plan Update (2012)		$150,000.00	$7,500.00	$0.00	$142,500.00
B.2	Install PAPIs on Runway 26 (2012)	g)	$78,408.00	$0.00	$0.00	$78,408.00
B.3	Install REILs on Runway 31 (2012)	g)	$94,380.00	$0.00	$0.00	$94,380.00
B.4	Runway 8/26 Rehabilitation (incl Drainage & Elect.) (2012)		$2,655,417.60	$132,770.88	$0.00	$2,522,646.72
B.5	Install PAPIs on Runway 8 (2013)	g)	$60,984.00	$0.00	$0.00	$60,984.00
B.6	Install PAPIs on Runway 13 (2013)	g)	$63,162.00	$0.00	$0.00	$63,162.00
B.7	Construct T-Hangar "I" & Ramp (2013)	f)	$540,419.88	$270,209.94		$270,209.94
B.8	Extend TW B to RW 13 from TW A2 (incl Drainage & Elect.) (2013)		$651,004.20	$32,550.21	$0.00	$618,453.99
B.9	Environmental Assessment for MALSF (2014)		$100,000.00	$5,000.00	$0.00	$95,000.00
B.10	Airfield Pavement Maintenance (State Program) (2014)	e)	$26,862.00	$6,715.50	$20,146.50	$0.00
B.11	Install MALSF (RW8) (2015)	g)	$782,192.40	$0.00	$0.00	$782,192.40
B.12	Relocate Existing Taxiway A (2015)		$951,568.20	$47,578.41	$0.00	$903,989.79
B.13	Construct Hangar w/Auto Parking next to Terminal (2016)	h)	$1,929,549.60	$1,447,162.20	$0.00	$482,387.40
	Sub-Total/Phase II		**$8,083,947.88**	**$1,949,487.14**	**$20,146.50**	**$6,114,314.24**

Notes
Cost estimates, based upon 2006 data, are intended for preliminary planning purposes and do not reflect a detailed engineering evaluation.

a) Local Funding - Private, current revenues, cash reserves, bonds, etc.
b) FAA AIP (Airport Improvement Program) funding currently allocated
c) FAA AIP (Airport Improvement Program) (95% Federal / 5% Local) - Unless Otherwise Noted
d) Assumes 100% Local Funding (low AIP priority)
e) State Sponsored Program - (75% State / 25% Local split)
f) Assumes 50% Federal (Taxilane/Apron) / 50% Local (Site/Facilities)
g) Assumes FAA F&E Project and Funding (five year lead time)
h) Assumes 25% Federal (Taxilane/Apron) / 75% Local (Site/Facilities) split

Table F3
PHASE III (11-20 YEARS) DEVELOPMENT PLAN PROJECTS
Astoria Regional Airport Master Plan Update

	Project Description	Note	Total Costs	Recommended Financing Method Local a)	State	Federal c)
C.1	Fog Seal Coat Pavement (2017)	c)	$194,568.00	$48,642.00	$145,926.00	$0.00
C.2	Extend TW A between TW A3 & TW A2 (2017)		$592,053.00	$29,602.65	$0.00	$562,450.35
C.3	Rehab TW B from TW A2 to RW 13/31 (2018)		$792,574.20	$39,628.71	$0.00	$752,945.49
C.4	Master Plan Update (2018)		$150,000.00	$7,500.00	$0.00	$142,500.00
C.5	Fencing Upgrades (2018)		$53,724.00	$2,686.20	$0.00	$51,037.80
C.6	Pavement Removal (20,000 SY) (2019)		$58,080.00	$2,904.00	$0.00	$55,176.00
C.7	Airfield Pavement Maintenance (State Program) (2020)	e)	$26,862.00	$6,715.50	$20,146.50	$0.00
C.8	Fog Seal Coat Pavement (2023)	c)	$194,568.00	$48,642.00	$145,926.00	$0.00
C.9	Construct New Terminal w/Auto Parking Imp (FBO Site) (2025)	h)	$3,532,240.80	$2,649,180.60	$0.00	$883,060.20
	Sub-Total/Phase III		**$5,594,670.00**	**$2,835,501.66**	**$311,998.50**	**$2,447,169.84**
	GRAND TOTALS (20-Year Program)		**$18,790,402.72**	**$6,257,037.62**	**$498,217.50**	**$12,035,147.60**

