AIRPORT MASTER PLAN *for*

Portland

INTERNATIONAL JETPORT

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INTRODUCTION AND SUMMARY

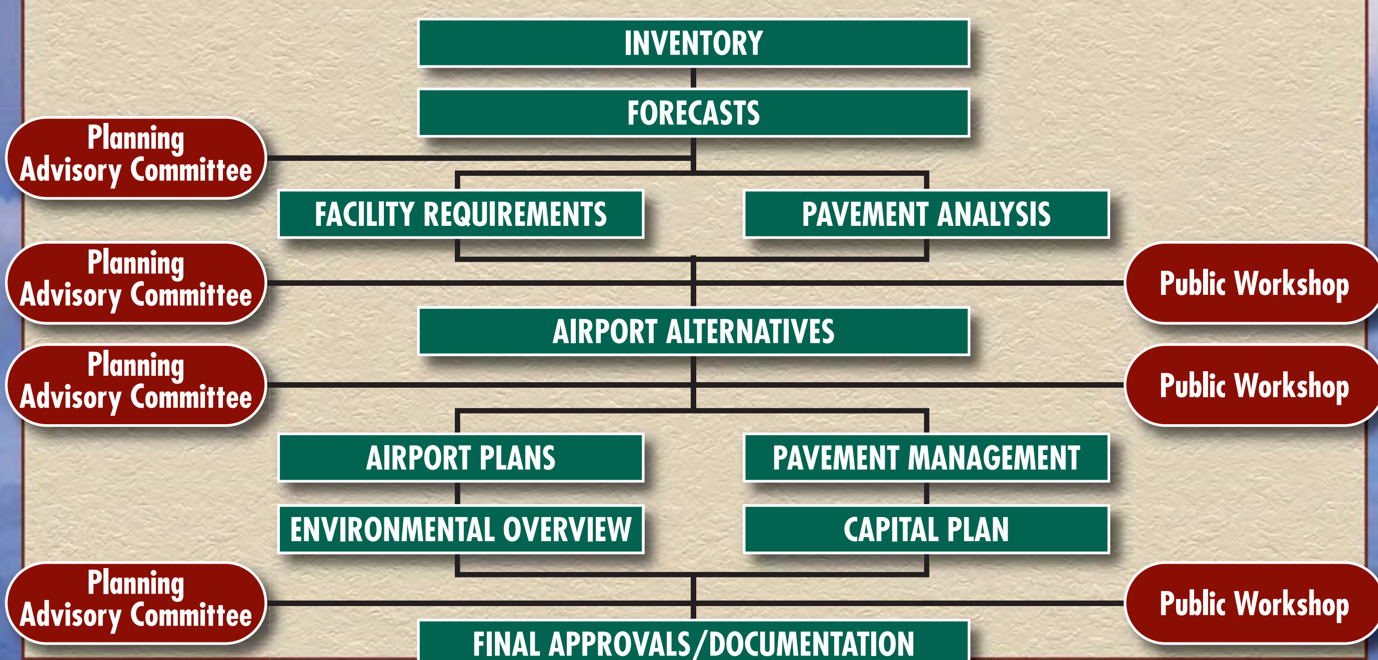
Introduction and Summary

The Portland International Jetport Master Plan was undertaken to evaluate the airport's capabilities and role, to forecast future aviation demand, and to plan for the timely development of new or improved facilities that may be required to meet that demand. The ultimate goal of the Master Plan is to provide systematic facility planning guidelines for the airport's overall maintenance, development, and operation.

The Master Plan is intended to be a proactive document which identifies and then plans for future facility needs well in advance of the actual need for the facilities. This is done to ensure that the City of Portland can coordinate project approvals, design, financing, and construction to avoid experiencing detrimental effects due to inadequate facilities.

An important result of the Master Plan is reserving sufficient areas for future facility needs. This protects development areas and ensures they will be readily available when required to meet future needs. The intended result is a detailed land use concept which outlines specific uses for all areas of airport property.

The preparation of this Master Plan is evidence that the City of Portland recognizes the importance of air transportation to the community and the associated challenges inherent in providing for its unique operating and improvement needs. The cost of developing and maintaining an airport is an investment which can yield impressive benefits to the community and the region. With a sound and realistic Master Plan, Portland International Jetport can maintain its role as



an important link to the national air transportation system for the community and maintain the existing public and private investments in its facilities.

MASTER PLAN OBJECTIVES

The primary objective of this Master Plan is to provide the community and public officials with guidance for future development in a manner that will satisfy aviation demands and be wholly compatible with the environment. The accomplishment of this objective requires the evaluation of the existing airport and determination of what actions should be taken to maintain an adequate, safe, and reliable airport facility to meet the general aviation needs of the area. This Master Plan provides an outline of necessary development and gives the responsible officials advance notice of future airport funding needs so that appropriate steps can be taken to ensure that adequate funds are budgeted and planned.

Specific objectives of the Portland International Jetport Master Plan were:

- To preserve and protect public and private investments in existing airport facilities;
- To enhance the safety of aircraft operations;
- To be reflective of community and regional goals, needs, and plans;
- To ensure that future development is environmentally compatible;
- To establish a schedule of development priorities and a program to meet the needs of the proposed improvements in the Master Plan;
- To develop a plan that is responsive to air transportation demands;
- To develop an orderly plan for use of the airport;
- To coordinate this Master Plan with local, regional, state, and federal agencies, and;
- To develop active and productive public involvement throughout the planning process.

The Master Plan accomplished these objectives by carrying out the following:

- Determining projected needs of airport users through the year 2025;
- Identifying existing and future facility needs;
- Evaluating future airport facility development alternatives which will optimize airport capacity and aircraft safety; and
- Developing a realistic, common sense plan for the use and/or expansion of the airport.

MASTER PLAN ELEMENTS AND PROCESS

The Portland International Jetport Master Plan was prepared in a systematic fashion following FAA guidelines and industry-accepted principles and practices. The Master Plan for Portland International Jetport has six chapters that are intended to assist in the discovery of future facility needs and provide the supporting rationale for their implementation.

Chapter One - Inventory summarizes the inventory efforts. The inventory efforts were focused on collecting and assembling relevant data pertaining to the airport and the area it serves. Information was collected on existing airport facilities and operations. Local economic and demographic data was collected to define the local growth trends. Planning studies which may have relevance to the Master Plan were also collected.

Chapter Two - Forecasts examined the potential aviation demand for aviation activity at the airport. The analysis utilized local socioeconomic information, as well as national air transportation trends to quantify the levels of aviation activity which can reasonably be expected to occur at Portland International Jetport through the year 2025. The results of this effort were used to determine the types and sizes of facilities which will be required to meet the projected aviation demands on the airport through the planning period.

Chapter Three - Facility Requirements comprised the demand capacity and facility requirements analyses. The intent of this analysis was to compare the existing facility capacities to forecast aviation demand and determine where deficiencies in capacities (as well as excess capacities) may exist. Where deficiencies were identified, the size and type of new facilities to accommodate the demand were identified. The airfield analysis focused on improvements needed to serve the type of aircraft expected to operate at the airport in the future, as well as navigational aids to increase the safety and efficiency of operations. This element also examined the passenger terminal, cargo area, as well as general aviation hangar, apron, and support needs.

Chapter Four - Alternatives considered a variety of solutions to accommodate the projected facility needs. This element proposed various facility and site plan configurations which can meet the projected facility needs. An analysis was completed to identify the strengths and weaknesses of each proposed development alternative, with the intention of determining a single direction for development.

Chapter Five - Airport Plans provides both a graphic and narrative description of the recommended plan for the use, development, and operation of the airport. An environmental overview is also provided. The Master Plan also includes the official Airport Layout Plan (ALP) and detailed technical drawings depicting related airspace, land use, and property data. These drawings are used by the Federal Aviation Administration (FAA) in determining grant eligibility and funding.

Chapter Six - Financial Plan focuses on the capital needs program which defines the schedules, costs, and funding sources for the recommended development projects.

An environmental overview was also performed with the purpose to identify potential environmental sensitivities. This overview also identifies those proposed actions which may trigger a more detailed environmental assessment.

COORDINATION

The Portland International Jetport Master Plan was of interest to many within the local community. This included local citizens, community organizations, airport users, airport tenants, area-wide planning agencies, and aviation organizations. As the Jetport is an important component of the state and national aviation systems, the Portland International Jetport Master Plan is of importance to both state and federal agencies responsible for overseeing air transportation.

To assist in the development of the Master Plan, the City of Portland identified a group of community members and aviation interest groups to act in an advisory role in the development of the master plan. Members of the Planning Advisory Committee (PAC) reviewed phase reports and provided comments throughout the study to help ensure that a realistic, viable plan was developed. The list of committee members is included at the end of this introduction.

To assist in the review process, draft working papers were prepared at the various milestones in the planning process. The working paper process allowed for timely input and review during each step within the master plan to ensure that all Master Plan issues were fully addressed as the recommended program was developed.

Three public information workshops were also be held as part of the plan coordination. The public information workshops were designed to allow any and all interested persons to become informed and provide input concerning the master plan. Notices of meeting times and locations will be advertised through the media as well as local neighborhood associations.

All Master Plan draft working papers were also made available to the public in electronic format via the Internet. This allowed any member of the public to download and view the same documents available to the City and PAC. Members of the public were also able to submit comment forms via the internet and expand the coordination of the study through a "Refer-a-Friend" tool. The internet allowed the Master Plan to be viewed virtually 24 hours each day of the week during the process.

AIRPORT ROLE

The federal government has had an important role in the development of airports in the United States. Many of the nation's existing airports were either initially constructed by the federal government or their development and maintenance was partially funded through various federal grant-in-aid programs to local communities. In large measure, the system of airports existing today is due to the existence of federal policy that promotes the development of civil aviation. As part of its effort to maintain a system of airports to meet the needs of civil aviation and promote air commerce, the United States Congress has continually supported a national plan for the development and maintenance of airports.

The current national airport system plan is the *National Plan of Integrated Airport Systems* (NPIAS). A primary purpose of the NPIAS is to identify the airports that are important to national transportation and includes all commercial service airports, all reliever airports, and selected general aviation airports. A total of 3,431 airports are identified in the NPIAS of which 3,364 are existing airports and 67 are proposed airports. Because of the importance of Portland International Jetport to the local community and the national air transportation system, the FAA includes it in the NPIAS.

The NPIAS classifies the Portland International Jetport as a primary commercial service airport. Commercial service airports are defined as airports receiving scheduled passenger service and having 2,500 or more enplaned passengers per year. Primary commercial service airports are those with more than 10,000 annual enplanements (an aircraft boarding) and are eligible for federal entitlement funding from the Airport Improvement Program (AIP).

The NPIAS defines 517 commercial service airports in the United States. Of these, 382 have more than 10,000 enplanements. Commercial service airports account for nearly 100 percent of national enplanements and 22 percent of active general aviation aircraft. Approximately 65 percent of the national population lies within 20 miles of these commercial service airports.

An additional classification of the airport is provided to indicate the amount of revenue-generating passengers that may be found in a given metropolitan area served by the airport. The percentage of revenue-producing passengers in a given metropolitan area is referred to as a "hub" and determined by dividing the number of annual passenger enplanements at the airport into the number of annual enplanements nationwide. This percentage then falls within a predetermined hub classification; large, medium, small, or non-hub. The Portland area is classified as a small hub air passenger market. A small hub airport enplanes between 0.05 to 0.25 percent of the total U.S. passenger enplanements nationwide. There are 72 small hub primary airports nationwide which account for 8.1 percent of all enplanements. Less than 25 percent of the runway capacity is used by airline operations, so these airports can accommodate a great deal of general aviation activity. Small hubs average 139 based aircraft.

The Portland International Jetport is part of the *New England Regional Airport System Plan* (NERASP). The NERASP describes the foundations of a regional strategy for the air carrier airport system to support the needs of air passengers through 2020. The underlying theme of the NERASP is to develop an airport system based upon the location of passengers and with adequate facilities to allow airlines to evolve the range of services that provide the best mix of efficiency, convenience, and reliability.

The NERASP describes the functional role of the Jetport as providing access to tourists visiting the state and that the Jetport serves an area of "strong economic growth" and that the recent highway improvements appeal to passengers. The NERASP notes that the Jetport looses passengers to Boston and Manchester due to lower fares and better service; however, this has been minimized with the introduction of low fare service. In particular the low fare service provided by JetBlue to New York.

This Master Plan update examines and consider all of the activities currently taking place at Portland International Jetport and will strive to produce refinements that will support all airport users and meet the needs of the community, while at the same time remaining sensitive to environmental and community concerns.

SUMMARY AND RECOMMENDATIONS

The proper planning of a facility of any type must consider the demand that may occur in the future. For the Portland International Jetport, this involved updating forecasts to identify potential future aviation demand. Because of the cyclical nature of the economy, it is virtually impossible to predict with certainty year-to-year fluctuations in activity when looking five, ten, and twenty years into the future.

Recognizing this reality, the Master Plan is keyed to potential demand "horizon" levels than future dates in time. These "planning horizons" were established as levels of activity that will call for consideration of the implementation of the next step in the Master Plan program. By developing the airport to meet the aviation demand levels instead of specific points in time, the airport will serve as a safe and efficient aviation facility which will meet the operational demands of its users while being developed in a cost efficient manner. This program allows the City to change specific development in response to unanticipated needs or demand. The forecast planning horizons are summarized in **Table A**.

The primary service area for commercial air travel from the Jetport includes all of Cumberland County as well as much of York, Androscoggin, and Sagadahoc Counties. The limits of the service area were established at a point equidistant between other commercial service airports. The Jetport is one of eight airports that can be used air travelers can within this service area. Five airports are in Maine, the other three airports (Pease International Tradeport in New Hampshire, Manchester Airport in New Hampshire, and Boston Logan International Airport in Massachusetts) are located in neighboring states. The low fare airlines and service levels from Manchester and Boston draw some traffic from the Jetport service area.

TABLE A
Planning Horizon Activity Levels
Portland International Jetport

	Base Year	Short Term Planning Horizon	Intermediate Term Planning Horizon	Long Range Planning Horizon
Enplaned Passengers	670,833	970,000	1,260,000	1,570,000
Total Air Cargo (tons)	16,812	21,200	24,200	31,600
Total Based Aircraft	43	54	61	76
Annual Operations				
Air Carrier	36,872	43,400	48,200	54,700
Air Cargo	4,398	4,800	5,000	5,500
General Aviation	41,457	53,000	59,000	69,000
Air Taxi	5,204	6,900	7,800	9,200
Military	1,338	2,000	2,000	2,000
Total Annual Operations	89,359	110,100	122,000	140,400

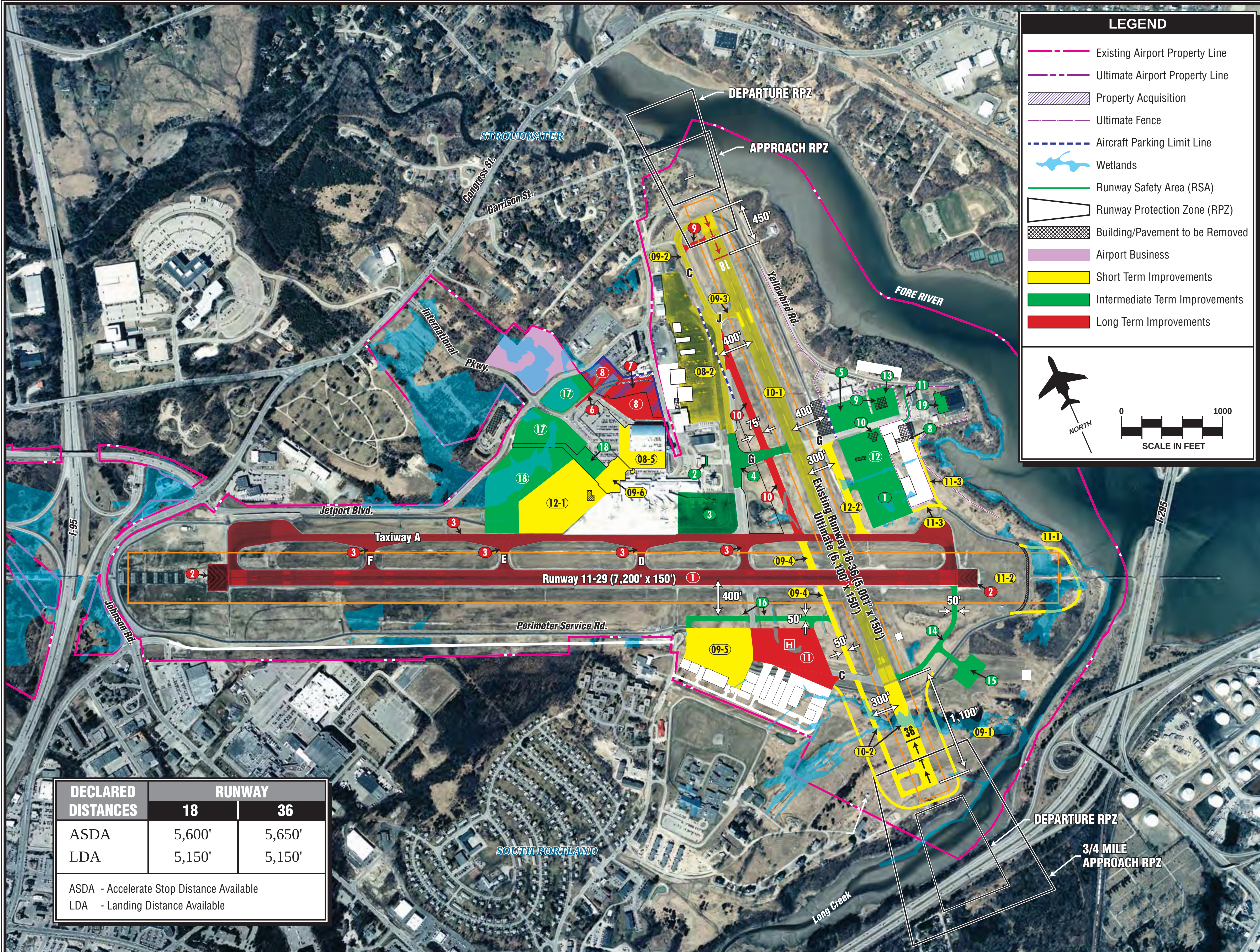
However, over the past two years, the Portland International Jetport service area has responded well to low fare service initially provided by Independence Air in 2004 and 2005 and then JetBlue in 2006. The low fare service has increased passenger levels to new records at the airport. Passenger enplanements were over 732,000 in 2005, the highest ever recorded for the Jetport. The second highest level was reached in 2006 with over 710,000 annual enplanements.

The Master Plan projects that passenger enplanements at the Jetport could reasonably be expected to grow at an average annual rate of four percent over the next 20 years with sustained low fare service. Growth is also projected for air cargo and annual operations. The annual tons of air cargo moved at the airport are projected to grow at an annual rate of 3.1 percent. Annual general aviation operations (takeoffs and landings) are projected to grow at 2.4 percent annually driven by business and corporate aircraft use. Up to 33 additional general aviation aircraft are expected to base at the airport.

This Master Plan is truly an update of the previous Master Plan completed in 1994. Planned facility improvements and development staging is shown on **Exhibit IA**.

This update concentrates on enhancing the safety of aircraft operations. Improvements are programmed for the FAA required runway safety area (RSA) behind the Runway 29, Runway 18, and Runway 36 ends. Improvements are also planned for Runway 18-36 to better serve as a back-up to Runway 11-29 during periods when conditions may favor the use of Runway 18-36 or Runway 11-29 is closed. Several new taxiways are planned to improve airfield efficiency.

Following a detailed terminal building planning study that occurred concurrently with the Master Plan, improvements for security, holdroom,



DECLARED DISTANCES	RUNWAY 18	RUNWAY 36
ASDA	5,600'	5,650'
LDA	5,150'	5,150'

ASDA - Accelerate Stop Distance Available
LDA - Landing Distance Available

SHORT TERM IMPROVEMENTS

2007
- 07-1 Environmental Assessment (RSA Improvements)

2008
- 08-1 Design and Permit Runway 18-36 Improvements
- 08-2 General Aviation Apron Rehabilitation
- 08-3 Acquire Snow Removal Equipment
- 08-4 Acquire Airport Rescue and Fire Fighting (ARFF) Equipment
- 08-5 Construct Parking Garage

2009
- 09-1 Wetlands Mitigation (9 Acres)
- 09-2 Taxiway C (Alpha to Juliet) Rehabilitation
- 09-3 Taxiway J Rehabilitation
- 09-4 Relocate Taxiway C - Phase I
- 09-5 Construct South General Aviation Apron - Phase I
- 09-6 Terminal Building Construction - Phase I

2010
- 10-1 Runway 18-36 Rehabilitation
- 10-2 Extend Runway 18-36 and Taxiway C 1,100', Improve Runway 18-36 RSA, Displace Landing Thresholds

2011
- 11-1 Wetlands Mitigation (6 Acres)
- 11-2 Improve Runway 29 Runway Safety Area (RSA)
- 11-3 Relocate Service/Access Road

2012
- 12-1 Terminal Apron Construction
- 12-2 Construct Air Cargo Taxiway

INTERMEDIATE TERM IMPROVEMENTS

1. Construct Air Cargo Apron Phase I
2. Expanded Airport Rescue and Fire Fighting (ARFF) Building
3. Terminal Apron and Taxiway Rehabilitation
4. Taxiway G and Taxiway C Rehabilitation
5. Cargo Apron Rehabilitation
6. Acquire Airport Rescue and Fire Fighting (ARFF) Equipment
7. Acquire Snow Removal Equipment
8. Remove General Aviation Hangar
9. Remove General Aviation Hangar
10. Remove General Aviation Hangar
11. Construct Air Cargo Access Road
12. Construct Air Cargo Apron Phase II
13. Extend Cargo Apron East
14. Construct Taxiway Between Runway 36 and Runway 29
15. Construct Aircraft Engine Run-Up Pad
16. Construct South Apron Taxiway
17. Construct Public Terminal Building Surface Parking - Phase I
18. Terminal Building Construction - Phase II
19. Expand Maintenance Building

LONG TERM IMPROVEMENTS

1. Runway 11-29 Rehabilitation
2. Runway 11-29 Blast Pad Rehabilitation
3. Taxiway A, D, E, & F Rehabilitation
4. Acquire Airport Rescue and Fire Fighting (ARFF) Equipment
5. Acquire Snow Removal Equipment
6. Relocate Terminal Loop Road
7. Land Acquisition
8. Construct Public Terminal Building Surface Parking - Phase II
9. Construct By-Pass Taxiway
10. Relocate Taxiway C - Phase II
11. Construct South GA Apron - Phase II

PWM PORTLAND INTERNATIONAL JETPORT

Exhibit IA
DEVELOPMENT STAGING

boarding gates, concessions, ticketing, and baggage make-up are programmed for the terminal building. Additional surface parking and an expanded parking garage are also programmed.

Air cargo facilities are planned to remain in the same location at the airport. The apron is planned to expand to the south to accommodate additional cargo carriers as needed. All general aviation facilities are planned to be relocated and consolidated either on the north general aviation apron or to south in a planned general aviation apron near the Runway 36 end.

The major development items over the planning horizons include the following:

Short Term

- Terminal Building and Apron Development
- Parking Garage Development
- South General Aviation Development
- Runway Safety Area Improvements
- Upgrade of Runway 18-36
- Snow Removal and Airport Rescue and Firefighting Equipment Purchases
- Pavement Rehabilitation/Reconstruction
- Service Road Improvements
- New Taxiways for Efficiency

Intermediate Term

- Expand Airport Rescue and Firefighting Building
- Cargo Apron Development
- Terminal Building Development
- Surface Parking Development
- Relocate General Aviation Hangars
- Snow Removal and Airport Rescue and Firefighting Equipment Purchases
- New Taxiways for Efficiency
- Pavement Rehabilitation/Reconstruction
- Aircraft Engine Run-Up Pad

Long Range

- Pavement Rehabilitation/Reconstruction
- Surface Parking Development
- Snow Removal and Airport Rescue and Firefighting Equipment Purchases
- Terminal Loop Roadway Realignment
- Land Acquisition
- New Taxiways for Efficiency
- Pavement Rehabilitation/Reconstruction

The full implementation of the Master Plan would involve a financial commitment of $245 million over the planning period (**Table B)**. Approximately 34 percent of the total costs will be eligible for grants-in-aid administered by the Federal Aviation Administration (FAA). The source of these grants is the Aviation Trust Fund which is a depository for aviation taxes such as those from airline tickets, aviation fuel, aircraft registrations, and other aviation-related fees. Most eligible projects can receive up to 95 percent funding from the FAA. These funding levels, however, are not guaranteed. The amount of federal funding that will be made available will depend upon the future of the Airport Improvement Program.

TABLE B
Capital Improvement Program Summary
Portland International Jetport

Planning Horizon	Total Cost	FAA Eligible	Passenger Facility Charge	State Eligible	Local Share
Short Term	$120,387,000	$35,359,380	$48,250,400	$894,573	$35,882,648
Intermediate Term	91,292,400	19,162,260	56,048,000	504,270	15,577,870
Long Range	33,654,300	29,584,710	900,000	778,545	2,391,045
All Development	**$ 245,333,700**	**$84,106,350**	**$105,198,400**	**$2,177,388**	**$53,851,563**

The City of Portland will need to use other sources of airport-generated funding as well. Commercial service airports such as Portland International Jetport have been authorized by Congress to impose passenger facility charges (PFCs) as a means to collect revenues for airport improvements. A PFC of up to $4.50 is allowed. The airport has been authorized at this maximum level and currently uses the revenue to retire bonds issued for the terminal development. When these bonds are retired, the City may authorize the PFC for other airport projects. Most of the projects not eligible for federal funding can be funded from the revenue they generate. Approximately 42 percent of the total costs are eligible through the PFC program.

The Jetport is also eligible to receive grants for airport development through the State of Maine. While 21 percent of the total costs must be paid through local funds, the airport will continue to operate and develop airport without using any local tax monies using revenues generated from the continued operation of the airport.

The Master Plan is evidence that the City of Portland is committed to providing high quality air transportation services in the regional. The City recognizes the importance of Portland International Jetport to the community and the region as well as the associated challenges inherent in providing for future aviation needs. By maintaining a sound, flexible Master Plan, the airport will continue to be a major economic asset to the area.

ECONOMIC BENEFITS OF PORTLAND INTERNATIONAL JETPORT

In conjunction with the Master Plan, the economic impact of Portland International Jetport was also evaluated. The study measured economic benefits of the airport through four indicators:

Revenues or output measure the total flow of dollars from aviation-related activity and include total sales of business firms and budgets of administration agencies.

Earnings or payroll represent the dollar value of payments received by workers (as wages) and business proprietors (as income) who create the goods and services that are sold to produce revenues.

Employment is a measure of the number of jobs required to create the gross revenues and value added.

The economic benefits of the Portland International Jetport for the year 2006 are summarized in **Table C**. The study concluded that the airport has nearly $900 million dollar benefit to the regional economy and supports over 11,000 jobs in the community.

TABLE C
Economic Benefits
Portland International Jetport

	Revenues (million$)	Earnings (million$)	Employment
Direct Benefits			
On-Airport	$196.3	$45.4	1,184
Visitors	221.8	84.5	4,456
Indirect Benefits	449.8	165.1	5,951
Total Benefits	**$867.9**	**$295.0**	**11,591**

PORTLAND INTERNATIONAL JETPORT MASTER PLAN PLANNING ADVISORY COMMITTEE

Frank Adams - FedEx Corporation
Jerry Angier – Portland Chamber of Commerce
Ralph Baxter – City of South Portland
Doug Booth – FAA Air Traffic Control Tower
Linda Boudreau – Jetport Noise Committee
David Brenerman – UNUM
Al Caruso – Corporate Aviation
James Cohen – City of Portland City Councilor
Eliot Cutler – City of Cape Elizabeth
John Duncan – PACTS
Richard Farnsworth – City of Portland, District 3
Mark Goodwin – Northeast Air
Steve Hewins – Hewin Travel
Linda Kokemuller – Maine Department of Environmental Protection
Joe Malone – Developer
Tom Marzouk – Delta Airlines
Dr. Jerry Morton – City of Portland, District 2
Ralph Nicosia-Rusin – FAA New England Region
John O'Hara – City of Westbrook
Ron Roy – Maine Department of Transportation
David Russell – Fairchild Semiconductor
Lee Tabenken – Air Line Pilots Association
Adam Weidermman – City of Portland, District 1
Barbara Whitten – Portland Convention and Visitors Bureau

PORTLAND INTERNATIONAL JETPORT

Chapter One

INVENTORY

CHAPTER ONE

Inventory

To produce a realistic and adequate plan for future growth at the Portland International Jetport (PWM), it is essential to understand the framework within which an airport exists. An initial task within this master plan update study consists of gathering data to provide a clear definition of the airport's aviation environment, including facilities, users, and activity levels. The information that follows formed the baseline for developing this report.

The initial action necessary in updating a master plan is the collection of all pertinent data that relates to the area served by the airport, as well as the airport itself. This inventory was conducted using the following sources of information:

- Previous airport master plan
- On-site visits
- Aerial and ground photography
- Aerial photogrammetry
- Interviews with airport management, tenants, and users
- Federal, state, and local publications
- Project record drawings

This chapter briefly describes the physical facilities at Portland International Jetport. Aviation-specific information on the airspace, aviation activity, and role of the airport are described. The chapter also describes the environment in which the airport operates including surrounding land uses and the socioeconomic characteristics of the region.

AIRPORT SETTING

Portland International Jetport is classified under the National Plan of Integrated Airport Systems (NPIAS) as a primary commercial service small-hub airport, reporting 710,671 total passenger enplanements in 2006. This equates to approximately 0.10 percent of the total annual enplanements in the United States. The percentage of annual passenger boardings for small-hub commercial airports must be at least 0.05 percent, but less than 0.25 percent of total enplanements for the United States. In 2006, Portland International Jetport ranked 102nd out of 383 primary commercial service airports, and 35th of 72 small-hub airports.

LOCALE

Portland International Jetport is uniquely situated on the corporate boundaries of Portland, South Portland, and Westbrook. In fact, portions of airport property are located within each city. The primary runway and the southern half of the crosswind runway are located in South Portland. The north half of the crosswind runway and the majority of the existing terminal facilities are located in Portland. A portion of airport property protecting the west approach extends into the Westbrook corporate limits.

The 726-acre airport is located three miles west of downtown Portland, as shown in **Exhibit 1A**.

Primary access to the airport is off Congress Street (Route 22) and International Parkway, the airport's main access road. A second entrance is off Johnson Road and Jetport Boulevard, which links directly to the Jetport off-ramp of the Maine Turnpike (Exit 46 on Interstate 95). The Stroudwater neighborhood abuts the airport to the north and the Redbank neighborhood is located to the south.

The surrounding terrain is mostly open, rolling and sloping generally toward the Fore River, a body of brackish water about l,000 feet wide forming the northeast boundary of the airport. The airport is about 5-1/2 miles west-northwest of the open ocean. An older section of the city of Portland known as the Western Promenade is situated on a hill rising abruptly from sea level to 170 feet, l-l/2 miles east of the airport and on the opposite side of the Fore River. A line of low hills southeast of the airport, near the ocean, which reach a maximum height of 160 feet, block the view of the ocean from the airport. Sebago Lake with an area of 44 square miles is situated about 15 miles to the northwest, and 45 miles farther are the White Mountains, averaging 3,000 to 5,000 feet in height.

CLIMATE

As a rule, Portland has very pleasant summers and falls, cold winters with frequent thaws, and disagreeable springs. Very few summer nights are too warm and humid for comfortable sleeping. Autumn has the greatest number of sunny days and the least cloudiness. Winters can be quite severe, but begin late, then extend deep into the normal springtime.

04MP17-1A-2/21/05

Exhibit 1A
LOCATION MAP

Heavy seasonal snowfalls, over 100 inches, normally occur about every 10 years. True blizzards are very rare. The White Mountains, to the northwest, keep larger snow accumulations from reaching the Portland area and moderate the temperature. Normal monthly precipitation is remarkably uniform throughout the year. Winds are generally quite light, with the highest velocities being confined mostly to March and November. Even in these months, the occasional northeasterly gales usually lose much of their severity before reaching the coast of Maine.

Temperatures well below zero are recorded frequently each winter. Cold waves sometimes come in on strong winds, but extremely low temperatures are generally accompanied by light winds.

The average freeze-free season at the airport is 139 days. Mid-May is the average occurrence of the last freeze in spring, and the average occurrence of the first freeze in fall is late September. The freeze-free period is longer in the city proper, but may be even shorter at susceptible places further inland. Snowfall is normal between the months of October and March, peaking in January, and averaging 71 inches per year.

Table 1A lists common climate data for Portland, Maine. Daily maximum airport temperatures agree closely with those near downtown, but minimum temperatures on clear, quiet mornings range as much as 15 degrees lower at the airport.

TABLE 1A
Climate Data
Portland, Maine

	Normal Precipitation (in.)	Avg. Monthly Snowfall (in.)	Normal Daily Max. Temperature (ºF)	Avg. Wind Speed (mph)
January	3.5	19.6	30	9.1
February	3.3	16.9	33	9.4
March	3.7	12.9	41	10.0
April	4.1	3.0	52	9.9
May	3.6	0.2	63	9.1
June	3.4	0.0	73	8.2
July	3.1	0.0	79	7.6
August	2.9	0.0	77	7.5
September	3.1	0.0	69	7.8
October	3.9	0.2	59	8.4
November	5.2	3.3	47	8.8
December	4.6	14.6	35	9.0
Total	**44.3**	**70.7**	**55**	**8.7**

Source: Northeast Regional Climate Center (http://met-www.cit.cornell.edu/ccd.html)

AIRPORT ADMINISTRATION

Portland International Jetport is owned and operated by the City of Portland. Portland has a mayor, with a city manager and city council form of government. A standing three-person transportation committee oversees the city-wide infrastructure for the council. A full-time airport manager, who reports to the City Manager, runs the facility, with the help of 40 full-time staff members. The following is a list of airport employee titles:

- Administration
  - -- Airport Manager
  - -- Assistant Airport Manager
  - -- Principal Financial Officer
  - -- Account Clerk II
  - -- Senior Admin. Officer
  - -- Marketing and Communications Coordinator
  - -- Receptionist

- Field
  - -- Operations Manager
  - -- Assistant Operations Manager
  - -- Maintenance Supervisor
  - -- Maintenance Foreman
  - -- Maintenance Worker III (12)
  - -- Airfield Electrician

- Security
  - -- Security Coordinator
  - -- Assistant Security Coordinator
  - -- Communications Supervisor
  - -- Communications Coordinator (5)

- Facilities
  - -- Facilities Manager
  - -- Facilities Engineer
  - -- Project Engineer
  - -- Facilities Technician Coordinator
  - -- Facilities Technician (2)
  - -- Facilities Technician Assistant
  - -- Maintenance Worker III

AIRPORT DEVELOPMENT HISTORY

Portland International Jetport was originally known as Stroudwater Airport, which was privately owned by the Portland Airport Company. The City of Portland purchased the airport in 1934 for $52,000, and changed the name to Portland Municipal Airport.

The original airline passenger terminal building was built in 1939, and enlarged twice, most recently in 1949. That building is currently used as the general aviation terminal. The present passenger terminal building was constructed in 1968, at a cost of $850,000. In 1969, the Portland Municipal Airport was renamed Portland International Jetport. Other significant construction included: Runway 11-29 in 1957, with an extension in 1966; Runway 18-36 in 1969; an airport rescue and firefighting (ARFF) station in 1972; a new control tower in 1975; and an airport surveillance radar in 1977.

In 1980, the passenger terminal was expanded to the east with the addition of two baggage carousels. The building was also expanded to the west by adding three second-level passenger jetways and a hold room.

The airport has undergone several improvements since the last master plan in 1994. In 1995, a terminal building improvement project was undertaken to add two second-level boarding gates, as well as additional space for ticketing, operations, departure lounge, concessions, and an international customs facility. Another phase of terminal improvements is scheduled for completion in 2005. This includes additional baggage claim and office space.

In 2001, a new multilevel parking garage was constructed, adding more than 1,300 parking spots and expanding long-term parking. A new access road (International Parkway) was developed off Congress Street, and the former access road (Westbrook Street) through the Stroudwater neighborhood was closed to through-traffic.

In 2004, a project was completed that enhances the operational safety of Runway 11-29. The runway safety areas beyond each end were upgraded to FAA design standards by extending the runway 400 feet to the west and grading additional safety area. The project was done in conjunction with the relocation and widening of Johnson Road.

Present day Portland International Jetport serves the air transportation needs of the Portland area through a variety of both air carrier and general aviation services. Scheduled air service to and from the Portland area, as of the end of 2006, was provided by Continental, Delta, United, US Air, Northwest, and Jet Blue.

HISTORICAL ACTIVITY

This section describes and quantifies air traffic operations, passenger enplanements, and cargo movement.

The number of aircraft operations is used to define the type and level of activity at general aviation airports such as Portland International Jetport. **Table 1B** summarizes the historical aircraft operations recorded by the FAA Air Traffic Control Tower (ATCT) at Portland International Jetport since 1990. These represent only the aircraft operations observed during the hours the ATCT was open. Presently, the ATCT is open from 5:45 a.m. to 12:00 a.m.

Aircraft operations are classified as either local or itinerant and separated further into air carrier, air taxi, general aviation, and military. Local operations are performed by aircraft which:

(a) Operate in the local traffic pattern or within sight of the airport;

(b) Are known to be departing or arriving from flight in local practice areas located within a 20-mile radius of the airport; or

(c) Execute simulated instrument approaches or low passes at the airport.

Itinerant operations are all other operations, and essentially represent the originating or departing aircraft.

Air carrier and air taxi are commercial airline and other for-hire aircraft operating with either Title 14 Code of Federal Regulations (CFR) Part 121, 125, or 135 certificates. For traffic count purposes, the air carrier category is defined as an aircraft capable of carrying more than 60 passengers or a maximum payload capacity of more than 18,000 pounds.

General aviation comprises the takeoffs and landings of all remaining civil aircraft. All operations within the air taxi category are transient, while military and general aviation activity is divided into local and itinerant categories.

TABLE 1B
Airport Operations - 1990-2004
Portland International Jetport

	Itinerant				Local			
Year	Air Carrier	Air Taxi	General Aviation	Military	General Aviation	Military	Total Operations	% Increase/ Decrease
1990	17,852	28,416	38,836	1,080	24,647	746	111,577	N/A
1991	18,189	25,603	38,102	1,216	26,779	1,054	110,943	-0.57%
1992	17,094	32,543	37,593	1,571	31,681	1,552	122,034	10.00%
1993	14,228	36,876	37,375	1,383	33,946	1,555	125,363	2.73%
1994	13,447	30,021	34,649	1,013	32,451	1,313	112,894	-9.95%
1995	13,019	31,447	34,311	1,542	37,489	1,851	119,659	5.99%
1996	14,952	33,573	31,715	1,456	32,961	1,224	115,881	-3.16%
1997	15,662	35,403	33,417	2,070	40,011	2,334	128,897	11.23%
1998	19,225	32,905	37,320	2,296	34,075	2,257	128,078	-0.64%
1999	17,304	31,335	38,371	1,899	35,055	1,062	125,026	-2.38%
2000	16,674	30,935	35,453	1,734	21,118	338	106,252	-15.02%
2001	16,807	30,963	34,704	1,823	27,310	436	112,043	5.45%
2002	15,380	29,706	33,756	1,695	21,823	270	102,630	-8.40%
2003	13,379	28,919	28,809	1,262	15,227	187	88,143	-14.12%
2004	8,805	37,669	27,843	1,176	13,704	162	89,359	1.38%
2005	10,369	32,292	22,935	1,215	13,256	190	80,257	-10.18%
2006	9,888	29,546	23,405	1,458	12,975	150	77,422	-3.5%
2007	12,924	27,990	21,771	1,027	9,082	191	72,895	-5.8%

Source: Federal Aviation Administration/Air Traffic Activity Data System

As shown in the table, aircraft operations have varied annually at the airport since 1990. The lowest recorded level of operations was 72,422 operations in 2007. The highest level of operations was 128,897 recorded in 1997. Nine of the past 15 years have had a negative growth rate annually. Total operations at Portland International Jetport have had a 2.5 percent annual reduction rate since 1990.

Since 1990, itinerant operations have averaged 74 percent of all operations, with local operations comprising the remaining 26 percent. General aviation aircraft have conducted 96 percent of local operations and accounted for 42 percent of itinerant operations. Air taxi operations accounted for 38 percent of itinerant operations, air carrier accounted for 19 percent, and military aircraft has accounted for two percent of itinerant operations. The air taxi category has grown in recent years, increasing from 33 percent of itinerant operations in 1990, to 38 percent of operations in 2007. This trend indicates the growing use of commuter aircraft, as well as business and corporate use of Portland International Jetport.

Exhibit 1B presents operations by category annually from 1990 through 2007, and the average monthly operations by category for the same time period. As expected, operations peak in the months of June, July and August, with 31 percent of the yearly total operations occurring in these three months. On average, August is the busiest or peak month with 10.7 percent of yearly operations, and January is the slowest month with 6.6 percent of the year's operations.

PASSENGER ENPLANEMENTS

The years 1982 through 1988 were periods of strong growth, with passenger boardings (enplanements) reaching a high of nearly 620,000 in 1988. This was followed by a seven-year period of slow but steady decline, reaching a low of 531,761 in 1995. Passenger movements have since recovered and grown to a new high of 827,588 in 2007. **Table 1C** shows annual enplanement totals since 1980.

AIRLINE ACTIVITY

In 1993, there were 12 airlines providing non-stop service as far north as Presque Isle, Maine, Chicago to the west, and as far south as Washington, D.C. The airlines included Continental, Delta, United, USAir, Allegheny, Atlantic Coast, Britt Airways, Commutair, Northeast Express, Precision, and Trans World Airlines. Since then, only the first four (Continental, Delta, United, and US Airways) remain, with added service by Northwest Airlines and Jet Blue. Independence Air served the airport from July 2004 to January 2006.

TABLE 1C
Historic Passenger Enplanements
Portland International Jetport

Year	Annual Enplaned	% Change
1980	278,427	NA
1981	243,724	-12.5%
1982	238,525	-2.1%
1983	362,500	52.0%
1984	490,867	35.4%
1985	525,489	7.1%
1986	602,933	14.7%
1987	604,628	0.3%
1988	619,934	2.5%
1989	604,066	-2.6%
1990	565,180	-6.4%
1991	555,488	-1.7%
1992	607,157	9.3%
1993	595,642	-1.9%
1994	573,390	-3.7%
1995	531,761	-2.0%
1996	570,395	1.5%
1997	610,545	7.0%
1998	653,193	7.0%
1999	681,122	4.3%
2000	673,153	-1.2%
2001	627,344	-6.8%
2002	629,400	0.3%
2003	629,085	-0.1%
2004	689,174	9.6%
2005	732,504	6.3%
2006	710,671	-3.1%
2007	827,588	16.4%

Source: Airport Management

The average number of weekly departures in December 2006 was 304, which includes 230 weekday, 36 Saturday, and 43 Sunday departures. US Airways has the highest number of daily and weekly departures with 111, followed by Delta with 87, then United. Airline departure totals and market share is shown in **Table 1D**.

The six airlines serving Portland International Jetport provide daily non-

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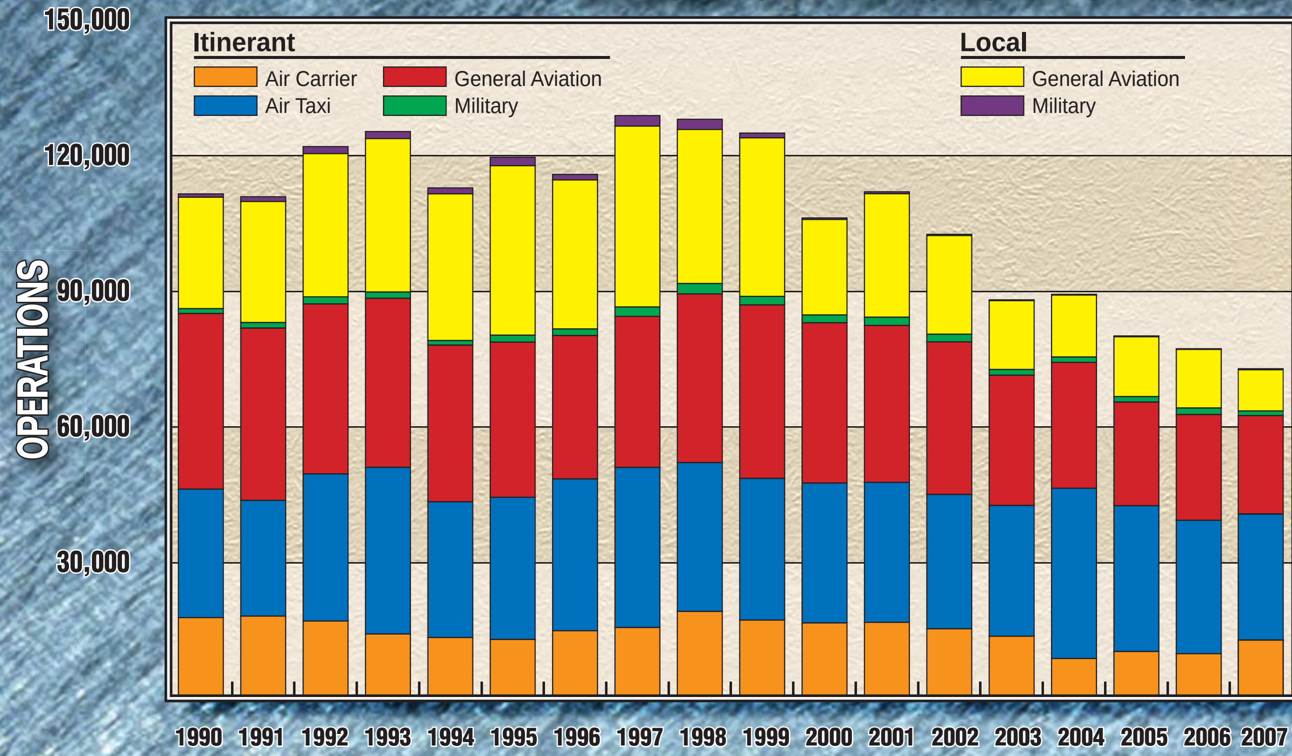
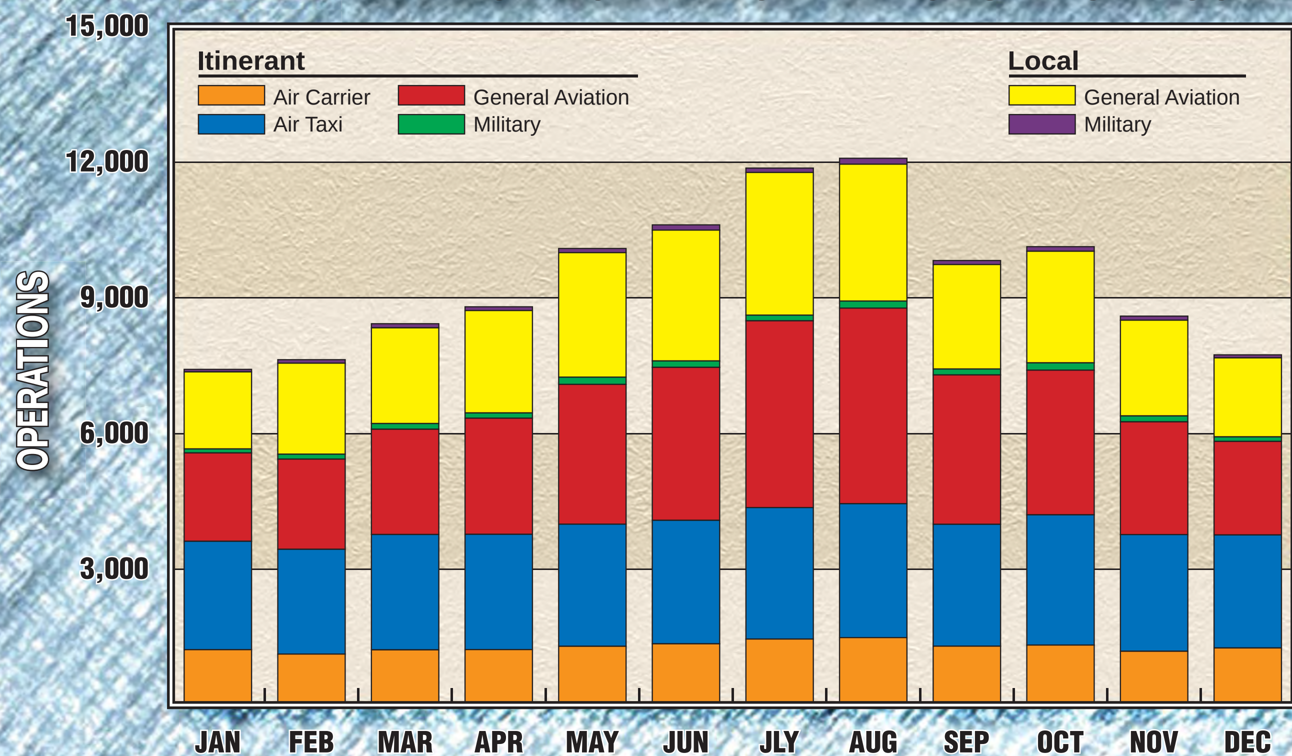
ANNUAL OPERATIONS BY CATEGORY



AVERAGE MONTHLY OPERATIONS BY CATEGORY



PWM PORTLAND INTERNATIONAL JETPORT

Exhibit 1B
HISTORICAL OPERATIONS

stop service to 11 destination airports, primarily on the eastern seaboard, but with some flights as far inland as Chicago and Atlanta.

New York - LaGuardia has the most daily departures with eight, followed by New York John F. Kennedy with seven; Philadelphia with six; and Chicago, Washington – National and Newark each have four daily non-stop flights.

TABLE 1D
Airline Departure and Market Share
November – December, 2006
Portland International Jetport

Airline	Departures			Market Share
	Weekday	Weekend	Total	
Northwest Airlines	10	4	14	5.0%
Jet Blue	20	7	27	9.0%
Continental Connection	20	8	28	9.0%
United Express	30	12	42	14.0%
Delta Air Lines	65	22	87	29.0%
US Airways	85	26	111	35.0%
Total	**230**	**79**	**309**	**100.0%**

Source: Portland International Jetport Flight Guide

Table 1E lists the non-stop destinations and total flights with market share.

TABLE 1E
Non-Stop Daily Destinations
Portland International Jetport

Destination	Daily Departures
Atlanta	4
Cincinnati	3
Washington-National	4
Chicago O'Hare	3
Detroit	2
Newark	4
Philadelphia	6
New York, LaGuardia	9
Washington-Dulles	3
Charlotte	1
New York – JFK	7
Total Flights	**46**

Source: Portland International Jetport Flight Guide

CARGO MOVEMENT

There are two major all-cargo carriers serving the airport, FedEx and DHL. Both businesses operate on the airport's east ramp. Cargo tonnage steadily increased between 1994 and 2000, and then declined slightly in 2001 and 2002. The 2003 totals increased to the 2000 levels. Cargo levels remained steady in 2004 and 2005. **Exhibit 1C** shows cargo movement during the period 1995 through 2007, overlaid on a view of the air cargo ramp at Portland International Jetport.

AIRPORT FACILITIES

Portland International Jetport consists of airside and landside facilities. Airside facilities include two runways, a series of taxiways, aprons, navigation aids, both visual and electronic, and airport lighting systems. Land-

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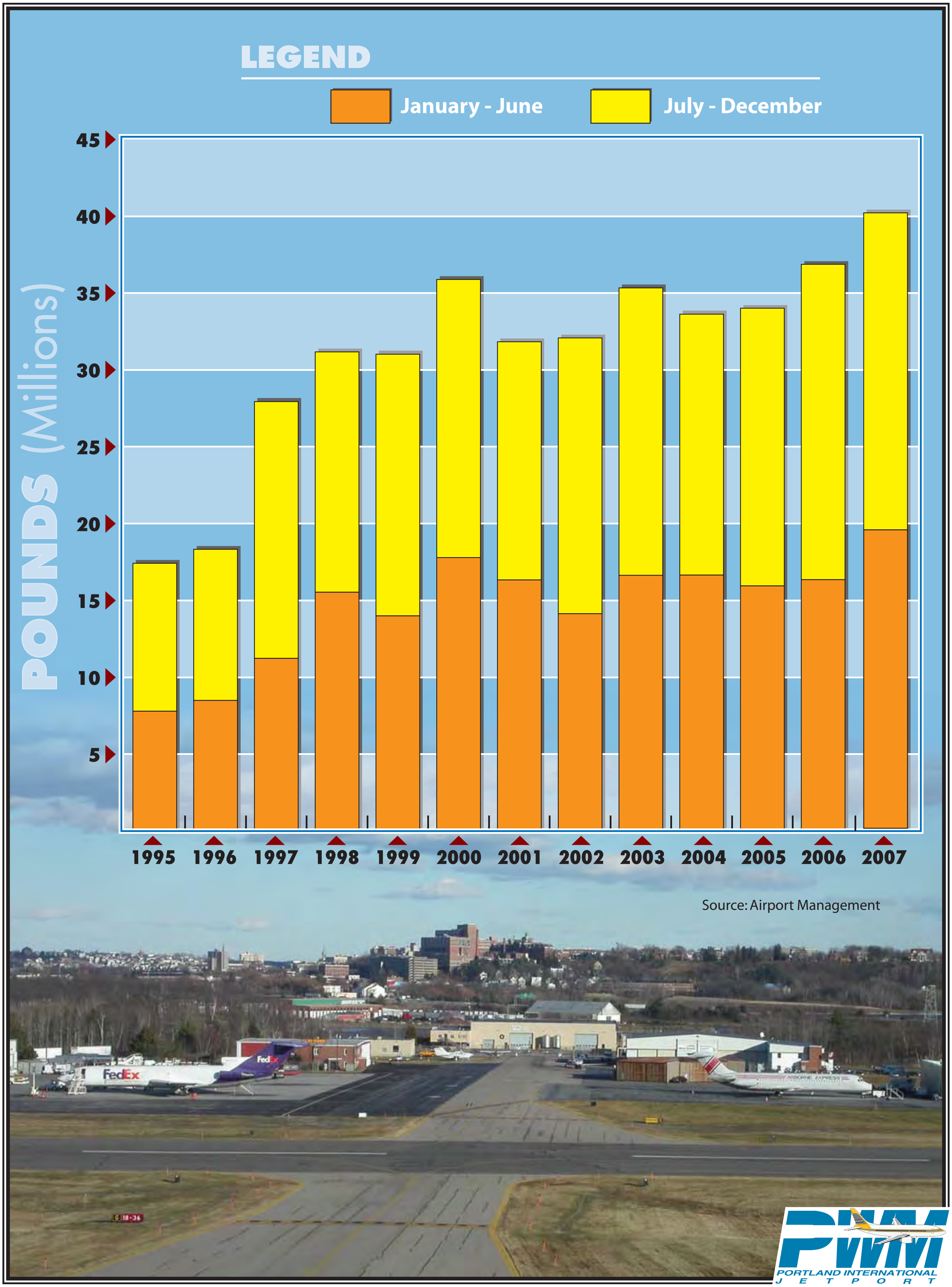

Exhibit 1C
CARGO MOVEMENT

side facilities include airport terminal buildings, hangars, automobile parking facilities, and access roads. **Exhibit 1D** depicts the existing airfield facilities.

AIRSIDE FACILITIES

This section describes the airport's airside facilities. Airside facilities include runways, taxiways, lighting, and navigational aids.

Runways

Portland International Jetport operates two runways: the primary runway is Runway 11-29, at 7,200 feet long and 150 feet wide. There is a 200-foot-long paved blast pad off each runway end. The runway is served at both ends by an instrument landing system (ILS) approach.

Runway 18-36 serves as the crosswind runway. It is 150 feet wide and 5,001 feet long. While capable of handling larger air carrier on an infrequent basis, it primarily serves general aviation and commuter aircraft, particularly during high wind conditions, and when advantageous to both air traffic control (ATC) and pilots.

Land and hold short operations (LAHSO) are occasionally implemented by ATC to improve traffic flow. Land and hold short operations are an air traffic control procedure intended to increase airport capacity without compromising safety. A pilot accepting a LAHSO clearance is expected to land and stop before reaching the intersection of a crossing runway, thus permitting an aircraft landing or taking off on the crossing runway to operate without regard to the other aircraft.

Since the last master plan, an RNAV (GPS) approach was added to both runway ends. **Table 1F** provides a detailed analysis of both runways.

Taxiways

A series of two parallel and six exit taxiways provide adequate coverage of the airport, with easy access to all four runway ends, and aprons. All taxiways are constructed of bituminous concrete (asphalt) and marked with standard yellow centerline, edge lines, and hold-short lines where applicable.

- Taxiway A is the parallel taxiway serving Runway 11-29. There are two exit taxiways (D and E) serving the main terminal apron, and Taxiway C, the Runway 18-36 parallel taxiway. A third exit (Taxiway F) is located along Taxiway A, halfway between the approach end of Runway 11 and Taxiway B and was constructed in 2006.

- Taxiway C is parallel to Runway 18-36. This is not a true parallel, but does provide easy access to both the general aviation and air carrier ramps. Taxiways J and G provide midfield access to Runway 18-36, and G continues across the runway to provide access to the east general aviation ramp, air cargo facilities, and the FAA Flight Standards District Office (FSDO) and U.S. Customs office.

- Taxiways D, E, G, and J are all exit taxiways.

Table 1G provides pavement detail.

04MP17-1D-5/24/06

Exhibit 1D
EXISTING AIRFIELD FACILITIES

TABLE 1F
Runway Data
Portland International Jetport

	Runway 11	Runway 29	Runway 18	Runway 36
Dimensions	7200 x 150 feet		5001 x 150 feet	
Surface	Asphalt/grooved		Asphalt	
Weight Limitation (Pounds)	Single wheel: 75,000 Double wheel: 169,000 Double tandem: 300,000		Single wheel: 75,000 Double wheel: 165,000 Double tandem: 300,000	
Runway Lights	High intensity, Touchdown Zone, Centerline		Medium intensity	
Latitude	43-38.751667N	43-38.642000N	43-39.268398N	43-38.480280N
Longitude	070-19.564667W	070-17.939667W	070-18.439078W	070-18.111795W
Elevation	75.6 ft.	42.2ft.	44.6 ft.	46.6 ft.
Gradient	0.47%		0.04%	
Runway Heading	112° magnetic, 095° true	292° magnetic, 275° true	180° magnetic, 163° true	000° magnetic, 343° true
Declared Distances	TORA – 7,200 ft. TODA – 7,200 ft. ASDA – 6,800 ft. LDA – 6,800 ft.	TORA – 7,200 ft. TODA – 7,200 ft. ASDA – 7,200 ft. LDA – 7,200 ft.	None	None
Markings	Precision		Non-precision	
Visual Glide Slope Indicator	PAPI – 4R	PAPI – 4R	VASI – 4L	VASI – 4R
RVR Equipment	TD, Mdpt., rollout	TD, Mdpt., rollout	No	No
Runway End/ Approach Lights	ALSF-2/SSALR	MALSR	REIL	REIL
Instrument Approach Procedures	ILS, NDB, RNAV (GPS)	ILS, RNAV (GPS)	RNAV (GPS)	RNAV (GPS)

Source: Airnav; Airport inspection
See Appendix A for list of abbreviations and definitions.

TABLE 1G
Taxiway Data
Portland International Jetport

	Service	Length (ft.)	Width (ft.)	Type	Strength (x 1000 lbs.)	Edge Lights
Taxiway A	AC/GA	7,800	75	Parallel	110S/184D/ 190DT	Yes
Taxiway C North	GA	3,600	60 (50' north of Twy. J)	Parallel	58S/64D/ 75DT	Yes
Taxiway C South	GA	1,900	60	Parallel	187S/164D/ 167DT	Yes
Taxiway D	AC/GA	300	75	Exit	110S/184D/ 190DT	Yes
Taxiway E	AC/GA	300	75	Exit	110S/184D/ 190DT	Yes
Taxiway F	AC/GA	300	75	Exit	110S/126D/190DT	Yes
Taxiway G West	GA	500	75	Exit	110S/184D/ 190DT	Yes
Taxiway G East	GA	1,650	75	Exit	190S/166D/ 170DT	Yes
Taxiway J	GA	150	75	Exit	110S/184D/ 190DT	Yes

Legend: AC – Air carrier operations; GA – General aviation operation; S – Single wheel load; D – Dual wheel load; DT – Dual tandem wheel load; N/A – Not available

Airfield Lighting And Marking

Airfield lighting systems extend an airport's usefulness into periods of darkness and/or poor visibility. A variety of lighting systems are installed at the airport for this purpose. They are categorized by function as follows:

Identification Lighting: Three distinct identification lighting systems are used at Portland International Jetport.

- The location of the airport at night is universally identified by a rotating beacon. A rotating beacon projects two beams of light, one white and one green, 180 degrees apart. The Jetport has a standard 36-inch rotating beacon located south and west at the airport maintenance facility.

- Runway ends 11, 18 and 36 are equipped with runway end identifier lights (REIL).

- Four lighted wind cones are located around the airport to assist pilots in evaluating wind direction and intensity.

Approach Lighting: Runway 11-29 is equipped with an approach lighting system (ALS) on both ends. Runway 18-36 has no ALS.

- Runway 29 is equipped with a medium intensity approach lighting system with runway alignment indicator lights (MALSR). The lights start 200 feet from the runway end, and extend across the Fore River, for a total distance of 1,400 feet.

- Runway 11 was recently equipped with a higher standard system, a dual mode system consisting of a high intensity ALS with sequenced flashers, Category II configuration (ALSF-2) and a simplified short approach lighting system with runway alignment indicator lights (SSALR). The ALSF-2 is necessary during periods when ILS Category II approaches are in operation, permitting weather minimums to 100 foot cloud ceilings. This ALS operates as an SSALR system until the weather goes below visual weather minimums, then operates as an ALSF-2. This system is 3,000 feet long.

Runway Lighting: Both runways are equipped with edge lights and other related systems as described below:

- Runway edge lights are used to outline the edges of runways during periods of darkness or restricted visibility conditions. These light systems are classified according to the intensity or brightness they are capable of producing: they are the High Intensity Runway Lights (HIRL), Medium Intensity Runway Lights (MIRL), and the Low Intensity Runway Lights (LIRL). Runway 11-29 is equipped with HIRL and Runway 18-36 has MIRL.

- Runway centerline lights are installed on Runway 11-29 to facilitate landing under adverse visibility conditions. They are located along the runway centerline and are spaced at 50-foot intervals.

- Touchdown zone lights are installed on Runway 11 to indicate the touchdown zone when landing under adverse visibility conditions. They consist of two rows of transverse light bars disposed symmetrically about the runway centerline.

- Runway end identifier lights (REIL) are installed on Runway 18, and 36 ends to provide rapid and positive identification of the approach end of a particular runway.

All runway ends are equipped with a visual landing system; either a visual approach slope indicator (VASI) system or precision approach path indictor (PAPI) lights. The PAPIs provide approach path guidance with a series of light units. The four-unit PAPI gives the pilot an indication of whether their approach is above, below, or on-path, through the pattern of red and white light visible from the light unit. A VASI is the older version of the PAPI, and also provides approach path guidance through the patterns of red and white lights.

- Runway 11 has a 4-light PAPI set at 3.0 degrees, located on the right side of the runway.

- Runway 29 is a 4-box PAPI on the right, with a 3.0 degree slope.

- Runway 18 is a 4-box VASI on the left, with a 3.25 degree slope.

- Runway 36 is a 4-box VASI on the right with a 3.0 degree slope.

Taxiway Lighting: All taxiways at Portland International Jetport are equipped with medium intensity taxiway lights (MITL).

Navigation Aids

Navigational aids are electronic devices that transmit radio frequencies, which pilots of properly equipped aircraft translate into point-to-point guidance and position information. The types of electronic navigational aids available for aircraft flying to or from Portland International Jetport include: the Very High Frequency Omnidirectional Range (VOR) facility, the nondirectional beacon (NDB), global positioning system (GPS), and Loran-C.

The VOR provides azimuth readings to pilots of properly equipped aircraft by transmitting a radio signal at every degree to provide 360 individual navigational courses. Frequently, distance measuring equipment (DME) is combined with a VOR facility to provide distance as well as direction information to the pilot. Military tactical air navigation aids (TACANs) and civil VORs are commonly combined to form a VORTAC. A VORTAC provides distance and direction information to civil and military pilots.

The Kennebunk VORTAC serves the Portland International Jetport. The Kennebunk VORTAC is located approximately 19 nautical miles southwest of Portland International Jetport.

The NDB transmits nondirectional radio signals, whereby the pilot of properly equipped aircraft can determine the bearing to or from the NDB facility and then "home" or track to or from the station. Pilots flying to or from the airport can utilize the Sebago NDB located approximately 26 nautical miles northwest of midfield.

The Orham NDB is located approximately 5.8 nautical miles west of the airport. When an NDB is used as the outer marker of an instrument landing system (ILS) it is called an outer compass locator (LOM). For Portland International Jetport, the Orham NDB (LOM) acts as the outer marker of the approach to Runway 11; it is broadcast at a frequency of 394 KHz.

Loran-C is a ground-based enroute navigational aid which utilizes a system of transmitters located in various locations across the continental United States. Loran-C allows pilots to navigate without using a specific facility. With a properly equipped aircraft, pilots can navigate to any airport in the United States using Loran-C.

GPS was initially developed by the United States Department of Defense for military navigation around the world. However, GPS is now used extensively for a wide variety of civilian uses, including the civil aircraft navigation.

GPS uses satellites placed in orbit around the globe to transmit electronic signals, which pilots of properly equipped aircraft use to determine altitude, speed, and navigational information. This provides more freedom in flight planning and allows for more direct routing to the final destination.

A GPS modernization effort is underway by the FAA and focuses on augmenting the GPS signal to satisfy requirements for accuracy, coverage, availability, and integrity. For civil aviation use, this includes the development of the Wide Area Augmentation System (WAAS), which was launched on July 10, 2003. The WAAS uses a system of reference stations to correct signals from the GPS satellites, for improved navigation and approach capabilities. The present GPS provides for enroute navigation and instrument approaches with both course and vertical navigation. The WAAS upgrades are expected to allow for the development of approaches to most airports with cloud ceilings as low as 250 feet above the ground and visibilities restricted to three-quarters mile, after 2015.

Instrument Approach Procedures

Instrument approach procedures are a series of predetermined maneuvers established by the FAA, using electronic navigational aids that assist pilots in locating and landing at an airport, especially during instrument flight conditions. Portland International Jetport has six published instrument approach procedures.

The capability of an instrument approach is defined by the visibility and cloud ceiling minimums associated with the approach. Visibility minimums define the horizontal distance the pilot must be able to see in order to complete the approach. Cloud ceilings define the lowest level a cloud layer (defined in feet above the ground) can be situated for the pilot to complete the approach. If the observed visibility or cloud ceilings are below the minimums prescribed for the approach, the pilot cannot complete the instrument approach. With the exception of the Area Navigation (RNAV) approach to Runway 18, which only provides course guidance information, all instrument approaches at the airport provide both vertical descent and course guidance. **Table 1H** summarizes instrument approach minima for Portland International Jetport.

TABLE 1H
Instrument Approach Data
Portland International Jetport

	WEATHER MINIMUMS BY AIRCRAFT TYPE							
	Category A		Category B		Category C		Category D	
	CH	VIS	CH	VIS	CH	VIS	CH	VIS
ILS or LOC 11								
Straight-In ILS	200	0.70	200	0.70	200	0.70	200	0.70
Straight-In LOC	483	1.0	483	1.0	483	1.25	483	1.50
Circling	543	1.0	543	1.0	563	1.50	663	2.0
ILS or LOC 29								
Straight-In ILS	200	0.50	200	0.50	200	0.50	200	0.50
Straight-In LOC	443	0.50	443	0.50	443	0.75	443	1.0
Circling	543	1.0	543	1.0	563	1.50	663	2.0
RNAV (GPS) 11								
LPV DA	339	0.75	339	0.75	339	0.75	339	0.75
LNAV/VNAV DA	442	1.0	442	1.0	442	1.0	442	1.0
LNAV MDA	483	0.5	483	0.5	483	1.75	483	1.0
Circling	543	1.5	543	1.5	563	1.50	663	2.0
RNAV (GPS) 18								
LNAV MDA	510	1.0	510	1.0	510	1.50	510	1.50
Circling	543	1.0	543	1.0	563	1.50	663	2.0
RNAV (GPS) 29								
LPV DA	300	0.5	300	0.5	300	0.5	300	0.5
LNAV/VNAV DA	620	1.50	620	1.50	620	1.50	620	1.50
LNAV MDA	503	0.50	503	0.50	503	1.0	503	1.0
Circling	543	2.0	543	2.0	563	2.0	663	2.0
RNAV (GPS) 36								
LNAV/VNAV DA	420	1.25	420	1.25	420	1.25	420	1.25
LNAV MDA	411	1.0	411	1.0	411	1.25	411	1.25
Circling	543	1.25	543	1.25	563	1.50	663	2.0

Aircraft categories are based on the approach speed of aircraft, which is determined as 1.3 times the stall speed in landing configuration. The approach categories are as follows:

Category A 0-90 knots (Cessna 172)
Category B 91-120 knots (Beechcraft KingAir)
Category C 121-140 knots (Canadair Challenger)
Category D 141-165 knots (Gulfstream IV)

CH – Cloud Height (in feet above ground level)
VIS – Visibility (in statute miles)
Source: U.S. Terminal Procedures

Runway 11-29 presently has two Category I ILS approaches. The Runway 29 ILS is comprised of a localizer with DME and a glideslope indicator. These electronic navaids are supplemented with a MALSR and high intensity runway edge lighting. The ILS on Runway 11 has Category II and Category III minimums. The approach has the same electronic navaids as Runway 29 plus a middle and outer marker. The inner marker completes the navaids necessary for Category II and III approaches. These navaids are supplemented by an ALSF-2/SSALR as well as touchdown, centerline, and high intensity runway edge lighting.

Visual Flight Procedures

Most flights at Portland International Jetport are conducted under visual flight rules (VFR). Under VFR flight, the pilot is responsible for collision avoidance and is provided basic radar service from ATC. The purpose of basic radar services is to sequence arriving IFR and VFR traffic into the traffic pattern, and to provide traffic information and radar flight tracking and Class C services to departing VFR traffic. Typically, the pilot will contact the tower when approximately 15 miles from the airport, for sequencing into the traffic pattern for landing.

In most situations, under VFR and basic radar services, the pilot is responsible for navigation and choosing the arrival and departure flight paths to and from the airport. However, depending on the needs of the ATC for sequencing, the pilot may be given directions by ATC to fly specified headings to position their aircraft behind a preceding aircraft in the approach sequence. Tower controllers sequence arriving and departing aircraft based on observed traffic, pilot reports, and anticipated aircraft maneuvers. The results of individual pilot navigation for sequencing and collision avoidance, and ATC instructions for sequencing and safety, are that aircraft do not fly a precise flight path to and from the airport. Therefore, aircraft can be found flying over a wide area around the airport for sequencing and safety reasons.

While aircraft can be expected to operate over most areas of the airport, the density of aircraft operations is higher near the airport. This is the result of aircraft following the established traffic patterns for the airport, and common sequencing techniques used by ATC. The traffic pattern is the traffic flow that is prescribed for aircraft landing or taking off from an airport. The components of a typical traffic pattern are upwind leg, crosswind leg, downwind leg, base leg, and final approach.

a. Upwind Leg - A flight path parallel to the landing runway in the direction of landing.

b. Crosswind Leg - A flight path at right angles to the landing runway off its upwind end.

c. Downwind Leg - A flight path parallel to the landing runway in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg.

d. Base Leg - A flight path at right angles to the landing runway off its approach end. The base leg normally extends from the downwind leg to the intersection of the extended runway centerline.

e. Final Approach - A flight path in the direction of landing along the extended runway centerline. The final approach normally extends from the base leg to the runway.

Essentially, the traffic pattern defines which side of the runway aircraft will operate. For example, at Portland International Jetport, Runway 11-29 and Runway 18-36 have established left-hand traffic patterns. For these runways, aircraft make a left turn from base leg to final for landing.

While the traffic pattern defines the direction of turns that an aircraft will follow on landing or departure, it does not define how far from the runway an aircraft will operate. The distance laterally from the runway centerline an aircraft operates or the distance from the end of the runway is at the discretion of the pilot, based on the operating characteristics of the aircraft, number of aircraft in the traffic pattern, and metrological conditions. The actual ground location of each leg of the traffic pattern varies from aircraft operation to aircraft operation, for the reasons of safety, navigation and sequencing described above. The distance that the downwind leg is located laterally from the runway will vary based mostly on the speed of the aircraft. Slower aircraft can operate closer to the runway, as their turn radius is smaller.

The FAA has established that piston-powered aircraft operating in the traffic pattern, fly at 1,000 feet above the ground (or 1,077 feet MSL) when on the downwind leg. Turbine-powered aircraft fly the downwind leg at 2,077 feet MSL. The traffic pattern altitude is established so that aircraft have a predictable descent profile on base leg to final for landing.

Portland International Jetport does have one published visual approach to Runway 29. The purpose of this approach is to provide guidance for visual approaches so that noise sensitive areas in the Cities of Portland, South Portland, Falmouth, and Cape Elizabeth are avoided during approach. Aircraft conducting this approach are asked to maintain an altitude of 3,000 feet or higher until they are located over water.

Weather Informational Aids

Pilots receive weather data through two primary means, air traffic control (ATC) and via an Automated Surface Observing System (ASOS), which broadcasts over a designated radio frequency or telephone.

ATC relays weather data and personal observations as required, often obtained directly from ASOS. ATC also maintains the automatic terminal information system (ATIS). ATIS is the continuous broadcast of recorded non-control information in selected high-activity terminal areas. Its purpose is to improve controller effectiveness and to relieve frequency congestion by automating the repetitive transmission of essential but routine information. The information is continuously broadcast over a discrete VHF radio frequency or the voice portion of a local NAVAID.

ASOS is a suite of sensors, which measure, collect, and broadcast weather data to help meteorologists, pilots and flight dispatchers prepare and monitor weather forecasts, plan flight routes, and provide necessary information for correct takeoffs and landings. ASOS units provide a minute-to-minute update to pilots by VHF radio or nondirectional beacon. Each hour ASOS data is available to offsite users by means of landline telephone communication or satellite uplink.

The data collected by the ASOS includes:

- Wind speed, direction, and gusts
- Temperature and dew point
- Cloud height and coverage
- Visibility
- Present weather (rain, drizzle, snow)
- Rain accumulation
- Thunderstorms and lightning
- Altimeter
- Fog, mist, haze, freezing fog

Airspace And Air Traffic Control

The *Federal Aviation Administration (FAA) Act of 1958* established the FAA as the responsible agency for the control and use of navigable airspace within the United States. The FAA has established the National Airspace System (NAS) to protect persons and property on the ground and to establish a safe and efficient airspace environment for civil, commercial, and military aviation. The NAS covers the common network of U.S. airspace, including: air navigation facilities; airports and landing areas; aeronautical charts; associated rules, regulations, and procedures; technical information; and personnel and material. The system also includes components shared jointly with the military.

Airspace Structure

Airspace within the United States is broadly classified as either "controlled" or "uncontrolled". The difference between controlled and uncontrolled airspace relates primarily to requirements for pilot qualifications, ground-to-air communications, navigation and air traffic services, and weather conditions. Six classes of airspace have been designated in the United States as shown on **Exhibit 1E**. Airspace designated as Class A, B, C, D, or E is considered controlled airspace. Aircraft operating within controlled airspace are subject to varying requirements for positive air traffic control. Airspace in the vicinity of Portland International Jetport is depicted on **Exhibit 1F**.

Class A Airspace: Class A airspace includes all airspace from 18,000 feet mean sea level (MSL) to flight level (FL) 600 (approximately 60,000 feet MSL). This airspace is designated in Federal Aviation Regulation (F.A.R.) Part 71.193, for positive control of aircraft. The Positive Control Area (PCA) allows flights governed only under IFR operations. The aircraft must have special radio and navigation equipment, and the pilot must obtain clearance from an ATCT facility to enter Class A airspace. In addition, the pilot must possess an instrument rating.

Class B Airspace: Class B airspace has been designated around some of the country's major airports, to sepa-

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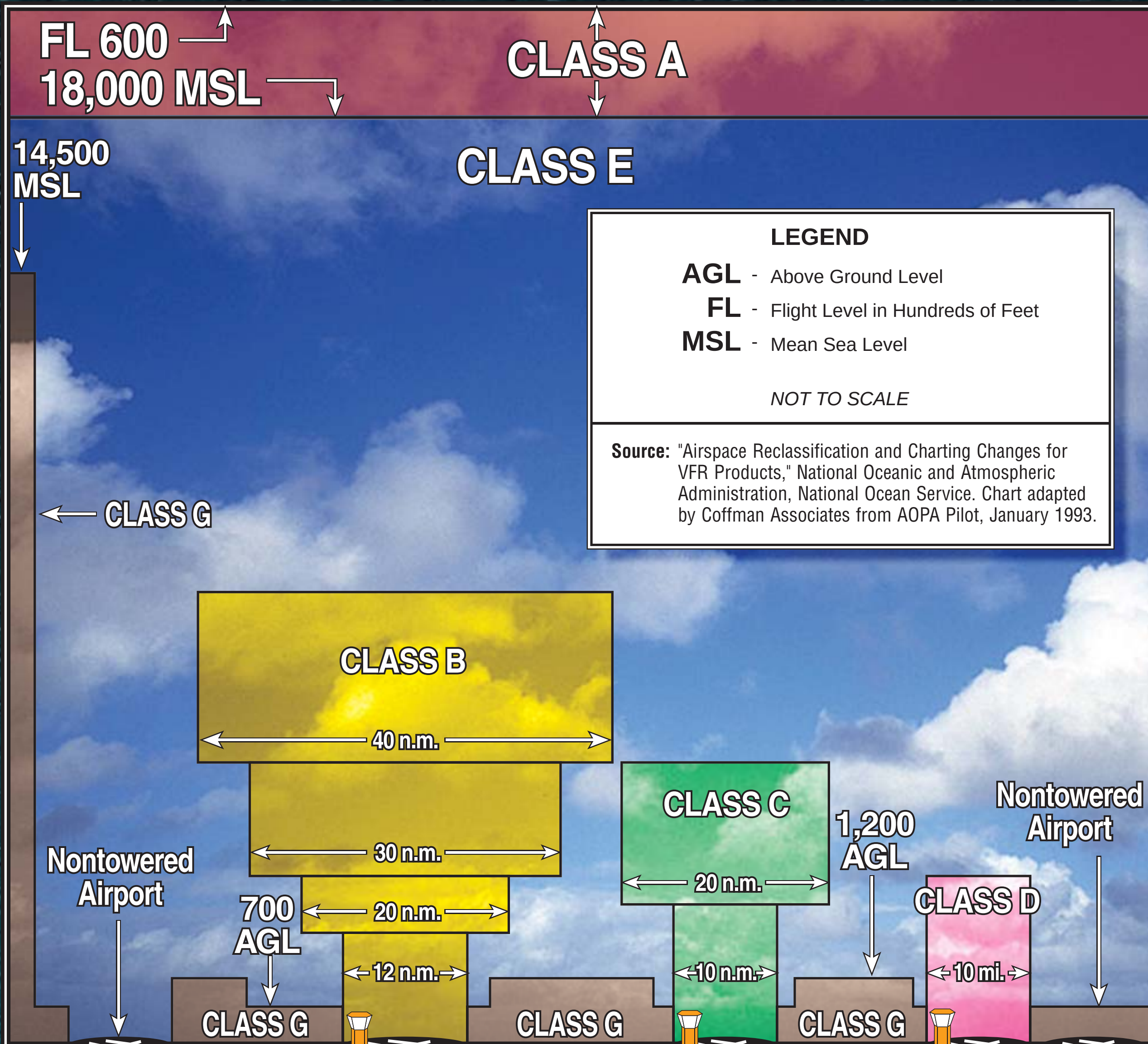

CLASSIFICATION	DEFINITION
CLASS A	Generally airspace above 18,000 feet MSL up to and including FL 600 .
CLASS B	Generally multi-layered airspace from the surface up to 10,000 feet MSL surrounding the nation's busiest airports.
CLASS C	Generally airspace from the surface to 4,000 feet AGL surrounding towered airports with service by radar approach control.
CLASS D	Generally airspace from the surface to 2,500 feet AGL surrounding towered airports.
CLASS E	Generally controlled airspace that is not Class A, Class B, Class C, or Class D.
CLASS G	Generally uncontrolled airspace that is not Class A, Class B, Class C, Class D, or Class E.

PWM PORTLAND INTERNATIONAL JETPORT

Exhibit 1E
AIRSPACE CLASSIFICATION

rate arriving and departing aircraft. Class B airspace is designed to regulate the flow of uncontrolled traffic, above, around, and below the arrival and departure airspace required for high-performance, passenger-carrying aircraft at major airports. This airspace is the most restrictive controlled airspace routinely encountered by pilots operating under VFR in an uncontrolled environment.

Portland International Jetport lies approximately 65 nautical miles north of the Logan International Airport Class B airspace. All aircraft within the specified altitudes of the Class B airspace are subject to the operating rules and pilot equipment requirements specified in **14 CFR Part 91.**

Class C Airspace: The FAA has established Class C airspace at 120 airports around the country, as a means of regulating air traffic in these areas. Class C airspace is designed to regulate the flow of uncontrolled traffic above, around, and below the arrival and departure airspace required for high-performance, passenger-carrying aircraft at major airports. In order to fly inside Class C airspace, the aircraft must have a two-way radio, an encoding transponder, and have established communication with ATC. Aircraft may fly below the floor of the Class C airspace, or above the Class C airspace ceiling without establishing communication with ATC.

Exhibit 1F shows the Portland International Jetport Class C airspace. The Class C airspace consists of controlled airspace extending upward from the surface to 4,100 feet above ground level (AGL), within which all aircraft are subject to the operating rules and pilot equipment requirements specified in **14 CFR Part 91**. Portland's Class C airspace consists of two cylinders centered on the airport. The inner cylinder has a radius of five nautical miles and extends from the surface of the airport up to 4,100 feet AGL. The outer cylinder has a radius of ten nautical miles that extends from 1,500 AGL up to 4,100 feet AGL, between the five and ten nautical mile rings.

Class D Airspace: Class D airspace is controlled airspace surrounding airports with an ATCT. The Class D airspace typically constitutes a cylinder with a horizontal radius of four or five nautical miles (NM) from the airport, extending from the surface up to a designated vertical limit, typically set at approximately 2,500 feet above the airport elevation. If an airport has an instrument approach or departure, the Class D airspace sometimes extends along the approach or departure path.

The Brunswick Naval Air Station Airport, located 22 miles northeast of Portland International Jetport, is a Class D airspace airport.

Class E Airspace: Class E airspace consists of controlled airspace designed to contain IFR operations near an airport, and while aircraft are transitioning between the airport and enroute environments. Unless otherwise specified, Class E airspace terminates at the base of the overlying airspace. Only aircraft operating under IFR are required to be in contact with air traffic control when operating in Class E airspace. While aircraft conducting visual flights in Class E air-

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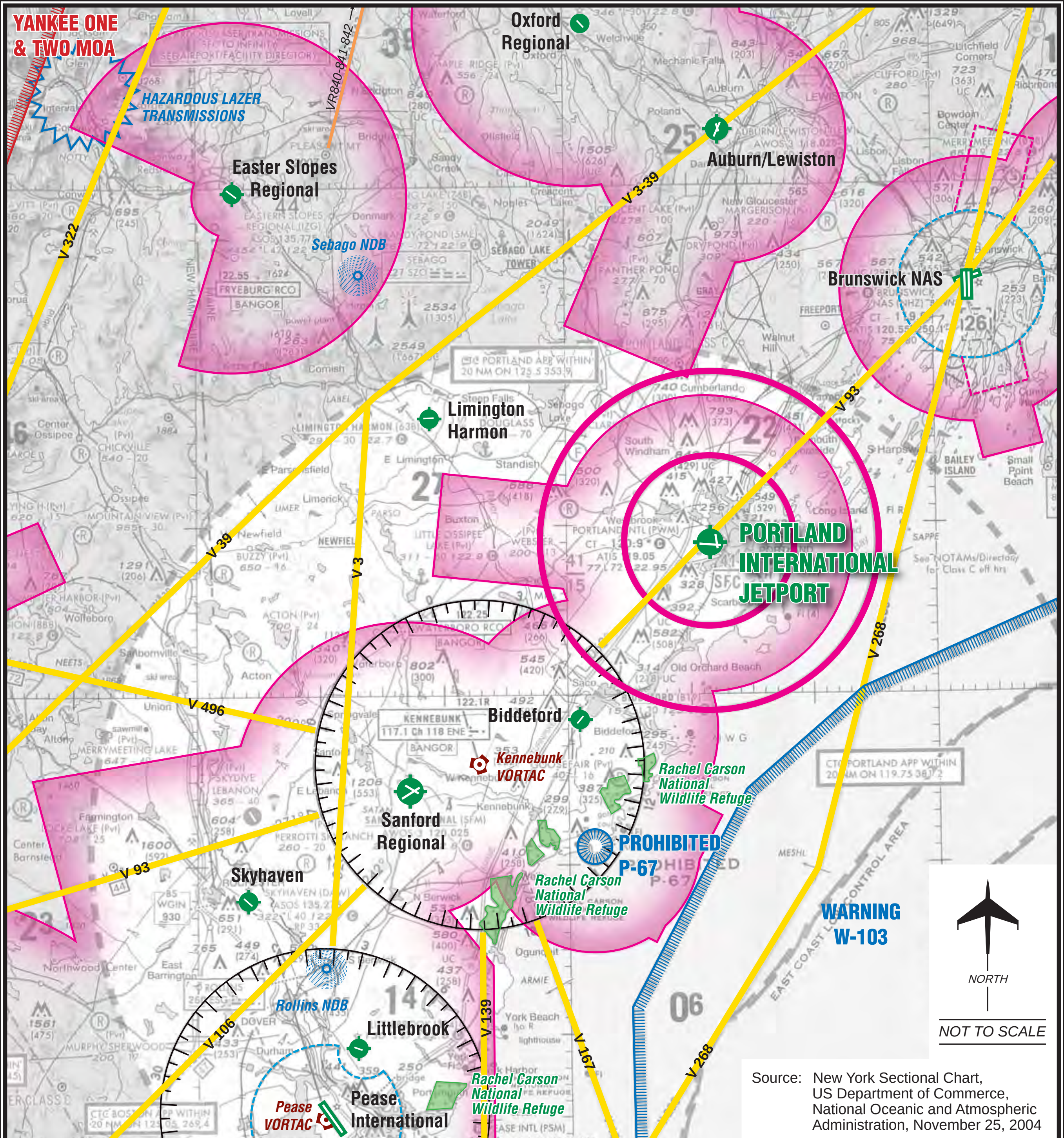

Source: New York Sectional Chart, US Department of Commerce, National Oceanic and Atmospheric Administration, November 25, 2004

LEGEND

- Airport with hard-surfaced runways 1,500' to 8,069' in length
- Airports with hard-surfaced runways greater than 8,069' or some multiple runways less than 8,069'
- Non-Directional Radiobeacon (NDB)
- VORTAC
- Compass Rose
- Class C Airspace
- Class D Airspace
- Class E Airspace
- Class E Airspace with floor 700 ft. above surface
- Victor Airways
- Military Training Routes
- Prohibited, Restricted, Warning and Alert Areas
- MOA - Military Operations Area

PORTLAND INTERNATIONAL JETPORT

Exhibit 1F
VICINITY AIRSPACE

space are not required to be in radio communications with air traffic control facilities, visual flight can only be conducted if minimum visibility and cloud ceilings exist.

Portland International Jetport airspace converts to Class E airspace after the ATCT closes at midnight and remains in effect until the ATCT opens at 5:45 in the morning, when Portland International Jetport airspace reverts to Class C airspace. The Class E airspace at Portland International Jetport begins at 700 feet AGL, and extends to 4,100 feet AGL. The Class E airspace extends out from the airport with a radius of eight and one-half nautical miles, and overlaps with the Biddeford Municipal Airport Class E airspace to the southwest. To allow for instrument approaches to Runway 11, there is an extended corridor of Class E airspace that extends out an additional seven and one-half nautical miles to the west.

Class G Airspace: Airspace not designated as Class A, B, C, D, or E is considered uncontrolled, or Class G, airspace. Air traffic control does not have the authority or responsibility to exercise control over air traffic within this airspace. Class G airspace lies between the surface and the overlaying Class E airspace (700 to 1,200 feet AGL). Class G airspace extends below the floor of the Class E airspace transition area in the Portland area.

While aircraft may technically operate within this Class G airspace without any contact with ATC, it is unlikely that many aircraft will operate this low to the ground. Furthermore, federal regulations specify minimum altitudes for flight. F.A.R. Part 91.119, *Minimum Safe Altitudes*, generally states that except when necessary for takeoff or landing, pilots must not operate an aircraft over any congested area of a city, town, or settlement, or over any open air assembly of persons, at an altitude of 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft. Over less congested areas, pilots must maintain an altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure. Finally, this section states that helicopters may be operated at less than the minimums prescribed above if the operation is conducted without hazard to persons or property on the surface. In addition, each person operating a helicopter shall comply with any routes or altitudes specifically prescribed for helicopters by the FAA.

Special Use Airspace

Special use airspace is defined as airspace where activities must be confined because of their nature or where limitations are imposed on aircraft not taking part in those activities. These areas are depicted on **Exhibit 1F** by blue and red-hatched lines, as well as with the use of green shading.

Military Operating Areas: The two MOAs, depicted on **Exhibit 1F,** in the vicinity of Portland International Jetport are the Yankee One and Yankee Two MOAs to the northwest. These MOAs are relatively distant from the Portland International Jetport and have little effect on air traffic in the Portland area.

Victor Airways: For aircraft arriving or departing the regional area using very high frequency omnidirectional range (VOR) facilities, a system of Federal Airways, referred to as Victor Airways, has been established. Victor Airways are corridors of airspace eight miles wide that extend upward from 1,200 feet AGL to 18,000 feet MSL and extend between VOR navigational facilities. Victor Airways are shown with solid yellow lines on **Exhibit 1F**. V93 crosses Portland, extending to the Kennebunk VORTAC, and V268 is located to the east of the Portland area.

Wilderness Areas: As depicted on **Exhibit 1F**, there are a number of wilderness areas to the south of the Portland metropolitan area. Aircraft are requested to maintain a minimum altitude of 2,000 feet above the surface of designated National Park areas, which includes wilderness areas. FAA *Advisory Circular 91-36C* defines the "surface" as the highest terrain within 2,000 feet laterally of the route of flight or the uppermost rim of a canyon or valley.

Warning Area: Portland International Jetport is approximately 13 nautical miles west of Warning Area 103. Warning areas are established beyond the three-mile limit along U.S. coastlines. Though the activities conducted within warning areas may be as hazardous as those in restricted areas, warning areas cannot be legally designated as restricted areas because they are over international waters. Penetrations of warning areas during periods of activity may be hazardous to aircraft not participating in national defense operations. The controlling ATCT facility may authorize flights through these areas depending upon time of day and expected activity. Boston Center is the controlling ATCT facility for these special use areas.

Prohibited Area: A two nautical mile diameter circle above Kennebunkport is Prohibited Airspace P-67. Airspace P-67 corresponds with a former President's residence. Penetrations into prohibited airspace are strictly forbidden at all times.

Air Traffic Control

Portland International Jetport is a controlled airport with an operating ATCT staffed by FAA employees. ATC is responsible for providing for the safe, orderly, and expeditious flow of air traffic at airports where the type of operations and/or volume of traffic requires such a service, such as the Jetport. Pilots operating from a controlled airport are required to maintain two-way radio communication with air traffic controllers, and to acknowledge and comply with their instructions.

The control tower, located east of the terminal building operates from 5:45 a.m. to midnight, seven days a week. Tower controllers provide services to aircraft operating on the airport and generally within a five mile radius of the airport, as approved by the collocated approach control facility. Primary air traffic services for the airport are provided within the airport's Class C airspace.

Portland ATC also provides terminal radar coverage during the same periods the tower is open. When the tower and approach control close, the airspace is turned over to Boston Air Route Traffic Control Center (ARTCC).

In addition to the Class C airspace, Portland Approach Control's total area of responsibility covers an area extending north to Norridgewock, east to Rockland, west to Fryeburg, and south to Sanford. Some additional airspace around the Brunswick Naval Air Station to the east is assumed late in the evening after the Navy relinquishes airspace, but eventually reverts to Boston Center when Portland ATC closes at midnight.

Since the last update, the FAA upgraded and moved the airport surveillance radar (ASR). The old ASR-8 system was replaced by a state-of-the-art ASR-9 and relocated to Bruce Hill in North Yarmouth, approximately 10 miles north of the Jetport. The ASR-9 has better capabilities for distinguishing aircraft in storm situations, identifying intensity of storms, and requires less maintenance.

Regional Airports

A review of public-use airports within the vicinity of Portland International Jetport has been made to identify and distinguish the type of air service provided in the area surrounding the airport. Information pertaining to each airport was obtained from FAA records. Each airport is identified on **Exhibit 1F**.

Biddeford Municipal Airport is located approximately 13 miles southwest of Portland International Jetport. Biddeford Municipal Airport is owned and operated by the City of Biddeford. A single runway is available for use. Runway 6-24 is 3,000 feet long and 75 feet wide. Runway 6 has a VOR and a GPS published instrument approach. There are approximately 41 based aircraft at Biddeford. General aviation services provided at Biddeford Municipal Airport include fueling, and major airframe and powerplant service. Each airport is also identified on **Exhibit 1F**.

Limington Harmon Airport is located 19 miles west of Portland International Jetport. Limington Harmon Airport is a privately-owned, public-use airfield with a single runway measuring 2,973 feet in length and 50 feet wide. There are approximately 43 based aircraft. There is not an operating ATCT at Limington Harmon Airport, and approaches to Limington Harmon are under visual flight rules (VFR). General aviation services provided at Limington Harmon include fueling, and major airframe and powerplant service.

Brunswick Naval Air Station Airport is located approximately 22 miles northeast of Portland International Jetport. Brunswick Naval Air Station Airport is a private airport, owned and operated by the United States Navy. There are two parallel runways at Brunswick Naval Air Station Airport, both 8,000 feet long and 200 feet wide.

There is an operating ATCT at the air station.

Sanford Regional Airport is located approximately 23 miles southwest of Portland International Jetport. Sanford Regional Airport is owned and operated by the City of Sanford. There are two runways at Sanford Regional Airport. The longest runway is 6,000 feet by 150 feet wide. Sanford Regional Airport does not have an operating ATCT. There is one published ILS instrument approach, two VOR instrument approaches, one NDB and one GPS instrument approach into Sanford Regional Airport. There are approximately 67 based aircraft at Sanford Regional. The full range of general aviation services are provided at Sanford Regional Airport.

Auburn/Lewiston Municipal Airport is located approximately 24 miles north of Portland International Jetport. Auburn/Lewiston Municipal Airport is owned and operated by the Cities of Auburn and Lewiston. There are two runways at Auburn/Lewiston Municipal Airport. The largest runway has a length of 5,001 feet long by 100 feet wide. There is not an operating ATCT at Auburn/Lewiston Municipal Airport. There are approximately 63 based aircraft at Auburn/Lewiston Municipal Airport. A full range of general aviation services are available at Auburn/Lewiston Municipal Airport.

LANDSIDE FACILITIES

Landside facilities are the facilities that support the aircraft and pilot/passenger handling functions. These facilities typically include a terminal building, aircraft parking aprons, and support facilities such as fuel storage, automobile parking, roadway access, and aircraft rescue and firefighting. The landside facilities at Portland International Jetport are identified on **Exhibit 1G**.

Passenger Terminal Complex

The passenger terminal is located along the north side of Runway 11-29. The current terminal configuration was redesigned since the last master plan. A new airport access road and entrance was developed; automobile parking areas expanded, including a new multilevel garage; automobile rental agencies were relocated to the lower level of the garage and a new agency storage lot developed; in addition, the east end of the terminal was expanded adding baggage claim and office space capacity.

Terminal Access Roadways

The main airport access off Congress Street (Route 9) was relocated from Westbrook Street to newly developed International Parkway. This new entrance reflects ongoing modernization of the Jetport, and shifted airport traffic away from the noise-sensitive Stroudwater residential area. Johnson Road, along the airport's west boundary, was redesigned to accommodate the recent runway extension, which was built entirely in this direction. Congress Street is a four-lane bidirectional highway that extends from downtown Portland past the airport and the Maine Turnpike and be-

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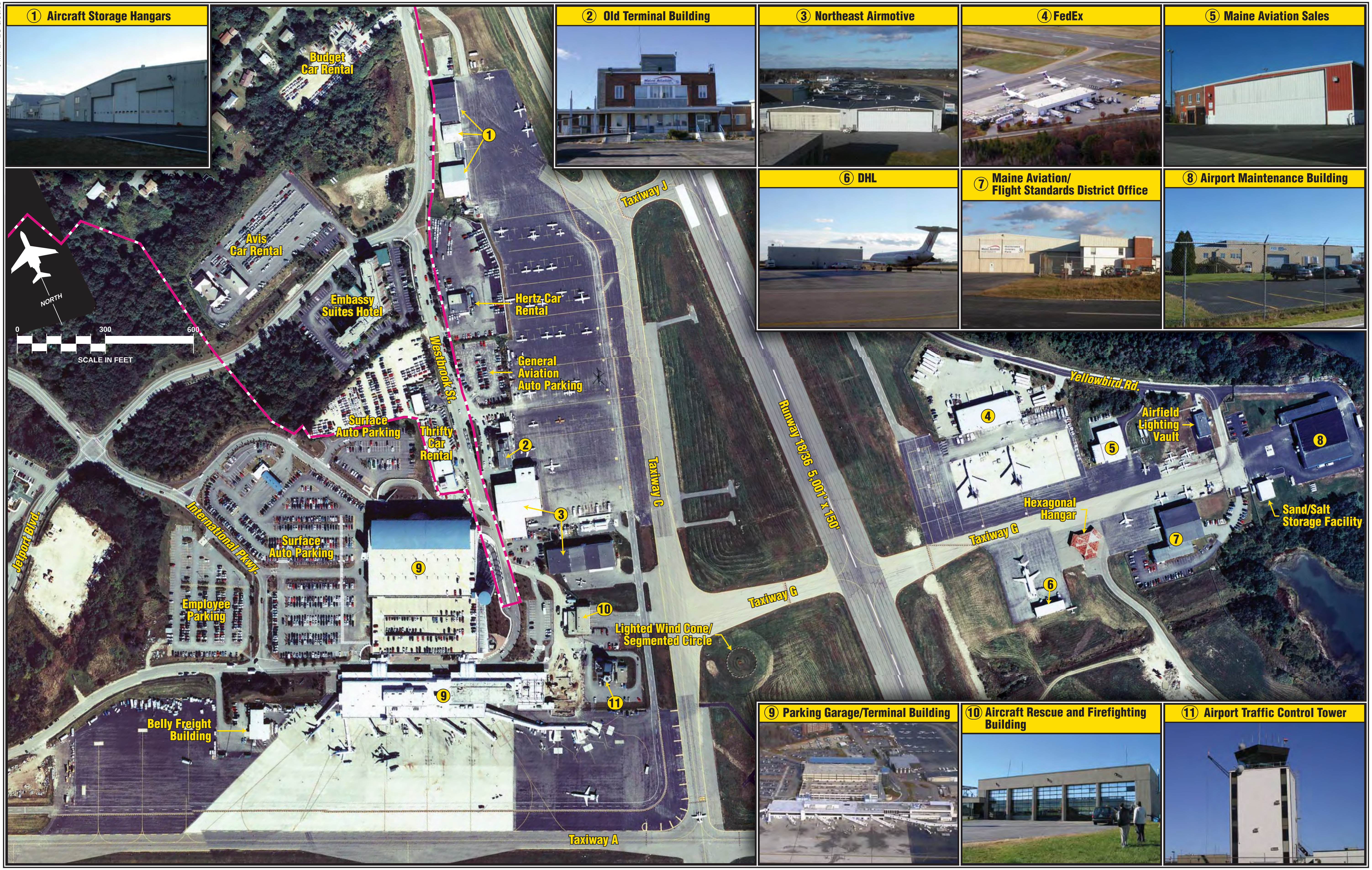

Exhibit 1G
LANDSIDE FACILITIES

yond. Traffic approaching the airport from the east would utilize the International Parkway entrance, while traffic from the west would either use the Jetport Boulevard entrance off Johnson Road or may continue east on Congress to the primary entrance. There is no advantage of one over the other. Both feed into the Jetport Access Road, which becomes a one-way loop around the parking lots and garage area and terminal building entrances.

Terminal Curb Frontage

The Jetport Access Road widens from two to three lanes approaching the terminal building. The left lane feeds into both short and long-term parking lots/garage, while the right lanes continue straight through, with ample room for passenger drop off and pickup. Transportation Security Administration (TSA) rules prohibit parking along this area, even short stays typically draw the attention of airport police and security personnel.

Terminal access provides multiple entrances to the building, with entry to airline ticket counters along the west end and the baggage area on the east end.

Vehicle Parking

Since the last update, the airport has revamped its automobile parking infrastructure, highlighted by construction of a $29.2 million six-level garage. This facility has five public levels of parking (all long-term), as well as a sixth underground level for rental car pickup and drop-off. Overall the airport has seven lots (five public and two employee) with a total capacity of 3,253 automobiles, including handicap spaces. There are 145 public short-term spaces located on the first level of the original garage, closest to the terminal building; 2,550 public long-term spaces located in the old and new garages, a new surface lot, and in the remote lot located two miles west of the airport on Outer Congress Street. There are 320 parking spaces designated for employees of the airport and its associated tenants. The sub-level of the new garage includes 238 spaces for rental car ready and return. **Table 1J** shows the capacity of each parking lot.

TABLE 1J
Automobile Parking Lots
Portland International Jetport

Lot	Capacity
Old Garage Short-Term (First Floor)	145
Old Garage Long-Term (Upper Levels)	478
New Garage Long-Term	1,171
New Garage Rental Car	238
Surface Lot Long-Term	501
Remote Lot Long-Term	400
Old (East) Employee Lot	225
New (North) Employee Lot	95
Public Short-Term Total	**145**
Public Long-Term Total	**2,550**
Employee Total	**320**
Rental Car Ready Total	**238**
Airport Total	**3,253**

Notes: Capacity includes handicap spaces; remote lot located off-airport; employee lots not open to public.
Source: Airport Management

Passenger Terminal Building

Recently completed improvements to the Jetport include a multimillion dollar expansion of the east end of the terminal building, which doubled the capacity of the baggage claim area, while providing additional office space on the second level, and a new partial third level that will house a mechanical penthouse with generator room. The new space adds 24,000 square feet to the existing 136,000 square feet, for a total capacity of 160,000 square feet. The terminal is a two-story linear design. Departing passengers enter the terminal on ground level, generally through the west end of the terminal where all airline ticket counters are located. Security processing and gates are on the second level. This area also contains the airport's four concessions (restaurant, snack bar, newsstand, and novelty shop), which combined with an expanding security screening area, creates a bottleneck during peak travel times.

Arriving passengers exit the second level and proceed to the baggage claim area at the terminal's east end, then exit to ground transportation via the access points used by departing passengers and visitors. Rental car customers proceed to the east end of the new parking garage, lower level.

There are 11 loading gates, including seven serviced with aircraft loading fingers. Six are standard size and three are designed for loading regional jets. The remaining two gates are designed for ground access to smaller aircraft.

Exhibit 1H graphic shows the existing terminal layout, both first and second levels.

Passenger Terminal Apron

No changes to the size of the passenger terminal apron have occurred since the last update in 1994. The apron is a rectangular 96,000 square foot ramp (2,160 feet x 400 feet) adjacent to the terminal building, with adequate room to service seven to eight air transport category aircraft simultaneously. In addition, a belly cargo ramp west of the main ramp serves as a marshalling area for spare aircraft.

Air Cargo Facilities

The primary air cargo facility is located on the eastside general aviation apron. One major change that has occurred since the last update in 1994 is the improvement of air cargo service from the Jetport. Both FedEx and DHL operate from the cargo area.

FedEx leases three ramp positions totaling 55,000 square feet. DHL leases one ramp position totaling 26,000 square feet.

General Aviation

A fixed-base operator (FBO), Northeast Airmotive, operates on the field, providing typical general aviation services. There are also two specialized aviation service operators (SASOs), Maine Aviation and Maine Aviation Sales, at the Jetport. The main offices of Northeast Airmotive and Maine Aviation are located on the west gen-

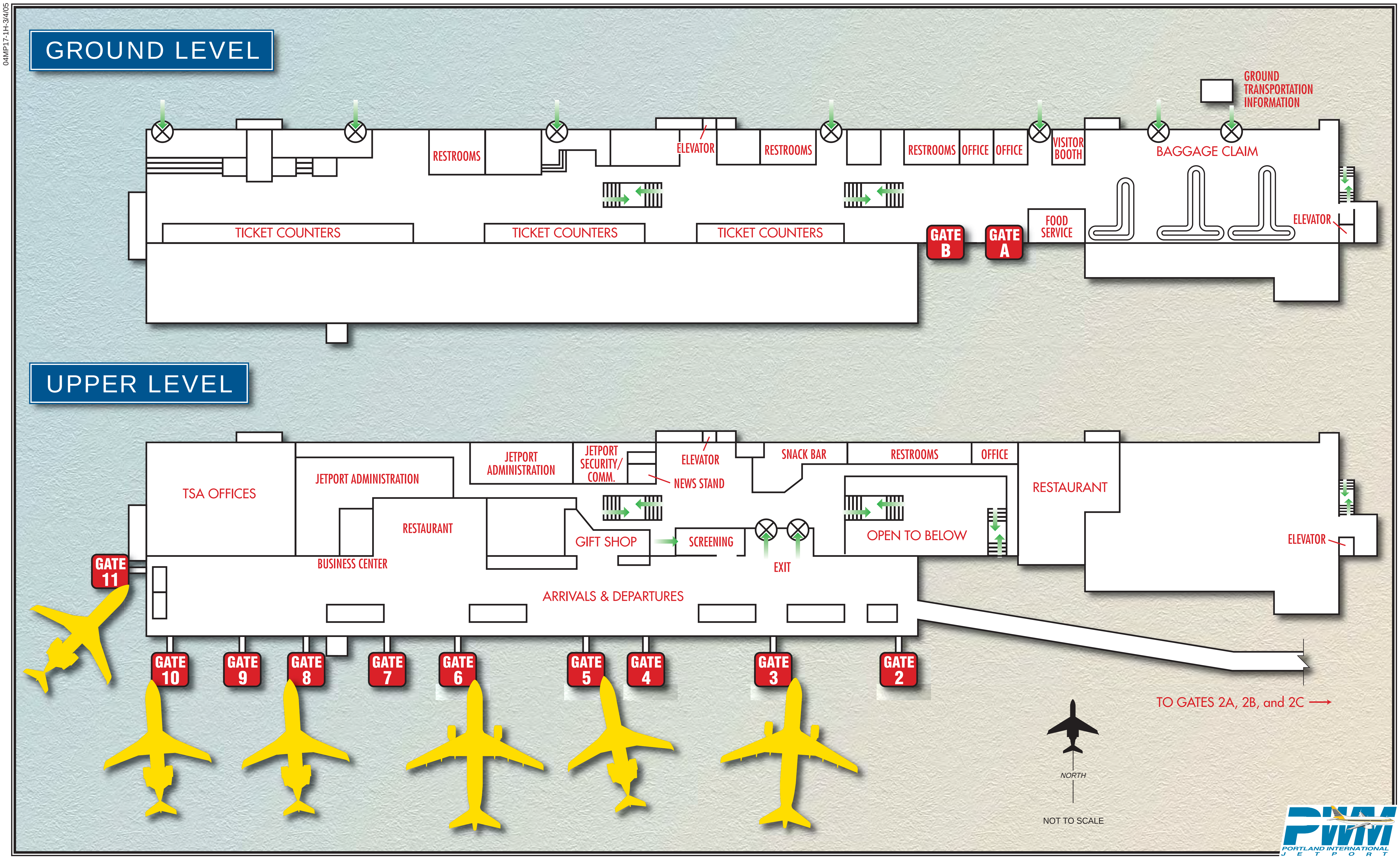

Exhibit 1H
TERMINAL FLOORPLAN

eral aviation ramp west of Runway 18-36 and north of Runway 11-29, off Taxiway C. Public access to both businesses is off Westbrook Street. The main offices for Maine Aviation Sales are located off from the Jetport's east general aviation apron, which is situated at the end of Taxiway G, east of Runway 18-36. Public access to this business is off Yellowbird Road. **Table 1K** highlights the general services offered by Northeast Airmotive and Maine Aviation.

TABLE 1K
FBO Services
Portland International Jetport

Services	Northeast Airmotive	Maine Aviation
Aircraft Charters	X	X
Aircraft Maintenance	X	X
Aircraft Modifications	X	X
Aircraft Parking	X	--
Aircraft Parts	X	X
Avionics Sales and Service	X	X
Car Rental	X	--
De-icing Service	X	--
Flight Training	--	X
Fuel	X	--
Ground Handling	X	X
Hangars	X	--
Oxygen Service	X	--
Passenger Terminal/Lounge	X	--
Weather/Briefing Services	X	--

Source: Airnav.com

- **Northeast Airmotive** operates from a large commercial hangar with adjoining office space, consisting of approximately 10,000 square feet. Northeast Airmotive leases and operates an 18,500 square foot conventional hangar used primarily for short and long-term aircraft parking. They also have ramp space with approximately 45 tie-down locations.

- **Maine Aviation Corporation** operates a maintenance facility on the east general aviation ramp, off Taxiway H. Access is from Yellowbird Road and Al McKay Ave.

- **Maine Aviation Sales** is located in two hangars on the FSDO ramp, one on the north and one on the south side. Maine Aviation Sales deals exclusively with aircraft sales.

East General Aviation Area

The east general aviation area is located off Taxiway G, east of Runway 18-36. Space is limited, consisting of approximately 90,000 square feet of pavement, with approximately 33 tie-down spaces. The SASO operates in an 8,000 square foot hangar. A separate conventional hangar is located on the south side of the apron, with space for up to six general aviation aircraft. Limited automobile parking is available on the east side of the hangar.

West General Aviation Area

The west general aviation ramp is the main source of aircraft servicing for all non-air carrier aircraft. As discussed, it is the primary business address for Northeast Airmotive, and Maine Aviation, and contains the largest number of aircraft parking spaces, including tiedowns. In addition, the only general aviation self-service fueling terminal is located on this ramp, as well as storage facilities for both aviation gasoline and jet fuel.

The west general aviation ramp is 425,000 square feet and contains approximately 60 parking spaces for small aircraft, and a large maneuvering/parking ramp for larger corporate aircraft. Public and user automobile parking for the west general aviation ramp is very limited; however, the airport's commercial parking facilities are within walking distance, as is one of two hotels located in the local area.

Support Facilities

The previous sections addressed airside and landside facilities. This section discusses other related facilities that support airport operations.

Part 139 Certification

CFR Part 139 prescribes rules governing the certification and operation of land airports that serve any scheduled or unscheduled passenger operation of an air carrier that is conducted with an aircraft having a seating capacity of more than nine passengers.

Under this certification process, airports are reclassified into four new classes, based on the type of air carrier operations served:

- **Class I Airport** – an airport certificated to serve scheduled operations of large air carrier aircraft that can also serve unscheduled passenger operations of large air carrier aircraft and/or scheduled operations of small air carrier aircraft. Portland International Airport is a Class I airport.
- **Class II Airport** – an airport certificated to serve scheduled operations of small air carrier aircraft and the unscheduled passenger operations of large air carrier aircraft. A Class II airport cannot serve scheduled large air carrier aircraft.
- **Class III Airport** – an airport certificated to serve scheduled operations of small air carrier aircraft. A Class III airport cannot serve scheduled or unscheduled large air carrier aircraft.
- **Class IV Airport** – an airport certificated to serve unscheduled passenger operations of large air carrier aircraft. A Class IV airport cannot serve scheduled large or small air carrier aircraft.

Airport Rescue And Firefighting (ARFF)

14 CFR Part 139 airports are required to provide aircraft rescue and fire fighting (ARFF) services during air carrier operations that require a Part 139 certificate. Each certificated airport maintains equipment and personnel based on an ARFF index established according to the length of aircraft and scheduled daily flight frequency. There are five indices, A through E, with A applicable to the smallest aircraft and E the largest (based on wingspan). Portland International Jetport falls within ARFF Index C. As such, the Jetport is required to maintain a fleet of equip-

ment and properly trained personnel consistent with this standard.

The Portland International Jetport ARFF facility is located on the corner of Taxiways A and C, centrally placed between the terminal and east general aviation ramps. **Exhibit 1G** shows the location of the facility on the airport. **Table 1L** is an itemized list of the airport's ARFF equipment including firefighting agent capacities.

Airport Maintenance And Snow Removal

Jetport personnel handle most airport maintenance and all snow removal operations, operating out of a large facility located on the eastern boundary of the airport, across from the east general aviation ramp.

TABLE 1L
ARFF Equipment Inventory
Portland International Jetport

Year-Make-Model	Dry Chemical (lbs.)	Water (gal.)	AFFF (gal.)	Halon 1211 (lbs.)	Halotron (lbs.)	Turret Gun Speed (GPM)
1991 Chevrolet C-30	450	N/A	N/A	N/A	N/A	N/A
1976 Walter CT4 1500 BSQG	N/A	1,500	150	N/A	N/A	Roof: 600 Bumper: 300
1989 Oshkosh T3000	N/A	3,000	405	500	N/A	Roof: 600/1200 Bumper: 350
2001 Oshkosh T1500	N/A	1,500	210	N/A	500	Roof: 750/375* Bumper: 300

* Snozzle elevated waterway
Source: Airport Management (January 2005).

The maintenance/SRE Building was originally built in 1974, with a 5,300-square foot floor plan. It has since been extended four times, bringing the total size to 35,600 square feet.

Table 1M is the current SRE inventory.

TABLE 1M
SRE Inventory
Portland International Jetport

Model Year	Vehicle Type	Equipment/Function	Scheduled Replacement Year
1986	4x4 Tractor	16' Front Mounted Broom	2006
1985	4x4 Tractor	16' Front Mounted Broom	2005
1990	4x4 Tractor	16' Front Mounted Broom	2010
1985	4x4 Tractor	5,000-ton-per-hour Snow Blower	2005
1990	4x4 Tractor	5,000-ton-per-hour Snow Blower	2010
1985	4x4 Front-end Loader	20' Ramp Blade with miscellaneous Buckets	2006
1991	4x4 Front-end Loader	20' Ramp Blade with miscellaneous Buckets	2011
1978	6x6 Truck	13' Plow (2) 12' wings, 10-cubic yard wet/dry spreader	2005
1979	6x4 Truck	13' Plow, 8-cubic-yard Wet/Dry Spreader	2005
1992	4x4 Truck	22' Plow	2012
1992	4x4 Truck	22' Plow	2012
1992	4x2 Truck	12' Plow, 11' Wing, 8 cubic yard spreader	2016
2001	4x4 Truck	400-on-per-hour Snow Blower	2012
1993	4x4 Truck	9' Plow with 1.5-cubic-yard Spreader	2005
2002*	4x2 Truck	2,000-gallon Liquid Dispenser with 50' Spray Broom	2012

* Rebuilt
Source: Airport Management (January 2005).

Fuel Storage

Under revised 14 CFR Part 139.321, *Handling and Storing of Hazardous Substances and Materials*, the FAA has clarified the airport operator's responsibility for fuel storage areas owned or operated by tenant air carriers. Specifically, the FAA has deleted paragraph (h), which exempted the airport operator from overseeing Part 121 or 135 air carrier fueling operations to ensure compliance with Part 139 fuel fire safety requirements. Accordingly, the FAA holds airport operators responsible for protecting against fire and explosion in air carrier fuel storage facilities. This will ensure that all fuel storage facilities at Part 139 airports are inspected in the same manner and held to the same fuel fire safety standards.

A wide range of fuel and glycol is stored on the airport in tanks ranging from small personal containers to 25,000-gallon bulk storage tanks. The significant facilities are listed in **Table 1N**.

TABLE 1N
Fuel Tanks
Portland International Jetport

Location	Installed	Type Containment	Fuel Type	Capacity (gallons)	Ownership
East of Northeast Air's hangar on south side of GA ramp	1998	Double-walled steel tank sitting in concrete containment tub	Auto Gas	3,000	Northeast Air
East of Northeast Air's hangar on south side of GA ramp	1998	Double-walled steel tank	Jet A	25,000	Northeast Air
East of Northeast Air's hangar on south side of GA ramp	1998	Double-walled steel tank	Jet A	25,000	Northeast Air
East of Northeast Air's hangar on south side of GA ramp	1998	Double-walled steel tank	Jet A	12,000	Northeast Air
East of Northeast Air's hangar on south side of GA ramp	1998	Double-walled steel tank	Diesel	12,000	Northeast Air
Centered on west edge of GA ramp in the north complex	1960s	Double-walled steel tank in concrete containment tub	Avgas (100LL)	20,000	City of Portland
South of Jetport maintenance building	1999	Double-walled steel tank, bulk headed for diesel and auto gas	Auto Gas Diesel	4,000 6,000	City of Portland
North end of airfield lighting vault	2004	Double-walled steel tank	Diesel	2,000	City of Portland
Northeast corner of ALSFF generator vault	2004	Double-walled steel tank surrounded by concrete vault	Diesel	2,000	FAA

Source: Airport Management (January 2005).

National Weather Service

The National Weather Service (NWS) office was moved to Gray, Maine, since the last update was published in 1994. NWS personnel and facilities were replaced by the ASOS (discussed earlier).

Rental Car Service and Storage

There are five car rental agencies located on the Jetport: Avis, Hertz, Alamo, Budget, and National conduct business at Portland International Jetport. All five agencies have counter space in the lower level of the new parking garage located directly across from the terminal exit. All five agencies have service and storage facilities on the Jetport or on private property adjacent to the airport. Enterprise operates from an off-site location.

Noise Wall

A concrete noise barrier was constructed in 1991, near the corner of Taxiway C and the Runway 18 end. The wall is designed to minimize noise impacts on the Stroudwater residential neighborhood located along the west side of Westbrook Street.

TRANSPORTATION NETWORK

REGIONAL HIGHWAY SYSTEM

Several significant changes to the regional highway system took place since the last update. The Maine Turnpike was widened from two to three lanes, from Portland to the New Hampshire state line, and redesignated I-95 along its entire length. In addition, I-295, which begins in South Portland, was also redesignated along its entire route to the point where it reemerges with I-95 just south of Augusta. Exit numbers along the entire Interstate system in Maine were renumbered from the former numeric sequential system, to mile marker designations.

Essentially, the Jetport is ideally situated to the major east coast Interstate (I-95), providing easy access to Houlton in northern Maine, to southern Florida. I-295 provides ready access to the smaller communities east of the Jetport (Falmouth, Yarmouth, Freeport, Brunswick, and others), and U.S. Route 1 connects Portland to all major ports along the Atlantic coast, as far north as the Canadian border.

A key new interchange (Exit 46) was constructed, connecting with Congress Street immediately west of the airport. This new exit provides quick and reliable access to the turnpike, considerably reducing travel time to and from the Jetport.

PUBLIC TRANSPORTATION

The public transportation network in and around Portland is extensive. Besides the Jetport, bus, rail, boat, and taxi service provides essential transportation for both pleasure and business.

Taxi service at the Jetport is provided by several businesses. In addition, the Portland Explorer provides continuous bus transportation from the airport to the local airport hotels, downtown Portland, the Amtrak station, and the Maine Mall. Travelers can connect with scheduled water transportation services at the city's waterfront terminal in downtown Portland.

SOCIOECONOMIC DATA

The demographic characteristics of the service area, in terms of population, employment, and income, are reviewed to assist in the bottom-up analysis. These will be compared to trends at the state and county levels and then used in the forecast analyses in the next chapter.

POPULATION

Table 1P presents historical population changes for Maine, Cumberland County, and the Portland Metropolitan Statistical Area (MSA). Population in the Portland MSA had a 1.3 percent average annual growth rate from 1970 to 2005, while Cumberland County and Maine grew by 1.0 percent and 0.8 percent respectively over the same time period.

TABLE 1P Historical Population Cumberland County, Portland MSA and State of Maine						
Year	**Cumberland County**	**Percent Change**	**Portland MSA**	**Percent Change**	**Maine**	**Percent Change**
1970	193,350	N/A	329,250	N/A	998,040	N/A
1980	216,580	12.0%	386,090	17.3%	1,127,820	13.0%
1990	243,865	12.6%	442,790	14.7%	1,227,928	8.9%
2000	266,138	9.1%	489,310	10.5%	1,274,923	3.8%
2005	274,950	3.2%	514,227	4.8%	1,321,505	3.5%
Average Annual Growth Rate						
1970-2000	Cumberland County – 1.0%		Portland MSA – 1.3%		Maine – 0.8%	
Source: U.S. Bureau of the Census						

Specific population facts include:

- In the 30 years since the 1970 census, Maine's population has grown by more than 300,000 residents, from 998,040 residents in 1970, to 1,321,505 residents in 2005. This represented a 32 percent increase in population; nationwide, there was a 38 percent increase in that period.

- Not only has Maine's population changed in size, it has changed in composition as well. In 1970, Maine's children and young adults (residents from birth to age 25) made up nearly half of the population (46 percent) – the same proportion that was observed nationally. By 2000, that proportion had diminished to 32 percent in Maine and to 35 percent nationwide.

- The greatest shift in Maine's population occurred with residents aged 25 to 64; their numbers grew by more than 260,000 individuals. This is important because this age group represents business and pleasure travelers. With that increase in numbers, by 2000, that segment of the population accounted for more than half (54 percent) of Maine's residents. Although they represented just two percent of the state's population in 2000, the segment of the population represented by Maine's oldest residents, those 85 years old or older, more than doubled in size, from fewer than 10,000 residents in 1970, to more than 23,000 residents in 2000. Nationwide, this segment of the population tripled in size.

- From 1970 to 2000, the median age of Maine residents increased from 29 to 39 years old, while nationally it rose from age 28 to 35.

- Only one Maine county had fewer residents in 2000 than it did in 1970; Aroostook County began the period with 92,463 residents, but by 2005, there were 73,240 – a 20 percent population loss (19,403 residents).

- The largest county in terms of population is Cumberland, which includes Portland, South Portland, and Westbrook; cities that abut the Jetport.

EMPLOYMENT

Table 1Q summarizes total employment for the Portland MSA, Cumberland County and the State of Maine from 1970 to 2000. As shown in the table, the Portland MSA recorded healthy growth in total employment between 1970 and 2000. During that 30-year period, total employment in Portland MSA grew by 170,130, growing by an average of 2.8 percent annually. Cumberland County experienced a higher growth rate in total employment, with an average annual increase of 3.0 percent. The State of Maine had an annual average growth rate of 2.1 percent.

TABLE 1Q
Total Employment
Cumberland County, Portland MSA and The State of Maine

Year	Cumberland County	Percent Change	Portland MSA	Percent Change	Maine	Percent Change
1970	99,410	N/A	156,760	N/A	445,890	N/A
1980	128,710	29.5%	205,520	31.10%	554,820	24.4%
1990	182,990	42.2%	287,470	39.90%	706,930	27.4%
2000	215,030	17.5%	326,890	13.70%	793,360	12.2%
Average Annual Labor Force Growth Rate						
1970-2000	Cumberland County – 3.0%		Portland MSA – 2.8%		Maine – 2.1%	

Source: U.S. Bureau of the Census

Exhibit 1J is a snapshot of the employment market sectors in Cumberland County from 1970, 1980, 1990 and 2000. Only three sectors saw a decrease in jobs over the 30-year period. The sectors with the largest percent increase were agricultural services and the services sector, while the sector with the largest increase in number of jobs was the services sector, adding more than 54,000 jobs. Overall, the county saw a 116 percent increase of jobs, adding more than 115,000 jobs since 1970.

The City of Portland has consistently been below the national and state average unemployment rate, as shown in **Table 1R**.

TABLE 1R
Unemployment Rate
Portland, Maine, The United States

Year	Portland	Maine	United States
1990	4.3%	5.2%	5.6%
1991	6.8%	7.6%	6.8%
1992	6.3%	7.2%	7.5%
1993	7.2%	7.9%	6.9%
1994	6.1%	7.4%	6.1%
1995	4.2%	5.7%	5.6%
1996	3.4%	5.1%	5.4%
1997	3.5%	5.4%	4.9%
1998	2.8%	4.4%	4.5%
1999	2.5%	4.1%	4.2%
2000	2.2%	3.5%	4.0%
2001	2.6%	3.9%	4.7%
2002	3.2%	4.4%	5.8%
2003	3.4%	5.1%	6.0%
2004	2.9%	4.7%	5.5%

Source: U.S. Department of Labor, Bureau of Labor Statistics

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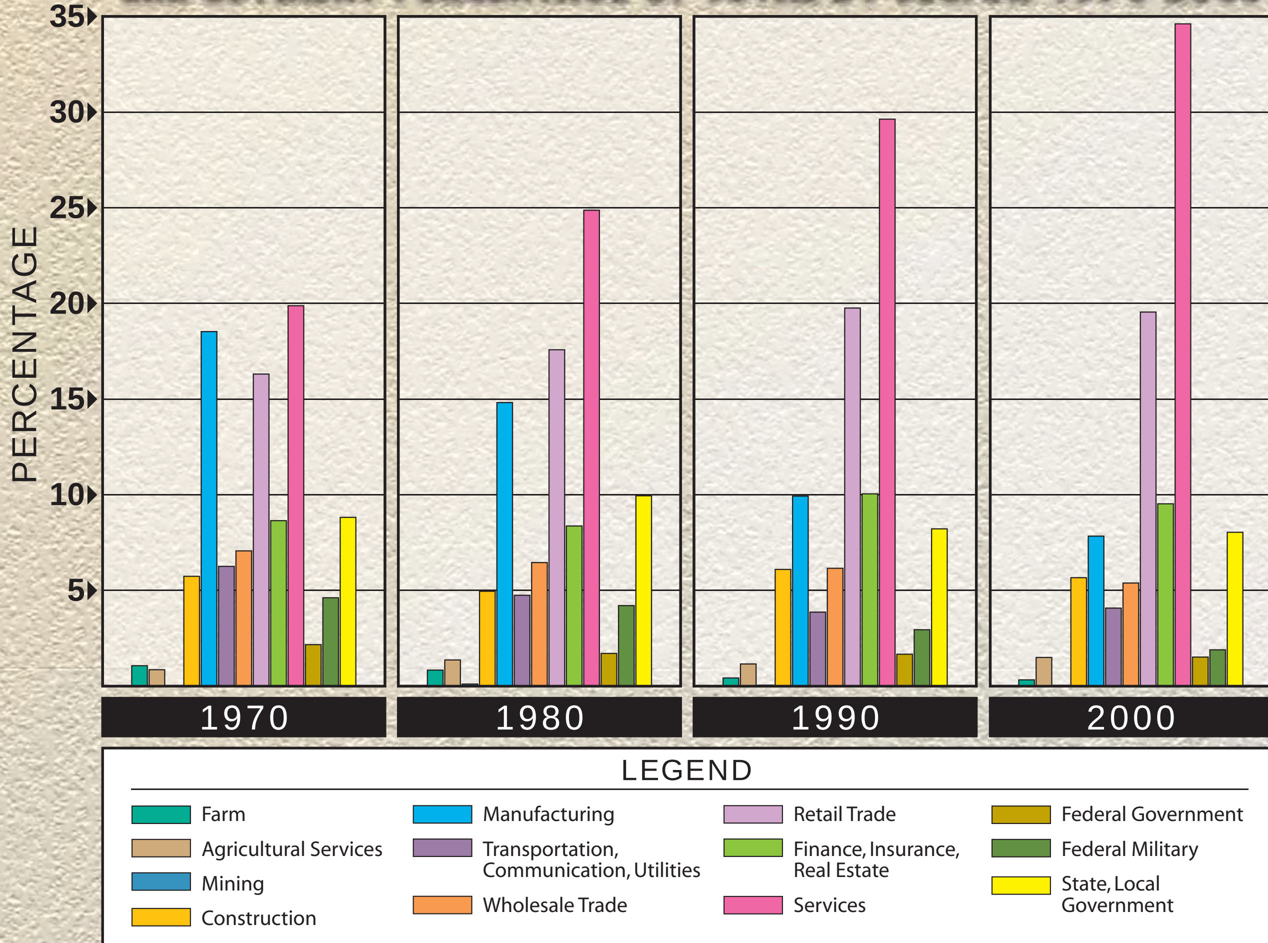
EMPLOYMENT PERCENTAGE OF TOTAL BY SECTOR 1970-2000



EMPLOYMENT BY SECTOR 1970-2000 • CUMBERLAND COUNTY

INDUSTRY	1970	1980	1990	2000
Farm	1,060	1,080	790	720
Agricultural Services	850	1,760	2,130	3,220
Mining	30	140	100	80
Construction	5,710	6,390	11,170	12,200
Manufacturing	18,420	19,070	18,170	16,860
Transportation, Communication, Utilities	6,220	6,120	7,090	8,770
Wholesale Trade	7,030	8,310	11,280	11,590
Retail Trade	16,210	22,630	36,150	42,040
Finance, Insurance, Real Estate	8,600	10,770	18,390	20,490
Services	19,760	32,010	54,220	74,430
Federal Government	2,160	2,200	3,060	3,260
Federal Military	4,590	5,420	5,390	4,090
State, Local Government	8,770	12,810	15,050	17,280
Total Employment	***99,410***	***128,710***	***182,990***	***215,030***

PWM PORTLAND INTERNATIONAL JETPORT

Exhibit 1J
EMPLOYMENT BY SECTOR

PER CAPITA PERSONAL INCOME

Per capita personal income (PCPI) for Cumberland County, the Portland MSA, and the State of Maine is summarized in **Table 1S.** PCPI is determined by dividing total income by population. For PCPI to grow significantly, income growth must outpace population growth. As shown in the table, PCPI for the Portland MSA has grown significantly since 1970, growing at an average annual rate of 2.7 percent between 1970 and 2000. Cumberland County and the State of Maine have also seen an increase in PCPI; growing 2.9 percent and 2.5 percent, respectively, annually over the same time period.

TABLE 1S
Per Capita Personal Income
1970-2000

Year	Cumberland County	Portland MSA	Maine
1970	$14,158	$13,561	$12,210
1980	17,405	16,672	15,215
1990	25,244	23,524	20,405
2000	29,831	27,239	23,961
Average Annual Per Capita Personal Income Growth Rate			
1970-2000	2.9%	2.7%	2.5%

Source: U.S. Bureau of the Census
Inflation adjusted to 1996 dollars

ENVIRONMENTAL INVENTORY

Available information about the existing environmental conditions at Portland International Jetport has been derived from the 1999 *Environmental Assessment,* the *2003 Form "C" Environmental Assessment,* as well as from internet resources, agency maps, and existing literature. The intent of this task is to inventory potential environmental sensitivities that might affect future improvements at the airport.

AREA LAND USE

Portland International Jetport is located in southwest Portland, Maine. The airport is bordered on the east by the Fore River, the north by the Stroudwater Historic District and Brooklawn Memorial Cemetery, the west by State Route (SR) 9 (Johnson Road/Western Avenue) and Interstate 95 (Maine Turnpike), the south by the City of South Portland's Redbank neighborhood, the Maine Youth Center, and Long Creek.

Exhibit 1K depicts land uses in the vicinity of the Jetport. East/northeast of the airport are urban areas which include transportation facilities, commercial, and industrial uses. There are also a number of residences, schools, and hospitals in the area. Immediately north of the jetport are some airport-related commercial businesses, the Stroudwater neighborhood (residential), the Fore River Wildlife Sanctuary, UNUM headquarters, and

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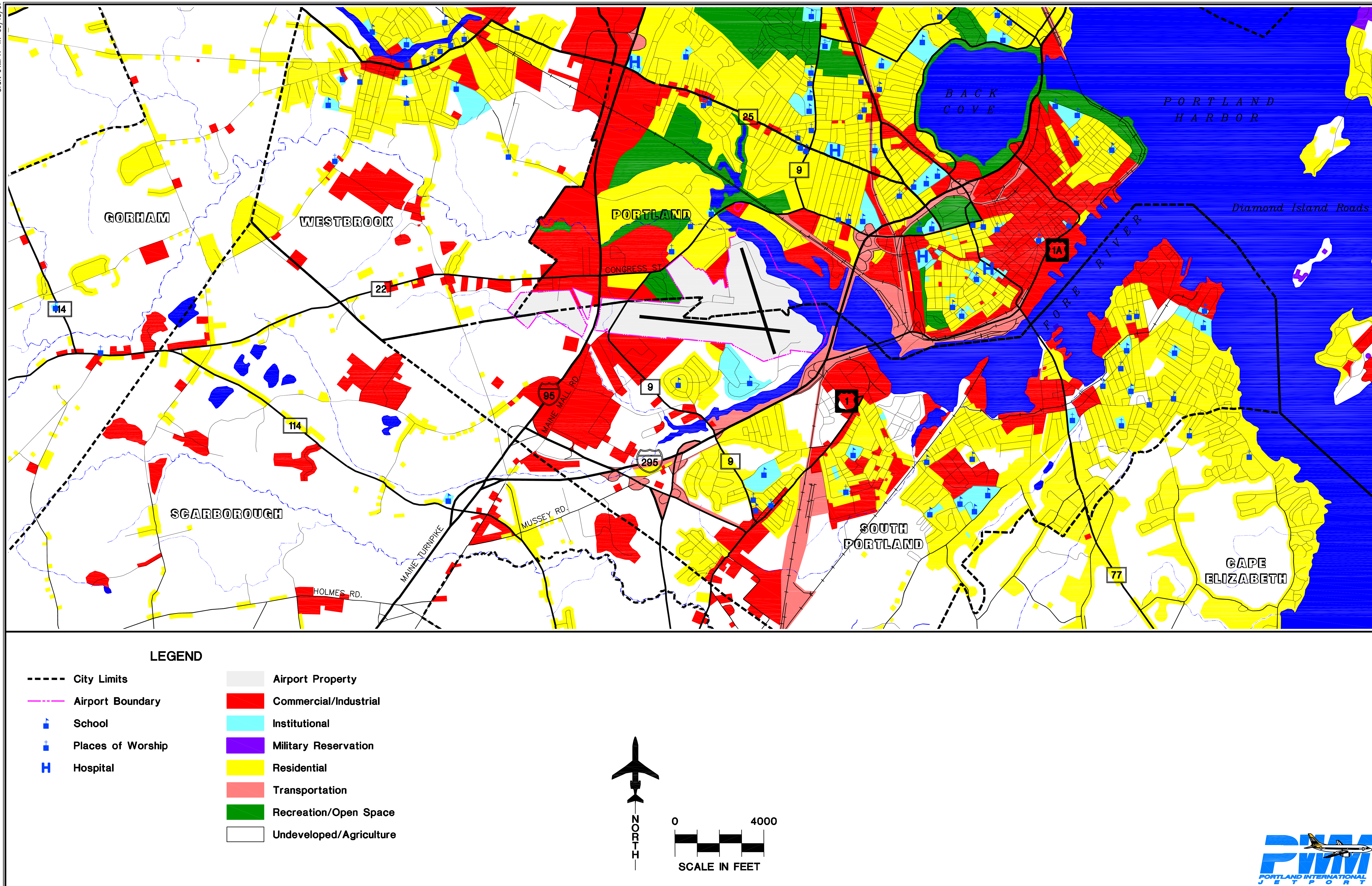

Exhibit 1K
GENERALIZED EXISTING LAND USE

other mixed uses located on Congress Street.

Southwest of the airport, in the City of South Portland, is the Maine Mall regional shopping center for the metropolitan area. This area also includes industrial uses. Immediately south of the jetport is the Redbank residential neighborhood of South Portland and the Maine Youth Center.

West of the Jetport is predominately agriculture or undeveloped land. There are isolated pockets of commercial and industrial uses as well as scattered residential units. The Town of Westbrook is located northwest of the airport.

HISTORIC AND CULTURAL RESOURCES

An archaeological sensitivity assessment was completed in 1998. It was determined that the Jetport is located within an area of low sensitivity for prehistoric resources with the exception of the frontage along Fore River. While shore lines are typically assessed as moderate to high for prehistoric sensitivity, the topography of the west bank of the Fore River is predominately comprised of a steep slope where the potential for recovery of prehistoric sites is low.

A Phase I archaeological survey was completed in 2002 for an area proposed to be acquired and developed by the Jetport. This survey revealed two prehistoric archaeological sites that require a Phase II investigation to determine their eligibility for listing in the National Register. It was determined that since these areas would not be disturbed by the proposed improvements, a Phase II study would not be necessary. A Phase II study would be necessary, however, prior to any construction in the area of the identified sites.

As previously identified, the Stroudwater Historic District is located northwest of the Jetport and the Maine Youth Center (State Reform School National Historic District) is located directly south.

WETLANDS

Wetlands are defined by *Executive Order 11990, Protection of Wetlands,* as "those areas that are inundated by surface or groundwater with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction." Categories of wetlands includes swamps, marshes, bogs, sloughs, potholes, wet meadows, river overflows, mud flats, natural ponds, estuarine area, tidal overflows, and shallow lakes and ponds with emergent vegetation. Wetlands exhibit three characteristics: hydrology, hydrophytes (plants able to tolerate various degrees of flooding or frequent saturation), and poorly drained soils.

The study area is dominated by urban and developed land uses; however, approximately 57 acres of wetlands have been previously delineated as occurring on airport property. It has been determined that wetlands present in the airport vicinity are heavily influenced by the area's poorly drained marine sediment soils. In previous studies, the wetlands were identified within four different regions including airfield wetlands, the Fore River intertidal zone, wetlands associated with the Maine Turnpike, and the support parcel area wetlands. The functional values of these wetlands vary greatly depending on location. **Exhibit 1D** depicts mapped wetlands at the Jetport.

FLOODPLAINS

As defined in the *FAA Order 1050.1E*, floodplains consist of "lowland and relatively flat areas adjoining inland and coastal water including flood prone areas of offshore islands, including at a minimum, that area subject to one percent or greater chance of flooding in any given year." Executive Order 11988 directs federal agencies to take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values served by the floodplains. Department of Transportation (DOT) Order 5650.2 contains DOT's policies and procedures for implementing the executive order. The limits of base floodplains are determined by Flood Insurance Rate Maps (FIRM) prepared by the Federal emergency Management Agency (FEMA). According to the FIRM map, there are 100-year flood areas associated with the Fore River, located east of Runway 11-29, and Long Creek, located south of Runway 11-29.

WATER QUALITY

Portland International Jetport is connected to the Portland Water District sewage collection system. The Jetport is connected via an eight-inch sanitary sewer line located along SR 9.

The existing stormwater collection and distribution system at the Jetport is comprised of a network of underdrains, catchbasins, drainage ditches, culverts, a detention pond, vegetative swales, and outlet pipes/swales. This network addresses all of the runoff from the various airside and landside facilities at the airport.

COASTAL RESOURCES

Federal activities involving or affecting coastal resources are governed by the Coastal Barriers Resource Act (CBRA), the Coastal Zone Management Act (CZMA), and E.O. 13089, Coral Reef Protection.

The Jetport is located within a defined coastal zone. Compliance with the CZMA is achieved through compliance with existing state land use and water protection regulations, and shoreland protection regulations. The Jetport is not located within the Coastal Barrier Resource or Coral Reef Protection Systems.

BIOTIC RESOURCES

Biotic resources refer to those flora and fauna (i.e., vegetation and wildlife) habitats which are present in an area. Impacts to biotic communities are determined based on whether a proposal would cause a minor permanent alteration of existing habitat or whether it would involve the removal of a sizable amount of habitat, habitat which supports a rare species, or a small, sensitive tract.

The area surrounding the Jetport supports six distinct cover types; airfield, urban, shrub, forested, intertidal, and field/shrub. Much of the undeveloped land surrounding the Jetport is disturbed to some extent due to past land practices. These undeveloped areas are also influenced by their proximity to the jetport, and other development in the area.

Previous consultation with federal and state agencies regarding the presence of threatened and endangered species in the project area indicated that there are no federally endangered or threatened species known to exist in the project area. The state indicated that there were no known rare botanical features or records of threatened, endangered, or species of special concern at the jetport.

AIR QUALITY

The Environmental Protection Agency (EPA) has adopted air quality standards that specify the maximum permissible short-term and long-term concentrations of various air contaminants. The National Ambient Air Quality Standards (NAAQS) consist of primary and secondary standards for six criteria pollutants which include: Ozone (O_3), Carbon Monoxide (CO), Sulfur Dioxide (SO_x), Nitrogen Oxide (NO_x), Particulate Matter (PM_{10}), and Lead (Pb).

Primary air quality standards are established at levels to protect the public health and welfare from any known or anticipated adverse effects of a pollutant. All areas of the country are required to demonstrate attainment with NAAQS.

Air contaminants increase the aggravation and the production of respiratory and cardiopulmonary diseases. The standards also establish the level of air quality which is necessary to protect the public health and welfare, including among other things, affects on crops, vegetation, wildlife, visibility, and climate, as well as affects on materials, economic values, and on personnel comfort and well-being.

According to the EPA ‘Greenbook’ website, Cumberland County is a non-attainment area for Ozone. The county is in attainment for all other criteria pollutants.

SOLID AND HAZARDOUS WASTE

The nearest active landfill to the Jetport is the Portland Landfill #1, located on Riverside Street. The South Portland solid waste facility is located on Highland Avenue. This facility was once active and currently serves as a transfer station for solid waste. Both of these facilities are located at a distance greater than 10,000 feet from the jetport and neither is in direct alignment with any of the runway ends.

Fuel and other chemicals are stored in several locations around the Jetport in tanks ranging from small personal containers to 25,000-gallon bulk storage tanks. Aircraft fuel, including both Jet A and AvGas, and auto gasoline are stored by both FBO's. Diesel and auto gasoline, which are used by airport maintenance vehicles, are stored by the City of Portland. Heating oil is stored on-airport. In addition, both the airport maintenance staff and other aviation service providers store various other cleaning, fueling, greasing, and painting products.

In 1996, a fuel spill from a ship affected the area between high and low tide lines along Long Creek. A Phase I Environmental Site Assessment was completed for a parcel proposed for acquisition. It was determined that given clean-up measures taken at the time, and on-going natural remediation, that no further actions were recommended.

SUMMARY

The information discussed on the previous pages provides a foundation upon which the remaining elements of the planning process will be constructed. Information on current airport facilities and utilization will serve as a basis, with additional analysis and data collection, for the development of forecasts of aviation activity and facility requirement determinations. The inventory of existing conditions is the first step in the process of determining those factors which will meet projected aviation demand in the community and the region.

Chapter Two

FORECASTS

CHAPTER TWO

Forecasts

An important factor in facility planning begins with a definition of demand that may reasonably be expected to occur during the useful life of its key components. In airport master planning, this involves projecting potential aviation activity over at least a twenty-year time frame. For small hub, primary commercial service airports such as Portland International Jetport (PWM), forecasts of passengers, cargo, based aircraft, and operations (takeoffs and landings) serve as a basis for facility planning.

FAA Advisory Circular 150/5070-6A outlines six standard steps involved in the forecast process, as listed below:

1. Obtain existing FAA and other related forecasts for the area served by the airport.
2. Determine if there have been significant local conditions or changes in the forecast factors.
3. Make and document any adjustments to the aviation activity forecasts.
4. Where applicable, consider the effects of changes in uncertain factors affecting demand for airport services.
5. Evaluate the potential for peak loads within the overall forecasts of aviation activity.
6. Monitor actual activity levels over time to determine if adjustments are necessary in the forecasts.

Aviation activity can be affected by many influences on the local, regional, and national level, making it virtually impossible to predict year-to-year fluctuations of activity over twenty years with any certainty into the future. Therefore, it is important to remember that forecasts are to serve only as guidelines and planning must remain flexible enough to respond to a range of unforeseen developments.

The following forecast analysis examines recent developments, historical information, and current aviation trends to provide an updated set of aviation-demand projections for PWM. The intent is to permit the City of Portland to make planning adjustments as necessary, to ensure that the facility meets projected demands in an efficient and cost-effective manner.

This is the first Master Plan to be prepared for PWM subsequent to the events of September 11, 2001. Immediately following the terrorist attacks, the national airspace system was closed and all civilian flights were grounded. Following the resumption of flights, commercial airline traffic declined, which led to schedule reductions and layoffs by many of the commercial airlines. The cumulative impacts of September 11 are being determined over time. Prior to updating the airport's forecasts, the following section discusses the trends in aviation at the national level.

NATIONAL AVIATION TRENDS

Each year, the FAA updates and publishes a national aviation forecast. Included in this publication are forecasts for the large air carriers, regional/commuter air carriers, general aviation, and FAA workload measures. The forecasts are prepared to meet budget and planning needs of the constituent units of the FAA and to provide information that can be used by state and local authorities, the aviation industry, and the general public. The current edition when this chapter was prepared was *FAA Aerospace Forecasts-Fiscal Years 2005-2016*, published in March 2005. The forecasts use the economic performance of the United States as an indicator of future aviation industry growth. Similar economic analyses are applied to the outlook for aviation growth in international markets.

In the seven years prior to the events of September 11, 2001, the U.S. civil aviation industry experienced unprecedented growth in demand and profits. The impacts to the economy and aviation industry from the events of 9/11 were immediate and significant. The economic climate and aviation industry, however, has been on the recovery. The FAA expects the U.S. economy to continue to recover rapidly through 2005 and 2006, but grow moderately thereafter. This will positively influence the aviation industry, leading to passenger, air cargo, and general aviation growth throughout the forecast period (assuming that there will not be any new successful terrorists incidents against either U.S. or world aviation). U.S. airline passengers (combined domestic and international) are expected to recover to pre-9/11 levels in 2005, and then grow at an average of 3.6 percent annually through 2016. Mainline air carriers will grow at 3.1 percent annually, while the regional/commuter airlines are expected to grow at an astonishing pace of 5.5 percent annually. U.S. airline air cargo revenue-ton-miles (RTMs) are projected to grow at 5.1 percent annually. The number of active general aviation aircraft is expected to grow at 1.1 percent annually.

COMMERCIAL AVIATION

Commercial aviation has emerged into three basic groupings of air carriers:

Legacy Network Carriers - This group includes the airlines established prior to deregulation in 1978 (e.g., Alaska Airlines, American Airlines, Continental Airlines, Delta Airlines, Northwest Airlines, United Airlines, US Airways). The legacy airlines were the most impacted by 9/11, and now are undergoing restructuring efforts to redefine themselves in the new operating environment of the industry. These airlines operate primarily in hub-and-spoke networks and generally have higher operating costs. The legacy airlines have been downsizing and cost-cutting to become competitive with the low-cost carriers. The string of negative external events, out it the control of the airlines, has made if difficult for most of the legacy carriers to achieve profitability.

Low-Cost Carriers - This group is comprised of established low-cost carriers, new entrants, and a few restructured legacy carriers (American Trans Air, America West Airlines, AirTran, Frontier Airlines, JetBlue Airways, Southwest Airlines, and Spirit Air Lines). These carriers typically operate point-to-point and have lower operating costs than their legacy counterparts. Their post-9/11 strategy has been growth in airports and city-pairs served, aircraft fleet, and longer-haul flights. The recent sharp increases in oil prices have impacted the profits of the low-cost airlines.

Regionals/Commuters - This grouping includes 79 airlines that operate turboprop and jet aircraft with 90 seats or less. Their operating strategy focuses around providing feeder traffic through a code-sharing arrangement with a legacy airline. Some, like Independence Air, have begun point-to-point service in competition with the larger carriers. Since 9/11 the regional commuters have benefited from the route restructuring and cost-cutting of the legacy network, taking over service to thinner medium-haul and long-haul markets.

While continuing to recover from 9/11, new challenges and uncertainties unfolded. A slowed economy, the Severe Acute Respiratory Syndrome (SARS) epidemic, and the war with Iraq all added to the difficulties already facing the industry. Since 2000, legacy air carrier enplanements are down over 20 percent. Their market share has declined from 70 percent in 2000 to 57 percent in 2004. Despite the continued declines in the legacy air carrier enplanements, system-wide domestic enplanements were up 7.2 percent in 2004.

System capacity is measured in available seat-miles (ASM). System capacity declined 20 percent immediately following 9/11. While some recovery took place in 2002 and 2003, system capacity remained below the pre-9/11 levels until 2004. Domestic ASMs grew an average of 7.0 percent in 2004.

Between 1994 and 2000, the U.S. air carriers saw revenue passenger miles (RPMs) grow at an annual average rate of 5.1 percent, while enplaned passengers grew at a 4.3 percent annual rate. Both measures of demand declined in 2001 and 2002. RPMs and enplanements were down a combined 9.1 and 10.3 percent, respectively, over the two year period. RPMs grew 2.6 percent in 2003 and 10.6 percent in 2004. Domestic enplanements grew by 2.5 percent in 2003 and 7.2 in 2004. Load factors rose by 2.4 points in 2004, to 75.2 percent, an all-time high.

Overall, the FAA projects the U.S. commercial aviation industry to grow its ASMs at an annual average rate of 3.8 percent through 2016. Enplanements are projected to grow at an average annual rate of 3.4 percent, and RPMs are projected to grow at a 3.9 percent annually through 2016.

Mainline Airlines

Following trends established after 9/11, the legacy airlines continued to reduce capacity in 2004, affecting the capacity calculations for the mainline carrier segment. After an immediate 20 percent reduction following 9/11, the domestic capacity in 2002 was down 8.4 percent from 2001, and down another 1.5 percent in 2003. Driven by an expanding economy and stronger passenger demand, ASMs for the mainline carriers are projected to increase by 4.9 percent in 2005. Legacy carrier reductions in the winter of 2004-05 are expected to keep ASM growth to just 0.6 percent in 2005. Growth in 2006 is projected to rebound by 4.8 percent, then average 3.5 percent annually through 2016.

Domestic enplanements are projected to increase just 0.7 percent in 2005, 3.7 percent in 2006, and then average 2.8 percent per year through 2016. Most of this growth is expected to come from the low-cost carriers. Full recovery to pre-9/11 large air carrier enplanements is not expected until 2009. The national enplanement history and projections are depicted on **Exhibit 2A.**

Load factors for the mainline carriers reached an all-time high of 74.7 percent in 2004. This is expected to jump to 75.5 percent in 2005, then increase more gradually to 76.1 percent by 2016.

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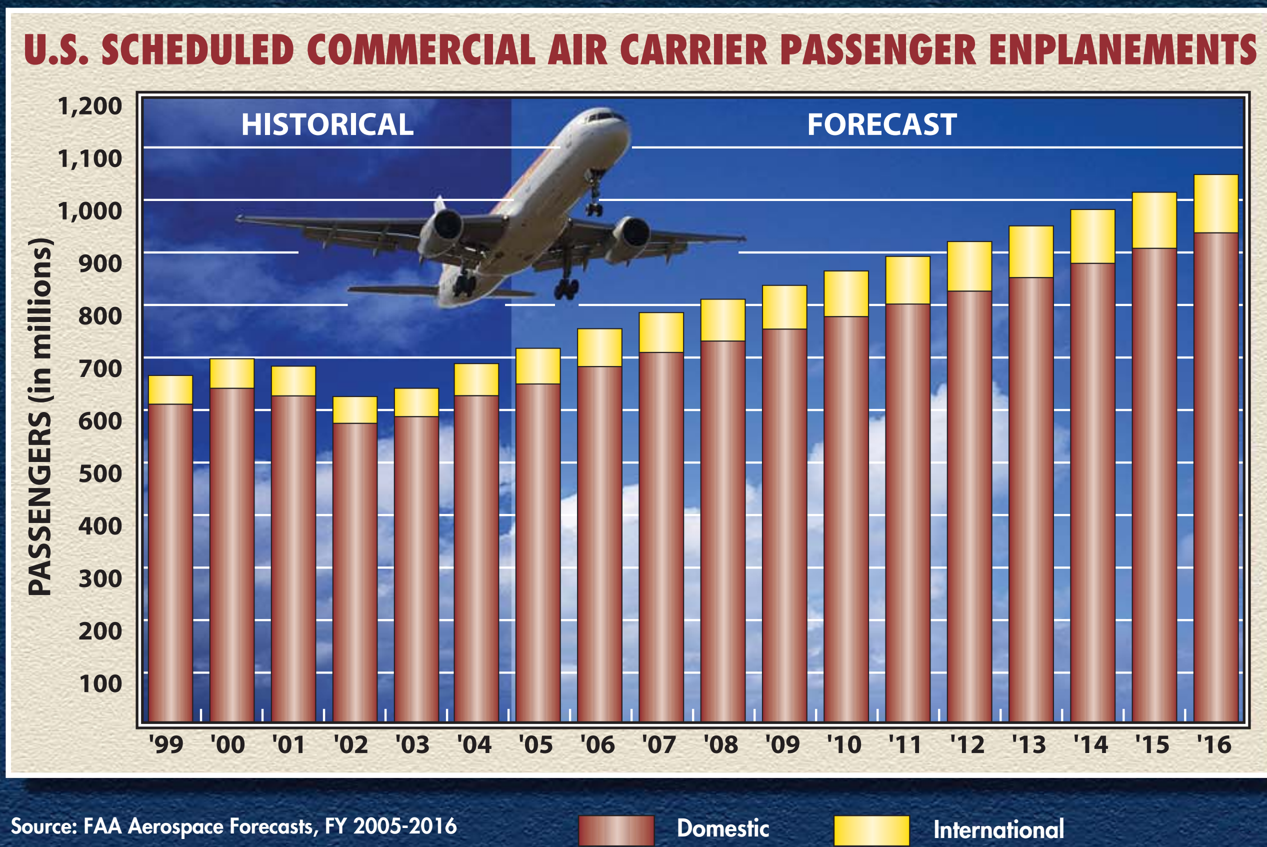

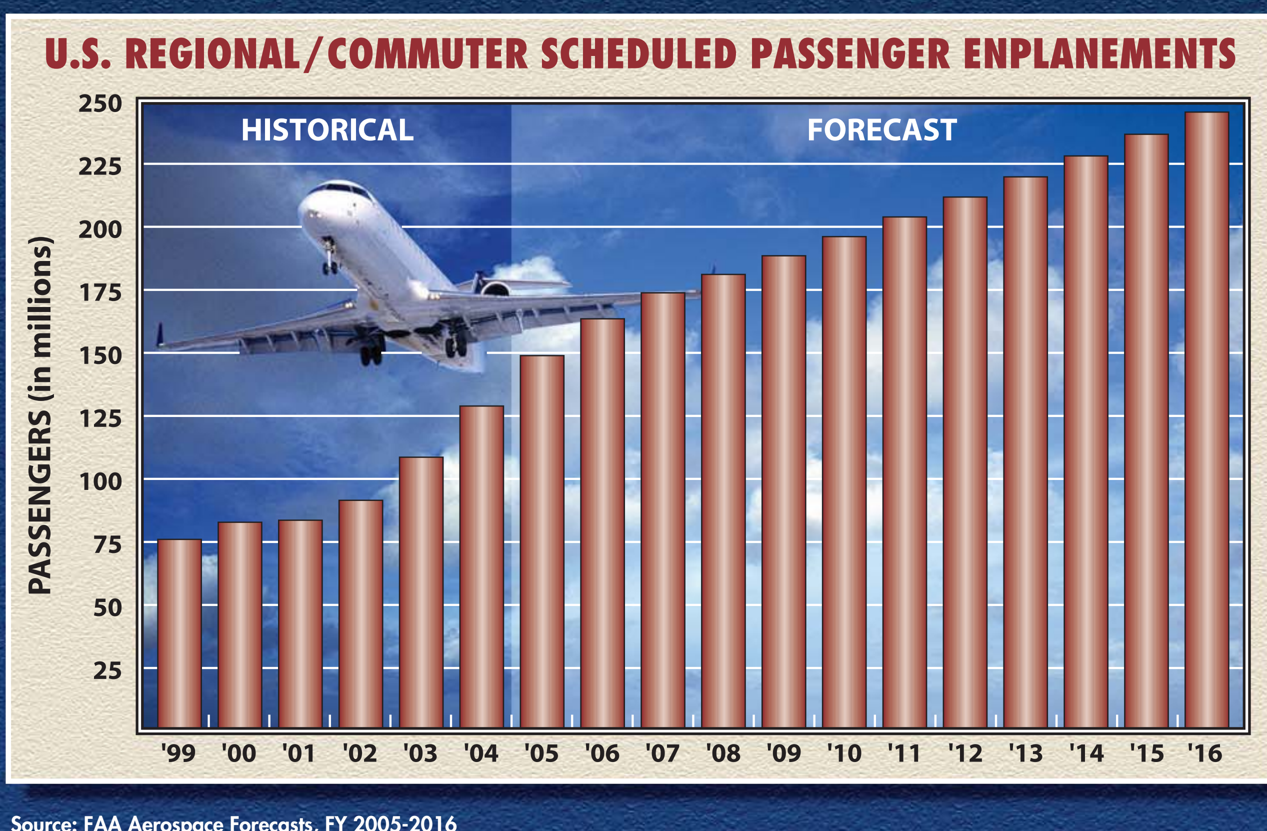

PWM PORTLAND INTERNATIONAL JETPORT

Exhibit 2A
U.S. COMMERCIAL AIR CARRIER AND
REGIONAL/COMMUTER FORECASTS

The main factor behind the major airline restructuring is the decline in domestic passenger yields brought on by the competition from successful low-cost carriers. Domestic passenger yields were down 2.2 percent in 2004. The yields are expected to decline an additional 3.1 percent in 2005, then increase 0.4 percent in 2006. After 2006, domestic passenger yields average 1.2 percent annual growth over the remaining 10 years. Nominal yields are not expected to even reach the pre-9/11 yields during the 12-year planning period.

In inflation-adjusted terms, domestic passenger yields were down 4.2 percent in 2004. The FAA projects inflation-adjusted yields to decline 5.7 percent in 2005, and then decline an average of 1.7 percent through 2016. These trends can be attributed to the ongoing pressure to hold down fares due to competition from the low-cost carriers. This will further pressure the legacy air carriers to carefully maintain capacity and control costs.

Mainline carrier operations, which have declined by 14.7 percent since 2000, were up 0.8 percent in 2004. They are projected to decline 0.3 percent in 2005 before growing by 3.4 percent in 2006. Beyond that, the annual rate is projected to average 2.5 percent. Mainline carrier operations are not expected to reach pre-9/11 levels until 2012.

The slower growth in operations reflects primarily on the efficiencies expected from the industry restructuring. The higher load factor discussed earlier is one of the reasons. A second is that average aircraft seating capacity is projected to increase by 0.4 seats annually over the forecast period. This will occur as the major airlines shift more of their thin routes to their regional affiliates.

The mainline carriers are also shifting many of their shorter distance routes to the regional airlines. This is resulting in increased passenger trip lengths. The average passenger trip length on the mainline carriers has increased by 87.1 miles per passenger since 2001. As demand recovers, however, the larger air carriers are expected to resume some of the medium-haul routes. Nonetheless, the average trip length is projected to increase an average of 7.2 miles per year through 2016, as the regional/commuter airlines continue to expand the number of markets they serve.

Regional/Commuter Airlines

There are several important trends for the regional/commuters that were brought about by the changes in the major airline industry and introduction of the regional jet. These include: increased capacity, increased passenger trip length, growing load factors, and increased passengers.

Regional/commuter traffic continued to grow in 2004 to 128.9 million passengers. This is up 18.7 percent from 108.6 million passengers in 2003. Since 2000, regional/commuter enplanements are up 55.7 percent. Despite the events of 9/11, many regionals/commuters were able to maintain their previous flight schedules. In fact, most have even increased their flight schedules in response to the transfer of additional routes from their larger code-sharing partners.

Driven by the rapid introduction of new regional jets, regional airline capacity (ASMs) was up an additional 25 percent in 2004. The average passenger trip length increased 39.3 miles in 2004. This reflects the fact that the routes being transferred from the larger network partners are the medium-haul, non-traditional regional markets which can be more efficiently flown with the regional jet. The regional/commuters also achieved an all-time-high load factor of 67.9 percent in 2004, an increase of 3.2 percent over the previous year.

Industry growth is expected to continue to outpace that of the larger commercial air carriers. The introduction of new state-of-the-art aircraft, especially high-speed turboprops and regional jets with ranges well over 1,000 miles, is expected to open up new opportunities for growth in non-traditional markets. The regional airline industry will also continue to benefit from integration with the larger air carriers. As the legacy carriers reduce costs and fleet size, they will continue to transfer smaller, marginally profitable routes to the regional air carriers. Between 2000 and 2003, over 1,060 regional jets have been put in service. Without the introduction of these aircraft, the changes in the industry since 9/11 would not have been possible.

Likewise, the increased use of regional jets will continue the trend of the regionals/commuters serving many of the lower-density routes of their major network partner. Regional jet aircraft can serve these markets with the speed and comfort of a larger jet, while at the same time providing greater service frequency that is not economically feasible with larger jets. This is expected to contribute to strong growth during the early portion of the planning period, although this phenomenon is expected to diminish during the mid-to-latter portion of the planning period.

The FAA forecasts the regional/commuter capacity to increase by 20.7 percent in 2005 and 11.9 percent in 2006. These large increases result from the projected delivery of nearly 439 regional jets in this two-year period. With 1,630 regional jets in service in 2004, the FAA projects this will increase by nearly 50 percent to 2,960 by 2016. Capacity growth will slow to 4.9 percent annually after 2005. An expected increase in the use of larger 70 and 90-passsenger regional jets will increase the average seating capacity from 46.3 seats in 2004 to 54.9 seats by 2016.

Enplanements are expected to grow 15.4 percent in 2005 and 9.9 percent in 2006. Between 2004 and 2016, enplanements will grow an average of 5.5 percent annually, from 128.9 million in 2004, to 245.5 million in 2016. By 2016, regional/commuters are expected to carry 23.4 percent of all passengers, up from 18.7 percent in 2004. Regional/commuter operations are expected to increase at 13.6 percent over the next two years. Thereafter, operations are forecast to grow at 2.5 percent annually.

The average trip length is projected to grow from 411.6 miles to 494.5 miles by 2016. Most of this growth is projected to occur between 2004 and 2007 when trip length will increase by a combined 57.5 miles, or 14.5 miles per year. The large increase between 2004 and 2007 is the result of the continued integration of regional jets and transfer of longer stage-length flights from the network partners. After 2007, passenger trip length will increase by 4.4 miles per year.

AIR CARGO

Air cargo traffic is comprised of freight/express and mail. Air cargo is moved either in the bellies of passenger aircraft or in dedicated all-cargo aircraft. FAA data and forecasts are presented in revenue ton-miles (RTMs).

Air cargo activity has historically had a high correlation to Gross Domestic Product (GDP). Other factors that affect air cargo growth are real yields, improved productivity, and globalization. Ongoing trends that could improve the air cargo market include the opportunities from open skies agreements, decreasing costs from global airline alliances, and increasing business volumes from e-commerce. At the same time, trends that could limit air cargo growth include increased use of e-mail, decreased costs of sending documents by facsimile, and increased airline costs due to environmental and security restrictions.

Before 2001, air cargo was the fastest growing sector of the aviation industry. From 1994 through 2000, total tons and revenue-ton miles (RTMs) grew at annual average rates of 8.0 and 8.6 percent. An economic slowdown in the U.S. combined with the collapse of the high-tech industry and a slowing of imports resulted in declines of 5.0 percent in tons and 3.9 percent in RTMs. Traffic began to recover in 2002 and 2003, showing increases, albeit not as strong as in the past decade.

The FAA notes there are several structural changes that are occurring within the air cargo industry. Among them are the following:

- **Security regulations** – Security regulations put in place shortly after 9-11 shifted cargo from the passenger airlines to the all-cargo airlines. Additional regulations have been put in place since. These include requiring the carriers to conduct random inspections, codifying and strengthening the "known shipper" program, and establishing a security program specifically to all-cargo operations by aircraft over 20,000 pounds.

- **Market maturation** – The express market in the United States has matured after dramatic growth over the last two decades. This is the majority of domestic air cargo activity.

- **Modal shift** – Improved service and economics from the use of alternative modes of cargo transport by the integrated cargo carriers (e.g. FedEx, UPS, and DHL) has matured.

- **Increased USPS use of all-cargo carriers –** This initially resulted from the U.S. Postal Service's (USPS) need to improve control over delivery. The trend has continued due to security regulations.

- **Increased use of mail substitutes** – Substitutes such as e-mail affect mail volume. The residual fear of mail because of terrorism has also been a factor.

FAA's forecasts of air cargo RTMs are predicated on several assumptions:

1) security restrictions concerning air cargo transportation will stay in place;
2) there will be no additional terrorist attacks in the U.S.;
3) there will be continued domestic and international economic growth;
4) most of the modal shift from air to ground has occurred; and
5) in the long term, cargo activity will be tied to economic growth.

The number of RTMs flown by U.S. carriers grew by 4.8 percent in 2004 to 35.1 billion. Total RTMs are forecast to increase 5.5 percent in 2005 and 5.2 percent in 2006. Over the following ten years, total RTMs are projected to increase at an annual average rate of 5.1 percent. **Exhibit 2B** depicts the FAA forecasts for air cargo and mail.

Domestic cargo RTMs increased by 3.8 percent in 2004 to 15.5 billion, primarily due to U.S. economic growth. Domestic RTMs are projected to increase 3.9 percent in 2005 and 3.5 percent in 2006. From 2007 through 2016, growth is expected to average 3.2 percent annually, based upon projected U.S. GDP growth.

Between 1996 and 2004, the all-cargo carrier percentage of U.S. domestic RTMs grew from 64.6 percent to 75.9 percent. By 2016, this share is projected to increase to 80 percent based upon the advantages provided by the integrated carriers.

International RTMs flown by U.S. carriers grew to 19.6 billion in 2004, a 5.5 percent increase over the previous year. The FAA forecasts a 6.7 percent increase in 2005 and a 6.5 percent increase in 2006, followed by an average annual increase of 6.3 percent through 2016. The all-cargo carriers' percentage of the international market is projected to increase from 59.7 percent in 2004 to 63.6 percent by 2016.

The all-cargo large jet aircraft fleet is expected to grow from 947 in 2004, to 1,312 by 2016. Narrow-body aircraft in the fleet are projected to decline from 54.2 percent of the fleet in 2004, to 38.6 percent by 2016. Widebody aircraft will increase proportionally.

GENERAL AVIATION

Following more than a decade of decline, the general aviation industry was revitalized with the passage of the *General Aviation Revitalization Act* in 1994 that limits the liability on general aviation aircraft to 18 years from the date of manufacture. This legislation sparked an interest to renew the manufacturing of general aviation aircraft due to the reduction in product

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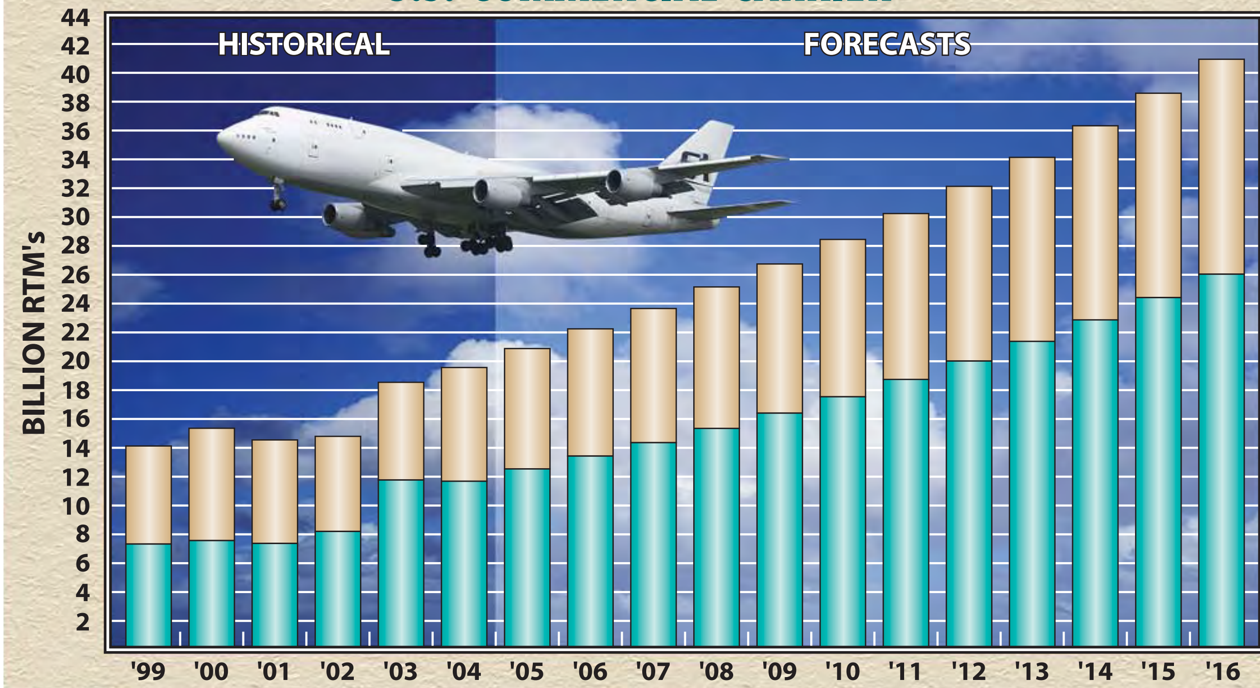
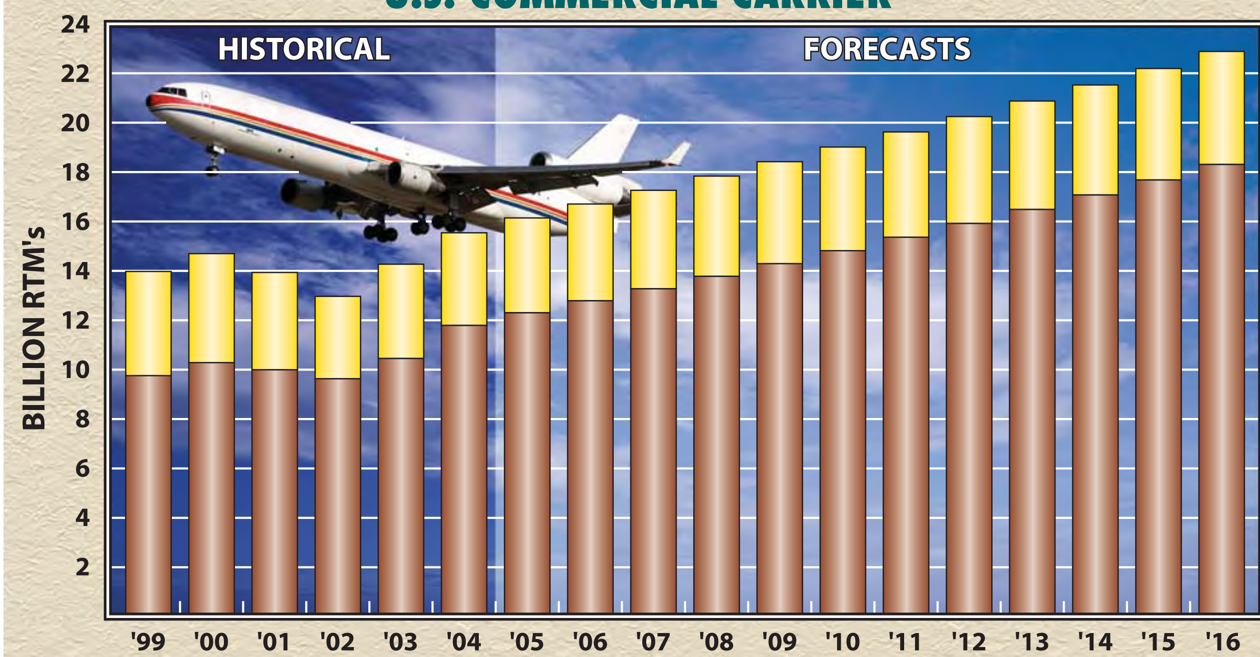
INTERNATIONAL AIR CARGO REVENUE TON-MILES (RTM's)
U.S. COMMERCIAL CARRIER



All-Cargo Carrier | Passenger Carrier

Source: FAA Aerospace Forecasts, FY 2005-2016

DOMESTIC AIR CARGO REVENUE TON-MILES (RTM's)
U.S. COMMERCIAL CARRIER



All-Cargo Carrier | Passenger Carrier

Source: FAA Aerospace Forecasts, FY 2005-2016

PWM PORTLAND INTERNATIONAL JETPORT

Exhibit 2B
U.S. AIR CARGO FORECASTS

liability, as well as renewed optimism for the industry. The high cost of product liability insurance had been a major factor in the decision by many American aircraft manufacturers to slow or discontinue the production of general aviation aircraft.

The sustained growth in the general aviation industry slowed considerably in 2001, negatively impacted by the events of September 11. Thousands of general aviation aircraft were grounded for weeks due to no-fly zone restrictions imposed on operations of aircraft in security-sensitive areas. General aviation aircraft remain restricted at Washington National Airport. This, in addition to the economic recession that began in early 2001, has had a negative impact on the general aviation industry. General aviation shipments by U.S. manufacturers declined for three straight years from 2001 through 2003.

Stimulated by an expanding U.S. economy as well as accelerated depreciation allowances for operators of new aircraft, general aviation staged a relatively strong recovery in 2004. U.S. general aviation aircraft manufacturer shipments increased by 10.2 percent over the previous year. Pistons (10.6 percent), turboprops (19.0 percent), and jets (4.6 percent) all had increased shipments.

Resilience being demonstrated in the piston aircraft market offers hope that the new aircraft models are attracting interest in the low-end market of general aviation. The introduction of new light sport aircraft could provide further stimulation in the coming years.

Despite a slower growth rate in shipments than pistons and turboprops in 2004, new models of business jets are also stimulating interest for the high-end of the market. The FAA still expects the business segment to expand at a faster rate than personal/sport flying. Safety concerns combined with increased processing time at commercial terminals make business/corporate flying an attractive alternative. In addition, the bonus depreciation provision of the President's economic stimulation package began to help business jet sales late in 2004.

Another contributing factor to business/corporate aviation growth has been the increasing popularity of fractional ownership in aircraft. Approximately 14 percent of the business jet deliveries in 2004 went to fractional companies. The total number of airplanes in fractional programs has increased by 65.6 percent since 2000. By the end of 2004, there were 4,765 individuals and companies in the U.S. that owned a share in a fractional aircraft. Still, the FAA believes that only a small percentage of this market has been developed.

In 2003, there were an estimated 210,600 active general aviation aircraft in the United States. **Exhibit 2C** depicts the FAA forecast for active general aviation aircraft. The FAA projects an average annual increase of 1.1 percent through 2016, resulting in 240,070 active aircraft. Piston-powered aircraft are expected to grow at an average annual rate of 0.2 percent. This is due, in part, to declining numbers of multi-engine piston aircraft, and the attrition of approxi-

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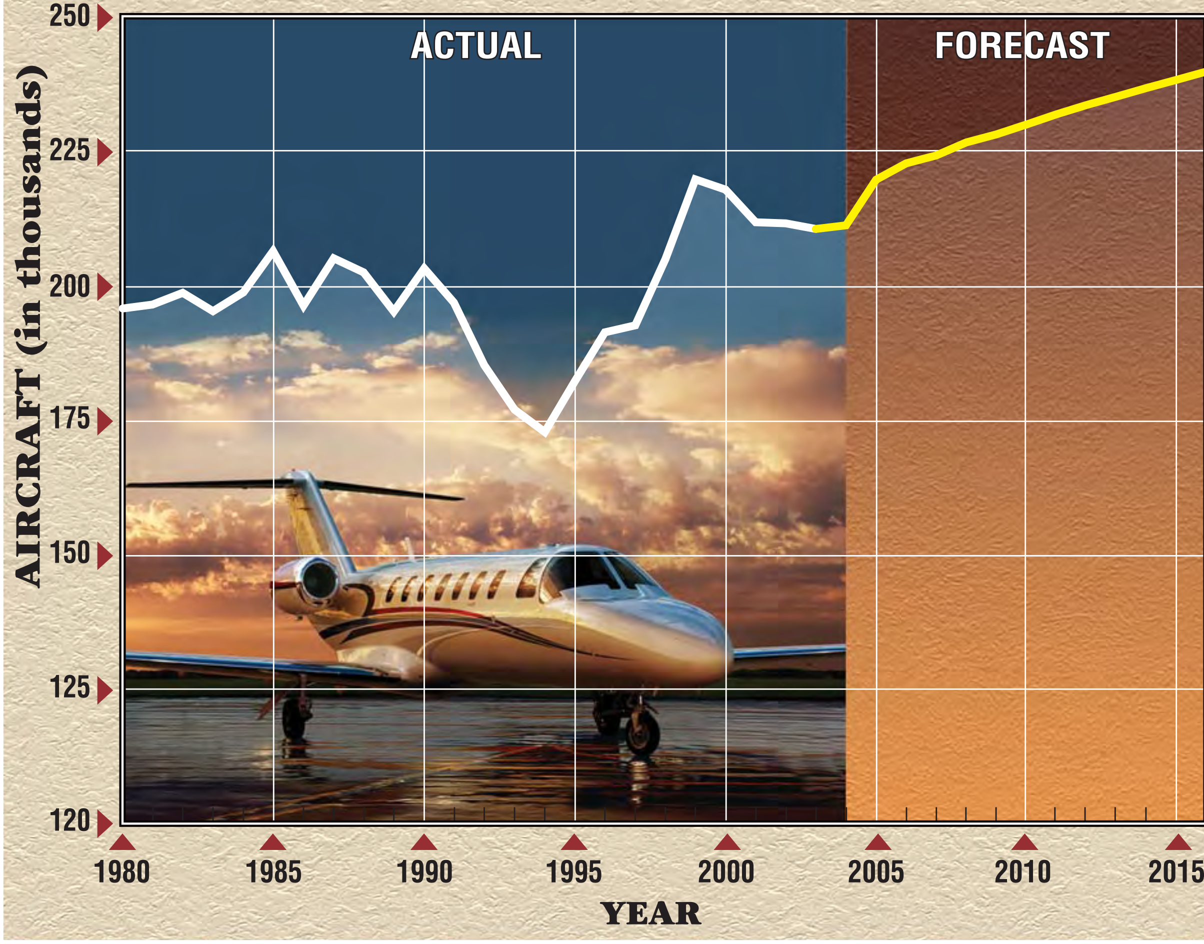
U.S. ACTIVE GENERAL AVIATION AIRCRAFT



U.S. ACTIVE GENERAL AVIATION AIRCRAFT (in thousands)

	FIXED WING									
	PISTON		TURBINE		ROTORCRAFT					
Year	Single Engine	Multi-Engine	Turboprop	Turbojet	Piston	Turbine	Experimental	Sport Aircraft	Other	Total
2004 (Est.)	144.0	17.7	7.3	8.4	2.2	4.7	20.8	N/A	6.2	211.3
2008	145.5	17.5	7.7	10.5	2.4	4.9	21.3	10.8	6.1	227.7
2012	147.0	17.4	8.1	13.3	2.5	5.1.	21.4	13.2	5.9	233.9
2016	148.0	17.2	8.4	15.9	2.6	5.3	21.4	15.4	5..8	240.1

Source: FAA Aerospace Forecasts, Fiscal Years 2005-2016.

Notes: An active aircraft is one that has a current registration and was flown at least one hour during the calendar year.

PWM PORTLAND INTERNATIONAL JETPORT

Exhibit 2C
U.S. ACTIVE GENERAL AVIATION AIRCRAFT FORECASTS

mately 1,500 older single-engine aircraft annually. In addition, it is expected that the new, light sport aircraft, and the relatively inexpensive microjets will dilute or weaken the replacement market for piston aircraft.

Owners of ultralight aircraft could begin registering their aircraft as "light sport" aircraft in 2005. The FAA estimates there will be a registration of 10,000 aircraft in 2005-06. After that, the forecast expects 300 to 500 new aircraft will enter the active fleet on an annual basis.

Turbine-powered aircraft (turboprop and jet) are expected to grow at an average annual rate of 3.2 percent over the forecast period. Even more significantly, the jet portion of this fleet is expected to grow at an average annual growth rate of 5.4 percent. The total number of jets in the general aviation fleet is projected to grow from 8,425 in 2004, to 15,900 by 2016.

The Business Aviation Panel has suggested that the market for the new Eclipse jet aircraft could add 5,000 more aircraft to the fleet by 2010. This twin-engine business jet is expected to be priced between $1 million and $2 million, and is believed to have the potential to redefine business jet flying with the capability to support a true on-demand air taxi business service. The FAA forecast assumes that microjets will begin to enter the active fleet in 2006 with 100 new aircraft, then grow by 400 to 500 aircraft per year, contributing a total of 4,500 aircraft to jet forecast by 2016.

SERVICE AREA

The service area of an airport is defined by its proximity to other airports providing similar service. As shown on **Exhibit 2D**, Portland International Jetport is one of several commercial service airports located in Maine. In addition to these airports, there are several more that serve only general aviation.

COMMERCIAL SERVICE

The closest of these commercial service airports to PWM is the Augusta State Airport (AUG), a 59-mile drive to the northeast. In the summer of 2004, this airport had three daily flights to Boston Airport (BOS), utilizing 19-seat turboprops. In 2003, the airport enplaned 3,310 passengers.

Knox County Regional Airport (RKD) is 83 miles northeast from PWM. In the summer of 2004, this airport had five daily flights to Boston, using 19-seat turboprops. In 2003, the airport reported 11,945 enplaned passengers.

The Bangor International Airport (BGR) is located at 132 miles driving distance to the northeast. This airport is served by six domestic airlines primarily using regional jets. The international terminal at the airport is used by international tour and holiday carriers to clear flights into the United States. In 2003, the airport enplaned 302,547 passengers.

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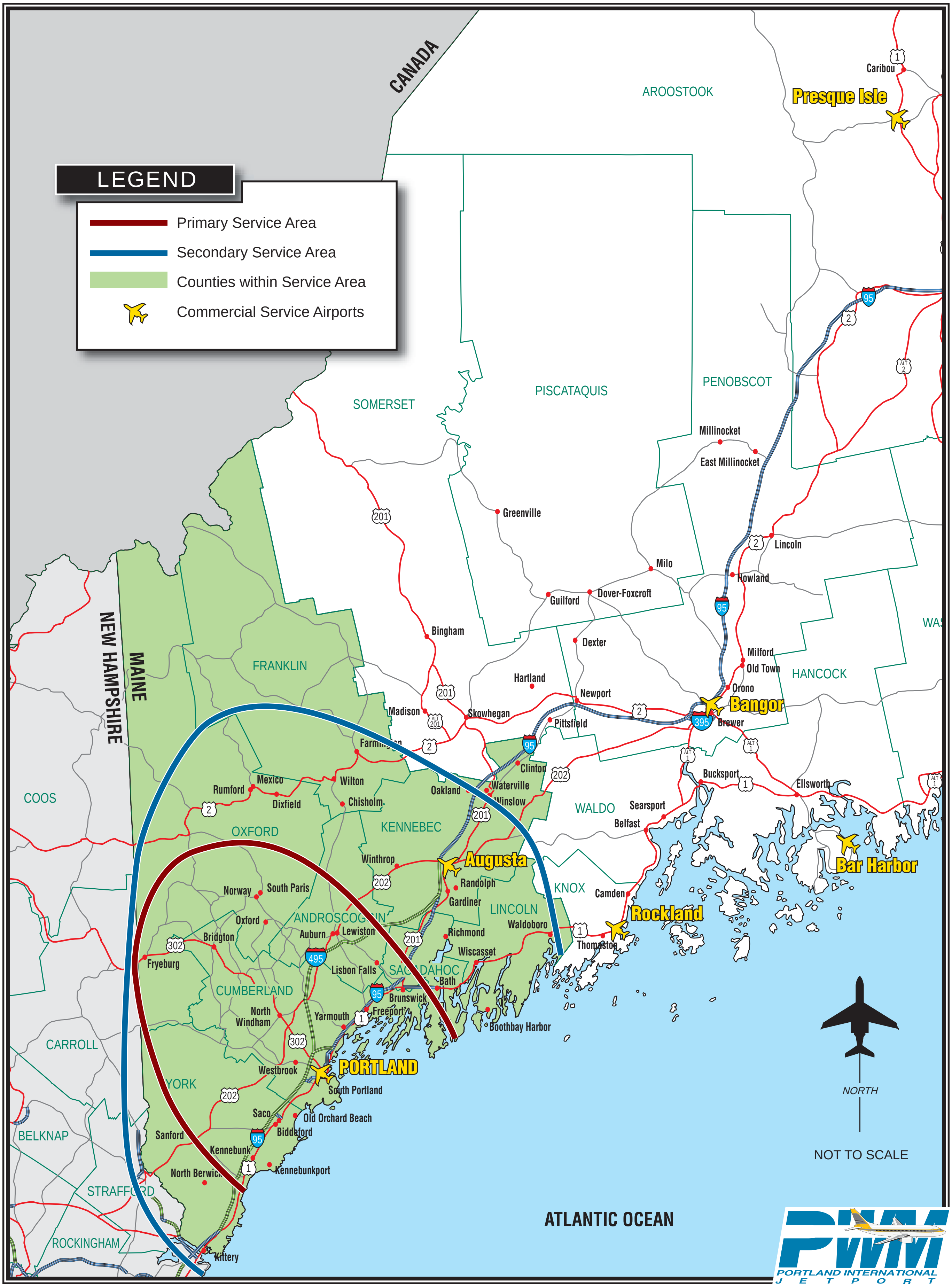

Exhibit 2D
JETPORT COMMERCIAL SERVICE AREA

Hancock County-Bar Harbor Airport (BHB) is located 165 miles driving distance to the northeast. Service is similar to RKD with five daily flights to BOS using 19-seat turboprops. Enplanements in 2003 totaled 9,730

Northern Maine Regional Airport (PQI) in Presque Isle is 246 miles driving distance from Portland. This airport has three daily flights to Boston with 34-seat turboprops. In 2003, the airport enplaned 15,775 passengers.