Notes
Cost estimates, based upon 2006 data, are intended for preliminary planning purposes and do not reflect a detailed engineering evaluation.

a) Local Funding - Private, current revenues, cash reserves, bonds, etc.
b) FAA AIP (Airport Improvement Program) funding currently allocated
c) FAA AIP (Airport Improvement Program) (95% Federal / 5% Local) - Unless Otherwise Noted
d) Assumes 100% Local Funding (low AIP priority)
e) State Sponsored Program - (75% State / 25% Local split)
f) Assumes 50% Federal (Taxilane/Apron) / 50% Local (Site/Facilities)
g) Assumes FAA F&E Project and Funding (five year lead time)
h) Assumes 25% Federal (Taxilane/Apron) / 75% Local (Site/Facilities) split

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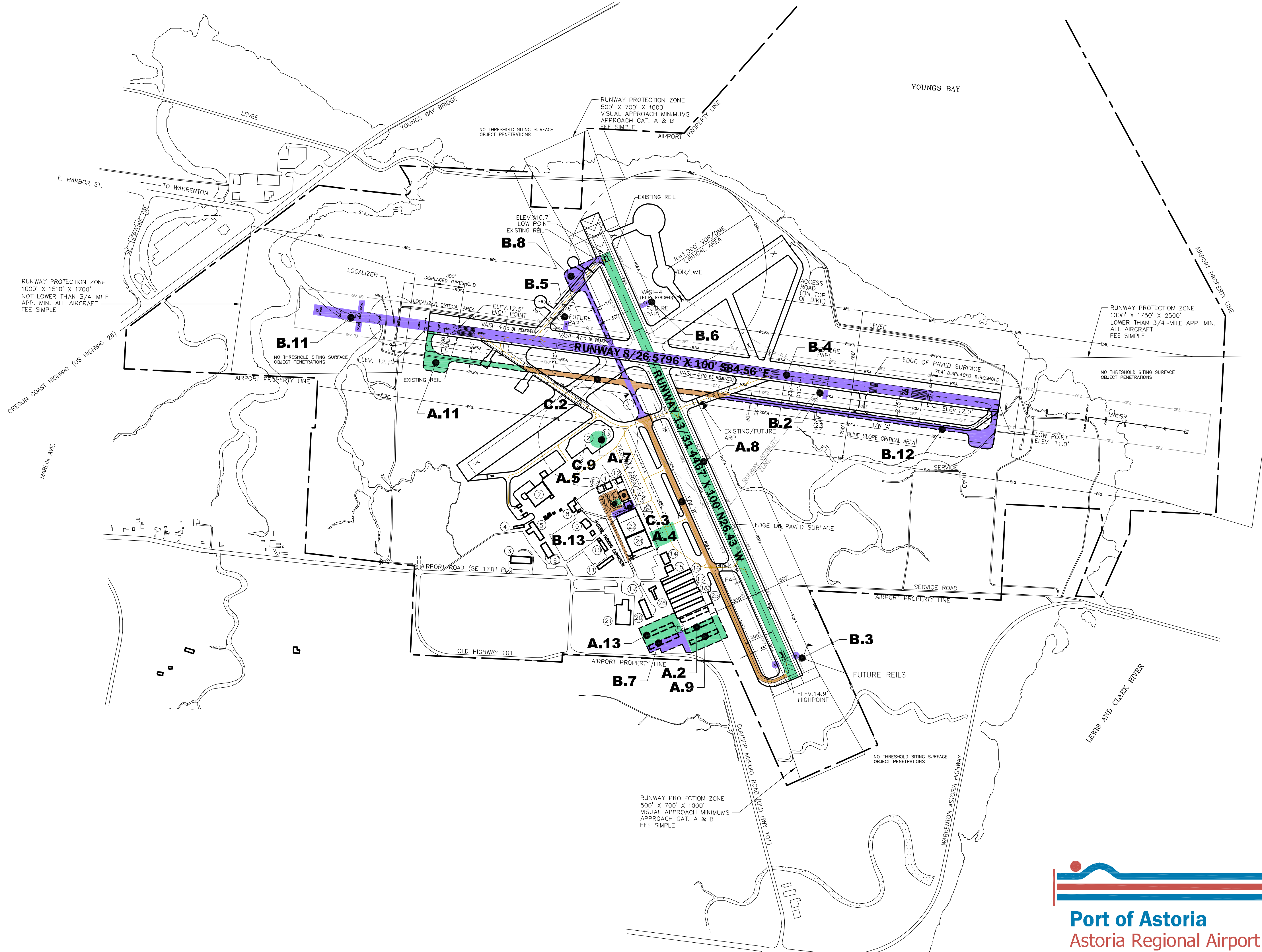
LAYOUT PLAN LEGEND