Out-of-state commercial service airports that have an effect on the Jetport's service area include Pease International Tradeport, Manchester Airport, and Boston Logan International Airport.

Pease International Tradeport in Portsmouth, NH is located 50 miles south of Portland. The airport has two daily flights to Philadelphia using 19-seat aircraft and one daily flight each to Orlando and San Juan, PR, using Boeing 727 aircraft. In 2003, the airport enplaned 27,096.

Manchester Airport (MHT) is the closest airport with more enplanements than the Jetport. Located 105 miles to the southwest of Portland, MHT is served by nine airlines with over 100 daily flights to 19 destinations. In 2003, MHT enplaned 1,776,347 passengers. Passenger traffic at MHT has more than tripled since Southwest Airlines began service there in 1998.

Boston Logan International Airport (BOS) is located 110 miles to the south of Portland. BOS is a large hub airport that enplanes over 11 million passengers annually.

Exhibit 2D depicts the primary commercial service area for Portland International Jetport. The primary service area is based upon equidistant access between PWM and the airports mentioned above. A secondary service area is depicted as equidistant access from airports with comparable or greater service (BGR and MHT).

Levels of service factors that can affect market share within a service area include frequency of service, number of airlines, type of aircraft, and nonstop destinations available. The biggest factor, however, tends to be airfares. Competition on routes and low-fare airlines are major factors that can draw vacation travelers to drive as much as three hours to a larger airport. Manchester and Boston Logan International Airports are both within a two-hour drive of Portland and do draw some traffic from the PWM service area.

As shown on the exhibit, the primary commercial service area includes all of Cumberland County as well as much of York, Androscoggin, and Sagadahoc Counties. The secondary service area expands to include all of these counties, plus much of Lincoln, Franklin, Oxford, and Kennebec Counties. The secondary service area also extends slightly into eastern New Hampshire.

GENERAL AVIATION

General aviation users have a wider variety of airports from which to choose. While there are just six commercial service airports in Maine there are 68 public use airports available to general aviation. Runway length is one of the first considerations for the various types of general aviation aircraft. Many small, single-engine piston, and some twin-engine aircraft can operate off runways with less than 2,500 feet of length. Cabin-class twin-engine piston aircraft and most small turboprops need 3,000 to 4,000 feet for regular operations. While some business jet aircraft can operate on less than 4,000 feet, lengths over 5,000 feet are typically necessary to be considered for regular operations by most business and corporate jet aircraft.

Portland International Jetport is the only public-use airport in Cumberland County. As outlined in **Chapter One – Inventory**, there are seven public general aviation airports within thirty nautical miles of PWM. Biddeford Municipal, Limington-Harmon, and Sanford Regional Airports are all located in York County. Eastern Slopes Regional Airport is located in Oxford County, Auburn-Lewiston Municipal Airport and Twitchell Airport are in Androscoggin County, and Wiscasset Airport is located in Sagadahuc County. Only Sanford Regional and Auburn-Lewiston Airport have a runway longer than 5,000 feet. Thus, the Jetport's general aviation service area is contained primarily within Cumberland County.

SOCIOECONOMIC TRENDS

Local and regional forecasts developed for key socioeconomic variables provide an indicator of the potential for creating growth in aviation activities at an airport. Three variables typically useful in evaluating potential for traffic growth are population, employment, and per capita personal income (PCPI). Most of this data is readily available on an annual historic basis at the county level.

POPULATION

Table 2A presents the historic and forecast population for the counties that are more than 50 percent within the primary and secondary service areas for Portland International Jetport. The population of the counties considered to be in the primary service area in 2000 totaled 591,361, while the secondary service area had 234,952 residents, for a combined total of 826,313. This was up 6.7 percent from the 1990 total of 774,387. The primary service area alone grew by 8.2 percent, outpacing the state as a whole, which grew by 3.8 percent. The secondary service area alone, however, grew just 3.1 percent.

The state has experienced population growth in each of the last three decades, although that growth has slowed over time. The strongest growth has been in the Jetport service area. In fact, that portion of the state outside of the Jetport service area actually lost population during the 1990s.

The State Planning Office last projected the population of the state and its counties in 2001. The projections were carried through 2015. Woods & Poole Economics prepares an updated forecast of population and other socioeconomic indicators for each county in the United States each year. The forecasts prepared in January 2004 by Woods & Poole Economics were compared to the earlier State Planning Office projections and found to be within 1.2 percent in 2015. Thus, the Woods and Poole projections were utilized to extend the forecasts through 2025 as shown on **Table 2A**.

TABLE 2A
Population History and Forecast
Primary and Secondary Services Areas
Portland International Jetport

	U.S. Census				Forecast	
	1970	**1980**	**1990**	**2000**	**2010**	**2025**
Primary Service Area by County						
Cumberland	192,528	216,396	243,135	265,612	286,028	317,880
Androscoggin	91,279	99,531	105,259	103,793	103,742	117,190
Sagadahoc	23,452	28,926	33,535	35,214	36,999	41,910
York	111,576	140,431	164,587	186,742	206,430	235,140
Primary Area Population	418,835	485,284	546,516	591,361	633,199	712,120
Secondary Service Area by County						
Franklin	22,494	20,069	29,008	29,467	30,266	32,100
Kennebec	95,247	110,008	115,904	117,114	119,578	127,880
Lincoln	20,537	25,691	30,357	33,616	36,518	43,490
Oxford	43,457	49,102	52,602	54,755	56,892	65,020
Secondary Area Population	181,735	204,870	227,871	234,952	243,254	268,490
Total Service Area Population	600,570	690,154	774,387	826,313	876,453	980,610
Primary Area %	69.7%	70.3%	70.6%	71.6%	72.2%	72.6%
State of Maine Population	992,048	1,126,800	1,227,928	1,274,923	1,337,466	1,483,060
Service Area % of State of Maine	60.5%	61.2%	63.1%	64.8%	65.5%	66.1%

Sources: History – U.S. Census Bureau; 2010 Forecast – Maine State Planning Office; 2025 Forecast – Woods and Poole

The percentage of the State of Maine population living within the Jetport service area has steadily grown from 60.5 percent in 1970, to 64.8 percent in 2000. The forecast indicates that this percentage will continue to grow, reaching 66.1 percent by 2025.

The four counties within the primary service area make up 71.6 percent of the total service area population. This has grown from 69.7 percent in 1970, and is forecast to grow to 72.6 percent by 2025.

EMPLOYMENT

Table 2B provides similar history and forecasts for total employment in the Jetport service area. As with population, the employment in the primary service area is growing faster than employment across the state. Employment in the secondary service area, however, has grown slower than the State as a whole.

In 2000, the primary service area employment was at 388,170 or 73.9 percent of the total service area employment of 525,550. The service area comprised essentially two-thirds of the State employment of 793,360. Projections indicate that employment will grow fastest in the more metropolitan counties of Cumberland and York. Overall, the primary service area will grow slightly faster than the secondary service area and the State through 2025.

TABLE 2B
Employment History and Forecast
Primary and Secondary Services Areas
Portland International Jetport

	Actual Employment				Forecast	
	1970	**1980**	**1990**	**2000**	**2010**	**2025**
Primary Service Area by County						
Cumberland	99,410	128,700	183,000	215,030	242,320	288,140
Androscoggin	42,850	48,020	53,700	61,270	65,450	76,530
Sagadahoc	10,070	15,360	22,550	20,900	23,320	26,940
York	47,290	61,460	81,920	90,970	101,220	118,950
Primary Area Employment	199,620	253,540	341,170	388,170	432,310	510,560
Secondary Service Area by County						
Franklin	10,530	13,710	16,290	17,730	18,150	20,550
Kennebec	46,340	57,660	72,950	75,450	81,260	91,830
Lincoln	9,790	10,350	14,930	19,170	21,310	25,670
Oxford	17,560	21,870	22,870	25,030	28,060	33,060
Secondary Area Employment	84,220	103,590	127,040	137,380	148,780	171,110
Total Service Area Employment	283,840	357,130	468,210	525,550	581,090	681,670
Primary Area %	70.3%	71.0%	72.9%	73.9%	74.4%	74.9%
State of Maine Employment	445,890	554,820	706,930	793,360	873,640	1,021,040
Service Area % State of Maine	63.7%	64.4%	66.2%	66.2%	66.5%	66.8%

Sources: Woods and Poole, January (2004)

PER CAPITA PERSONAL INCOME

Table 2C follows with the history of per capita personal income (PCPI), inflation-adjusted to 1996 dollars. Statewide, inflation-adjusted PCPI grew at an annual average rate of 2.3 percent between 1970 and 2000. Over the same period the Jetport's primary service area has maintained a similar annual average. The secondary service area PCPI has averaged a lower annual growth rate of 2.0 percent. The projected average PCPI growth is slightly higher for the State (1.25 percent) than for either the primary (1.21) or the secondary (1.15) service areas.

Cumberland County has maintained the highest per capita income in the service area since 1970. The Cumberland County inflation-adjusted PCPI grew at an annual average rate of 2.51 percent between 1970 and 2000. Its PCPI is projected to grow at a 1.34 percent annual rate.

TABLE 2C
PCPI History and Forecast (1996$)
Primary and Secondary Services Areas
Portland International Jetport

	Actual Employment				Forecast	
	1970	**1980**	**1990**	**2000**	**2010**	**2025**
Primary Service Area by County						
Cumberland	$14,158	$17,405	$25,244	$29,831	$34,751	$41,688
Androscoggin	12,861	15,301	19,402	22,941	26,408	32,430
Sagadahoc	12,058	15,471	21,840	24,578	26,974	31,472
York	12,849	15,789	21,329	24,071	26,006	30,254
Primary Area PCPI	$13,409	$16,391	$22,731	$26,490	$30,079	$35,788
Secondary Service Area by County						
Franklin	$10,644	$13,885	$17,325	$19,999	$22,380	$26,847
Kennebec	12,659	15,658	21,058	23,738	26,776	32,053
Lincoln	13,578	16,320	22,514	24,842	27,846	32,683
Oxford	11,511	14,796	16,876	19,124	21,581	25,720
Secondary Area PCPI	$12,239	$15,361	$19,811	$22,352	$25,176	$29,999
Total Service Area PCPI	$13,055	$16,085	$21,872	$25,313	$28,718	$34,203
State of Maine PCPI	$12,210	$15,215	$20,405	$23,961	$27,272	$32,741

Sources: Woods and Poole, January (2004)

AIRLINE ACTIVITY FORECASTS

To determine the types and sizes of facilities necessary to properly accommodate present and future airline activity at any airport, two basic elements must be forecast: annual enplaned passengers and annual aircraft operations. Annual enplaned passengers is the most basic indicator of demand for commercial service activity. From a forecast of annual enplanements, operations and other activity descriptors can be projected based upon behavioral factors characteristic of Portland International Jetport or the airline industry as a whole.

AIR SERVICE HISTORY

Table 2D and **Exhibit 2E** provide a review of the history of passenger enplanements at PWM back to 1970. Over the past 35 years, the Jetport has seen its passenger activity grow from 104,708 in 1970, to an all-time high of 689,174 in 2004. The annual growth rate over the past 35 years has averaged 5.5 percent, but the table and graph show how traffic has fluctuated on an annual basis.

Traffic has declined from the previous year 12 times since 1970, even though enplanements are up a net 558 percent over that period of time. A drop of 12.5 percent in 1981 was the largest single-year decline. The largest single-year increase of 52.0 percent occurred two years later in 1983.

As can be seen from the exhibit, the 1970s was a period of strong growth as passenger traffic grew each year at an average 10.6 percent. The 1970s ended with deregulation of the airline industry.

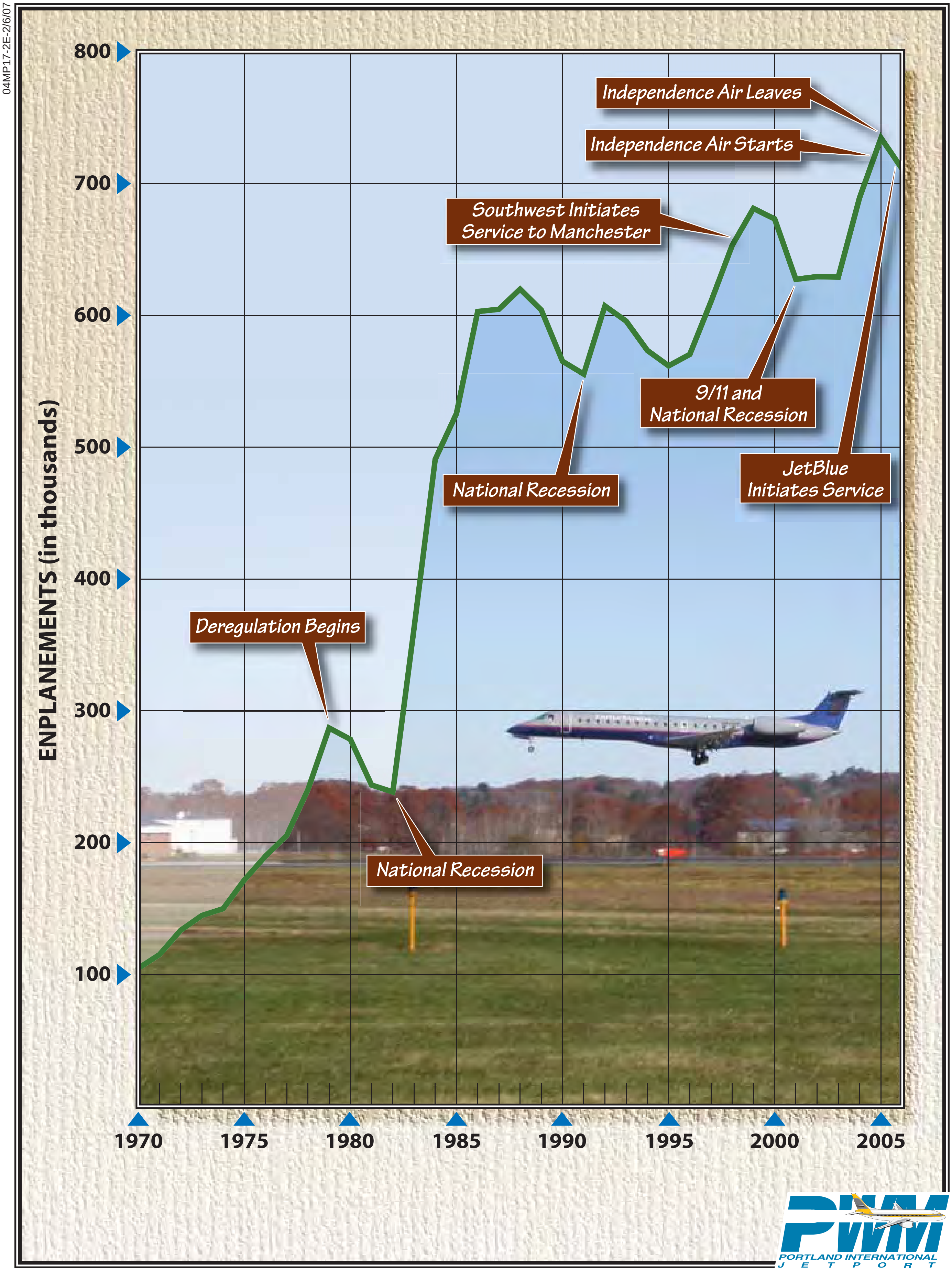

Exhibit 2E
HISTORIC ENPLANEMENTS 1970-2007

TABLE 2D
Historic Passenger Enplanements
Portland International Jetport

Year	Annual Enplaned	% Change
1970	104,708	NA
1971	115,137	10.0%
1972	133,571	16.0%
1973	144,792	8.4%
1974	149,920	3.5%
1975	171,715	14.5%
1976	189,817	10.5%
1977	205,498	8.3%
1978	240,340	17.0%
1979	286,977	19.4%
1980	278,427	-3.0%
1981	243,724	-12.5%
1982	238,525	-2.1%
1983	362,500	52.0%
1984	490,867	35.4%
1985	525,489	7.1%
1986	602,933	14.7%
1987	604,628	0.3%
1988	619,934	2.5%
1989	604,066	-2.6%
1990	565,180	-6.4%
1991	555,488	-1.7%
1992	607,157	9.3%
1993	595,642	-1.9%
1994	573,390	-3.7%
1995	561,761	-2.0%
1996	570,395	1.5%
1997	610,545	7.0%
1998	653,193	7.0%
1999	681,122	4.3%
2000	673,153	-1.2%
2001	627,344	-6.8%
2002	629,400	0.3%
2003	629,085	-0.1%
2004	689,174	9.6%

A three-year decline followed in the early 1980s, as a prolonged national recession and rising fuel prices combined with the initial uncertainties of deregulation to affect traffic throughout the airline industry. As the airlines became more acclimated to their deregulated environment, traffic responded to the economic recovery and grew very strongly through the middle part of the decade. Lower air fares and an expanding economy helped traffic set a new all-time high of 619,934 enplanements in 1988.

From 1989 through 1995, passenger traffic at PWM declined in six of the seven years. Enplanements in 1995 were 561,761, or 9.3 percent below the 1988 peak. During this period, the nation experienced a recession, as well as the 1991 Gulf War. Both had an effect on the airline industry, as several airlines, many of which did not exist prior to deregulation, went into bankruptcy. While some airlines did turn their fortunes around under bankruptcy protection, others did not. Some merged or were acquired by other airlines, while others ceased operations permanently.

In 1996, however, traffic began four years of growth that culminated in setting a new high enplaned passenger level of 681,122 in 1999. This growth coincided with a strong resurgence in the national economy. It also came about despite the initiation of service by discount carrier Southwest Airlines at Manchester in 1998.

In 2000, this all-time high in passenger traffic declined slightly, reflecting the early signs of another recessionary period. The United States officially entered into an economic recession in March 2001; however, traffic appeared to be growing once more during the middle part of the year. The events of September 11, 2001, initiated a sharp decline at the end of the year, resulting in a 6.8 loss from the previous year.

Enplanement levels remained relatively flat through 2002 and 2003. In June of 2004, traffic levels began to rise in relation to the previous year. This coincided with the initiation of service at PWM by regional discount carrier Independence Air. Traffic continued to grow the remainder of the year to finish 9.6 percent above the previous year and set a new all-time high of 689,174 enplanements.

The composition of the airlines serving the Jetport has undergone a transformation over the past decade. In 1994, there were four major airlines serving PWM. They included Continental, Delta, United, and US Airways. These four airlines boarded 68.5 percent of the 573,389 enplanements at the Jetport that year.

In 2004, there were three mainline carriers serving the airport, but they boarded just 40 percent of the 689,174 passengers. Delta and US Airways have remained while Northwest is now serving the market. In 1994, Northwest was represented by its commuter codeshare, Northwest Airlink. While United and Continental are no longer directly serving the market, they maintain a presence with service by codesharing regional airlines. In fact, Continental Express enplaned more passengers in 2004 (52,000) than Continental did in 1994 (46,294). Independence Air, a low-fare regional airline with no affiliation to a major airline, began service in June of 2004 and boarded 35,565 passengers.

The origins and destinations of PWM air travelers have changed somewhat over the last 10 years. **Table 2E** examines the changes in the top twenty destinations between 1994, 1999, and 2004.

The top seven markets have remained the same; however, their rank has changed. In 1994 New York was the largest destination market followed by Philadelphia and Chicago. Orlando jumped to the top in 1999, while Philadelphia remained second and New York dropped to third. In 2004, Washington climbed to first, New York moved up to second, and Orlando dropped to third. Tampa and Atlanta are the other two markets that have consistently remained in the top seven.

Several Florida markets have consistently been in the top twenty destinations for PWM. In addition to Orlando, Tampa, Fort Lauderdale, Fort Myers, and West Palm Beach have remained top twenty destinations. Miami was in the top twenty destination markets in 1984, but has since dropped out. The five Florida markets totaled 93,530 passengers in 1994, and over 128,000 passengers in both 1999 and 2004.

Table 2F provides a comparison of the number of daily flights and their nonstop destinations from PWM between 1994 and 2004. There were more daily flights in 1994 with 65 compared to 54 in 2004. The primary difference was in the number of flights less than 200 miles. In 1994, there were 31 flights of less than 200 miles compared to just nine in 2004. Twenty-seven (27) of these flights were to Boston. The number of flights between 200 and 500 miles was nearly equal at 29 and 30, respectively.

TABLE 2E
Top Twenty Origin-Destination Markets
Portland International Jetport

Market	1994	Market	1999	Market	2004
1. New York	83,720	1. Orlando	64,610	1. Washington	120,500
2. Philadelphia	57,240	2. Philadelphia	58,500	2. New York	100,070
3. Chicago	49,940	3. New York	55,560	3. Orlando	51,500
4. Orlando	41,720	4. Washington	48,890	4. Chicago	50,440
5. Washington	40,220	5. Chicago	48,110	5. Atlanta	50,380
6. Tampa	28,210	6. Atlanta	46,400	6. Tampa	38,160
7. Atlanta	26,080	7. Tampa	43,280	7. Philadelphia	36,390
8. Boston	21,400	8. Pittsburgh	26,470	8. Fort Myers	29,030
9. Pittsburgh	21,390	9. San Francisco	26,150	9. Fort Lauderdale	23,390
10. Fort Lauderdale	18,840	10. Los Angeles	24,660	10. Detroit	23,030
11. San Francisco	18,330	11. Fort Myers	24,400	11. Minneapolis	22,150
12. Baltimore	18,060	12. Fort Lauderdale	23,840	12. Cincinnati	21,340
13. Fort Myers	16,500	13. Cincinnati	22,140	13. Pittsburgh	20,820
14. West Palm Beach	15,980	14. Detroit	21,890	14. Denver	20,710
15. Denver	15,450	15. Denver	21,740	15. San Francisco	20,680
16. Los Angeles	15,240	16. West Palm Beach	21,650	16. West Palm Beach	20,650
17. Miami	14,000	17. Minneapolis	18,130	17. Los Angeles	17,670
18. Dallas/Ft. Worth	13,650	18. Seattle/Tacoma	17,480	18. Las Vegas	16,560
19. Detroit	12,350	19. Jacksonville	16,780	19. Seattle/Tacoma	16,000
20. Las Vegas	11,730	20. Dallas/Ft. Worth	15,800	20. Albany	15,950
Top Twenty Total	540,050		646,480		715,420
Total True O-D Markets	948,720		1,187,810		1,260,340
Top Twenty %	56.9%		54.4%		56.7%
Total Passengers	1,149,794		1,357,053		1,368,647
% True O-D Markets	82.5%		87.5%		92.1%

In 1994, there were just four flights with trip lengths greater than 500 miles. Chicago was the longest haul flight at 885 miles. In 2004, there were 15 flights longer than 500 miles with the longest hauls to Minneapolis (1,132 miles) and Atlanta (1,025 miles).

Destinations in 1994 that were no longer served in 2004 included Augusta, ME; Providence, RI; and Presque Isle, ME. Destinations in 2004 that were not served in 1994 included Cincinnati, OH; Detroit, MI; Atlanta, GA; and Minneapolis, MN. Thus, service at PWM now has less short-haul flights than a decade ago, but more long-haul destinations are served non-stop.

Exhibit 2F graphically compares the non-stop flight destinations from Portland International Jetport to its top twenty destinations. PWM has daily non-stops to six of its top ten markets, and nine of its top twenty. The top two destinations in 2004, Washington, DC and New York, NY, also had the most non-stops at 13 and 12, respectively.

04MP17-2F-2/23/05

PORTLAND INTERNATIONAL JETPORT

TOP TWENTY DESTINATIONS/ NON-STOP SERVICE CITY PAIRS

TOP TWENTY DESTINATIONS (2004)

1. Washington
2. New York
3. Orlando
4. Chicago
5. Atlanta
6. Tampa
7. Philadelphia
8. Fort Myers
9. Fort Lauderdale
10. Detroit
11. Minneapolis
12. Cincinnati
13. Pittsburgh
14. Denver
15. San Francisco
16. West Palm Beach
17. Los Angeles
18. Las Vegas
19. Seattle/Tacoma
20. Albany

NON-STOP SERVICE CITIES (2004)

- Albany, NY
- Atlanta, GA
- Boston, MA
- Chicago, IL
- Cincinnati, OH
- Detroit, MI
- Minneapolis, MN
- New York City, NY
- Philadelphia, PA
- Pittsburgh, PA
- Washington D.C.

PORTLAND INTERNATIONAL JETPORT

Exhibit 2F
TOP TWENTY DESTINATIONS/
NON-STOP SERVICE CITY PAIRS

TABLE 2F **Non-Stop Service 1994 and 2004** **Portland International Jetport**	**Daily Flights**	
	1994	**2004**
Less than 200 miles		
Albany, NY	2	4
Augusta, ME	1	0
Boston, MA	27	5
Providence, RI	1	0
Subtotal	31	9
Between 200 and 500 miles		
New York, NY	19	12
Philadelphia, PA	4	5
Presque Isle, ME	2	0
Washington, DC	4	13
Subtotal	29	30
Between 500 and 800 miles		
Cincinnati, OH	0	2
Detroit, MI	0	2
Pittsburgh, PA	1	2
Subtotal	1	6
Over 800 miles		
Atlanta, GA	0	2
Chicago, IL	4	5
Minneapolis, MN	0	2
Subtotal	4	9
TOTAL NON-STOPS	65	54

ENPLANEMENT FORECASTS

As discussed in this chapters introduction, the first steps involved in updating an airport's forecasts include reviewing previous forecasts in comparison to actual activity, to determine what changes, if any, may be necessary. The next step involves consideration of the effects of any potential new factors that could affect the forecasts. Factors that have a strong potential for affecting commercial service at the Jetport include low-cost carrier service and international service. Independence Air is a low-cost carrier that began service to Portland in 2004.

The Jetport has also had inquiries for scheduled and charter international service. These potential scenarios will be addressed separately in the following subsections:

1) Traffic based upon applicable socioeconomic and airline industry trends

2) Traffic generated by the introduction of low-cost carrier service

3) Traffic generated by international service from the Jetport

First, however will be a review of previously prepared forecasts.

Previous Enplanement Forecasts

The first step in this forecast update is to compare actual activity to recent forecasts prepared for PWM. Two sets of previous forecasts were reviewed and are outlined in **Table 2G**. The first and oldest is the projection taken for the previous Master Plan that is dated 1994. The *FAA Terminal Area Forecasts (TAF)*, published in January 2005, is the FAA's most current forecast of activity for Portland International Jetport.

The forecast from the *1994 Master Plan* was derived from a review of previous forecasts of two planning studies prepared for the Jetport in the 1980s, as well as the Maine Aviation Systems Plan and the 1993 FAA-TAF.

The 1993 FAA-TAF was selected as the *1994 Master Plan* forecast. This forecast is presented in **Table 2G** as well as on **Exhibit 2G**.

TABLE 2G
Previous Enplanement Projections
Portland International Jetport

	2004	2005	2010	2015	2020
Actual	689,174				
Previous Master Plan, Dec. 1994		1,000,000		1,400,000	
FAA-TAF, Jan. 2005	672,388	697,200	821,259	945,318	1,069,377
NERASP – Base Case*			858,235		1,173,743
NERASP – High Case*			967,203		1,390,605
NERASP - Low Case*			776,749		1,041,872

NERASP: New England Regional System Plan
* Enplanements extrapolated as 50 percent of total passengers

The Jetport is part of the New England Regional Airport System Plan (NERASP). The NERASP describes the foundations of a regional strategy for the air carrier airport system to support the needs of air passengers through 2020. The underlying theme of the NERASP is to develop an airport system based upon the location of passengers and with adequate facilities to allow airlines to evolve the range of services that provide the best mix of efficiency, convenience, and reliability. **Table 2G** summarizes the enplanement forecasts included in the NERASP for the Jetport.

As can be seen from the table and the exhibit, actual enplanement levels have not kept pace with the *1994 Master Plan*. The 2005 TAF and 2006 NERASP projections have the benefit of being prepared most recently, thus considering more recent enplanement activity. The 2005 TAF average annual growth rate projected over the planning period is 2.9 percent. This is a lower rate than the 3.4 percent annual growth projected by the FAA for domestic enplanements nationwide. The NERASP Base Case projects enplanements growing at 3.4 percent annually, while the High Case and Low Case projects enplanements growing at 4.5 percent and 2.6 percent annually, respectively. The following section will consider the industry trends as well as local socioeconomic factors for comparison to the TAF.

Analytical Projections

Several analytical techniques were examined for their applicability to projecting airline enplanements at PWM. These included time-series extrapolation, regression analyses (using several variables), and market share analysis.

Table 2H examines the Jetport's enplanements as a percentage of domestic enplanements in the United States since 1970. While PWM had a growing market share leading up to deregulation in the late 1970s, the market share took a significant jump in 1983-84. The market share peaked at 0.149 percent of the U.S. Domestic enplaned passengers in 1986. The percentage then began to decline until reaching .0112 percent in 1994. For the past ten years, the local market

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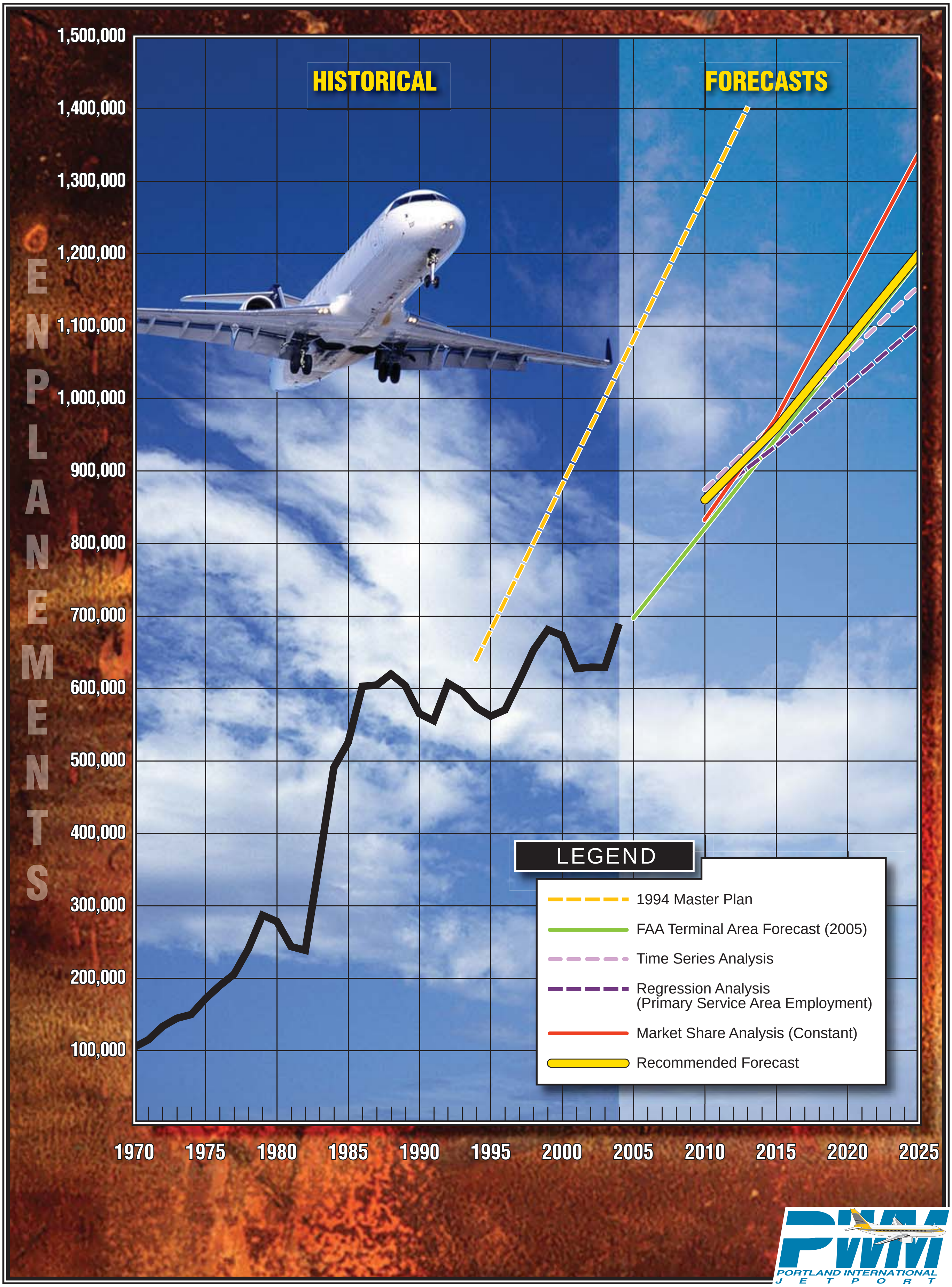


Exhibit 2G
ENPLANEMENT FORECASTS
TREND ANALYSIS

share has remained relatively constant, averaging 0.107 percent. An enplanement projection based upon maintaining the ten-year average is presented in the table.

A time-series analysis of airline enplanements was also prepared based upon the historic enplanements between 1970 and 2004. The correlation coefficient (r^2) was determined to be 0.858. The correlation coefficient **(Pearson's "r")** measures the association between changes in the dependent variable (enplanements) and the independent variable(s) (calendar years). An r^2 greater than 0.90 indicates good predictive reliability. A value below 0.90 may be used with the understanding that the predictive reliability is lower.

TABLE 2H
Market Share Analysis – PWM Enplanements
Portland International Jetport

Year	Annual Enplaned	U.S. Domestic Enplanements (millions)	PWM % Market Share
1970	104,708	146.7	0.071%
1971	115,137	149.0	0.077%
1972	133,571	165.9	0.081%
1973	144,792	183.2	0.079%
1974	149,920	189.5	0.079%
1975	171,715	186.6	0.092%
1976	189,817	195.1	0.097%
1977	205,498	216.6	0.095%
1978	240,340	246.7	0.097%
1979	286,977	283.4	0.101%
1980	278,427	287.9	0.097%
1981	243,724	274.7	0.089%
1982	238,525	286.0	0.083%
1983	362,500	308.1	0.118%
1984	490,867	333.8	0.147%
1985	525,489	369.9	0.142%
1986	602,933	404.7	0.149%
1987	604,628	441.2	0.137%
1988	619,934	441.2	0.141%
1989	604,066	443.6	0.136%
1990	565,180	456.6	0.124%
1991	555,488	445.9	0.125%
1992	607,157	464.7	0.131%
1993	595,642	470.4	0.127%
1994	573,390	511.3	0.112%
1995	561,761	531.1	0.106%
1996	570,395	558.1	0.102%
1997	610,545	577.8	0.106%
1998	653,193	590.4	0.111%
1999	681,122	610.9	0.111%
2000	673,153	641.2	0.105%
2001	627,344	626.8	0.100%
2002	629,400	574.5	0.110%
2003	629,085	587.9	0.107%
2004	689,174	627.2	0.110%
Constant Market Share Projection			
2010	832,000	777.8	0.107%
2015	971,000	907.8	0.107%
2025	1,338,000	1,250.0	0.107%

U.S. Domestic Enplanements History and Forecast: FAA Aeronautical Forecasts 2004-2016, March 2005. 2025 forecast extrapolated by Coffman Associates.

Two shorter periods were also tested beginning with 1980 and 1990. The resulting correlations are shown in **Table 2J**. The shorter time periods resulted in lower statistical correlations.

TABLE 2J
Correlation Analysis – PWM Enplanements
Portland International Jetport

Time Series Correlations	r^2
Enplanements 1970-2004	0.858
Enplanements 1980-2004	0.615
Enplanements 1990-2004	0.593
SINGLE VARIABLE CORRELATIONS 1970-2004	
Vs. Population	
Primary Service Area	0.874
Full Service Area	0.878
Vs. Employment	
Primary Service Area	0.923
Full Service Area	0.918
Vs. PCPI (1996$)	
Cumberland County	0.847
NATIONAL VARIABLES	
Vs. U.S. Domestic Enplanements	0.894
Vs. U.S. Gross Domestic Product	0.786
Vs. U.S. Domestic Yield	0.747

While the best statistical fit of the time-series analysis is below 0.90, the time-series analysis at least provides a general trend line for long-term growth. The trend line of the past 35 years was felt to be the most representative of past trends. The time-series projection for 1970-2004 is shown for comparison with the TAF and other projections in **Table 2K** and on **Exhibit 2G**.

TABLE 2K
Passenger Enplanement Projections
Portland International Jetport

	2010	2015	2025
Time Series Analysis (1970-2004)	874,000	968,000	1,155,000
Regression Analysis (1970-2004) Vs. Primary Service Area Employment	858,000	934,000	1,101,000
Market Share Analysis Constant Market Share	832,000	971,000	1,338,000
FAA Terminal Area Forecast January 2005*	821,259	945,318	1,193,436
RECOMMENDED FORECAST	**850,000**	**960,000**	**1,200,000**

* Extrapolated by Coffman Associates

Next, several regression analyses were run to examine the correlation between enplanements and various local and national independent variables. Local variables included population, wage and salary employment, and per capita income (inflation-adjusted PCPI) for the primary and secondary service areas. As with the time-series, the best correlation coefficients were for the period extending back to 1970.

The correlations for each socioeconomic variable are presented on **Table 2J.** The only variable to provide at correlation coefficient over 0.90 was employment. The employment in the primary service area was the highest at 0.923.

Several national independent variables were considered. On a national level, domestic enplanements, domestic available seat miles (ASMs), domestic yield, and U.S. gross domestic product (inflation-adjusted GDP) were tested. U.S. domestic enplanements had the highest correlation coefficient at 0.894, but none of the national variables tested above 0.90.

Table 2K and **Exhibit 2G** compare the three key projections. These include the time-series analysis, the constant share of the U.S. domestic market, and the regression involving the primary service area employment. They are also compared to the *FAA-TAF*. In the short term, all three projections are within two percent. The 2015 projections remain within five percent of each other. Over the long term, the projections range by 18 percent from lowest to highest. The constant market share results in the highest long term projection, while the employment regression results in the lowest. To ensure that both local growth and national industry growth are reflected in the forecast, a median projection was selected based upon the average of these three projections. This recommended forecast is also presented on both the table and the exhibit.

The recommended forecast compares favorably with the FAA-TAF. For 2010, the Master Plan forecast is within four percent of the FAA-TAF. For 2015, the Master Plan forecast is within two percent, and over the long term, the recommended analytical forecast is within one percent of the FAA-TAF.

Low-Cost Carrier Projections

As indicated earlier, Independence Air start-up of service at PWM in the summer of 2004 was the first entry of a low-cost carrier to the market. After the first full nine months of service by Independence Air (July 2004 through March 2005), passengers at the Jetport were up 15 percent over the same period a year earlier. Traffic in March of 2005 was 25 percent higher than the previous March. While the long-term success of this particular airline remains to be determined, it does indicate the potential for low-cost carrier service expanding into the Portland market.

To examine this potential effect, a study was made of what has happened in other air service markets after the introduction of a low-cost carrier. **Table 2L** presents the ratio of enplanements to population for the MSAs in the contiguous United States with a population similar to the Portland MSA (450,000 to 550,000), and that have a local commercial service airport. The year 2000 was used for this comparison because it was a census year, and was prior to 9/11 and the recent recession.

TABLE 2L
Enplanements vs. Population
MSAs of 350,000 to 450,000 Population

MSA Population Rank	MSA	2000 Population	2000 Enplanements	Enpl./Pop. Ratio
97	Boise, ID	468,780	1,524,458	3.25
86	Colorado Springs, CO	540,120	1,010,985	1.87
93	Des Moines, IA	483,140	887,515	1.84
88	Madison, WI	503,830	802,730	1.59
90	Jackson, MS	498,330	679,103	1.36
91	**Portland, ME**	**489,310**	**629,085**	**1.29**
87	Harrisburg, PA	509,400	650,340	1.28
100	Lansing, MI	448,360	273,426	0.61
95	Chattanooga, TN	477,170	232,198	0.49
89	Augusta, GA	500,360	165,874	0.33
99	Modesto, CA	449,890	14,594	0.03

Sources: Population: U.S. Bureau of Economic Analysis; Enplanements: FAA DOT ACAIS CY 2000 Database

The enplanement to population ratio in each of the 11 communities ranges from a high of 3.25 to a low of 0.03. Portland is in the middle of both population and enplanements with a ratio of 1.29.

There are a variety of local factors that affect the potential for passengers within each MSA. The MSAs with lower ratios are typically impacted by proximity to large hub airports, while the higher ratios tend to be located further from large hubs, have a service area that extends into other well populated regions, or have some type of air service advantage that attracts more of those passengers that would otherwise chose the large-hub airport.

Boise, Idaho's, ratio of 3.25 was well above that of the other airports. Boise is nearly six hours driving time from the next closest medium or large-hub airport, and is served by a low-cost carrier, Southwest Airlines. Thus, Boise's commercial service airport captures not only all of its own market, but also many of the passengers from surrounding markets.

The only other market of similar size to Portland that is directly served by Southwest Airlines is Jackson, Mississippi. While Jackson's enplanement to population ratio of 1.36 was just above Portland's at 1.29, its passenger traffic has increased by more than 40 percent in less than four years after Southwest Airlines began service.

The other three markets with higher ratios than Portland have all been served by low-cost carriers. Colorado Springs, Colorado is located less than 70 miles from Denver, and is currently served by low-cost carriers Allegiant Air and America West. The Colorado Springs Airport had over 2.4 million enplanements in 1996 at its peak as a hub for another low-cost carrier, Western-Pacific Airlines. In 1997, the airline moved its hub to the new Denver International Airport. Traffic levels at Colorado Springs were cut in half within two years.

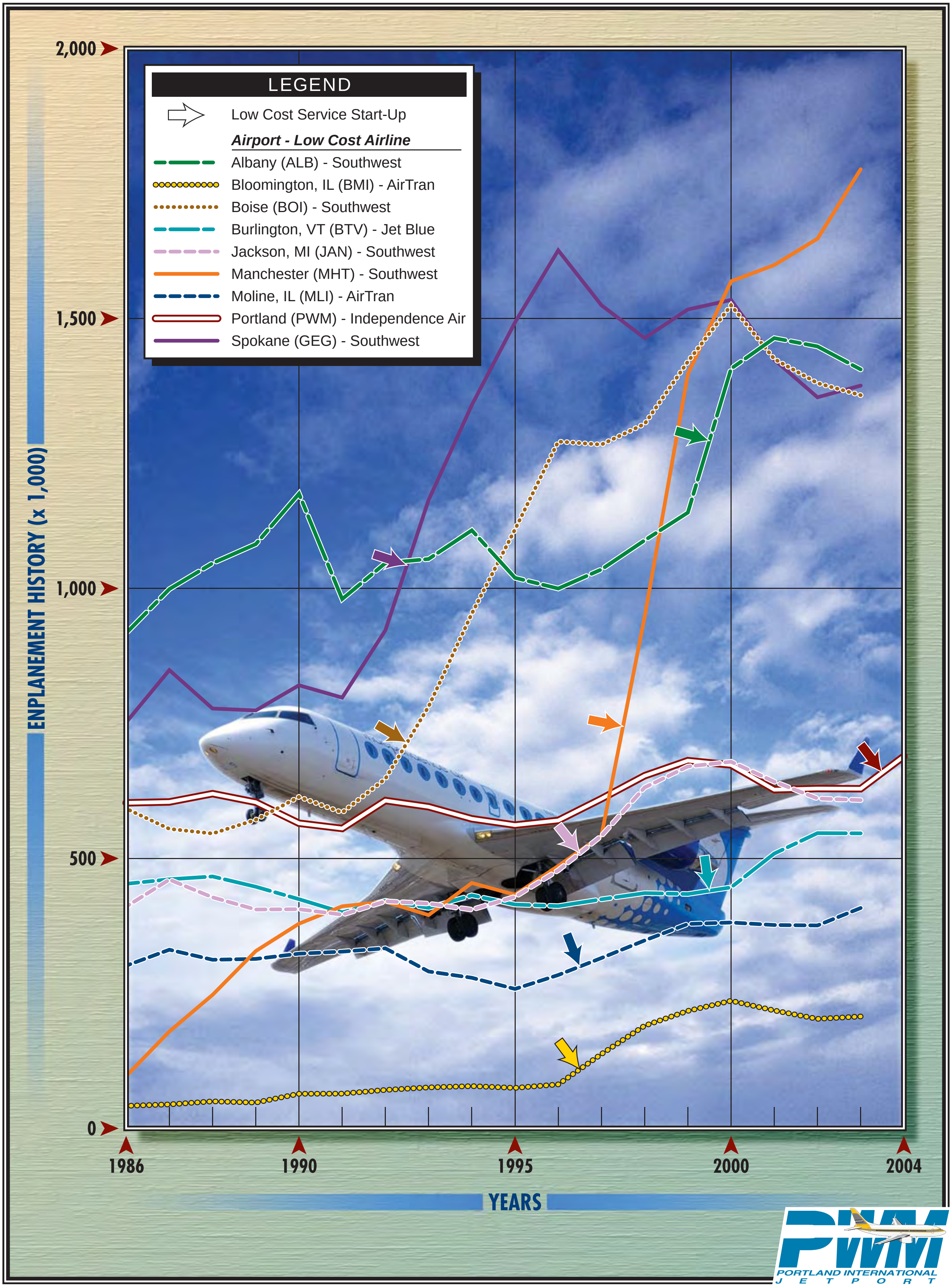
Des Moines, Iowa, and Madison, Wisconsin, have had experience with low-cost airline service as well. Both are currently served by Allegiant Air, and Des Moines also has regional jet service by America West Express.

Exhibit 2H depicts how the introduction of service by a low-cost airline can affect passenger traffic at an airport. The graph presents the enplanement history of eight airports that gained service by a low-cost carrier at some point between 1993 and 2001. The Jetport's enplanements during that period are also shown for comparison. Five of the airports (Albany, NY; Boise, ID; Jackson, MS; Manchester, NH; and Spokane, WA) are served by Southwest Airlines. Bloomington and Moline, Illinois, are served by AirTran, and Burlington, Vermont is served by JetBlue. Only the Albany and Jackson MSAs have a larger population than the Portland MSA.

It is evident from the graph that all eight airports received a large short term boost in traffic with the entry of a low-cost carrier. In most cases, the major jump in traffic occurred within the first three years. After that, traffic returned to more normal growth rates. **Table 2M** examines the increase in traffic at each airport three full years after the low-cost carrier initiated service.

TABLE 2M
Effect of Low-Cost Airline Service
Small Market Examples

		Enplanements Before		Enplanements Three Years After		Three-Year Change	
Population Rank	**MSA Pop 2000**	**Low-Cost Service**	**Enpl/Pop**	**Low-Cost Service**	**Enpl/Pop**	**% Increase**	**Enpl/Pop**
Markets served by Southwest Airlines							
56-Albany, NY	826,700	1,089,109	1.32	1,463,632	1.77	34%	0.45
90-Jackson, MS	498,330	478,025	0.96	679,103	1.36	42%	0.40
97-Boise, ID	468,780	781,343	1.67	1,272,071	2.71	63%	1.05
107-Spokane, WA	418,740	922,609	2.20	1,492,838	3.57	62%	1.36
119-Manchester, NH	382,350	542,247	1.42	1,568,860	4.10	189%	2.69
Average			1.47		2.50	70%	1.03
Markets served by other Low-Cost Airlines							
122-Moline, IL	375,840	284,091	0.76	378,616	1.01	33%	0.25
193-Burlington, VT	199,510	446,363	2.24	546,857	2.74	23%	0.50
243-Bloomington, IL	150,890	81,448	0.54	217,596	1.44	167%	0.90
Average			1.12		1.57	41%	0.46



PORTLAND INTERNATIONAL JETPORT

Exhibit 2H
ENPLANEMENT HISTORY
AIRPORTS WITH DISCOUNT CARRIER SERVICE

Manchester, NH, the closest location to Portland, saw the largest jump in traffic, nearly tripling passengers in three years. The Manchester MSA is smaller than Portland, but is located adjacent to the Boston MSA. Southwest Airlines does not serve Boston Logan International Airport, so its low fares draw passengers to Manchester from the Boston area.

Albany, NY, is another northeastern market that has benefited from Southwest Airlines entry. Albany experienced a 28 percent increase in traffic just before 9-11. Jackson, MS, is the market most similar to Portland in population. Jackson experienced a 42 percent increase in the three years after Southwest Airlines' start-up. The five markets averaged an 88 percent increase in passengers after three full years of service from Southwest Airlines. The enplanement per population ratio increased an average of 1.31.

With Southwest Airlines currently located in Manchester, the carrier is unlikely to bring service 60 miles up the road to Portland, at least in the foreseeable future. Service from other low-cost airlines, however, is still possible. The other three examples depicted on the exhibit and table are airports in markets smaller than Portland that have done just that.

Bloomington, Illinois, experienced a 190 percent increase in passengers within three years after AirTran Airways started service to the airport. The airport's enplanement to population ratio increased from 0.54 to 1.44. AirTran started service to Moline, Illinois, at the same time. While already having a higher level of service than Bloomington, the Moline market still experienced a 33 percent increase after three years with the enplanement to population ratio increasing from 0.76 to 1.01.

Closer to Portland is the Burlington, Vermont, market. The Burlington population is less than half that of Portland, but it is served by JetBlue Airlines. A vacation market for skiing, Burlington's enplanement per MSA population ratio was already at 2.24 prior to JetBlue. In three years, enplanements increased by over100,000 or 26 percent, and the ratio increased to 2.74.

The Portland market would most likely respond to low-cost airline service with a recapture of some of its own market share that is currently lost to Boston and Manchester. It could also expect to draw more traffic from the surrounding secondary service area, as well as more traffic from northern Maine. Lower airfares also generate new traffic that may not have considered flying at higher fares.

The short term enplanement increases experienced at Manchester are not likely, nor are the percentage increases experienced at Bloomington. Manchester is a smaller market that attracted air travelers from a neighboring large market (Boston). Bloomington is an even smaller market that previously had minimum commuter service.

The smallest growth rates were experienced at Albany and Burlington. Like Portland, these are northeastern markets. In each case, however, the low-cost service began in 2000, just a year before 9-11. Thus the growth rates were affected by 9-11 and the recession in 2001, just like passenger traffic around the country.

This can be rectified somewhat by examining the share of the U.S. domestic enplanement market that the airport maintained before and after the initiation of low-cost service. **Table 2N** presents each airport's market share before and after the establishment of low-cost carrier service. Albany increased its market share from 0.187 percent to 0.239 percent, for a net increase of 28 percent. Burlington increased its market share by 31 percent. Jackson's market share increased by 23 percent. Spokane increased by 46 percent and Boise by 64 percent. Moline's market share increased by 16 percent in the three years after the initiation of service. Most of the market shares have since remained relatively constant at the new level, except for Moline which has experienced another 17 percent increase in the last three years.

TABLE 2N
Low-Cost Airline Service
Market Share Effect

	Before Low-Cost Service		With Low-Cost Service		
Airport	Enplanements	U.S. Market Share (%)	Enplanements	U.S. Market Share (%)	% Share Increase
Albany, NY	1,140,518	0.187	1,463,382	0.239	27.8%
Jackson, MS	478,025	0.086	679,103	0.106	23.3%
Boise, ID	647,554	0.139	1,272,071	0.228	64.0%
Spokane, WA	922,609	0.199	1,626,276	0.291	46.2%
Manchester, NH	524,247	0.139	1,599,062	0.228	64.0%
Moline, IL	284,091	0.051	381,330	0.059	15.7%
Burlington, VT	434,111	0.071	546,857	0.093	31.0%
Bloomington, IL	81,848	0.015	236,343	0.037	146.7%

The double digit percentage growth that the Jetport has experienced since the entry of Independence Air into the market would indicate that the low-cost service did have an immediate effect on the airport's traffic. Based upon the history of low-cost carriers at the airports discussed, the Jetport could readily experience a 40 to 50 percent increase in traffic in the next few years.

For planning purposes, the growth will be expressed in terms of an increase in PWM's share of the U.S. domestic market. In line with the most similar airports, a 30 percent increase in market share is projected with the low-cost carrier scenario. This would increase the Jetport's market share to 0.141 percent in 2010. **Table 2P** presents the forecast scenario with a 30 percent market share increase over the trend forecast. The projection is also depicted on **Exhibit 2J** for comparison to the trend forecast and the FAA-TAF.

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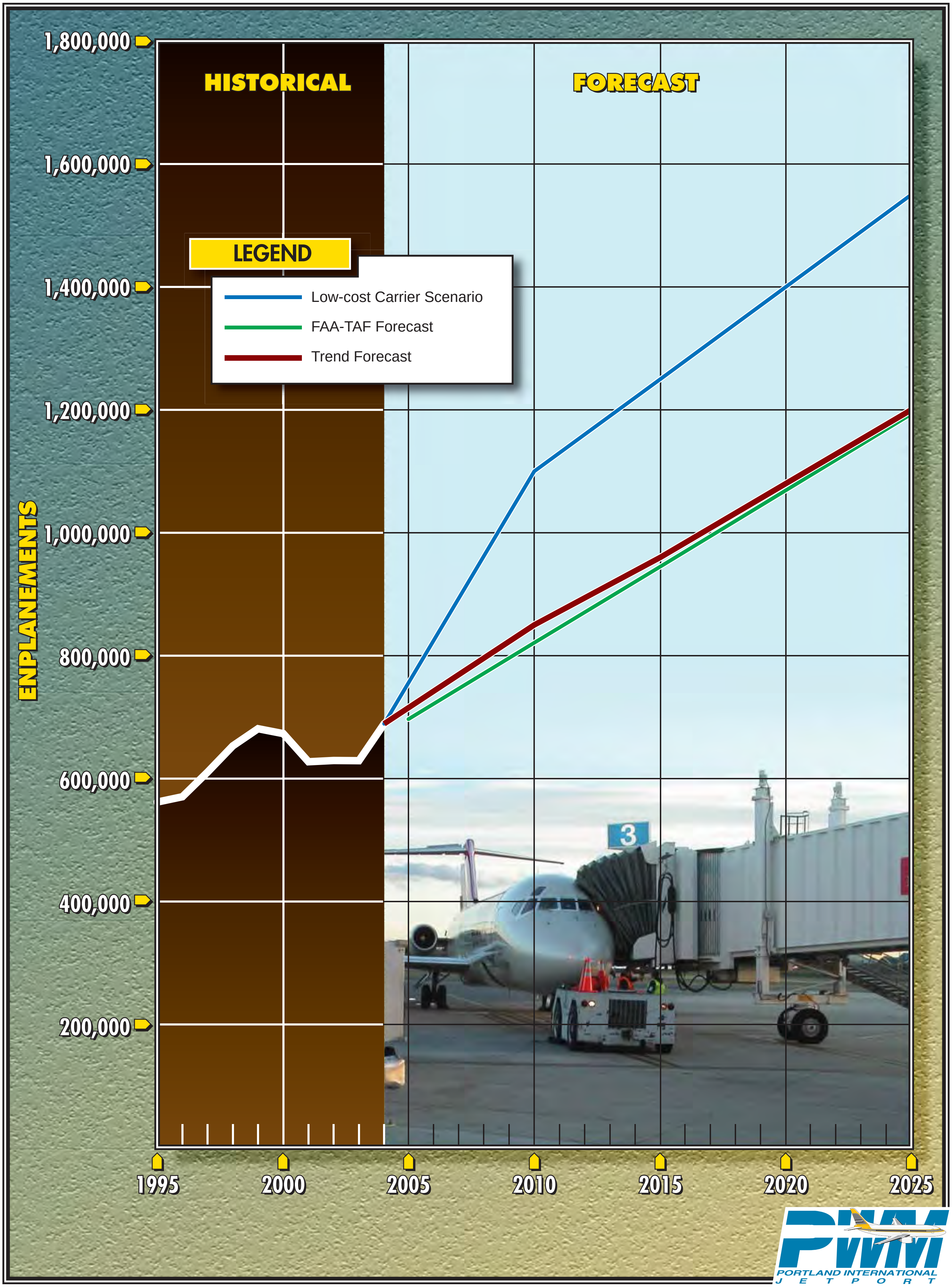

Exhibit 2J
ENPLANEMENT FORECASTS

TABLE 2P
Low-Cost Carrier Scenario Forecast
Portland International Jetport

Year	Annual Enplaned	U.S. Domestic Enplanements (millions)	PWM% Market Share
1999	681,122	610.9	0.111%
2000	673,153	641.2	0.105%
2001	627,344	626.8	0.100%
2002	629,400	574.5	0.110%
2003	629,085	587.9	0.107%
2004	689,174	627.2	0.110%
TREND FORECAST			
2010	850,000	777.8	0.109%
2015	960,000	907.8	0.106%
2025	1,200,000	1,250.0	0.096%
FAA-TAF FORECAST			
2010	821,000	777.8	0.106%
2015	945,000	907.8	0.104%
2025	1,193,000	1,250.0	0.095%
LOW-COST CARRIER SCENARIO			
2010	1,100,000	777.8	0.141%
2015	1,250,000	907.8	0.138%
2025	1,550,000	1,250.0	0.124%

International Service Potential

Portland International Jetport currently has no scheduled international service. Most international flights in the past have been special charters. There have been, and still are airlines looking at the Jetport for scheduled international flights.

The proximity to a major international airport (Boston Logan) and limited runway length have been the primary factors limiting Portland's role in international service. In the past, Bangor International Airport in northern Maine has been important as a fuel stop for international flights. The availability of an 11,440 foot runway made it a stopover for flights over the Great Circle. Greater aircraft fuel efficiency and open skies agreements have reduced the need for this stopover, and the international activity at BGR has declined in recent years.

The Portland market is not strong enough to warrant scheduled international commercial service on its own. The Jetport's opportunities for international flights may come about due to the improved fuel efficiency as well as the airport's proximity to east coast international hub airports like Boston Logan. Improved fuel efficiency and performance characteristics available in the newer commercial jets allow the aircraft to travel further from shorter runways. In addition, the limitations on available ramp space at Boston Logan and other international hubs have some airlines looking to other airports in the region to overnight aircraft.

As a result, the Jetport does have some potential for future international service, although on a limited basis. Service would likely be by Boeing 757 aircraft or similar that would stop at Boston or another airport prior to flying overseas. Destinations would likely be Europe or the Caribbean. Initially, service could be once a week or less. If successful, international service could eventually provide two to four daily flights to. With an average of 15 to 20 local passengers per flight, this could generate up to 20,000 annual passengers in the long term. These figures will be utilized for the long range planning purposes of this master plan.

AIRLINE OPERATIONS

The commercial service fleet mix is needed to project airline operations for the airport. A projection of the fleet mix for PWM has been developed by reviewing equipment used by the carriers serving the airport. **Exhibit 2K** depicts the aircraft fleet mix and seating capacities of the airlines serving the Jetport.

Changes in equipment, airframes, and engines have always had a significant impact on airlines and airport planning. There are many ongoing programs by the manufacturers to improve performance characteristics. These programs continue to focus on improvements in fuel efficiency. Regional jets have also become a larger factor as the airlines look for ways to reduce costs. Many airlines have replaced larger commercial jets on smaller emerging routes with regional jets.

Commuter airlines such as the ones serving PWM are transitioning to advanced turboprop aircraft and regional jets to fit their market needs. Many of these aircraft have greater seating capacity, lower operating costs, and are considerably more comfortable for the flying public. The regional jets made their initial impact in the 44 to 50-seat range. Regional jet aircraft are now available with as few as 37 seats and as many as 90 seats. This is essentially bridging a long-existing gap in seating capacity. Regional jets have become the aircraft of choice at non-hub and small-hub airports such as PWM.

Table 2Q compares the airline operational fleet mix by seat capacity for the last three years at PWM. The average seats per departure increased from 54.9 in 1993 to 61.3 in 2003. In 1993, over 69 percent of the airport's scheduled flights were by aircraft with 39 seats of less, and over 27 percent were by aircraft with at least 80 seats. In 2003, the flights with 80 seats or more declined to 21 percent, but the flights with 39 seats or less declined to just 34 percent. Aircraft with seating capacities between 40 and 79 grew from just three percent to 45 percent.

This exemplifies the change to service by regional jet aircraft. The transition continued through 2004 with the 40 to 79 seat aircraft comprising over 73 percent of the flights. Aircraft with 39 seats or less dropped to 15 percent of the total flights, while aircraft with 80

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AIRCRAFT TYPE	Continental Airlines	Delta	Independence Air	Northwest Airlines	United Airlines	US Airways Express	AVERAGE
B767-300	235	252		244			244
B767-200	174	204		168	203		187
B757-200	183	183		190	182	193	186
A321						169	169
B737-900	167						167
B737-800	155	150					153
MD-90		150					150
B727-200				149			149
B737-400						144	144
A320				148	138	142	143
MD-83/88	141	142					142
B737-300	124	128			120	126	125
DC-9-50					125		125
A-319			132	124	122	120	125
B737-700	124						124
DC-9-40				110			110
B737-500	104				104		104
B737-200		100					100
DC-9-30				100			100
BAe-146					88		88
DC-9-10				78			78
ERJ-170						72	72
CRJ-700		70				70	70
Avro RJ-85				69			69
ATR-72		66					66
CRJ-100/200		50	50	50	50	50	50
ERJ-145	50					50	50
ERJ-140				44			44
ERJ-135	37						37
Dash 8						37	37
SF-340				34		34	34
Jetstream 41					29	30	30
Beech 1900						19	19

PWM PORTLAND INTERNATIONAL JETPORT

Exhibit 2K
AIRCRAFT SEATING
FOR PWM CARRIERS

seats or more declined to 12 percent. By the end of 2004, Northwest and Delta were the only airlines using the larger commercial jets on scheduled flights into PWM. All other airlines were utilizing commuter aircraft and primarily regional jets. Even Northwest and Delta supplemented their DC-9 and MD-88 service with additional flights by their commuter affiliates.

TABLE 2Q
Airline Fleet Mix and Operations Forecast
Portland International Jetport

STANDARD GROWTH SCENARIO				FORECAST		
Fleet Mix Seating Capacity	**1993**	**2003**	**2004**	**2010**	**2015**	**2025**
> 210	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
180-210	3.9%	0.0%	0.0%	1.0%	2.0%	2.0%
160-179	0.0%	0.0%	0.0%	1.0%	2.0%	2.0%
140-159	8.6%	9.2%	7.8%	6.0%	5.0%	5.0%
120-139	2.4%	9.3%	1.9%	3.0%	4.0%	5.0%
100-119	4.1%	2.5%	1.9%	3.0%	4.0%	5.0%
80-99	8.5%	0.0%	0.0%	2.0%	5.0%	12.0%
60-79	0.0%	4.1%	4.2%	6.0%	8.0%	12.0%
40-59	3.5%	40.5%	69.0%	66.0%	60.0%	52.0%
20-39	34.4%	24.6%	8.4%	8.0%	7.0%	7.0%
< 20	34.7%	9.7%	6.8%	4.0%	3.0%	0.0%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Average Seats Per Departure	54.9	61.3	57.6	61.8	66.7	72.6
Boarding Load Factor	46.4%	64.4%	64.9%	66.0%	67.0%	68.0%
Enplanements Per Departure	25.5	39.5	37.4	40.8	44.7	48.2
Annual Enplanements	595,648	629,085	689,174	855,000	970,000	1,220,000
Annual Departures	23,371	15,941	18,436	20,960	21,700	24,730
Annual Operations	46,742	31,882	36,872	41,920	43,400	49,460

LOW COST CARRIER SCENARIO				FORECAST		
Fleet Mix Seating Capacity	**1993**	**2003**	**2004**	**2010**	**2015**	**2025**
> 210	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
180-210	3.9%	0.0%	0.0%	1.0%	2.0%	2.0%
160-179	0.0%	0.0%	0.0%	1.0%	2.0%	3.0%
140-159	8.6%	9.2%	7.8%	7.0%	7.0%	7.0%
120-139	2.4%	9.3%	1.9%	9.0%	11.0%	14.0%
100-119	4.1%	2.5%	1.9%	4.0%	5.0%	6.0%
80-99	8.5%	0.0%	0.0%	4.0%	6.0%	10.0%
60-79	0.0%	4.1%	4.2%	8.0%	8.0%	10.0%
40-59	3.5%	40.5%	69.0%	60.0%	54.0%	45.0%
20-39	34.4%	24.6%	8.4%	6.0%	5.0%	3.0%
< 20	34.7%	9.7%	6.8%	0.0%	0.0%	0.0%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Average Seats Per Departure	54.9	61.1	57.4	70.2	75.7	81.9
Boarding Load Factor	46.4%	64.6%	65.2%	68.0%	69.0%	70.0%
Enplanements Per Departure	25.5	39.5	37.4	47.0	51.5	57.4
Annual Enplanements	595,648	629,085	689,174	1,105,000	1,260,000	1,570,000
Annual Departures	23,371	15,941	18,436	23,150	24,110	27,370
Annual Operations	46,742	31,882	36,872	46,300	48,220	54,740

The boarding load factor (BLF) is defined as the ratio of passengers boarding aircraft compared to the seating capacity of the aircraft. The BLF at the Jetport has increased dramatically since 1993, growing from 46.4 percent to over 64 percent each of the last two years. This is comparable to what has happened at airports across the country as airlines have worked to improve efficiency and reduce costs. In the future, boarding load factors can be expected to continue to grow, although much more slowly.

With an increase in both seating capacity and load factors, the number of passengers on each aircraft flight has grown significantly over the past decade. The average enplanements per departure were 25.5 in 1993. In 2003, the ratio was 39.5 percent. While 2004 experienced a decline, the 37.4 percent ratio was still 47 percent higher than in 1993. The result has been a 21 percent reduction in commercial service flights even while passengers have increased by over 15 percent.

Portland International Jetport can expect regional airlines to dominate service into the future. While the 50-passenger aircraft will continue to be the most dominant, RJs with higher seating capacities will also factor in. A growing market will maintain at least some service by the larger commercial jets. Service by smaller commuter turboprops, however, is expected to continue to decline. **Table 2Q** presents the fleet mix and operations forecast for Portland International Jetport under the standard growth scenario. The international service potential is reflected in the projections with flights by larger aircraft such as the B757.

The table also presents the fleet mix and operations forecast for the low-cost carrier scenario. Under this scenario, it is anticipated that the boarding load factors will be slightly higher as the airlines compete to keep costs down. The use of more aircraft with higher seating capacities would also be expected as more passengers are drawn to lower fares.

AIR CARGO

Air cargo is comprised of air freight and air mail. Air freight is handled by both passenger airlines and all-cargo airlines. Air mail is now primarily handled by an all-cargo carrier under contract with the United States Postal Service. The 1994 Master Plan included history related to enplaned air cargo dating back to 1980. Enplaned cargo is typically between 40 and 50 percent of the total cargo handled at PWM. **Table 2R** presents the updated history of enplaned cargo through 2004.

Up until the mid-1980s, air cargo to and from the Portland area was carried almost exclusively by the passenger airlines as belly freight. That began to change with the introduction of the overnight package delivery carriers. In the mid-to-late 1980s, all-cargo carriers such as Airborne (now DHL Worldwide) and FedEx began to serve PWM with priority overnight service. That service has since expanded to include next-day, second-day, and third-day service. By 1995, the passenger airlines were handling just 13 percent of the air cargo at PWM. Since that time, belly freight tonnage has continued to decline. In 2004, belly freight comprised just 2.5 percent of the total air cargo handled at the Jetport.

TABLE 2R
Enplaned Air Cargo Tonnage
Portland International Jetport
Market Share Analysis

Year	Enplaned Tons	Annual % Change	U.S. Domestic RTMs	Market Share %
1980	1,462	NA	NA	NA
1983	1,685	15.3%	NA	NA
1986	2,906	72.5%	NA	NA
1987	3,813	31.2%	NA	NA
1988	3,909	2.5%	NA	NA
1989	3,726	-4.7%	NA	NA
1990	4,200	12.7%	NA	NA
1991	4,765	13.5%	NA	NA
1992	5,312	11.5%	NA	NA
1993	4,848	-8.7%	NA	NA
1994	4,765	-1.7%	NA	NA
1995	4,677	-1.8%	12,415.7	0.0000377%
1996	4,551	-2.7%	12,781.7	0.0000356%
1997	6,512	43.1%	13,454.1	0.0000484%
1998	7,020	7.8%	13,828.1	0.0000508%
1999	6,273	-10.6%	13,974.9	0.0000449%
2000	6,983	11.3%	14,698.8	0.0000475%
2001	6,638	-4.9%	13,934.0	0.0000476%
2002	7,232	8.9%	13,114.7	0.0000551%
2003	7,555	4.5%	14,972.4	0.0000505%
2004	7,331	-3.0%	15,541.6	0.0000472%
Constant Share Forecast				
2010	9,316	4.1%	19,013.8	0.0000490%
2015	10,875	3.1%	22,194.8	0.0000490%
2025	14,771	3.1%	30,146.4	0.0000490%

Source for historical enplaned tons: City of Portland
Source for historical and forecast U.S. Domestic RTMs: FAA

Exhibit 2L displays the relatively steady growth in cargo volume at PWM over the past 25 years. In 1980, the airport enplaned 1,462 tons of cargo. By 1992, enplaned cargo had increased to 5,312 tons. Enplaned cargo reached a new high of 7,555 tons in 2003.

Exhibit 2L compares the enplaned cargo forecasts prepared for the *1994 Master Plan* to the actual traffic that has occurred since. The previous forecast has proven to be relatively accurate over the past ten years. In 2003, the ten-year forecast of the previous master plan projected 7,900 enplaned tons of cargo, within 4.6 percent of the actual total. This forecast was based primarily on extrapolating the statistical trend line established between 1980 and 1993.

To update the forecasts the enplaned cargo data was evaluated using time-series, regression, and market share analyses in a manner similar to the passenger projections. The updated time-series analysis of the past 25 years resulted in a correlation coefficient of 0.929. The resulting project-

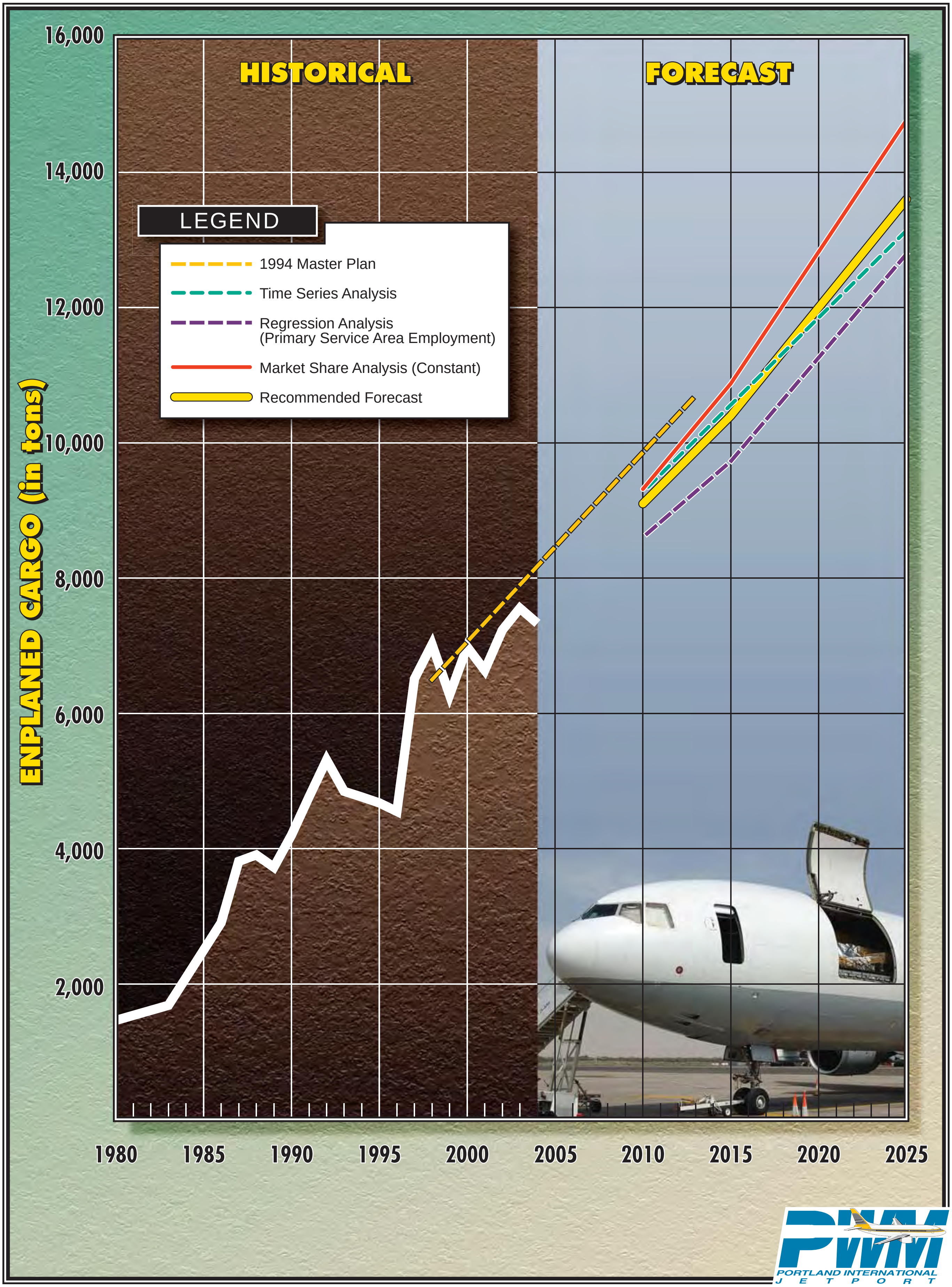

Exhibit 2L
ENPLANED CARGO FORECASTS

tion is presented for comparison on **Exhibit 2L** and in **Table 2S**. This projection is slightly lower than the *1994 Master Plan* forecast.

TABLE 2S
Enplaned Air Cargo Projections (tons)
Portland International Jetport

	2004	2010	2015	2025
Time Series Analysis (1980-2004)	7,331	9,272	10,561	13,139
Regression Analysis (1980-2004) vs. Service Area Population	7,331	8,604	9,726	12,792
Market Share Analysis Constant Market Share	7,331	9,316	10,875	14,771
1994 Master Plan			10,700	
RECOMMENDED FORECAST	**7,331**	**9,100**	**10,400**	**13,600**

Regression analyses similar to those prepared for the passenger projections were run for enplaned cargo. The only correlation coefficient above 0.90 related to service area population with a 0.92. The resulting enplaned cargo projection is also shown on the exhibit and table for comparison. This projection is lower than the time-series projection.

Table 2R presents the market share of enplaned cargo tons at PWM to U.S. domestic cargo revenue ton-miles (RTMs). The percentage has been fluctuating around an average of 0.0000490 percent over the past eight years. A projection of enplaned cargo based upon maintaining this percentage into the future is presented on the table and exhibit as well.

The constant market share would project the airport's cargo to grow at the industry rate for domestic air cargo. This results in a projection of 14,771 tons by 2025, the highest of the three projections.

As can be seen from the exhibit, the previous master plan forecast is slightly above the envelope of the updated projections, but if extended beyond 2013, this growth trend would fit within the long range envelope. For the purposes of this master plan update, a hybrid projection representing an average of the three updated projections was selected as the recommended forecast of enplaned air cargo, and is presented on **Table 2S** as well as **Exhibit 2L.**

Table 2T presents a full summary of the air cargo forecasts. Enplaned air cargo is forecast to remain at the past eight year average of 43 percent of total air cargo. The amount of air cargo carried by the passengers airlines is expected to stabilize and grow slightly in the future, however, the belly freight percentage of total air cargo will continue to decline.

TABLE 2T
Air Cargo Forecasts
Portland International Jetport

Year	Enplaned Tons	Enplaned %	Deplaned Tons	Total Cargo Tons	Belly Freight Tons	Belly Freight (%)
1995	4,677	53.7%	4,033	8,710	1,153	13.2%
1996	4,551	49.7%	4,613	9,164	1,131	12.3%
1997	6,512	46.6%	7,456	13,968	1,181	8.5%
1998	7,020	45.0%	8565	15,585	1,074	6.9%
1999	6,273	40.4%	9,236	15,509	1,051	6.8%
2000	6,983	38.9%	10,956	17,939	939	5.2%
2001	6,638	41.7%	9,276	15,914	765	4.8%
2002	7,232	45.1%	8,807	16,039	531	3.3%
2003	7,555	42.8%	10,110	17,665	544	3.1%
2004	7,331	43.6%	9,481	16,812	421	2.5%
FORECAST						
2010	9,100	43.0%	12,100	21,200	477	2.2%
2015	10,400	43.0%	13,800	24,200	531	2.1%
2025	13,600	43.0%	18,000	31,600	687	2.0%

ALL-CARGO OPERATIONS

Portland International Jetport is served by several of the major all-cargo carriers or their contract carriers. These include DHL and FedEx as well as several commuter carriers. The major all-cargo commercial airlines commercial utilize commercial jet aircraft, while the commuter cargo carriers primarily utilize turboprops.

Additional flights and larger aircraft will be necessary to absorb some of the long-range growth. Thus, air cargo operations were projected to increase, although not as fast as the cargo tonnage.

As shown on **Table 2U,** all-cargo operations totaled 4,398 in 2004. This was up slightly from the year 2003, when there were 4,168 all-cargo operations. As cargo volumes grow, part of the growth can be expected to be added to existing flights as load factors increase.

Table 2L also presents the operational forecasts for the all-cargo carriers, taking into account the aircraft size and load factors. As can be seen from the table, operations are anticipated to increase, but not at the same rate as the cargo tonnage. This will be due to higher load factors as well as an evolving mix of higher capacity aircraft.

GENERAL AVIATION FORECASTS

General aviation encompasses all portions of civil aviation except commercial operations. To determine the types and sizes of facilities that should be planned to accommodate general aviation activity, certain elements of this activity must be forecast. These indicators of general aviation demand include based aircraft, aircraft fleet mix, and annual operations.

TABLE 2U **All-Cargo Airline Fleet Mix and Operations Forecast** **Portland International Jetport**					
	Actual		**Forecast**		
Fleet Mix Payload Capacity (lbs.)	**2003**	**2004**	**2010**	**2015**	**2025**
All-Cargo Commercial Jet					
> 150,000	0.0%	0.0%	0.0%	0.0%	0.0%
110,000 – 150,000	0.0%	0.0%	0.0%	0.0%	0.0%
80,000 – 110,000	0.0%	0.0%	0.0%	0.0%	0.0%
60,000 – 80,000	0.0%	0.0%	0.0%	2.0%	9.0%
40,000 – 60,000	24.7%	22.9%	25.0%	25.0%	21.0%
20,000 – 40,000	13.2%	13.0%	15.0%	15.0%	15.0%
< 20,000	62.1%	64.1%	60.0%	58.0%	55.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
Average Capacity (lbs.)	19,101	18,017	19,810	21,228	23,915
Load Factor	43.0%	41.4%	45.0%	46.0%	48.0%
Lbs./Operation	8,215	7,454	8,915	9,765	11,479
All-Cargo Tons	17,121	16,391	21,200	24,200	31,600
Annual Operations	4,168	4,398	4,800	5,000	5,500

Aircraft Examples:	
> 140,000	B-747, MD-11, A380
110,000 – 140,000	B-767-300, A300
80,000 – 110,000	DC-8
60,000 – 80,000	B-757-200
40,000 – 60,000	B-727-200
20,000 – 40,000	B-727-100, DC-9

BASED AIRCRAFT

The number of based aircraft is the most basic indicator of general aviation demand. By first developing a forecast of based aircraft, the growth of other general aviation activities and demands can be projected.

Aircraft basing at an airport is somewhat dependent upon the nature and magnitude of aircraft ownership in the local service area. As a result, aircraft registrations in the area were reviewed and forecast first.

Aircraft Registrations

Data was collected on the history of aircraft ownership in Cumberland County over the last two decades. This information was obtained from records of the FAA's Aircraft Registry over the years and is presented in **Table 2V**, as well as on **Exhibit 2M.**

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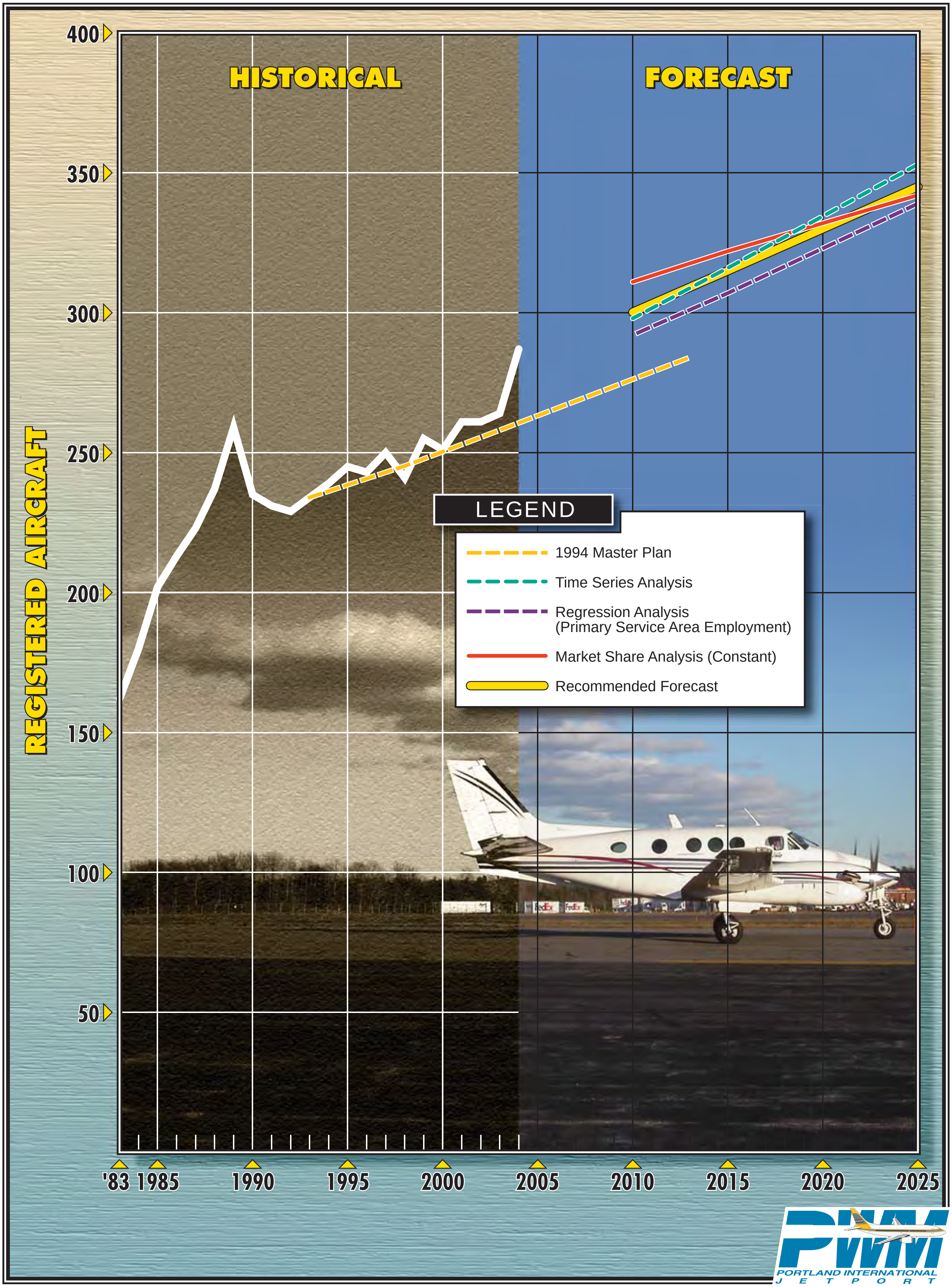

Exhibit 2M
AIRCRAFT REGISTRATIONS
CUMBERLAND COUNTY

TABLE 2V
Registered Aircraft Market Share
Cumberland County

Year	County Registered Aircraft	U.S. Active Aircraft	County Market Share
1983	162	NA	NA
1984	180	NA	NA
1985	202	NA	NA
1986	213	NA	NA
1987	223	NA	NA
1988	237	NA	NA
1989	259	NA	NA
1990	235	NA	NA
1991	231	NA	NA
1992	229	NA	NA
1993	234	177,719	0.132%
1994	239	172,936	0.138%
1995	245	188,089	0.130%
1996	243	191,129	0.127%
1997	250	192,414	0.130%
1998	241	204,710	0.118%
1999	255	219,464	0.116%
2000	251	217,533	0.115%
2001	261	211,447	0.123%
2002	261	211,244	0.124%
2003	264	210,600	0.125%
2004	287	211,295	0.136%
FORECAST (Constant Market Share)			
2010	311	230,335	0.135%
2015	322	238,645	0.135%
2025	342	253,300	0.135%

Unlike most locations around the country, registered aircraft in Cumberland County grew throughout the 1980s. Between 1983 and 1989, registered aircraft in the county grew from 162 to 259. By 1992 aircraft registrations had dipped to 229, then slowly grew back to 264 in 2003. The *1994 Master Plan* forecast 258 registered aircraft in 2003, within two percent of the actual figure. In 2004, the number of aircraft registered in the county jumped to 287, which is above that forecast for 2013 by the *1994 Master Plan*. The forecast from the *1994 Master Plan* is presented on **Exhibit 2M** for comparison.

There are no recently prepared forecasts of registered aircraft to examine and compare. As a result, a projection of county registrations was developed.

The Cumberland County share of the U.S. general aviation active aircraft market is examined in **Table 2V**. Because of a change in how the FAA counts active aircraft, this comparison could only be extended back to 1993. From 1993 through 2003, Cumberland County's market share fluctuated between a high of 0.138 percent in 1994, and a low of 0.115 percent in 2000. In 2004, the market share was 0.136 percent. A projection that would maintain a constant share of 0.135 percent into the future, results in 342 registered aircraft by 2025.

Next, trend line or "time-series" analysis was conducted for the period dating back to 1983. The correlation coefficient, or r^2, was just 0.73. Extrapolating this growth trend would result in 353 registered aircraft by 2025.

Several regression analyses comparing registered aircraft to Cumberland County's socioeconomic variables were conducted. These included population, employment, and per capita personal income. None achieved an r^2 value equal to or greater than 0.90 for any period tested. For the long term period of 1983 through 2003, employment provided the best correlation of 0.85. Each of the regression analyses using local variables for the 21-year period is presented for comparison in **Table 2W**. As can be seen from the table, each provides a very similar projection.

In fact, the envelope created by all the projections is very small. The forecast was selected from the middle of this range and is shown on the exhibit and the table.

TABLE 2W
Cumberland County
Registered Aircraft Projections

	r^2	2004	2010	2015	2025
Time-Series (1983-2004)	0.73	287	298	316	353
Regression Analyses (1983-2003)					
vs. County Population	0.74	287	293	308	344
vs. County Employment	0.85	287	292	307	339
vs. County PCPI	0.80	287	297	313	346
Market Share Analysis					
Constant Share	NA	287	311	322	342
Selected Forecast	**NA**	**287**	**300**	**315**	**345**

Based Aircraft Forecast

Having forecast the aircraft ownership demand in Cumberland County, the historic basing at Portland International Jetport was reviewed to examine the change in market share over the years. The market share at PWM is somewhat dependent upon what is happening at other area airports. The closest general aviation airport to the Jetport is in Biddeford in York County. FAA records indicate there are 41 aircraft based at Biddeford Municipal Airport. Auburn-Lewiston Airport has 62 based aircraft, and Sanford Municipal Airport has 67.

Table 2X examines the based aircraft at PWM as a percentage of the aircraft registered to residents of Cumberland County. The historic based aircraft figures at the Jetport were taken from airport records when available, and for other years, from FAA records of counts conducted as part of an annual airport inspection by the FAA or state aviation officials.

TABLE 2X
Based Aircraft Forecasts
Portland International Jetport

Year	PWM Based Aircraft	County Registered Aircraft	PWM Percent
1983	64	162	39.5%
1984	76	180	42.2%
1985	76	202	37.6%
1986	76	213	35.7%
1987	76	223	34.1%
1988	74	237	31.2%
1989	61	259	23.6%
1990	45	235	19.1%
1991	53	231	22.9%
1992	43	229	18.8%
1993	46	234	19.7%
1994	52	239	21.8%
1995	54	245	22.0%
1996	54	243	22.2%
1997	44	250	17.6%
1998	44	241	18.3%
1999	44	255	17.3%
2000	44	251	17.5%
2001	56	261	21.5%
2002	56	261	21.5%
2003	56	264	21.2%
2004	43	287	15.0%
Master Plan Forecast			
2010	54	300	18.0%
2015	61	315	19.5%
2025	76	345	22.0%
FAA-TAF (2004)			
2010	60	300	20.0%
2015	64	315	20.3%
2025	69	345	20.0%

In the 1980s, PWM based aircraft totaled as many as 76. In 1993, the base year of the *1994 Master Plan*, there were 46 based aircraft. The number fluctuated between 44 and 56 from 1994 through 2003. According to the last count in 2004, there are 43 aircraft based on the airport.

In the 1980s, the based aircraft were equivalent to more than one-third of the registered aircraft in the County. This number declined to between 17 and 22 percent in the 1990s. The most current count is just 15 percent of the registrations.

The fluctuations in the count over the years may reflect some differences in how aircraft were counted from year-to-year. Discussions with airport staff do confirm that the number of based aircraft did rise since the last master plan, but have declined recently. A review of recent FAA records of based aircraft for the three closest publicly-owned GA airports (Biddeford Municipal, Sanford Regional, and Auburn-Lewiston) suggests that some aircraft may have moved from PWM to these other facilities.

One of the factors affecting based aircraft at Portland International Jetport has been the lack of hangar storage. If space is more readily available at another airport, some aircraft owners may chose to use a less convenient airport to ensure they can store their aircraft inside. Other factors can be costs for storage, fuel, and fixed base operators services.

For planning purposes, it is assumed that the Jetport's general aviation facilities can be developed in a manner that will allow the airport to recapture and maintain market share based primarily upon convenience and airfield capabilities.

Table 2X depicts the forecast based upon this premise. The PWM based aircraft as a percentage of county registrations would gradually increase back to 22 percent, similar to the higher percentage maintained over the past 15 years. This would result in a based aircraft forecast in 2025 of 76. The table also includes the FAA-TAF projections for based aircraft. This FAA forecast would essentially maintain a constant share of 20 percent over the planning period. **Exhibit 2N** compares these forecasts with the forecasts from the *1994 Airport Master Plan*.

Based Aircraft Fleet Mix

The based aircraft fleet mix at Portland International Jetport (**Table 2Y**) was compared to the existing and forecast U.S. general aviation fleet mix trends as presented in FAA *Aerospace Forecasts Fiscal Years 2005-2016*. The FAA expects business jets will continue to be the fastest growing general aviation aircraft type in the future. The number of business jets in the industry fleet is expected to nearly double in the next twelve years.

Single-engine piston aircraft (including sport aviation and experimental aircraft), helicopter, and turboprop aircraft are expected to grow at slower rates. The number of multi-engine piston aircraft in the U.S. will actually decline slightly as older aircraft are retired according to the FAA forecasts.

GENERAL AVIATION OPERATIONS

General aviation (GA) operations are classified by the airport traffic control tower (ATCT) as either local or itinerant. A local operation is a take-off or landing performed by an aircraft that operates within sight of the airport, or which executes simulated approaches or touch-and-go operations at the airport. Itinerant operations are those performed by aircraft with a specific origin or destination away from the airport. Generally, local operations are characterized by training operations. Typically, itinerant operations increase with business and commercial use, since business aircraft are operated on a higher frequency.

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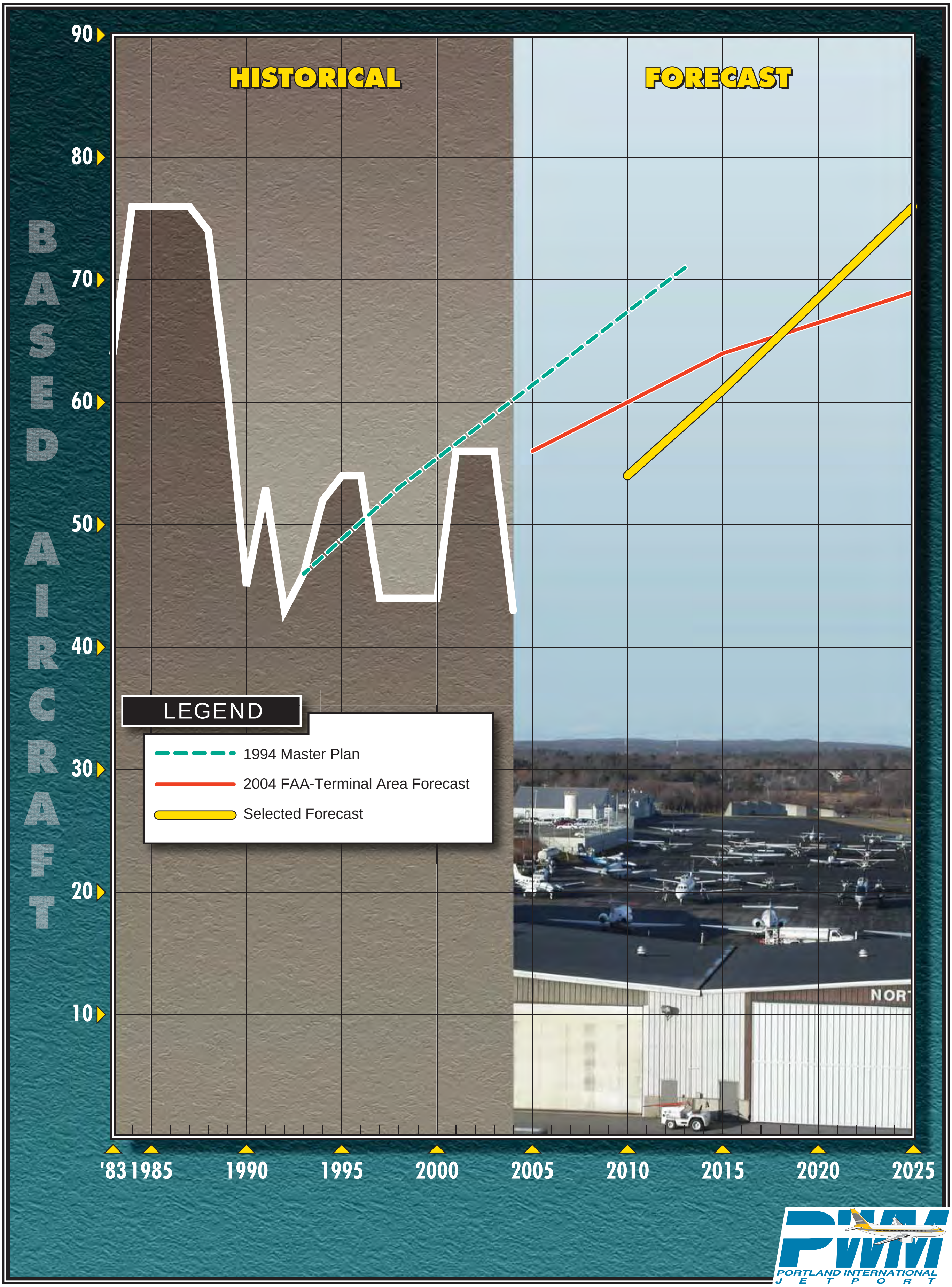

PWM PORTLAND INTERNATIONAL JETPORT

Exhibit 2N
BASED AIRCRAFT FORECASTS

TABLE 2Y Based Aircraft Mix Portland International Jetport								
PWM Based	Current	%	2010	%	2015	%	2025	%
Single Engine Piston	30	69.8%	38	70.4%	42	68.9%	51	67.1%
Multi-Engine Piston	9	20.9%	9	16.7%	9	14.8%	9	11.8%
Turboprop	1	2.3%	2	3.7%	3	4.9%	5	6.6%
Jet	1	2.3%	3	5.6%	4	6.6%	7	9.2%
Helicopter	2	4.7%	2	3.7%	3	4.9%	4	5.3%
Other	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Totals	43	100.0%	54	100.0%	61	100.0%	76	100.0%

Itinerant Operations

Table 2Z and **Exhibit 2P** depict general aviation itinerant operations, as counted by the ATCT at Portland International Jetport since 1990. Itinerant operations began the 1990s at a high of 38,836, then declined to 31,715 in 1996. Traffic grew back to 38,371 in 1999, but has been declining since. In 2004, there were 27,843 GA itinerant operations.

The Jetport market share as a percentage of GA itinerant operations at towered airports across the country has remained relatively constant over the past decade fluctuating between 0.139 percent in 2004 and 0.177 in 1993. The PWM market share has averaged 0.161 percent.

In *FAA Aerospace Forecasts Fiscal Years 2005-2016*, the FAA projects itinerant general aviation operations at towered airports. **Table 2Z** presents this forecast as well as a projection for the Jetport based upon maintaining its average share of the itinerant market.

The table also examines the relationship of annual operations to based aircraft. Operations per based aircraft have ranged from a low of 514 in 2003 to a high of 874 in 1992. The ratio has typically been higher when the based aircraft were in the mid-40s, and lower when the based aircraft were in the 50s. The average when based aircraft were over 50 was approximately 600 itinerant operations per based aircraft. Therefore, the second projection in **Table 2Z** reflects the itinerant operational levels that could be expected if the operations per based aircraft ratio were to average 600 in the future.

The market share projection was considered more reliable for the short term. For the long term, however, a projection midway between the market share and the based aircraft ratio was selected. The resulting forecast is included at the bottom of **Table 2Z**.

The itinerant operations forecast is depicted on **Exhibit 2P** and compared to the forecasts from the *1994 Master Plan* and the *FAA-TAF 2004*. The previous Master Plan forecasts were accurate over the first five years, but have since proven to be high as activity has declined in the last five years. The TAF forecasts show no-growth with itinerant operations projected to remain constant. The Master Plan

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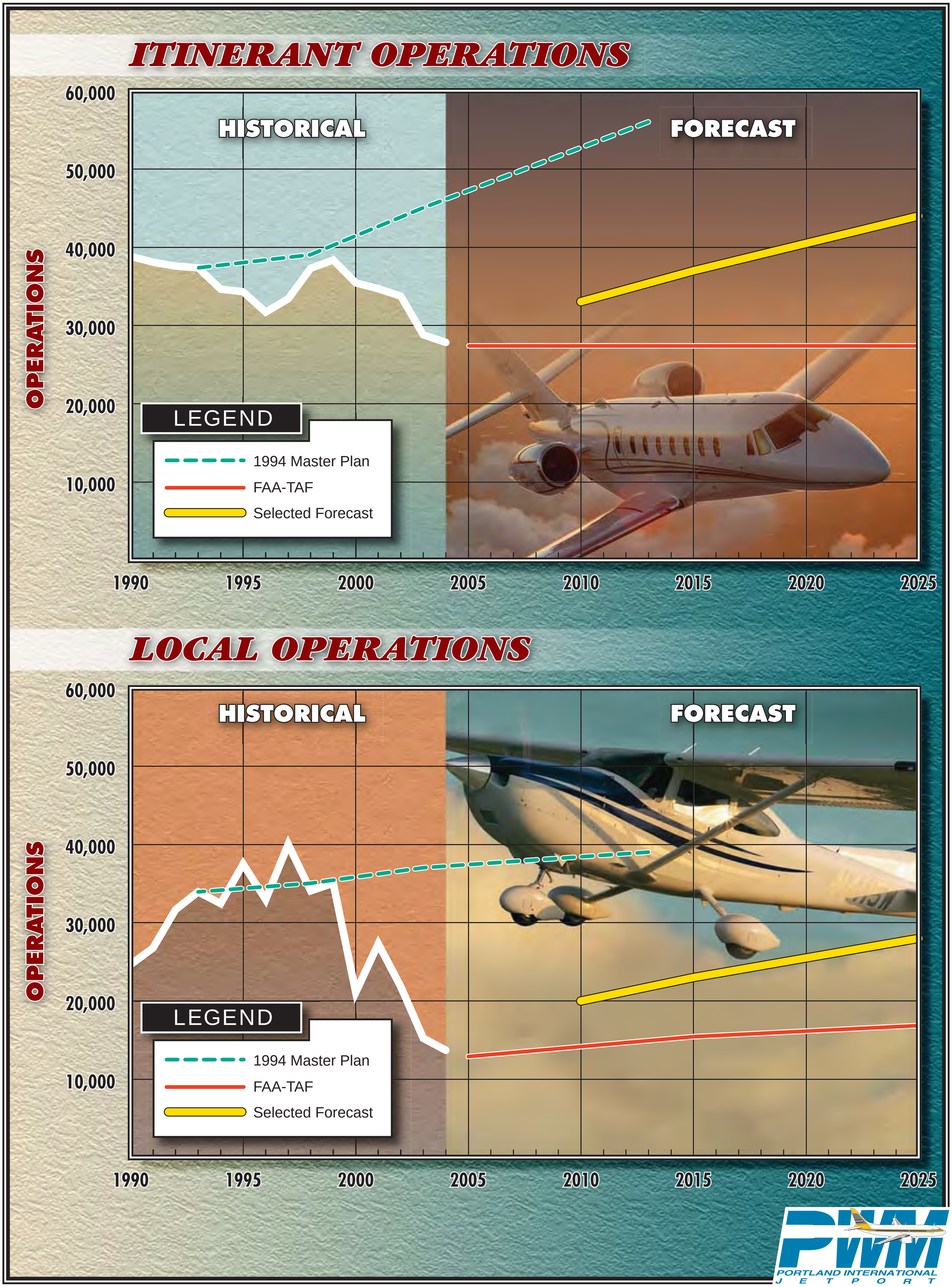

Exhibit 2P
GENERAL AVIATION OPERATIONS

forecast, however, attempts to allow for growth that would reflect a recovery of general aviation activity that has been affected by the lack of facilities, the aftermath of 9-11, and the recent economic recession.

TABLE 2Z
General Aviation Itinerant Operations Forecast
Portland International Jetport

Year	PWM GA Itinerant	U.S. ATCT GA Itinerant (millions)	PWM Market Share (%)	PWM Based AC	Itinerant Ops Per AC
1990	38,836	23.1	0.168%	45	863
1991	38,102	22.2	0.172%	53	719
1992	37,593	22.1	0.170%	43	874
1993	37,375	21.1	0.177%	46	813
1994	34,649	21.1	0.164%	52	666
1995	34,311	20.9	0.164%	54	635
1996	31,715	20.8	0.152%	54	587
1997	33,417	21.7	0.154%	44	759
1998	37,320	22.1	0.169%	44	848
1999	38,371	23.0	0.167%	44	872
2000	35,453	22.8	0.155%	44	806
2001	34,704	21.4	0.162%	56	620
2002	33,756	21.5	0.157%	56	603
2003	28,809	20.2	0.143%	56	514
2004	27,843	20.0	0.139%	43	648
Constant Market Share Projection					
2010	35,420	22.0	0.161%	54	656
2015	37,835	23.5	0.161%	61	620
2025	41,377	25.7	0.161%	76	544
Operations Per Based Aircraft Projection					
2010	32,400	22.0	0.147%	54	600
2015	36,600	23.5	0.156%	61	600
2025	45,600	25.7	0.177%	76	600
FAA-TAF Projections					
2010	27,396	22.0	0.125%	60	457
2015	27,396	23.5	0.117%	64	428
2025	27,396	25.7	0.107%	69	397
Selected Forecast					
2010	33,000	22.0	0.150%	54	611
2015	37,000	23.5	0.157%	61	607
2025	44,000	25.7	0.171%	76	579

Local Operations

A similar methodology was utilized to forecast local operations. **Table 2AA** depicts the history of local operations at Portland International Jetport, and examines its historic market share of GA local operations at towered airports in the United States. Local operations grew through the early 1990s to a peak of 40,011 in 1997. This was followed by a sharp decline with local operations at 13,704 in 2004.

TABLE 2AA General Aviation Local Operations Forecast Portland International Jetport					
Year	**PWM GA Local**	**U.S. ATCT GA Local (millions)**	**PWM Market Share (%)**	**PWM Based AC**	**Local Ops Per AC**
1990	24,647	17.1	0.144%	45	548
1991	26,779	16.6	0.161%	53	505
1992	31,681	16.3	0.194%	43	737
1993	33,946	15.5	0.219%	46	738
1994	32,451	15.2	0.213%	52	624
1995	37,489	15.1	0.248%	54	694
1996	32,961	14.5	0.227%	54	610
1997	40,011	15.2	0.263%	47	851
1998	34,075	16.0	0.213%	44	774
1999	35,055	17.0	0.206%	44	797
2000	21,118	17.0	0.124%	44	480
2001	27,310	16.2	0.169%	56	488
2002	21,823	16.2	0.135%	56	390
2003	15,227	15.3	0.100%	56	272
2004	13,704	14.9	0.092%	43	319
Constant Market Share Projection					
2010	25,921	16.1	0.161%	54	480
2015	27,370	17.0	0.161%	61	449
2025	30,590	19.0	0.161%	76	403
Operations Per Based Aircraft Projection					
2010	18,900	16.1	0.117%	54	350
2015	21,350	17.0	0.126%	61	350
2025	26,600	19.0	0.140%	76	350
FAA-TAF Projections					
2010	14,138	16.1	0.088%	60	236
2015	15,437	17.0	0.091%	64	241
2025	16,855	19.0	0.089%	69	244
Selected Forecast					
2010	20,000	16.1	0.124%	54	370
2015	23,000	17.0	0.135%	61	377
2025	28,000	19.0	0.147%	76	368

The market share has declined as well from around 0.263 percent to 0.092 percent. **Table 2AA** presents a market share projection, carrying a share equivalent to the itinerant operations market share of 0.161 percent.

Local operations per based aircraft have also declined over the past thirteen years. The 2004 ratio of 319 annual local operations per based aircraft was down from a high of 851 in 1997. Local operations can easily fluctuate at an airport depending upon the level of general aviation pilot training available at the facility. It should be noted that in the first three month of 2005, local operations were up by over 50 percent from the same period in 2004.

With this under consideration, the second projection in **Table 2AA** maintains a ratio of 350 local operations per based aircraft into the future. This reflects the potential for some recovery in local operations. For planning purposes a projection that would recapture some market share was selected for use in this Master Plan.

Exhibit 2P graphically depicts the general aviation local operations forecast for PWM and compares it to that of the *1994 Master Plan* as well as *FAA Terminal Area Forecasts-2004*. As with itinerant operations, the previous Master Plan forecast has proven to be high beyond the initial five-year period. The TAF, projects some slow growth in local operations.

OTHER AIR TAXI

Air taxi operations as reported by the ATCT include commuter passenger, commuter cargo, as well as for-hire general aviation operations. Some operations by aircraft operated under fractional ownership programs are also counted as air taxi operations. Since the airline and cargo operations have been forecast, this section reviews the growth potential for the "other air taxi" operations.

Table 2BB presents the other air taxi operations for the past two years. These operations have been equivalent to 21 percent of the itinerant general aviation operations. Because of the relationship to general aviation activity, other air taxi operations were projected to increase in line with that of general aviation itinerant operations. The resulting forecast is also presented on **Table 2BB**.

TABLE 2BB
Other Air Taxi Operations
Portland International Jetport

Year	Other Air Taxi
Actual	
2003	6,608
2004	5,204
Forecast	
2010	6,900
2015	7,800
2025	9,200

MILITARY

Military activity accounts for the smallest portion of the operational traffic at the Jetport. The *1994 Master Plan* forecast military operations to remain at 3,000 annual operations. Military activity has not been above this level since 1998. Since 1999, annual military operations have generally been on the decline with only 1,338 operations in 2004. Unless there is an unforeseen mission change in the area, it is anticipated that military operations will remain at or below the average of the last six years. **Table 2CC** presents the military activity of the last five years and the forecast of 2,000 operations.

TABLE 2CC
Military Operations
Portland International Jetport

Year	Itinerant	Local	Total
1990	1,080	746	1,826
1991	1,216	1,054	2,270
1992	1,571	1,552	3,123
1993	1,383	1,555	2,938
1994	1,013	1,313	2,326
1995	1,542	1,851	3,393
1996	1,456	1,224	2,680
1997	2,070	2,334	4,404
1998	2,296	2,257	4,553
1999	1,899	1,062	2,961
2000	1,734	338	2,072
2001	1,823	436	2,259
2002	1,695	270	1,965
2003	1,262	187	1,449
2004	1,176	162	1,338
FORECAST			
2010	1,600	400	2,000
2015	1,600	400	2,000
2025	1,600	400	2,000

ANNUAL INSTRUMENT APPROACHES

Forecasts of annual instrument approaches provide guidance in determining an airport's requirements for navigational aid facilities. An instrument approach as defined by FAA as "an approach to an airport with intent to land by an aircraft in accordance with an Instrument Flight Rule (IFR) flight plan, when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude."

Data on instrument approaches to Portland International Jetport was obtained from FAA statistics for the past 10 years (1995-2004). For commercial operations, AIAs have averaged 5.4 percent of annual air carrier and commuter operations. The AIA percentage for military activity has averaged 2.9 percent of itinerant military operations. The AIAs for general aviation have averaged 2.4 percent of itinerant operations. These percentages can be expected to remain relatively constant with the exception of general aviation where a growing mix of more sophisticated business aircraft and more widespread use of GPS (global positioning system) will increase the percentage over time. **Table 2DD** presents the AIA forecast for the Jetport.

TABLE 2DD
Annual Instrument Approaches (AIAs) Forecast
Portland International Jetport

	Air Carrier & Air Taxi			GA Itinerant			Military Itinerant			Total
Year	**Total**	**AIAs**	**%**	**Total**	**AIAs**	**%**	**Total**	**AIAs**	**%**	**AIAs**
1995	34,659	2,055	5.93%	34,311	931	2.71%	1,542	52	3.37%	3,038
1996	48,525	3,715	7.66%	31,715	1,069	3.37%	1,456	78	5.36%	4,862
1997	51,065	2,264	4.43%	33,417	705	2.11%	2,070	67	3.24%	3,036
1998	52,130	3,407	6.54%	37,320	1,124	3.01%	2,296	93	4.05%	4,624
1999	48,639	1,783	3.67%	38,371	653	1.70%	1,899	46	2.42%	2,482
2000	47,609	2,057	4.32%	35,453	709	2.00%	1,734	28	1.61%	2,794
2001	47,770	1,916	4.01%	34,704	460	1.33%	1,823	22	1.21%	2,398
2002	45,086	2,455	5.45%	33,756	642	1.90%	1,695	24	1.42%	3,121
2003	42,658	2,995	7.02%	28,809	916	3.18%	1,262	31	2.46%	3,942
2004	46,474	2,288	4.92%	27,843	617	2.22%	1,176	43	3.66%	2,948
Avg. %			**5.39%**			**2.35%**			**2.88%**	
FORECAST										
2010	53,600	2,894	5.40%	33,000	825	2.50%	1,600	46	2.90%	3,766
2015	56,200	3,035	5.40%	37,000	962	2.60%	1,600	46	2.90%	4,043
2025	64,200	3,467	5.40%	44,000	1,232	2.80%	1,600	46	2.90%	4,745

SUMMARY

This chapter has outlined the various activity levels that might reasonably be anticipated over the planning period. **Exhibit 2Q** is a summary of the aviation forecasts prepared in this chapter. Actual activity is included for 2004, which was the base year for these forecasts.

Airline passenger activity has good potential for growth, although most of that growth will be handled by regional jet aircraft. The smaller jets, coupled with additional flights to more destinations and competitive air fares will permit PWM to continue to develop a strong passenger market. A forecast scenario that considers the potential with a low-cost carrier serving the Jetport is included.

Based aircraft at PWM are expected to see some growth over the planning period. Business and corporate aircraft will spur most general aviation growth. The growth in smaller piston aircraft will depend upon the availability of services and facilities in the future.

Air cargo activity can be expected to grow in volume. Other air taxi operations can be expected to continue to grow with increased business use of general aviation. Military activity is expected to continue to be a small part of the mix at Portland International Jetport.

The next step in the planning process is to assess the capabilities of the existing facilities to determine what upgrades may be necessary to meet future demands. The forecasts developed here will be taken forward in the next chapter as planning horizon activity levels that will serve as milestones or activity benchmarks in evaluating facility requirements. Peak activity characteristics will also be determined for the various activity levels, for use in determining facility needs.

	BASELINE	FORECAST 2010	FORECAST 2015	FORECAST 2025
ANNUAL OPERATIONS				
General Aviation				
Itinerant	27,843	33,000	36,000	41,000
Local	13,704	20,000	23,000	28,000
Total General Aviation	*41,547*	*53,000*	*59,000*	*69,000*
Airline	36,872	41,900	43,400	49,500
Air Cargo	4,398	4,800	5,000	5,500
Air Taxi	5,204	6,900	7,800	9,200
Military	1,338	2,000	2,000	2,000
Total Operations	***89,359***	***108,600***	***117,200***	***135,200***
ENPLANEMENTS	***689,174***	***855,000***	***970,000***	***1,220,000***
AIR CARGO (tons)				
Enplaned	7,331	9,100	10,400	13,600
Deplaned	9,481	12,100	13,800	18,000
Total Air Cargo	***16,812***	***21,200***	***24,200***	***31,600***
BASED AIRCRAFT				
Single Engine Piston	30	38	42	51
Multi-Engine Piston	9	9	9	9
Turboprop	1	2	3	5
Business Jet	1	3	4	7
Helicopter	2	2	3	4
Total Based Aircraft	***43***	***54***	***61***	***76***
Low-Cost Carrier Scenario				
Enplanements	689,174	1,105,000	1,260,000	1,570,000
Airline Operations	36,872	46,300	48,200	54,700

PWM PORTLAND INTERNATIONAL JETPORT

Exhibit 2Q
ACTIVITY FORECAST SUMMARY

PORTLAND INTERNATIONAL JETPORT

Chapter Three

AVIATION FACILITY REQUIREMENTS

CHAPTER THREE

Aviation Facility Requirements

In this chapter, existing components of the Portland International Jetport (Jetport) are evaluated so that the capacities of the overall system are identified. Once identified, the existing capacities are compared to the forecast activity levels prepared in Chapter Two to determine where deficiencies currently exist or may be expected to materialize in the future. Once deficiencies in a component are identified, a more specific determination of the approximate sizing and timing of the new facilities can be made.

The objective of this effort is to identify, in general terms, the adequacy of the existing airport facilities and outline what new facilities may be needed and when they may be needed to accommodate forecast demands. Having established these facility requirements, alternatives for providing these facilities will be evaluated in Chapter Four to determine the most cost-effective and efficient means for implementation.

Recognizing that the need to develop facilities is determined by demand, rather than a point in time, the requirements for new facilities have been expressed for the short, intermediate, and long term planning horizons. For planning purposes, the low-cost air carrier scenario has been assumed. This is the result of continued strong passenger growth in 2005. In June 2005, the airport surpassed 750,000 enplanements for a 12-month period. This is the first time this happened at the airport. Future facility needs will be related to these activity

levels rather than a specific year. **Table 3A** summarizes the activity levels that define the planning horizons used in the remainder of this master plan.

TABLE 3A
Planning Horizon Activity Levels
Portland International Jetport

	Base Year	Short Term Planning Horizon	Intermediate Term Planning Horizon	Long Term Planning Horizon
Enplaned Passengers	689,174	970,000	1,260,000	1,570,000
Total Air Cargo (tons)	16,812	21,200	24,200	31,600
Total Based Aircraft	43	54	61	76
Annual Operations				
Air Carrier	36,872	43,400	48,200	54,700
Air Cargo	4,398	4,800	5,000	5,500
General Aviation	41,547	53,000	59,000	69,000
Air Taxi	5,204	6,900	7,800	9,200
Military	1,338	2,000	2,000	2,000
Total Annual Operations	89,359	110,100	122,000	140,400

PEAKING CHARACTERISTICS

Most facility planning relates to levels of peak activity. The following planning definitions apply to the peak periods:

- **Peak Month** - The calendar month for peak passenger enplanements or operations.
- **Design Day** - The average day in the peak month.
- **Busy Day** - The busy day of a typical week in the peak month.
- **Design Hour** - The peak hour within the design day.

The peak month for passenger enplanements in that past three years has been August, with 12.2 percent of the yearly total. Given this consistency, peak month enplanement projections were developed using this percentage. The design hour enplanements are projected based on airline schedules, aircraft type, and boarding load factors. The peak hour projections were prepared separately for the terminal design and planning study being completed concurrently with this Master Plan study, and they represented approximately 19 percent of design day activity. The peak hour projections used in that study are summarized in **Table 3B**.

The peak month for general aviation operations in 2005 was November, with 11.5 percent of the annual total general aviation operations. This is uncharacteristic of past general aviation activity at the Jetport, where the peak month usually occurs in July or August. Between 2000 and 2003, the peak month represented between 11.7 percent and 13.3 percent of total general aviation operations and occurred in either July or August. For planning purposes, the total general aviation operations peak month was projected at 12.4 percent, the average of the past five years of general aviation activity. For 2004, busy day operations were calculated at 1.7 times the design day operations. Design hour activity was calculated at 10.2 percent of the design day. These percentages were carried forward through the planning period. The peak period forecasts have been summarized in **Table 3B**.

TABLE 3B
Peak Period Forecasts
Portland International Jetport

		FORECASTS		
	2004	Short Term	Intermediate Term	Long Range
AIRLINE ENPLANEMENTS				
Annual	689,174	970,000	1,260,000	1,570,000
Peak Month	84,138	118,300	153,700	191,500
Design Day	2,800	3,900	5,100	6,400
Design Hour	416	741	973	1,200
GENERAL AVIATION OPERATIONS				
Annual	41,547	53,000	59,000	67,000
Peak Month	5,200	6,600	7,300	8,300
Design Day	173	220	243	277
Busy Day	295	374	414	470
Design Hour	18	22	25	28

AIRFIELD CAPACITY

An airport's airfield capacity is expressed in terms of its annual service volume (ASV). Annual service volume is a reasonable estimate of the maximum level of aircraft operations that can be accommodated in a year without incurring significant delay factors. As aircraft operations surpass the ASV, delay factors increase exponentially. Annual service volume accounts for annual differences in runway use, aircraft mix, and weather conditions. The airport's annual service volume was examined utilizing Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay*.

FACTORS AFFECTING ANNUAL SERVICE VOLUME

Exhibit 3A graphically presents the various factors included in the calculation of an airport's ASV. These include the airfield characteristics, meteorological conditions, aircraft mix, and demand characteristics (aircraft operations). These factors are described below.

Airfield Characteristics

The layout of the runways and taxiways directly affects an airfield's capacity. This not only includes the location and orientation of the runways,

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Exhibit 3A
AIRFIELD CAPACITY FACTORS

but the percent of time that a particular runway or combination of runways is in use and the length, width, weight bearing capacity, and instrument approach capability of each runway at the airport. The length, width, weight bearing capacity, and instrument approaches available to a runway determine which type of aircraft may operate on the runway and if operations can occur during poor weather conditions.

- RUNWAY CONFIGURATION

The existing runway configuration includes two intersecting runways. Runway 18-36 and Runway 11-29 physically intersect approximately 1,100 feet west of the Runway 29 threshold and approximately 6,100 feet east of the Runway 11 threshold.

While it would be preferable to use only Runway 18-36 during certain wind conditions, Runway 11-29 is used in conjunction with Runway 18-36 most of the time, as Runway 11-29 has the length and instrument approach capabilities to accommodate all the aircraft that use the Jetport. Aircraft can land to Runway 11 and 18 simultaneously, using land and hold short operations (LAHSO). The LAHSO procedures have been established at the Jetport to reduce capacity loss normally associated with intersecting runway use. LAHSO allows for simultaneous operations to Runway 11 and Runway 18. Aircraft landing Runway 11 are issued LAHSO instructions to not cross Runway 18-36 when landing. Aircraft landing Runway 18 are issued LASHO instructions to not cross Runway 11-29 when landing. These instructions essentially allow for simultaneous landings to intersecting runways. Using Runway 18-36 in conjunction with Runway 11-29 improves airfield capacity when there are strong winds from the south-southeast.

Each runway is served by either full-length or partial parallel taxiway access. This maximizes airfield capacity and safety as aircraft are not required to taxi on the active runway surface to gain access to a runway end. Aircraft located east of Runway 18-36 along Taxiway H must cross Runway 18-36 to access any runway end for departure, which can add delay to departure operations.

- RUNWAY USE

Runway use relates to the type of aircraft operating on a runway and the time that runway orientation is in use. Aircraft operations to a particular runway are determined by the weight bearing capacity of the runway, instrument approach capability, and wind conditions. Wind conditions are examined for both visual and inclement weather conditions.

Maximum runway capacity is achieved when all runways at an airport are able to accommodate the entire fleet mix of aircraft. Each runway has the necessary weight bearing capacity to accommodate all aircraft that operate at the airport. However, the length of Runway 18-36 prevents this runway from being used for the large transport air carrier and large transport air cargo operations. Smaller air cargo feeder aircraft use Runway 18-36 during certain wind conditions. Many regional jet aircraft; however, can use Runway 18-36. In all but the strongest wind conditions, most air carrier and air cargo aircraft utilize Runway 11-29. Small general aviation aircraft use both Runway 18-36 and 11-29, depending upon wind conditions. Larger general aviation turboprop and turbojet aircraft utilize Runway 11-29 as much as possible. Runway 29 is designated as the preferred departure runway and Runway 11 the preferred arrival runway for noise abatement.

Runway use is normally dictated by wind conditions. The direction of take-offs and landings are generally determined by the speed and direction of wind. It is generally safest for aircraft to takeoff and land into the wind, avoiding crosswind (wind that is blowing perpendicular to the travel of the aircraft) or tailwind components during these operations. For runway selection in a capacity analysis, a crosswind component is considered excessive at 10.5 knots for small aircraft weighing less than 12,500 pounds and 13 knots for aircraft over 12,500 pounds. It is at these thresholds that an aircraft is likely to choose a more favorable runway orientation, if available.

Exhibit 3B depicts the all-weather wind rose for the Jetport. Using the most current 10 years of wind data for the Jetport, it is shown that the combined runway orientations provide 98 percent or greater coverage for all wind conditions at the airport. Runway 11-29 provides more than 95 percent coverage for crosswind components in excess of 16 knots. Therefore, this runway orientation is sufficient for large aircraft use, and Runway 18-36 is needed for smaller aircraft use during strong crosswind conditions.

Prevailing winds are in an east-west direction at the airport, leading to a greater use of Runway 11-29. However, during light wind conditions or situations when the crosswind to the parallel runways exceeds allowable thresholds (primarily for small general aviation aircraft [aircraft under 12,500 pounds]), Runway 18-36 is used simultaneously with Runway 11-29, as discussed above.

Each runway end is equipped with an instrument approach procedure. However, the most capable instrument approach procedure is available to Runway 11, followed by Runway 29. Therefore, during the lowest visibility and cloud ceiling situations, only Runway 11-29 can be used. For weather conditions below 200-foot cloud ceilings and ½-mile visibility, only Runway 11 is assumed to be in use.

- EXIT TAXIWAYS

Exit taxiways have a significant impact on airfield capacity since the number and location of exits directly determines the occupancy time of an aircraft on the runway. The airfield capacity analysis gives credit to exits

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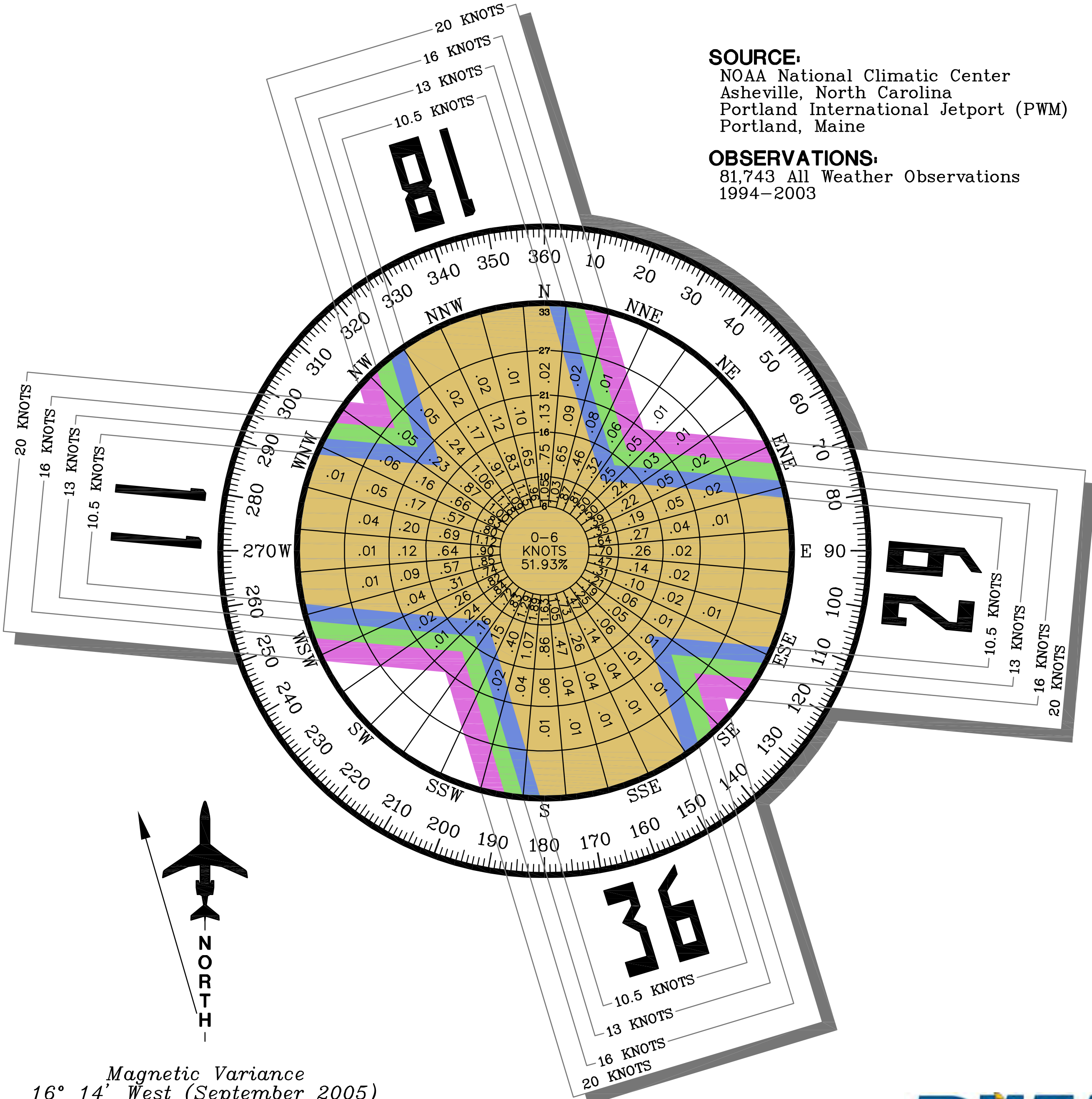
ALL WEATHER WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 11-29	*90.15%*	*94.45%*	*98.61%*	*99.71%*
Runway 18-36	*93.44%*	*96.33%*	*98.89%*	*99.71%*
Combined	*98.84%*	*99.74%*	*99.95%*	*99.99%*

SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Portland International Jetport (PWM)
Portland, Maine

OBSERVATIONS:
81,743 All Weather Observations
1994-2003



Magnetic Variance
16° 14' West (September 2005)
Annual Rate of Change
00° 05' West (September 2005)

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Exhibit 3B
ALL WEATHER WIND ROSE

located within a prescribed range from a runway's threshold. This range is based upon the mix index of the aircraft that use the runway. The exits must be at least 750 feet apart to count as separate exits. While Runway 11-29 has five exit taxiways, under the criterion described above, Runway 11-29 is credited with two exit taxiways. Runway 18-36 is credited with three exits.

Meteorological Conditions

Weather conditions can have a significant affect on airfield capacity. Airport capacity is usually highest in clear weather, when flight visibility is at its best. Airfield capacity is diminished as weather conditions deteriorate and cloud ceilings and visibility are reduced. As weather conditions deteriorate, the spacing of aircraft must increase to provide allowable margins of safety. The increased distance between aircraft reduces the number of aircraft which can operate at the airport during any given period. This consequently reduces overall airfield capacity.

There are three categories of meteorological conditions used in the capacity analysis, each defined by the reported cloud ceiling and flight visibility. Visual flight rule (VFR) conditions exist whenever the cloud ceiling is greater than 1,000 feet above ground level, and visibility is greater than three statute miles. VFR flight conditions permit pilots to approach, land, or takeoff by visual reference, and to see and avoid other aircraft.

Instrument flight rule (IFR) conditions exist when the reported ceiling is less than 1,000 feet above ground level and/or visibility is less than three statute miles. Under IFR conditions, pilots must rely on instruments for navigation and guidance to the runway. Other aircraft cannot be seen and safe separation between aircraft must be assured solely by following air traffic control rules and procedures. As mentioned, this leads to increased distances between aircraft, which diminishes airfield capacity. For the capacity analysis, poor visibility conditions (PVC) exist when cloud ceilings are less than 500 feet above the ground and visibility is less than one mile.

According to data recorded at the airport for the past 10 years, VFR conditions have occurred approximately 86 percent of the time, whereas IFR conditions occur approximately five percent of the time and PVC conditions occurred eight percent of the time, respectively. Even with the upgraded approach to Runway 11, the airport is closed to arrivals approximately 0.4 percent of the time, as visibility and cloud ceilings are too low to allow an approach to landing. In the previous Master Plan, the time the airport was closed due to meteorological conditions being less than the approach capability was estimated at 2.4 percent of the time. This new approach has reduced the closure time by two percent.

Aircraft Mix

Aircraft mix refers to the speed, size, and flight characteristics of aircraft operating at the airport. As the mix of aircraft operating at an airport increases to include larger aircraft, airfield capacity begins to diminish. This is due to larger separation distances that must be maintained between aircraft of different speeds and sizes.

Aircraft mix for the capacity analysis is defined in terms of four aircraft classes. Classes A and B consist of single and multi-engine aircraft weighing less than 12,500 pounds. Aircraft within these classifications are primarily associated with general aviation operations, but this classification does include some air taxi and regional airline aircraft (i.e., Cessna Caravan used for air cargo service). Class C consists of multi-engine aircraft weighing between 12,500 and 300,000 pounds. This is broad classification that includes business jets, turboprops, and large commercial airline aircraft. All scheduled airline and most cargo aircraft operating from the airport are included within Class C. Class D includes all aircraft over 300,000 pounds and includes wide-bodied and jumbo jets. There is one Class D aircraft operating from the airport, an Airbus A300-600 used in air cargo service. **Exhibit 3A** depicts representative aircraft in each aircraft class. The existing and projected operational fleet mix for the airport is summarized in **Table 3C**.

TABLE 3C
Aircraft Operational Mix
Portland International Jetport

Weather	Year	A & B	C	D
VFR (Visual)	Existing (2004)	50%	49%	1%
	Short Term	51%	48%	1%
	Intermediate Term	51%	48%	1%
	Long Term	51%	48%	1%
IFR (Instrument)	Existing (2004)	27%	72%	1%
	Short Term	30%	69%	1%
	Intermediate Term	32%	67%	1%
	Long Term	34%	65%	1%
PVC (Instrument)	Existing (2004)	24%	75%	1%
	Short Term	25%	74%	1%
	Intermediate Term	26%	73%	1%
	Long Term	28%	71%	1%

For the capacity analysis, the percentage of Class C and D aircraft operating at the airport is critical in determining the ASV, as these classes include the larger and faster aircraft in the operational mix. The percentage of Class C aircraft is higher during IFR and PVC conditions since some general aviation operations are suspended. This is due to the fact that some general aviation aircraft are not equipped to operate during poor weather conditions. The percentage of Class C and D aircraft to operate at the airport is expected to decline slightly over time, as the mix of aircraft operating at the airport will include higher portions of light business jet aircraft. The percentage of Class C and D aircraft for the Jetport is summarized in **Table 3D**.

TABLE 3D
Percent C+3D Mix
Portland International Jetport

Existing	Short Term	Intermediate Term	Long Term
VFR (Visual)			
51%	50%	51%	51%
IFR (Instrument)			
75%	71%	70%	68%
PVC (Instrument)			
78%	76%	76%	75%

Demand Characteristics

Operations, not only the total number of annual operations, but the manner in which they are conducted, have an important effect on airfield capacity. Peak operational periods, touch-and-go operations, and the percent of arrivals impact the number of annual operations that can be conducted at the airport.

Peak Period Operations

For the airfield capacity analysis, average daily operations and average peak hour operations during the peak month is calculated based upon data recorded by the air traffic control tower (ATCT). These operational levels were calculated previously for existing and forecast levels of operations. Typical operational activity is important in the calculation of an airport's annual service level as "peak demand" levels occur sporadically. The peak periods used in the capacity analysis are representative of normal operational activity and can be exceeded at various times through the year.

- TOUCH-AND-GO OPERATIONS

A touch-and-go operation involves an aircraft making a landing and an immediate take-off without coming to a full stop or exiting the runway. These operations are normally associated with general aviation training operations and are included in local operations data recorded by the air traffic control tower.

Touch-and-go activity is counted as two operations since there is an arrival and a departure involved. A high percentage of touch-and-go traffic normally results in a higher operational capacity, because one landing and one takeoff occurs within a shorter time than individual operations. Touch-and-go operations are recorded by the air traffic control tower and currently account for approximately 16 percent of annual operations.

- PERCENT ARRIVALS

The percentage of arrivals as they relate to the total operations in the design hour is important in determining airfield capacity. Under most circumstances, the lower the percentage of arrivals, the higher the hourly capacity. However, except in unique circumstances, the aircraft arrival-departure split is typically 50-50. At the Jetport, traffic information indicated no major deviation from this pattern, and arrivals were estimated to account for 50 percent of design period operations.

CALCULATION OF ANNUAL SERVICE VOLUME

The preceding information was used in conjunction with the airfield capacity methodology developed by the FAA to determine airfield capacity for the Jetport.

Hourly Runway Capacity

The first step in determining annual service volume involves the computation of the hourly capacity of each runway in use configuration. The percentage use of each runway configuration in VFR, IFR, and PVC weather conditions, the amount of touch-and-go training activity, and the number and locations of runway exits become important factors in determining the hourly capacity of each runway configuration.

Considering the existing and forecast aircraft mix and the additional factors discussed above, the hourly capacity of each runway configuration was computed. The use of both Runway 11 and Runway 18 simultaneously in VFR weather conditions results in the highest hourly capacity of the airfield (86 hourly operations).

During IFR and PVC conditions, the hourly capacity of the runway system is less than that during VFR conditions, due to increases in aircraft handling and separation. The IFR and PVC hourly capacity is calculated to be 57 operations per hour.

As the mix of aircraft operating at an airport changes to include a decreasing percentage of Class C aircraft operating at the airport as a percentage of total operations, the hourly capacity of the runway system will change only slightly by the long term planning horizon. As mentioned previously, the increases in light business aircraft use of the airport will reduce the overall percentage of Class C operations as a percentage of total operations at the airport over the planning period.

Annual Service Volume

Once the weighted hourly capacity is known, the annual service volume can be determined. Annual service volume is calculated by the following equation:

Annual service volume = C x D x H	
C =	weighted hourly capacity
D =	ratio of annual demand to average daily demand during the peak month
H =	ratio of average daily demand to average peak hour demand during the peak month

The ratio of annual demand to average daily demand was computed as 27:9. The ratio of average daily demand to average peak hour demand was computed as 9:8. Using this data, the current annual service volume for the Jetport is estimated at 175,000 operations. The increasing percentage of Class A and B aircraft operating during IFR and PVC conditions over the planning period will contribute to a slight decrease in the annual service volume in the long term planning horizon, to 173,000 annual operations.

Table 3E summarizes annual service volume values. **Exhibit 3C** compares annual service volume to existing and forecast operational levels. The 2004 total of 89,359 operations represented 51 percent of the existing annual service volume. By the end of the planning period, total annual operations are expected to represent 81 percent of annual service volume.

TABLE 3E
Annual Service Volume and Delay Summary
Portland International Jetport

	Annual Operations	Hourly Demand	Weighted Hourly Capacity	Annual Service Volume	Percent Capacity	Total Annual Hours of Aircraft Delay
Existing (2004)	89,359	33	64	175,000	51%	596
Short Term	110,100	37	63	173,000	64%	918
Intermediate Term	122,000	40	63	173,000	71%	1,423
Long Range	140,400	45	63	173,000	81%	2,106

Delay

As the number of annual aircraft operations approaches the airfield's capacity, increasing amounts of delay to aircraft operations begin to occur. Delays occur to arriving and departing aircraft in all weather conditions. Arriving aircraft delays result in aircraft holding outside of the airport traffic area. Departing aircraft delays result in aircraft holding at the runway end until released by the air traffic control tower (ATCT).

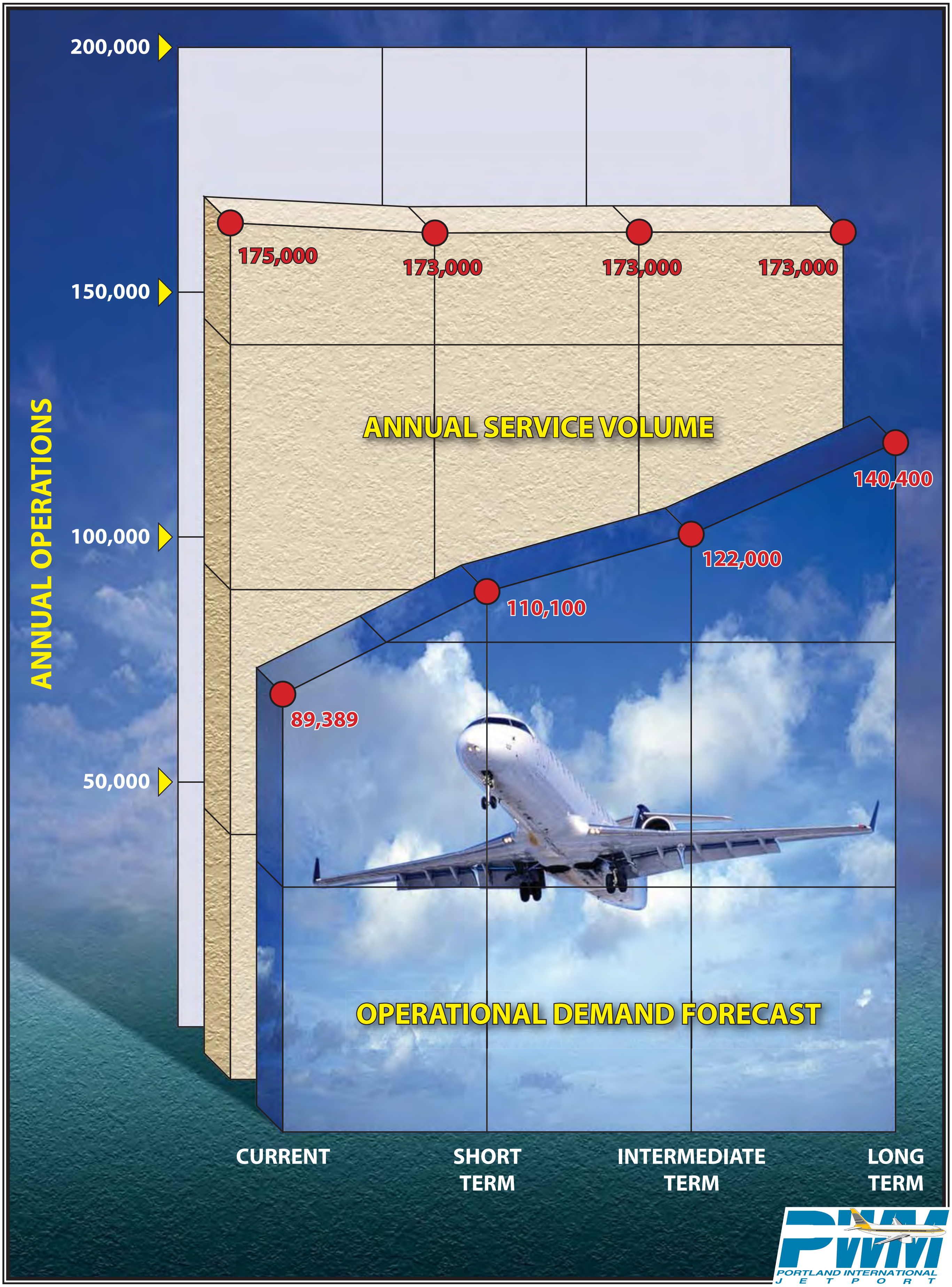

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Exhibit 3C
DEMAND/CAPACITY

Currently, total annual delay at the airport is minimal and is estimated at 596 hours. This can be attributed to peak period arrival and departure delays that are typical of any airport with this level of operations. Based upon the projected increases in aircraft operations, annual delay can be expected to reach 2,106 hours in the long range planning horizon.

It should be recognized that the level of calculated delay in this analysis is relatively small for each aircraft operation. The current delay equates to approximately 24 seconds per aircraft operation. In the long term planning horizon, this would equate to approximately 54 seconds per aircraft operation. Some inherent delay is inevitable in aircraft operations and cannot be removed entirely from the airport operating environment.

The airport has the ability to continue to operate efficiently beyond the planning period of this Master Plan. The FAA through the annual *Aviation Capacity Enhancement Plan* examines capacity enhancements for over 30 benchmark airports across the country. These benchmark airports are chosen based upon their delay conditions and contributions to the national air transportation system. Delay factors at these airports exceed more than 5,000 annual hours, some airports (more than 20 nationally) have over 20,000 annual hours of delay. The Jetport is not included in this study since it has limited delay factors now. Even the projections 20 years into the future of over 2,100 hours of delay at the Jetport are below those levels currently experienced at the benchmark airports.

Capacity enhancement if needed at the Jetport would not be limited only to physical improvements (runway/taxiways). The FAA's capacity planning program includes facility and equipment improvements (wake turbulence avoidance systems, adding airport surface detection radar) and operational improvements (airspace restructure/analysis, departure sequencing, expanded terminal radar approach control [TRACON] establishing a terminal control area [TCA]). These other types of improvements would be considered in the future to increase the capacity of the airport and reduce delay factors as needed.

Conclusions

From the analysis, it was determined that annual operations at the Jetport are anticipated to remain below the ASV over the planning period. Therefore, it is apparent that the existing airfield layout should have adequate capacity to accommodate the projected type of aircraft to operate at the airport and operational levels.

AIRFIELD REQUIREMENTS

Airfield facilities include those facilities that are related to the arrival, departure, and ground movement of aircraft. Theses components include:

- Runways
- Navigational Approach Aids and Instrument Approaches
- Taxiways
- Airfield Lighting, Marking, and Signage

The adequacy of existing airfield facilities at the Jetport is analyzed from a number of perspectives within each of these components, including (but not limited to): runway orientation, runway length, runway pavement strength, FAA design standards, airfield lighting, airfield signage, and pavement markings.

RUNWAY ORIENTATION

For the operational safety and efficiency of an airport, it is desirable for the primary runway of an airport's runway system to be oriented as close as possible to the direction of the prevailing wind. This reduces the impact of wind components perpendicular to the direction of travel of an aircraft that is landing or taking off (defined as a crosswind).

FAA design standards specify that additional runway configurations are needed when the primary runway configuration provides less than 95 percent wind coverage at specific crosswind components. The 95 percent wind coverage is computed on the basis of crosswinds not exceeding 10.5 knots for small aircraft weighing less than 12,500 pounds and from 13 to 16 knots for aircraft weighing over 12,500 pounds. **Exhibit 3B** depicted the wind rose for the Jetport and summarized wind coverage for the airport.

As shown in the table on the exhibit, Runway 11-29 provides greater than 95 percent wind coverage for both the 16 knot and 20 knot crosswind components. Runway 11-29 provides only 90.15 percent wind coverage for the 10.5 knot crosswind component and 94.45 percent coverage in the 13 knot crosswind component. While Runway 18-36 alone does not provide 95 percent wind coverage for the 10.5 crosswind components, when considered in conjunction with Runway 11-29, the combined wind coverage exceeds 95 percent coverage for all crosswind components. Therefore, based on this analysis, the runway system at the airport is properly oriented to prevailing wind flows and aircraft operational safety is maximized. No new runway orientations or changes to the existing orientations are needed at the airport.

PHYSICAL PLANNING CRITERIA

The selection of appropriate FAA design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently using, or are expected to use, the airport. Planning for future aircraft use is of particular importance since design standards are used to plan separation distances between facilities. These standards must be determined now since the relocation of these facilities would likely be extremely expensive at a later date. The most important characteristics in airfield planning are the approach speed and wingspan of the critical design aircraft anticipated to use the airport now and in the future.

The FAA has established a coding system to relate airport design criteria to the operational and physical characteristics of aircraft expected to use the airport. This code, referred to as the airport reference code (ARC), has two components: the first component, depicted by a letter, is the aircraft approach category and relates to aircraft approach speed (operational characteristic); the second component, depicted by a Roman numeral, is the airplane design group (ADG) and relates to aircraft wingspan (physical characteristic). Generally, aircraft approach speed applies to runways and runway-related facilities, while airplane wingspan primarily relates to separation criteria involving taxiways, taxilanes, and landside facilities.

According to FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, Change 8, an aircraft's approach category is based upon 1.3 times its stall speed in landing configuration at that aircraft's maximum certificated weight. The five approach categories used in airport planning are as follows:

Category A: Airspeed less than 91 knots.

Category B: Airspeed 91 knots or more, but less than 121 knots.

Category C: Airspeed 121 knots or more, but less than 141 knots.

Category D: Airspeed 141 knots or more, but less than 166 knots.

Category E: Airspeed greater than 166 knots.

The airplane design group (ADG) is based upon the aircraft's wingspan. The six ADGs used in airport planning are as follows:

Group I: Up to but not including 49 feet.

Group II: 49 feet up to but not including 79 feet.

Group III: 79 feet up to but not including 118 feet.

Group IV: 118 feet up to but not including 171 feet.

Group V: 171 feet up to but not including 214 feet.

Group VI: 214 feet or greater.

Exhibit 3D presents a summary of representative aircraft by ARC. As indicated with the large crossed-out red circle, aircraft within ARC D-V are not expected to comprise the critical design aircraft at the airport. While aircraft within this ARC may occasionally use the airport, their use of the airport is expected to be less than 500 annual operations. As mentioned previously, the FAA has established that aircraft within a particular ARC

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A-I

- Beech Baron 55
- **Beech Bonanza**
- Cessna 150
- Cessna 172
- Piper Archer
- Piper Seneca

C-I, D-I

- Beech 400
- **Lear** 25, 31, **35**, 45, 55, 60
- Israeli Westwind
- HS 125-400, 700

B-I less than 12,500 lbs.

- Beech Baron 58
- Beech King Air 100
- Cessna 402
- **Cessna 421**
- Piper Navajo
- Piper Cheyenne
- Swearingen Metroliner
- Cessna Citation I

C-II, D-II

- Cessna Citation X
- **Gulfstream** II, III, **IV**
- Canadair 600
- Canadair Regional Jet
- Embraer Regional Jet
- Lockheed JetStar
- Super King Air 350

B-II less than 12,500 lbs.

- **Super King Air 200**
- Cessna 441
- DHC Twin Otter

C-III, D-III

- Boeing Business Jet
- B 727-200
- **B 737-300 Series**
- MD-80, DC-9
- Fokker 70, 100
- A319, A320
- Gulfstream V
- Global Express

B-I, II over 12,500 lbs.

- Super King Air 300
- Beech 1900
- Jetstream 31
- Falcon 10, 20, 50
- Falcon 200, 900
- **Citation** II, **III**, IV, V
- Saab 340
- Embraer 120

C-IV, D-IV

- **A-300**
- B-757
- B-767
- DC-8-70
- DC-10
- MD-11
- L1011

A-III, B-III

- DHC Dash 7
- **DHC Dash 8**
- DC-3
- Convair 580
- Fairchild F-27
- ATR 72
- ATP

D-V

- **B-747** Series
- B-777

Note: Aircraft pictured is identified in bold type.

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Exhibit 3D
AIRPORT REFERENCE CODES

must conduct 500 annual operations to be considered the critical design aircraft.

In order to determine airfield facility requirements, an ARC should first be determined, and then appropriate airport design criteria can be applied. This begins with a review of the type of aircraft using and expected to use the Jetport.

The Jetport is currently used by a wide variety of aircraft, ranging from aircraft used for scheduled airline service to air cargo, general aviation recreational aircraft, general aviation business aircraft, and a limited number of helicopters. Helicopters are not included in this determination as they are not assigned an ARC.

Commercial Aircraft

Aircraft used for scheduled airline service in 2004 included a mix of turboprop commuter aircraft, regional jets, and large transport aircraft. Turboprop aircraft were comprised of the Raytheon Beechcraft 1900 and Saab SF-340B, both within ARC B-II and the Dornier 328, within ARC A-II. Regional jet aircraft included the Embraer 135 and 145 regional jets and Canadair CRJ200 and CRJ 700 within ARC C-II; as well as the Embraer 170 within ARC C-III. Larger transport aircraft included the Boeing 737 and 757, McDonnell-Douglas MD-80 and DC9, and Airbus A319, all within ARC C-III. Based on the number of operations by these aircraft, the critical design aircraft for scheduled airline service falls within ARC C-III.

Air Freight

Aircraft used in scheduled air freight service included a mix of turboprop and large transport aircraft. The Cessna 208 Caravan and Embraer Bandit 110, both within ARC B-I, are used for regular feeder service. Large transport aircraft included the Boeing 727-200 and DC-9, both with ARC C-III, and the Airbus A300-600 within ARC C-IV. Within the air freight segment of aircraft activity at the Jetport, the Airbus A300-600 comprises the critical design aircraft.

General Aviation

General aviation aircraft using the airport include small single and multi-engine aircraft (which fall within approach categories A and B and ADG I) and business turboprop and jet aircraft (which fall within approach categories B, C, and D, and ADGs I and II). While general aviation aircraft within ARC A-I to B-II conduct the majority of general aviation operations at the airport, business turbojet aircraft comprise the critical design aircraft for general aviation activity.

As shown in **Table 3F**, a wide range of business jets operate at the airport. The source for this data is FAA-maintained records of flight plans filed to and from the Jetport. It is expected that not all business jet operations are captured through this process, as some flight plans may be cancelled before the aircraft reaches the airport, or the flight plan is filed enroute. However, the majority of business jet operations are represented through flight plans, especially in the complicated east coast airspace environment where most of these corporate aircraft would operate. Based on the numbers in the table, business turbojet aircraft within ARC C-II comprise the critical design aircraft for general aviation activity at the airport.

TABLE 3F
Business Aircraft Operations By Type
Calendar Year 2004
Portland International Jetport

ARC	Aircraft Type	Operations	%
B-I	Falcon 10	48	1.1%
B-I	Cessna 500 Citation I	24	0.6%
B-I	Cessna 501 Citation I	50	1.2%
B-I	Cessna 525 Citation Jet	36	0.9%
B-I	Beech 390	2	0.0%
B-I	MU-300	12	0.3%
Total B-I		**172**	**4.1%**
B-II	Cessna 525A Citation II	12	0.3%
B-II	Cessna 550 Citation II	414	9.8%
B-II	Cessna 551	8	0.2%
B-II	Cessna 560	316	7.5%
B-II	Cessna 560XL Citation V	62	1.5%
B-II	Raytheon Hawker 800	176	4.2%
B-II	Falcon 50	80	1.9%
B-II	Falcon 200	2	0.0%
B-II	Falcon 900	44	1.0%
B-II	Falcon 2000	52	1.2%
Total B-II		**1,166**	**27.7%**
C-I	Beechjet 400	416	9.9%
C-I	IAI 1124 Westwind	62	1.5%
C-I	Lear 24	18	0.4%
C-I	Lear 25	6	0.1%
C-I	Lear 31	88	2.1%
C-I	Lear 35	106	2.5%
C-I	Lear 45	88	2.1%
C-I	Lear 55	48	1.1%
C-I	Hawker-Siddley 125-3A	18	0.4%
C-I	Hawker-Siddley 125-400	6	0.1%
C-I	Raytheon Hawker 700	258	6.1%
Total C-I		**1,114**	**26.4%**

TABLE 3F (Continued) Business Aircraft Operations By Type Calendar Year 2004 Portland International Jetport			
ARC	**Aircraft Type**	**Operations**	**%**
C-II	Cessna 650 Citation III, VI, VII	332	7.9%
C-II	Cessna 680	10	0.2%
C-II	Cessna 750 Citation X	34	0.8%
C-II	Challenger 600	104	2.5%
C-II	Challenger 601	2	0.0%
C-II	Hawker 800XP	568	13.5%
C-II	Hawker 1000 Horizon	12	0.3%
C-II	IAI 1125 Astra	246	5.8%
C-II	IAI 1126 Galaxy	14	0.3%
C-II	Falcon 900EX	26	0.6%
C-II	Falcon F-Series	10	0.2%
C-II	Rockwell Sabre 65 (NA 265)	8	0.2%
C-II	Gulfstream 100	10	0.2%
C-II	Gulfstream 200	4	0.1%
C-II	Gulfstream III	50	1.2%
Total C-II		**1,430**	**34.0%**
C-III	Bombardier Global Express	34	0.8%
C-III	DC-9	2	0.0%
Total C-III		**36**	**0.9%**
C-IV	Boeing 707	2	0.0%
C-IV	Boeing 757	6	0.1%
Total C-IV		**8**	**0.2%**
D-I	Lear 60	60	1.4%
Total D-I		**60**	**1.4%**
D-II	Gulfstream II	46	1.1%
D-II	Gulfstream IV	144	3.4%
Total D-II		**190**	**4.5%**
D-III	Gulfstream V	32	0.8%
D-III	Gulfstream 550	4	0.1%
Total D-III		**36**	**0.9%**
Total Activity		**4,212**	**100%**
Source: FAA Records			

Critical Design Aircraft Conclusion

The critical design aircraft is defined as the most demanding category of aircraft which conducts 500 or more operations per year at the airport. For the Jetport, the critical design aircraft is represented by the Airbus A300-600 (ARC C-IV). This is the largest aircraft in terms of wingspan to regularly operate at the airport. It also shares the same approach speed with the critical design aircraft in the air carrier segment of activity and general aviation segment of activity. For planning purposes, an increase in Approach Category D operations can be expected. The critical design aircraft for Long Range facility planning should consider ARC D-IV requirements.

It is not necessary to design all airfield areas to the same ARC design standards. This is the case at the Jetport where there is a marked difference in the capabilities of Runway 11-29 when compared with Runway 18-36. Runway 11-29 provides a longer length and superior instrument approach capability than Runway 18-36, as Runway 11-29 serves as the primary runway. Therefore, Runway 11-29 should be designed and capable of accommodating all aircraft expected to operate at the airport through the planning period. Considering this, Runway 11-29 should be designed to the most demanding ARC D-IV design standards.

For Runway 18-36, a lower design standard can be considered since this runway can only serve a limited number of the aircraft that use the airport. Based solely upon the wind analysis completed previously in this chapter, Runway 18-36 is needed mostly for small aircraft within ARCs A-I, A-II, B-I, and B-II during those periods when there are strong winds from the north or south. While this includes many of the smaller piston-engine general aviation aircraft, these ARCs also include a wide range of commercial airline turboprop aircraft and business aircraft.

Wind coverage requirements are not the only reason for selecting an appropriate ARC for a runway. Other utilization factors must also be considered. For the Jetport, this includes the past and present occasional use of Runway 18-36 by aircraft within ARC C-II when Runway 11-29 was not available for use during maintenance periods. For the Jetport, Runway 18-36 not only ensures the safe operation of small aircraft during strong wind conditions from the north and south, but it also ensures that the airport can remain open in a limited capacity when Runway 11-29 is closed. As recently as 2004, Runway 18-36 accommodated operations by regional jet aircraft within ARC C-II and higher when Runway 11-29 was closed for maintenance. Aircraft within ARC C-II conduct less than 500 annual operations on Runway 18-36.

Essentially, Runway 18-36 has evolved as the back-up to Runway 11-29, accommodating operations by regional jet aircraft and turboprops providing scheduled air service, feeder aircraft for air cargo service, and most of the general aviation aircraft fleet using the airport. To ensure the safe operation of these aircraft, an appropriate design standard that widens and lengthens the safety areas of the airport should be considered.

Therefore, Runway 18-36 should consider ARC B-III design requirements in the future. This ARC provides a longer and wider safety area than ARC B-II and encompasses potential cargo feeder aircraft. ARC C-II standards will also be examined in the alternatives analysis and runway safety area evaluations in Appendix B.

AIRFIELD SAFETY STANDARDS

The FAA has established several imaginary surfaces to protect aircraft operational areas and keep them free from obstructions that could affect the safe operation of aircraft. These include the runway safety area (RSA), object free area (OFA), obstacle free zone (OFZ), precision obstacle free zone (POFZ), and runway protection zone (RPZ). The dimensional requirements for the Jetport based upon the existing and future ARC for each runway discussed above is summarized on **Exhibit 3E**.

The RSA is defined as "a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway." FAA Order 5200.8, *Runway Safety Area Program*, details the objective of the Runway Safety Area Program. This objective is that RSAs at certificated airports, such as the Jetport, conform to the FAA RSA standards. Presently, the Jetport conforms to RSA standards only behind the Runway 11 end. None of the runway ends conform to existing or future RSA requirements. Behind each of these runway ends, the RSA is obstructed by service roads or is not appropriately graded. A focus of the Airport Development Alternatives (Chapter Four) will be examining the options the City of Portland has available to comply with these requirements. Full compliance with RSA standards is expected by FAA Order 5200.8, as this order prevents FAA staff from modifying the RSA design standard for the Jetport.

The OFA is defined as "a two-dimensional ground area surrounding runways, taxiways, and taxilanes which is clear of objects except for objects whose location is fixed by function." Similar to the RSA, OFA standards are fully met behind the Runway 11 end; however, OFA standards are not met at the Runway 18, 36, or 29 ends. Behind each of these runway ends, the OFZ is obstructed by service roads or is not appropriately graded.

The OFZ is defined as a "defined volume of airspace centered above the runway centerline whose elevation is the same as the nearest point on the runway centerline and extends 200 feet beyond each runway end." OFZ standards are not met behind the Runway 18 or Runway 36 ends.

The RPZ is a two-dimensional trapezoidal-shaped surface located along the extended runway centerline to protect people and property on the ground. The RPZ is intended to be clear of buildings or uses that cause the congregation of people and property on the ground. It is not necessary to completely own all the property within the RPZ. The RPZs behind the Runway 11, Runway 29, and Runway 36 ends are clear of any buildings or uses that cause the congregation of people and property on the ground. A few single-family residential homes

04MP17-3E-2/6/07

EXISTING	SHORT TERM NEED	LONG RANGE NEED
RUNWAYS		
Runway 11-29		
ARC C-IV ≤ 1/2 mile visibility approach minimums each end 7,200' x 150' Grooved Surface 75,000# SWL 169,000# DWL 300,000# DTWL	Same Same Same Same Same Same Same	*ARC D-IV* Same Same Same Same Same Same
Runway Safety Area (RSA)		
250' each side of runway centerline 600' prior to landing threshold 1,000' beyond each runway end	Same Same Same *Clear obstructions behind Runway 29 end*	Same Same Same
Object Free Area (OFA)		
400' each side of runway centerline 1,000' beyond each runway end	Same *Clear obstructions behind Runway 29 end*	Same Same
Obstacle Free Zone (OFZ)		
200' each side of runway centerline 200' beyond each runway end	Same Same	Same Same
Precision Obstacle Free Zone (POFZ) Each End		
400' each side of runway centerline 200' beyond each runway end	Same Same	Same Same
Runway Protection Zone (RPZ) Each End		
Inner Width - 1,000' Outer Width - 1,700' Length - 2,500'	Same Same Same	Same Same Same
Runway 18-36		
ARC B-II ≥ 1 mile visibility approach minimums each end 5,001' x 150' No Surface Treatment 75,000# SWL 165,000# DWL 300,000# DTWL	*ARC B-III* *3/4 mile visibility approach Rwy 36* *≥ 1 mile visibility approach Rwy 18* *6,100' x 150'* *Grooved Surface* Same Same Same	Same Same Same Same Same Same Same
Runway Safety Area (RSA)		
75' each side of runway centerline 300' prior to landing threshold 300' beyond each runway end	*150' each side of runway centerline* *600' prior to landing threshold* *600' beyond each runway end* *Clear obstructions behind each runway end*	Same Same Same

EXISTING	SHORT TERM NEED	LONG RANGE NEED
Runway 18-36 (continued)		
Object Free Area (OFA)		
250' each side of runway centerline 300' beyond each runway end	*250' each side of runway centerline* *600' beyond each runway end*	Same Same
Obstacle Free Zone (OFZ)		
200' each side of runway centerline 200' beyond each runway end	*Clear obstructions each end*	Same Same
Runway Protection Zone (RPZ)		
Inner Width - 500' Outer Width - 700" Length - 1,000'	Same Same Same	Same Same Same

EXISTING	SHORT TERM NEED	LONG RANGE NEED
TAXIWAYS		
Runway 11-29		
Full-length Parallel Taxiway A 75' wide 400' from runway centerline Connecting Taxiways B & D 75' wide each	Same Same Same *Add exit taxiway* Same	Same Same Same Same Same *Taxiway connecting Runway 29 end with Runway 36 end*
Runway 18-36		
Full-length Parallel Taxiway C 60' wide 400' from runway centerline Connecting Taxiway E 60' wide Connecting Taxiways G & H 75' wide each No holding aprons	Same Same Same Same Same *Add holding apron Runway 36 end* *Relocate portion of Taxiway C from Runway 36 end to Taxiway A 300' from runway centerline to facilitate aviation development in southwest quadrant of airport*	Same Same Same Same Same Same *Partial parallel taxiway from Taxiway G to Taxiway A 300' from centerline*
HELIPAD		
None	*Helipad* *2 lighted parking positions*	Same

KEY

ARC - Airport Reference Code
SWL - Single Wheel Loading
DWL - Dual Wheel Loading
DTWL - Dual Tandem Wheel Loading

PWM PORTLAND INTERNATIONAL JETPORT

Exhibit 3E
AIRCRAFT OPERATIONAL AREA REQUIREMENTS

are located in the western portion of the Runway 18 RPZ. RPZ standards will be more fully explored within Chapter Four, Airport Development Alternatives.

The POFZ is "defined volume of airspace centered above an area beginning at the runway threshold, at the threshold elevation, and centered on the extended runway centerline." The POFZ is applicable only to runway ends with a precision approach when the following operational conditions are met:

1. Reported ceiling is below 250 feet and/or visibility is less than ¾ statute mile; and

2. An aircraft is on final approach within two miles of the runway threshold.

When these conditions are met, a wing of an aircraft holding on a taxiway waiting for runway clearance may penetrate the POFZ; however, neither the fuselage nor the tail may infringe upon the POFZ. At the Jetport, the Runway 11 and Runway 29 ends must comply with POFZ criterion. Presently, each end of Runway 11-29 fully complies with POFZ requirements.

RUNWAY LENGTH

The determination of runway length requirements is based upon five primary factors:

- Critical aircraft type expected to use the runway,

- Stage length of the longest non-stop trip destination,

- Mean maximum temperature of the hottest month,

- Airport elevation, and

- Runway gradient (difference in elevation of each runway end).

Aircraft performance declines as elevation, temperature, and runway gradient factors increase. For calculating runway length requirements at the airport, the airport elevation is 77 feet above mean sea level (MSL) and the mean maximum daily temperature of the hottest month is 79 degrees Fahrenheit (July). For runways accommodating Approach Category C and D aircraft, a maximum of 1.5 percent runway gradient is allowed. The existing runway gradients on each of the airport's runways are below this FAA design requirement.

The type of commercial airline and air cargo aircraft using the airport and their nonstop destinations will define the critical runway length for the Jetport. The current mix of commercial passenger aircraft operating at the airport is dominated by regional jets in the Embraer and Canadair families. Regional jet aircraft conducted nearly three-quarters of the scheduled airline service at the airport in 2004. Larger transport aircraft providing scheduled airline service include the Airbus A319 (introduced in 2005), Boeing 737, MD-88, DC-9, and Boeing 757. It is not expected that there will be a significant change in the mix of commercial airline aircraft serving the airport through the planning period. The airline industry is continuing to invest in regional jets. The regional jet manufacturers are producing larger-capacity regional jets in the 75 to 100-seat range. Should passenger levels warrant, the airlines could replace regional jets with larger-capacity regional jets and narrowbody transport aircraft such as those listed above.

The current mix of commercial air freight aircraft includes the Boeing 727-200, DC9-30/40, and Airbus A300-600. Air freight aircraft which have the potential to use the airport in the future include the Boeing 767-200.

Table 3G summarizes existing non-stop destinations for the scheduled airline and air cargo carriers at the airport. The airport has nonstop service to most every major east coast airline hub and air cargo hub. The longest scheduled airline flight is to Minneapolis, Minnesota (984 miles). The longest air cargo flight is to Memphis, Tennessee (1,045 miles).

The Jetport is in close proximity to all major commercial airline hubs and air cargo hubs on the east coast and Midwestern United States. Therefore, it is not expected that the stage lengths from the Jetport would change significantly through the planning period, even if new non-stop service or point-to-point service was initiated at the airport. For example, non-stops to major Florida destinations would be less than 1,200 miles from the Jetport. Major Midwestern hubs not currently served from the Jetport include Dallas and Houston, Texas, both less than 1,500 miles from the Jetport. Longer flights to metropolitan cities on the west coast are unlikely, as this would require airline operators to by-pass existing hub locations or potential point-to-point service opportunities. Passenger airline traffic is not expected to be sufficient at the Jetport to warrant direct non-stop flights to all final destinations without first stopping at an enroute hub airport or point-to-point market. Because of this, fuel loading requirements are reduced. This reduces runway length requirements for aircraft operating at the Jetport.

TABLE 3G
Existing and Potential
Non-Stop Destinations
Portland International Jetport

Destination	Distance (nautical miles)
Boston, Massachusetts	83
LaGuardia, New York	234
Newark, New Jersey	247
Philadelphia, Pennsylvania	316
Washington (National)	418
Washington (Dulles)	428
Pittsburgh, Pennsylvania	472
Detroit, Michigan	579
Wilmington, Ohio	655
Cincinnati, Ohio	702
Louisville, Kentucky	771
Chicago (O-Hare)	779
Atlanta, Georgia	891
Minneapolis, Minnesota	984
Memphis, Tennessee	1,045
Potential	
Orlando, Florida	1,055
Tampa, Florida	1,110
Miami, Florida	1,177
Dallas, Texas	1,406
Houston, Texas	1,446

Runway 11-29

As the primary runway, Runway 11-29 should be able to accommodate the mix of commercial airline and air cargo aircraft to existing and potential nonstop destinations. As shown previously in **Table 3G**, potential stage lengths for scheduled airline and air cargo service can extend up to 1,500 miles from the Jetport. **Table 3H** examines the stage length capabilities of a wide variety of commercial transport aircraft and regional jet aircraft from the Jetport considering the existing 7,200 feet of departure length on Runway 11-29. As shown in **Table 3H**, with the exception of the DC9-30, 727-200, and 737-900, all the aircraft examined would be able to reach the existing and potential future airports from the Jetport with the existing length of Runway 11-29. Therefore, the existing length of Runway 11-29 should be sufficient to accommodate the current and expected mix of passenger and all-cargo aircraft serving the airport through the planning period. To meet runway safety area standards, the length of Runway 11 has been reduced by 400 feet. The length of Runway 11 should be the same as Runway 29 to eliminate disparities in takeoffs and landing lengths at the airport. The different runway lengths reduce loading capabilities for the commercial service operators at the airport.

Runway 18-36

As discussed earlier, Runway 18-36 has evolved as the secondary air carrier runway. In this capacity, Runway 18-36 accommodates limited regional jet air carrier operations, air cargo feeder operations, and most general aviation activity if the primary runway (Runway 11-29) is not operational (e.g., closed for maintenance or repairs). Using Runway 18-36 in this situation allows the community to maintain limited scheduled airline, air cargo, and business general aviation activity.

TABLE 3H
Runway Length Capabilities

Aircraft Type	Trip Length (Nautical Miles)
Transport Aircraft	
DC-9-30	1,100
727-200	1,150
737-300	2,500
737-400	2,200
737-500	2,300
737-600	2,800
737-700	2,600
737-800	2,100
737-900	1,400
757-200	4,300
767-200	3,900
A319	4,200
A320	2,800
A300-600	3,200
MD-83	2,000
MD-82,88	1,600
MD-87	2,400
Regional Jets	
EMB135LR	2,000
EMB145LR	> 1,500
EMB170LR	3,700
EMB175LR	3,300
EMB190LR	> 1,500
EMB195LR	> 1,500
CRJ200	2,300
CRJ700	1,700
CRJ900	> 1,500

At its present length of 5,001 feet, Runway 18-36 places takeoff and landing weight restrictions on those regional jet that are used to maintain the limited scheduled airline activity. While FAA Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design*, states that a secondary air carrier runway for regional jet service should be equal in length to the primary runway, existing physical and environmental constraints prevent Runway 18-36 from ever obtaining the same length as Runway 11-29. These constraints include the Stroudwater neighborhood and the Fore River to the north, and wetlands and a creek to the south. As detailed previously, Runway 18-36 does not currently provide for a full runway safety area beyond either runway end.

Only a limited extension is necessary to increase the payloads of departing regional jets. Increased payload can allow for additional passengers and/or fuel to reach longer stage lengths. **Table 3J** examines the payload (passengers) and range benefits of an increase in pavement length for the Canadair CRJ200 Regional Jet. As shown in the table, with 5,800 feet of runway length available, the CRJ200 can carry a full load of 50 passengers on flights up to 900 nautical miles (nm) in length. With 5,001 feet of length available, the CRJ200 cannot carry full passengers at any stage length above 300 nm. Incremental increases in passengers or payload are provided by any increases in pavement length, as shown on the table. Considering that the best benefit in terms of passenger loading and stage lengths is provided by a 5,800-foot runway, the alternatives analysis to follow will examine providing an additional 800 feet of length on Runway 18-36, if possible.

While up to 800 feet of additional runway length will be examined for Runway 18-36, priority will be given to establishing the proper runway safety areas. In all instances, additional length will be sacrificed for improvements to the runway safety area behind each runway end. The alternatives analysis to follow in Chapter Four examines meeting safety requirements at each end of Runway 18-36, as well as limiting those opportunities to extend Runway 18-36.

When considering the safety benefits of a longer runway, consideration needs to be given to the benefits of additional pavement during emergency situations. A longer runway helps to ensure aircraft that must abort a takeoff can decelerate to a stop before running off the end runway. Similarly, increased runway length provides an additional measure of safety for landings. Many situations such as changing wind conditions or wet/contaminated runway surfaces can unexpectedly increase landing distances from that normally required for operation at the airport.

TABLE 3J Canadair CRJ200 Passenger Loading	**Runway Length**			
	5,000'	**5,200'**	**5,500'**	**5,800'**
Takeoff Weight	44,000	44,400	46,000	49,000
Operating Empty Weight	30,500	30,500	30,500	30,500
Payload	13,500	13,900	15,500	18,500
300 NM				
Fuel Loading (lbs)	4,800	4,800	4,800	4,800
Passengers and Baggage (lbs)	8,700	9,100	10,700	13,700
No. of Passengers	44	46	50	50
400 NM				
Fuel Loading (lbs)	5,200	5,200	5,200	5,200
Passengers and Baggage (lbs)	8,300	8,700	10,300	13,300
No. of Passengers	42	44	50	50
500 NM				
Fuel Loading (lbs)	5,800	5,800	5,800	5,800
Passengers and Baggage (lbs)	7,700	8,100	9,700	12,700
No. of Passengers	39	41	49	50
600 NM				
Fuel Loading (lbs)	6,400	6,400	6,400	6,400
Passengers and Baggage (lbs)	7,100	7,500	9,100	12,100
No. of Passengers	36	38	46	50
700 NM				
Fuel Loading (lbs)	6,900	6,900	6,900	6,900
Passengers and Baggage (lbs)	6,600	7,000	8,600	11,600
No. of Passengers	33	35	43	50
800 NM				
Fuel Loading (lbs)	7,400	7,400	7,400	7,400
Passengers and Baggage (lbs)	6,100	6,500	8,100	11,100
No. of Passengers	31	33	41	50
900 NM				
Fuel Loading (lbs)	8,000	8,000	8,000	8,000
Passengers and Baggage (lbs)	5,500	5,900	7,500	10,500
No. of Passengers	28	30	38	50
1,000 NM				
Fuel Loading (lbs)	8,700	8,700	8,700	8,700
Passengers and Baggage (lbs)	4,800	5,200	6,800	9,800
No. of Passengers	24	26	34	49

Passengers and Baggage = 200 pounds
Source: Canadair Flight Planning and Cruise Control Manual, Airport Planning Manual

Takeoff runway length requirements for the general aviation aircraft fleet also need to be considered in the runway length analysis for Runway 18-36.

Recommended runway lengths for these aircraft are prepared by the FAA and presented in **Table 3K**. At 5,001 feet, Runway 18-36 has sufficient length to serve all general aviation aircraft less than 12,500 pounds, as up to 4,100 feet of runway is needed to serve these aircraft (refer to small airplanes with 10 or more passenger seats). However, larger business jet aircraft can need additional runway length. As shown in the 100 percent of large airplanes (business turboprops and jets) at 60 percent of useful load (fuel and passengers) category, up to 5,500 feet of runway length is needed. Therefore, to meet the demands of general aviation aircraft that use this runway during crosswind conditions, up to 500 feet of additional length should be considered for Runway 18-36.

TABLE 3K
FAA Recommended Runway Length Requirements

RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with less than 10 passenger seats	
75 percent of these small airplanes	2,400 feet
95 percent of these small airplanes	3,000 feet
100 percent of these small airplanes	3,500 feet
Small airplanes with 10 or more passenger seats	4,100 feet
Large airplanes of 60,000 pounds or less, 100 percent of these large airplanes at 60 percent useful load	5,500 feet

Source: FAA Airport Design Computer Program, Version 4.2D.
Small airplanes – aircraft weighing less than 12,500 pounds.

RUNWAY WIDTH

Runway width is primarily determined by the planning ARC for the particular runway. The ultimate planning ARC for Runway 11-29 is C-IV. ARC C-IV design standards specify a runway width of 150 feet. Runway 11-29 is presently 150 feet wide, meeting this design requirement. Ultimately, Runway 18-36 is designated for ARC C-II design standards which specify a runway width of 100 feet. Runway 18-36 is presently 150 feet wide, exceeding this design requirement.

RUNWAY PAVEMENT STRENGTH

Existing pavement strength ratings for each runway at the airport are shown on **Exhibit 3E**. While large narrow-body transport aircraft used in commercial airline service, such as the Boeing 737, Boeing 757, or Airbus A319, conduct many more operations annually than aircraft in the air cargo fleet, air cargo aircraft define the future critical aircraft for pavement strength. The air cargo fleet is more likely than the scheduled airline fleet to continue to include wide-body transport aircraft such as the Airbus A300-600 and Boeing 767. The takeoff weights of both common narrow-body airline aircraft and wide-body air cargo aircraft are shown in **Table 3L**. Since Runway 11-29 serves as the primary runway, it should have sufficient strength to accommodate regular operations by the heaviest aircraft within the fleet. Presently, Runway 11-29 at 300,000 pounds dual tandem wheel loading (DTWL) is rated below the maximum takeoff weight of both the A300-600 and Boeing 767. The Boeing 767 is not currently used at the airport. While the A300-600 is used daily at the airport, it rarely departs at full takeoff weight. The pavement strength should continue to be monitored for its ability to handle maximum loading conditions of these aircraft in the future. Runway 18-36 has adequate strength to accommodate general aviation aircraft and regional jet aircraft.

TABLE 3L
Aircraft Weights and Pavement Loading

Aircraft	Weight (lbs.)/Pavement Loading
Boeing 727-200	209,500 (DWL)
Boeing 757	255,000 (DTWL)
Boeing DC9-30	110,000 (DWL)
Boeing MD-83	160,000 (DWL)
Boeing 717-200	121,000 (DWL)
Boeing 767-200	315,000 (DTWL)
Boeing DC8-73F	355,000 (DTWL)
Airbus A300-600	363,763 (DTWL)

Source: FAA AC 150/5300-13, Airport Design, Airplane Characteristics for Airport Design (Boeing)
DWL – Dual Wheel Loading
DTWL – Dual Tandem Wheel Loading

TAXIWAYS

Taxiways are constructed primarily to facilitate aircraft movements to and from the runway system. Some taxiways are necessary simply to provide access between the aprons and runways, whereas other taxiways become necessary as activity increases at an airport to provide safe and efficient use of the airfield.

Taxiway width is determined by the ADG of the most demanding aircraft to use the taxiway on a regular basis. As mentioned previously, the most demanding aircraft to use the airport fall within ADG IV. According to FAA design standards, the minimum taxiway width for ADG IV is 75 feet. All taxiways at the airport are 75 feet wide, meeting this design requirement.

Design standards for the separation distances between runways and parallel taxiways are based primarily on the ARC for that particular runway and the type of instrument approach capability. ARC C-IV design standards specify a runway/taxiway separation distance of 400 feet for runways served by an instrument approach procedure with visibility minimums of less than ¾ statute miles. Presently, Taxiway A is located 400 feet from the Runway 11-29 centerline, meeting this design requirement.

For Runway 18-36, taxiway separation distances vary based on the existing and future ARC. The existing ARC is B-II. FAA design standards specify a separation distance of 240 feet for this ARC. The ultimate ARC has been designated as C-II. FAA design standards specify a separation distance of 300 feet for runways with this ARC served by an instrument approach procedure with visibility minimums of greater than ¾ statute miles.

Presently, the Taxiway C to Runway 18-36 separation distance varies. At its closest point, Taxiway C is approximately 331 feet from Runway 18-36, exceeding the minimum FAA separation requirement for both ARC C-II and ARC C-II. Facility planning should include relocating the southern portion of Taxiway C from Taxiway A to the Runway 36 end parallel with Runway 18-36, 300 feet from the runway centerline. This can provide for up to an additional acre of land to be developed at the Runway 36 end.

Facility planning should include improvements for access from the air cargo and general aviation located east of Runway 18-36 along Taxiway H. Presently, Taxiway H only extends to Runway 18-36. Aircraft needing to access any runway end at the airport must cross Runway 18-36. Air cargo aircraft must cross Runway 18-36 two times to access the Runway 29 end, the most-used runway end. In an effort to reduce controller workload and reduce the potential for runway incursions, a partial or full parallel taxiway east of Runway 18-36 should be planned. Most important, there should be a partial parallel taxiway extending from Taxiway H south to Taxiway A. This would eliminate the need to cross Runway 18-36 to access the Runway 29 end.

Facility planning should also include a taxiway connecting the Runway 36 end with the Runway 29 end. This taxiway would improve access to the Runway 29 end from future potential development west of the Runway 36 end.

Holding aprons and by-pass taxiways provide an area at the runway end for aircraft to prepare for departure and/or bypass other aircraft which are ready for departure. Holding aprons are currently available at the Runway 11 and Runway 29 ends. Holding aprons or a by-pass taxiway should be planned for the remaining runway ends.

HELIPADS

The airport does not have a designated helipad. Helicopters utilize the same areas as fixed-wing aircraft. Helicopter and fixed-wing aircraft should be segregated to the extent possible. Facility planning should include establishing a designated helipad at the airport. This should be supplemented with two parking positions and be lighted to allow for operations at night and during low-visibility conditions.

NAVIGATIONAL AIDS AND INSTRUMENT APPROACH PROCEDURES

Navigational Aids

Navigational aids are electronic devices that transmit radio frequencies which properly equipped aircraft and pilots translate into point-to-point guidance and position information. The types of electronic navigational aids available for aircraft flying to or from the Jetport include the very high frequency omnidirectional range (VOR) facility, global positioning system (GPS), and Loran-C. These systems are sufficient for navigation to and from the airport; therefore, no other navigational aids are needed at the airport.

GPS was developed and deployed by the United States Department of Defense as a dual-use (civil and military) radio navigation system. GPS initially provided two levels of service: the GPS standard positioning system (SPS), which supported civil GPS uses; and the GPS precise positioning system (PPS), which was restricted to U.S. Armed Forces, U.S. federal agencies and selected allied armed forces, and government use.

The differences in GPS signals have been eliminated and civil users now access the same signal integrity as federal agencies. A GPS modernization effort is underway by the FAA and focuses on augmenting the GPS signal to satisfy requirements for accuracy, coverage, availability, and integrity. For civil aviation use, this includes the continued development of the Wide Area Augmentation System (WAAS), which was initially launched in 2003. The WAAS uses a system of reference stations to correct signals from the GPS satellites for improved navigation and approach capabilities. Where the present GPS provides for enroute navigation and limited instrument approach (nonprecision) capabilities, WAAS provides for approaches with both course and vertical navigation. This capability was historically only provided by an instrument landing system (ILS), which requires extensive on-airport facilities. The WAAS upgrades are expected to allow for the development of approaches to most airports with cloud ceilings as low as 200 feet above the ground and visibilities restricted to ½ mile, after 2015.

Instrument Approach Procedures

Instrument approach procedures have been established for the airport using GPS as well as the instrument landing system (ILS). The ability to access the airport using different navigational aids allows the most flexibility for aircraft operators, by not requiring that they have a specific navigational aid on board to access the airport. This also provides significant levels of redundancy should a primary navigational aid fail.

A Category I ILS approach is available to Runway 29. A Category II ILS approach is available to Runway 11. A Category I approach provides for landing when the cloud ceilings are as low as 200 feet above the ground and visibility is restricted to ½ mile. A Category II approach provides even more capability, allowing for a landing when visibility is one-eighth of a mile (1,200 feet) and cloud ceilings are as low as 100 feet from the ground. This approach capability should be maintained through the planning period.

A GPS approach is available to each runway end. GPS approaches are currently categorized as to whether they provide only lateral (course) guidance or a combination of lateral and vertical (descent) guidance. An approach procedure with vertical guidance (APV) GPS approach provides both course and descent guidance. An APV approach is currently available to the Runway 11, Runway 29, and Runway 36 ends. A lateral navigation approach (LNAV) approach only provides course guidance. An LNAV approach is available to Runway 18. The APV approach to Runway 29 is sufficient through the planning period. An APV approach should be planned to Runway 18.

In the future as WAAS is upgraded, precision approaches similar in capability to the existing ILS will become available. These approaches are currently categorized as the Global Navigation Satellite System (GNSS) Landing System (GLS). A GLS approach may be able to provide for approaches with ½ mile visibility and 200-foot cloud ceilings. A GLS would supplement the existing ILS approaches to the Runway 11 and Runway 29 ends. A GLS and should be planned for each of these runway ends; however, a GLS approach is not needed at either the Runway 18 or Runway 36 ends. A GLS approach requires an extensive approach lighting system that cannot be accommodated behind the Runway 18 end, and it is not needed for Runway 36 since there is already this capability at the Runway 11 and Runway 29 ends.

LIGHTING AND MARKING

Currently, there are a number of lighting and pavement marking aids serving pilots using the Jetport. These lighting systems and marking aids assist pilots in locating the airport at night or in poor weather conditions, and assist in the ground movement of aircraft. Existing and future lighting and marking aids are summarized on **Exhibit 3F**.

Identification Lighting

The Jetport is equipped with a rotating beacon to assist pilots in locating the airport at night. The existing rotating beacon is located east of Runway 18-36 near the shoreline. The rotating beacon is sufficient and should be maintained through the planning. It is required for the airport to maintain its certification for scheduled airline activity.

04MP17-3F-9/19/05

Instrument Approach Procedures

EXISTING	SHORT TERM NEED	LONG TERM NEED
ILS Runway 11 - CAT II	Same	Same
ILS Runway 29 - CAT I	Same	Same
GPS APV Runway 11	Same	***Upgrade to GLS***
GPS APV Runway 29	Same	***Upgrade to GLS***
GPS Runway 18 LNAV	***Upgrade to APV***	Same
GPS APV Runway 36	Same	Same
		ILS Runway 36

Airfield Lighting

EXISTING	SHORT TERM NEED	LONG TERM NEED
Rotating Beacon	Same	Same
Lighted Airfield Directional Signs	Same	Same
Medium Intensity Taxiway Edge Lighting (MIRL)	Same	Same
Pilot Controlled Lighting	Same	Same
Runway 11-29		
High Intensity Runway Edge Lighting (HIRL)	Same	Same
Centerline Lighting	Same	Same
Touchdown Zone Lighting (TDZL) - Rwy. 11	Same	Same
ALSF-2 - Runway 11	Same	Same
MALSR - Runway 29	Same	Same
PAPI-4 - each end	Same	Same
Distance Remaining Signs	Same	Same
Runway 18-36		
Medium Intensity Runway Edge Lighting (MIRL)	Same	Same
VASI-4 - each end	***Convert to PAPI-4***	Same
REIL - each end	Same	Same
Distance Remaining Signs	Same	Same

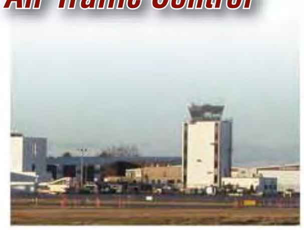
Airfield Markings

EXISTING	SHORT TERM NEED	LONG TERM NEED
Taxiway Centerline, Hold Positions	Same	Same
Land and Hold Short Positions	Same	Same
Runway 11-29		
Precision	Same	Same
Runway 18-36		
Nonprecision Marking	Same	Same

Weather Facilities

EXISTING	SHORT TERM NEED	LONG TERM NEED
Automated Surface Observation System (ASOS)	Same	Same
Runway Visual Range - Runways 11 & 29	Same	Same
Lighted Wind Socks	Same	Same

Air Traffic Control



EXISTING	SHORT TERM NEED	LONG TERM NEED
Airport Traffic Control Tower (ATCT)	Same	Same
Radar Approach Control	Same	Same
Radar Departure Control	Same	Same
Airport Surveillance Radar (ASR-9)	Same	Same
		Add Airport Surface Detection Equipment (ASDE) Ground Radar

Key:

ILS - Instrument Landing System
GPS - Global Positioning System
GLS - Global Navigation Satellite System (GNSS) Landing System
APV - Approach with Vertical Guidance
LNAV - Lateral Navigation
CAT I - Category I Standards
CAT II - Category II Standards
ALSF-2 - Approach Lighting System with Sequenced Flashing Lights
MALSR - Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights

PWM PORTLAND INTERNATIONAL JETPORT

Exhibit 3F
AIRFIELD SUPPORT REQUIREMENTS

Runway and Taxiway Lighting

Runway 11-29 is equipped with high intensity runway lights (HIRL). The runway is also equipped with threshold lights, which indicate the location of the runway threshold at night. These lighting aids are required to maintain the ILS approach to each end. The designed touchdown zone and runway centerline is also lighted on Runway 11. These lighting aids are required to maintain the Category II ILS approach to the Runway 11 end and should be maintained through the planning period.