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
AIRPORT SECURITY FENCE		
AIRPORT BUILDINGS		
AIRFIELD PAVEMENT		
PAVED ROADS		
RUNWAY PROTECTION ZONE		
BUILDING RESTRICTION LINE	BRL	
OBSTACLE FREE ZONE	OFZ	
RUNWAY SAFETY AREA	RSA (E)	
RUNWAY OBJECT FREE AREA	ROFA (E)	
FUEL STORAGE AREA		
AIRPORT BEACON		
LIGHTED WIND CONE & SEGMENTED CIRCLE		
WIND CONE		
PRECISION APPROACH PATH INDICATOR (PAPI)	PAPI	
VISUAL APPROACH SLOPE INDICATOR (VASI)	VASI	
RUNWAY END IDENTIFIER LIGHTS (REIL)		
TAXIWAY HOLDLINE & SIGN		

BUILDING LEGEND

NO.	DESCRIPTION
1	HANGAR (PRIVATE)
2	ASOS
3	GENERAL COMMERCIAL/INDUSTRIAL
4	U.S. COAST GUARD
5	U.S. COAST GUARD
6	U.S. COAST GUARD
7	U.S. COAST GUARD HANGAR
8	U.S. COAST GUARD
9	U.S. COAST GUARD
10	U.S. COAST GUARD
11	U.S. COAST GUARD
12	AIRPORT RESTAURANT (RUNWAY CAFE)
13	AIRPORT ELECTICAL VAULT
14	HANGAR (BAR PILOTS)
15	FBO (TWISS AIR SERVICE)
16	T-HANGAR 'A' (10 HANGAR UNITS)
17	T-HANGAR 'B' (10 HANGAR UNITS)
18	T-HANGAR 'C' (10 HANGAR UNITS)
19	TELEPHONE VAULT
20	STORAGE BUILDING
21	MANUFACTURING BUILDING
22	HANGAR (NON-AVIATION USE) (LEKTRO)
23	GLIDE SLOPE
24	HANGAR (NON-AVIATION USE) (LEKTRO)
25	T-HANGAR 'D' (10 HANGAR UNITS)
26	UNITED PARCEL SERVICE (UPS)
F1	FUTURE TERMINAL
F2	FUTURE T-HANGARS (10 HANGAR UNITS PER BUILDING)
F3	FUTURE HANGAR (PRIVATE)



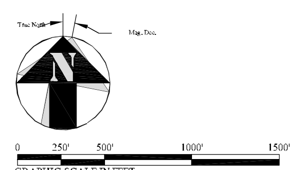


Figure F1 **Phasing Plan**

- Phase I (0-5 years)
- Phase II (6-10 years)
- Phase III (11-20 years)

SOURCE: CLATSOP COUNTY, PORT OF ASTORIA

Port of Astoria
Astoria Regional Airport
Master Plan Update

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