Runway 18-36 is equipped with medium intensity runway lights (MIRL). These lights are sufficient and should be maintained through the planning period.

Effective ground movement of aircraft at night can be enhanced by taxiway lighting. Currently, all airport-maintained taxiways are equipped with medium intensity taxiway lights (MITL). Airports are currently pursuing upgrades to LED systems to reduce maintenance and operating costs.

Airfield Signs

Lighted directional and hold signs are installed at the airport. This signage identifies runways, taxiways, and apron areas. These aid pilots in determining their position on the airport and provide directions to their desired location on the airport. These lighting aids are sufficient and should be maintained through the planning period.

Distance Remaining Signs

Each runway is equipped with distance remaining signs. These lighted signs are placed in 1,000-foot increments along the runway to notify pilots of the length of runway remaining and should be maintained in the future.

Visual Approach Lighting

The landing phase of most flights to the airport must be conducted visually. To provide pilots with visual descent information during landings to the runway, visual glideslope indicators have been provided at each runway end. A visual approach slope indicator (VASI) 4 has been installed at the Runway 18 and Runway 36 ends. Facility planning should include replacing each VASI-4 with precision approach path indicators (PAPI-4). The PAPI-4 is more appropriate for the type of operations at the airport and more cost-effective to operate. A PAPI-4 is available at the Runway 11 and Runway 29 end.

Approach Lighting

Approach lighting systems consist of a configuration of signal lights extending into the approach area from the runway threshold to aid pilots transitioning from instrument flight to visual flight and landing. A medium intensity approach lighting system with runway alignment indicator lights (MALSR) is installed at the Runway 29 end to assist pilots in landing to these runway ends during inclement weather conditions. An Approach Lighting System with Sequenced Flashing Lights (ALSF-2) is installed at the Runway 11 end. The ALSF-2 allows for lower visibility and cloud ceiling minimums for instrument landings to this runway end. These lighting aids are sufficient and should be maintained in the future.

Runway End Identification Lighting

Runway end identification lighting provides the pilot with rapid and positive identification of the runway end. The most basic system involves runway end identifier lights (REILs). As REILs provide pilots with the ability to identify the runway ends and distinguish the runway end lighting from other lighting on the airport and in the approach areas, REILs are installed at the Runway 18 and Runway 36 ends. These lighting aids should be maintained through the planning period. REILs are not required at the Runway 11 and Runway 29 ends, as each of these runway ends is equipped with a more extensive approach lighting system.

Pilot-Controlled Lighting

The Jetport is equipped with pilot-controlled lighting (PCL). PCL allows pilots to turn on the Runway 29 MALSR and Runway 18 and Runway 36 REILs when the tower is closed, using the radio transmitter in the aircraft. This system should be maintained through the planning period. The existing and future PAPIs should be added to the PCL system.

Pavement Markings

Pavement markings are designed according to the type of instrument approach available on the runway. FAA AC 150/5340-1H, *Markings of Paved Areas on Airports*, provides the guidance necessary to design an airport's markings. The Runway 11 and 29 ends are equipped with precision runway markings. Runway 18-36 is equipped with nonprecision runway markings. These makings will be sufficient through the panning period.

Taxiway and apron areas also require marking to assure that aircraft remain on the pavement. Yellow centerline stripes are currently painted on all taxiway and apron surfaces at the airport to provide this guidance to pilots. Besides routine maintenance, these markings will be sufficient through the planning period.

WEATHER REPORTING

The Jetport is equipped with an Automated Surface Observation System (ASOS). The ASOS provides automated aviation weather observations 24 hours-a-day. The system updates weather observations every minute, continuously reporting significant weather changes as they occur. The ASOS reports cloud ceiling, visibility, temperature, dew point, wind direction, wind speed, altimeter setting (barometric pressure), and density altitude (airfield elevation corrected for temperature). This system is essential for aircraft operations and should be maintained through the planning period.

Runway 11 and Runway 29 are equipped with runway visual range (RVR) equipment. The RVR consists of a transmissometer located along the runway edge, to determine, in feet, the horizontal distance a pilot can see down the runway from the approach threshold. This RVR equipment is sufficient and should be maintained through the planning period.

The Jetport is equipped with several lighted wind cones. The wind cones, located in various locations throughout the airfield, provide wind direction and speed information to pilots. These wind cones are required for the airport's certification and should be maintained through the planning period.

A segmented circle identifies the proper landing pattern for each runway. This segmented circle is required for the airport's certification and should be maintained through the planning period.

AIR TRAFFIC CONTROL TOWER

The existing air traffic control tower (ATCT) is located on the east side of the terminal building along Taxiway C. Ultimately, this facility may need to be relocated to facilitate the expansion needs of the terminal building. The alternatives analysis will examine alternative locations for the ATCT building should it ultimately need to be relocated.

AIRPORT TRAFFIC CONTROL RADAR

The Jetport is served by an Airport Surveillance Radar (ASR-9). The ASR-9 is located off the airport site. The ASR is critical for maintaining proper separation and control of aircraft in the airspace surrounding the airport and will be maintained by the FAA through the planning period. Upgrades to this system will be the responsibility of the FAA.

The FAA has developed the Automated Surface Detection Equipment (ASDE) Program to monitor ground operations at an airport. The ASDE system uses a combination of surface movement radar and transponder sensors to display aircraft position labeled with flight call-signs on an ATCT display. The integration of these sensors provides data with an accuracy, update rate, and reliability suitable for improving airport safety in all weather conditions. The primary application is to provide controllers with positive identification of aircraft on the surface in all weather conditions. The ASDE system provides:

- Positive correlation of flight plan information with aircraft position on controller displays,

- Seamless surveillance coverage of the airport from arrival through departure,
- Elimination of blind spots and coverage gaps, and
- Conflict detection and resolution and taxi route conformance monitoring.

Utilization and installation of an ASDE system at the Jetport will the responsibility of the FAA Air Traffic Division. However, the Jetport staff should follow the progress of ADSE installations and technological improvements for their applicability to ground control at the Jetport. The installation of ASDE can improve airfield capacity.

LANDSIDE REQUIREMENTS

Landside facilities are those necessary for handling aircraft and passengers while on the ground. These facilities provide the essential interface between the air and ground transportation modes. The capacities of the various components of each area were examined in relation to projected demand to identify future landside facility needs. This includes components for commercial service and general aviation needs such as:

- Passenger Airline Terminal Requirements
- Air Cargo Facilities Requirements
- General Aviation Requirements
- Airport Support Requirements

PASSENGER AIRLINE TERMINAL REQUIREMENTS

Components of the terminal area complex include the terminal apron, aircraft gate positions, and the functional elements within the terminal building. This section identifies the terminal area facilities required to meet the airport's needs through the planning period.

Planning for the functional elements of the terminal building is being conducted separately, yet concurrently, with this Master Plan Update. Future terminal facility needs are being studied by a team of architects and planners experienced with the Jetport and commercial airline terminals both nationally and internationally. The following is a summary of their findings to date in the August 2005 *Overview of Capacity/Demand Analysis and Project Requirements* document. The City of Portland has empanelled a separate advisory group to study future terminal needs.

Passenger Terminal Building

Original portions of the current terminal building still in use today date from 1968. Several renovations and expansions have been completed to the airport over ensuing years; most recently in 2005, new baggage claim facilities were added. Currently, total usable terminal area is approximately 145,000 square feet.

Through observation and analysis of facility capacities and with the use of

2003 and 2004 summer aircraft schedules, the terminal planning team identified a number of deficiencies and planning considerations with regard to the current terminal building. Principal among these include:

Aircraft Gates/Apron

- The tail of aircraft parked at the terminal building penetrates the transitional surface as defined in 14 Code of Regulations (CFR) Part 77, *Objects Affecting Navigable Airspace*. Greater separation from Runway 11-29 would be desirable.
- Inadequate apron area causes the number of aircraft that remain overnight to be “double parked” at the gates, which produces safety and level of service concerns.
- There is an inadequate number of gates without “double parking” to serve peak period arrival demand.

Check-in

- Terminal depth is minimal, leaving inadequate space for queuing and lateral circulation.
- The in-lobby explosive detection system (EDS) is labor intensive, space consuming, and inefficient.

Passenger Security Processing

- Lack of processing capacity and queue space generates long waits and very long queues.

Holdrooms

- Holdrooms at either end, where there are multiple aircraft boarding positions, are inadequately sized.

Arrivals

- Meeters and greeters at the mezzanine level further congest an area already congested with departing passengers queued for security processing.

Baggage Make-up facilities

- Airlines are generally operating in extremely tight rooms with considerable manual handling of carts and baggage.

General Circulation

- Multiple levels and the curb raised above check-in generate many circulation complexities.

Retail, Food, and Beverage

- The scattered provision of retail, food, and beverage facilities is not conveniently located for passenger flows and is not likely performing as well as it could.
- Goods and waste movement in the terminal is difficult and also complicated by level changes.

Other Support Facilities

- The limited size of in-terminal maintenance facilities was noted.

These issues all suggest that the terminal facilities need significant improvement and expansion, both to cope with current conditions and volumes and to support continued growth.

Terminal building facility requirements are to a large extent directly related to accommodating the peak flows through the terminal and are not planned around annual volumes. The terminal planning team reviewed in detail the current operations, based on 2003 and 2004 summer aircraft schedules, to determine the size and timing of the peak activity. These were then extrapolated to represent 2015 levels of activity, from which a program of facility requirements could be established. 2004 in particular was used as the basis of the more demanding low-cost forecast scenario, and in turn for the basis of the facility requirements. It should be noted that the analysis was to some extent limited by lack of data available for variable load factors (i.e., percentage. percent of seats on aircraft occupied) by time of day and airlines, and some educated assumptions were made. The results of this analysis is summarized in the **Table 3M**.

TABLE 3M
Terminal Area Facility Requirements
Portland International Jetport

Functional Area	Available	2015 Projected Need
Number of Contact Gates	11	14
Number of Remote Gates	Not Determined	12
Check-In Counters	32	33
Passenger Security Screening Lanes	3	6
Holdroom Area (square feet)	26,000	32,000
Baggage Claim Belts	3	3
International Arrivals Processing	None	Not Determined
Automated EDS Screening Area	In Lobby	5,000
Baggage Make-Up (square feet)	11,500	28,000
Retail, Food, and Beverage (square feet)	10,500	15,500
Current Terminal Area (square feet)	145,000	
Total Terminal Area (green field) (square feet)		254,000
Total Terminal Area (planned) (square feet)		387,000

Source: *Overview of Capacity/Demand Analysis and Project Requirements, DHK*

Note that a theoretical terminal area has been calculated assuming initially a greenfield development where a highly efficient layout can be achieved. In practice, the single-sided linear terminal configuration at the Jetport that extends an existing highly-constrained facility cannot achieve the same efficiencies. Additionally, flexibility in the form of generous area provision in key areas such as the TSA screening point should be built in to accommodate changed processes and potentially higher demands that extend beyond the forecast period.

The facility program has been built-up in consultation with the airport management, the Transportation Security Administration (TSA), and the concession operators. It should be noted that it provides currently-unavailable facilities (e.g., international arrivals, automated baggage screening) and ensures currently-undersized facilities (passenger security screening, check-in hall, holdrooms etc.) are sized to meet ongoing growth in demand.

Some processes will continue to improve in efficiency, such as check-in, where the planning requirements provide for additional self check-in kiosks, but not additional conventional check-in counters. Gate utilization can be improved through the gradual introduction of aircraft towing to better accommodate morning peak period gate demand. Other facilities, principally related to security, remain the subject of much ongoing developments in technologies and processes. The terminal planning team is in ongoing discussions with TSA to anticipate these, but also proposes that the facilities in this area should include flexibility to deal with unanticipated requirements.

In 2005, the Jetport was experiencing an ongoing growth in passenger traffic levels. While changes to the long range forecasts are not warranted (i.e., the low-cost forecast scenario already anticipates stronger growth), the terminal planning team looked more closely at 2005 summer passenger demand to determine if and to what extent this growth could impact the above requirements and planning, which has to date been largely based on extrapolating from 2004.

The terminal planning team's analysis shows that:

- Daily number of seats is up only about four percent in the summer
- Load factors are running much higher, likely at close to 100 percent in the peaks
- Daily aircraft movements have declined, although the number of movements in the peak is similar
- Average aircraft size has increased
- That a triple bank in the morning has changed to a more widely spaced double bank, resulting in a single larger peak for the first departures wave

The impacts of these changes translate into two key factors:

- Increased departure volumes in the peak hour – estimated at 40 to 50 percent
- Increased average aircraft size

These impacts have been reviewed in light of the planning and programming completed to date. It is believed that the increased peak, if sustained in subsequent years, will primarily impact the number of passenger security lanes operated. The flexibility planned in this area, plus anticipated improvements in processing rates, should accommodate this growth. It may also impact the size of the automated EDS system, where again processing rate improvements are likely.

The gating proposed is already premised on larger regional jets (70-seat aircraft) with a mix in part dictated by afternoon demand for some larger aircraft positions. An increase in the number of larger aircraft in the morning can thus be accommodated.

In conclusion, while worthy of ongoing monitoring, the current rapid growth should not substantively change the planning already completed.

Terminal Curb Frontage

The curb element is the interface between the terminal building and the ground transportation system. The length of curb required for the loading and unloading of passengers and baggage is determined by the type and volume of ground vehicles anticipated in the peak period on the design day. The length of time a vehicle remains at the curb is also an important factor. Current security policies limit dwell times on the curbs by not allowing vehicle owners to remain at the curb to wait for passengers or to drop baggage and departing passengers. As discussed earlier in the terminal requirements, due to high load factors of departing aircraft, peak hourly passenger levels are high at the airport. This increases curb requirements. The airport constructed a small automobile parking area near the bag claim portion of the terminal building. This lot allows people picking up arriving passengers to stage their vehicle near the bag claim area. This reduces congestion along the bag claim curb by allowing vehicles to park near the bag claim but away from the curb which can get congested during peak periods.

The existing curb frontage totals approximately 650 feet in length, split approximately evenly between enplaning and deplaning activities. As shown in **Table 3N**, an increase in terminal curb length is needed through the planning period. The ultimate curb length may be a function of the design and configuration of the ultimate terminal complex. This will be examined concurrently with the terminal planning project. Other areas that could be examined are the separation of commercial vehicles (taxis, courtesy vehicles) from passenger cars along a separate median. A full range of terminal curb alternatives will be examined within Chapter Four.

TABLE 3N Terminal Curb Requirements Portland International Jetport					
	Available	Current Need	Short Term	Intermediate Term	Long Range
Terminal (Enplanements)		689,174	970,000	1,260,000	1,570,000
Enplane Curb (ft)	325	240	390	440	550
Deplane Curb (ft)	325	330	520	600	750
Total Curb (ft)	**650**	**570**	**910**	**1,040**	**1,300**

Terminal Vehicle Parking

Vehicle parking in the airline passenger terminal area of the airport includes those spaces utilized by passengers, visitors, and employees of the airline terminal facilities. Parking spaces are classified as public, employee, and rental car.

Public parking is located in both a parking structure and surface lots north of the terminal building. The first floor in the original parking structure is used for short term parking and contains 145 spaces. The long term lots include 1,649 spaces in the parking structure, 501 surface spaces at the terminal, and 400 remote spaces used during peak periods. This accounts for 2,550 spaces for long term public parking.

The peak period for parking lot usage at the Jetport is not during the peak passenger months. Rather, it occurs during the late winter/early spring when use by area residents is highest. During the summer, a higher percentage of traffic is made up of visitors to the area, thus requiring less parking. A review of parking lot counts the last two years indicated that the long term parking lot was essentially operating at or above its comfortable capacity. From this review, a parking ratio of 3.85 spaces per 1,000 annual enplaned passengers was determined. This ratio is expected to remain relatively constant through the planning horizons.

The short term lot presently comprises just five percent of the public parking total. The common ratio at similar airports of 20 percent was projected for future planning. **Table 3P** presents the parking requirements for the planning horizons.

Rental car ready/return parking is provided in the lower level of the parking structure. There are 238 spaces for ready/return use by the rental car companies, with counters also in the lower level of the parking structure. A ratio of 0.30 spaces per 1,000 annual enplanements was used to project ready/return needs. Additional spaces will be needed in the short term.

TABLE 3P
Terminal Curb and Vehicle Parking
Portland International Jetport

		PLANNING HORIZON			
	Available	Base Year	Short Term	Intermediate Term	Long Term
Terminal (Enplanements)	NA	689,174	70,000	1,260,000	1,570,000
Terminal Parking					
Public	2,695	2,650	3,750	4,850	6,050
Short Term	145	530	750	970	1,210
Long Term	2,550	2,120	3,000	3,880	4,840
Employee	320	240	340	440	550
Rental Car					
Ready/Return	238	210	290	380	470

To the west of the public parking is a 320-space employee lot. Employee parking requirements were estimated at 0.35 spaces per thousand annual enplaned passengers. Additional employee parking will be needed by the intermediate planning milestone.

Airport Access

In terminal facility planning, both on and off airport vehicle access is important. For the convenience of the traveler (and to provide maximum capacity), access to the terminal should include (to the extent practical) connections to each of the major arterial roadways near the airport. The Jetport has two primary access points. International Parkway extends from Congress Street (SR 9/22) which runs on the northwest side of the airport. This is a two-way arterial with two lanes in each direction and a signalized intersection at the Jetport entrance. Jetport Boulevard provides access from the east side of the airport where it intersects with Johnson Road (SR9) and the Interstate 95 Turnpike entrance/exit. This signalized intersection provides the Jetport with direct access to the primary interstate route serving Maine. Johnson Road is a four-lane arterial providing access to areas south of the airport.

On-airport traffic counts indicate that Jetport Boulevard remains the primary on-airport access road, carrying 6,600 vehicles per day during the peak month of August. This roadway has a single lane in each direction. Peak hour traffic can reach 700 vehicles per hour on this road.

International Parkway carries 3,200 vehicles per day between Congress Street and its intersection with Jetport Boulevard. International Parkway also has a single lane in each direction. Peak hour traffic on this roadway can reaches 280 vehicles per hour.

Using guidance provided in FAA AC 150/5360-13, *Design Guidelines for Airport Terminal Facilities*, the access roads were estimated to each have a capacity of up to 1,500 vehicles per hour in interrupted flow conditions. By the long range planning horizon, the airport could anticipate a total of 2,000 vehicles during the peak hour on these two entrance roads. The combined capacity of the roadways should be adequate to meet this demand. It is likely, however, that the intersection of the two entrance roads will warrant signalization by the short term planning horizon.

An added concern with International Parkway is the limited lane width. Combined with the divided median, there is not adequate room to maneuver around a stalled vehicle. As traffic levels increase, the potential for this occurrence will also increase and could generate traffic tie-ups extending back onto Congress Street.

Much of the traffic entering the airport enters and exits the passenger terminal area. This traffic utilizes a loop road system that is linked to the intersection of the two entrance roads. The loop system provides two lanes in a one-way counterclockwise pattern that provides access to the parking lots and the front terminal curb.

Peak hour traffic in front of the terminal building currently reaches 450 vehicles per hour during the peak month. By the long term planning horizon, this demand could be expected to double to 900 vehicles per hour.

Using guidance provided in FAA AC 150/5360-13, *Design Guidelines for Airport Terminal Facilities*, the capacity of the terminal loop at the terminal curb can be determined. With vehicles stopping for enplaning and deplaning passengers at the terminal curb, this portion of the terminal roadway has the most potential for congestion and reduced levels of capacity. Therefore, the capacity of the terminal loop is most commonly measured in this area.

In front of the terminal, the roadway includes two lanes plus a curb lane. The inside lane is affected by the maneuvering at the curbfront and provides a limited service volume of 300 vehicles per hour. The outside lane can accommodate up to 600 vehicles per hour. By combining the capacity of these two lanes, there is essentially an effective capacity of 900 vehicles per hour. This would be reached by the long term planning horizon. Combined with terminal curb limitations discussed earlier, an additional lane would be desirable after reaching the short term planning horizon activity level.

The highest traffic levels on the loop road are experienced on the return roadway where traffic can reach 600 vehicles per hour. By the long term planning horizon, the demand could be expected to be 1,200 vehicles per hour. According to the FAA guidance, the return loop provides a capacity of 600 vehicles per lane. Thus, the loop road will be operating at capacity by the long term.

AIR CARGO REQUIREMENTS

Approximately 98 percent of the total air freight tonnage at the Jetport is handled by the all-cargo carriers. Forecasts have been prepared for enplaned and deplaned tonnages, projecting each category to the year 2025. While the tonnages handled by the passenger airlines are expected to increase through the planning period, the tonnages handled by the all-cargo airlines are expected to nearly double.

The primary cargo-related facilities requiring analysis include the cargo apron, building space, and truck/automobile parking area. All air cargo facilities at the Jetport are located east of Runway 18-36 along Taxiway H. Both FedEx and DHL maintain their own air cargo facilities at the Jetport. FedEx facilities include a 16,500-square-foot building, 11,100 square yards of apron, and 7,000 square yards of space used for automobile parking and trucking docking. DHL facilities include a 3,600-square-yard apron and 3,000-square-foot building. DHL does not have separate dedicated space for automobile parking or truck docks. Automobile parking and circulation is accomplished on the apron area.

Apron

The space requirements of aircraft commonly used for air cargo operations at the airport were reviewed to examine future ramp requirements. FedEx currently operates a Boeing 727-200 and Airbus A300-600 at the airport. DHL operates DC-9-30/40 aircraft. Commuter aircraft include the Cessna 208 Caravan and Embraer 110 Bandit. Potential aircraft that can be used in the future include the Boeing 757 and 767 aircraft.

Apron space requirements vary on the size of the aircraft and the manner in which aircraft are handled on the ground. Aircraft that are maneuvered with a tug can require less apron space due to closer wingtip clearances. Aircraft that are maneuvered without a tug require wider wingtip clearances and consequently larger apron areas. For the Jetport, tighter wingtip clearances are currently maintained. For determining, future apron requirements, 1,900 square yards of apron was assumed for narrow-body transport aircraft such as the DC-9, 2,500 square yards of apron for the 727, 3,900 square yards of apron was assumed for wide-body aircraft such as the A300-600 or 767, and 800 square yards of apron was assumed for feeder aircraft.

Since forecasts of air cargo operations have been developed based upon an increasing average lift capacity and load factors (refer to Chapter Two, Forecasts), apron requirements may be calculated using the forecast assumptions. However, it should be noted that these requirements are based upon average day departures and average load conditions by the commercial jets used in cargo service. Peak holiday activity generally requires greater ramp capacity, as will the accommodation of feeder aircraft on the ramp. **Table 3Q** summarizes apron requirements for the Jetport through the planning period.

TABLE 3Q
Apron Requirements
All-Cargo Fleet
Portland International Jetport

	Average Daily Departures				Apron Requirements
Planning Period	Feeders	Small Narrow-body	Large Narrow-body	Wide-body	Square Yards
Available					13,000
Existing	5	1	1	1	13,000
Short Term	6	1	1	1	13,100
Intermediate Term	6	1	2	1	15,600
Long Range	6	2	2	2	21,400

Source: Coffman Associates Analysis

Cargo Building

The annual tons of cargo handled by the air cargo carriers (16,812) has been compared to the combined total square footage of dedicated air cargo building space (26,500 square feet) to determine existing utilization rates for comparison to other facility utilization in the U.S. Surveys of the top 50 cargo airports in the U.S. have determined that the current utilization rate is approximately 1.75 square feet per ton. The range of adequacy for an airport on average is between 1.00 and 2.50 square feet per ton. The Jetport's current utilization rate of 1.16 indicates that the cargo operators maximize the use of their facilities by moving more air cargo per square foot than at other facilities across the country. This had allowed the cargo operators to handle more air cargo with smaller buildings. It also indicates that additional space will be needed should growth materialize as forecast.

In providing future cargo building requirements, it is important to consider the goals of individual operators. Some operators may want to limit space for cargo sorting activates for cost savings, while others may need more square-footage to accommodate their specific sorting methods. Taking this need into consideration, future requirements have been based upon a utilization factor of 1.25. Cargo building requirements have been summarized on **Exhibit 3G**.

Automobile Parking

An area must be provided adjacent to the building for staging activities and employee parking. Reviewing the current configuration, approximately 7,000 square yards is provided adjacent to the FedEx building for these activities. As mentioned previously, there is no dedicated automobile parking area at the DHL building. Normally, an area approximately three

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Air Cargo

	Available	Short Term Need	Intermediate Term Need	Long Range Need
Apron Area (square yards)	13,000	13,100	15,600	21,400
Cargo building (square feet)	19,500	26,500	30,300	39,500
Air freight building (square feet)	3,600	Adequate through planning period		
Truck staging/automobile parking (square yards)	7,000 *	8,800	10,100	13,200

* DHL parking and staging occurs on apron area.

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Exhibit 3G
AIR CARGO REQUIREMENTS

times the building area is provided for staging activities and employee parking. This factor has been applied to future building space projections to determine future staging/employee parking areas. The results of the analysis are summarized on **Exhibit 3G**.

Air Freight Building

The air freight building handles cargo transported on the scheduled passenger airlines. Based upon tonnages handled each year, the passenger carriers handle only two percent of the total air freight on the airport. These levels have declined in recent years due to new security requirements for cargo carried in the passenger aircraft. Since these tonnages (421 tons in 2004) are relatively small compared to the square footage of the air freight building (39,900 square feet), and the forecasts for this segment of air freight is projected to increase to only 687 tons by the Long Range Planning Horizon, this facility is considered to have adequate capacity through the planning period to meet anticipated demands.

The existing air freight building is located on the west side of the terminal building along Taxiway C. Ultimately, this facility may need to be relocated to facilitate the expansion needs of the terminal building. The alternatives analysis will examine alternative locations for the air freight building should it ultimately need to be relocated.

GENERAL AVIATION REQUIREMENTS

The Jetport is a full-service general aviation airport providing facilities and services for the general aviation community. General aviation facilities at the airport are primarily located west of Runway 18-36 and north of Runway11-29. This area provides an aircraft parking apron, storage hangars, and office and terminal space. Three general aviation hangars are located east of Runway 18-36 along Taxiway H.

Combined, the total amount of apron area dedicated to general aviation activities encompasses approximately 57,000 square yards, including space for aircraft tiedown and taxilane access. General aviation hangar area is approximately 66,500 square feet.

Hangars

The demand for aircraft storage hangars typically depends upon the number and type of aircraft expected to be based at the airport. For planning purposes, it is necessary to estimate hangar requirements based upon forecast operational activity. However, hangar development should be based on actual demand trends and financial investment conditions.

Utilization of hangar space varies as a function of local climate, security, and owner preferences. The trend in general aviation aircraft, whether single or multi-engine, is in more sophisticated (and consequently, more expensive) aircraft. Vintage aircraft owners and many recreational aircraft owners prefer hangar space to protect their aircraft, which many times are constructed with fabric wing and fuselage covers. Therefore, many aircraft owners prefer hangar space to outside tiedowns, especially for the business and corporate users which may have millions of dollars invested in an aircraft. Presently, the majority of aircraft based at the airport are stored on outside tiedown spaces due to a lack of available hangar space.

For this Master Plan, future hangar requirements were determined assuming that a majority of based aircraft owners would prefer enclosed aircraft storage space to outside tiedown space through the planning period. Hangar space was determined by providing 1,200 square feet for single engine aircraft and 2,500 square feet for multi-engine, turboprop, and jet aircraft. Increases in maintenance area were also anticipated through the planning period as based aircraft levels grow and the mix changes at the airport to include a higher percentage of business and corporate aircraft.

As indicated on **Exhibit 3H**, additional hangar space may be required through the planning period. The alternatives analysis will examine options available for hangar development at the airport and determine the best location for each type of hangar facility. Additionally, consideration will be given to designating areas for commercial general aviation facilities providing services such as aircraft maintenance and repair.

Aircraft Parking Apron

A parking apron should be provided for at least the number of locally-based aircraft that are not stored in hangars, as well as transient aircraft. There are approximately 85 tiedowns available for both based and transient aircraft at the airport. Although the majority of future based aircraft were assumed to be stored in an enclosed hangar, a number of based aircraft will still tie down outside. Along with based aircraft parking needs, transient aircraft parking needs must also be considered in determining apron requirements. The aircraft tiedown apron encompasses approximately 57,000 square yards.

Total apron area requirements were determined by applying a planning criterion of 800 square yards per transient aircraft parking position and 500 square yards for each locally based aircraft parking position. The results of this analysis are presented on **Exhibit 3H**. Based upon the planning criteria above and the assumed transient and based aircraft users, a slight increase in apron area may be required through the planning period. Additional apron area in excess of these needs may be needed as new hangar areas are developed on the airport which is not contiguous with the existing apron areas.

General Aviation Terminal Facilities

General aviation terminal facilities have several functions separate from

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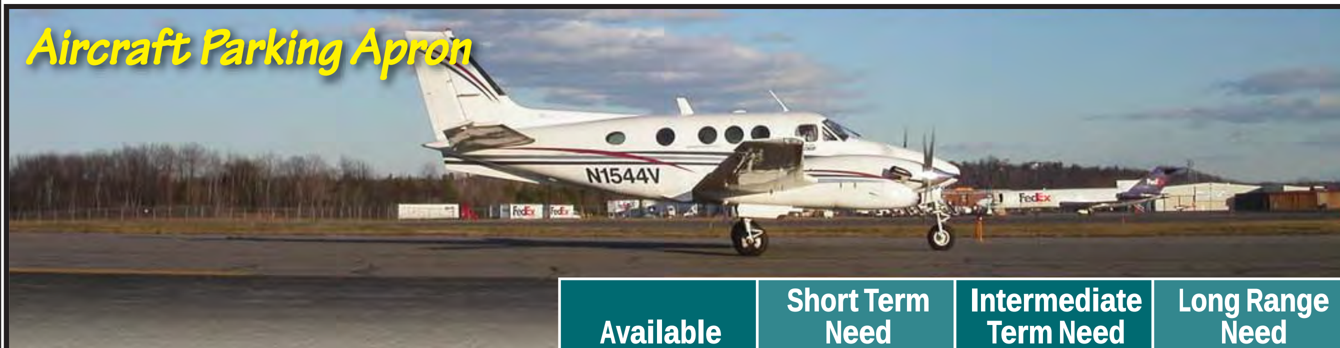
Aircraft Storage Hangars

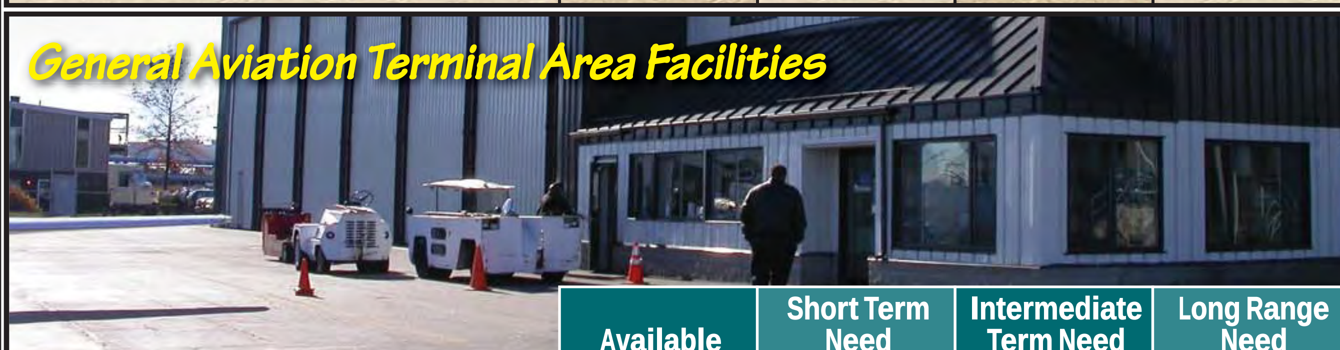
	Available	Short Term Need	Intermediate Term Need	Long Range Need
Aircraft to be hangared	25	31	37	50
Hangar storage area (s.f.)	47,700	58,000	69,100	92,500
Maintenance area (s.f.)	18,800	22,900	27,200	36,500
Total hangar area (s.f.)	**66,500**	**80,900**	**96,300**	**129,000**

Aircraft Parking Apron



	Available	Short Term Need	Intermediate Term Need	Long Range Need
Single, multi-engine transient aircraft positions		46	52	58
Apron area (s.y.)		37,000	41,300	46,300
Transient business jet positions		2	2	3
Apron area (s.y.)		3,200	3,200	4,800
Locally-based aircraft positions		23	24	26
Apron area (s.y.)		11,500	12,000	13,000
Total positions	**85**	**71**	**78**	**87**
Total apron area (s.y.)	**57,000**	**51,700**	**56,500**	**64,100**

General Aviation Terminal Area Facilities



	Available	Short Term Need	Intermediate Term Need	Long Range Need
Area (s.f.)	9,000	6,000	8,200	9,100

Other Facilities

		Aircraft Wash Rack	Same	Same

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Exhibit 3H
GENERAL AVIATION
FACILITY REQUIREMENTS

those of the airline terminal building. Space is required for passengers waiting, pilots' lounge and flight planning, concessions, management, storage, and various other needs. This space is not necessarily limited to a single, separate terminal building, but also includes the space offered by fixed base operators for these functions and services.

In the future, terminal space within the general aviation facilities will be needed to serve the on-demand and air taxi operators using microjet aircraft. A significant number of the existing microjet orders are intended to be put in air taxi service across the country. Since these services will not be scheduled airline activity, they will be able to efficiently and affordably operate from general aviation terminal facilities.

The methodology used in estimating general aviation terminal facility needs was based on the number of airport users expected to utilize general aviation facilities during the design hour. General aviation space requirements were then based upon providing 90 square feet per design hour itinerant passenger. **Exhibit 3C** outlines the general aviation space requirements for general aviation terminal services at the Jetport. Presently, terminal space is provided in separate areas of the privately-owned general aviation operator buildings. This space appears to be adequate through the planning period.

AIRPORT SUPPORT REQUIREMENTS

Various facilities that do not logically fall within classifications of airfield, terminal building, or general aviation facilities have been identified for inclusion in this Master Plan. Facility requirements have been identified for these remaining facilities:

- Aircraft Rescue and Firefighting Equipment
- Airport Maintenance Building
- Snow Removal Equipment
- Aviation Fuel Facilities

Aircraft Rescue and Firefighting Equipment

Requirements for aircraft rescue and firefighting (ARFF) services at an airport are established under 14 Code of Regulations (CFR) Part 139. 14 CFR Part 139 applies to the certification and operation of land airports served by any scheduled or unscheduled passenger operation of an air carrier using aircraft with more than 10 seats. Paragraph 139.315 establishes ARFF index ratings based on the length of the largest aircraft with an average of five or more daily departures. The airport operates as an Index "C" facility. ARFF Index C includes scheduled air carrier aircraft up to 159 feet long. This index rating is sufficient for the mix of air carrier aircraft expected to operate at the airport through the planning and should be maintained for certification.

The existing ARFF building is located on the east side of the terminal building along Taxiway C. Ultimately, this facility may need to be relocated to facilitate the expansion needs of the terminal building. The alternatives analysis will examine alternative locations for the ARFF building should it ultimately need to be relocated.

Airport Maintenance Facilities

The airport maintenance facilities are located at the east end of Taxiway H near the airport's eastern border with the Fore River. Airport maintenance equipment storage and operations are conducted from a 33,000-square-foot building. An adjacent 5,600-square-foot building provides for the storage of sand/salt.

Future expansion of these facilities will be a function of airport management needs. The alternatives analysis will focus on retaining the airport maintenance facilities in this area to the extent possible as it is segregated from other airfield uses, is in a remote area of the airport that cannot be used for aviation-related activities, and provides an area to accommodate limited growth.

Snow Removal Equipment

The Portland area receives an average of 69.0 inches of snow annually. Generally this occurs during the months from December through March. The heaviest snow typically falls in January. As a result, an evaluation of the snow removal equipment and storage is in order.

The FAA Advisory Circular 5200-30A, *Airport Winter Safety and Operations*, provides general guidance for snow clearance for commercial service airports. According to the Circular, "commercial service airports should have sufficient equipment to clear one inch of snow weighing up to 25 pounds per cubic foot from the primary instrument runway, one or two principal taxiways to the ramp area, emergency or firefighters access roads, and sufficient ramp area to accommodate anticipated aircraft operations." The time that one inch of snow should be cleared is based on the number of annual operations for the airport. The Jetport is in the highest category of over 40,000 annual operations, so the clearance time requirement is one-half hour.

The minimum area required for the Jetport would include Runway 11-29, Taxiway A, the terminal ramp, and access to the ARFF facility. Adherence to the snow removal plan constitutes approximately 2.6 million square feet of pavement to be cleared. Assuming a density of 25 pounds per cubic foot, this translates to a requirement to clear nearly 7,900 tons per hour. As shown previously in Table 1M, the airport currently owns two snowblowers with a combined capacity of 10,000 tons per hour. The present equipment is capable of clearing this area in the required timeframe. These snowblowers are supplemented with three rotary brooms and seven plows.

Snow removal equipment is stored in the airport's maintenance facility. This building should be adequate for the parking and maintenance of the existing snow removal equipment.

Aviation Fuel Facilities

The existing aviation fuel storage at the Jetport consists of underground storage of 62,000 gallons of Jet A and 201,000 gallons of 100LL Avgas. All fuel storage and sales are handled through the airport's two FBOs. Fuel storage requirements can vary based upon individual supplier and distributor policies. For this reason, fuel storage requirements will be dependent upon the individual distributors.

At the present time, the fuel storage facilities are dispersed at various locations around the airport. Consideration should be given to ultimately consolidating fuel storage in one or two locations on the airport.

SUMMARY

The facility needs evaluation has identified several requirements on the airfield in the terminal building, public parking, air cargo, and general aviation segments. Each of these functional areas will be given consideration in the following evaluation of airport development alternatives. The next chapter will provide analysis for the future development options for the airport to meet these projected needs.

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Chapter Four

AIRPORT DEVELOPMENT ALTERNATIVES

Airport Development Alternatives

Prior to defining the recommended development program for Portland International Jetport, it is important to consider development potential and constraints at the airport. The purpose of this chapter is to consider the actual physical facilities which are needed to accommodate projected demand and meet the program requirements as defined in Chapter Three, Aviation Facility Requirements.

In this chapter, a number of development alternatives are considered for the airport. For each alternative, different physical facility layouts are presented for the purposes of evaluation. The ultimate goal is to develop the underlying rationale which supports the final recommended master plan development concept. Through this process, an evaluation of the highest and best uses of airport property is made while considering local development goals, physical and environmental constraints, and appropriate federal airport design standards.

Any development proposed by a Master Plan evolves from an analysis of projected needs. Though the needs were determined by the best methodology available, it cannot be assumed that future events will not change these needs. Therefore, to ensure flexibility in planning and development to respond to unforeseen needs, some of the landside alternatives consider the maximum development potential of airport property.

The alternatives presented in this chapter have been developed to meet the overall program objectives for the airport in a balanced manner. Through coordination with the Planning Advisory Committee (PAC), the public, and the City of Portland, the alternatives (or combination thereof) will be refined and modified as necessary to develop the recommended development concept. Therefore, the alternatives presented in this chapter can be considered a beginning point in the creation of the recommended concept for the future development of Portland International Jetport. Input from the general public and members of the PAC will be necessary to define this concept and the resultant capital improvement program.

The scope of this analysis focuses solely on the development of Portland International Jetport to serve the existing and forecast aviation demand for the region. The role of the Jetport in both state system planning and the *National Plan of Integrated Airports System* (NPIAS) is to serve commercial airline, air cargo, and a portion of the general aviation needs of the City of Portland and surrounding communities. The scope of this Master Plan assumes that Portland International Jetport will continue to serve in that role into the foreseeable future. Therefore, the development proposals shown in this chapter are limited to the development of the existing Jetport site so that city, state, and federal officials have a plan to accommodate future aviation demand for the region.

AIRFIELD ALTERNATIVES

Exhibit 4A summarizes key airfield development issues. These issues are the result of the findings of the Aviation Facility Requirements evaluations, and include input from the PAC and City staff. Each issue is more fully discussed in the following sections.

Runway 11 presently provides a departure and landing length of 6,800 feet while Runway 29 provides a departure and landing length of 7,200 feet. This disparity in lengths was implemented by the FAA to ensure adequate runway safety area (RSA) is available for operations to the east. The differences in runway lengths require different loading capabilities for operations on Runway 11 than for Runway 29. This can negatively impact commercial service operators who must reduce loading for operations on Runway 11. Additional length on Runway 11 can be achieved improving the RSA beyond the Runway 29 end.

RUNWAY SAFETY AREAS

The runway safety areas (RSAs) behind the Runway 18, Runway 36, and Runway 29 ends do not fully comply with current Federal Aviation Administration (FAA) design standards. An analysis in Appendix B analyzes options for compliance with RSA standards in accordance with FAA Order 5200.8, *Runway Safety Area Program*. Established in October 1999, the objective of the Runway Safety Area

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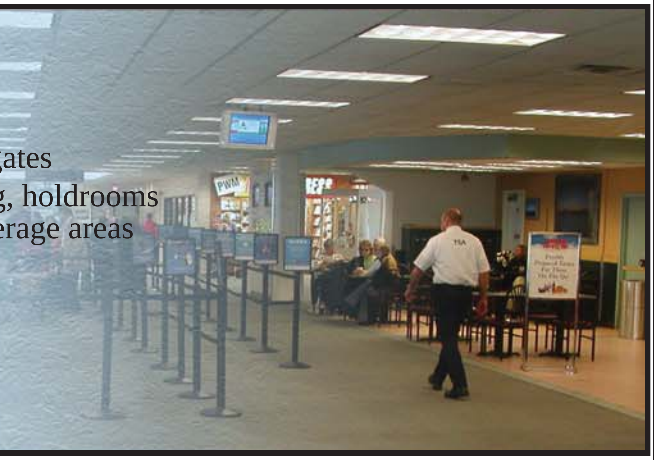
AIRFIELD

- Additional length - Runway 11
- Improve the Runway Safety Area (RSA) behind Runway 18, Runway 36, and Runway 29 ends
- Additional length - Runway 18-36
- Improved instrument approach capability - Runway 36
- Realign Taxiway C
- Taxiway access between Runway 29 end and Runway 36 end
- By-pass taxiways at Runway 18 and 36 ends

PASSENGER TERMINAL



- Additional Gates
- Additional apron area for overnight parking and gates
- Expanded check-in, passenger security processing, holdrooms baggage make-up areas, and retail, food, and beverage areas
- Additional curb length
- Additional public parking
- Additional rental car ready/return parking and maintenance areas
- Replacement air freight building

AIR CARGO

- Additional apron
- Additional building space
- Additional truck staging and automobile parking
- Vehicle access to south apron area
- Taxiway access to Runway 29 end

GENERAL AVIATION

- T-hangar space for small aircraft
- Provide for a second fixed-base operator (FBO)
- Storage and maintenance hangars for larger corporate aircraft
- Additional automobile parking
- Helipad

SUPPORT

- Larger Airport Rescue and Firefighting building (ARFF)
- Potential relocation of Airport Traffic Control Tower (ATCT)
- Public access road east side of airport

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Exhibit 4A
ALTERNATIVE DEVELOPMENT CONSIDERATIONS

Program is to ensure that all runway safety areas (RSAs) at federally-obligated airports conform to standards contained in FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, "to the extent practicable." The following discussion summarizes the findings of the analysis completed in Appendix B.

Existing Runway Safety Area Condition

FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, defines the RSA as, "A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot or excursion from the runway." According to the *Airport Design* AC, the RSA shall be…

1) cleared and graded and have no potentially hazardous ruts, bumps, depressions, or other surface variations;

2) drained by grading or storm sewers to prevent water accumulation;

3) capable, under dry conditions, of supporting aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft; and

4) free of objects, except for objects that need to be located in the safety area because of their function.

AC 150/5300-13, *Airport Design*, further specifies longitudinal and transverse grade standards for the RSA. For the first 200 feet of the RSA beyond the runway end, the longitudinal grade must be less than three percent, with any slope being downward from the runway end. For the remainder of the RSA, the maximum longitudinal grade is such that no part of the RSA penetrates the approach surface or clearway plane, with a maximum negative five percent grade. The maximum allowable grade change is plus/minus two percent over 100 feet. Transverse grades are to be kept at a minimum, consistent with local drainage needs, and should not exceed plus/minus five percent.

The size of the RSA is dependent upon the Airport Reference Code (ARC) assigned to the runway. As described in Chapter Three, the ARC is comprised of the approach speed and wingspan of the critical design aircraft using the runway. The critical design aircraft is the single aircraft, or family of aircraft with similar design characteristics, that conduct more than 500 annual operations to the runway. The current Portland International Jetport Airport Layout Plan (ALP) designates the following ARC for each runway at the airport:

- Runway 11-29, D-IV
- Runway 18-36, B-II

Analysis in Chapter Three, Facility Requirements, of the Master Plan supported the same ARC D-IV designation for Runway 11-29. Runway 11-29 presently serves as the primary runway at the airport and is planned to be developed to safely accommodate all the aircraft that currently use the airport, or may be expected to use the airport, in the future.

While the ARC for Runway 18-36 had been established as ARC B-II in the past, the Master Plan recommended that consideration be given to planning for a higher ARC for Runway 18-36 such as ARC B-III or ARC C-II. This is due to the change in mix of aircraft using the airport, in particular, the type of aircraft used in commercial air service. Regional jet aircraft (ARC C-II) now conduct the overwhelming majority of scheduled passenger operations at the airport. However, their use of Runway 18-36 is less than 500 annual operations and limited to those times when Runway 11-29 is closed for maintenance or when wind conditions dictate the use of Runway 18-36. Business aircraft (ARCs B-I to D-II) use of the airport has also increased.

Runway 18-36 has been used in the past to maintain limited air service when Runway 11-29 was closed for maintenance. This is an advantage of the shift to more regional jets using the airport now than in the past. Regional jets can currently operate in a weight restricted condition on Runway 18-36. Essentially, Runway 18-36 has evolved as a back-up runway to Runway 11-29, accommodating operations by regional jet aircraft and turboprops providing scheduled air service, turboprop aircraft providing feeder aircraft for air cargo service, and most of the general aviation fleet using the airport. In fulfilling its role as a back-up runway, consideration is now being given to providing wider and longer runway safety areas for the regional jets, potential for air cargo feeder aircraft, and general aviation business aircraft that occasionally use Runway 18-36 when Runway 11-29 is closed for maintenance or weather conditions favor the use of Runway 18-36.

Table 4A summarizes the standard dimensions of the RSA for each runway at the airport. This is compared to the actual RSA dimensions to clearly identify the RSA deficiencies at the airport.

TABLE 4A
Existing and Standard Runway Safety Area Dimensions
Portland International Jetport

	Runway 11-29		Runway 18-36	
ARC	D-IV		B-II	
Visibility Minimums	<½ Mile		One Mile	
Standard Dimensions				
Width (feet)	500		150	
Length Beyond Runway End (feet)	1,000		300	
Existing Dimensions	11	29	18	36
Width (feet)	500	500	150	150
Length Beyond Runway End (feet)	1,000	610[1]	153[2]	89[3]

Source: AC 150/5200-13, *Airport Design*, Change 9
[1] Intersection with localizer antenna.
[2] Does not meet grade requirements
[3] Intersection with service road.

The following describes the condition of each standard with regard to design requirements.

Runway 11-29 ARC D-IV RSA

- **Transverse Grade and Width:** Currently, Runway 11-29 RSA meets transverse grade and width requirements along the length of the paved runway.
- **Behind the Runway 11 End:** The RSA meets width, length, and grade requirements.
- **Behind the Runway 29 End:** There are obstructions to the RSA behind the Runway 29 end. The localizer antenna used for the Runway 11 instrument landing system (ILS) approach is located approximately 610 feet from the end of pavement, within the limits of the RSA. The airport interior service road is located approximately 700 feet from the end of pavement, within the limits of the RSA. Beyond the service road, the RSA does not meet grade requirements or provide a surface condition that would support aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft due to the presence of wetlands.

Runway 18-36 ARC B-II RSA

- **Transverse Grade and Width:** Currently, the Runway 18-36 RSA meets transverse grade and width requirements along the length of the paved runway.
- **Behind the Runway 18 End:** The RSA does not meet grade requirements approximately 153 feet from the end of the runway. Yellowbird Road is located approximately 195 feet from the end of pavement, within the limits of the RSA.
- **Behind the Runway 36 End:** The airport interior service road is located approximately 89 feet from the end of pavement, within the limits of the RSA. Beyond the service road, the RSA does not meet grade requirements or provide a surface condition that would support aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft due to the presence of potential wetlands.

Runway 29 Alternatives

As mentioned previously, a localizer antenna and the airport interior service road are located within the limits of the RSA behind the Runway 29 end. Beyond the service road is an area of wetlands that do not meet standards for supporting aircraft and/or vehicles. The following discussion presents the various options available at the Jetport to meet FAA RSA standards behind the Runway 29 end in compliance with the *Runway Safety Area Program*.

Consistent with the methodology specified in Order 5200.8, the realignment or relocation of Runway 11-29 has been considered as a means to meet RSA standards; however, these alternatives have been eliminated from further consideration. It is not prudent to consider the realignment or relocations of Runway 11-29 to clear the RSA when it is less costly to relocate the localizer antenna and interior service road. The airport infrastructure and airspace are already designed around the Runway 11-29 alignment. Changing the Runway 11-29 orientation would require unnecessary changes to the physical locations of taxiways, buildings, and the approach and departure paths to the airport.

Reducing the Runway 11-29 length as a means to achieve safety standards has also been eliminated from consideration. This alternative would involve reducing runway length by removing pavement and relocating the Runway 29 end at an appropriate distance from the controlling obstacle (localizer antenna) to ensure the full RSA standard can be met behind the Runway 29 end. For the Jetport, this involves relocating the Runway 29 end approximately 390 feet west. Following this alternative would reduce Runway 11-29 from 7,200 feet to 6,810 feet.

As stated in FAA Order 5200.8, this alternative is only practicable when the existing runway length "exceeds that what is required for the existing or projected design aircraft." As shown in Chapter Three of the 2005 Airport Master Plan, the existing 7,200 feet of length on Runway 11-29 is needed to ensure the existing and future nonstop airline service destinations can be served from the Jetport.

Alternative A
Existing Condition

Alternative A is shown on **Exhibit 4B**. This alternative depicts the existing method that has been used to comply with ARC D-IV design standards for Runway 11-29. This alternative utilizes the declared distance concept. Declared distances are used by the FAA to define the effective runway length for landing and takeoff. Declared distances ensure that pilots have sufficient information of the operating limitations at the airport for both takeoff and landing operations.

Declared distances are defined as the amount of runway that is declared available for certain takeoff and landing operations. The four types of declared distances, as defined in FAA AC 150/530-13, *Airport Design*, are as follows:

Takeoff Run Available (TORA) – The runway length declared available and suitable for the ground run of an airplane taking off.

Takeoff Distance Available (TODA) – The TORA plus the length of any remaining runway and/or clearway beyond the far end of the TORA.

Accelerate-Stop Distance Available (ASDA) – The runway plus stopway length declared available for the acceleration and deceleration of an aircraft aborting a takeoff.

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Alternative A: Existing Condition

DECLARED DISTANCES	RUNWAY 11	RUNWAY 29
ASDA	6,800'	7,200'
LDA	6,800'	7,200'

Alternative B: Clear and Grade Full Runway Safety Area

DECLARED DISTANCES	RUNWAY 11	RUNWAY 29
ASDA	7,200'	7,200'
LDA	7,200'	7,200'

Alternative C: Install EMAS

DECLARED DISTANCES	RUNWAY 11	RUNWAY 29
ASDA	7,200'	7,200'
LDA	7,200'	7,200'

Exhibit 4B
RUNWAY 29 RUNWAY SAFETY ALTERNATIVES

Landing Distance Available (LDA) – The runway length declared available and suitable for landing.

TORA and TODA at the Jetport are equal to the actual pavement length. The most critical of the declared distances are ASDA and LDA. ASDA is equal to the balance field length calculated by pilots prior to takeoff. The ASDA, or balanced field length, considers the runway length required by an aircraft to accelerate to rotation speed and then decelerate safely on the remaining runway available. This is the controlling takeoff distance and is used for evaluating if sufficient takeoff distance is provided. Landing distance considers the runway length necessary for an aircraft to touch down and decelerate to a safe speed prior to exiting the runway, while allowing for appropriate safety areas at each end of the runway to safely accommodate an aircraft that may undershoot or overshoot the runway.

To ensure that a full 1,000 feet of RSA is available behind the Runway 29 end for aircraft landing and departing Runway 11, the Runway 11 landing distance (LDA) and departure distance (ASDA) has been reduced by 400 feet to 6,800 feet. With the declared distances concept, aircraft operators must load their aircraft to be able to depart in the declared distance available of 6,800 feet instead of the full 7,200 feet of pavement length.

The reduction in departure distance (ASDA) on Runway 11 is the primary disadvantage of this alternative. While this alternative allows the airport to technically comply with RSA standards, it does allow a disparity between capabilities at the airport. Since a full 1,000-foot RSA is available behind the Runway 11 end, there are no limitations on the use of Runway 29. Therefore, the full 7,200 feet of pavement is available for landing and departing Runway 29. The different runway length requires the airlines to load aircraft differently depending upon which runway is in use. As discussed previously, the full 7,200 feet of runway length is desirable for operations on both Runway 11 and Runway 29. The full 7,200 feet of runway length provides the best capabilities for the airport in terms of serving the non-stop air service destinations that the airport currently serves or could potentially serve in the future.

Alternative B
Clear and Grade Full Runway Safety Area (RSA)

FAA Order 5200.8 states, "The first alternative that must be considered in every case is constructing the traditional graded runway safety area surrounding the runway." As shown on **Exhibit 4B**, to fully meet RSA standards behind the Runway 29 end, the localizer antenna and interior airport service road need to be relocated. The area beyond the existing interior service road would need to filled and graded to RSA standards.

This alternative impacts approximately 3.1 acres of wetlands, which would require mitigation. As part of the ongoing wildlife management program at the airport, which is focused on reducing the potential for bird strikes, the

United States Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), has recommended removal of the wetlands behind the Runway 29 end. The USDA-APHIS has indicated that these wetlands serve as a bird attractant. Removal of the bird attractant is the primary means to control the hazard of bird strikes.

In comparison with Alternative A, clearing and grading the full RSA would eliminate the need for declared distances on Runway 11. Therefore, the full 7,200 feet of pavement would be available for landings and departures on Runway 11. This increases the Runway 11 LDA and ASDA by 400 feet.

Alternative C – Engineered Materials Arresting Systems (EMAS)

In compliance with FAA Order 5200.8, EMAS is a required alternative to be considered. EMAS serves as an equivalent to a full RSA if there is a standard installation.

The EMAS system is designed to stop an overrunning aircraft by exerting predictable deceleration forces on its landing gear as the EMAS material crushes. It must be designed to minimize the potential for structural damage to aircraft, since such damage could result in injuries to passengers and/or affect the predictability of deceleration forces.

An EMAS bed is located beyond the end of the runway, centered on the extended runway centerline. It typically is designed to begin at some distance beyond the runway end to avoid damage due to jet blast and short landings. The minimum width of the EMAS shall be the width of the runway, plus any sloped area as necessary. The system should be designed to decelerate jet aircraft expected to use the runway at exit speeds of 70 knots or less, without imposing loads that exceed the aircraft's structural design limits. EMAS is generally limited to the width of the runway because of its cost; therefore, its effectiveness is limited to aircraft running directly off the end of the runway. There is also a cost to replace any part of the system damaged during an overrun incident.

For planning purposes, an EMAS to serve Runway 29 and its critical aircraft would need to be approximately 450 feet long and 150 feet wide. As shown on **Exhibit 4B**, the EMAS structure is placed along the extended runway centerline 75 feet from the Runway 29 end.

In comparison with Alternative A, installing EMAS would eliminate the need for declared distances on Runway 11. Therefore, the full 7,200 feet of pavement would be available for landings and departures on Runway 11. This increases the Runway 11 LDA and ASDA by 400 feet. In comparison with Alternative B, this alternative does not impact the existing wetlands behind the Runway 29 end. However, as stated previously, the airport would still need to remove and replicate these wetlands as part of the wildlife management program at the airport.

This alternative is estimated at $7.25 million for construction costs only. This is the cost to install the EMAS structure and purchase specialized snow removal equipment. This is also limited to the initial development costs. There is on-going maintenance costs associated with EMAS that have not been included in this cost. Additionally, there are potential replacement costs associated with damage to the EMAS from aircraft or airport maintenance equipment. Should the EMAS be damaged, the airport would need to reduce the LDA and ASDA on Runway 11 by 400 feet and temporarily implement declared distances (Alternative A) to ensure a full RSA by filing a Notice to Airmen (NOTAM) until the EMAS structure can be repaired.

Runway 29 Summary

Table 4B summarizes estimated development costs for Runway 29 Alternatives A, B, and C. While Alternative A, the existing condition at the airport, does not have any further costs to implement, this alternative results in a disparity between departure and landing distances on Runway 11 and Runway 29. This can result in different operating requirements for the airlines depending upon which runway is in use. Alternative B complies with the intent of FAA Order 5200.8, which states that "The first alternative that must be considered in every case is constructing the traditional graded runway safety area surrounding the runway." While this alternative impacts approximately 3.1 acres of wetlands, these wetlands will need to be removed anyway. As stated previously, the United States Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), has recommended removal of the wetlands behind the Runway 29 end to reduce the potential for bird strikes. Alternative C, which utilizes EMAS, is the most expensive option. While Alternatives A and C do not impact the wetlands east of the Runway 29 end, the wetlands would still need to be removed to reduce the potential for bird strikes. Thus, Alternative B is the preferred alternative as it provides for additional safety area and also improves safety by removing wetlands deemed to be a bird attractant.

RUNWAY 18-36 ALTERNATIVES

A series of alternatives, based on differing ARCs, is considered for improving the Runway 18-36 RSA. The 2005 Airport Master Plan has shown a need to consider providing wider and longer RSAs behind each end of Runway 18-36 due to the runway's evolving role. As discussed previously, Runway 18-36 now serves as a back-up to Runway 11-29 when it is closed for maintenance and other reasons. Runway 18-36 can now serve a limited role in maintaining the continuity of air service as it can accommodate the regional jet and turboprop aircraft that use the airport now. In previous planning studies, the regional jet did not use the airport.

In this back-up role, Runway 18-36 accommodates limited regional jet operations and some cargo turboprop operations. These operations currently number less than 500 per year on Runway 18-36, the threshold considered by the FAA for changing the ARC for a runway. Based upon the change in mix utilizing this runway, this analysis will examine the feasibility of RSA improvements to Runway 18-36 for ARC B-II, ARC B-III, and ARC C-II.

TABLE 4B
Summary of Salient Features and Construction Costs
Runway 11-29

Alternative	ARC	Estimated Construction Cost
Exhibit 4B – Alternative A Runway 11 ASDA – 6,800' Runway 11 LDA – 6,800' Runway 29 ASDA – 7,200' Runway 29 LDA – 7,200'	D-IV	$310,000[1]
Exhibit 4B –Alternative B Runway 11 ASDA – 7,200' Runway 11 LDA – 7,200' Runway 29 ASDA - 7,200' Runway 29 LDA – 7,200'	D-IV	$ 1,750,000[2]
Exhibit 4B –Alternative C Runway 11 ASDA – 7,200' Runway 11 LDA – 7,200' Runway 29 ASDA - 7,200' Runway 29 LDA – 7,200'	D-IV	$ 7,560,000[2]

Source: Dufresne-Henry
[1] Wetlands mitigation costs east of the Runway 29 end to prevent the potential for bird strike hazards.
[2] Includes wetland mitigation costs.
Notes: No land acquisition or obstruction removal costs are included in these estimates.

As previously identified on **Exhibit 4A**, a number of other design requirements will also be considered concurrently with RSA improvements. This includes additional length, realignment of Taxiway C, runway protection zone (RPZ) requirements, and instrument approach capability to Runway 36.

The Aviation Facility Requirements in Chapter Three indicated that an additional 800 feet of pavement on Runway 18-36 would reduce payload restrictions that regional jet aircraft currently incur when operating on the existing 5,001-foot runway. This additional length would allow Runway 18-36 to more fully serve as a back-up to Runway 11-29. Additional length also increases safety by increasing the ASDA and LDA. The additional pavement length can aid in an emergency by providing additional pavement for deceleration. This can ensure that aircraft remain on the pavement instead of exiting the runway into the RSA.

The distance Taxiway C is located west of Runway 18-36 currently varies from as close as 304 feet to more than

1,100 feet near the Runway 36 end. Consideration is given to relocating Taxiway C at a uniform and standard distance from the Runway 18-36 centerline. As will be shown more closely later in this chapter, a relocation of Taxiway C can allow for up to an acre of development to support general aviation development south of Runway 11-29.

By-pass taxiways are also considered for each end of Runway 18-36. By-pass taxiways allow aircraft ready for departure to pass aircraft holding for clearance or still preparing for departure. This reduces departure delays. By-pass taxiways serve in the same capacity as holding aprons. Holding aprons are provided at the Runway 11 and Runway 29 ends for the same purpose. Sufficient area is not available for holding aprons at the Runway 18-36 ends.

The RPZ is a trapezoidal area at the end of the runway to protect people and property on the ground. The RPZ is two-dimensional and is required to be kept clear of structures and land uses that could cause the congregation of people and or property on the ground. The entire limits of the RPZ are ideally owned in fee. The RPZ behind the Runway 18 end currently extends beyond the airport property boundary and encompasses at least two residential home sites. The existing RPZ behind the Runway 36 end is located entirely on airport property. However, an extension to Runway 36, improved instrument approach capability, or a change in ARC for Runway 18-36 would place the RPZ outside the existing property line.

A precision instrument approach to Runway 36 with visibility minimums as low as three-quarters of a mile, providing both lateral and vertical navigation capabilities, is also considered. During low visibility and cloud ceiling situations, wind speeds above 10 knots are aligned with Runway 36 approximately 15 percent of the time. Whereas wind speeds above 10 knots are aligned with Runway 18 approximately five percent of the time. In these stronger wind conditions, some pilots may desire to land directly into the wind to reduce the crosswind component. While an instrument approach is available to Runway 36 now, this approach is limited to conditions when visibility is greater than one mile.

Prior to defining development alternatives, physical and environmental constraints must be defined. A limited area exists for development of Runway 18-36 pavement and RSAs. To the north, the RSA can extend no farther than its intersection with Yellowbird Road. A relocation of Yellowbird Road to the north is limited by shoreline zoning requirements along Fore River and the Stroudwater neighborhood. Shoreline zoning limits development within 75 feet of the normal high water level. To the south, development is also limited by shoreline zoning requirements along Long Creek. Within these physical constraints, there is an approximately 6,300-foot long platform for development of the runway pavement and RSA.

Consistent with the methodology specified in Order 5200.8, the realignment, relocation, and shortening of

Runway 18-36 has been considered as a means to meet RSA standards. However, these alternatives are considered impracticable and have been eliminated from further consideration. Realigning Runway 18-36 would cause the relocation of hangars, aprons, and taxiways. It would also change the wind coverage for the airport. Currently, Runway 18-36 is ideally aligned with the prevailing wind conditions. This runway is needed to accommodate small aircraft operations that are susceptible to strong crosswinds. When combined with the Runway 11-29 alignment, Runway 18-36 provides over 98 percent coverage for aircraft operating at the airport. Considering that the current runway configuration provides the optimum configuration to meet the FAA design requirements for wind coverage, this alternative is not cost-effective, nor would it meet any FAA or industry-accepted practices.

A relocation of the runway to the east or west would not clear the RSA as the obstructions extend completely through the RSA. Similar to the realignment option, relocating the runway centerline would also impact existing taxiways, buildings, and aprons, causing additional design standard and safety deficiencies.

Runway 18-36 is presently 5,001 feet long. Analysis in Chapter Three, Aviation Facility Requirements, identified the need for up to 800 additional feet of length. Since Runway 18-36 requires additional length, shortening the runway to meet RSA standards is not considered.

While the analysis in Appendix B examined seven different alternatives to improve the Runway 18-36 RSA, only three have been retained for this study. These three alternatives are carried forward as they more fully meet all the program objectives stated above. The other four alternatives resulted in less pavement length than currently provided on Runway 18-36. This would provide a significant operational disadvantage to the existing condition at the airport that would significantly limit the operation of the airport in the future and the ability of Runway 18-36 to serve a back-up role to Runway 11-29.

Runway 18-36 Alternative A Baseline Condition

The baseline condition comprises those improvements necessary to conform to ARC B-II design requirements for Runway 18-36. As stated earlier, the ARC B-II RSA behind the Runway 18 end is limited by terrain and the location of Yellowbird Road. The RSA extends approximately 153 feet behind the Runway 18 end where the terrain begins to decline and the RSA can no longer meet grade requirements. Yellowbird Road obstructs the RSA approximately 195 feet behind the Runway 18 end.

The RSA behind the Runway 36 end is obstructed by the airport interior service road, which is located approximately 89 feet from the end of the runway. Beyond the service road, the RSA crosses existing wetlands. These wetlands would need to be removed to fill and grade the RSA.

FAA Order 5200.8 states, "The first alternative that must be considered in every case is constructing the traditional graded runway safety area surrounding the runway." To create the standard RSA behind the Runway 18 end, the baseline condition (**Exhibit 4C**) would shift the Runway 18 end 147 feet to the south. The pavement behind the relocated end would be removed and a new entrance taxiway constructed. This would shift the Runway 18 departure point slightly away from the Stroudwater neighborhood. The landing threshold would also be further south. Aircraft following a three-degree descent path to the runway would be approximately eight feet higher on approach.

To maintain the existing length, the Runway 36 end would be shifted 147 feet south. A relocation of the interior airport service road would be needed so that the RSA behind Runway 36 could be filled and graded to standard. The wetlands would be removed.

In this alternative, a portion of Taxiway C south of Taxiway G is relocated 300 feet west of Runway 18-36 and extended to the new Runway 36 end. The portion of this taxiway between Taxiway G and Runway 11-29 is 75 feet wide to allow for large transport aircraft use. The remaining portions of the taxiway need only be 35 feet wide to serve ARC B-II aircraft. Relocating Taxiway C impacts a large drainage area and existing wetlands in the area between Taxiway A and Taxiway G. By-pass taxiways are located at the Runway 18 and Runway 36 ends.

Runway 18-36
Alternative B ARC B-III RSA
Three-Quarter Mile Visibility
Minimum Precision Approach
to Runway 36

Alternative B is shown on **Exhibit 4C**. This alternative includes a 1,100-foot extension to the Runway 36 end for a total pavement length of 6,100 feet. This requires the mitigation of wetlands located south of Runway 36. The on-airport service road must also be relocated to clear the RSA and provide for the extension.

This alternative assumes a precision approach to Runway 36 with three-quarter mile visibility minimums. For three-quarter mile visibility minimums, the RSA extends 150 feet on each side of the runway centerline and 600 feet beyond each runway end.

Taxiway C is relocated 300 feet west of Runway 18-36 and extended to the new Runway 36 end. The relocated taxiway would impact existing aircraft parking on the general aviation apron west of Runway 36 and the existing service road on this apron. To maintain appropriate wingtip clearance, the service road and aircraft parking must be located at least 400 feet from the runway centerline. Approximately three tiedown locations would be lost and the service road relocated to maintain this clearance. Three feeder aircraft parking positions on the west side of the cargo apron might also need to be relocated to meet a clear-

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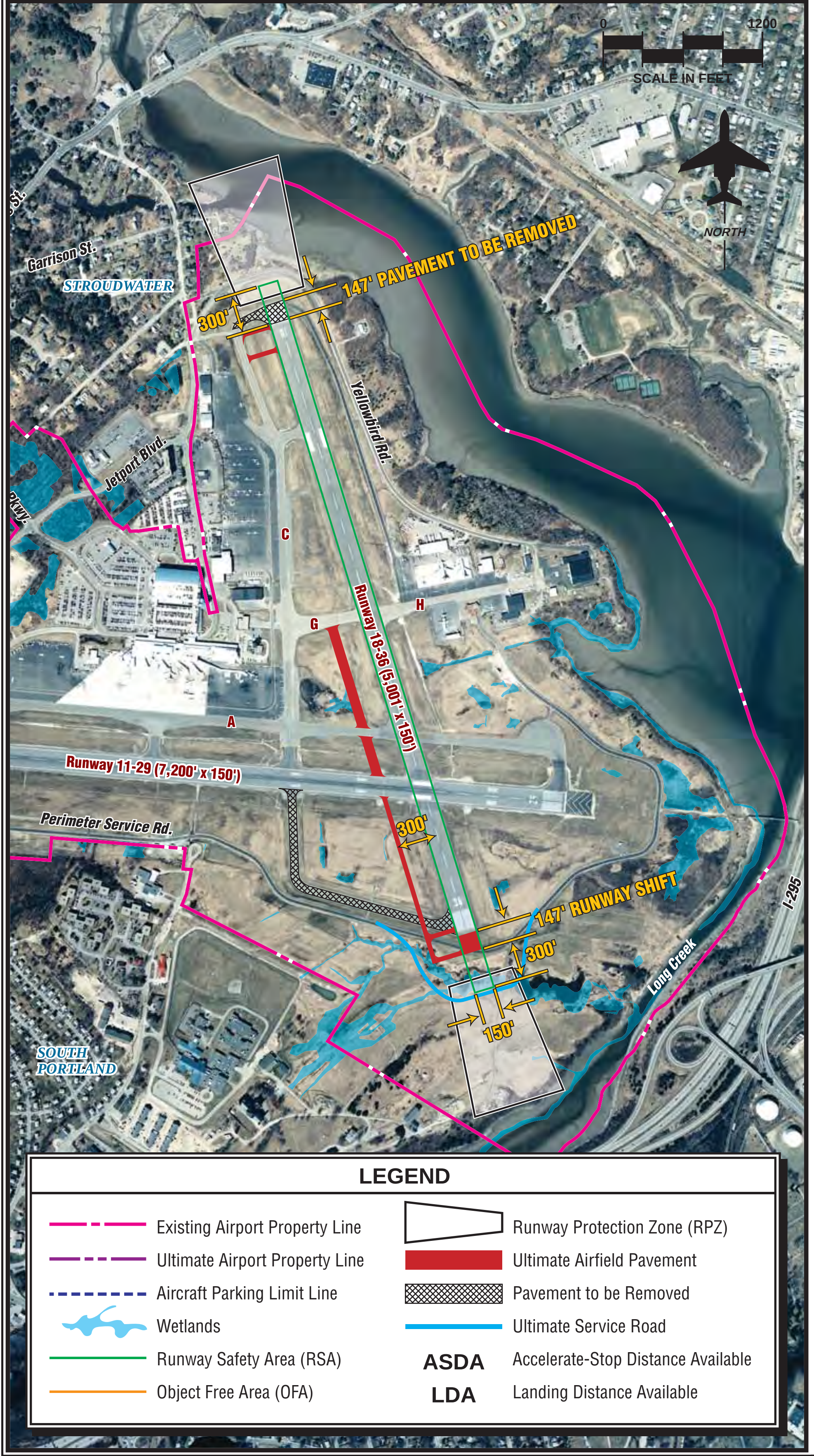
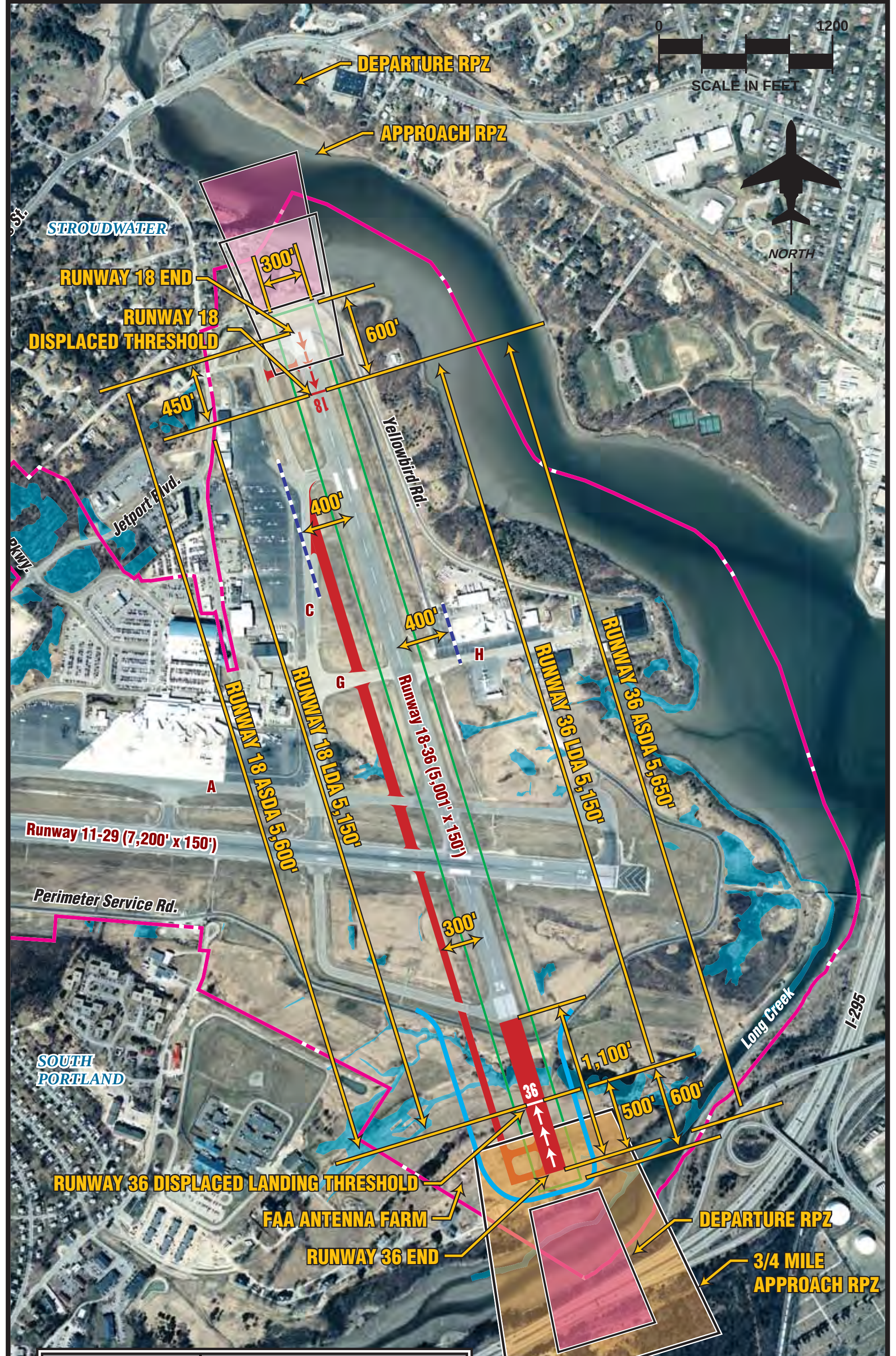
ALTERNATIVE A: Develop Runway 18-36 to maintain B-II Standards and Current Length

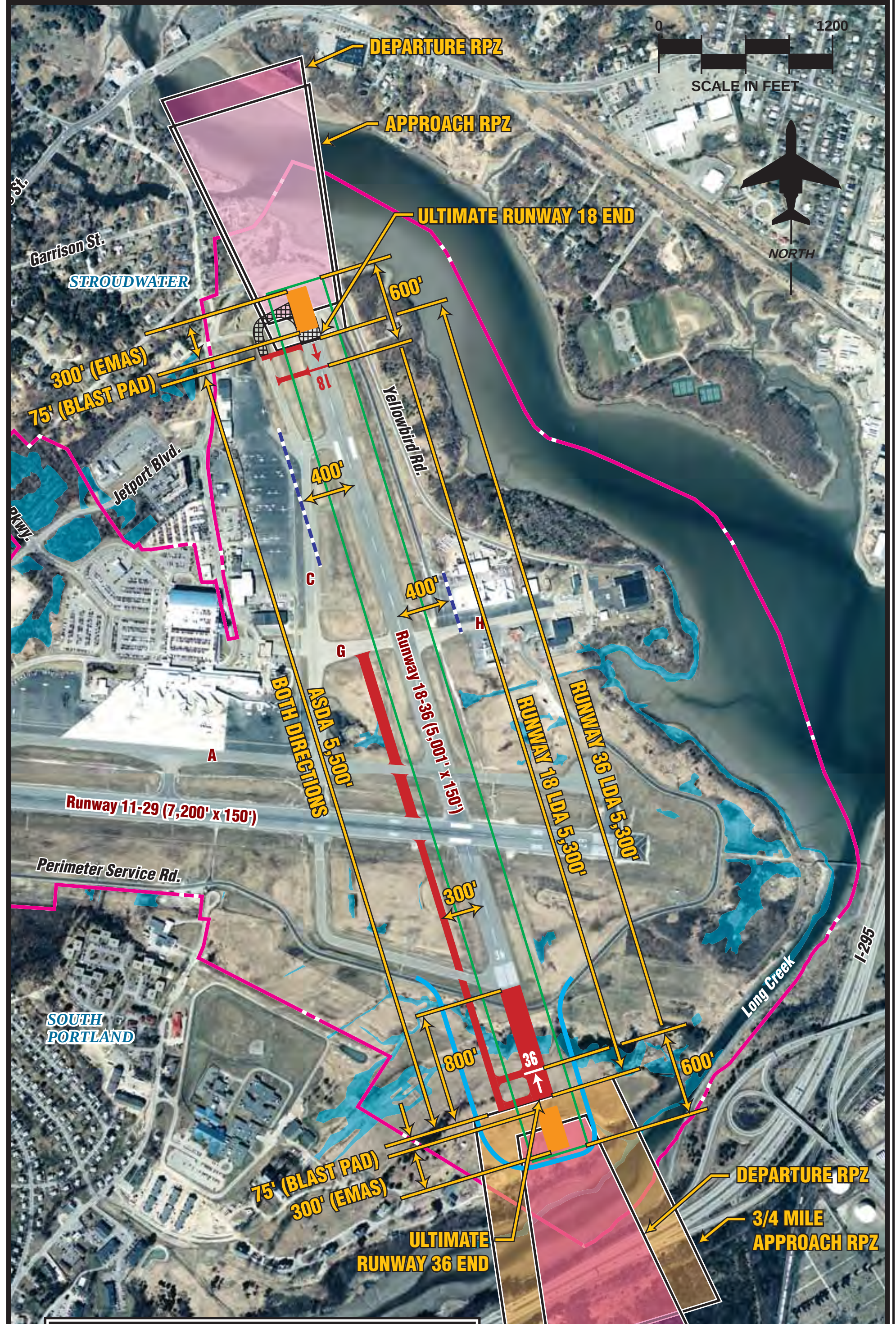


ALTERNATIVE B: Develops Runway 18-36 to B-III Standards. 3/4 Mile Visibility Minimum GPS Approach - Runway 36.



DECLARED DISTANCES	RUNWAY 18	RUNWAY 36
ASDA	5,600'	5,650'
LDA	5,150'	5,150'
Total Runway Pavement: 6,100'		

ALTERNATIVE C: Develops Runway 18-36 to C-II Standards. Develop Runway 18-36 with EMAS off both ends. 3/4 Mile Minimum Precision Approach - Runway 36.



DECLARED DISTANCES	RUNWAY 18	RUNWAY 36
ASDA	5,500'	5,500'
LDA	5,300'	5,300'
Total Runway Pavement: 5,500'		

PWM PORTLAND INTERNATIONAL JETPORT

Exhibit 4C
RUNWAY 18-36 ALTERNATIVES

ance standard for the location of parked aircraft. The portion of this taxiway between Taxiway G and Runway 11-29 is 75 feet wide to allow for large transport aircraft use. The remaining portions of the taxiway need only be 35 feet wide to serve ARC B-II aircraft. Relocating Taxiway C impacts a large drainage area and existing wetlands in the area between Taxiway A and Taxiway G. By-pass taxiways are located at the Runway 18 and Runway 36 ends.

This alternative implements declared distances to ensure the appropriate RSA standards are met during takeoff and landings since existing site constraints prevent the RSA from extending the standard distance beyond the physical ends of the runway. As shown on **Exhibit 4C**, the ASDA (departure length) for Runway 18 is 5,600 feet and the ASDA for Runway 36 is 5,650 feet. The LDA (landing length) for both runways is 5,150 feet.

When determining the ASDA, FAA guidelines require that the full RSA safety area be provided at the far end of the runway an aircraft is departing. The ASDA for Runway 18 is reduced by 500 feet, the distance necessary to locate the RSA behind the Runway 36 end. For Runway 36, the ASDA is reduced by 450 feet, the distance necessary to locate the RSA behind the Runway 18 end.

In this alternative, the LDA must provide at least 600 feet of RSA at the approach end of the runway, as well as at the roll-out end of the runway. The LDA for Runway 18 and Runway 36 is 5,150 feet. The Runway 18 LDA is reduced by 450 feet, the length necessary to provide for the RSA prior to the Runway 18 landing threshold plus an additional 500 feet, the length necessary to provide for the RSA at the roll-out end of the runway. For Runway 36, the LDA is reduced by 500 feet, the length necessary to provide for the RSA prior to the Runway 36 landing threshold plus 450 feet, the length necessary to provide for the RSA at the roll-out end of the runway.

While this alternative maintains the same Runway 18 departure point, the Runway 18 landing threshold is moved 450 feet south. Aircraft following a three-degree descent path to the runway would be approximately 22 feet higher on approach.

Two RPZs are required when implementing declared distances. The departure RPZ begins 200 feet behind the physical pavement end. The Runway 18 departure RPZ may contain at least two residential home sites. The Runway 36 departure RPZ encompasses one home site.

The approach RPZ is based upon the visibility minimums to the runway end. For Runway 18, the approach RPZ is based on one mile visibility minimums. This approach RPZ may include two residential home sites. The approach RPZ to Runway 36 is much larger as it is sized for a three-quarter mile visibility minimum approach. This RPZ contains approximately seven home sites. Residential home sites are considered by AC 150/5300-13 to be incompatible with the RPZ.

This alternative would require the relocation of an existing FAA antenna farm, located west of an extended runway centerline, near the airport's southwestern property line. A suitable relocation area is available southeast of the Runway 11-29/Runway 18-36 intersection.

Runway 18-36 Alternative C ARC C-II Three-Quarter Mile Visibility Minimum Precision Approach to Runway 36

Alternative C is shown on **Exhibit 4C**. This alternative utilizes Engineering Materials Arresting System (EMAS) behind both ends of Runway 18-36. As discussed previously, EMAS is comprised of high energy absorbing materials of selected strength which will reliably and predictably crush under the weight of an aircraft. According to FAA Order 5200.9, EMAS installation provides a level of safety that is generally equivalent to a full RSA. Therefore, where EMAS is installed, the full standard RSA is not required.

The length of the EMAS bed is established by the maximum takeoff weight of the largest aircraft to use the runway. For the type of aircraft using Runway 18-36, an EMAS bed 300 feet long and 150 feet wide is required. The EMAS bed must be located at least 75 feet from the takeoff position of the aircraft to reduce the degrading effects of jet blast and propeller wash on the EMAS surface. This requires a total of 375 feet beyond the end of the runway to accommodate the EMAS and equivalent RSA.

As shown on Alternative C, to accommodate EMAS behind the Runway 18 end, the Runway 18 end must be relocated approximately 300 feet south. A new entrance taxiway is constructed and the pavement behind the new runway end removed. The Runway 18 landing threshold is located 600 feet from the end of the EMAS structure as specified in FAA Order 5200.9.

In this alternative, the Runway 36 end is shifted 800 feet to the south to replace the pavement lost behind the Runway 18 end (which allowed for the EMAS installation) and to provide for additional runway length. The EMAS is installed behind the new Runway 36 end. This requires the mitigation of wetlands located south of Runway 36. The on-airport service road must also be relocated to clear the RSA and provide for the extension as shown on the exhibit.

This alternative increases both the ASDA (departure length) and LDA (landing length) available at the airport. In this alternative, the ASDA is 5,500 feet and the LDA is 5,300 feet.

This alternative shifts the Runway 18 departure and landing thresholds to the south. The Runway 18 departure threshold is relocated approximately 300 feet south. The landing threshold is moved approximately 500 feet south. Aircraft following a three-degree descent path to the runway would be approximately 25 feet higher on approach.

Similar to Alternative C, this alternative extends Taxiway C to the new Runway 36 end and relocates the taxiway centerline 300 feet from the Runway 18-36 centerline as required by AC 150/5300-13.

North of Taxiway G, the relocated taxiway impacts a portion of the on-airport interior service road and aircraft tiedown locations. To maintain wingtip clearance along the taxiway, approximately three tiedown locations would need to be removed and the on-airport interior access road relocated. Three feeder aircraft parking positions on the west side of the cargo apron might also need to be relocated to meet a clearance standard for the location of parked aircraft. The portion of this taxiway between Taxiway G and Runway 11-29 is 75 feet wide to allow for large transport aircraft use. The remaining portions of the taxiway need only be 35 feet wide to serve ARC B-II aircraft. Relocating Taxiway C impacts a large drainage area and existing wetlands in the area between Taxiway A and Taxiway G. By-pass taxiways are located at the Runway 18 and Runway 36 ends.

The Runway 18 departure RPZ may contain two residential home sites. The Runway 36 departure RPZ encompasses approximately one home site.

The approach RPZ is based upon the visibility minimums to the runway end. For Runway 18, the approach RPZ is based on one mile visibility minimums. This approach RPZ may encompass two residential home sites. The approach RPZ to Runway 36 is much larger as it is sized for a three-quarter mile visibility minimum approach. This RPZ contains approximately 12 home sites. Residential home sites are considered by AC 150/5300-13 to be incompatible with the RPZ.

Similar to Alternative B, this alternative would require the relocation of an existing FAA antenna farm, located west of an extended runway centerline, near the airport's southwestern property line. A suitable relocation area is available southeast of the Runway 11-29/Runway 18-36 intersection.

Summary

Table 4C summarizes estimated development costs for the Runway 18-36 alternatives. While the base alternative (Alternative A) improves the RSA behind both the Runway 18 and Runway 36 ends, this alternative does not meet some of the other planning requirements identified in this analysis. This alternative does not provide for a wider or longer RSA, nor does it increase runway length or improve the instrument approach capability to the Runway 36 end. Alternative B provides for a longer and wider RSA and also meets the other program requirements identified above, which include increased takeoff distance, realignment of Taxiway C, and improved instrument approach capability to Runway 36. While Alternative C meets the same program requirements, it costs more than two times as much as Alternative B. Alternative B is the preferred alternative. It provides a longer and wider RSA for Runway 18-36, increases pavement length, and improves instrument approach capability to Runway 36, while at the same time costing less than half of Alternative C.

TABLE 4C **Summary of Salient Features and Construction Costs** **Runway 18-36**		Structures In RPZ				
Alternative	**ARC**	**18 App.**	**18 Dep.**	**36 App.**	**36 Dep.**	**Est. Costs**
Alternative A Runway 18 ASDA – 5,001' Runway 18 LDA - 5,001' Runway 36 ASDA - 5,001' Runway 36 LDA - 5,001'	B-II	±2	N/A	0	N/A	$3,450,000
Alternative B Runway 18 ASDA – 5,600' Runway 18 LDA - 5,150' Runway 36 ASDA – 5,650' Runway 36 LDA - 5,150'	B-III	±2	±2	±7	1	$7,850,000
Alternative C Runway 18 ASDA – 5,500' Runway 18 LDA - 5,300' Runway 36 ASDA - 5,500' Runway 36 LDA - 5,300'	C-II	±5	±4	±12	1	$17,400,000

Source: Dufresne-Henry

Notes: Wetland mitigation costs are included in cost estimates. No land acquisition or obstruction removal costs are included in these estimates.

PASSENGER TERMINAL BUILDING ALTERNATIVES

Planning for the functional elements of the passenger terminal building has concluded following a nine-month process. A number of concepts for accommodating growth within the 20-year and 50 year-planning horizons were evaluated. A primary conclusion of the terminal planning process was that the existing terminal has capacity and circulation deficiencies that need to be addressed and can not be resolved without expanding the facility. **Table 4D** summarizes the issues and needs evaluated during the terminal planning process.

Exhibit 4D depicts three terminal configuration options considered to meet forecast passenger demand over the 20-year planning horizon of this Master Plan. Each of these alternatives expands the departure concourse to the west to add additional contact gates. The existing gates are reserved for regional jet aircraft which have lower tail heights to conform to 14 Code of Federal Regulations (CFR) Part 77 transitional surface height requirements. The new contact gates to the east are moved further north from Runway 11-29 to provide for appropriate transitional surface clearance for the taller tail heights of larger aircraft such as the Boeing 737 and Airbus family of aircraft. Each of the alternatives introduces a new core structure west of the existing building. This new area would accommodate new ticketing and baggage make-up with

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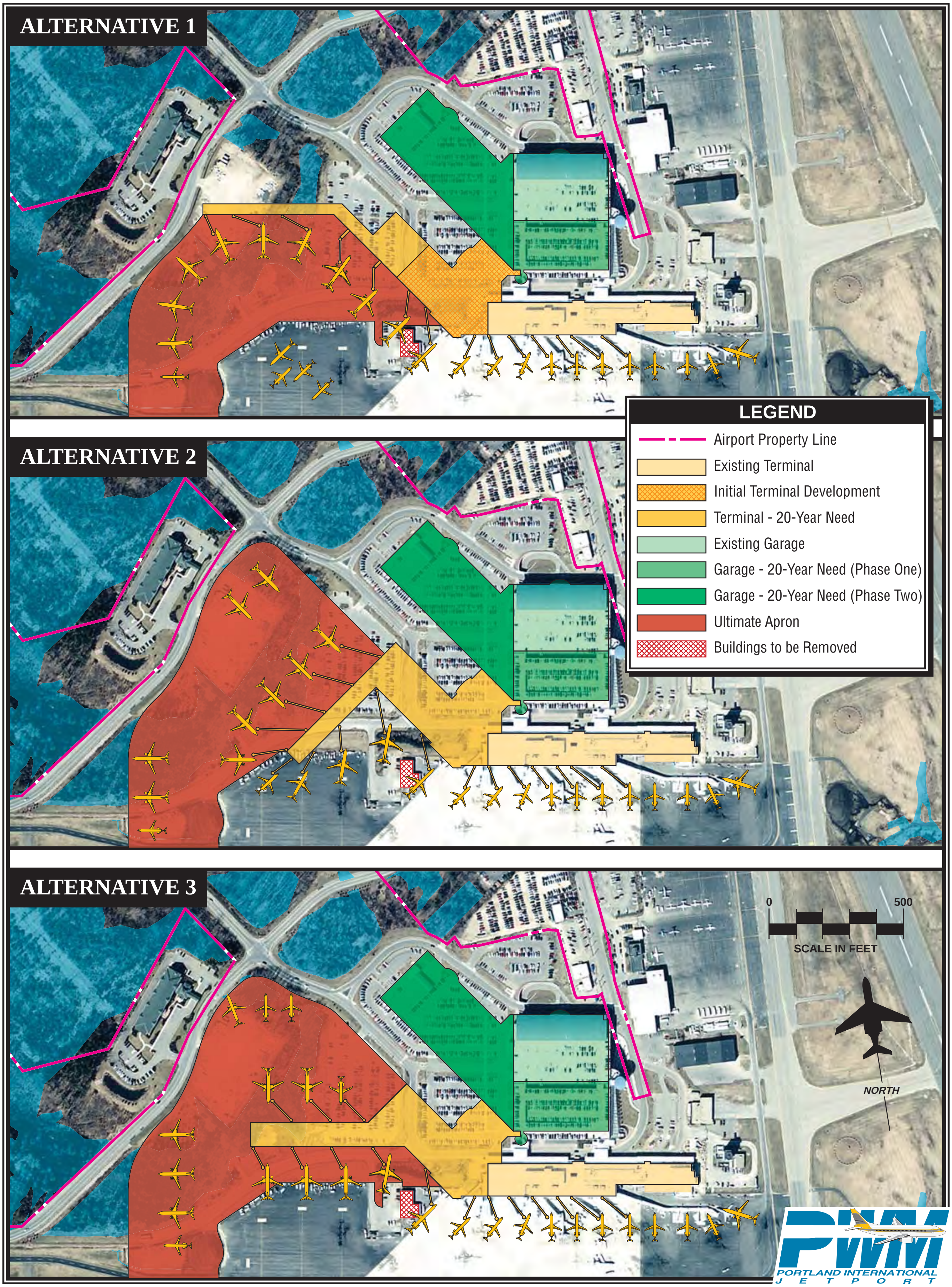

Exhibit 4D
20-YEAR HORIZON
TERMINAL ALTERNATIVES

in-line explosive detection devices. The second floor would provide expanded passenger screening points, holdroom, and concessions. Expansion of the parking garage is also identical in each alternative. The parking garage plan includes the removal of the old three-level parking garage and replacement with a new five-story structure similar to the parking structure built in 2003. The parking garage would be expanded to the northwest to meet forecast needs. Each of the alternatives requires the relocation of the existing airline belly freight building. This building would be relocated to the west, along Jetport Boulevard.

TABLE 4D
Terminal Planning Issues and Needs

Issue	Need
Accumulated Needs	
New Transportation Security Agency (TSA) requirements for baggage screening.	Modernize the baggage system in terms of handling and screening.
New TSA standards for passenger screening.	Increase screening stations and organize passenger queuing.
Conflicts in the movement of passengers	Improve vertical circulation in the terminal.
High levels of peak hour traffic.	Increase number of contact gates and aircraft parking positions.
Coexistence of passenger screening and meeters/greeters in a restricted area.	Separate passenger screening from meeters/greeters.
Low efficiency of first floor accessibility and wayfinding.	Improve circulation from access points to all terminal functions.
Congested apron with aircraft parking not conforming to FAA standards.	Extend apron, in part, further from the primary runway.
Growth Needs	
General increase in passenger volume in the U.S. and airlines' requirements for flexibility in the allocation of terminal space.	Increase the number of check-in options, baggage screening throughput, contact gates, and associated supporting infrastructure.
Increase in the size of regional jets, as manufacturers tend to produce larger cost-efficient aircraft.	Provide for a variety of gating options conforming to relevant regulations.
Architectural Identity Needs	
Jetport's profile as a competitive transportation facility in the 21st Century and emerging demands of air travelers for better service.	Invest in the identity and projected image of the Jetport to the public, especially of the terminal building. Convey confidence to travelers and enhance passenger experience.
Jetport's profile as a gate/portal to the City of Portland and to Maine.	Incorporate local character and imagery in an architectural aesthetic vision.
Terminal spatial organization from the passenger's perspective.	Establish high standards in orientation and wayfinding within the building.
Source: *Terminal Development Plan Final Report*, March 2006	

Terminal needs for a 50-year planning horizon were also examined. **Exhibit 4E** depicts how the 20-year alternatives would be expanded to meet the 50-year need. In each case, the holdroom and contact gates are expanded to the east. In Alternatives 1 and 3, the hotel would need to be removed

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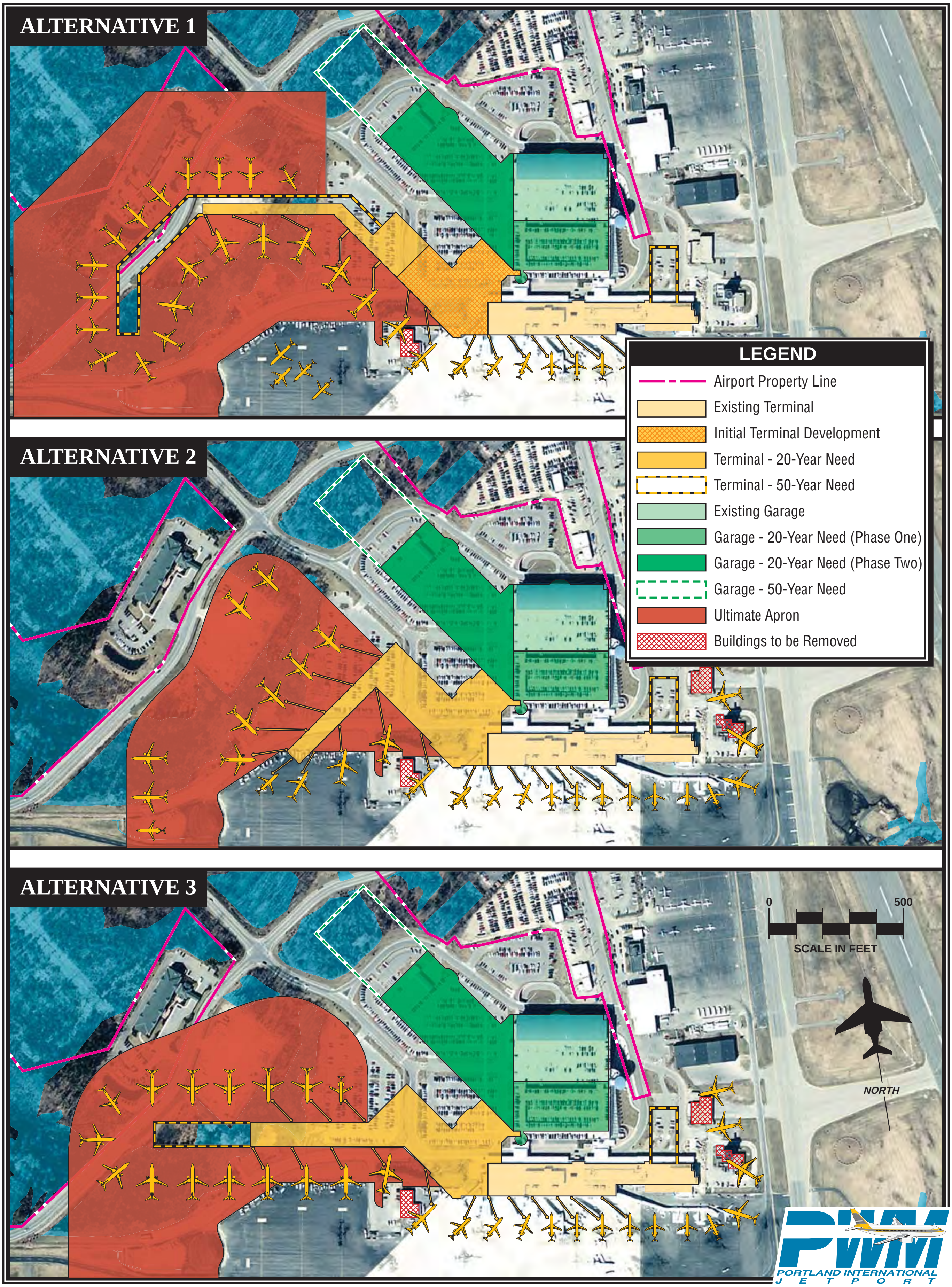

Exhibit 4E
50-YEAR HORIZON
TERMINAL ALTERNATIVES

and Jetport Boulevard relocated. Alternative 2 would not impact the Jetport Boulevard or the hotel. In each alternative, additional contact gates and holdroom would be required on the east side of the terminal. This would require relocation of the Airport Traffic Control Tower (ATCT) and Airport Rescue and Firefighting (ARFF) facility.

The terminal planning process concluded that the configuration of Alternative 2 proved difficult for future expansion potential. Alternatives 2 and 3 also required additional apron when compared to Alternative 1.

Alternative 1 is the recommended alternative. This ultimate terminal plan includes provisions for international arrivals and departures including Federal Inspection Services (U.S. Customs and Border Patrol).

Alternative 1, shown on **Exhibit 4D** and **Exhibit 4E,** also depicts the recommended initial terminal development. This initial development focuses on the terminal check-in, baggage make-up, and passenger screening improvements. An additional four contact gate positions are also created by this development.

Terminal Curb, Automobile Parking, And Vehicle Circulation Alternatives

Exhibit 4F examines terminal curb, automobile parking, and vehicle circulation through the terminal area. Alternatives A and B assume the preferred 20-year terminal concept discussed above, including the parking structure needs. Alternative C examines the 50-year need.

Terminal curb options are the same for each alternative. The terminal curb is the interface between ground vehicle loading and unloading, and arriving and departing passengers. Analysis in Chapter Three concluded there are deficiencies in the length of the terminal curb and its ability to efficiently accommodate peak demand levels. In each of the alternatives, the length of the terminal curb increases as the building is expanded to the west/northwest. The new parking garages are constructed so as to allow for up to six vehicle lanes in front of the terminal. This would include a staging lane along the actual curb and two lanes closest to the terminal. A segregated median curb would be constructed outside these through-lanes for additional passenger loading and unloading. This median curb would be served by an additional two through-lanes. The vehicle circulation pattern, which is one-way from east to west, would continue. Two-way traffic begins north of the parking garage.

Alternative A would maintain the existing circulation roads and patterns around the parking structure. Surface terminal parking (which could be used for terminal employees) would be created on the northeast side of the expanded departure concourse in the vacant area southwest of the Jetport Boulevard/International Parkway intersection. Additional surface remote parking would be developed south of Jetport Boulevard/east of International Parkway. This alternative pro-

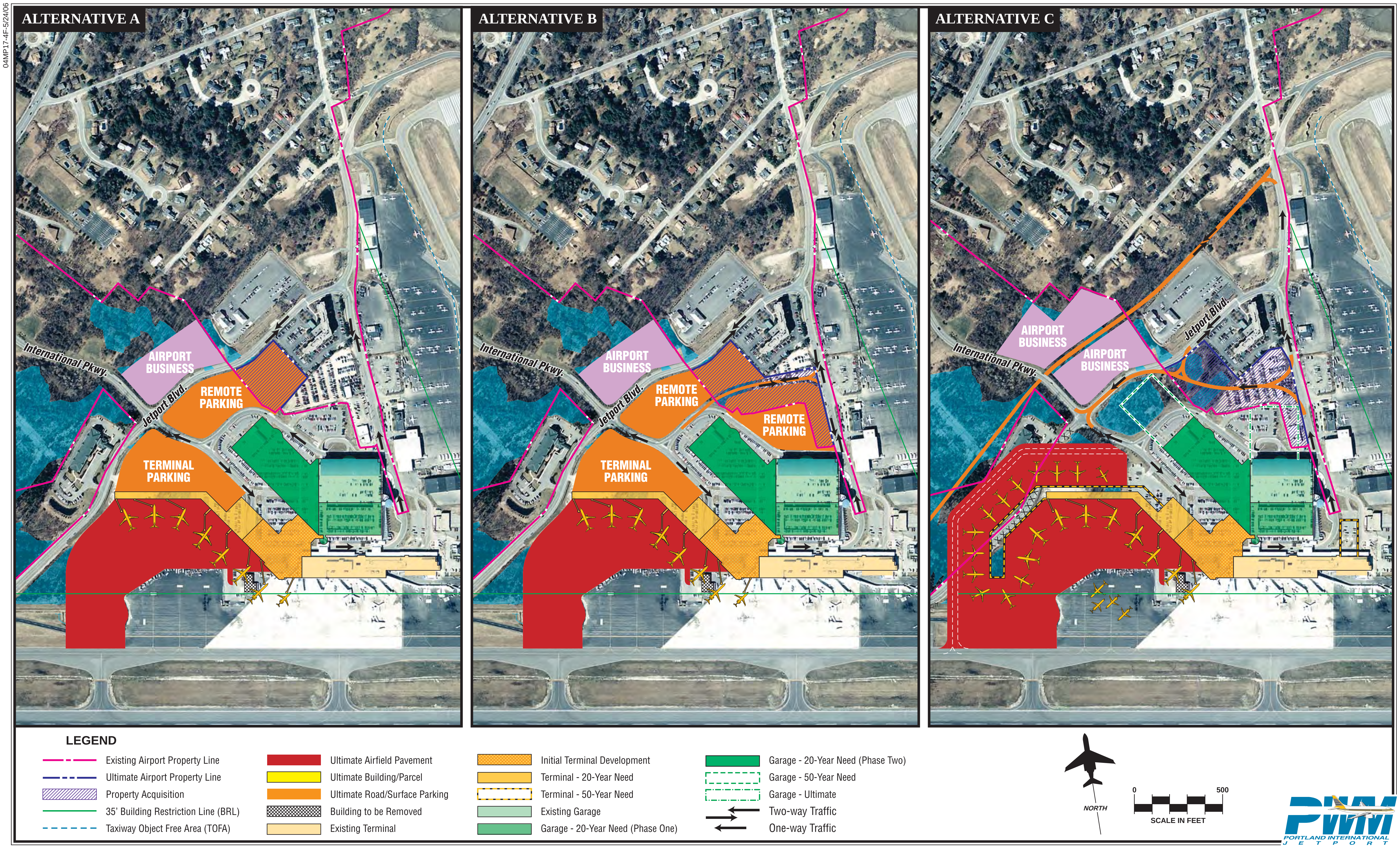

Exhibit 4F
TERMINAL LOOP ALTERNATIVES

poses acquisition of approximately 11 acres of land to accommodate remote parking north of the circulation loop. The area northeast of the Jetport Boulevard/International Parkway intersection is reserved for airport business development. This could include a wide variety of uses supporting terminal services including, but not limited to: rental car storage and maintenance, hotel/motel, office. A disadvantage of this alternative is that the remote parking and terminal parking lot are outside the terminal circulation loop. This requires additional ticketing and payment booths or some type of automated collection system for parking fees.

Alternative B retains the same terminal parking and remote parking proposed by Alternative A. In order to locate more remote surface parking within the terminal loop system, Alternative B proposes the expansion of the loop. This change would involve creating a new roadway north of the parking garage. This alternative proposes the acquisition of approximately 16 acres of land for surface parking. Similar to Alternative A, the area northeast of the Jetport Boulevard/International Parkway intersection is reserved for airport business development.

Alternative C examines terminal roadway, parking, and vehicle circulation needs assuming the 50-year configuration of the terminal building. The 50-year terminal configuration requires the relocation of Jetport Boulevard. In this alternative, the Jetport Boulevard/International Parkway intersection is moved to the north. Jetport Boulevard is extended along the northern edge of an existing rental car facility to intersect with Yellowbird Road. Areas for airport business development are reserved along the new Jetport Boulevard alignment. Portions of the existing Jetport Boulevard, east of the Jetport Boulevard/International Parkway intersection, are retained in this alternative. To provide for parking garage expansion, the terminal recirculation road is routed to the north. The existing Jetport Boulevard/International Parkway intersection becomes the new recirculation point back to the terminal. East of this intersection, two-way traffic would be maintained to provide access to the rental car facility and hotel. In this alternative, all automobile parking is contained within the parking structure. This alternative proposes the acquisition of approximately 15 acres of land.

AIR CARGO ALTERNATIVES

All air cargo facilities at the Jetport are located east of Runway 18-36, along Taxiway H. Two separate air cargo sort buildings and apron are located in this area. The facility needs evaluation indicated that an additional 8,400 square yards of apron, 20,000 square feet of building sort space, and 6,200 square yards of truck staging/automobile parking space may be needed in the future to accommodate projected air cargo demand.

Facility planning also includes taxiway access to the Runway 29 end from Taxiway H. This would reduce the number of runway crossings and the potential for runway incursions. Presently, aircraft needing to access the Runway 29 end from Taxiway H must cross Runway 18-36 to Taxiway C, then cross Runway 18-36 again on Taxiway A. A taxiway extending between Taxiway A and Taxiway H would eliminate the need to cross any runways to access the Runway 29 end. Accessing the Runway 11 end would only require one runway crossing. This taxiway would also reduce controller workload.

Segregated public vehicle access to the south side of Taxiway H should also be considered. Presently, public vehicle access only extends to the general aviation facility on the south side of Taxiway H. Air cargo users on the southern side of Taxiway C must now cross the apron area to access their facility. The planning process should include segregating public vehicles and aircraft operational areas.

Air Cargo Alternative A is shown on **Exhibit 4G**. In this alternative, Yellowbird Road is relocated to allow for a new cargo sort building and apron area to be developed on the north side of Taxiway H. This alternative assumes that the existing feeder aircraft parking, located on the west side of the apron, would need to be relocated to meet clearance standards for ARC B-III and ARC C-II runway centerline–to-aircraft parking apron clearance requirements discussed earlier in this chapter. The relocation of Yellowbird Road also allows for expanded automobile parking and truck staging adjacent to the cargo sort buildings. In this alternative, all general aviation facilities are relocated either to the north general aviation apron or the south general aviation area planned along the Runway 36 end. Vehicle access to the south side of the apron utilizes the same public access road that currently provides access to a general aviation facility located south of Taxiway H. A consideration with this roadway alignment is that the airport maintenance building is segregated from the interior airport access road. This alignment would require airport maintenance personnel to move through two gates to access the airfield operational area. There is a potential for existing wetlands along the Yellowbird Road realignment. Wetlands mapping has not been completed for this portion of the airport.

Alternative A shows an expansion potential for the airport maintenance building. This expansion would occur on the south side of the building.

Air Cargo Alternative B incorporates the taxiway segment between Taxiway A and Taxiway H to facilitate aircraft movements to and from the Runway 29 end. In this alternative, the air cargo apron is expanded on the north side of Taxiway H to meet forecast demand and allow for the relocation of the feeder aircraft parking located on the west side of the apron. As discussed previously, these parking spaces may need to be relocated to meet clearance standards for ARC B-III and ARC C-II runway centerline-to-aircraft parking apron clearance requirements discussed earlier in this chapter. All existing general aviation facilities are relocated in this alternative. Additional truck staging and

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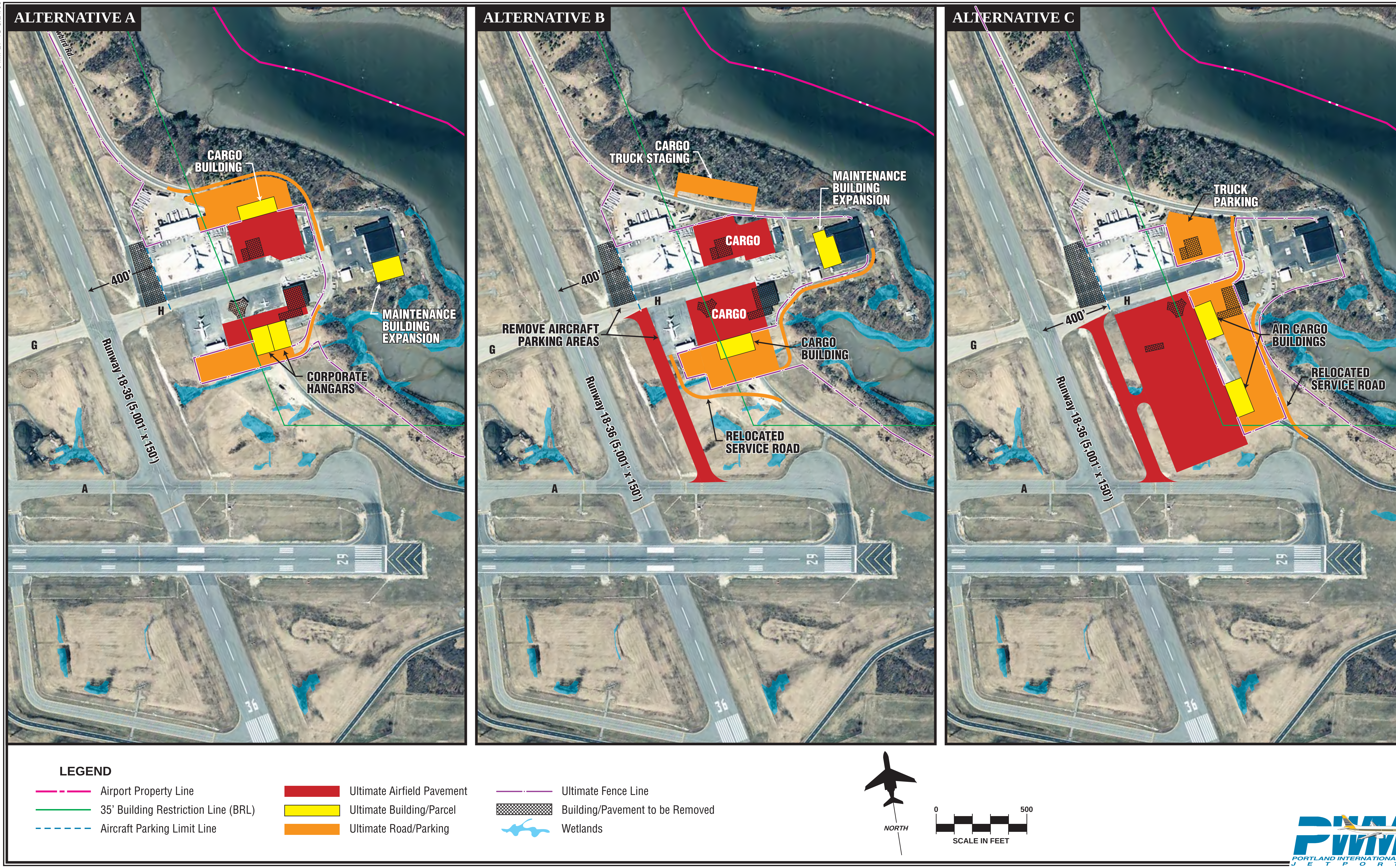

Exhibit 4G
AIR CARGO AREA ALTERNATIVES

automobile parking for the northern cargo sort building is located on the north side of Yellowbird Road. This alternative proposes a new cargo sort building and adjacent automobile parking and truck staging. The southern public access road would extend around the east side of the airport maintenance building. In contrast with Alternative A, this roadway alignment would allow for the airport maintenance building to be located contiguously with the airfield operational area.

Air Cargo Alternative C reconfigures the air cargo apron parallel to a new taxiway extending between Taxiway H and Taxiway A. This alternative requires the relocation of an existing cargo sort building, located on the south side of Taxiway A. Additional truck staging and automobile parking for the northern cargo sort building is created south of Yellowbird Road, and by relocating an existing general aviation facility. The general aviation facilities on the south side of Taxiway H are also relocated. Access to the air cargo apron is via a dedicated road connecting with Yellowbird Road. The interior airport service road is relocated to provide contiguous access to the airport maintenance facility.

All three alternatives impact existing drainage patterns and wetlands located south of Taxiway H.

GENERAL AVIATION ALTERNATIVES

The primary landside general aviation functions to be accommodated at Portland International Jetport include aircraft storage hangars, aircraft parking aprons, commercial general aviation hangars, and automobile parking and access. The interrelationship of these functions is important to defining a long-range landside layout for general aviation uses at the airport. Runway frontage should be reserved for those uses with a high level of airfield interface, or need of exposure. Other uses with lower levels of aircraft movements or little need for runway exposure can be planned in more isolated locations.

General aviation facilities at the Jetport are currently located in two separate areas. Most general aviation facilities are located west of Taxiway C, north of the ARFF building. Additional general aviation facilities are located east of Runway 18-36, along Taxiway H. Current facility planning includes new general aviation development south of Runway 11-29 near the existing Runway 36 end. The development alternatives to follow examine the north general aviation apron and the potential general aviation development south of Runway 11-29 to accommodate forecast demand. All general aviation facilities located east of Runway 18-36 are assumed to be ultimately relocated, either to the existing north general aviation apron or the potential south general aviation area.

GENERAL AVIATION ISSUES IDENTIFCATION

The following briefly describes potential general facility improvements.

Commercial General Aviation Activities

This essentially relates to providing areas for the development of facilities associated with aviation businesses that require airfield access. This includes businesses involved with (but not limited to) aircraft rental and flight training, aircraft charters, aircraft maintenance, line service, and aircraft fueling. These types of operators are commonly referred to as Fixed Base Operators (FBOs). High levels of activity characterize businesses such as these, with a need for apron space for the storage and circulation of aircraft. These facilities are best placed along ample apron frontage with good visibility from the runway system for transient aircraft. The facilities commonly associated with businesses such as these include large conventional type hangars that hold several aircraft. Utility services are needed for these types of facilities, as well as automobile parking areas.

Planning for commercial general aviation activities is important for this Master Plan. The mix of aircraft using Portland International Jetport has changed recently to include some business class aircraft which have larger wingspans than the mix of aircraft using the airport in the past. These larger aircraft, which have wingspans approaching 100 feet, require greater separation distance between facilities, larger apron areas for parking and circulation, and larger hangar facilities.

The existing north general aviation area is limited in its ability to accommodate these aircraft. The FBO facilities near the terminal building are restricted by the location of Westbrook Street, the location of the passenger airline terminal building, and Taxiway C. Height restrictions, which protect the approach paths to Runway 18-36, also limit how close general aviation facilities may be located to Runway 18-36.

Small Aircraft Storage Hangars

The Aviation Facility Requirements analysis indicated a need for the development of small general aviation aircraft storage hangars. This primarily involves additional T-hangars but may also include some clearspan hangars for accommodating several aircraft simultaneously. Since storage hangars often have lower levels of activity, these types of facilities should be located away from the primary apron areas which should be reserved for commercial general aviation activity and can be located in more remote locations of the airport. Since most of the aircraft owners want to access their aircraft directly and park their vehicle in their hangars when they are gone, these facilities do not have a requirement for large parking areas. Limited utility services are needed for these areas. Typically, this involves water, sanitary sewer, and electricity.

Corporate Hangar Areas

This includes areas for large hangar development. Typically, these types of hangars are used by corporations with company-owned aircraft. Since large business jets utilize these areas, the minimum parcel size must be at least one acre, and up to two-acre parcels are commonly requested. Corporate hangar areas require all utilities and segregated roadway access.

Transient Helicopters

A helipad and helicopter parking area should be considered. There is currently no designated helipad, and helicopters must use apron areas typically designed for use by fixed-wing aircraft. Fixed-wing aircraft and rotary aircraft should be segregated to the extent practical.

Public Access

Public vehicle access and parking at the airport is a primary concern in the planning process. The lack of available automobile parking is a concern for many general aviation areas on the airport. Increasing automobile parking areas will be a goal of the planning process.

NORTH GENERAL AVIATION ALTERNATIVES

Potential development along the north general aviation apron is shown on **Exhibit 4H**. Alternative A proposes to remove the old airline terminal building not presently in use to allow for the development of two additional commercial FBO hangars. Automobile parking would be created in the area between Westbrook Street and the hangars. Small aircraft T-hangars are proposed along the apron and would replace existing outside tiedowns. A new conventional storage hangar is planned near the north end of the apron.

This alternative also incorporates a potential 20-foot expansion of the ARFF building to the east. This will allow for the building to more easily accommodate the new ARFF vehicles which now extend the full width of the building leaving little room for movement around the vehicles. The ARFF building can remain in this location for the foreseeable future.

Alternative B proposes only a single FBO hangar be developed in the location currently occupied by the old airline terminal building. This alternative proposes 20 small aircraft T-hangars north of the new FBO hangar. Five small aircraft clearspan hangars are proposed along the west side of the apron. While this alternative provides more small aircraft hangar space, the T-hangar configuration does take away existing automobile parking areas for the FBO hangars. Automobile parking in this area is presently congested with many vehicles parking along Westbrook Street.

SOUTH GENERAL AVIATION ALTERNATIVES

Potential development alternatives for the south general aviation area is shown on **Exhibit 4J**. Alternative A depicts the currently planned general aviation development in this area. The city has obtained site plan approval for

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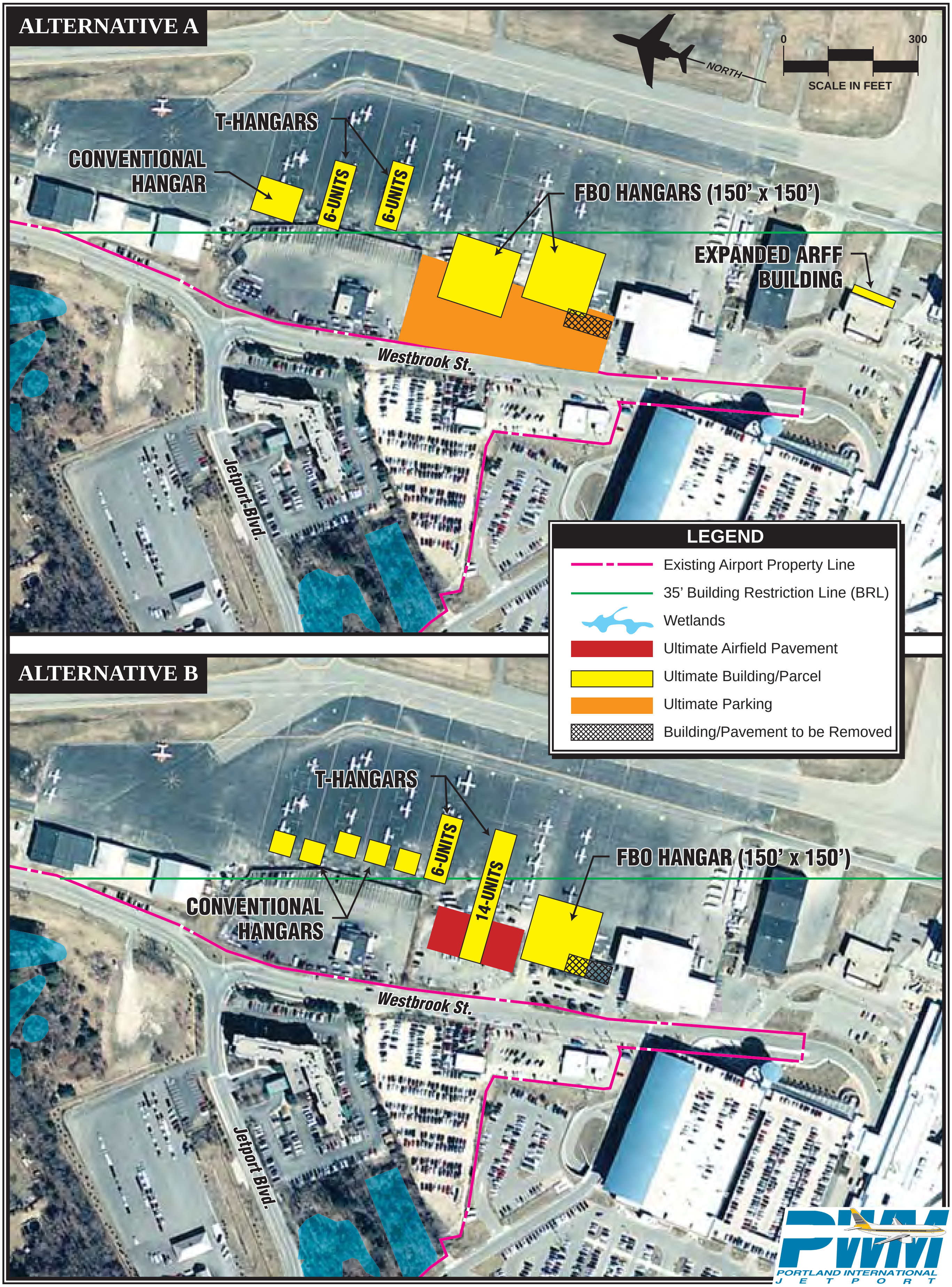

Exhibit 4H
NORTH GENERAL AVIATION ALTERNATIVES

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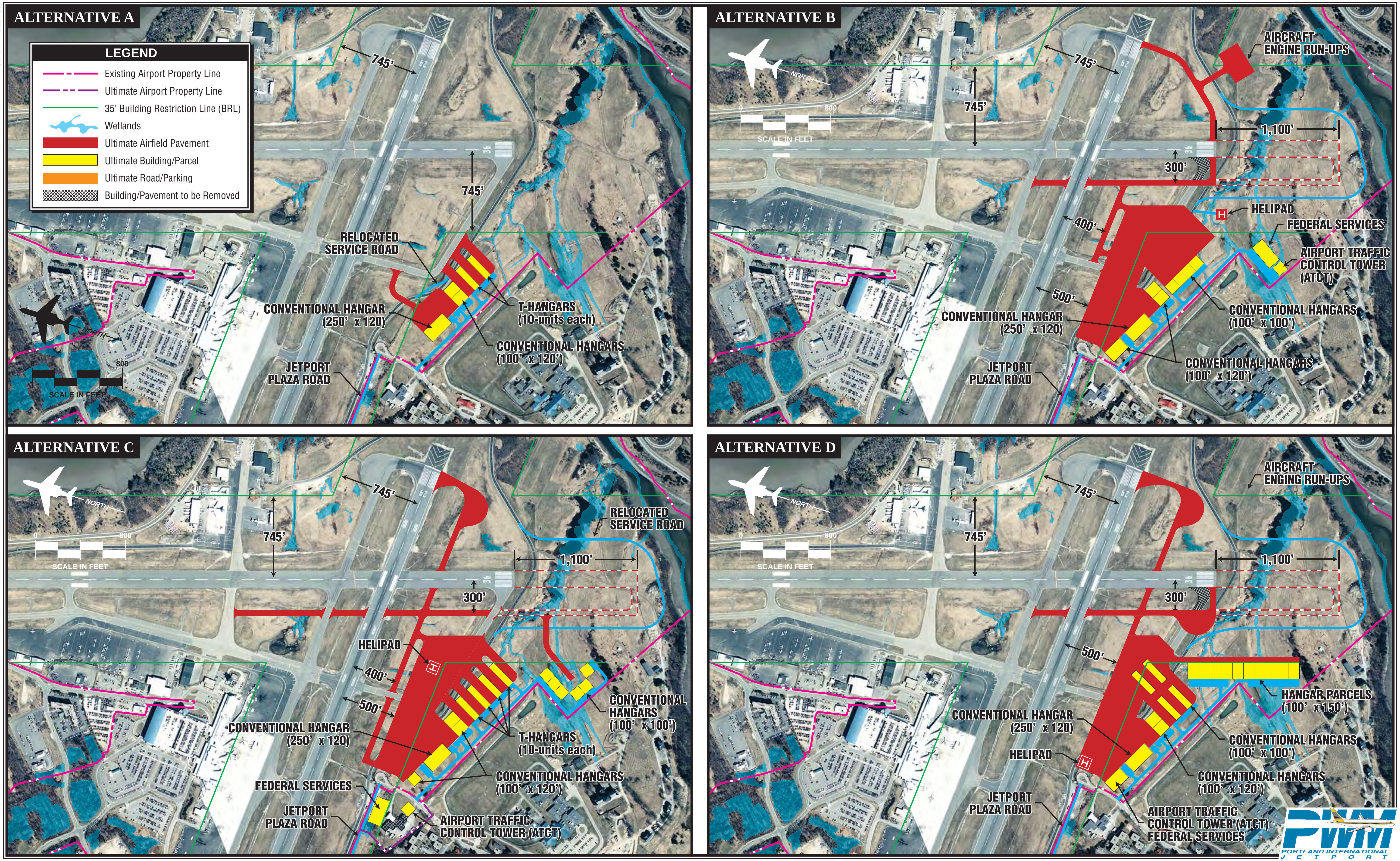

Exhibit 4J
SOUTH GENERAL AVIATION ALTERNATIVES

this development. The proposed development includes three large conventional hangars to support business class aircraft and/or FBO activities and two 10-unit T-hangars for small aircraft storage. Vehicle access is from a connection with Westbrook Street. This exhibit also depicts the location of the planned Jetport Plaza Road, which will extend along the southern airport boundary.

Alternative B builds upon Alternative A and focuses on providing larger business class aircraft storage instead of the small aircraft T-hangar storage. In this alternative, small aircraft storage is assumed to be accommodated on the north general aviation apron. Alternative B proposes two additional conventional hangars near Westbrook Street. The apron is expanded to the north and east for additional aircraft parking and circulation. The apron to the east would support up to six conventional hangars. A helipad is developed off the apron area near the relocated Taxiway C.

Access to the Runway 29 end would be via a taxiway extending between the Runway 36 and Runway 29 ends. A small apron area along this taxiway could serve as an engine maintenance run-up area.

The Airport Traffic Control Tower (ATCT) is relocated to the airport's southern boundary in this alternative. This location provides the ATCT with a segregated location that orients the tower with a line-of-sight of all potential aircraft movement areas.

A number of federal services are located within existing general aviation areas on the airport. This includes the FAA Flight Standards District Office (FSDO), U.S. Customs Service, and FAA Airway Facilities management offices. Alternative B proposes to consolidate all these federal services near the ATCT. Some of the federal offices would be affected by the relocation of the general aviation facilities located along Taxiway H for air cargo development.

Alternative C assumes nearly the same apron area as Alternative B. However, instead of the conventional hangars on the east end of the apron, this alternative focuses on small aircraft T-hangars. This alternative locates the helipad along the apron area for ease of access to the FBO hangars. The relocated ATCT and federal services building is located off existing airport property west of Westbrook Street. An area for conventional hangar development is proposed via a taxiway extending west from Taxiway C. This taxiway access to a certain extent would be dependent upon an extension of Runway 36 to the south as shown with the red/white dashed lines.

The helipad in Alternative D is located on the west end of the apron for ease of access to the FBO hangar. The ATCT and consolidated federal services building is located on the west end of the apron near Westbrook Street. This alternative provides for up to 40 small aircraft T-hangars on the east side of the apron and up to 11 business class aircraft hangar parcels on a taxiway extending to the south from the apron area.

SUMMARY

The process utilized in assessing airside and landside development alternatives involved a detailed analysis of short- and long-term requirements, as well as future growth potential. Current airport design standards were considered at each stage of development.

These alternatives present an ultimate configuration of the airport that would need to be able to be developed over a long period of time. The next phase of the Master Plan will define a reasonable phasing program to implement a preferred master plan development concept over time.

Upon review of this chapter by the city, the public, and the PAC, a final Master Plan concept can be formed. The resultant plan will represent an airside facility that fulfills safety and design standards, and a landside complex that can be developed as demand dictates.

The preferred master plan development concept for the airport must represent a means by which the airport can grow in a balanced manner, both on the airside as well as the landside, to accommodate forecast demand. In addition, it must provide for flexibility in the plan to meet activity growth beyond the 20-year planning period.

The remaining chapters will be dedicated to refining these basic alternatives into a final development concept with recommendations to ensure proper implementation and timing for a demand-based program.

Chapter Five

AIRPORT PLANS

Airport Plans

The planning process for the Portland International Jetport Master Plan has included several analytic efforts in the previous chapters intended to project potential aviation demand, establish airside and landside facility needs, and evaluate options for improving the airport to meet the identified airside and landside facility needs. The planning process, thus far, has included the presentation of four draft working papers (representing the first four chapters of the Master Plan) to the Planning Advisory Committee (PAC) and City of Portland. Two public information workshops have been held to share the results of the Master Plan with the general public. A plan for the use of Portland International Jetport has evolved considering the input received from the PAC, City of Portland, and public. The purpose of this chapter is to describe in narrative and graphic form the plan for the future use of Portland International Jetport.

MASTER PLAN CONCEPT

The Master Plan Concept includes improvements to the airfield, terminal area, air cargo, and general aviation facilities to meet current and forecast needs. The sections below more fully address these plans.

AIRFIELD CONCEPT

The Airfield Concept for Portland International Jetport focuses on meeting FAA design and safety standards, new taxiways for efficiency, and upgrading Runway 18-36 so that it can more fully serve as a back-up to Runway 11-29. **Exhibit 5A** graphically depicts the proposed airfield improvements. The following text summarizes the elements of the Airfield Concept.

Airfield Design Standards

The Federal Aviation Administration (FAA) has established design criteria to define the physical dimensions of runways and taxiways, and the imaginary surfaces surrounding them to protect the safe operation of aircraft at the airport. FAA design standards also define the separation criteria for the placement of landside facilities.

The FAA has established a coding system to relate airport design criteria to the operational and physical characteristics of aircraft expected to use the airport. According to FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, Change 10, this code, referred to as the airport reference code (ARC), has two components: the first component, depicted by a letter, is the aircraft approach category and relates to aircraft approach speed (operational characteristic); the second component, depicted by a Roman numeral, is the airplane design group (ADG) and relates to aircraft wingspan or tail height (physical characteristic), whichever is more restrictive.

An aircraft's approach category is based upon 1.3 times its stall speed in landing configuration at that aircraft's maximum certificated weight. The five approach categories used in airport planning are as follows:

Category A: Airspeed less than 91 knots.

Category B: Airspeed 91 knots or more, but less than 121 knots.

Category C: Airspeed 121 knots or more, but less than 141 knots.

Category D: Airspeed 141 knots or more, but less than 166 knots.

Category E: Airspeed greater than 166 knots.

The airplane design group (ADG) is based upon the aircraft's wingspan or tail height. The six ADGs used in airport planning are as follows:

Group I: Wingspan up to but not including 49 feet or tail heights up to but not including 20 feet.

Group II: Wingspan above 49 feet but not including 79 feet or tail heights above 20 but not including 30 feet.

Group III: Wingspan above 79 feet but not including 118 feet or tail heights above 30 but not including 45 feet.

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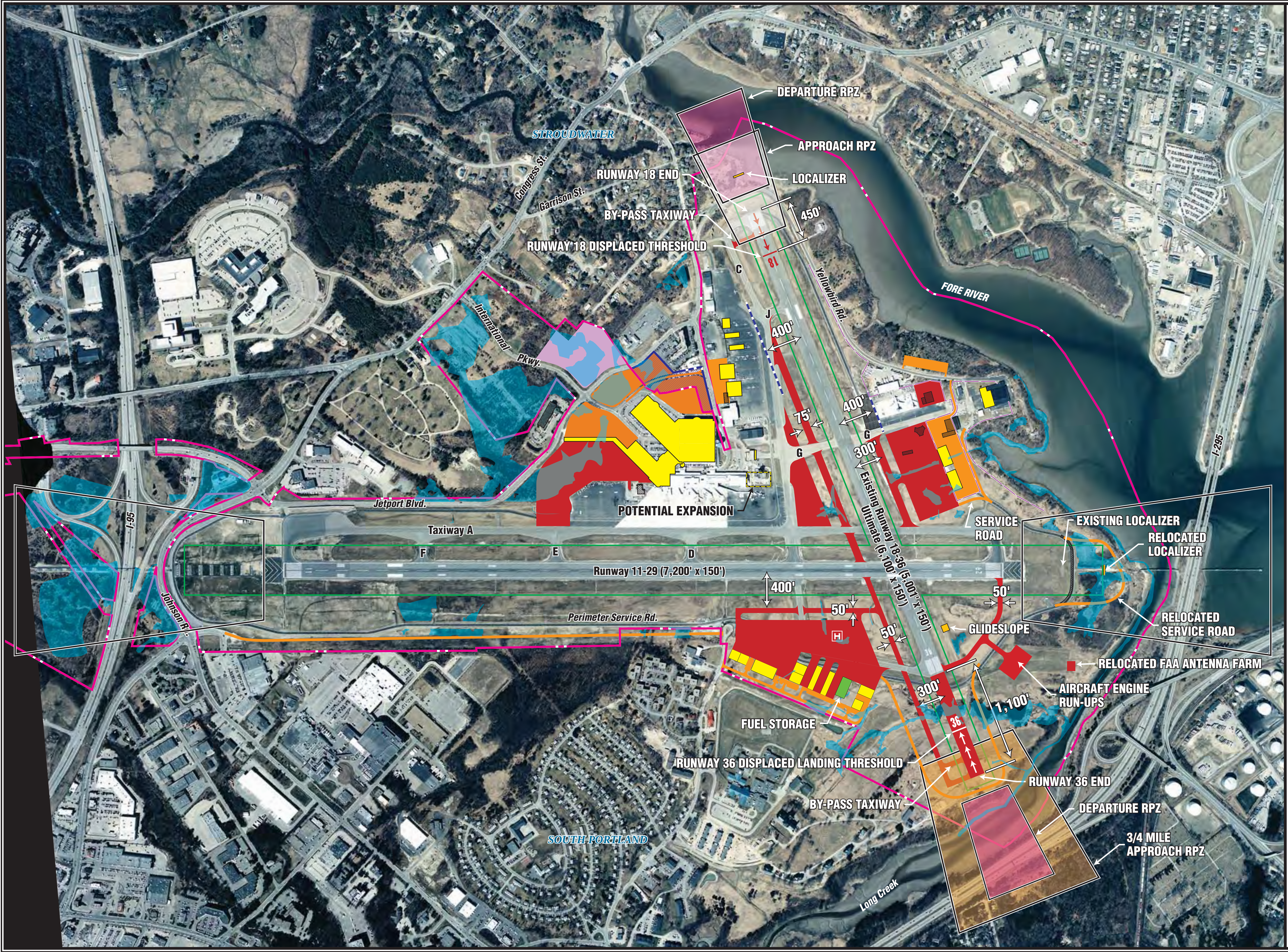

LEGEND

- Existing Airport Property Line
- Ultimate Airport Property Line
- Property Acquisition
- Ultimate Fence
- Aircraft Parking Limit Line
- Wetlands
- Runway Safety Area (RSA)
- Runway Protection Zone (RPZ)
- Ultimate Airfield Pavement
- Building/Pavement to be Removed
- Ultimate Road/Parking
- Ultimate Building
- Airport Business

DECLARED DISTANCES	RUNWAY 18	RUNWAY 36
ASDA	5,600'	5,650'
LDA	5,150'	5,150'

ASDA - Accelerate Stop Distance Available
LDA - Landing Distance Available

NORTH

0 1000 2000
SCALE IN FEET

PWM PORTLAND INTERNATIONAL JETPORT

Exhibit 5A
AIRFIELD CONCEPT

Group IV: Wingspan above 118 feet but not including 171 feet or tail heights above 45 but not including 60 feet.

Group V: Wingspan above 171 feet but not including 214 feet or tail heights above 60 but not including 66 feet.

Group VI: Wingspan above 214 feet but not including 262 feet or tail heights above 66 but not including 80 feet.

The critical design aircraft for Portland International Jetport is driven by the transport category aircraft used in the scheduled airline and air cargo service at the airport. Analysis in Chapter Three indicated that the Airbus A320 family of aircraft is the largest aircraft to be used regularly in scheduled airline service. The Airbus A320 family of aircraft has an approach speed of 138 knots, a wingspan of 111 feet, and a tail height of 39 feet, which falls within ARC C-III. The largest aircraft regularly used in air cargo service is the Airbus A300-600. The Airbus A300-600 has an approach speed of 135 knots, a wingspan of 147 feet, and a tail height of 55 feet, which falls within ARC C-IV.

For the Jetport, the critical design aircraft is currently represented by the Airbus A300-600 (ARC C-IV). This is the largest aircraft in terms of wingspan and tail height to regularly operate at the airport. It also shares the same approach speed with the critical design aircraft in the air carrier segment of activity and general aviation segment of activity. For planning purposes, an increase in Approach Category D operations is projected. Therefore, the critical ARC for long range facility planning is ARC D-IV.

Since Runway 11-29 serves as the primary runway, it is designed to be capable of accommodating all aircraft expected to regularly operate at the airport through the planning period. Considering this, Runway 11-29 is designed to the most demanding ARC D-IV design standards.

For Runway 18-36, a different design standard is considered since this runway can only serve a limited number of the aircraft that use the airport due to its existing length and approach capabilities. Analysis in Chapter Four concluded that Runway 18-36 can be designed and constructed to fully meet ARC B-III standards. Presently, Runway 18-36 is designed to ARC B-II standards.

Upgrading to ARC B-III standards would allow Runway 18-36 to more fully serve as a back-up to Runway 11-29. In this role, Runway 18-36 would accommodate operations by regional jet aircraft and turboprops providing scheduled air service, feeder aircraft for air cargo service, and most of the general aviation aircraft fleet using the airport when Runway 11-29 is not available for use during maintenance periods. As recently as 2004, Runway 18-36 accommodated operations by regional jet aircraft and turboprop aircraft when Runway 11-29 was closed for maintenance. This maintained the continuity of air service and prevented the full closure of the airport during the maintenance period.

Table 5A summarizes the ultimate airfield and facility design standards for Portland International Jetport. These standards were considered in the planned improvements of the existing airport site, to be discussed in greater detail later within this chapter.

TABLE 5A
Ultimate Airfield Dimensions

Design Standard	Runway 11-29	Ultimate Runway 18-36
Airport Reference Code	**D-IV**	**B-III**
RUNWAYS		
Runway Pavement Length	7,200	6,100
Runway Width	150	150
Runway Shoulder Width	25	20
Runway Safety Area		
Width	500	300
Length Beyond End	1,000	600
Runway Object Free Area		
Width	800	800
Length Beyond End	1,000	600
Runway Blast Pad		
Width	200	140
Length	200	200
Runway Centerline to:		
Holding Position	250	200
Parallel Taxiway	400	300
TAXIWAYS		
Taxiway Width	75	50
Taxiway Centerline to:		
Fixed or Movable Object	130	93
Parallel Taxilane	215	152
Taxilane Centerline to:		
Fixed or Movable Object	113	81
Parallel Taxilane	198	140

RUNWAY PROTECTION ZONES			
	Runway 11	Runway 18 (Approach)	Runway 18 (Departure)
Inner Width	1,000	500	500
Length	2,500	1,000	1,000
Outer Width	1,750	700	700
	Runway 29	Runway 36 (Approach)	Runway 36 (Departure)
Inner Width	1,000	1,000	500
Length	2,500	1,700	1,000
Outer Width	1,750	1,510	700

Source: FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, Change 10
Note: All dimensions are in feet

Runway 29
Runway Safety Area

The runway safety areas (RSA) behind the Runway 29 end does not fully comply with FAA design standards. The RSA is defined as a "surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot or excursion from the runway." According to the Airport Design AC, the RSA for Runway 11-29 extends 250 feet each side of the runway centerline and 1,000 feet beyond each runway end.

There are obstructions to the RSA behind the Runway 29 end. The localizer antenna used for the Runway 11 instrument landing system (ILS) approach is located approximately 610 feet from the end of pavement, within the limits of the RSA. The airport interior service road is located approximately 700 feet from the end of pavement, within the limits of the RSA. Beyond the service road, the RSA does not meet grade requirements or provide a surface condition that would support aircraft rescue and firefighting equipment, or the occasional passage of aircraft without causing structural damage to the aircraft due to the presence of wetlands.

The Airfield Concept includes clearing the objects within the Runway 29 RSA and grading and filling the RSA to standard. This follows Alternative B shown previously in Chapter Four and complies with the intent of FAA Order 5200.8, *Runway Safety Area*, which states that "the first alternative that must be considered in every case is constructing the traditional graded runway safety area surrounding the runway." As shown on **Exhibit 5A,** to implement this concept, the interior service road and localizer antenna will need to be relocated outside the limits of the RSA and the RSA will be graded and filled to standard. The grading and fill impacts approximately 4.0 acres of wetlands located behind the Runway 29 end.

Alternative B was preferred over Alternative A as Alternative B eliminates the differences in departure and landing length currently associated with the existing condition at the airport reflected in Alternative A. To meet RSA standards now (Alternative A), the departure and landing length on Runway 11 has been reduced by 400 feet to ensure that a full 1,000 feet of RSA is provided when an aircraft is landing or departing Runway 11. However, there are no similar restrictions on Runway 29 as the full RSA standard is met beyond the Runway 11 end. The 400-foot reduction for RSA limits the departure and landing length on Runway 11 to 6,800 feet, whereas the departure and landing distance on Runway 29 is 7,200 feet. Alternative C was dismissed due to the cost's initial high development cost and the ongoing maintenance costs for the Engineered Material Arresting System (EMAS). While Alternatives A and C did not impact the wetlands located behind the Runway 29 end, the United States Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), has recommended removal of these wetlands to reduce the potential for bird strikes. The FAA supported these RSA improvements as shown in the Runway Safety Area Determination, which can be found in Appendix D.

Runway 18-36

Several improvements are considered for Runway 18-36 to more effectively serve as a back-up to Runway 11-29 when it is closed for maintenance or other reasons. Runway 18-36 now serves a limited role in maintaining the continuity of air service when Runway 11-29 is closed as Runway 18-36 can accommodate the regional jet and turboprop aircraft that use the airport in scheduled airline and air cargo service. The improvements to Runway 18-36 include upgrading to ARC B-III design standards, a 1,100-foot extension to the south, wider and longer RSAs behind each end, and an instrument approach with vertical guidance to Runway 36. In August 2007, the FAA completed a Runway Safety Area Determination supporting the RSA improvements include in this discussion. The FAA determination can be found in Appendix B.

The improvements to Runway 36 are consistent with Alternative B shown in Chapter Four. As shown on **Exhibit 5A**, the entire extension will be placed behind the Runway 36 end as this is the only end of the runway with available area to accommodate an extension. Extending Runway 18-36 to the south impacts approximately 2.5 acres of wetlands and requires the realignment of the interior service road.

The RSA will be improved to clear all obstructions and meet ARC B-III standards which require the RSA extend 150 feet each side of the runway centerline, extend 600 feet beyond each runway end and 600 feet prior to the landing threshold. Presently, the RSA behind the Runway 18 end is obstructed by Yellowbird Road and does not meet minimum grade requirements. The RSA behind the Runway 36 end is obstructed by the interior service road. Beyond the service road, the RSA does not meet grade requirements or provide a surface condition that would support aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft due to the presence of wetlands.

Since existing site constraints prevent the RSA from extending the standard distance beyond the physical ends of the runway, declared distances are included in this concept to ensure the appropriate RSA standards are met during takeoffs and landings. Declared distances are defined as the amount of runway that is declared available for certain takeoff and landing operations. The four types of declared distances, as defined in FAA AC 150/530-13, *Airport Design*, are as follows:

Takeoff Run Available (TORA) – The runway length declared available and suitable for the ground run of an airplane taking off.

Takeoff Distance Available (TODA) – The TORA plus the length of any remaining runway and/or clearway beyond the far end of the TORA.

Accelerate-Stop Distance Available (ASDA) – The runway plus stopway length declared available for the acceleration and deceleration of an aircraft aborting a takeoff.

Landing Distance Available (LDA) – The runway length declared available and suitable for landing.

As shown on **Exhibit 5A**, the ASDA (departure length) for Runway 18 is 5,600 feet and the ASDA for Runway 36 is 5,650 feet. The LDA (landing length) for both runways is 5,150 feet.

When determining the ASDA, FAA guidelines require that the full RSA safety area be provided at the far end of the runway an aircraft is departing. The ASDA for Runway 18 is reduced by 500 feet, the distance necessary to locate the RSA behind the Runway 36 end. For Runway 36, the ASDA is reduced by 450 feet, the distance necessary to locate the RSA behind the Runway 18 end.

The LDA must provide at least 600 feet of RSA at the approach end of the runway, as well as at the roll-out end of the runway. The LDA for Runway 18 and Runway 36 is 5,150 feet. The Runway 18 LDA is reduced by 450 feet, the length necessary to provide for the RSA prior to the Runway 18 landing threshold plus an additional 500 feet, the length necessary to provide for the RSA at the roll-out end of the runway. For Runway 36, the LDA is reduced by 500 feet, the length necessary to provide for the RSA prior to the Runway 36 landing threshold plus 450 feet, the length necessary to provide for the RSA at the roll-out end of the runway.

An instrument approach to Runway 36 with visibility minimums as low as three-quarters-of-a-mile, providing both lateral and vertical navigation capabilities, is also considered. During low visibility and cloud ceiling situations, wind speeds above 10 knots are aligned with Runway 36 approximately 15 percent of the time; whereas wind speeds above 10 knots are aligned with Runway 18 approximately five percent of the time. In these stronger wind conditions, some pilots may desire to land directly into the wind to reduce the crosswind component. While an instrument approach is available to Runway 36 now, this approach is limited to conditions when visibility is greater than one mile.

This type of approach to Runway 36 will require a larger runway protection zone (RPZ). Departure RPZs are also required due to the displaced thresholds on each runway end. As shown on **Exhibit 5A**, the RPZ is a trapezoidal area at the end of the runway to protect people and property on the ground. The RPZ is two-dimensional and is required to be kept clear of structures and land uses that could cause the congregation of people and/or property on the ground. Portions of the approach and departure RPZs at each runway end will extend beyond the existing airport property line in this concept. The City of Portland will need to pursue land use control measures to protect these future RPZs from future incompatible development. Land control measures can include land use zoning, the acquisition of avigation easements, or fee simple acquisition of the limits of the RPZ.

Taxiways

The distance Taxiway C is located west of Runway 18-36 currently varies from as close as 304 feet to more than 1,100 feet near the Runway 36 end. The Airfield Concept includes relocating Taxiway C at a uniform and standard distance from the Runway 18-36 centerline and extending it to the new Runway 36 end. Taxiway C is ultimately located 300 feet from the Runway 18-36 centerline. This is consistent with FAA design standards for ARC B-III and a three-quarters-of-a-mile visibility minimum precision approach to Runway 36.

By-pass taxiways are also included in the Airfield Concept for each end of Runway 18-36. By-pass taxiways allow aircraft ready for departure to pass aircraft holding for clearance or still preparing for departure. This reduces departure delays. By-pass taxiways serve in the same capacity as holding aprons. Holding aprons are provided at the Runway 11 and Runway 29 ends for the same purpose. Sufficient area is not available for holding aprons at the Runway 18-36 ends.

A taxiway connecting the Runway 36 and Runway 18 ends is also included in the Airfield Concept. This taxiway will provide direct access to the Runway 29 end, primarily for aircraft located in the future southern general aviation area.

This taxiway could ultimately provide access to an aircraft engine run-up area. The run-up area would support on-the-ground engine runs that are sometimes required after maintenance. This area is suitable for maintenance run-ups as this is a remote part of the airport that is segregated from residential development. The run-up apron would also orient the aircraft emissions toward Highway 295 and the tank farm to the southeast of the airport.

TERMINAL AREA CONCEPT

The Terminal Area Concept includes improvements to the functional elements within the terminal building, additional automobile parking areas, changes to roadway circulation patterns, and provisions for airport business development along Jetport Boulevard.

The concept for the functional elements of the passenger terminal building was developed through a nine-month planning process specific to the terminal building. A primary conclusion of the terminal planning process was that the existing terminal building has capacity and circulation deficiencies that need to be addressed and cannot be resolved without expanding the facility.

The terminal building concept, shown on **Exhibit 5B**, extends the departure concourse to the west to add additional aircraft contact gates. The existing aircraft contact gates are reserved for regional jet aircraft which have lower tail heights to conform to Title 14 of Code of Federal Regulations (CFR) Part 77 transitional surface height requirements for Runway 11-29. The new contact gates to the east are moved further north from Runway 11-29 to provide for appropriate transitional surface clearance for the taller tail heights of larger aircraft such as the Boeing 737 and Airbus family of aircraft.

The terminal building concept includes a new core structure west of the existing building. This new area would accommodate new ticketing and baggage make-up with in-line explosive detection devices. The second floor would provide larger passenger screening points, secure holdroom, and concessions areas. This area is shown in hatch on **Exhibit 5B** and would represent the first phase of development. The terminal building concept allows for an easterly extension of the terminal concept in the event the airport traffic control tower (ATCT) is moved to the south.

To accommodate future public automobile parking needs and provide convenient access to the terminal, the parking garage is expanded to the northwest. The parking garage plan includes the removal of the existing three-level parking garage and replaces it with a new five-story structure similar to the parking structure built in 2003.

Additional surface parking is provided along Jetport Boulevard and to the northeast of the existing terminal circulation roadway as shown on **Exhibit 5B**. The terminal circulation roadway that currently extends around the northern side of the parking garage would be relocated to the north to allow a larger portion of the surface parking area to be included within the terminal loop system. This allows this surface parking area to be served by the same ticketing and payment booths used for the parking garage. The parking areas along Jetport Boulevard would require separate ticketing and payment booths. The acquisition of approximately six acres of land is needed to allow for the roadway relocation and surface parking construction.

The terminal building construction will require the removal of the existing airline belly freight building. Should this building be retained as a stand-alone structure, it could be relocated to the west, along Jetport Boulevard.

The area northeast of the Jetport Boulevard/International Parkway intersection is reserved for airport business development. This could include a wide variety of uses supporting terminal services including, but not limited

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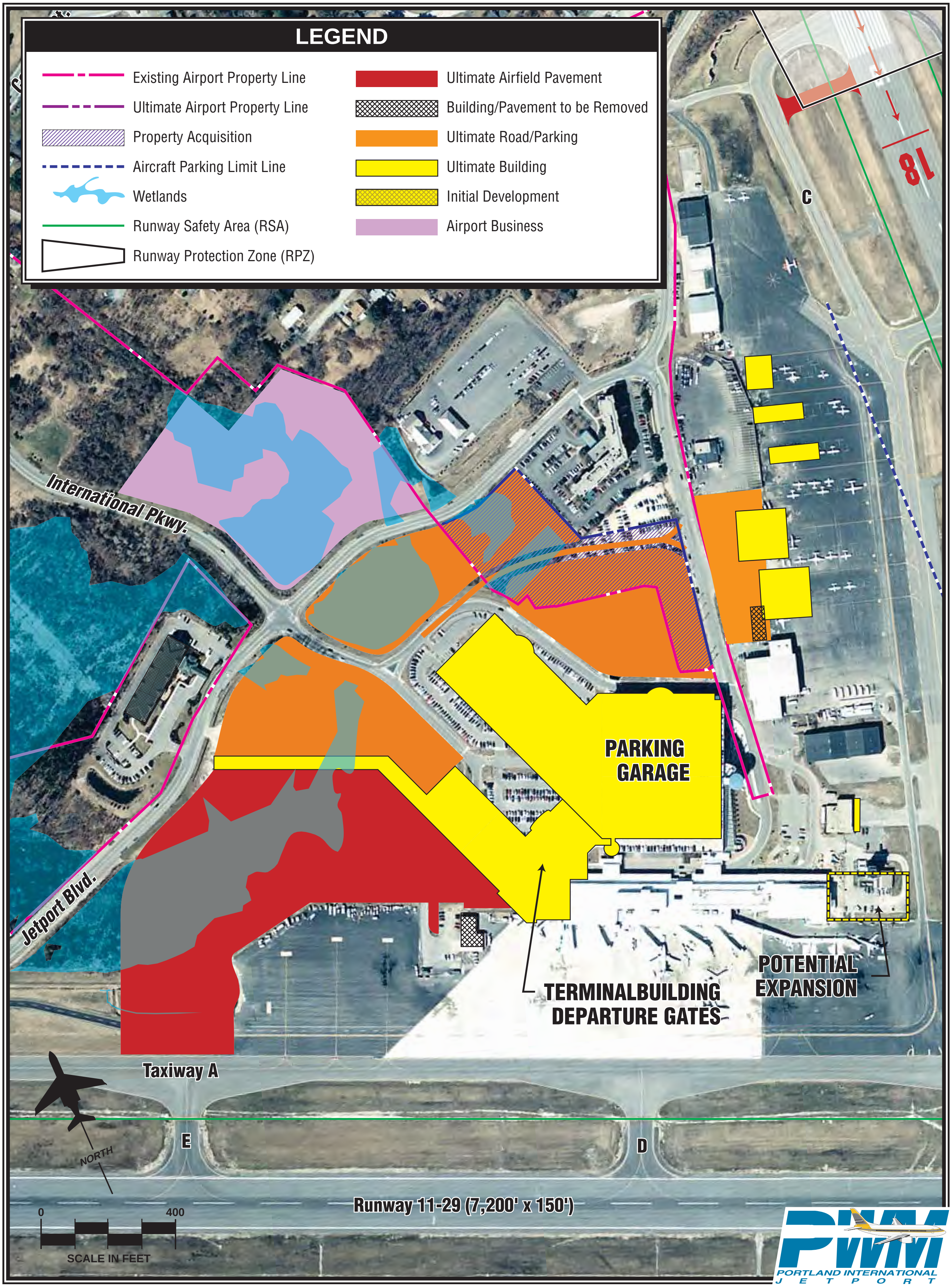

Exhibit 5B
TERMINAL BUILDING CONCEPT

to: rental car storage and maintenance, hotel/motel, and office.

AIR CARGO CONCEPT

The Air Cargo Concept is shown on **Exhibit 5C**. The Air Cargo Concept continues air cargo facility development east of Runway 18-36 along Taxiway H. This was the area established for air cargo development in the last master plan. Two air cargo carriers have subsequently developed facilities in this area following previous planning.

This Air Cargo Concept reconfigures the air cargo apron parallel to Runway 18-36 as shown in Alternative C in Chapter Four. Air cargo sort buildings, vehicle parking, and related truck courts would be developed on the east side of the apron. The configuration of this apron allows for a larger apron area and for easier circulation on the apron. Alternative A and Alternative B focused development on the north and south sides of Taxiway H, leaving only this single taxiway to serve circulation along the apron. The parallel apron configuration allows for additional circulation along the new taxiway extending between Taxiway H and Taxiway A.

The new taxiway between Taxiway H and Taxiway A is intended to reduce the number of runway crossings and the potential for runway incursions. Presently, aircraft needing to access the Runway 29 end from Taxiway H must cross Runway 18-36 to Taxiway C, then cross Runway 18-36 again on Taxiway A. A taxiway extending between Taxiway A and Taxiway H would eliminate the need to cross any runways to access the Runway 29 end. Accessing the Runway 11 end would only require one runway crossing. This taxiway would also reduce controller workload.

A goal of this concept is to develop this area exclusively for air cargo activity. The concept relocates all existing general aviation facilities from this area to other general aviation areas on the airport. This will segregate uses on the airport and allow air cargo development exclusively east of Runway 18-36.

This concept requires the demolition of an existing cargo sort building, located on the south side of Taxiway H. Additional truck staging and automobile parking for the northern cargo sort building is created along Yellowbird Road. Access to the air cargo apron is via a dedicated road connecting with Yellowbird Road. The interior airport service road is relocated to provide contiguous access to the airport maintenance facility. Expansion potential for the airport maintenance building is reserved on the west side of the building.

The upgrade of Runway 18-36 to ARC B-III standards will require the relocation of four existing aircraft tiedowns used by small feeder aircraft. These tiedowns are located north of Taxiway H. The apron is expanded to the east of the existing FedEx building to allow for the relocation of the feeder aircraft or to provide for larger aircraft

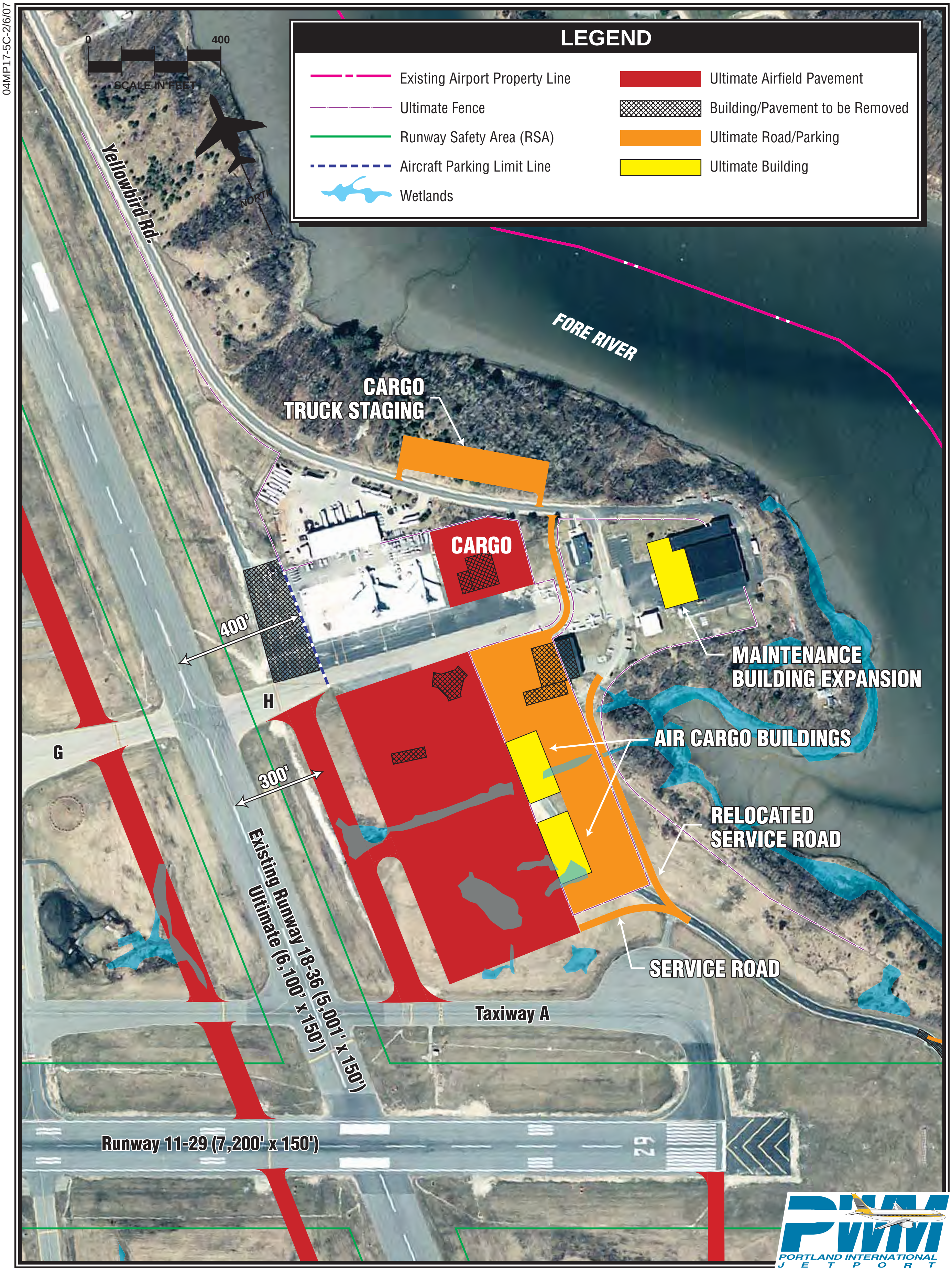

Exhibit 5C
AIR CARGO CONCEPT

parking should the feeder aircraft remain closer to the building.

GENERAL AVIATION CONCEPT

Future general aviation development is reserved in two separate areas on the airport. General aviation development is continued along Taxiway C, north of Taxiway G, and in a new area southwest of the Runway 11-29/Runway 18-36 intersection.

As shown on **Exhibit 5D**, this existing general aviation area can accommodate up to two additional fixed base operator (FBO) facilities along Westbrook Street with the removal of the old airline terminal building which is not presently in use. FBOs comprise businesses involved with (but not limited to) aircraft rental and flight training, aircraft charters, aircraft maintenance, line service, and aircraft fueling. To the north, existing tiedown areas are proposed for conversion to enclosed T-hangars. As depicted, these T-hangars could provide up to six units each. A conventional hangar for aircraft storage is located north of the T-hangars.

The potential 20-foot expansion of the airport rescue and firefighting (ARFF) building to the east is shown on **Exhibit 5D**. This expansion will allow for the building to more easily accommodate the new ARFF vehicles, which now extend the full width of the building, leaving little room for movement around the vehicles. The ARFF building can remain in this location for the foreseeable future.

The south general aviation area is also shown on **Exhibit 5D**. The south general aviation area includes two 10-unit T-hangars for small aircraft storage and five conventional hangars to support either business class aircraft storage or FBO activities. Vehicle access is from a connection with Westbrook Street and the planned Jetport Plaza Road, which extends along the southern airport boundary. An area for fuel storage is also planned.

This concept also provides for the relocation of the airport traffic control tower (ATCT) along the airport's southern boundary should this be required in the future. This location provides ATCT personnel with a segregated location that orients the tower with a line-of-sight of all potential aircraft movement areas. A number of federal services are located within existing general aviation areas on the airport. This includes the FAA Flight Standards District Office (FSDO), U.S. Customs Service, and FAA Airway Facilities management offices. Some of these offices will be relocated as a result of the air cargo development along Taxiway H. The south General Aviation Concept proposes to consolidate all these federal services near the ATCT and have apron access.

A helipad is located along the apron area for ease of access to the FBO hangars. The helipad is an operational area for the takeoff and departure of helicopters, which is segregated from the runway approach and departure paths used by the fixed-wing aircraft.

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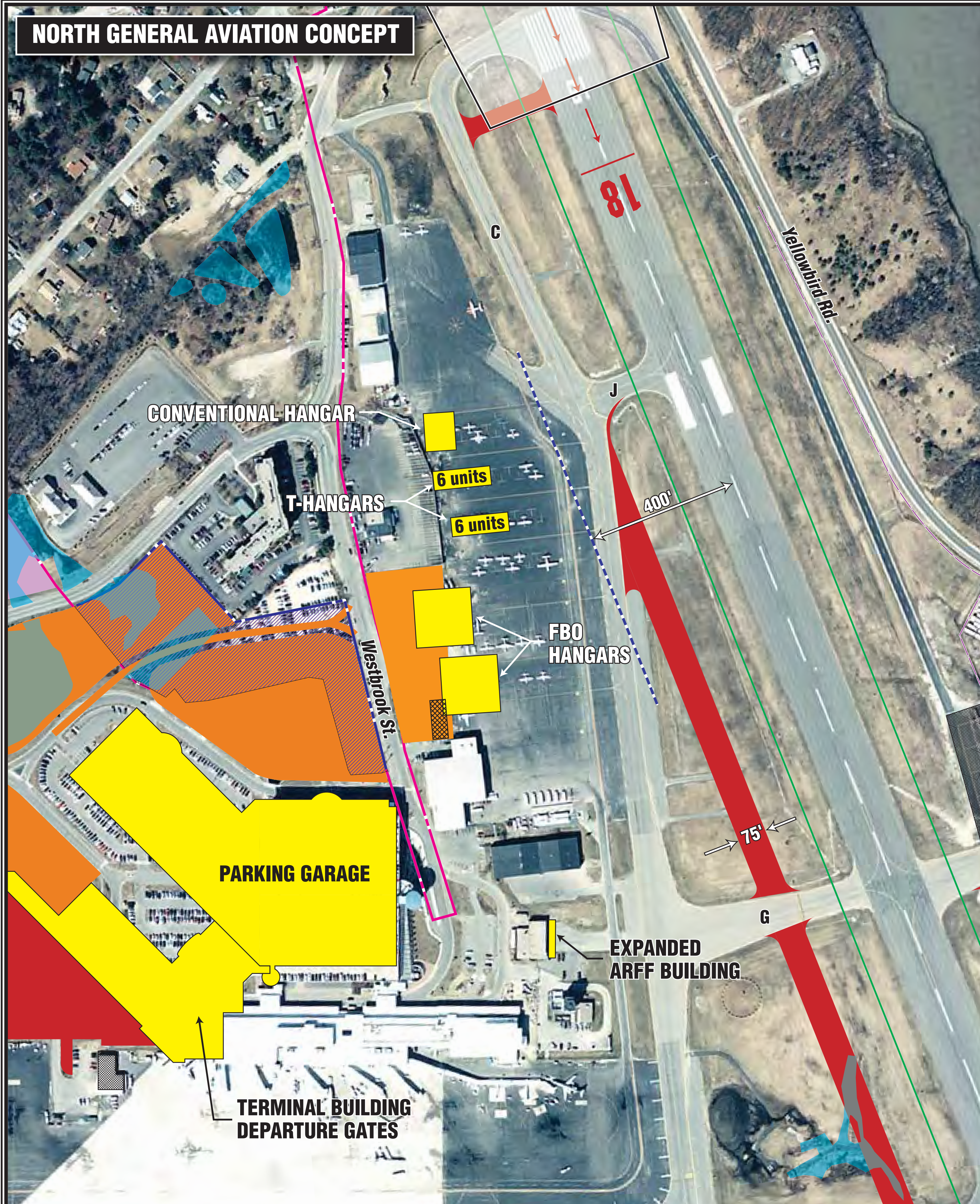

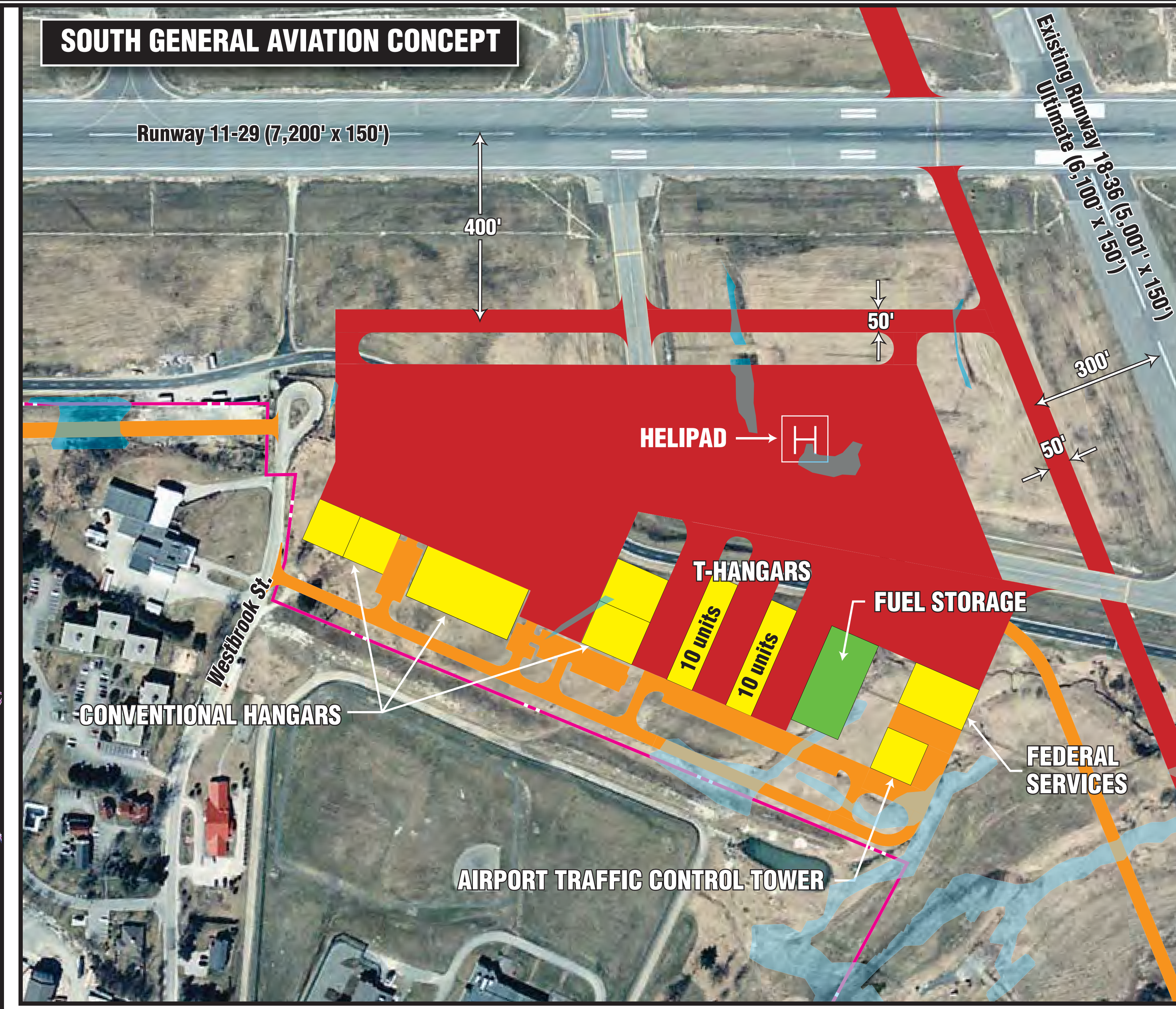

LEGEND

Existing Airport Property Line	Runway Protection Zone (RPZ)
Ultimate Airport Property Line	Ultimate Airfield Pavement
Property Acquisition	Building/Pavement to be Removed
Ultimate Fence	Ultimate Road/Parking
Aircraft Parking Limit Line	Ultimate Building
Wetlands	FBO Fixed Base Operator
Runway Safety Area (RSA)	

NORTH

0 300
SCALE IN FEET

PWM PORTLAND INTERNATIONAL JETPORT

Exhibit 5D
GENERAL AVIATION CONCEPT

There is currently no such designated area for helicopters at the Jetport.

NOISE EXPOSURE ANALYSIS

To determine the noise related impacts that the proposed development could have on the environment surrounding Portland International Jetport, noise exposure patterns were analyzed for both existing airport activity conditions (September 2005 to August 2006) and projected Intermediate Term Planning Horizon and Long Range Planning Horizon activity conditions.

The basic methodology employed to define aircraft noise levels involves the use of a mathematical model for aircraft noise predication. The Yearly Day Night Average Sound Level (DNL) is used in this study to assess aircraft noise. DNL is the metric currently accepted by the FAA, Environmental Protection Agency (EPA), and Department of Housing and Urban Development (HUD), as an appropriate measure of cumulative noise exposure. These three federal agencies have each identified the 65 DNL noise contour as the threshold of incompatibility, meaning that noise levels below 65 DNL are considered compatible with underlying land uses. Most federally funded airport noise studies use DNL as the primary metric for evaluating noise.

DNL is defined as the average A-weighted sound level as measured in decibels (dB) during a 24-hour period. A 10-dB penalty applies to noise events occurring at night (10:00 p.m. to 7:00 a.m.). DNL is a summation metric which allows objective analysis and can describe noise exposure comprehensively over a large area. The 65 DNL contour has been established as the threshold of incompatibility, meaning that noise levels below 65 DNL are considered compatible with underlying land uses.

Since noise decreases at a constant rate in all directions from a source, points of equal DNL noise levels are routinely indicated by means of a contour line. The various contour lines are then superimposed on a map of the airport and its environs. It is important to recognize that a line drawn on a map does not imply that a particular noise condition exists on one side of the line and not on the other. DNL calculations do not precisely define noise impacts. Nevertheless, DNL contours can be used to: (1) highlight existing or potential incompatibilities between an airport and any surrounding development; (2) assess relative exposure levels; (3) assist in the preparation of airport environs land use plans; and (4) provide guidance in the development of land use control devices, such as zoning ordinances, subdivision regulations, and building codes.

The noise contours for Portland International Jetport have been developed using the Integrated Noise Model (INM) Version 6.2. The INM was developed by the Transportation Systems Center of the U.S. Department of Transportation at Cambridge, Massachusetts, and has been specified by the FAA as one of the two models acceptable for federally funded noise analysis.

The noise contours were developed utilizing the same study files developed as part of the 2004 14 CFR Part 150 Noise Compatibility Plan for Portland International Jetport. The study files for the 14 CFR Part 150 Noise Compatibility Plan for the Portland International Jetport model accounts for each aircraft along flight tracks during an average 24-hour period. These flight tracks are coupled with separate tables contained in the database of the INM, which relate to noise, distances, and engine thrust for each make and model of aircraft type selected. Computer input files for the noise analysis contain operational data, runway utilization, aircraft flight tracks, and fleet mix as projected in the plan.

The operational data and aircraft fleet mix are summarized in **Table 5B** and represent the only changes made to the 14 CFR Part 150 Noise Compatibility Plan study. These fleet mix changes represent the current mix of aircraft operating at the airport. The current fleet mix has substantially changed in the past few years. In 2002, (the base year for the 14 CFR Part 150 Noise Compatibility Plan) only a small portion of airline activity was conducted by regional jet aircraft. In October 2006, nearly all commercial airline activity was conducted by regional jet aircraft. The McDonnell-Douglas DC-9 and Airbus A320 were the only large transport aircraft used on a daily basis at the airport. These aircraft only conducted six daily departures. The fleet mix in **Table 5B** was derived after a review of instrument flight plans, landing fee reports, and records maintained by the City of Portland through their flight monitoring program.

TABLE 5B
2005/2006 Average Daily Aircraft Operations

Aircraft	Operations
Air Carrier	
Boeing 727-200	1.44
Boeing 737-200	0.07
Airbus A300-600	1.42
Airbus A319	2.55
Airbus A320	2.22
Beechcraft 1900	0.42
Cessna 208 Caravan	7.88
Canadair Regional 200	6.97
Canadair Regional 700	42.13
Canadair Regional 900	3.13
McDonnell-Douglas DC9 30/40/50	3.97
DeHavilland Dash-8	0.79
Embraer EMB170 Regional Jet	2.84
Embraer Bandeirante	1.85
Embraer EMB145 Regional Jet	16.87
Subtotal Air Carrier	**94.55**
Military	
Boeing KC135	0.84
Lockheed P3 Orion	2.58
Lockheed C130	0.70
Subtotal Military	**4.12**
General Aviation	
Single Engine Piston - Fixed Propeller	46.38
Single Engine Piston - Variable Pitch Propeller	17.64
Multi-Engine Piston	11.62
Cessna 441	2.24
DeHavilland Twin Otter	2.28
Cessna Citation V	1.02
Cessna Citation X	0.19
Falcon 20	0.19
Falcon 900	1.67
Cessna Citation III	1.21
Canadair CL600	3.96
Gulfstream II	0.19
Gulfstream IV/400	0.47
Gulfstream V/500	0.37
Westwind IA1125	0.28
Learjet 25	1.95
Learjet 35	10.60
Beechjet 400A	7.07
Helicopter (Bell 206)	1.68
Subtotal General Aviation	**111.0**
Total All Aircraft	**209.68**

Source: Coffman Associates analysis

TABLE 5B (Continued)
Average Daily Aircraft Operations

Aircraft	Intermediate Term	Long Range
Air Carrier		
Airbus A300-600	0.27	1.36
Boeing 727-200	3.42	3.16
Boeing 757-200	2.38	1.36
Boeing 737-800	5.95	6.78
Boeing 737-900	2.38	1.36
Airbus A319	4.76	6.78
Airbus A320	4.76	6.78
Cessna 208 Caravan	7.95	8.29
Canadair Regional 700	9.51	16.27
Canadair Regional 900	5.95	16.27
Embraer EMB145 Regional Jet	71.34	70.52
McDonnell-Douglas DC9 30/40/50	2.05	2.26
SAAB 340	8.32	9.49
Beechcraft 1900	3.57	-
Subtotal Air Carrier	**132.60**	**150.68**
Military		
Boeing KC135	1.12	1.12
Lockheed P3 Orion	3.43	3.43
Lockheed C130	0.93	0.93
Subtotal Military	**5.48**	**5.48**
General Aviation		
Single Engine Piston - Fixed Propeller	60.39	66.61
Single Engine Piston - Variable Pitch Propeller	22.88	24.96
Multi-Engine Piston	15.63	17.82
Cessna 441	3.49	3.97
DeHavilland Twin Otter	3.56	4.06
Cessna Citation V/ Very Light Jet	6.18	7.55
Cessna Citation X	0.33	0.40
Falcon 900	2.95	3.61
Cessna Citation III	2.13	2.61
Canadair CL600	7.00	8.55
Gulfstream IV/400	0.82	1.00
Gulfstream V/500	0.66	0.80
Learjet 35	18.71	22.86
Beechjet 400A	12.47	15.24
Helicopter (Bell 206)	2.62	2.98
Subtotal General Aviation	**159.82**	**183.03**
Total All Aircraft	**297.90**	**339.19**

Source: Coffman Associates analysis

Table 5C summarizes the runway use percentages used in the analysis. A small increase in regional jet and business jet use of Runway 18-36 is assumed following the runway extension.

TABLE 5C
Runway Use

	Departure Stage	2005/2006					Intermediate Term					Long Range				
		Night	11	18	29	36	Night	11	18	29	36	Night	11	18	29	36
Airline/Air Cargo																
Large Aircraft																
Arrivals	N/A	31%	43%	0%	56%	1%	30%	43%	0%	56%	1%	28%	43%	0%	56%	1%
Departures	Stage 1	12%	34%	1%	65%	0%	11%	34%	1%	65%	0%	10%	34%	1%	65%	0%
	Stage 2	25%	31%	1%	68%	0%	24%	31%	1%	68%	0%	22%	31%	1%	68%	0%
Regional Jets																
Arrivals	N/A	25%	41%	5%	52%	2%	24%	40%	6%	51%	3%	22%	40%	6%	51%	3%
Departures	Stage 1	31%	30%	3%	66%	1%	30%	29%	4%	65%	2%	28%	29%	4%	65%	2%
	Stage 2	31%	40%	4%	55%	1%	30%	39%	5%	54%	2%	28%	39%	5%	54%	2%
Turboprops																
Arrivals		7%	39%	9%	48%	4%	6%	39%	9%	48%	4%	5%	39%	9%	48%	4%
Departures	Stage 1	18%	28%	12%	58%	2%	17%	28%	12%	58%	2%	15%	28%	12%	58%	2%
Military																
L188																
Arrivals	N/A	7%	39%	9%	48%	4%	7%	39%	9%	48%	4%	7%	39%	9%	48%	4%
Departures	Stage 1	18%	28%	12%	58%	2%	18%	28%	12%	58%	2%	18%	28%	12%	58%	2%
KC135																
Arrivals	N/A	0%	43%	0%	57%	0%	0%	43%	0%	57%	0%	0%	43%	0%	57%	0%
Departures	Stage 1	0%	34%	0%	66%	0%	0%	34%	0%	66%	0%	0%	34%	0%	66%	0%
C130																
Arrivals		0%	39%	8%	49%	4%	0%	39%	8%	49%	4%	0%	39%	8%	49%	4%
Departures	Stage 1	0%	34%	12%	53%	1%	0%	34%	12%	53%	1%	0%	34%	12%	53%	1%
General Aviation																
Business Jets																
Arrivals	N/A	4%	40%	4%	54%	2%	3%	39%	5%	53%	3%	3%	39%	5%	53%	3%
Departures	Stage 1	14%	35%	3%	61%	1%	13%	34%	4%	59%	3%	12%	34%	4%	59%	3%
Multi-Engine Piston																
Arrivals	N/A	3%	17%	33%	39%	11%	3%	17%	33%	39%	11%	3%	17%	33%	39%	11%
Departures	Stage 1	9%	8%	37%	40%	15%	9%	8%	37%	40%	15%	9%	8%	37%	40%	15%
Single Engine Piston																
Arrivals	N/A	2.7%	17%	33%	39%	11%	2.7%	17%	33%	39%	11%	2.7%	17%	33%	39%	11%
Departures	Stage 1	9.3%	8%	37%	40%	15%	9.3%	8%	37%	40%	15%	9.3%	8%	37%	40%	15%

Source: 2004 Portland International Jetport Noise Compatibility Study, Coffman Associates analysis
Stage 1 Departure is less than 500 miles
Stage 2 Departure is more than 500 miles

The aircraft noise contours generated using the aforementioned data for Portland International Jetport are depicted on **Exhibit 5E.** For existing activity levels, the 70 and 75 DNL contours remain entirely on airport property. A portion of the 65 DNL contour extends outside the eastern and western airport boundaries. However, it does not appear to contain any incompatible land uses.

When considering the Intermediate Term and Long Range forecast activity

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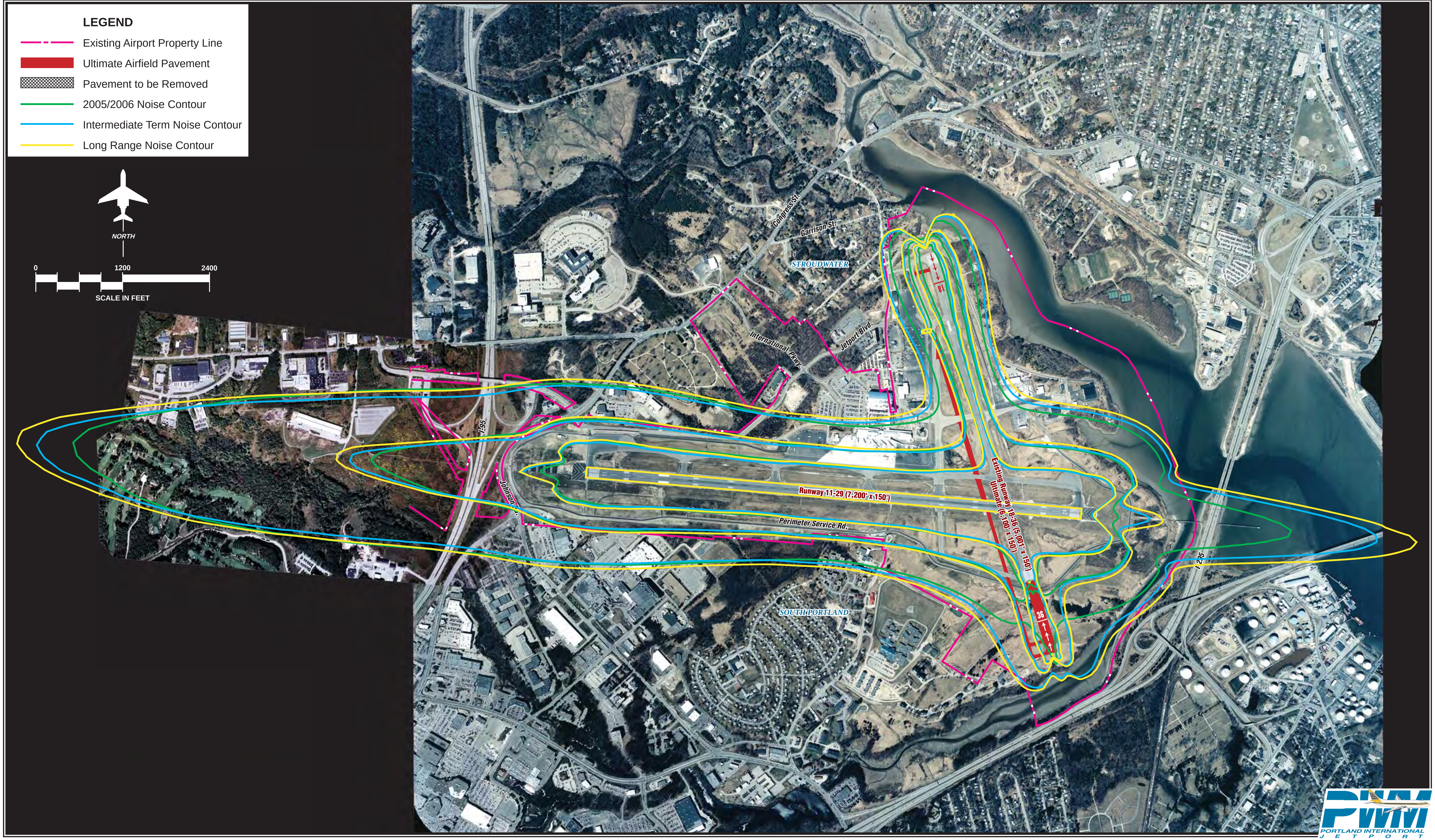


Exhibit 5E
NOISE CONTOURS

at the airport, the 70 and 75 DNL contours continue to remain entirely on airport property. However, the 65 DNL contour extends beyond the airport boundaries off each runway end. The Long Range 65 DNL contour appears to encompass residential land uses adjacent to the northern airport boundary.

ENVIRONMENTAL EVALUATION

A review of the potential environmental impacts associated with the proposed airport projects is an essential consideration in the Airport Master Plan process. The primary purpose of this inventory is to review the proposed improvement program for Portland International Jetport to determine whether the proposed actions could, individually or collectively, have the potential to significantly affect the quality of the environment.

Construction of the improvements depicted on the Airport Layout Plan will require compliance with the *National Environmental Policy Act (NEPA) of 1969*, as amended, to receive federal financial assistance. For projects not "categorically excluded" under FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, compliance with NEPA is generally satisfied through the preparation of an Environmental Assessment (EA). Instances in which significant environmental impacts are expected, an Environmental Impact Statement (EIS) may be required. While this portion of the Master Plan is not designed to satisfy the NEPA requirements for a categorical exclusion, EA, or EIS, it is intended to supply a preliminary review of environmental issues that would need to be analyzed in more detail within the NEPA process.

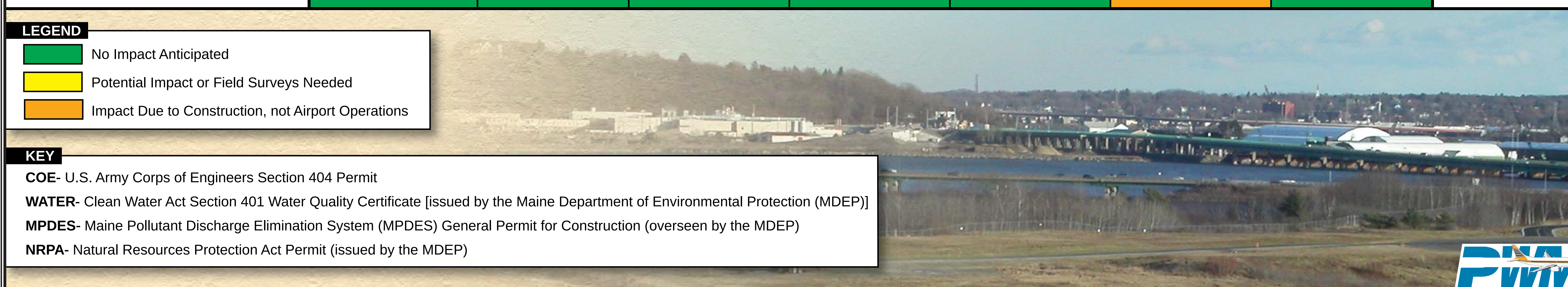
Exhibit 5F contains a matrix which outlines the potential environmental impacts of all projects planned to be undertaken in the short term. This matrix will assist the FAA in determining the type of NEPA documentation warranted for each of the projects. Also contained within the matrix is a list of permits which will likely be needed for each planned project. This evaluation considers all environmental categories required for the NEPA process as outlined in FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures* and FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions.* Of the 20-plus environmental categories, the following resources are not found within the airport environs.

- Wild and Scenic Rivers
- Prime or Unique Farmland
- Floodplains
- Environmental Justice Areas

A review of the existing environmental condition of the airport environs was provided in Chapter One. The following sections describe potential impacts to these resources (as outlined within Appendix A of FAA Order 1050.1E) as the planned development at the airport is undertaken. **Exhibit 5A** de-

04MP17-5F-2/21/05

PROGRAMMED SHORT-TERM PROJECTS	Historic and Cultural Resources/Section 4(f)	Wetlands	Water Quality	Coastal Resources	Biotic Resources	Air Quality	Noise/Compatible Land Use	Potential Environmental Permits
Apron, taxiway, runway rehabilitation projects	No Impact Anticipated	No Impact Anticipated	Impact Due to Construction, not Airport Operations	No Impact Anticipated	No Impact Anticipated	Impact Due to Construction, not Airport Operations	No Impact Anticipated	None
Construct air cargo taxiway	Potential Impact or Field Surveys Needed	Potential Impact or Field Surveys Needed	No Impact Anticipated	Potential Impact or Field Surveys Needed	Potential Impact or Field Surveys Needed	Impact Due to Construction, not Airport Operations	No Impact Anticipated	COE, WATER, MPDES, NRPA
Terminal apron construction	No Impact Anticipated	No Impact Anticipated	Potential Impact or Field Surveys Needed	No Impact Anticipated	No Impact Anticipated	Impact Due to Construction, not Airport Operations	No Impact Anticipated	MPDES
Terminal building construction-Phase I	No Impact Anticipated	No Impact Anticipated	Impact Due to Construction, not Airport Operations	No Impact Anticipated	No Impact Anticipated	Impact Due to Construction, not Airport Operations	No Impact Anticipated	MPDES
Construct parking garage	No Impact Anticipated	No Impact Anticipated	Impact Due to Construction, not Airport Operations	No Impact Anticipated	No Impact Anticipated	Potential Impact or Field Surveys Needed	No Impact Anticipated	MPDES
Improve runway 29 runway safety area	Potential Impact or Field Surveys Needed	Potential Impact or Field Surveys Needed	Potential Impact or Field Surveys Needed	Potential Impact or Field Surveys Needed	Potential Impact or Field Surveys Needed	Impact Due to Construction, not Airport Operations	No Impact Anticipated	COE, WATER, MPDES, NRPA
Extend runway 18-36 and Taxiway C 1,100', Improve Runway 18-36 RSA, Displace landing thresholds	Potential Impact or Field Surveys Needed	Potential Impact or Field Surveys Needed	Potential Impact or Field Surveys Needed	Potential Impact or Field Surveys Needed	Potential Impact or Field Surveys Needed	Potential Impact or Field Surveys Needed	Potential Impact or Field Surveys Needed	COE, WATER, MPDES, NRPA
Relocate services/access road	Potential Impact or Field Surveys Needed	Potential Impact or Field Surveys Needed	Potential Impact or Field Surveys Needed	Potential Impact or Field Surveys Needed	Potential Impact or Field Surveys Needed	Impact Due to Construction, not Airport Operations	No Impact Anticipated	COE, WATER, MPDES, NRPA
Construct air cargo apron Phase I	Potential Impact or Field Surveys Needed	Potential Impact or Field Surveys Needed	Potential Impact or Field Surveys Needed	Potential Impact or Field Surveys Needed	Potential Impact or Field Surveys Needed	Impact Due to Construction, not Airport Operations	No Impact Anticipated	COE, WATER, MPDES, NRPA
Construct South General Aviation Apron - Phase I	Potential Impact or Field Surveys Needed	Potential Impact or Field Surveys Needed	Potential Impact or Field Surveys Needed	No Impact Anticipated	Potential Impact or Field Surveys Needed	Impact Due to Construction, not Airport Operations	No Impact Anticipated	COE, WATER, MPDES, NRPA
Expand airport rescue and fire fighting building	No Impact Anticipated	No Impact Anticipated	No Impact Anticipated	No Impact Anticipated	No Impact Anticipated	Impact Due to Construction, not Airport Operations	No Impact Anticipated	None



LEGEND

- No Impact Anticipated (green)
- Potential Impact or Field Surveys Needed (yellow)
- Impact Due to Construction, not Airport Operations (orange)

KEY

COE- U.S. Army Corps of Engineers Section 404 Permit

WATER- Clean Water Act Section 401 Water Quality Certificate [issued by the Maine Department of Environmental Protection (MDEP)]

MPDES- Maine Pollutant Discharge Elimination System (MPDES) General Permit for Construction (overseen by the MDEP)

NRPA- Natural Resources Protection Act Permit (issued by the MDEP)

PWM PORTLAND INTERNATIONAL JETPORT

Exhibit 5F
ANTICIPATED ENVIRONMENTAL IMPACTS OF PROGRAMMED SHORT-TERM PROJECTS

picts the location of identified environmental sensitivities.

HISTORIC AND CULTURAL RESOURCES/ SECTION 4(f)

As discussed within Chapter One, an archaeological sensitivity assessment was completed for the airport in 1998. It was determined that the Jetport is located within an area of low sensitivity for prehistoric resources with the exception of the frontage along Fore River. Planned projects that are located along the river include the development of air cargo buildings, expansion of the existing maintenance building, and the relocation of various segments of the airport service road. Field surveys will be needed to ensure that historical or cultural resources are not present within these proposed development areas as much of the area has not been field surveyed.

In 2002, additional archaeological field surveys were conducted prior to the acquisition of property southwest of the airport. Two potentially eligible sites were identified during the surveys. These sites are located in proximity to the Runway 36 extension and relocated service road projects. Further investigation and coordination with the State Historic Preservation Officer (SHPO) is needed to determine whether implementation of the projects will result in potential impacts to these identified resources.

Two historic sites, the Stroudwater neighborhood and the Maine Youth Center, are located in proximity to the airport. The Stroudwater neighborhood is located northwest of the airport and the Maine Youth Center is located southwest of the airport. Development of the improvements to Runway 18-36 will likely result in a change in the manner in which overflights occur in over these areas, as well as a change in the types of aircraft which will utilize this runway. Further coordination with the SHPO is needed to assess potential impacts to these identified resources resulting from the runway development projects.

WETLANDS

As discussed within Chapter One, approximately 57 acres of wetlands have been previously delineated on airport property. Previous determinations indicated that wetlands present in the airport vicinity are heavily influenced by the area's poorly drained marine sediment soils. The functional values of the wetlands varied greatly depending on location within four different regions including airfield wetlands, the Fore River intertidal zone, wetlands associated with the Maine Turnpike, and support parcel area wetlands.

Exhibit 5B depicts the location of previously delineated wetlands in relation to proposed development at the airport. As indicated on the exhibit, a number of proposed projects will directly impact identified wetland resources. Development of the terminal area and associated parking will impact wetland areas south and east of Jetport Boulevard. Impacts to wetland areas north of Jetport Boulevard will be limited to those associated with the development of airport businesses in this area.

The most significant wetland resources impacted are those that are adjacent to the Fore River and Long Creek. The planned RSA and runway extension planned for Runway 18-36 will impact approximately 2.5 acres of wetland areas in the southern portions of airport property. The RSA improvements for Runway 29 and the relocation of the airport access road in this area will require filling of approximately 4.0 acres of wetlands located immediately east of the existing easternmost airport access road. These wetlands will likely be considered high quality wetlands by the various regulating agencies due to their proximity to the Fore River.

Finally, development of the air cargo facilities will directly impact a number of smaller wetlands, also associated with the Fore River.

WATER QUALITY

Water quality concerns resulting from the proposed airport development will likely be focused on the loss of wetland resources and the construction of the various runway improvements near the Fore River and Long Creek. Further coordination with various state and local agencies during the NEPA and/or required permitting processes for these projects will be needed to assess potential impacts.

COASTAL RESOURCES

As discussed within Chapter One, the Jetport is located within a coastal zone. A number of projects are currently planned in coastal areas, as defined by the City of South Portland's Shoreland Area Overlay District. Further coordination with federal, state, and local agencies will need to be undertaken during the NEPA and/or permitting processes to determine consistency with coastal plans for the area.

BIOTIC RESOURCES

As indicated in Chapter One, previous consultation with federal and state agencies regarding the presence of threatened and endangered species in the project area indicated that there are no federally endangered or threatened species known to exist in the project area. The state indicated that there were no known rare botanical features or records of threatened, endangered, or species of special concern at the Jetport. These findings will need to be confirmed prior to development at the area.

AIR QUALITY

The Portland municipal area is classified as a marginal non-attainment area for Ozone. Further analysis will be undertaken during required NEPA analysis to assess potential air quality impacts which could result from airport improvements. This analysis will be used to determine whether the proposed airport improvements will be consistent with local and state air quality plans.

HAZARDOUS MATERIALS, POLLUTION PREVENTION, AND SOLID WASTE

It is not anticipated that the proposed improvements will result in significant impacts to any of these resources. Historically, the airport has obtained and complied with necessary construction and operational permits, thereby minimizing potential project impacts.

LIGHT EMISSIONS AND VISUAL IMPACTS

Potential lighting and visual impacts resulting from the proposed airport improvements are not anticipated to be significant. Impacts associated with the hangar development in the southwestern portions of airport property were addressed in detail within the 2003 Environmental Assessment (EA). Other lighting and visual impacts may result from development of the terminal area improvements; however, due to the presence of open space and treed buffers between the development area and residential areas, it is not anticipated that these impacts will be significant.

CONSTRUCTION IMPACTS

Construction impacts typically relate to the effects on specific impact categories, such as air quality or noise, during construction. To minimize construction-related impacts, the use of Best Management Practices (BMPs) is recommended. All applicable permits and certifications will need to be obtained prior to any construction.

SUMMARY

The Master Plan for Portland International Jetport has been developed in cooperation with the Planning Advisory Committee, interested citizens, and the City of Portland. It is designed to assist the City in making decisions relative to the future use of Portland International Jetport as it is maintained to meet the air transportation needs for the region.

Flexibility will be a key to the plan, since activity may not occur exactly as forecast. The Master Plan provides the City of Portland with options to pursue in marketing the assets of the airport for community development. Following the general recommendations of the plan, the airport can maintain its viability and continue to provide air transportation services to the region.

Chapter Six

FINANCIAL PLAN

Financial Plan

The analyses conducted in the previous chapters evaluated airport development needs based upon safety, security, potential aviation activity, and operational efficiency. However, the most important element of the master planning process is the application of basic economic, financial, and management rationale to each development item so that the feasibility of implementation can be assured. The purpose of this chapter is to identify capital needs at Portland International Jetport and identify when these should be implemented according to need, function, and demand.

The presentation of the financial plan and its feasibility has been organized into three sections. First, the airport's capital needs are presented in narrative and graphic form. Second, funding sources on the federal, state, and local levels are identified and discussed. Finally, the airport's operating fund is examined for its ability to support future capital needs.

DEMAND-BASED PLAN

The master plan for Portland International Jetport has been developed according to a demand-based schedule. Demand-based planning refers to the intention to develop planning guidelines for the airport based upon airport activity levels instead of guidelines based upon subjective factors such as points in time. By doing so, the levels of activity derived from the demand forecasts can be related to the actual capital investments needed to safely and efficiently accommodate the

level of demand being experienced at the airport. More specifically, the intention of this master plan is that the facility improvements needed to serve new levels of demand should only be implemented when the levels of demand experienced at the airport justify their implementation.

For example, the aviation demand forecasts projected that passenger enplanements at Portland International Jetport could be expected to grow through the year 2025. This forecast was supported by the local community's expectation for a growing local population and recent historical trends, which indicate a growing number of local residents choosing air service at Portland International Jetport instead of other regional airports.

The forecasts noted, however, that future enplanement levels will be dependent upon the level of air service available at the airport. The factors affecting air service include the number of airlines serving the airport, the number of destinations served, air fares, and flight schedules. Individually or collectively, these factors could slow or accelerate enplanement levels differently than projected in the aviation demand forecasts. Since changes in these factors cannot be realistically predicted for the entire forecast period, it is difficult to predict, with the level of accuracy needed to justify a capital investment, exactly when an improvement will be needed to satisfy demand level.

For these reasons, the Portland International Jetport Master Plan has been developed as a demand-based plan. The master plan projects an enplanement level of 1,260,000 for the Intermediate Term Planning Horizon. When enplanement levels exceed 1,260,000, the master plan suggests planning begin to consider the Long Range Planning Horizon level of 1,570,000 annual enplanements. While the aviation demand forecasts suggested the 1,260,000 annual enplanement level could be reached in 10 years, changes in airline service could result in this level being reached in less than, or more than, 10 years. Should the 1,260,000 enplanement level take longer to achieve than projected in the aviation demand forecasts, any terminal improvements to accommodate that level of demand would be delayed. Should this level be reached sooner, the schedule to implement the improvements could be accelerated. This provides a level of flexibility in the master plan and can extend the time between master plan updates.

A demand-based master plan does not specifically require the implementation of any of the demand-based improvements. Instead, it is envisioned that the implementation of any master plan improvement would be examined against demand levels prior to implementation. In many ways, this master plan is similar to a community's general plan. The master plan establishes a plan for the use of the airport facilities consistent with potential aviation needs and the capital needs required to support that use. However, individual projects in the plan are not implemented until the need is demonstrated and the project is approved by the City of Portland.

CAPITAL NEEDS AND COST SUMMARIES

Once the specific needs for the airport have been established, the next step is to determine a realistic schedule and costs for implementing each project. The capital needs presented in this chapter outline the costs and timing for implementation. The program outlined on the following pages has been evaluated from a variety of perspectives and represents the culmination of a comparative analysis of basic budget factors, demand, and priority assignments.

The recommended improvements are grouped into three planning horizons: short, intermediate, and long range. Each year, the City of Portland will need to re-examine the priorities for funding, adding or removing projects on the capital programming lists. **Table 6A** summarizes the key activity milestones for each planning horizon.

TABLE 6A
Planning Horizon Activity Levels
Portland International Jetport

	Existing	Short Term Planning Horizon	Intermediate Term Planning Horizon	Long Range Planning Horizon
Enplaned Passengers	670,833	970,000	1,260,000	1,570,000
Total Air Cargo (tons)	16,812	21,200	24,200	31,600
Total Based Aircraft	43	54	61	76
Annual Operations				
Air Carrier	36,872	43,400	48,200	54,700
Air Cargo	4,398	4,800	5,000	5,500
General Aviation	41,457	53,000	59,000	69,000
Air Taxi	5,204	6,900	7,800	9,200
Military	1,338	2,000	2,000	2,000
Total Annual Operations	89,359	110,100	122,000	140,400

While some projects will be demand-based, others will be dictated by design standards, safety, or rehabilitation needs. In putting together a listing of projects, an attempt has been made to include anticipated rehabilitation needs through the planning period and capital replacement needs.

Exhibit 6A summarizes capital needs for Portland International Jetport through the planning period of this master plan. An estimate has been included with each project of federal and state funding eligibility, although this amount is not guaranteed. For larger capital projects, it may be necessary for the City of Portland to apply for discretionary funds (discussed in more detail in the following paragraphs). **Exhibit 6B** graphically depicts development staging.

Individual project cost estimates account for engineering, environmental permitting, and other contingencies

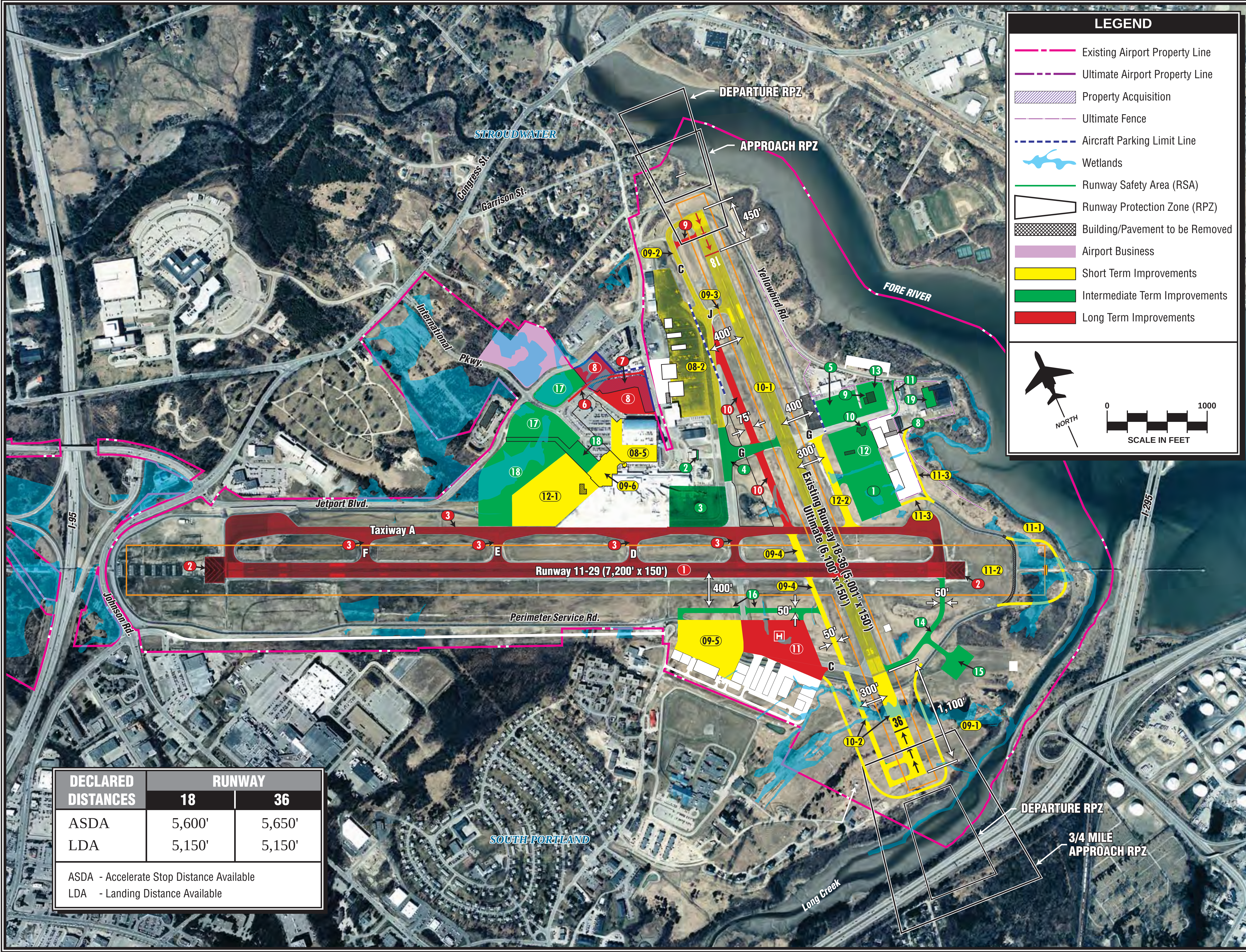
04MP17-6A-2/12/07

Description	Total Cost	FAA Eligible	Passenger Facility Charge	State Eligible	Local Share	Category
SHORT TERM PLANNING HORIZON (First 6 years)						
2007						
1. Environmental Assessment (RSA Improvements)	$ 650,000	$ 617,500	$ -	$ 16,250	$ 16,250	Environmental
2008						
1. Design and Permit Runway 18-36 Improvements	$ 300,000	$ 285,000	$ -	$ 7,500	$ 7,500	Environmental
2. General Aviation Apron Rehabilitation	2,000,000	1,900,000	-	50,000	50,000	Reconstruction/Rehabilitation
3. Acquire Snow Removal Equipment	2,000,000	-	2,000,000	-	-	Safety
4. Acquire Airport Rescue and Fire Fighting (ARFF) Equipment	60,000	-	-	-	60,000	Safety
5. Construct Parking Garage	25,000,000	-	-	-	25,000,000	Demand
Subtotal 2008	**$ 29,360,000**	**$ 2,185,000**	**$ 2,000,000**	**$ 57,500**	**$ 25,117,500**	
2009						
1. Wetlands Mitigation (9 Acres)	$ 5,850,000	$ 5,557,500	$ -	$ 146,250	$ 146,250	Environmental
2. Taxiway C (Alpha to Juliet) Rehabilitation	1,437,500	1,365,625			71,875	Reconstruction/Rehabilitation
3. Taxiway J Rehabilitation	200,000	190,000	-	5,000	5,000	Reconstruction/Rehabilitation
4. Relocate Taxiway C - Phase I	1,646,800	1,564,460	-	41,170	41,170	Demand
5. Construct South General Aviation Apron - Phase I (291,100 s.f.)	3,776,600	-	-	-	3,776,600	Demand
6. Terminal Building Construction - Phase I	52,330,000	-	46,050,400	-	6,279,600	Demand
Subtotal 2009	**$ 65,240,900**	**$ 8,677,585**	**$ 46,050,400**	**$ 192,420**	**$ 10,320,495**	
2010						
1. Runway 18-36 Rehabilitation	$ 5,562,500	$ 5,284,375	$ -	$ 139,063	$ 139,063	Reconstruction/Rehabilitation
2. Extend Runway 18-36 and Taxiway C 1,100', Improve Runway 18-36 RSA, Displace Landing Thresholds	6,336,500	6,019,675	-	158,413	158,413	Safety
Subtotal 2010	**$ 11,899,000**	**$ 11,304,050**	**$ -**	**$ 297,475**	**$ 297,475**	
2011						
1. Wetlands Mitigation (6 Acres)	$ 1,650,000	$ 1,567,500	$ -	$ 41,250	$ 41,250	Environmental
2. Improve Runway 29 Runway Safety Area (RSA)	2,012,500	1,911,875	-	50,313	50,313	Environmental
3. Relocate Service/Access Road	281,800	267,710	-	7,045	7,045	Safety
Subtotal 2011	**$ 3,944,300**	**$ 3,747,085**	**$ -**	**$ 98,608**	**$ 98,608**	
2012						
1. Terminal Apron Construction	$ 8,000,000	$ 7,600,000	$ 200,000	$ 200,000	$ -	Demand
2. Construct Air Cargo Taxiway (1,000 feet x 75 feet)	1,592,800	1,513,160	-	39,820	39,820	Capacity
Subtotal 2012	**$ 9,592,800**	**$ 9,113,160**	**$ 200,000**	**$ 239,820**	**$ 39,820**	
Total Short Term Planning Horizon	***$ 120,687,000***	***$ 35,644,380***	***$ 48,250,400***	***$ 902,073***	***$ 35,890,148***	
INTERMEDIATE TERM PLANNING HORIZON						
1. Construct Air Cargo Apron Phase I (210,500 s.f.)	$ 3,105,000	$ 2,949,750	$ -	$ 77,625	$ 77,625	Demand
2. Expanded Airport Rescue and Fire Fighting (ARFF) Building	324,300	-	-	-	324,300	Capacity
3. Terminal Apron and Taxiway Rehabilitation	2,375,000	2,256,250	-	59,375	59,375	Reconstruction/Rehabilitation
4. Taxiway G and Taxiway C Rehabilitation	3,187,500	3,028,125	-	79,688	79,688	Reconstruction/Rehabilitation
5. Cargo Apron Rehabilitation	1,399,000	1,329,050	-	34,975	34,975	Reconstruction/Rehabilitation
6. Acquire Airport Rescue and Fire Fighting (ARFF) Equipment	750,000	712,500	-	18,750	18,750	Safety
7. Acquire Snow Removal Equipment	1,400,000	-	1,400,000	-	-	Safety
8. Remove General Aviation Hangar	126,500	-	-	-	126,500	Demand
9. Remove General Aviation Hangar	235,800	-	-	-	235,800	Demand
10. Remove General Aviation Hangar	92,500	-	-	-	92,500	Demand
11. Construct Air Cargo Access Road	126,500	120,175	-	3,163	3,163	Demand
12. Construct Air Cargo Apron Phase II (184,200 s.f.)	2,300,000	2,185,000	-	57,500	57,500	Demand
13. Extend Cargo Apron East (8,300 s.y.)	950,000	902,500	-	23,750	23,750	Demand
14. Construct Taxiway Between Runway 36 and Runway 29 (1,165 x 50 feet)	953,400	905,730	-	23,835	23,835	Demand
15. Construct Aircraft Engine Run-Up Pad (75,000 s.f.)	1,024,700	973,465	-	25,618	25,618	Demand
16. Construct South Apron Taxiway (1500 x 50 ft.)	1,672,100	1,588,495	-	41,803	41,803	Demand
17. Construct Public Terminal Building Surface Parking - Phase I	6,842,500	-	-	-	6,842,500	Demand
18. Terminal Building Construction - Phase II	62,100,000	-	54,648,000	-	7,452,000	Demand
19. Expand Maintenance Building	2,327,600	2,211,220	-	58,190	58,190	Capacity
Total Intermediate Term Planning Horizon	***$ 91,292,400***	***$ 19,162,260***	***$ 56,048,000***	***$ 504,270***	***$ 15,577,870***	
LONG RANGE PLANNING HORIZON						
1. Runway 11-29 Rehabilitation	$ 10,187,500	$ 9,678,125	$ -	$ 254,688	$ 254,688	Reconstruction/Rehabilitation
2. Runway 11-29 Blast Pad Rehabilitation	637,500	605,625	-	15,938	15,938	Reconstruction/Rehabilitation
3. Taxiway A, D, E, & F Rehabilitation	8,062,500	7,659,375	-	201,563	201,563	Reconstruction/Rehabilitation
4. Acquire Airport Rescue and Fire Fighting (ARFF) Equipment	60,000	-	-	-	60,000	Safety
5. Acquire Snow Removal Equipment	900,000	-	900,000	-	-	Safety
6. Relocate Terminal Loop Road	2,200,000	2,090,000	-	55,000	55,000	Demand
7. Land Acquisition	500,000	475,000	-	12,500	12,500	Demand
8. Construct Public Terminal Building Surface Parking - Phase II	1,552,500	-	-	-	1,552,500	Demand
9. Construct By-Pass Taxiway (250 x 50 feet)	431,300	409,735	-	10,783	10,783	Demand
10. Relocate Taxiway C - Phase II (850 x 75 ft, 1100 x 75 ft)	2,857,800	2,714,910	-	71,445	71,445	Capacity
11. Construct South GA Apron - Phase II (559,000 s.f.)	6,265,200	5,951,940	-	156,630	156,630	Demand
Total Long Range Planning Horizon	***$ 33,654,300***	***$ 29,584,710***	***$ 900,000***	***$ 778,545***	***$ 2,391,045***	
TOTAL ALL DEVELOPMENT	**$ 245,633,700**	**$ 84,391,350**	**$ 105,198,400**	**$ 2,184,888**	**$ 53,859,063**	

RSA - Runway Safety Area
s.f. - square-foot

Exhibit 6A
CAPITAL IMPROVEMENT PROGRAM

04MP17-5A-2/12/07



DECLARED DISTANCES	RUNWAY 18	RUNWAY 36
ASDA	5,600'	5,650'
LDA	5,150'	5,150'

ASDA - Accelerate Stop Distance Available
LDA - Landing Distance Available

SHORT TERM IMPROVEMENTS

2007
- 07-1 Environmental Assessment (RSA Improvements)

2008
- 08-1 Design and Permit Runway 18-36 Improvements
- 08-2 General Aviation Apron Rehabilitation
- 08-3 Acquire Snow Removal Equipment
- 08-4 Acquire Airport Rescue and Fire Fighting (ARFF) Equipment
- 08-5 Construct Parking Garage

2009
- 09-1 Wetlands Mitigation (9 Acres)
- 09-2 Taxiway C (Alpha to Juliet) Rehabilitation
- 09-3 Taxiway J Rehabilitation
- 09-4 Relocate Taxiway C - Phase I
- 09-5 Construct South General Aviation Apron - Phase I
- 09-6 Terminal Building Construction - Phase I

2010
- 10-1 Runway 18-36 Rehabilitation
- 10-2 Extend Runway 18-36 and Taxiway C 1,100', Improve Runway 18-36 RSA, Displace Landing Thresholds

2011
- 11-1 Wetlands Mitigation (6 Acres)
- 11-2 Improve Runway 29 Runway Safety Area (RSA)
- 11-3 Relocate Service/Access Road

2012
- 12-1 Terminal Apron Construction
- 12-2 Construct Air Cargo Taxiway

INTERMEDIATE TERM IMPROVEMENTS

1. Construct Air Cargo Apron Phase I
2. Expanded Airport Rescue and Fire Fighting (ARFF) Building
3. Terminal Apron and Taxiway Rehabilitation
4. Taxiway G and Taxiway C Rehabilitation
5. Cargo Apron Rehabilitation
6. Acquire Airport Rescue and Fire Fighting (ARFF) Equipment
7. Acquire Snow Removal Equipment
8. Remove General Aviation Hangar
9. Remove General Aviation Hangar
10. Remove General Aviation Hangar
11. Construct Air Cargo Access Road
12. Construct Air Cargo Apron Phase II
13. Extend Cargo Apron East
14. Construct Taxiway Between Runway 36 and Runway 29
15. Construct Aircraft Engine Run-Up Pad
16. Construct South Apron Taxiway
17. Construct Public Terminal Building Surface Parking - Phase I
18. Terminal Building Construction - Phase II
19. Expand Maintenance Building

LONG TERM IMPROVEMENTS

1. Runway 11-29 Rehabilitation
2. Runway 11-29 Blast Pad Rehabilitation
3. Taxiway A, D, E, & F Rehabilitation
4. Acquire Airport Rescue and Fire Fighting (ARFF) Equipment
5. Acquire Snow Removal Equipment
6. Relocate Terminal Loop Road
7. Land Acquisition
8. Construct Public Terminal Building Surface Parking - Phase II
9. Construct By-Pass Taxiway
10. Relocate Taxiway C - Phase II
11. Construct South GA Apron - Phase II

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Exhibit 6B
DEVELOPMENT STAGING

that may be experienced during the implementation of the project and are in current (2006) dollars. Due to the conceptual nature of a master plan, implementation of capital improvement projects should occur only after further refinement of their design and costs through engineering and/or architectural analyses. Capital costs in this chapter should be viewed only as estimates subject to further refinement during design. Nevertheless, these estimates are considered sufficient for performing the feasibility analyses in this chapter.

Capital needs for the airport can be categorized as follows:

1) **Safety** - these are capital needs required to implement Code of Federal Regulations (CFR), Title 14, Part 139, certification; meet FAA design standards; or are considered necessary for operational safety and protection of aircraft and/or people and property on the ground near the airport.

2) **Environmental** - these are capital needs which are identified to enable the airport to operate in an environmentally acceptable manner, or meet needs identified in the Environmental Overview (Chapter Five).

3) **Demand** - these are capital needs required to accommodate levels of aviation demand. The implementation of these projects should only occur when demand for these needs is verified.

4) **Rehabilitation/Reconstruction** - these are capital needs required to maintain the existing infrastructure at the airport.

5) **Efficiency** - these are capital needs intended to improve aircraft ground operations or passengers' use of the terminal building.

Each capital need is categorized according to this schedule. **Table 6B** summarizes development needs by category. As shown in the table, nearly three-quarters of the development program is dependent upon future levels of demand. While four percent is currently shown as related to environmental needs, environmental compliance costs have been included in all future development costs. Rehabilitation/Reconstruction and safety costs represent 14 percent and 5 percent of the total costs, respectively. Three percent of total project costs are related to capacity projects to increase the efficiency of the airfield system.

The applicable categories for each project are shown on **Exhibit 6A**.

TABLE 6B Development Needs By Category					
Category	**Short Term Planning Horizon**	**Intermediate Term Planning Horizon**	**Long Range Planning Horizon**	**Totals**	**% Of Total**
Safety	$10,325,100	$2,150,000	$960,000	**$13,435,100**	5%
Environmental	10,162,500	-	-	**10,162,500**	4%
Demand	89,106,600	79,529,000	10,949,000	**179,584,600**	73%
Reconstruction/Rehabilitation	9,200,000	6,961,500	18,887,500	**35,049,000**	14%
Capacity	1,592,800	2,651,900	2,857,800	**7,102,500**	3%
Totals	**$120,387,000**	**$91,292,400**	**$33,654,300**	**$245,333,700**	**100%**

SHORT TERM CAPITAL NEEDS

As indicated above, the Short Term Planning Horizon is the only planning horizon correlated to time. This is because development within this initial period is concentrated first on the most immediate needs of the airfield and landside areas. Therefore, the program is presented year-by-year for the first five years to assist in capital planning not only locally, but at the state and federal levels. Short term capital needs presented on **Exhibit 6A** are estimated at $120.4 million.

A focus of the Short Term Planning Horizon is pavement rehabilitation/reconstruction. Projects included in this period include the rehabilitation of Runway 18-36, the portion of Taxiway C from the Runway 18 end to Taxiway G, Taxiway J, and the general aviation apron. Pavement rehabilitation/reconstruction can include pavement removal and reconstruction, as well as crack sealing and the application of a slurry sealcoat. The application of the sealcoat rejuvenates the pavement surfaces and extends the pavement life. Crack sealing helps prevent water seepage under the pavement. Water which seeps under the pavement can weaken the subbase and subgrade, which deteriorates the pavement and reduces its useful life.

Safety needs programmed for the Short Term Planning Horizon include the acquisition of snow removal equipment and airport rescue and firefighting (ARFF) equipment. ARFF equipment includes the acquisition of a command vehicle with firefighting capability. Snow removal equipment includes sweeper attachments for existing vehicles, replacing a snow blower, and replacing two front end loaders with ramp blades.

Terminal area development includes the construction of new terminal building space, construction of a new terminal apron area, and construction of a new parking garage. The terminal construction includes the development of a new core structure west of the existing building. This new area would accommodate new ticketing and baggage make-up with in-line explosive detection devices. The second floor would provide larger passenger screening points, secure holdroom, and concessions areas. The new terminal apron is required to serve the three new aircraft boarding gates. The existing three-level parking garage will be removed and replaced with a new five-story structure, similar to the parking structure built in 2003, that connects directly to the new terminal core.

Air cargo development programmed in the Short Term Planning Horizon includes the construction of a new taxiway between Taxiway H and Taxiway A. This taxiway is intended to reduce the number of runway crossings and the potential for runway incursions. Presently, aircraft needing to access the Runway 29 end from Taxiway H must cross Runway 18-36 to Taxiway C, then cross Runway 18-36 again on Taxiway A. A taxiway extending between Taxiway A and Taxiway H would eliminate the need to cross any runways to access the Runway 29 end. Accessing the Runway 11 end would only require one runway crossing. This taxiway would also reduce controller workload.

General aviation development includes the construction of the first phase of the southern general aviation apron. The southern access road was under construction in 2006. This expansion of the airport rescue and firefighting building is also programmed. The 20-foot expansion of the building will more easily accommodate the new ARFF vehicles, which now occupy the full width of the building, leaving little room for movement around the vehicles.

Airfield development includes improving the Runway 29 runway safety area (RSA) and upgrading Runway 18-36 to more fully serve as a back-up to Runway 11-29. The Runway 29 RSA improvements include relocating the localizer antenna and interior service road which currently extend through the limits of the RSA. To meet grade requirements, the Runway 29 RSA will also be graded and filled.

Runway 18-36 improvements include extending Runway 18-36 and Taxiway C 1,100 feet south and grading and filling the RSA at each runway end. These improvements will allow Runway 18-36 to more effectively serve as a back-up to Runway 11-29 when it is closed for maintenance or other reasons. By upgrading Runway 18-36 to accommodate the regional jet and turboprop aircraft that use the airport in scheduled airline and air cargo service, the continuity of air service can be assured.

The Runway 29 RSA improvements, Runway 18-36 extension, and RSA improvements, as well as the construction of the south general aviation apron will impact existing wetlands on the airport. The Short Term Planning Horizon includes wetlands mitigation, as well as the Environmental Assessment (EA), which is required to obtain the necessary federal environmental determinations for project implementation.

INTERMEDIATE TERM CAPITAL NEEDS

The intermediate term capital needs include improvements to the passenger terminal, air cargo, and general aviation areas. Intermediate Term Planning Horizon capital needs are presented on **Exhibit 6A** and are estimated at $91.3 million.

Pavement rehabilitation/reconstruction projects included in this period include rehabilitating the existing air cargo apron along Taxiway H, a portion of the terminal apron, and Taxiways G and C.

The construction of a new departure concourse and related apron area is programmed for the terminal area. This will include the departure concourse extending to the northwest to allow for greater separation between Runway 11-29 and the terminal building to provide more clearance for taller tail heights of transport category aircraft. Aircraft parked at the existing terminal building obstruct the transitional surface extending upward and outward from Runway 11-29. Additional surface parking is planned along Jetport Boulevard to replace existing parking lost to the new terminal construction.

The air cargo apron is programmed to be constructed in two phases. The construction of the southern portion of the new air cargo apron is programmed to occur first. Constructing this portion of the apron first does not require the relocation of any existing general aviation facilities or air cargo facilities located along Taxiway G. Vehicle access would be via an extension of an existing access road.

Phase II development includes constructing the northern half of the apron. This will require removal of all existing general aviation facilities and hangars. These facilities are assumed to be replaced either on the existing north general aviation apron or in the south general aviation area developed in the Short Term Planning Horizon. A segregated air cargo access road is developed directly to the sort buildings. This has the advantage of providing for a separate secure interior service road extending from the airport maintenance building. The existing air cargo apron north of Taxiway H is expanded to the east to allow for the replacement of apron lost along Taxiway H due to tail height restrictions caused by improved instrument approach capability to Runway 36.

Taxiway construction includes a new taxiway connecting the Runway 29 and Runway 36 ends. This taxiway will provide direct access to the Runway 29 end for aircraft located in the general aviation area. This will reduce runway crossings and taxi times.

This taxiway could ultimately provide access to an aircraft engine run-up area. The run-up area would support on-the-ground engine runs that are sometimes required after maintenance. This area is suitable for maintenance run-ups as this is a remote part of the airport that is segregated from residential development. The run-up apron would also orient the aircraft emissions toward Highway 295 and the tank farm to the southeast of the airport.

The relocation of a portion of Taxiway C, south of Taxiway A, is programmed to provide direct access to the Runway 36 end. A new taxiway serving the south general aviation apron is also programmed to increase circulation in this area.

The replacement of a 1,500-gallon ARFF vehicle is programmed in this planning period. Snow removal equipment acquisition includes a sweeper attachment, replacement of two plow trucks, replacement of a snow blower, replacement of a de-icing truck, and replacement of truck with a plow, wing, and spreader.

LONG RANGE CAPITAL NEEDS

Pavement rehabilitation/reconstruction projects included in this planning period include the rehabilitation of Runway 11-29, the Runway 11-29 blast pads, and Taxiways A, D, E, and F.

The replacement of a 1,500-gallon ARFF vehicle is programmed in this planning period. Snow removal equipment acquisition includes two plows with sweepers, replacement of a snow blower, replacement of two sweepers, and replacement of truck with plow, wing, and spreader.

Within the terminal area, the acquisition of approximately six acres of land is programmed. This will allow for the relocation of the terminal access road and construction of additional surface parking within the terminal recirculation loop. Constructing public parking within the terminal recirculation loop utilizes the same ticketing and payment booths as used for the parking garage. Additional surface parking is programmed along Jetport Boulevard.

The relocation of Taxiway C, the portion between Taxiway G and Taxiway A, is also programmed. This will allow for a completed parallel taxiway located 300 feet west of Runway 18-36. By-pass taxiways are programmed at each end of Runway 18-36. By-pass taxiways allow aircraft ready for departure to pass aircraft holding for clearance or still preparing for departure. This reduces departure delays. Additional apron is planned in the south general aviation area. Long Range Planning Horizon capital needs are presented on **Exhibit 6A** and are estimated at $33.7 million.

FINANCIAL ANALYSIS

This section presents financial projections for Portland International Jetport based on the Capital Improvement Program (CIP) discussed in this chapter and the aviation activity forecasts presented in Chapter Two. Financial projections were developed for the three planning periods used for the CIP: Short Term Planning Horizon (years 1 – 5), Intermediate Term Planning Horizon (years 6 – 10), and Long Range Planning Horizon (years 11 – 20). Portland International Jetport's Fiscal Year ends June 30.

AIRPORT FINANCIAL STRUCTURE

This section discusses the City of Portland's (the City) accounting practices, including the structure utilized for airline rate-setting purposes, the requirements and provisions of the General Certificate dated as of July 1, 2003 (the Certificate) which authorizes the issuance of general airport revenue bonds, and the Airline Agreement. For projection purposes, the Financial Plan uses the more conservative Recommended Forecast for enplanements shown in Table 2K, rather than the enplanement scenario shown in **Table 6A**.

Jetport Accounting

Portland International Jetport is owned by the City of Portland and is operated as a financially self-sufficient enterprise of the City. The City's elected officials include the Mayor and the City Council, which consists of five members that are elected by voters in five separate districts of the City and four at-large members elected by the voters throughout the entire City. Portland International Jetport's operating budget is approved by the City Council.

The accounting and financial reporting policies of the City conform to accounting principles for local government units as set forth by the Government Accounting Standards Board. Nine divisions are included in the City's financial structure for the Jetport, of which four are direct cost centers and five are indirect cost centers. These divisions are:

Direct

- Jetport Field
- General Aviation
- Terminal
- Parking

Indirect

- Jetport Administration
- Fringe and Indirect Costs
- Security
- Jetport Surplus
- Marketing

The Certificate

The Certificate authorizes the issuance of general airport revenue bonds by the City. Certain provisions of the Certificate, as well as the rate-making methodology contained in the Airline Agreements (discussed in subsequent subsections), were utilized to develop the financial analysis contained in this report. Sections of the Certificate as they pertain to this report are summarized in the following paragraphs.

- The Certificate defines Revenues as all receipts, revenues, fees, rentals, investment earnings, income, and other monies received by or on behalf of the City from or in connection with the ownership or operation of all or any part of the Jetport including without limitation all tolls and charges, landing fees, terminal rentals, real property rentals, concession fees, parking receipts, interest income, proceeds of business interruption insurance and condemnation awards from temporary takings, but not including proceeds of insurance (except business interruption insurance, if any) and of condemnation awards (except awards for temporary takings); proceeds of the sale of any Indebtedness; Grant Receipts; Passenger Facility Charges (PFC) Revenues; proceeds of any permitted sale of any portion of the Jetport; monies derived from facilities financed with the proceeds of certain Indebtedness; interest income or other investment earnings on the Project Fund; any Swap Termination Payments paid to the City; or any other amounts which are not deemed to be Revenues in accordance with generally accepted accounting principles or that are restricted as to their use.

- Under the Certificate, Net Revenues means with respect to a period of time, an amount equal to Revenues minus Maintenance and Operating (M&O) Expenses both accrued and payable during such period in accordance with generally accepted accounting principles.

- Under the Certificate, PFC Revenues are defined as any passenger facility charges or similar charges levied by or on behalf of the City pursuant to the *Federal Aviation Safety and Capacity Expansion Act of 1990*, as from time-to-time amended, and any successor thereto, and all investment earnings thereon.

- In Section 705 of the Certificate, the City covenants that for each Fiscal Year, it will fix and adjust Rates and Charges with respect to Portland International Jetport for the services and facilities furnished by the Jetport so that Net Revenues in each Fiscal Year will equal at least 125% of the Required Debt Service Fund deposits.

Application of Revenues

Article V of the Certificate creates certain funds and accounts and establishes the principal function and uses of each fund and account. These funds are described in detail in Section 503 through Section 513 of the Certificate and the purpose of the funds used in the financial analysis is summarized below.

- **Revenue Fund** – The purpose of this fund is to provide an account for the deposit of all Revenues as well as transfers to the Operating Fund, Debt Service Fund, M&O Expense Fund, Renewal and Replacement Reserve Fund, and Rebate Fund.

- **Project Fund** – This fund is for the deposit of all proceeds of Bonds, as defined in the Certificate, and certain other monies for the payment of Costs of a Project.

- **Operating Fund** – Transfers to this fund include the amount equal to M&O Expenses as shown in the Operating Budget.

- **Debt Service Fund** – This fund contains sub-accounts for principal, interest, redemption, and capitalized interest associated with Debt Service.

- **Debt Service Reserve Fund** – This fund includes deposits in an amount equal to the Maximum Annual Debt Service in any Fiscal Year. Investment earnings for this fund are considered Revenues.

- **M&O Reserve Fund** – Each Fiscal Year, the deposit in this fund shall equal the amount necessary to make the fund balance equal to M&O Expenses, as provided in the Operating Budget, for three consecutive months. Investment earnings for this fund are considered Revenues.

Passenger Airline Leases

The City has entered into signatory leases with Air Wisconsin Airlines, Continental Airlines, Delta Air Lines, DHL Airlines, FedEx, JetBlue Airways, Northwest Airlines, and US Airways (collectively, the Signatory Airlines). The Airline Agreement provides for code-share carriers to operate under the Airline Agreement as a Signatory Airline. Therefore, the regional/ commuter carriers that provide service under an operating agreement with a mainline carrier are also considered Signatory Airlines.

The Airline Agreements for the Signatory Airlines each have a term extending through December 31, 2006. It is the Jetport's intent to extend the current leases annually until treatment of the new terminal is negotiated with the airlines. This analysis assumes that the current methodologies outlined in the Airline Agreements will remain in place throughout the projection period. If new agreements are not signed once the Airline Agreements expire, the City has the option of setting rates by ordinance. Key provisions of the Airline Agreements between the City and the Signatory Airlines include the following:

- Rates for rentals, charges, and fees for the Signatory Airlines are calculated on an annual basis. The Landing Fee is a compensatory-based formula, based on requirements of the Jetport Field divided by total airport landed weight. The Terminal Building Rental Rate for each Terminal Building sub-centers (Common Use, Exclusive Use, International Arrivals Area, and Public/Concessions) is a compensatory-based formula, based on requirements of the Terminal Building divided by total square footage.

- Rentals, charges, and fees for the current rate setting period are adjusted for the variance of budget to actual M&O Expenses from the prior rate setting period.

- The Airline Agreements provide that for each rate adjustment period, the City will provide the budget and actual financial information for the prior rate setting period and a budget for the current rate setting period; the adjustment of rates for the prior Fiscal Year that is carried over to the current rate setting period; and the calculation of proposed rentals, charges, and fees for the current rate setting period to the Signatory Airlines. A meeting is also held between the Airport Manager and the Signatory Airlines for the purpose of discussing the proposed rentals, charges, and fees. The Airport Manager may also give consideration to Signatory Airline comments and suggestions prior to the adoption and finalization of the proposed rentals, charges, and fees.

- A Majority-In-Interest (MII) provision is included in the Airline Agreements for the Jetport Field and Terminal Building Capital Improvements that are not included as part of Exhibit B[1] of the Airline Agreement. MII is defined as 50% in number of all Signatory Airlines, which in aggregate paid 50% or more of Landing Fees or Terminal Building rentals in the preceding Fiscal Year for the Jetport Field and the Terminal Building, respectively.
- Portland International Jetport premises are leased by the Signatory Airlines exclusively, preferentially, and jointly. Any unleased areas are under the direct control of the City.

Other Leases

Other tenants occupy space and operate at Portland International Jetport under the terms and conditions of other leases. In general, the business terms of the other leases are based on industry practices and cost-recovery principles. Currently, Portland International Jetport has leases covering the following:

- Rental car activities;
- Food and beverage, and news and gifts concessions;
- Airport advertising and other terminal concessions;
- Other buildings and grounds;
- General aviation services; and
- Cargo airline operations.

CAPITAL IMPROVEMENT PROGRAM AND FUNDING SOURCES

Exhibit 6A shows gross project costs for the CIP and the estimated sources of funding. For purposes of projecting the financial results for Portland International Jetport, the project costs shown on the exhibit include allowances for Portland International Jetport costs allocable to capital projects and the acquisition of land; design, construction, and program management fees and contingencies; and allowances for inflation.

[1] Exhibit B, shown in the existing Airline Agreement, was the capital program developed in the previous master plan.

Sources of funding for the CIP are as follows:

- Federal grants under the Airport Improvement Program (AIP);
- PFC revenues;
- State grants; and
- Proceeds from the sale of airport revenue bonds.

The amount of funding available from these sources will depend primarily on future levels of aviation activity at Portland International Jetport and future federal reauthorizations.

Federal Grants

The Airport Improvement Program is authorized by the *Airport and Airway Improvement Act of 1982* (the Act). The Act authorized funding for the AIP from the Airport and Airway Trust Fund for airport development, airport planning, and noise compatibility planning and programs. The Airport and Airway Trust Fund is funded through several aviation user taxes on airline fares, air freight, and aviation gasoline.

Under the AIP, Portland International Jetport receives annual entitlement grants based on numbers of enplaned passengers and cargo tonnage and is eligible to receive discretionary grants. Other sources of funds under the AIP are also available to Portland International Jetport; however, entitlement and discretionary funds are the primary sources. In general, AIP grants can be used for land acquisition, noise mitigation, airfield improvements, on-airport roadways, public areas of terminal buildings, and safety and security systems and equipment. In allocating its discretionary funds, the FAA gives priority to projects that enhance airport capacity where capacity constraints have been demonstrated.

On April 5, 2000, the U.S. Congress approved passage of the *Wendell H. Ford Aviation Investment and Reform Act for the 21st Century* (AIR-21). Among several provisions, AIR-21 provided four years of AIP authorization, including Federal Fiscal Years (FFY) 2000 – 2003. The AIP was reauthorized for fiscal years 2000-2003 in legislation enacted in April 2000, and in the 2003 FAA Reauthorization Act for Federal Fiscal Years 2004-2007. For purposes of this analysis, it was assumed that federal programs similar to the AIP program would continue throughout the planning period.

The federal grants shown on **Exhibit 6A** reflect the receipt of entitlement funds beginning in FY 2007 through the Long Term Planning Period to finance projects in the CIP up to 95% of project costs. No discretionary grants are assumed for this analysis.

Passenger Facility Charges

PFCs are authorized by Title 14 of the Code of Federal Regulations, Part 158, and the PFC program is administered by the FAA. PFCs are collected from qualified enplaned passengers, and PFC revenues are used to fund eligible projects. A PFC of up to $4.50 per eligible enplaned passenger can be imposed by an airport operator. Once a PFC is imposed, it is included as part of the ticket price paid by passengers enplaning at the airport, collected by the airlines, and remitted to the airport operator, less an allowance for airline processing expenses. Portland International Jetport currently imposes a $3.00 PFC. The PFC legislation stipulates that if a medium- to large-hub airport institutes up to a $3.00 PFC, they must forego 50% of their AIP entitlement funds, which increases to 75% if they charge a $4.50 PFC. Since Portland International Jetport is a small-hub airport, it does not have to forego any of its annual AIP entitlement funds.

Projects that are eligible for PFC funding are those that preserve or enhance the capacity, safety, or security of the air transportation system; reduce noise or mitigate noise effects; or furnish opportunities for enhanced competition between or among air carriers. PFCs cannot be used for commercial facilities at airports, such as restaurants and other concession space, rental car facilities, public parking facilities, or construction of exclusively leased space or facilities.

In August 2005, Portland International Jetport received the FAA's authorization to collect up to $34,389,032 through a $3.00 PFC. In May 2006, this approval amount was increased by $1,190,731 to $35,579,763. Portland International Jetport expects that the first PFC authorization will expire on September 1, 2012. For purposes of this analysis, it was assumed that PFC revenues at the $3.00 level would not be available to fund the CIP until FY 2013, when the initial PFC authorization is projected to expire. The PFCs shown on **Exhibit 6A** assume that Portland International Jetport would receive authorization to increase its PFC to $4.50 per enplaned passenger and would be used to fund PFC-eligible project costs in the CIP. These monies would be available beginning in 2009 for the amount of the increase in the collection ($1.50) and beginning in September 2012 for the entire amount ($4.50). Since PFCs will not be available at the time the eligible projects are being constructed, this analysis assumed that general airport revenue bonds will be issued and future PFCs will be applied to pay down that eligible debt service.

State Grants

The AIP legislation stipulates that states fund half the local share percentage for eligible projects in an airport's capital program. Since Portland International Jetport is a small-hub airport, the formula for grants is 95% federal and 5% local. As a result, it is assumed that the State of Maine will fund 2.5% of the eligible projects in the CIP.

Local Share (General Airport Revenue Bonds)

Portland International Jetport has one series of outstanding bonds. The Series 2003A Bonds were issued in June 2003 for $35 million. These bonds were issued to primarily fund the parking garage that was completed in March 2003.

As shown on **Exhibit 6A**, the local share of the CIP equals approximately $53.9 million. Included in this amount is the construction of a south general aviation apron totaling approximately $3.8 million. This project is assumed to be funded by a third party and is not included in the financial results presented in the next section. The remaining $50.1 million of the local share is assumed to be funded with additional revenue bonds. Assumptions used to determine annual principal and interest payment on those future revenue bonds are described in the next section.

PROJECTED FINANCIAL RESULTS

Debt Service

Exhibit 6C presents the Jetport's debt service requirements for general obligation (GO) bonds, Series 2003A Bonds, and future airport revenue bonds (Future Bonds). The Future Bonds are anticipated to be issued to fund the remaining local share of the CIP costs in the three planning periods as presented in **Exhibit 6A** in the total amount of $50.1 million.

Estimated debt service requirements on Future Bonds issued for the CIP were based on the following allowances and assumptions:

- 30-year maturities (which is consistent with past practices at Portland International Jetport);
- Allowances for increases in bond interest rates through the long term;
- Allowances for capitalized interest;
- Funding of the Debt Service Reserve Account; and
- Allowances for costs of issuance.

The Debt Service Requirements are allocated to Portland International Jetport's divisions on the basis of the project costs financed with such bonds.

Maintenance and Operation Expenses

M&O Expenses at Portland International Jetport are assigned to the divisions described in the section entitled "Airport Financial Structure." Within each division, there are line items to which the M&O Expenses are assigned, which include, but are not limited to, the following categories:

- Payroll
- Benefits
- Administrative Services
- Contractual Services
- Maintenance and Repairs
- Rentals
- Insurance
- Supplies
- Utilities
- Contributions
- Capital Outlay

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	Historical			Projected: Short Term					Projected: Intermediate Term	Projected: Long Term
	2004	2005	2006	2007	2008	2009	2010	2011		
GENERAL OBLIGATION BONDS										
Jetport Administration (01)	$245,334	$224,492	$211,038	$200,224	$189,414	$178,596	$107,794	$80,267	$0	$0
TOTAL	$245,334	$224,492	$211,038	$200,224	$189,414	$178,596	$107,794	$80,267	$0	$0
SERIES 2003 BONDS										
Parking (09)	$743,826	$2,255,949	$2,253,625	$2,255,310	$2,255,809	$2,255,119	$2,253,241	$2,255,175	$11,269,095	$22,544,931
TOTAL	$743,826	$2,255,949	$2,253,625	$2,255,310	$2,255,809	$2,255,119	$2,253,241	$2,255,175	$11,269,095	$22,544,931
FUTURE REVENUE BONDS										
Jetport Administration (01)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Jetport Field (02)	0	0	0	0	0	0	316,752	316,752	1,907,311	6,508,314
General Aviation (03)	0	0	0	0	0	0	41,176	41,176	228,868	666,326
Fringe & Indirect Costs (04)	0	0	0	0	0	0	0	0	0	0
Security (05)	0	0	0	0	0	0	0	0	0	0
Terminal (06)	0	0	0	0	0	0	5,025,721	5,025,721	31,217,349	112,264,948
Jetport Surplus (07)	0	0	0	0	0	0	0	0	0	0
Marketing (08)	0	0	0	0	0	0	0	0	0	0
Parking (09)	0	0	0	0	0	0	1,955,351	1,955,351	10,868,472	31,642,411
TOTAL	$0	$0	$0	$0	$0	$0	$7,339,000	$7,339,000	$44,222,000	$151,082,000
TOTAL DEBT SERVICE										
Jetport Administration (01)	$245,334	$224,492	$211,038	$200,224	$189,414	$178,596	$107,794	$80,267	$0	$0
Jetport Field (02)	0	0	0	0	0	0	316,752	316,752	1,907,311	6,508,314
General Aviation (03)	0	0	0	0	0	0	41,176	41,176	228,868	666,326
Fringe & Indirect Costs (04)	0	0	0	0	0	0	0	0	0	0
Security (05)	0	0	0	0	0	0	0	0	0	0
Terminal (06)	0	0	0	0	0	0	5,025,721	5,025,721	31,217,349	112,264,948
Jetport Surplus (07)	0	0	0	0	0	0	0	0	0	0
Marketing (08)	0	0	0	0	0	0	0	0	0	0
Parking (09)	743,826	2,255,949	2,253,625	2,255,310	2,255,809	2,255,119	4,208,592	4,210,526	22,137,567	54,187,343
TOTAL	$989,160	$2,480,441	$2,464,663	$2,455,534	$2,445,223	$2,433,715	$9,700,035	$9,674,442	$55,491,095	$173,626,931

Sources: Jetport records for G.O. and Series 2003B Bond debt service, MAC Consulting, LLC for future debt service requirements

PORTLAND INTERNATIONAL JETPORT

Exhibit 6C
DEBT SERVICE REQUIREMENTS

Exhibit 6D presents historical and projected M&O Expenses by line item and cost center for FY 2004 through the long-term planning period. M&O Expenses are projected to increase at an average annual growth rate of 7.1 percent from 2007 through the long-term planning period, reflecting an increase due to inflation of 4.0 percent and allowances for additional expenses associated with certain projects in the CIP, such as the terminal expansion, roadways, and public parking projects.

Revenues

- NON-AIRLINE REVENUES

Non-airline revenues accounted for nearly 60 percent of total revenues in FY 2006. Non-airline revenues are projected to increase at an average annual growth rate of 5.9% from 2007 through the long-term planning period, reflecting an increase in the number of enplaned passengers and price increases. In general, it was assumed that Portland International Jetport would renegotiate leases that expire during the planning period with terms and conditions reflective of a new terminal, and would implement changes in rate structures and business practices, as necessary, to maintain positive financial performance.

Exhibit 6E presents historical non-airline revenues from FY 2004 through FY 2006 and projected non-airline revenues for the three planning periods.

- PASSENGER AND CARGO AIRLINE REVENUES

As stated earlier, the Airline Agreement provides the basis for the annual recalculation of passenger and cargo airline rates and charges, which are compensatory-based formulas that recover the costs of operating the Jetport Field and Terminal cost centers. For purposes of this analysis, it was assumed that similar methodologies for recalculating airline rates and charges would be used by Portland International Jetport following expiration of the leases on December 31, 2006.

In general, the projections of passenger and cargo airline revenues shown on **Exhibit 6F** were based on the following assumptions:

- The calculation of airline rates and charges in the future would include the additional Debt Service Requirements, M&O Expenses, and amortization of internally generated cash flow associated with projects in the CIP;
- Current amounts of airline rented space and gate use would form the basis for the use of existing facilities; and
- Additional space leased by the passenger airlines would be based on assumptions regarding existing gate use, the ratio of space leased, on average, to the number of gates leased, and the forecasts of aviation activity presented in Chapter Two.

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	Historical			Projected						
				Short Term					Intermediate Term	Long Term
	2004	2005	2006	2007	2008	2009	2010	2011		
Summary by Line Item										
Payroll	$1,719,620	$1,724,901	$1,860,790	$1,997,298	$2,076,000	$2,159,000	$3,291,000	$3,424,000	$20,369,000	$65,537,000
Benefits	898,996	965,420	1,035,803	1,067,776	1,110,000	1,154,000	1,210,000	1,258,000	7,088,000	19,152,000
Administrative Services	436,915	471,363	484,162	512,947	533,000	556,000	769,000	799,000	4,688,000	14,562,000
Contractual Services	1,505,846	1,498,482	1,584,244	1,713,898	1,783,000	1,854,000	3,598,000	3,743,000	22,779,000	77,942,000
Maintenance & Repairs	665,729	529,655	714,501	649,408	675,000	701,000	1,121,000	1,165,000	6,943,000	22,559,000
Rentals	155,156	213,899	153,541	221,953	230,000	238,000	263,000	273,000	1,549,000	4,304,000
Insurance	120,324	120,366	127,064	147,232	153,000	159,000	165,000	172,000	968,000	2,607,000
Supplies	439,141	534,552	571,938	594,895	619,000	645,000	873,000	908,000	5,316,000	16,245,000
Utilities	499,754	497,486	623,134	707,064	735,000	763,000	1,686,000	1,754,000	10,816,000	38,334,000
Contributions	1,791,986	2,004,969	1,872,061	1,871,669	1,946,000	2,024,000	2,105,000	2,189,000	12,335,000	33,276,000
	$8,233,467	$8,561,093	$9,027,239	$9,484,140	$9,860,000	$10,253,000	$15,081,000	$15,685,000	$92,851,000	$294,518,000
Summary by Cost Center										
Jetport Administration (01)	$1,395,319	$1,360,636	$1,532,908	$1,639,080	$1,704,000	$1,772,000	$1,843,000	$1,917,000	$10,796,000	$29,027,000
Jetport Field (02)	1,484,833	1,516,131	1,699,588	1,852,234	1,925,000	2,001,000	2,080,000	2,163,000	12,181,000	32,802,000
General Aviation (03)	16,142	21,320	40,954	28,306	31,000	32,000	33,000	34,000	185,000	445,000
Fringe & Indirect Costs (04)	37,213	29,407	0	0	0	0	0	0	0	0
Security (05)	1,594,703	1,493,237	1,522,232	1,259,319	1,308,000	1,360,000	1,415,000	1,472,000	8,285,000	22,332,000
Terminal (06)	2,176,283	2,086,735	2,338,142	2,549,626	2,652,000	2,757,000	7,170,000	7,458,000	46,542,000	169,906,000
Jetport Surplus (07)	0	0	0	0	0	0	0	0	0	0
Marketing (08)	0	153,057	132,429	151,756	157,000	164,000	171,000	178,000	1,001,000	2,697,000
Parking (09)	137,011	111,008	51,239	193,509	201,000	209,000	333,000	346,000	1,937,000	5,165,000
ARFF	1,310,761	1,697,716	1,709,746	1,810,310	1,882,000	1,958,000	2,036,000	2,117,000	11,924,000	32,144,000
Roadways	81,202	91,845	0	0	0	0	0	0	0	0
	$8,233,467	$8,561,093	$9,027,239	$9,484,140	$9,860,000	$10,253,000	$15,081,000	$15,685,000	$92,851,000	$294,518,000

Sources: Jetport Records, 2004 through 2007; MAC Consulting, LLC, 2008 - long-term projection period

	Historical			Projected: Short Term					Projected: Intermediate Term	Projected: Long Term
	2004	2005	2006	2007	2008	2009	2010	2011		
Terminal Concessions										
Restaurant	$272,982	$330,298	$341,187	$360,000	$378,000	$397,000	$866,000	$910,000	$6,421,000	$29,896,000
News/Gift Shop	168,904	212,592	228,759	275,000	289,000	304,000	663,000	697,000	4,924,000	22,930,000
Advertising	82,943	53,602	81,558	80,000	84,000	88,000	192,000	202,000	1,425,000	6,647,000
Other	12,141	15,142	36,966	37,000	39,000	41,000	89,000	94,000	662,000	3,091,000
	$536,969	$611,633	$688,469	$752,000	$790,000	$830,000	$1,810,000	$1,903,000	$13,432,000	$62,564,000
TSA Space Rental	$0	$241,712	$200,067	$199,041	$207,000	$215,000	$224,000	$233,000	$1,311,000	$3,530,000
Parking										
Main Garage	$3,168,502	$4,123,770	$3,702,125	$4,768,100	$4,963,000	$5,167,000	$6,450,000	$6,712,000	$37,238,000	$95,598,000
Employee Lot	0	90,223	102,072	104,527	106,000	107,000	108,000	109,000	560,000	1,195,000
Remote Garage	0	1,500	9,812	1,500	2,000	2,000	2,000	2,000	10,000	20,000
	$3,168,502	$4,215,492	$3,814,009	$4,874,127	$5,071,000	$5,276,000	$6,560,000	$6,823,000	$37,808,000	$96,813,000
Rental Car										
Commissions	$1,923,438	$2,144,827	$1,964,889	$2,394,663	$2,517,000	$2,647,000	$3,059,000	$3,215,000	$18,386,000	$50,940,000
Terminal Use	103,556	127,008	100,583	111,323	114,000	116,000	118,000	120,000	633,000	1,485,000
Parking	214,200	214,200	211,944	214,200	223,000	232,000	241,000	251,000	1,412,000	3,807,000
Service Facility	21,668	21,668	23,272	25,700	27,000	28,000	29,000	30,000	165,000	433,000
	$2,262,862	$2,507,703	$2,300,688	$2,745,886	$2,881,000	$3,023,000	$3,447,000	$3,616,000	$20,596,000	$56,665,000
Ground and Hangar Rentals	$363,218	$411,216	$455,865	$425,720	$443,000	$461,000	$479,000	$598,000	$3,370,000	$9,081,000
Miscellaneous	$157,306	$42,216	$29,452	$30,063	$31,000	$32,000	$33,000	$34,000	$185,000	$445,000
TOTAL NONAIRLINE REVENUES	**$6,488,857**	**$8,029,972**	**$7,488,551**	**$9,026,837**	**$9,423,000**	**$9,837,000**	**$12,553,000**	**$13,207,000**	**$76,702,000**	**$229,098,000**

Sources: Jetport Records, 2004 through 2007; MAC Consulting, LLC, 2008 - long-term projection period

PWM PORTLAND INTERNATIONAL JETPORT

Exhibit 6E
NONAIRLINE OPERATING REVENUES

As shown on the table, the total of all passenger airline payments (terminal rentals, landing fees, and other charges) expressed on a per enplaned passenger basis for the same period is projected to increase from $6.25 in FY 2006 to $23.06 in the long-term planning period (from $6.25 to $12.76 in FY 2006 dollars).

Debt Service Coverage

Exhibit 6F also presents the estimated debt service coverage ratio. In Section 705 of the Certificate, the City covenants that for each Fiscal Year, it will adjust Rates and Charges with respect to the Jetport for the services and facilities furnished by the Jetport so that Net Revenues in each Fiscal Year will equal at least 125% of the Required Debt Service Fund Deposits. As shown on the table, Net Revenues (Revenues less M&O Expenses) are projected to increase from $3.1 million in FY 2006 to $191.8 million in the long-term planning period, resulting in debt service coverage ratios that exceed the requirements of the Certificate.

SUMMARY

Exhibit 6A presents the CIP and funding sources. As previously indicated, it was assumed that project costs would be funded with a combination of federal grants, PFC revenues, state grants, and future airport revenue bonds. Beyond the short-term planning period, Portland International Jetport will continue to be developed as required to meet the needs of increasing passenger demand, consistent with future funding sources available to Portland International Jetport at the time of project implementation. The financial feasibility of future projects will be determined by the provisions of existing or future leases, funding levels and participation rates of federal grant programs, the availability of PFC revenues (pay-as-you-go and leveraged), bonding capacity, and the ability to generate internal cash flow from Portland International Jetport operations.

The financial projections were prepared on the basis of available information and assumptions set forth in this chapter. It is believed that such information and assumptions provide a reasonable basis for the projections to the level of detail appropriate for an airport master plan. Based on these assumptions, the CIP could be financed in the future by Portland International Jetport and result in key financial indicators that are consistent with the historical results of the Jetport and industry comparables. However, some of the assumptions used to develop the projections will not be realized, and unanticipated events and circumstances may occur. Therefore, the actual results will vary from those projected, and such variations could be material.

04MP17-6F-2/12/07

Airline Revenues

	Historical			Projected						
				Short Term					Intermediate Term	Long Term
	2004	2005	2006	2007	2008	2009	2010	2011		
Terminal Areas	$2,836,094	$2,696,633	$2,275,025	$2,262,572	$2,648,000	$2,733,000	$9,400,000	$8,437,000	$51,512,000	$201,211,000
Landing Fees	1,884,664	2,283,332	1,969,475	2,391,388	2,511,000	2,574,000	2,847,000	2,893,000	16,084,000	43,251,000
Total	$4,720,758	$4,979,964	$4,244,499	$4,653,960	$5,159,000	$5,307,000	$12,247,000	$11,330,000	$67,596,000	$244,462,000
Enplanements	638,674	744,513	679,458	754,000	777,000	801,000	825,000	850,000	4,574,000	10,880,000
Airline Cost Per Enplanement	$7.39	$6.69	$6.25	$6.17	$6.64	$6.63	$14.84	$13.33	$23.20	$23.06
Airline Cost Per Enpl (PV at 3%)	$7.39	$6.69	$6.25	$5.99	$6.26	$6.06	$13.19	$11.50	$17.26	$12.76

Sources: Jetport Records, 2004 through 2007; MAC Consulting, LLC, 2008 - long-term projection period

Cash Flow

	Historical			Projected						
				Short Term					Intermediate Term	Long Term
	2004	2005	2006	2007	2008	2009	2010	2011		
REVENUES										
Airline Revenues	$4,720,758	$4,979,964	$4,244,499	$4,653,960	$5,159,000	$5,307,000	$12,247,000	$11,330,000	$67,596,000	$244,462,000
Nonairline Revenues	6,488,857	8,029,972	7,488,551	9,026,837	9,423,000	9,837,000	12,553,000	13,207,000	76,702,000	229,098,000
Non-Operating [1]	132,326	250,600	440,305	271,600	277,000	282,000	728,000	734,000	5,575,000	12,725,000
TOTAL REVENUES	$11,341,940	$13,260,537	$12,173,354	$13,952,397	$14,859,000	$15,426,000	$25,528,000	$25,271,000	$149,873,000	$486,285,000
M&O Expense	$8,233,467	$8,561,093	$9,027,239	$9,484,140	$9,860,000	$10,253,000	$15,081,000	$15,685,000	$92,851,000	$294,518,000
NET REVENUES	$3,108,473	$4,699,443	$3,146,116	$4,468,257	$4,999,000	$5,173,000	$10,447,000	$9,586,000	$57,022,000	$191,767,000
Equipment & Capital Outlays	$207,780	$372,767	$237,492	$582,650	$26,490	$26,490	$26,490	$26,490	$132,450	$264,900
Prior G.O. Bond Dbt Svc	245,334	224,492	211,038	200,224	189,414	178,596	107,794	80,267	0	0
Series 2003 Bond Debt Service	743,826	2,255,949	2,253,625	2,255,310	2,255,809	2,255,119	2,253,241	2,255,175	11,269,095	22,544,931
Future Revenue Bond Debt Service	0	0	0	0	0	0	7,339,000	7,339,000	44,222,000	151,082,000
LESS: PFCs Applied to Debt Service	0	0	0	0	0	0	(1,127,000)	(1,760,000)	(16,796,000)	(46,258,000)
Net Surplus/(Deficit)	$1,911,534	$1,846,236	$443,960	$1,430,073	$2,527,288	$2,712,796	$1,847,476	$1,645,069	$18,194,455	$64,133,169
M&O Reserve Fund	$758,367	$81,907	$116,536	$114,225	$93,965	$98,250	$1,207,000	$151,000	$1,980,500	$2,823,250
NET REMAINING REVENUES	$1,153,167	$1,764,329	$327,424	$1,315,848	$2,433,323	$2,614,546	$640,476	$1,494,069	$16,213,955	$61,309,919
DEBT SERVICE COVERAGE RATIO										
Net Revenues	$3,108,473	$4,699,443	$3,146,116	$4,468,257	$4,999,000	$5,173,000	$10,447,000	$9,586,000	$57,022,000	$191,767,000
PLUS: Rollling Coverage	0	0	0	0	0	0	855,515	855,515	5,431,642	20,308,569
Adjusted Net Revenues	$3,108,473	$4,699,443	$3,146,116	$4,468,257	$4,999,000	$5,173,000	$11,302,515	$10,441,515	$62,453,642	$212,075,569
Revenue Bond Debt Service	$743,826	$2,255,949	$2,253,625	$2,255,310	$2,255,809	$2,255,119	$9,592,241	$9,594,175	$55,491,095	$173,626,931
LESS: PFCs Applied to Debt Service	0	0	0	0	0	0	(1,127,000)	(1,760,000)	(16,796,000)	(46,258,000)
Net Debt Service	$743,826	$2,255,949	$2,253,625	$2,255,310	$2,255,809	$2,255,119	$8,465,241	$7,834,175	$38,695,095	$127,368,931
DEBT SERVICE COVERAGE RATIO	**N/A**	**2.08**	**1.40**	**1.98**	**2.22**	**2.29**	**1.34**	**1.33**	**1.61**	**1.67**

[1]Non-operating revenue includes interest income. Source: Jetport Records, 2004 through 2007; MAC Consulting, LLC, 2008 - long-term project period

Exhibit 6F
AIRLINE REVENUES & CASH FLOW

PORTLAND INTERNATIONAL JETPORT

Appendix A

GLOSSARY OF TERMS

Appendix A

GLOSSARY OF TERMS

ACCELERATE-STOP DISTANCE AVAILABLE (ASDA): see declared distances.

AIR CARRIER: an operator which: (1) performs at least five round trips per week between two or more points and publishes flight schedules which specify the times, days of the week, and places between which such flights are performed; or (2) transport mail by air pursuant to a current contract with the U.S. Postal Service. Certified in accordance with Federal Aviation Regulation (FAR) Parts 121 and 127.

AIRPORT REFERENCE CODE (ARC): a coding system used to relate airport design criteria to the operational (Aircraft Approach Category) to the physical characteristics (Airplane Design Group) of the airplanes intended to operate at the airport.

AIRPORT REFERENCE POINT (ARP): The latitude and longitude of the approximate center of the airport.

AIRPORT ELEVATION: The highest point on an airport's usable runway expressed in feet above mean sea level (MSL).

AIRPORT LAYOUT DRAWING (ALD): The drawing of the airport showing the layout of existing and proposed airport facilities.

AIRCRAFT APPROACH CATEGORY: a grouping of aircraft based on 1.3 times the stall speed in their landing configuration at their maximum certificated landing weight. The categories are as follows:

- *Category A:* Speed less than 91 knots.
- *Category B:* Speed 91 knots or more, but less than 121 knots.
- *Category C:* Speed 121 knots or more, but less than 141 knots.
- *Category D:* Speed 141 knots or more, but less than 166 knots.
- *Category E:* Speed greater than 166 knots.

AIRPLANE DESIGN GROUP (ADG): a grouping of aircraft based upon wingspan. The groups are as follows:

- *Group I:* Up to but not including 49 feet.
- *Group II:* 49 feet up to but not including 79 feet.
- *Group III:* 79 feet up to but not including 118 feet.
- *Group IV:* 118 feet up to but not including 171 feet.
- *Group V:* 171 feet up to but not including 214 feet.
- *Group VI:* 214 feet or greater.

AIR TAXI: An air carrier certificated in accordance with FAR Part 135 and authorized to provide, on demand, public transportation of persons and property by aircraft. Generally operates small aircraft "for hire" for specific trips.

AIRPORT TRAFFIC CONTROL TOWER (ATCT): a central operations facility in the terminal air traffic control system, consisting of a tower, including an associated instrument flight rule (IFR) room if radar equipped, using air/ground communications and/or radar, visual signaling, and other devices to provide safe and expeditious movement of terminal air traffic.

AIR ROUTE TRAFFIC CONTROL CENTER (ARTCC): a facility established to provide air traffic control service to aircraft operating on an IFR flight plan within controlled airspace and principally during the enroute phase of flight.

ALERT AREA: see special-use airspace.

ANNUAL INSTRUMENT APPROACH (AIA): an approach to an airport with the intent to land by an aircraft in accordance with an IFR flight plan when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude.

APPROACH LIGHTING SYSTEM (ALS): an airport lighting facility which provides visual guidance to landing aircraft by radiating light beams by which the pilot aligns the aircraft with the extended centerline of the runway on his final approach and landing.

APPROACH MINIMUMS: the altitude below which an aircraft may not descend while on an IFR approach unless the pilot has the runway in sight.

AUTOMATIC DIRECTION FINDER (ADF): an aircraft radio navigation system which senses and indicates the direction to a non-directional radio beacon (NDB) ground transmitter.

AUTOMATED WEATHER OBSERVATION STATION (AWOS): equipment used to automatically record weather conditions (i.e. cloud height, visibility, wind speed and direction, temperature, dewpoint, etc...)

AUTOMATED TERMINAL INFORMATION SERVICE (ATIS): the continuous broadcast of recorded non-control information at towered airports. Information typically includes wind speed, direction, and runway in use.

AZIMUTH: Horizontal direction expressed as the angular distance between true north and the direction of a fixed point (as the observer's heading).

BASE LEG: A flight path at right angles to the landing runway off its approach end. The base leg normally extends from the downwind leg to the intersection of the extended runway centerline. See "traffic pattern."

BEARING: the horizontal direction to or from any point, usually measured clockwise from true north or magnetic north.

BLAST FENCE: a barrier used to divert or dissipate jet blast or propeller wash.

BUILDING RESTRICTION LINE (BRL): A line which identifies suitable building area locations on the airport.

CIRCLING APPROACH: a maneuver initiated by the pilot to align the aircraft with the runway for landing when flying a predetermined circling instrument approach under IFR.

CLASS A AIRSPACE: see Controlled Airspace.

CLASS B AIRSPACE: see Controlled Airspace.

CLASS C AIRSPACE: see Controlled Airspace.

CLASS D AIRSPACE: see Controlled Airspace.

CLASS E AIRSPACE: see Controlled Airspace.

CLASS G AIRSPACE: see Controlled Airspace.

CLEAR ZONE: see Runway Protection Zone.

CROSSWIND: wind flow that is not parallel to the runway of the flight path of an aircraft.

COMPASS LOCATOR (LOM): a low power, low/medium frequency radiobeacon installed in conjunction with the instrument landing system at one or two of the marker sites.

CONTROLLED AIRSPACE: airspace of defined dimensions within which air traffic control services are provided to instrument flight rules (IFR) and visual flight rules (VFR) flights in accordance with the airspace classification. Controlled airspace in the United States is designated as follows:

- *CLASS A:* generally, the airspace from 18,000 feet mean sea level (MSL) up to but not including flight level FL600. All persons must operate their aircraft under IFR.

- *CLASS B:* generally, the airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports. The configuration of Class B airspace is unique to each airport, but typically consists of two or more layers of air space and is designed to contain all published instrument approach procedures to the airport. An air traffic control clearance is required for all aircraft to operate in the area.

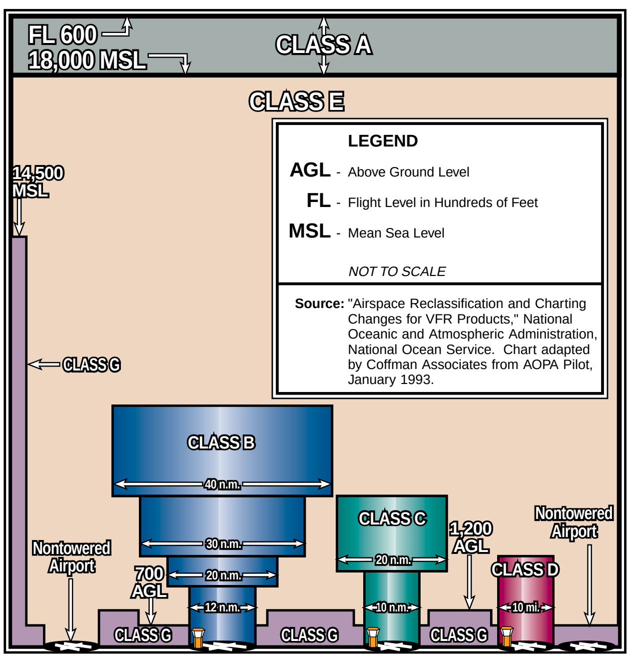
- *CLASS C:* generally, the airspace from the surface to 4,000 feet above the air port elevation (charted as MSL) surrounding those airports that have an operational control tower and radar approach control and are served by a qualifying number of IFR operations or passenger enplanements. Although individually tailored for each airport, Class C airspace typically consists of a surface area with a five nautical mile (nm) radius and an outer area with a 10 nautical mile radius that extends from 1,200 feet to 4,000 feet above the airport elevation. Two-way radio communication is required for all aircraft.

- *CLASS D:* generally, that airspace from the surface to 2,500 feet above the air port elevation (charted as MSL) surrounding those airport that have an operational control tower. Class D air space is individually tailored and configured to encompass published instrument approach procedures.
  Unless otherwise authorized, all

persons must establish two-way radio communication.

- *CLASS E:* generally, controlled airspace that is not classified as Class A, B, C, or D. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. When designated as a surface area, the airspace will be configured to contain all instrument procedures. Class E airspace encompasses all Victor Airways. Only aircraft following instrument flight rules are required to establish two-way radio communication with air traffic control.

- *CLASS G:* generally, that airspace not classified as Class A, B, C, D, or E. Class G airspace is uncontrolled for all aircraft. Class G airspace extends from the surface to the overlying Class E airspace.



CONTROLLED FIRING AREA: see special-use airspace.

CROSSWIND LEG: A flight path at right angles to the landing runway off its upwind end. See "traffic pattern."

DECLARED DISTANCES: The distances declared available for the airplane's takeoff runway, takeoff distance, accelerate-stop distance, and landing distance requirements. The distances are:

- *TAKEOFF RUNWAY AVAILABLE (TORA):* The runway length declared available and suitable for the ground run of an airplane taking off;

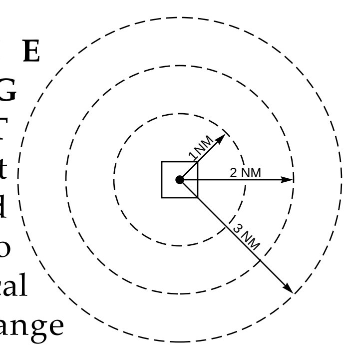
- *TAKEOFF DISTANCE AVAILABLE (TODA):* The TORA plus the length of any remaining runway and/or clear way beyond the far end of the TORA;

- *ACCELERATE-STOP DISTANCE AVAILABLE (ASDA):* The runway plus stopway length declared available for the acceleration and deceleration of an aircraft aborting a takeoff; and

- *LANDING DISTANCE AVAILABLE (LDA):* The runway length declared available and suitable for landing.

DISPLACED THRESHOLD: a threshold that is located at a point on the runway other than the designated beginning of the runway.

DISTANCE MEASURING EQUIPMENT (DME): Equipment (airborne and ground) used to measure, in nautical miles, the slant range



distance of an aircraft from the DME navigational aid.

DNL: The 24-hour average sound level, in A-weighted decibels, obtained after the addition of ten decibels to sound levels for the periods between 10 p.m. and 7 a.m. as averaged over a span of one year. It is the FAA standard metric for determining the cumulative exposure of individuals to noise.

DOWNWIND LEG: A flight path parallel to the landing runway in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg. Also see "traffic pattern."

EASEMENT: The legal right of one party to use a portion of the total rights in real estate owned by another party. This may include the right of passage over, on, or below the property; certain air rights above the property, including view rights; and the rights to any specified form of development or activity, as well as any other legal rights in the property that may be specified in the easement document.

ENPLANED PASSENGERS: the total number of revenue passengers boarding aircraft, including originating, stop-over, and transfer passengers, in scheduled and non-scheduled services.

FINAL APPROACH: A flight path in the direction of landing along the extended runway centerline. The final approach normally extends from the base leg to the runway. See "traffic pattern."

FIXED BASE OPERATOR (FBO): A provider of services to users of an airport. Such services include, but are not limited to, hangaring, fueling, flight training, repair, and maintenance.

FRANGIBLE NAVAID: a navigational aid which retains its structural integrity and stiffness up to a designated maximum load, but on impact from a greater load, breaks, distorts, or yields in such a manner as to present the minimum hazard to aircraft.

GENERAL AVIATION: that portion of civil aviation which encompasses all facets of aviation except air carriers holding a certificate of convenience and necessity, and large aircraft commercial operators.

GLIDESLOPE (GS): Provides vertical guidance for aircraft during approach and landing. The glideslope consists of the following:

1. Electronic components emitting signals which provide vertical guidance by reference to airborne instruments during instrument approaches such as ILS; or

2. Visual ground aids, such as VASI, which provide vertical guidance for VFR approach or for the visual portion of an instrument approach and landing.

GLOBAL POSITIONING SYSTEM: See "GPS."

GPS - GLOBAL POSITIONING SYSTEM: A system of 24 satellites used as reference points to enable navigators equipped with GPS receivers to determine their latitude, longitude, and altitude.

HELIPAD: a designated area for the takeoff, landing, and parking of helicopters.

HIGH-SPEED EXIT TAXIWAY: a long radius taxiway designed to expedite aircraft turning off the runway after landing (at speeds to 60 knots), thus reducing runway occupancy time.

INSTRUMENT APPROACH: A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

INSTRUMENT FLIGHT RULES (IFR): Rules governing the procedures for conducting instrument flight. Also a term used by pilots and controllers to indicate type of flight plan.

INSTRUMENT LANDING SYSTEM (ILS): A precision instrument approach system which normally consists of the following electronic components and visual aids:

1. Localizer.
2. Glide Slope.
3. Outer Marker.
4. Middle Marker.
5. Approach Lights.

LANDING DISTANCE AVAILABLE (LDA): see declared distances.

LOCAL TRAFFIC: aircraft operating in the traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from the local practice areas, or aircraft executing practice instrument approach procedures. Typically, this includes touch-and-go training operations.

LOCALIZER: The component of an ILS which provides course guidance to the runway.

LOCALIZER TYPE DIRECTIONAL AID (LDA): a facility of comparable utility and accuracy to a localizer, but is not part of a complete ILS and is not aligned with the runway.

LORAN: long range navigation, an electronic navigational aid which determines aircraft position and speed by measuring the difference in the time of reception of synchronized pulse signals from two fixed transmitters. Loran is used for enroute navigation.

MICROWAVE LANDING SYSTEM (MLS): an instrument approach and landing system that provides precision guidance in azimuth, elevation, and distance measurement.

MILITARY OPERATIONS AREA (MOA): see special-use airspace.

MISSED APPROACH COURSE (MAC): The flight route to be followed if, after an instrument approach, a landing is not affected, and occurring normally:

1. When the aircraft has descended to the decision height and has not established visual contact; or

2. When directed by air traffic control to pull up or to go around again.

MOVEMENT AREA: the runways, taxiways, and other areas of an airport which are utilized for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports with a tower, air traffic control clearance is required for entry onto the movement area.

NAVAID: a term used to describe any electrical or visual air navigational aids, lights, signs, and associated supporting equipment (i.e. PAPI, VASI, ILS, etc..)

NOISE CONTOUR: A continuous line on a map of the airport vicinity connecting all points of the same noise exposure level.

NONDIRECTIONAL BEACON (NDB): A beacon transmitting nondirectional signals whereby the pilot of an aircraft equipped with direction finding equipment can determine his or her bearing to and from the radio beacon and home on, or track to, the station. When the radio beacon is installed in conjunction with the Instrument Landing System marker, it is normally called a Compass Locator.

NONPRECISION APPROACH PROCEDURE: a standard instrument approach procedure in which no electronic glide slope is provided, such as VOR, TACAN, NDB, or LOC.

OBJECT FREE AREA (OFA): an area on the ground centered on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.

OBSTACLE FREE ZONE (OFZ): the airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be kept clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function, in order to provide clearance for aircraft landing or taking off from the runway, and for missed approaches.

OPERATION: a take-off or a landing.

OUTER MARKER (OM): an ILS navigation facility in the terminal area navigation system located four to seven miles from the runway edge on the extended centerline indicating to the pilot, that he/she is passing over the facility and can begin final approach.

PRECISION APPROACH: a standard instrument approach procedure which provides runway alignment and glide slope (descent) information. It is categorized as follows:

- *CATEGORY I (CAT I):* a precision approach which provides for approaches with a decision height of not less than 200 feet and visibility not less than 1/2 mile or Runway Visual Range (RVR) 2400 (RVR 1800) with operative touchdown zone and runway centerline lights.

- *CATEGORY II (CAT II):* a precision approach which provides for approaches with a decision height of not less than 100 feet and visibility not less than 1200 feet RVR.

- *CATEGORY III (CAT III):* a precision approach which provides for approaches with minima less than Category II.

PRECISION APPROACH PATH INDICATOR (PAPI): A lighting system providing visual approach slope guidance to aircraft during a landing approach. It is similar to a VASI but provides a sharper transition between the colored indicator lights.

PRECISION OBJECT FREE AREA (POFA): an area centered on the extended runway centerline, beginning at the runway threshold and extending behind the runway threshold that is 200 feet long by 800 feet wide. The POFA is a clearing standard which requires the POFA to be kept clear of above ground objects protruding above the runway safety area edge elevation (except for frangible NAVAIDS). The POFA applies to all new authorized instrument approach procedures with less than 3/4 mile visibility.

PROHIBITED AREA: see special-use airspace.

REMOTE COMMUNICATIONS OUTLET (RCO): an unstaffed transmitter receiver/facility remotely controlled by air traffic personnel. RCOs serve flight service stations (FSSs). RCOs were established to provide ground-to-ground communications between air traffic control specialists and pilots at satellite airports for delivering enroute clearances, issuing departure authorizations, and acknowledging instrument flight rules cancellations or departure/landing times.

REMOTE TRANSMITTER/RECEIVER (RTR): see remote communications outlet. RTRs serve ARTCCs.

RELIEVER AIRPORT: an airport to serve general aviation aircraft which might otherwise use a congested air-carrier served airport.

RESTRICTED AREA: see special-use airspace.

RNAV: area navigation - airborne equipment which permits flights over determined tracks within prescribed accuracy tolerances without the need to overfly ground-based navigation facilities. Used enroute and for approaches to an airport.

RUNWAY: a defined rectangular area on an airport prepared for aircraft landing and takeoff. Runways are normally numbered in relation to their magnetic direction, rounded off to the nearest 10 degrees. For example, a runway with a magnetic heading of 180 would be designated Runway 18. The runway heading on the opposite end of the runway is 180 degrees from that runway end. For example, the opposite runway heading for Runway 18 would be Runway 36 (magnetic heading of 360). Aircraft can takeoff or land from either end of a runway, depending upon wind direction.

RUNWAY BLAST PAD: a surface adjacent to the ends of runways provided to reduce the erosive effect of jet blast and propeller wash.

RUNWAY END IDENTIFIER LIGHTS (REIL): Two synchronized flashing lights, one on each side of the runway threshold, which provide rapid and positive identification of the approach end of a particular runway.

RUNWAY GRADIENT: the average slope, measured in percent, between the two ends of a runway.

RUNWAY PROTECTION ZONE (RPZ): An area off the runway end to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape. Its dimensions are determined by the aircraft approach speed and runway approach type and minima.

RUNWAY SAFETY AREA (RSA): a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.

RUNWAY VISUAL RANGE (RVR): an instrumentally derived value, in feet, representing the horizontal distance a pilot can see down the runway from the runway end.

RUNWAY VISIBILITY ZONE (RVZ): an area on the airport to be kept clear of permanent objects so that there is an unobstructed line-of-site from any point five feet above the runway centerline to any point five feet above an intersecting runway centerline.

SEGMENTED CIRCLE: a system of visual indicators designed to provide traffic pattern information at airports without operating control towers.

SHOULDER: an area adjacent to the edge of paved runways, taxiways or aprons providing a transition between the pavement and the adjacent surface; support for aircraft running off the pavement; enhanced drainage; and blast protection. The shoulder does not necessarily need to be paved.

SLANT-RANGE DISTANCE: The straight line distance between an aircraft and a point on the ground.

SPECIAL-USE AIRSPACE: airspace of defined dimensions identified by a surface area wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. Special-use airspace classifications include:

- *ALERT AREA:* airspace which may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft.

- *CONTROLLED FIRING AREA:* airspace wherein activities are conducted under conditions so controlled as to eliminate hazards to nonparticipating aircraft and to ensure the safety of persons or property on the ground.

- *MILITARY OPERATIONS AREA (MOA):* designated airspace with defined vertical and lateral dimensions established outside Class A airspace to separate/segregate certain military activities from instrument flight rule (IFR) traffic and to identify for visual flight rule (VFR) traffic where these activities are conducted.

- *PROHIBITED AREA:* designated airspace within which the flight of aircraft is prohibited.

- *RESTRICTED AREA:* airspace designated under Federal Aviation Regulation (FAR) 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated joint use. When not in use by the using agency, IFR/VFR operations can be authorized by the controlling air traffic control facility.

- *WARNING AREA:* airspace which may contain hazards to nonparticipating aircraft.

STANDARD INSTRUMENT DEPARTURE (SID): a preplanned coded air traffic control IFR departure routing, preprinted for pilot use in graphic and textual form only.

STANDARD TERMINAL ARRIVAL (STAR): a preplanned coded air traffic control IFR arrival routing, preprinted for pilot use in graphic and textual or textual form only.

STOP-AND-GO: a procedure wherein an aircraft will land, make a complete stop on the runway, and then commence a takeoff from that point. A stop-and-go is recorded as two operations: one operation for the landing and one operation for the takeoff.

STRAIGHT-IN LANDING/APPROACH: a landing made on a runway aligned within 30 degrees of the final approach course following completion of an instrument approach.

TACTICAL AIR NAVIGATION (TACAN): An ultra-high frequency electronic air navigation system which provides suitably-equipped aircraft a continuous indication of bearing and distance to the TACAN station.

TAKEOFF RUNWAY AVAILABLE (TORA): see declared distances.

TAKEOFF DISTANCE AVAILABLE (TODA): see declared distances.

TAXILANE: the portion of the aircraft parking area used for access between taxiways and aircraft parking positions.

TAXIWAY: a defined path established for the taxiing of aircraft from one part of an airport to another.

TAXIWAY SAFETY AREA (TSA): a defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway.

TETRAHEDRON: a device used as a landing direction indicator. The small end of the tetrahedron points in the direction of landing.

THRESHOLD: the beginning of that portion of the runway available for landing. In some instances the landing threshold may be displaced.

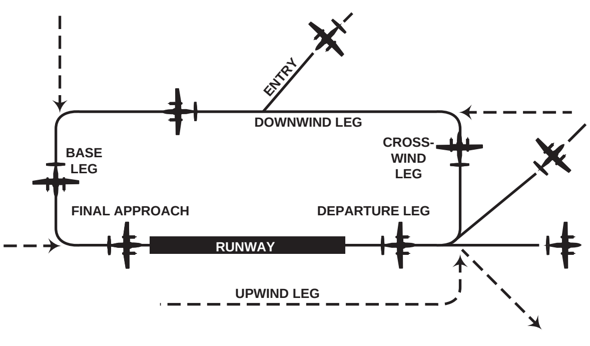
TOUCH-AND-GO: an operation by an aircraft that lands and departs on a runway without stopping or exiting the runway. A touch-and-go is recorded as two operations: one operation for the landing and one operation for the takeoff.

TOUCHDOWN ZONE (TDZ): The first 3,000 feet of the runway beginning at the threshold.

TOUCHDOWN ZONE ELEVATION (TDZE): The highest elevation in the touchdown zone.

TOUCHDOWN ZONE (TDZ) LIGHTING: Two rows of transverse light bars located symmetrically about the runway centerline normally at 100-foot intervals. The basic system extends 3,000 feet along the runway.

TRAFFIC PATTERN: The traffic flow that is prescribed for aircraft landing at or taking off from an airport. The components of a typical traffic pattern are the upwind leg, crosswind leg, downwind leg, base leg, and final approach.

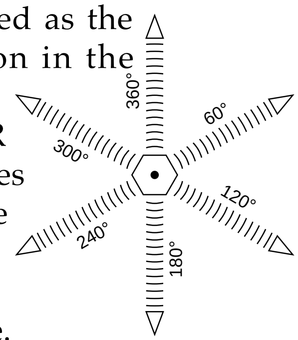


UNICOM: A nongovernment communication facility which may provide airport information at certain airports. Locations and frequencies of UNICOM's are shown on aeronautical charts and publications.

UPWIND LEG: A flight path parallel to the landing runway in the direction of landing. See "traffic pattern."

VECTOR: A heading issued to an aircraft to provide navigational guidance by radar.

VERY HIGH FREQUENCY/ OMNIDIRECTIONAL RANGE STATION (VOR): A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north. Used as the basis for navigation in the national airspace system. The VOR periodically identifies itself by Morse Code and may have an additional voice identification feature.



VERY HIGH FREQUENCY OMNIDIRECTIONAL RANGE STATION/ TACTICAL AIR NAVIGATION (VORTAC): A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance-measuring equipment (DME) at one site.

VICTOR AIRWAY: A control area or portion thereof established in the form of a corridor, the centerline of which is defined by radio navigational aids.

VISUAL APPROACH: An approach wherein an aircraft on an IFR flight plan, operating in VFR conditions under the control of an air traffic control facility and having an air traffic control authorization, may proceed to the airport of destination in VFR conditions.

VISUAL APPROACH SLOPE INDICATOR (VASI): An airport lighting facility providing vertical visual approach slope guidance to aircraft during approach to landing by radiating a directional pattern of high intensity red and white focused light beams which indicate to the pilot that he is on path if he sees red/white, above path if white/white, and below path if red/red. Some airports serving large aircraft have three-bar VASI's which provide two visual guide paths to the same runway.

VISUAL FLIGHT RULES (VFR): Rules that govern the procedures for conducting flight under visual conditions. The term VFR is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan.

VOR: See "Very High Frequency Omnidirectional Range Station."

VORTAC: See "Very High Frequency Omnidirectional Range Station/Tactical Air Navigation."

WARNING AREA: see special-use airspace.

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ABBREVIATIONS

AC: advisory circular

ADF: automatic direction finder

ADG: airplane design group

AFSS: automated flight service station

AGL: above ground level

AIA: annual instrument approach

AIP: Airport Improvement Program

AIR-21: Wendell H. Ford Aviation Investment and Reform Act for the 21st Century

ALS: approach lighting system

ALSF-1: standard 2,400-foot high intensity approach lighting system with sequenced flashers (CAT I configuration)

ALSF-2: standard 2,400-foot high intensity approach light ing system with sequenced flashers (CAT II configuration)

APV: instrument approach procedure with vertical guidance

ARC: airport reference code

ARFF: aircraft rescue and firefighting

ARP: airport reference point

ARTCC: air route traffic control center

ASDA: accelerate-stop distance available

ASR: airport surveillance radar

ASOS: automated surface observation station

ATCT: airport traffic control tower

ATIS: automated terminal information service

AVGAS: aviation gasoline - typically 100 low lead (100LL)

AWOS: automated weather observation station

BRL: building restriction line

CFR: Code of Federal Regulations

CIP: capital improvement program

DME: distance measuring equipment

DNL: day-night noise level

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DWL: runway weight bearing capacity for aircraft with dual-wheel type landing gear

DTWL: runway weight bearing capacity for aircraft with dual-tandem type landing gear

FAA: Federal Aviation Administration

FAR: Federal Aviation Regulation

FBO: fixed base operator

FY: fiscal year

GPS: global positioning system

GS: glide slope

HIRL: high intensity runway edge lighting

IFR: instrument flight rules (FAR Part 91)

ILS: instrument landing system

IM: inner marker

LDA: localizer type directional aid

LDA: landing distance available

LIRL: low intensity runway edge lighting

LMM: compass locator at middle marker

LOC: ILS localizer

LOM: compass locator at ILS outer marker

LORAN: long range navigation

MALS: medium intensity approach lighting system

MALSR: medium intensity approach lighting system with runway alignment indicator lights

MIRL: medium intensity runway edge lighting

MITL: medium intensity taxiway edge lighting

MLS: microwave landing system

MM: middle marker

MOA: military operations area

MSL: mean sea level

NAVAID: navigational aid

NDB: nondirectional radio beacon

NM: nautical mile (6,076 .1 feet)

NPES: National Pollutant Discharge Elimination System

NPIAS: National Plan of Integrated Airport Systems

NPRM: notice of proposed rule-making

ODALS: omnidirectional approach lighting system

OFA: object free area

OFZ: obstacle free zone

OM: outer marker

PAC: planning advisory committee

PAPI: precision approach path indicator

PFC: porous friction course

PFC: passenger facility charge

PCL: pilot-controlled lighting

PIW: public information workshop

PLASI: pulsating visual approach slope indicator

POFA: precision object free area

PVASI: pulsating/steady visual approach slope indicator

RCO: remote communications outlet

REIL: runway end identifier lighting

RNAV: area navigation

RPZ: runway protection zone

RSA: Runway Safety Area

RTR: remote transmitter/receiver

RVR: runway visibility range

RVZ: runway visibility zone

SALS: short approach lighting system

SASP: state aviation system plan

SEL: sound exposure level

SID: standard instrument departure

SM: statute mile (5,280 feet)

SRE: snow removal equipment

SSALF: simplified short approach lighting system with sequenced flashers

SSALR: simplified short approach lighting system with run-way alignment indicator lights

STAR: standard terminal arrival route

SWL: runway weight bearing capacity for aircraft with single-wheel type landing gear

STWL: runway weight bearing capacity for aircraft with single-wheel tandem type landing gear

TACAN: tactical air navigational aid

TDZ: touchdown zone

TDZE: touchdown zone elevation

TAF: Federal Aviation Administration (FAA) Terminal Area Forecast

TODA: takeoff distance available

TORA: takeoff runway available

TRACON: terminal radar approach control

VASI: visual approach slope indicator

VFR: visual flight rules (FAR Part 91)

VHF: very high frequency

VOR: very high frequency omnidirectional range

VORTAC: VOR and TACAN collocated

PORTLAND INTERNATIONAL JETPORT

Appendix B

RUNWAY SAFETY AREA STANDARDS EVALUATION

Appendix B
RUNWAY SAFETY AREA STANDARDS EVALUATION

Portland International Jetport

This analysis has been prepared in response to FAA Order 5200.8, *Runway Safety Area Program*, which became effective October 1, 1999. The objective of the Runway Safety Area Program is to ensure that all runway safety areas (RSAs) at federally-obligated airports conform to standards contained in FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, "to the extent practicable."

The purpose of this appendix to the Master Plan is to examine the feasibility of meeting the runway safety area design standards requirements at Portland International Jetport. This will be accomplished by first outlining the existing conditions regarding the runway safety areas and related airport design standards. Subsequently, alternatives for correcting any existing deviations from standards will be identified. These alternatives will then be analyzed to consider airport development and operational costs, as well as potential environmental impacts, to determine the most prudent and feasible solution.

SUFFICIENCY ANALYSIS

Portland International Jetport is a Class I certificated airport under Title 14 of the Code of Federal Regulations (CFR) Part 139, *Certification and Operations: Land*

Airports Serving Certain Air Carriers. 14 CFR Part 139.309, *Safety Areas*, specifies that the airport will provide an RSA in compliance with Federal Aviation Administration (FAA) standards when a runway is reconstructed or has a significant expansion. However, this part also allows the airport to maintain the RSA conditions that currently exist (even if the RSA does not fully meet current standards as specified in AC 150/5300-13, *Airport Design*) until the runway is reconstructed.

As an important commercial service airport to the region, state, and national airport systems, Portland International Jetport has been assisted in its development by federal airport improvement grants. FAA Order 5190.6A, *Airport Compliance Requirements*, outlines the contractual obligations of airports accepting and receiving federal grant funds. The basic objective of these regulations and compliance requirements is to ensure safe and properly maintained airports that are operated in a manner which protects the public's interest and investment.

Order 5190.6A, Paragraph 4-17j, *Conformance to FAA Criteria and Standards* states, "Any facilities developed with grant funds must be constructed to the then current applicable FAA design standards . . ." Most of these standards are outlined in AC 150/5300-13, *Airport Design*, including Changes 1-9. The following subsection defines these design standards as they relate to Portland International Jetport.

DESIGN STANDARDS

The selection of appropriate FAA design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently using, or are expected to use, the airport. The critical design aircraft is defined as the most demanding category of aircraft which conducts 500 or more operations per year.

The FAA has established a coding system to relate airport design criteria to the operational and physical characteristics of aircraft expected to use the airport. The airport reference code (ARC), has two components. The first component, depicted by a letter, is the aircraft approach category and relates to aircraft approach speed (operational characteristic); the second component, depicted by a Roman numeral, is the airplane design group and relates to aircraft wingspan (physical characteristic). Generally, aircraft approach speed applies to runways and runway-related facilities, while airplane wingspan primarily relates to separation criteria involving taxiways, taxilanes, and landside facilities.

According to AC 150/5300-13, *Airport Design*, an aircraft's approach category is based upon 1.3 times its stall speed in landing configuration at that aircraft's maximum certificated weight. The five approach categories used in airport planning are as follows:

Category A: Speed less than 91 knots.

Category B: Speed 91 knots or more, but less than 121 knots.

Category C: Speed 121 knots or more, but less than 141 knots.

Category D: Speed 141 knots or more, but less than 166 knots.

Category E: Speed greater than 166 knots.

The airplane design group (ADG) is based upon the aircraft's wingspan. The six ADGs used in airport planning are as follows:

Group I: Up to but not including 49 feet.

Group II: 49 feet up to but not including 79 feet.

Group III: 79 feet up to but not including 118 feet.

Group IV: 118 feet up to but not including 171 feet.

Group V: 171 feet up to but not including 214 feet.

Group VI: 214 feet or greater.

The current Portland International Jetport Airport Layout Plan (ALP) designates the following ARC for each runway at the airport:

- Runway 11-29, D-IV
- Runway 18-36, B-II

Analysis in Chapter Three, Facility Requirements, of the Master Plan supported the same ARC D-IV designation for Runway 11-29. Runway 11-29 presently serves as the primary runway at the airport and should be developed to safely accommodate all the aircraft that currently use the airport or may be expected to use the airport in the future.

While the ARC for Runway 18-36 had been established as ARC B-II in the past, the Master Plan recommended that consideration be given to planning for a higher ARC for Runway 18-36, such as ARC B-III or ARC C-II. This is due to the change in the mix of aircraft using the airport, in particular, the type of aircraft used in commercial air service. Regional jet aircraft now conduct the overwhelming majority of scheduled passenger operations at the airport. Business aircraft use of the airport has increased. Runway 18-36 has been used in the past to maintain limited air service when Runway 11-29 was closed for maintenance. Essentially, Runway 18-36 has evolved as a back-up runway to Runway 11-29, accommodating operations by regional jet aircraft and turboprops providing scheduled air service, turboprop aircraft providing feeder aircraft for air cargo service, and most of the general aviation fleet using the airport. In fulfilling its role as a back-up runway, consideration is now being given to providing wider and longer runway safety areas for the regional jets, potential for air cargo feeder aircraft, and general aviation business aircraft that occasionally use Runway 18-36 when Runway 11-29 is closed for maintenance or weather conditions favor the use of Runway 18-36.

EXISTING RSA CONDITIONS

FAA AC 150/5300-13, *Airport Design*, defines the RSA as, "A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot or excursion from the runway." According to the *Airport Design* AC, the RSA shall be...

1) cleared and graded and have no potentially hazardous ruts, bumps, depressions, or other surface variations;

2) drained by grading or storm sewers to prevent water accumulation;

3) capable, under dry conditions, of supporting aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft; and

4) free of objects, except for objects that need to be located in the safety area because of their function.

AC 150/5300-13, *Airport Design*, further specifies longitudinal and transverse grade standards for the RSA. For the first 200 feet of the RSA beyond the runway end, the longitudinal grade must be less than three percent, with any slope being downward from the runway end. For the remainder of the RSA, the maximum longitudinal grade is such that no part of the RSA penetrates the approach surface or clearway plane, with a maximum negative five percent grade. The maximum allowable grade change is plus/minus two percent over 100 feet. Transverse grades are to be kept at a minimum, consistent with local drainage needs, and should not exceed plus/minus five percent.

Table A summarizes the standard dimensions of the RSA for each runway at the airport. This is compared to the actual RSA dimensions to clearly identify the RSA deficiencies at the airport. **Exhibit B1** depicts the limits of the RSA for each runway at the airport.

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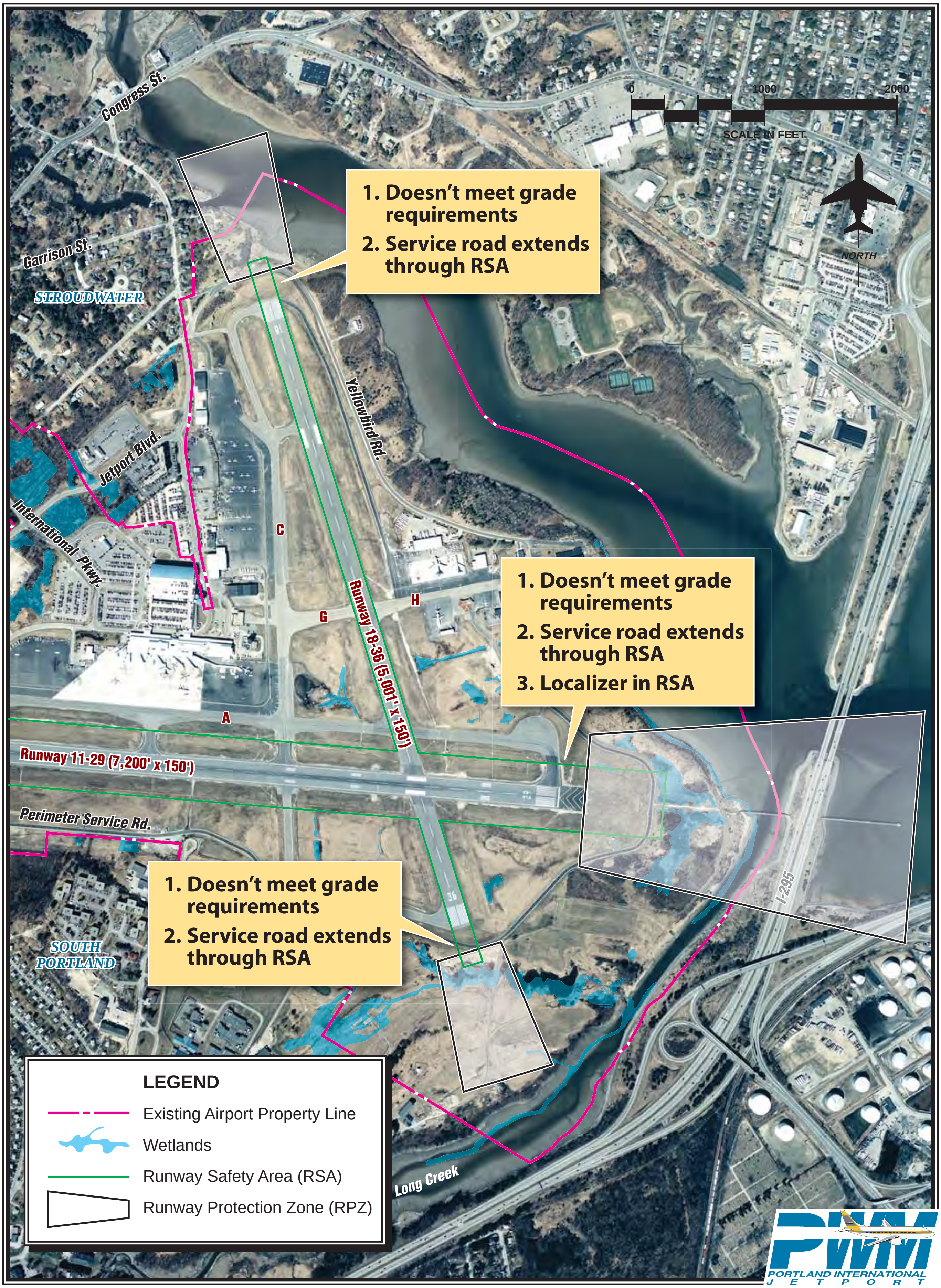

Exhibit B1

EXISTING SAFETY AREA CONDITION

TABLE A
Existing and Standard Runway Safety Area Dimensions
Portland International Jetport

	Runway 11-29		Runway 18-36	
ARC	D-IV		B-II	
Visibility Minimums	<½ Mile		One Mile	
Standard Dimensions				
Width (feet)	500		150	
Length Beyond Runway End (feet)	1,000		300	
Existing Dimensions	11	29	18	36
Width (feet)	500	500	150	150
Length Beyond Runway End (feet)	1,000	610[1]	153[2]	89[3]

Source: AC 150/5200-13, Airport Design, Change 9
[1] Intersection with localizer antenna.
[2] Does not meet grade requirements
[3] Intersection with service road.

The following describes the condition of each standard with regard to design requirements.

Runway 11-29 ARC D-IV RSA

- **Transverse Grade and Width:** Currently, the Runway 11-29 RSA meets transverse grade and width requirements along the length of the paved runway.

- **Behind the Runway 11 End:** The RSA meets width, length, and grade requirements.

- **Behind the Runway 29 End:** There are obstructions to the RSA behind the Runway 29 end. The localizer antenna used for the Runway 11 instrument landing system (ILS) approach is located approximately 610 feet from the end of pavement, within the limits of the RSA. The airport interior service road is located approximately 700 feet from the end of pavement, within the limits of the RSA. Beyond the service road, the RSA does not meet grade requirements or provide a surface condition that would support aircraft rescue and firefighting equipment and the occasional passage of aircraft without causing structural damage to the aircraft due to the presence of wetlands.

Runway 18-36 ARC B-II RSA

- **Transverse Grade and Width:** Currently, the Runway 18-36 RSA meets transverse grade and width requirements along the length of the paved runway.

- **Behind the Runway 18 End:** The RSA does not meet grade requirements approximately 153 feet from the end of the runway. Yellowbird Road is located approximately 195 feet from the end of pavement, within the limits of the RSA.

- **Behind the Runway 36 End:** The airport interior service road is located approximately 89 feet from the end of pavement, within the limits of the RSA. Beyond the service road, the RSA does not meet grade requirements or provide a surface condition that would support aircraft rescue and firefighting equipment and the occasional passage of aircraft without causing structural damage to the aircraft due to the presence of potential wetlands.

ALTERNATIVES IDENTIFICATION

FAA Order 5300.1F, *Modification of Agency Airport Design, Construction, and Equipment Standards* indicates in Paragraph 6.d. that ". . . runway safety areas at both certificated and non-certificated airports that do not meet dimensional standards are subject to FAA Order 5200.8, *Runway Safety Area Program*" and "Modifications of Standards are **not** issued for nonstandard runway safety areas."

FAA Order 5200.8 establishes the procedures that the FAA will follow in implementing the Runway Safety Area Program. Paragraph 5 of this Order states:

"The objective of the Runway Safety Area Program is that all RSAs at federally-obligated airports . . . shall conform to the standards contained in AC 150/5300-13, *Airport Design*, to the extent practicable."

The Order goes on to indicate in Paragraph 8.b.:

"The Regional Airports Division Manager shall review all data collected for each RSA in Paragraph 7, along with the supporting documentation prepared by the region/ADO for that RSA, and make one of the following determinations:

1) The existing RSA meets the current standards contained in AC 150/5300-13.

2) The existing RSA does not meet the current standards, but it is practicable to improve the RSA so that it will meet current standards.

3) The existing RSA can be improved to enhance safety, but the RSA will still not meet current standards.

4) The existing RSA does not meet current standards, and it is not practicable to improve the RSA."

Appendix 2 of FAA Order 5200.8 provides the direction for an RSA determination. This includes the alternatives that must be evaluated. Paragraph 3 of Appendix 2 states:

"The first alternative that must be considered in every case is constructing the traditional graded runway safety area surrounding the runway. Where it is not practicable to obtain the entire safety area in this manner, as much as possible should be obtained. Then, the following alternatives shall be addressed in the supporting documentation . . .:

a. Relocation, shifting, or realignment of the runway.

b. Reduction in runway length where the existing runway length exceeds that which is required for the existing or projected design aircraft.

c. A combination of runway relocation, shifting, grading realignment, or reduction.

d. Declared distances.

e. Engineered Materials Arresting Systems (EMAS)."

From the list above, several basic options can be considered for Portland International Jetport. The first, and most straightforward, is to fully meet the design standards by providing for the clearing and grading of the safety area behind the runway ends. This is certainly the most desirable as long as physical, environmental, and economic considerations can be reasonably accommodated.

The next option is to relocate, shift, or realign the runway. Relocating the runway involves moving the centerline in an effort to move the RSA away from a controlling obstacle. This option does not involve changing the runway orientation. Realigning the runway would include a new orientation. Shifting the runway ends involves moving the runway ends to achieve the required runway safety areas within the available graded and cleared area. This is accomplished by either relocating or displacing the threshold. Unless combined with an addition of pavement and/or safety area, relocated and displaced thresholds generally reduce the effective length of the runway. The portion of pavement behind a relocated threshold is not available for takeoff or landing. The portion of pavement behind a displaced threshold is not available for landing; however, it may be available for takeoff roll. Physical constraints must be evaluated when considering this alternative.

Declared distances are used by the FAA to define the effective runway length for landing and takeoff when a displaced threshold is implemented. Declared distances ensure that pilots have sufficient information of the operating limitations at the airport for both takeoff and landing operations.

Declared distances are defined as the amount of runway that is declared available for certain takeoff and landing operations. The four types of declared distances, as defined in FAA Advisory Circular 150/530-13, *Airport Design*, are as follows:

Takeoff Run Available (TORA) – The runway length declared available and suitable for the ground run of an airplane taking off.

Takeoff Distance Available (TODA) – The TORA plus the length of any remaining runway and/or clearway beyond the far end of the TORA.

Accelerate-Stop Distance Available (ASDA) – The runway plus stopway length declared available for the acceleration and deceleration of an aircraft aborting a takeoff.

Landing Distance Available (LDA) – The runway length declared available and suitable for landing.

The most critical of the declared distances are ASDA and LDA. ASDA is equal to the balance field length calculated by pilots prior to takeoff. The ASDA, or balanced field length, considers the runway length required by an aircraft to accelerate to rotation speed and then decelerate safely on the remaining runway available. This is the controlling takeoff distance and is used for evaluating if sufficient takeoff distance is provided. Landing distance considers the runway length necessary for an aircraft to touch down and decelerate to a safe speed prior to exiting the runway, while allowing for appropriate safety areas at each end of the runway to safely accommodate an aircraft that may undershoot or overshoot the runway.

Paragraph 4.f of the Appendix further states, "At any time, when it is not practicable to obtain a safety area that meets the current standards, consideration should be given to enhancing the safety of the area beyond the runway end with the installation of EMAS. FAA Order 5200.9, *Financial Feasibility and Equivalency of Runway Safety Area Improvements and Engineered Material Arresting Systems*, establishes guidance for EMAS installation, and provides details on design to be considered in determining feasibility of this alternative."

Recognizing the difficulties associated with achieving a standard safety area at all airports, the FAA undertook research programs on the use of various materials for arresting systems. Engineered Materials Arresting Systems (EMAS) are comprised of high energy absorbing materials of selected strength which will reliably and predictably crush under the weight of an aircraft. According to FAA Order 5200.9, EMAS installation provides a level of safety that is generally equivalent to a full

RSA, constructed to the standards of AC 150/5220-22, for overruns. It also provides an acceptable level of safety for undershoots. The length of the EMAS bed is established by the maximum takeoff weight of the largest aircraft to use the airport. It should also be noted that EMAS is currently designed to be effective for aircraft with a maximum takeoff weight of at least 25,000 pounds.

RUNWAY 29 ALTERNATIVES

As mentioned previously, a localizer antenna and the airport interior service road are located within the limits of the RSA behind the Runway 29 end. Beyond the service road is an area of wetlands that do not meet standards for supporting aircraft and/or vehicles. The following discussion presents the various options available at Portland International Jetport to meet FAA RSA standards behind the Runway 29 end in compliance with the *Runway Safety Area Program*.

Consistent with the methodology specified in Order 5200.8, the realignment or relocation of Runway 11-29 has been considered as a means to meet RSA standards; however, these alternatives have been eliminated from further consideration. It is not prudent to consider the realignment or relocation of Runway 11-29 to clear the RSA when it is less costly to relocate the localizer antenna and interior service road. The airport infrastructure and airspace are already designed around the Runway 11-29 alignment. Changing the Runway 11-29 orientation would require unnecessary changes to the physical locations of taxiways, buildings, and the approach and departure paths to the airport.

Reducing the Runway 11-29 length as means to achieve safety standards has also been eliminated from consideration. This alternative would involve reducing runway length by removing pavement and relocating the Runway 29 end at an appropriate distance from the controlling obstacle (localizer antenna) to ensure the full RSA standard can be met behind the Runway 29 end. For the Jetport, this involves relocating the Runway 29 end approximately 390 feet west. Following this alternative would reduce Runway 11-29 from 7,200 feet to 6,810 feet.

As stated in FAA Order 5200.8, this alternative is only practicable when the existing runway length "exceeds that what is required for the existing or projected design aircraft." As shown in Chapter Three of the 2005 Airport Master Plan, the existing 7,200 feet of length on Runway 11-29 is needed to ensure the existing and future nonstop airline service destinations can be served from the Jetport.

Alternative A Existing Condition

Alternative A is shown on **Exhibit B2**. This alternative depicts the existing method that has been used to comply with ARC D-IV design standards for Runway 11-29. This alternative utilizes the declared distance concept discussed previously.

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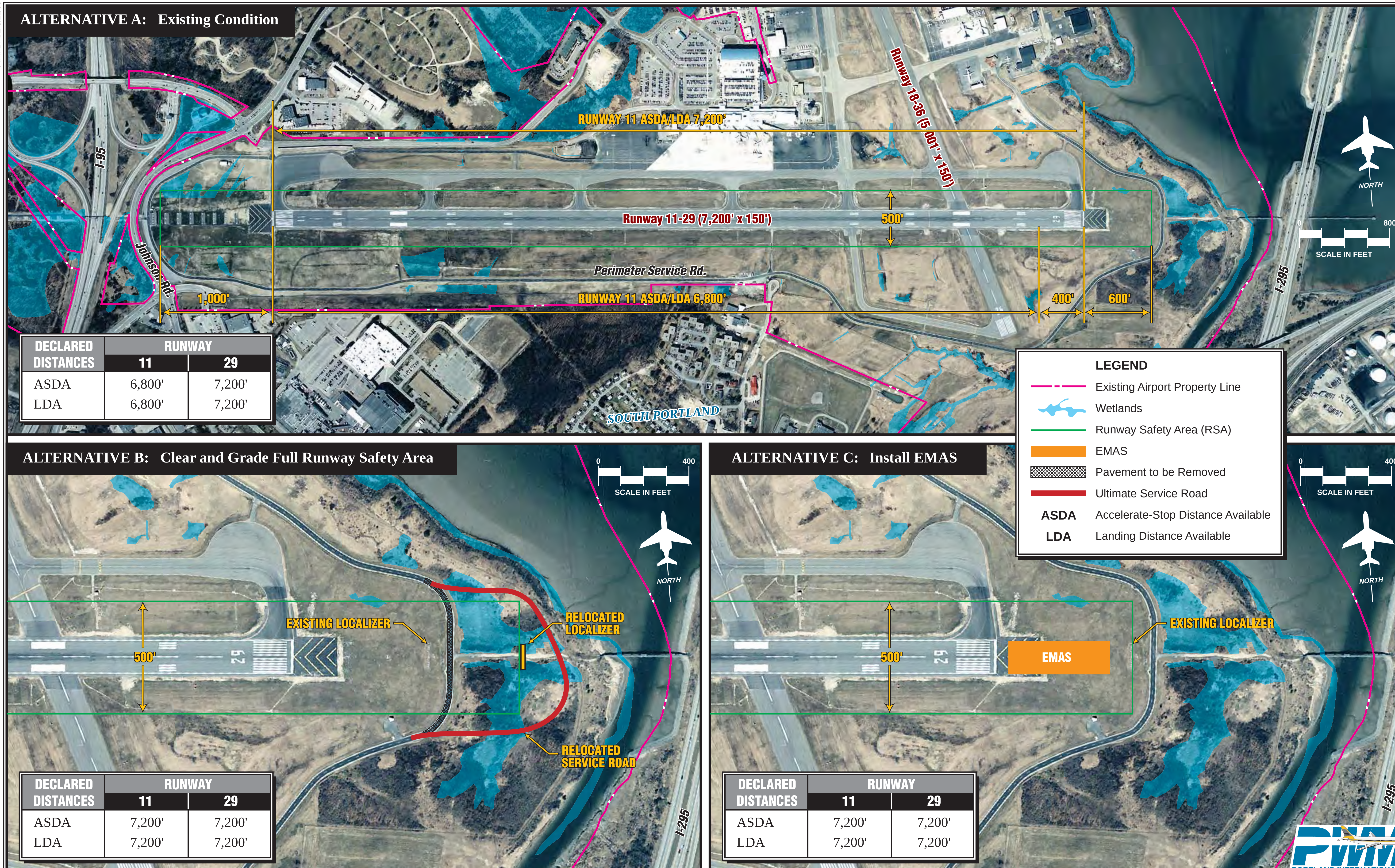

Alternative A:

DECLARED DISTANCES	RUNWAY 11	RUNWAY 29
ASDA	6,800'	7,200'
LDA	6,800'	7,200'

Alternative B:

DECLARED DISTANCES	RUNWAY 11	RUNWAY 29
ASDA	7,200'	7,200'
LDA	7,200'	7,200'

Alternative C:

DECLARED DISTANCES	RUNWAY 11	RUNWAY 29
ASDA	7,200'	7,200'
LDA	7,200'	7,200'

Exhibit B2
RUNWAY 29 RUNWAY SAFETY ALTERNATIVES

To ensure that a full 1,000 feet of RSA is available behind the Runway 29 end for aircraft landing and departing Runway 11, the Runway 11 landing distance (LDA) and departure distance (ASDA) has been reduced by 400 feet to 6,800 feet. With the declared distances concept, aircraft operators must load their aircraft to be able to depart in the declared distance available of 6,800 feet instead of the full 7,200 feet of pavement length.

The reduction in departure distance (ASDA) on Runway 11 is the primary disadvantage of this alternative. While this alternative allows the airport to technically comply with RSA standards, it does allow a disparity between capabilities at the airport. Since a full 1,000-foot RSA is available behind the Runway 11 end, there are no limitations on the use of Runway 29. Therefore, the full 7,200 feet of pavement is available for landing and departing Runway 29. The different runway length requires the airlines to load aircraft differently depending upon which runway is in use. As discussed previously, the full 7,200 feet of runway length is desirable for operations on both Runway 11 and Runway 29. The full 7,200 feet of runway length provides the best capabilities for the airport in terms of serving the nonstop air service destinations that the airport currently serves or could potentially serve in the future.

Alternative B
Clear and Grade Full Runway Safety Area (RSA)

FAA Order 5200.8 states, "The first alternative that must be considered in every case is constructing the traditional graded runway safety area surrounding the runway." As shown on **Exhibit B2**, to fully meet RSA standards behind the Runway 29 end, the localizer antenna and interior airport service road need to be relocated. The area beyond the existing interior service road would need to filled and graded to RSA standards.

This alternative impacts approximately 3.1 acres of wetlands, which would require mitigation. As part of the ongoing wildlife management program at the airport which is focused on reducing the potential for bird strikes, the United States Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), has recommended the removal of the wetlands behind the Runway 29 end. The USDA-APHIS has found that these wetlands serve as a bird attractant. Removal of the bird attractant is the primary means to control the hazard of bird strikes.

In comparison with Alternative A, clearing and grading the full RSA would eliminate the need for declared distances on Runway 11. Therefore, the full 7,200 feet of pavement would be available for landings and departures on Runway 11. This increases the Runway 11 LDA and ASDA by 400 feet.

Alternative C –
Engineered Materials Arresting Systems (EMAS)

In compliance with FAA Order 5200.8, EMAS is a required alternative to be considered. As was mentioned earlier, EMAS serves as an equivalent to a full RSA if there is a standard installation.

The EMAS system is designed to stop an overrunning aircraft by exerting predictable deceleration forces on its landing gear as the EMAS material crushes. It must be designed to minimize the potential for structural damage to aircraft, since such damage could result in injuries to passengers and/or affect the predictability of deceleration forces.

An EMAS bed is located beyond the end of the runway, centered on the extended runway centerline. It typically is designed to begin at some distance beyond the runway end to avoid damage due to jet blast and short landings. The minimum width of the EMAS shall be the width of the runway, plus any sloped area as necessary. The system should be designed to decelerate jet aircraft expected to use the runway at exit speeds of 70 knots or less, without imposing loads that exceed the aircraft's structural design limits. EMAS is generally limited to the width of the runway because of its cost; therefore, its effectiveness is limited to aircraft running directly off the end of the runway. There is also a cost to replace any part of the system damaged during an overrun incident.

For planning purposes, an EMAS to serve Runway 29 and its critical aircraft would need to be approximately 450 feet long and 150 feet wide. A shown on **Exhibit B2**, the EMAS structure is placed along the extended runway centerline 75 feet from the Runway 29.

In comparison with Alternative A, installing EMAS would eliminate the need for declared distances on Runway 11. Therefore, the full 7,200 feet of pavement would be available for landings and departures on Runway 11. This increases the Runway 11 LDA and ASDA by 400 feet. In comparison with Alternative B, this alternative does not impact the existing wetlands behind the Runway 29 end. However, as stated previously, the airport would still need to remove and replicate these wetlands as part of the wildlife management program at the airport.

This alternative is estimated to $7.25 million for construction costs only. This is the cost to install the EMAS structure and purchase specialized snow removal equipment. This is also limited to the initial development costs. There are on-going maintenance costs associated with EMAS that have not been included in this cost. Additionally, there are potential replacement costs associated with damage to the EMAS from aircraft or airport maintenance equipment. Should the EMAS be damaged, the airport would need to reduce the LDA and ASDA on Runway 11 by 400 feet and temporarily implement declared distances (Alternative A) to ensure a full

RSA by filing a Notice to Airmen (NOTAM) until the EMAS structure can be repaired.

RUNWAY 18-36 ALTERNATIVES

A series of alternatives, based on differing ARCs, is considered for improving the Runway 18-36 RSA. The 2005 Airport Master Plan has shown a need to consider providing wider and longer RSAs behind each end of Runway 18-36 due to the runway's evolving role. As discussed previously, Runway 18-36 now serves as a back-up to Runway 11-29 when it is closed for maintenance and other reasons. Runway 18-36 can now serve a limited role in maintaining the continuity of air service as it can accommodate the regional jet and turboprop aircraft that use the airport now. In previous planning studies, the regional jet did not use the airport.

In this back-up role, Runway 18-36 accommodates limited regional jet operations and some cargo turboprop operations. These operations currently number less than 500 per year on Runway 18-36, the threshold considered by the FAA for changing the ARC for a runway. Based upon the change in mix utilizing this runway, this analysis will examine the feasibility of RSA improvements to Runway 18-36 for ARC B-II, ARC B-III, and ARC C-II.

A number of other design requirements will also be considered. This includes additional length, runway protection zone (RPZ) requirements, and instrument approach capability to Runway 36. The RPZ is a trapezoidal area at the end of the runway to protect people and property on the ground. The RPZ is two-dimensional and is required to be kept clear of structures and land uses that could cause the congregation of people and or property on the ground. The entire limits of the RPZ are ideally owned in fee. The RPZ behind the Runway 18 end currently extends beyond the airport property boundary and encompasses at least two residential home sites. The existing RPZ behind the Runway 36 end is located entirely on airport property. However, an extension to Runway 36, improved instrument approach capability, or a change in ARC for Runway 18-36 would place the RPZ outside the existing property line.

For this analysis, a precision instrument approach with visibility minimums as low as one-half mile providing both lateral and vertical navigation capabilities is considered. Additional length on Runway 18-36 is also considered. The 2005 Airport Master Plan indicated up to 800 feet of additional pavement on Runway 18-36 would reduce payload restrictions that regional jet aircraft currently incur when operating on the existing 5,000-foot runway.

Prior to defining development alternatives, physical constraints must be defined. A limited area exists for the development of Runway 18-36 pavement and RSAs. To the north, the RSA can extend no farther than its intersection with Yellowbird Road. A relocation of Yellowbird Road to the north is limited by shoreline zoning requirements along Fore River. This zoning limits development within 75 feet of the normal high water level. To the south, development is also limited by shoreline zoning requirements along Long Creek. Within these physical constraints, there is an approximately 6,300-foot long platform for development of the runway pavement and RSA.

Consistent with the methodology specified in Order 5200.8, the realignment, relocation, and shortening of Runway 18-36 has been considered as a means to meet RSA standards. However, these alternatives are considered impracticable and have been eliminated from further consideration. Realigning Runway 18-36 would cause the relocation of hangars, aprons, and taxiways. It would also change the wind coverage for the airport. Currently, Runway 18-36 is ideally aligned with the prevailing wind conditions. This runway is needed to accommodate small aircraft operations that are susceptible to strong crosswinds. When combined with the Runway 11-29 alignment, Runway 18-36 provides over 98 percent coverage for aircraft operating at the airport. Considering that the current runway configuration provides the optimum configuration to meet the FAA design requirements for wind coverage, this alternative is not cost–effective, nor would it meet any FAA or industry-accepted practices.

A relocation of the runway to the east or west would not clear the RSA as the obstructions extend completely through the RSA. Similar to the realignment option, relocating the runway centerline would also impact existing taxiways, buildings, and aprons, causing additional design standard and safety deficiencies.

Runway 18-36 is presently 5,001 feet long. The 2005 Airport Master Plan has identified the need for up to 800 additional feet of length. Since Runway 18-36 requires additional length, shortening the runway to meet RSA standards is not considered.

Runway 18-36 Baseline Condition

The baseline condition comprises those improvements necessary to conform to ARC B-II design requirements for Runway 18-36. As stated earlier, the ARC B-II RSA behind the Runway 18 end is limited by terrain and the location of Yellowbird Road. The RSA extends approximately 153 feet behind the Runway 18 end where the terrain begins to decline and the RSA can no longer meet grade requirements. Yellowbird Road obstructs the RSA approximately 195 feet behind the Runway 18 end.

The RSA behind the Runway 36 end is obstructed by the airport interior service road, which is located approximately 89 feet from the end of the runway. Beyond the service road, the RSA crosses existing wetlands. These wetlands would need to be removed to fill and grade the RSA.

FAA Order 5200.8 states, “The first alternative that must be considered in every case is constructing the traditional graded runway safety area surrounding the runway." To create the standard RSA behind the Runway 18 end, the baseline condition (**Exhibit B3**) would shift the Runway 18 end 147 feet to the south. The pavement behind the relocated end would be removed and a new entrance taxiway constructed. To maintain the existing length, the Runway 36 end would be shifted 147 feet south. A relocation of the interior airport service road would be needed so that the RSA behind the Runway 36 could be filled and graded to standard. The wetlands would be removed. The Runway 18 RPZ contains approximately two residential home sites. There are no structures in the Runway 36 RPZ.

Runway 18-36 Alternative 1A
ARC B-III RSA
One-Half Mile Visibility Minimum
Precision Approach to Runway 36

Alternative 1A assumes an ARC B-III RSA and a one-half mile visibility minimum precision approach to Runway 36. An ARC B-III RSA for a runway served by a one-half-mile visibility minimum precision approach extends 200 feet on each side of the runway centerline and 800 feet beyond the runway end. To provide additional takeoff length to better serve the aircraft using this runway, the Runway 36 end is extended 1,100 feet south. This requires the mitigation of wetlands located south of Runway 36. The on-airport service road must also be relocated to clear the RSA and provide for the extension.

Taxiway C is relocated 351 feet west of Runway 18-36 and extended to the new Runway 36 end. The taxiway is placed in compliance with AC 150/5300-13 and FAA Notice 8260.56, *Precision Category II/III Obstacle Assessment and Requirements*. Notice 8260.56 specifies an increase in runway/taxiway separation for precision instrument runways beyond the standard shown in AC 150/5300-13 based upon the airport's elevation. For the Jetport, this increase is one-foot.

The relocated taxiway would impact existing aircraft parking on the general aviation apron west of Runway 36 and the existing service road on this apron. To maintain appropriate wingtip clearance, the service road and aircraft parking must be located at least 444 feet from the runway centerline. Approximately five tiedown locations would be lost and the service road located on the apron relocated to maintain this clearance. Three feeder aircraft parking positions on the west side of the cargo apron might also need to be relocated to meet a clearance standard for the location of parked aircraft. Extending Taxiway C the full length of Runway 18-36 impacts a large drainage area and existing wetlands in the area between Taxiway A and Taxiway G.

Alternative 1A implements declared distances to ensure the appropriate RSA standards are met during takeoff and landings since existing site constraints prevent the RSA from extending the standard distance beyond the physical ends of the runway,. As shown on **Exhibit B4**, the ASDA (departure length) for Runway 18 is

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BASE ALTERNATIVE: Develop Runway 18-36 to maintain B-II Standards and Current Length

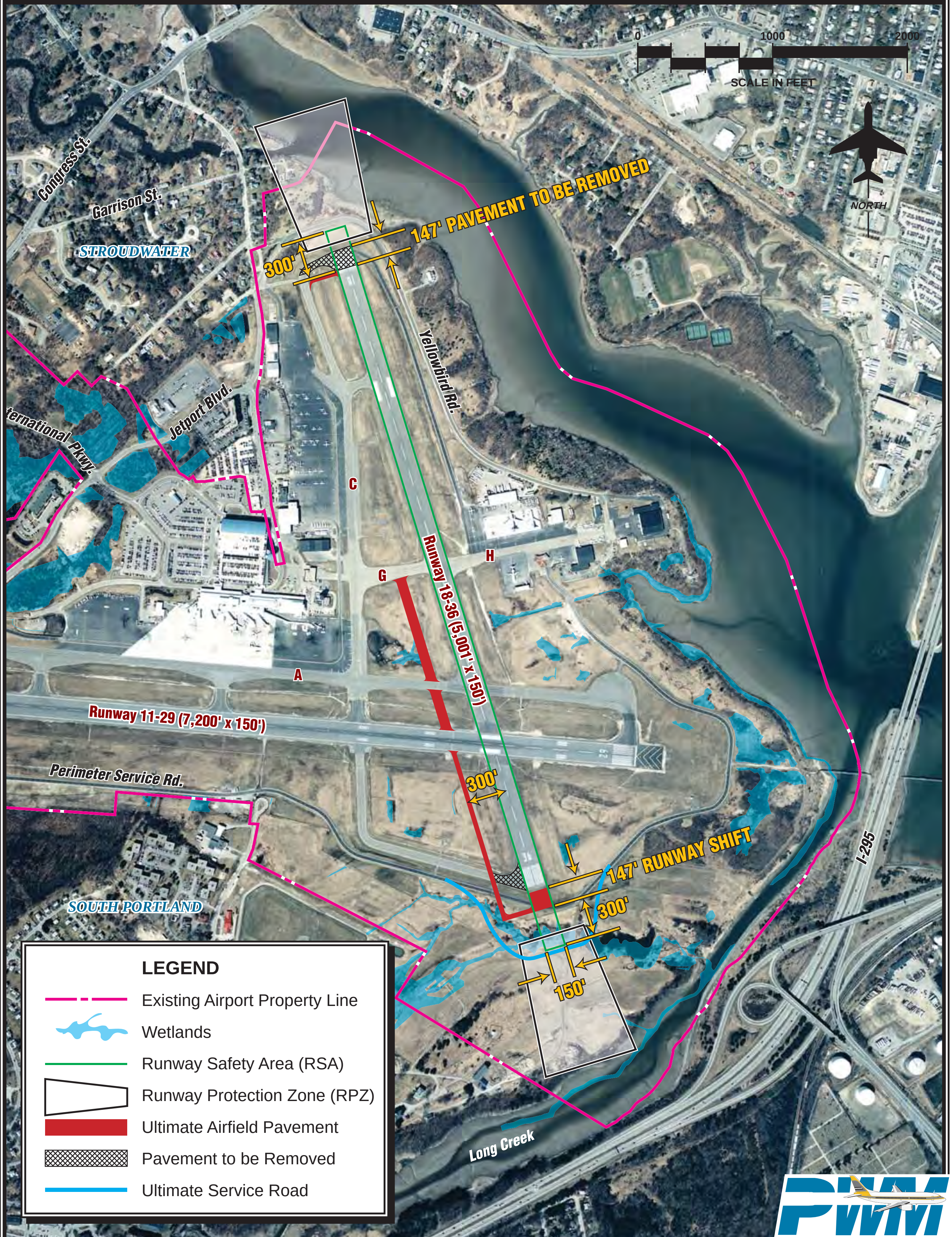
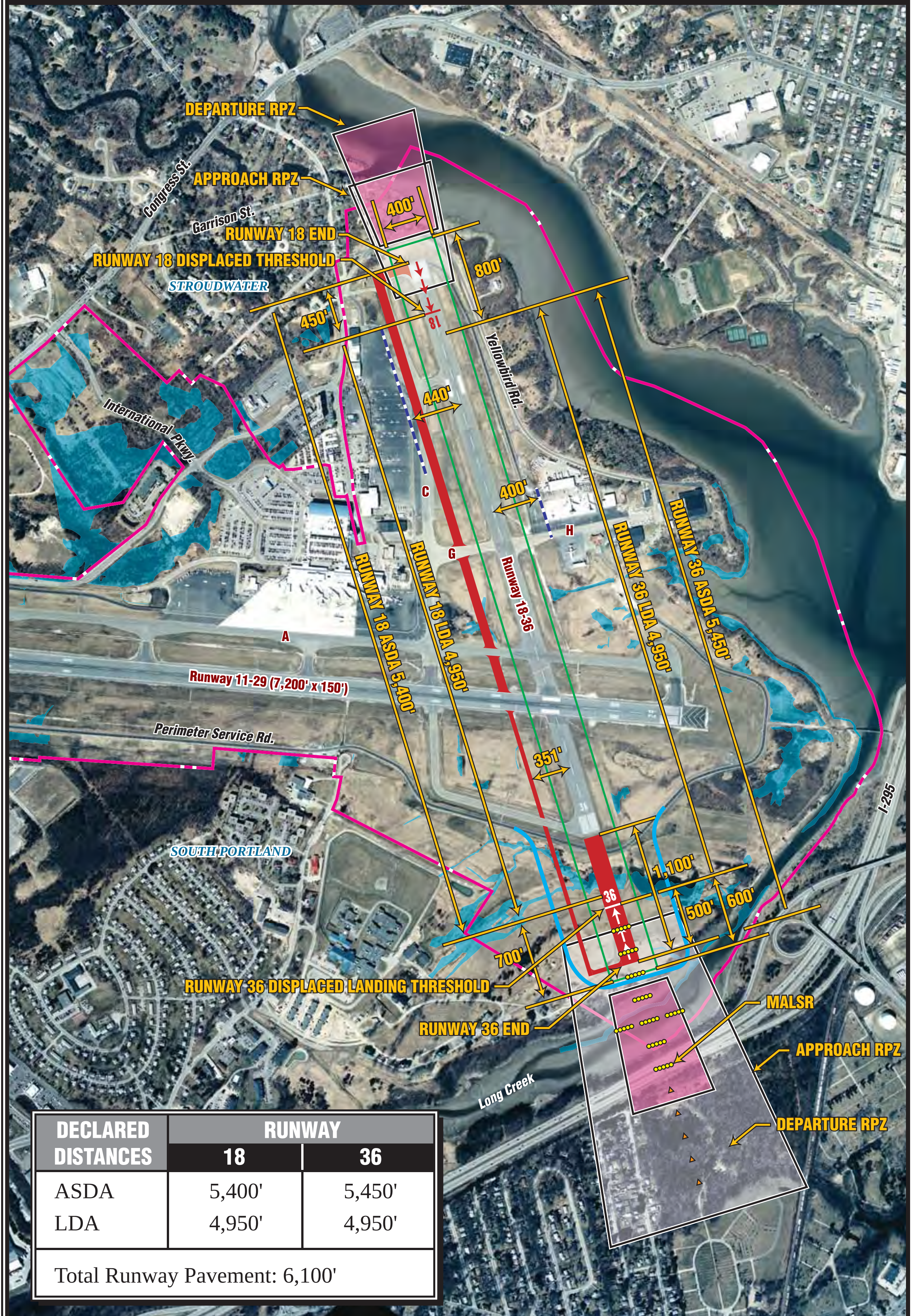


Exhibit B3
RUNWAY 18-36 BASE ALTERNATIVE
ARC B-II SAFETY AREAS

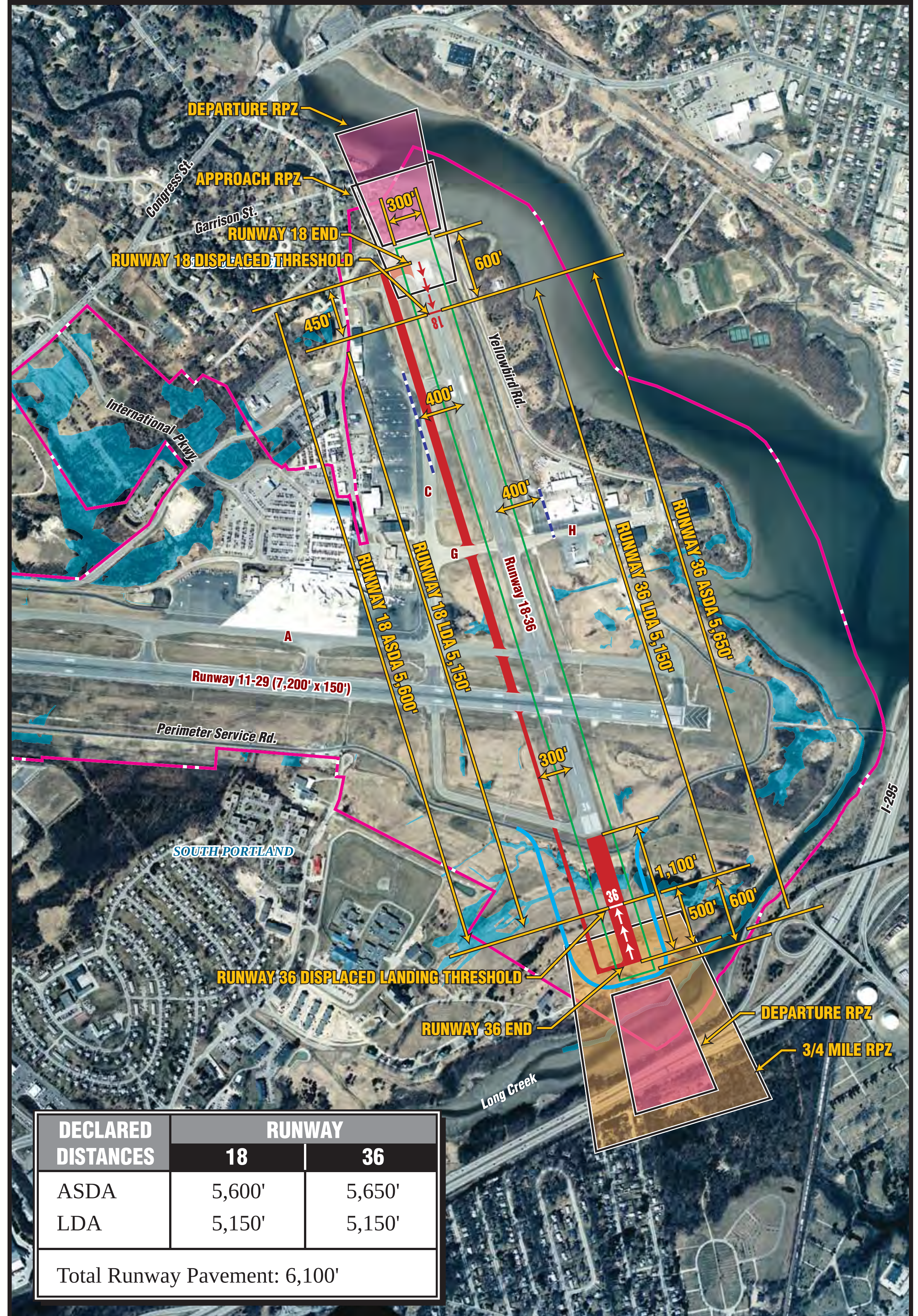
04MP17-B4-2/21/06

ALTERNATIVE 1A: Develop Runway 18-36 to B-III Standards. 1/2 Mile Minimum Precision Approach - Runway 36.



DECLARED DISTANCES	RUNWAY 18	RUNWAY 36
ASDA	5,400'	5,450'
LDA	4,950'	4,950'
Total Runway Pavement: 6,100'		

ALTERNATIVE 1B: Develops Runway 18-36 to B-III Standards. 3/4 Mile Visibility Minimum GPS Approach - Runway 36.



DECLARED DISTANCES	RUNWAY 18	RUNWAY 36
ASDA	5,600'	5,650'
LDA	5,150'	5,150'
Total Runway Pavement: 6,100'		

LEGEND

- Existing Airport Property Line
- Aircraft Parking Limit Line
- Wetlands
- Runway Safety Area (RSA)
- Runway Protection Zone (RPZ)
- Ultimate Airfield Pavement
- Pavement to be Removed
- Ultimate Service Road

ASDA Accelerate-Stop Distance Available
LDA Landing Distance Available
MALSR Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights

0 1200 2400
SCALE IN FEET

NORTH

PWM PORTLAND INTERNATIONAL JETPORT

Exhibit B4
RUNWAY 18-36 ALTERNATIVES 1A AND 1B

5,460 feet and the ASDA for Runway 36 is 5,360 feet. The LDA (landing length) is 4,940 feet for Runway 18 and 4,860 feet for Runway 36. The total pavement length is 6,100 feet.

When determining the ASDA, FAA guidelines require that the full RSA safety area be provided at the far end of the runway an aircraft is departing. For example, the ASDA for Runway 18 is reduced by 640 feet, the distance necessary to locate the RSA at the far end of the departure operation. For Runway 36, the ASDA is reduced by 740 feet, the distance necessary to locate the RSA at the far end of the departure operation.

In this alternative, the LDA must provide at least 600 feet of RSA at the approach end of the runway, as well as 800 feet at the rollout end of the runway. The LDA for Runway 18 is 5,060 feet. The Runway 18 LDA is reduced by 540 feet, the length necessary to provide for the RSA prior to the Runway 18 landing threshold plus an additional 740 feet, the length necessary to provide for the RSA at the roll-out end of the runway. The LDA for Runway 36 is 4,860 feet as well. For Runway 36, the LDA is reduced by 500 feet, the length necessary to provide for the RSA prior to the Runway 36 landing threshold plus 740 feet, the length necessary to provide for the RSA at the roll-out end of the runway.

Two RPZs are required when implementing declared distances. The departure RPZ begins 200 feet behind the physical pavement end. The Runway 18 departure RPZ contains approximately two residential home sites. The Runway 36 departure RPZ encompasses approximately one residential home site.

The approach RPZ is based upon the visibility minimums to the runway end. For Runway 18, the approach RPZ is based on one-mile visibility minimums. This approach RPZ includes approximately two residential home sites. The approach RPZ to Runway 36 is much larger as it is sized for a one-half mile visibility minimum approach. This RPZ contains approximately 45 home sites. Residential home sites are considered by AC 150/5300-13 to be incompatible with the RPZ.

This alternative also depicts the location of a medium intensity approach lighting system with runway alignment indicator lights (MALSR). The MALSR is required to achieve the one-half mile visibility minimums.

This alternative would require the relocation of an existing FAA antenna farm located west of an extended runway centerline near the airport's southwestern property line. A suitable relocation area is available southeast of the Runway 11-29/Runway 18-36 intersection.

Runway 18-36 Alternative 1B
ARC B-III RSA
Three-quarter Mile Visibility Minimum
Precision Approach to Runway 36

Alternative 1B is shown on **Exhibit B4**. This alternative assumes the same runway length as shown in Alternative 1A. This includes a 1,100-foot extension to the Runway 36 end for a total pavement length of 6,100 feet. This requires the mitigation of wetlands located south of Runway 36. The on-airport service road must also be relocated to clear the RSA and provide for the extension.

In contrast with Alternative 1A, this alternative assumes a precision approach to Runway 36 with three-quarter mile visibility minimums instead of the one-half mile visibility minimums assumed in Alternative 1A. For three-quarter mile visibility minimums, the RSA extends 150 feet on each side of the runaway centerline and 600 feet beyond each runway end.

Taxiway C is relocated 300 feet west of Runway 18-36 and extended to the new Runway 36 end. The relocated taxiway would impact existing aircraft parking on the general aviation apron west of Runway 36 and the existing service road on this apron. To maintain appropriate wingtip clearance, the service road and aircraft parking must be located at least 400 feet from the runway centerline. Several tie-down locations would be lost and the service road relocated to maintain this clearance. Three feeder aircraft parking positions on the west side of the cargo apron might also need to be relocated to meet a clearance standard for the location of parked aircraft. Extending Taxiway C the full length of Runway 18-36 impacts a large drainage area and existing wetlands in the area between Taxiway A and Taxiway G.

Similar to Alternative 1A, this alternative implements declared distances to ensure the appropriate RSA standards are met during takeoff and landings since existing site constraints prevent the RSA from extending the standard distance beyond the physical ends of the runway,. As shown on **Exhibit B4**, the ASDA (departure length) for Runway 18 is 5,600 feet and the ASDA for Runway 36 is 5,650 feet. The LDA (landing length) for both runways is 5,150 feet.

When determining the ASDA, FAA guidelines require that the full RSA safety area be provided at the far end of the runway an aircraft is departing. The ASDA for Runway 18 is reduced by 500 feet, the distance necessary to locate the RSA behind the Runway 36 end. For Runway 36, the ASDA is reduced by 450 feet, the distance necessary to locate the RSA behind the Runway 18 end.

In this alternative, the LDA must provide at least 600 feet of RSA at the approach end of the runway, as well as at the rollout end of the runway. The LDA for Runway 18 and 36 is the same as the landing distance is reduced 950 feet to provide for the RSA at the approach end and far end of both runways.

The Runway 18 departure RPZ contains approximately two residential home sites. The Runway 36 departure RPZ encompasses approximately one home site.

The approach RPZ is based upon the visibility minimums to the runway end. For Runway 18, the approach RPZ is based on one-mile visibility minimums. This approach RPZ includes approximately two residential home sites. The approach RPZ to Runway 36 is much larger as it is sized for a three-quarter mile visibility minimum approach. This RPZ contains approximately seven home sites. Residential home sites are considered by AC 150/5300-13 to be incompatible with the RPZ.

This alternative would require the relocation of an existing FAA antenna farm located west of an extended runway centerline near the airport's southwestern property line. A suitable relocation area is available southeast of the Runway 11-29/Runway 18-36 intersection.

Runway 18-36 Alternative 2A
ARC C-II RSA
One-Half Mile Visibility Minimum
Precision Approach to Runway 36

Alternative 2A is shown on **Exhibit B5**. This alternative examines ARC C-II design standards on Runway 18-36. ARC C-II design standards specify that the RSA extend 200 feet on each side of the runway centerline and 1,000 feet beyond each runway end.

The intent of this alternative is to examine the requirements necessary to maintain 5,000 feet of takeoff distance while also implementing a one-half mile visibility minimum precision instrument approach to Runway 36. A one-half mile visibility minimum precision instrument approach to Runway 36 requires a 400-foot runway/taxiway separation distance. FAA Notice 8260.56 specifies a one-foot increase in runway/taxiway separation due to the precision instrument approach assumed in this alternative.

This alternative extends Taxiway C the full length of the runway. North of Taxiway G, the relocated taxiway impacts a portion of the on-airport interior service road and aircraft tiedown locations. To maintain wingtip clearance along the taxiway, approximately 10 tiedown locations would need to be removed and the on-airport interior access road relocated. A portion of the northern part of the general aviation apron would also become unusable for the same reasons. Three feeder aircraft parking positions on the west side of the cargo apron might also need to be relocated to meet a clearance standard for the location of parked aircraft. Extending Taxiway C the full length of Runway 18-36 impacts a large drainage area and existing wetlands in the area between Taxiway A and Taxiway G.

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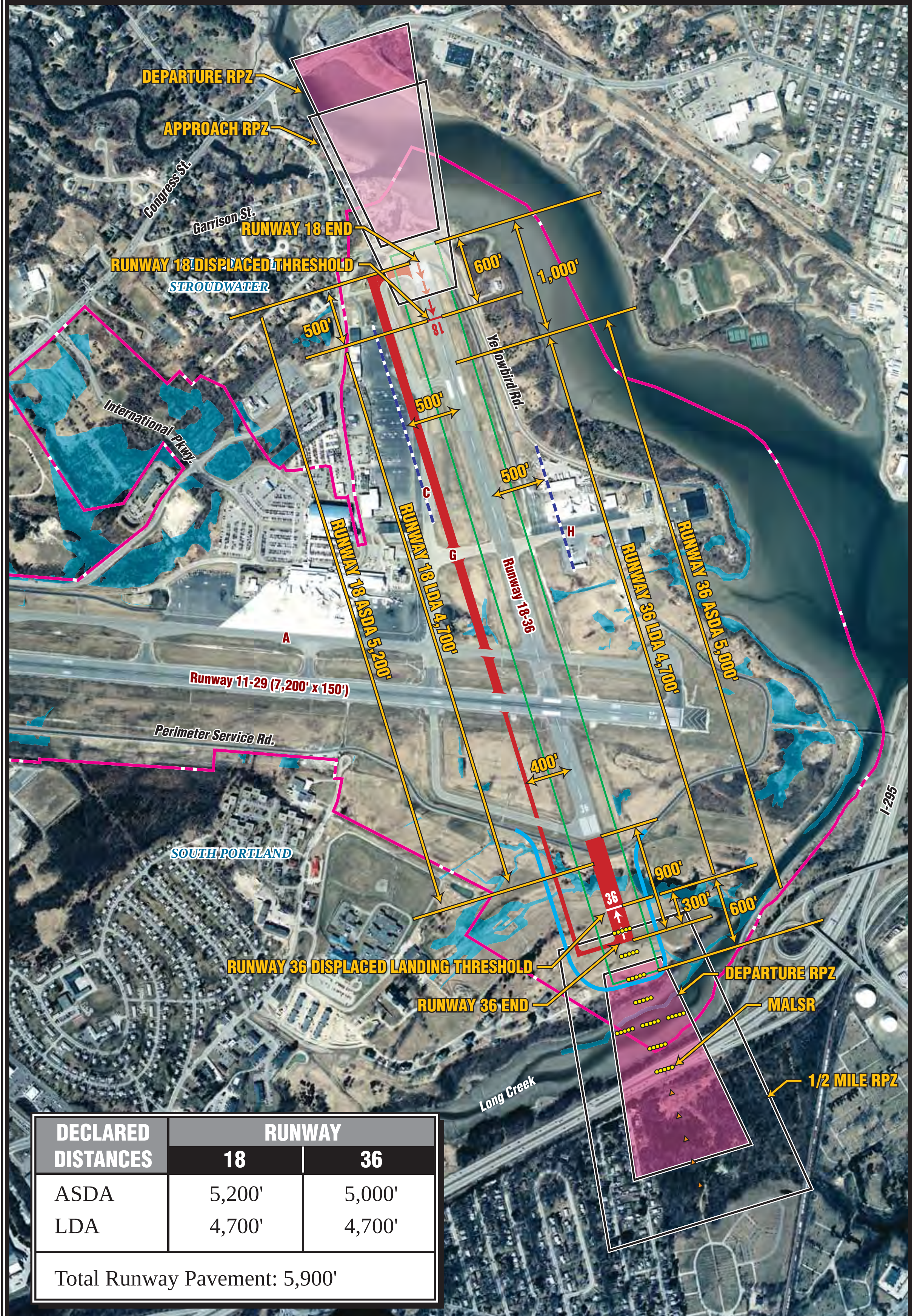
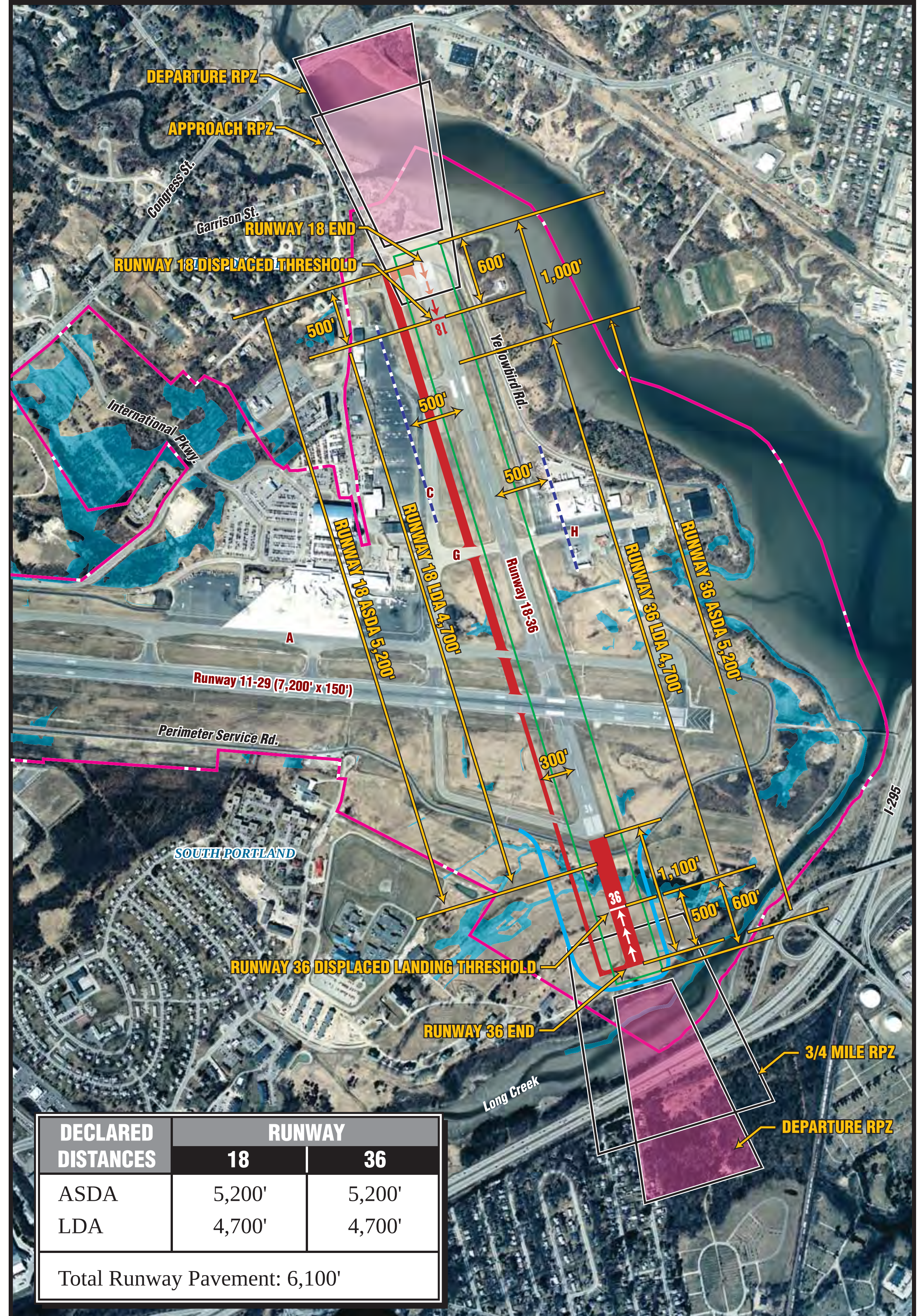
ALTERNATIVE 2A: Develop Runway 18-36 to C-II Standards and Maintain at Least 5,000' for Takeoff. 1/2 Mile Minimum Precision Approach - Runway 36



DECLARED DISTANCES	RUNWAY 18	RUNWAY 36
ASDA	5,200'	5,000'
LDA	4,700'	4,700'

Total Runway Pavement: 5,900'

ALTERNATIVE 2B: Develops Runway 18-36 to C-II Standards. Maximize Runway Length . 3/4 Mile Minimum Precision Approach - Runway 36



DECLARED DISTANCES	RUNWAY 18	RUNWAY 36
ASDA	5,200'	5,200'
LDA	4,700'	4,700'

Total Runway Pavement: 6,100'

LEGEND

- Existing Airport Property Line
- Aircraft Parking Limit Line
- Wetlands
- Runway Safety Area (RSA)
- Runway Protection Zone (RPZ)
- Ultimate Airfield Pavement
- Pavement to be Removed
- Ultimate Service Road

ASDA Accelerate-Stop Distance Available
LDA Landing Distance Available
MALSR Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights

0 1200 2400
SCALE IN FEET

NORTH

PWM PORTLAND INTERNATIONAL JETPORT

Exhibit B5
RUNWAY 18-36 ALTERNATIVES 2A AND 2B

This alternative extends the Runway 36 end 900 feet south for a total pavement length of 5,900 feet. This requires the mitigation of wetlands located south of Runway 36. The on-airport service road must also be relocated to clear the RSA and provide for the extension.

Declared distances are implemented to ensure the RSA is provided during takeoff and landing operations. As shown on **Exhibit B5**, this alternative increases the Runway 18 ASDA (departure distance) by 200 feet to 5,200 feet. The Runway 36 ASDA is maintained at 5,000 feet. The LDA (landing distance) is reduced by 300 feet to 4,700 feet.

The ASDA for Runway 18 is reduced by 700 feet, the length necessary to provide the RSA at the far end of the departure operation. The Runway 36 ASDA is reduced by 900 feet, the length necessary to provide the RSA at the far end of a departure operation on Runway 36.

In this alternative, the LDA must provide at least 600 feet of RSA at the approach end of the runway, as well as 1,000 feet at the rollout end of the runway. The LDA for both runways is 4,700 feet. The Runway 18 LDA is reduced by 500 feet, the length necessary to provide for the RSA prior to the Runway 18 landing threshold plus an additional 700 feet, the length necessary to provide for the RSA at the roll-out end of the runway. For Runway 36, the LDA is reduced by 300 feet, the length necessary to provide for the RSA prior to the Runway 36 landing threshold plus 900 feet, the length necessary to provide for the RSA at the roll-out end of the runway.

Two RPZs are required when implementing declared distances. The departure RPZ begins 200 feet behind the physical pavement end. The Runway 18 departure RPZ contains approximately two residential home sites. The Runway 36 departure RPZ also encompasses approximately five home sites.

The approach RPZ is based upon the visibility minimums to the runway end. For Runway 18, the approach RPZ is based on one-mile visibility minimums. This approach RPZ encompasses approximately two residential home sites. The approach RPZ to Runway 36 is much larger as it is sized for a one-half mile visibility minimum approach. This RPZ contains approximately 45 home sites. Residential home sites are considered by AC 150/5300-13 to be incompatible with the RPZ.

This alternative also depicts the location of a medium intensity approach lighting system with runway alignment indicator lights (MALSR). The MALSR is required to achieve the one-half mile visibility minimums.

This alternative would require the relocation of an existing FAA antenna farm located west of an extended runway centerline near the airport's southwestern property line. A suitable relocation area is available southeast of the Runway 11-29/Runway 18-36 intersection.

Runway 18-36 Alternative 2B
ARC C-II RSA
Three-Quarter Mile Visibility Minimum
Precision Approach to Runway 36

Alternative 2B is shown on **Exhibit B5**. This alternative includes a 1,100-foot extension to the Runway 36 end for a total pavement length of 6,100 feet. This requires the mitigation of wetlands located south of Runway 36. The on-airport service road must also be relocated to clear the RSA and provide for the extension, as shown on the exhibit.

In contrast with Alternative 2A, this alternative assumes a precision approach to Runway 36 with three-quarter mile visibility minimums instead of the one-half mile visibility minimums assumed in Alternative 3A. This eliminates the requirement for an approach lighting system to Runway 36, reduces the size of the Runway 36 approach RPZ, and reduces the runway/taxiway separation distance to 300, but it does not change the size of the RSA. For this alternative, the RSA extends 200 feet on each side of the runway centerline and 1,000 feet beyond each runway end, the same as Alternative 2A.

Taxiway C is relocated 300 feet west of Runway 18-36 and extended to the new Runway 36 end. The relocated taxiway would impact existing aircraft parking on the general aviation apron west of Runway 36 and the existing service road on this apron. To maintain appropriate wingtip clearance, the service road and aircraft parking must be located at least 500 feet from the runway centerline. Approximately three tiedown locations would be lost to allow for the service road to be relocated and maintain this clearance. Three feeder aircraft parking positions on the west side of the cargo apron might also need to be relocated to meet a clearance standard for the location of parked aircraft. Extending Taxiway C the full length of Runway 18-36 impacts a large drainage area and existing wetlands in the area between Taxiway A and Taxiway G.

Similar to Alternative 2A, this alternative implements declared distances to ensure the appropriate RSA standards are met during takeoff and landings since existing site constraints prevent the RSA from extending the standard distance beyond the physical ends of the runway,. As shown on **Exhibit B5**, the ASDA (departure length) for Runway 18 and Runway 36 is 5,200 feet. The ASDA for Runway 18 and Runway 36 is reduced by 900 feet, the distance necessary to provide the RSA at the far end of the departure operation.

In this alternative, the LDA must provide at least 600 feet of RSA at the approach end of the runway, as well as 1,000 feet at the rollout end of the runway. The LDA for both runways is 4,700 feet. The Runway 18 LDA is reduced by 500 feet, the length necessary to provide for the RSA prior to the Runway 18 landing threshold plus an additional 700 feet, the length necessary to provide for the RSA at the rollout end of the runway. For Runway 36, the LDA is reduced by 300 feet, the length necessary to provide for the RSA prior to the Runway 36 landing threshold plus 900 feet, the length necessary to provide for the RSA at the roll-out end of the runway.

The Runway 18 departure RPZ contains approximately three residential home sites. The Runway 36 departure RPZ encompasses approximately eight home sites.

The approach RPZ is based upon the visibility minimums to the runway end. For Runway 18, the approach RPZ is based on one-mile visibility minimums. This approach RPZ may include four residential home sites. The approach RPZ to Runway 36 is much larger as it is sized for a three-quarter mile visibility minimum approach. This RPZ contains approximately seven home sites. Residential home sites are considered by AC 150/5300-13 to be incompatible with the RPZ.

This alternative would require the relocation of an existing FAA antenna farm located west of an extended runway centerline near the airport's southwestern property line. A suitable relocation area is available southeast of the Runway 11-29/Runway 18-36 intersection.

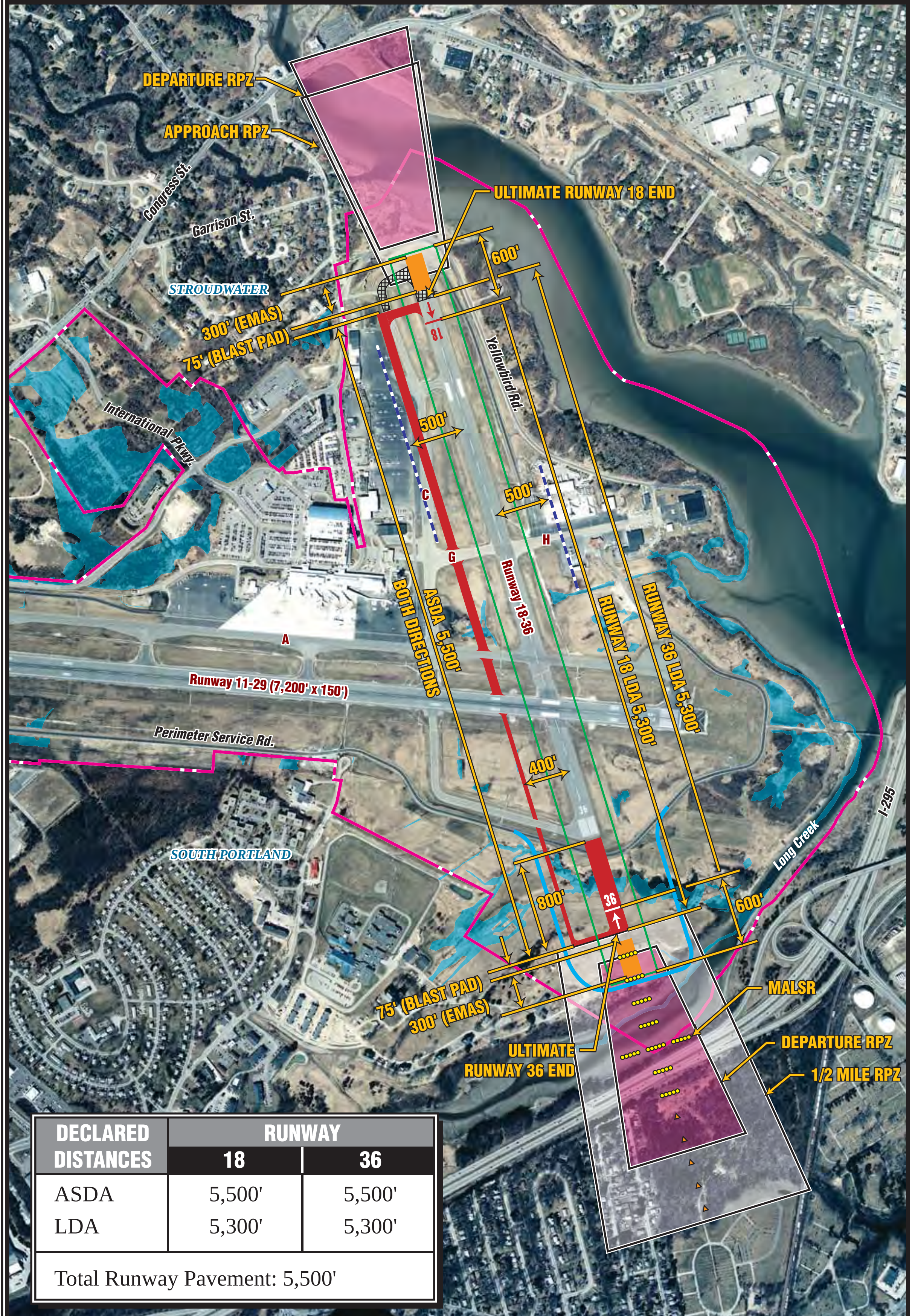
Runway 18-36 Alternative 3A
ARC C-II RSA
One-Half Mile Visibility Minimum
Precision Approach to Runway 36

Alternative 3A is shown on **Exhibit B6**. This alternative utilizes EMAS behind both ends of Runway 18-36. As discussed previously, EMAS is comprised of high energy absorbing materials of selected strength which will reliably and predictably crush under the weight of an aircraft. According to FAA Order 5200.9, EMAS installation provides a level of safety that is generally equivalent to a full RSA. Therefore, where EMAS is installed the full standard RSA is not required.

The length of the EMAS bed is established by the maximum takeoff weight of the largest aircraft to use the runway. For the type of aircraft using Runway 18-36, an EMAS bed 300 feet long and 150 feet wide is required. The EMAS bed must be located at least 75 feet from the takeoff position of the aircraft to reduce the degrading effects of jet blast and propeller wash on the EMAS surface. This requires a total of 375 feet beyond the end of the runway to accommodate the EMAS and equivalent RSA.

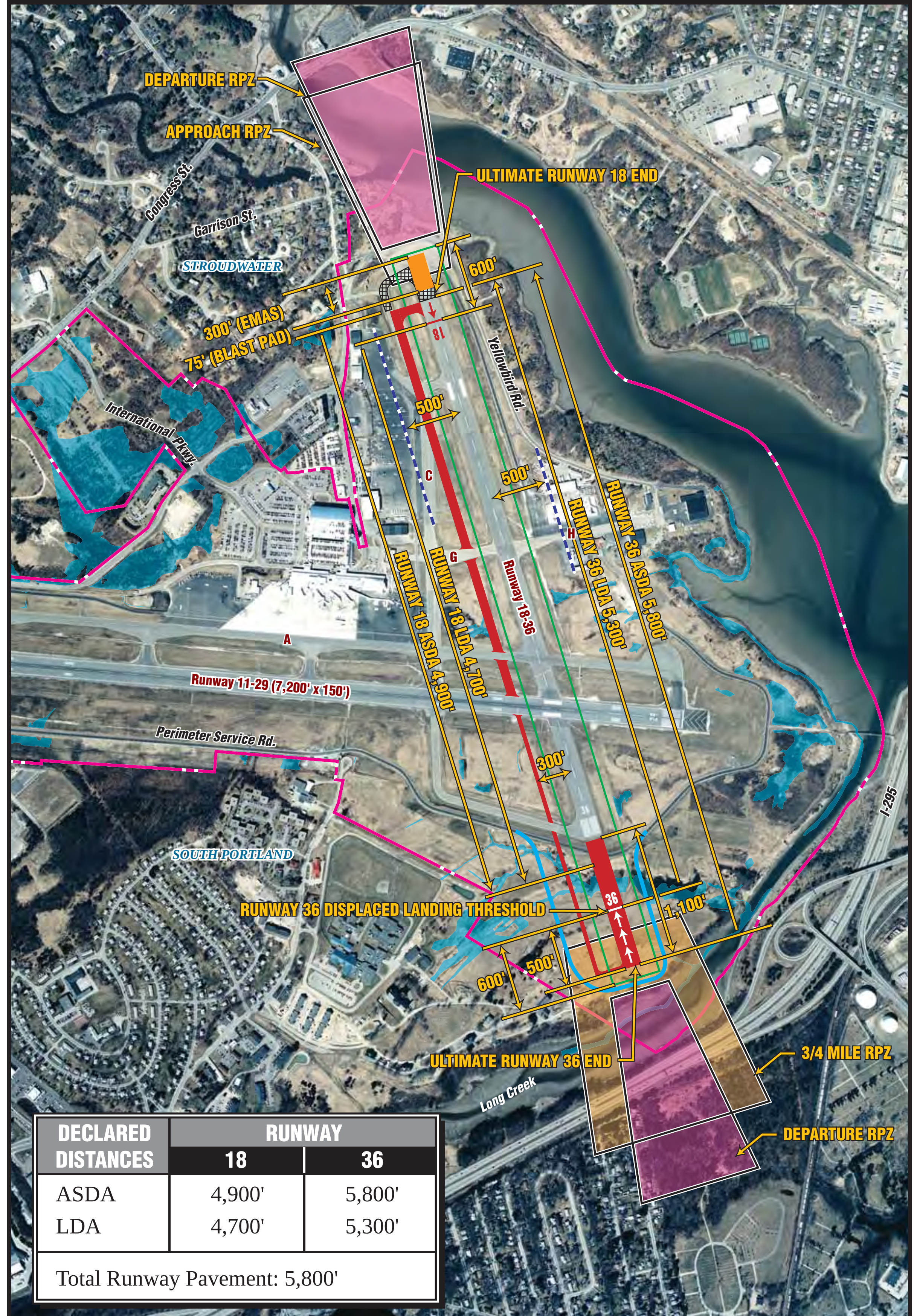
As shown on Alternative 3A, to accommodate EMAS behind the Runway 18 end, the Runway 18 end must be relocated approximately 300 feet south. A new entrance taxiway is constructed and the pavement behind the new runway end removed. The Runway 18 landing threshold is located 600 feet from the end of the EMAS structure as specified in FAA Order 5200.9.

ALTERNATIVE 3A: Develops Runway 18-36 to C-II Standards. Develop Runway 18-36 with EMAS off both ends. 1/2 Mile Minimum Precision Approach - Runway 36.



DECLARED DISTANCES	RUNWAY 18	RUNWAY 36
ASDA	5,500'	5,500'
LDA	5,300'	5,300'
Total Runway Pavement: 5,500'		

ALTERNATIVE 3B: Develops Runway 18-36 to C-II Standards. Develop Runway 18-36 with EMAS off North End Only. 3/4 Mile Minimum Precision Approach - Runway 18-36.



DECLARED DISTANCES	RUNWAY 18	RUNWAY 36
ASDA	4,900'	5,800'
LDA	4,700'	5,300'
Total Runway Pavement: 5,800'		

LEGEND

- Existing Airport Property Line
- Ultimate Airport Property Line
- Aircraft Parking Limit Line
- Wetlands
- Runway Safety Area (RSA)
- Object Free Area (OFA)
- Runway Protection Zone (RPZ)
- Ultimate Airfield Pavement
- Pavement to be Removed
- Ultimate Service Road
- **ASDA** Accelerate-Stop Distance Available
- **LDA** Landing Distance Available
- **MALSR** Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights

0 1200 2400
SCALE IN FEET

NORTH

PORTLAND INTERNATIONAL JETPORT

Exhibit B6
RUNWAY 18-36 ALTERNATIVES 3A AND 3B

In this alternative, the Runway 36 end is shifted 800 feet to the south to replace the pavement lost behind the Runway 18 end (which allowed for the EMAS installation) and to provide for additional runway length. The EMAS is installed behind the new Runway 36 end. This requires the mitigation of wetlands located south of Runway 36. The on-airport service road must also be relocated to clear the RSA and provide for the extension as shown on the exhibit.

This alterative increases both the ASDA (departure length) and LDA (landing length) available at the airport. In this alternative, the ASDA is 5,500 feet and the LDA is 5,300 feet.

Similar to Alternative 2A, this alternative extends Taxiway C to the new Runway 36 end and relocates the taxiway centerline 401 feet from the Runway 18-36 centerline as required by AC 150/5300-13 and FAA Notice 8260.56.

North of Taxiway G, the relocated taxiway impacts a portion of the on-airport interior service road and aircraft tiedown locations. To maintain wingtip clearance along the taxiway, approximately 10 tiedown locations would need to be removed and the on-airport interior access road relocated. A portion of the northern part of the general aviation apron would also become unusable for the same reasons. Three feeder aircraft parking positions on the west side of the cargo apron might also need to be relocated to meet a clearance standard for the location of parked aircraft. Extending Taxiway C the full length of Runway 18-36 impacts a large drainage area and existing wetlands in the area between Taxiway A and Taxiway G.

The Runway 18 departure RPZ contains approximately four residential home sites. The Runway 36 departure RPZ also encompasses approximately six home sites.

The approach RPZ is based upon the visibility minimums to the runway end. For Runway 18, the approach RPZ is based on one-mile visibility minimums. This approach RPZ may encompass approximately five residential home sites. The approach RPZ to Runway 36 is much larger as it is sized for a one-half mile visibility minimum approach. This RPZ contains approximately 45 home sites. Residential home sites are considered by AC 150/5300-13 to be incompatible with the RPZ.

This alternative also depicts the location of a medium intensity approach lighting system with runway alignment indicator lights (MALSR). The MALSR is required to achieve the one-half mile visibility minimums.

This alternative would require the relocation of an existing FAA antenna farm located west of an extended runway centerline near the airport's southwestern property line. A suitable relocation area is available southeast of the Runway 11-29/Runway 18-36 intersection.

Runway 18-36 Alternative 3B
ARC C-II RSA
Three-Quarter Mile Visibility Minimum
Precision Approach to Runway 36

Alternative 3B is shown on **Exhibit B6**. In an effort to reduce the cost of construction in comparison with Alternative 3A, this alternative removes the EMAS structure behind the Runway 36 end. The EMAS behind the Runway 18 end is retained. This allows for a 1,100-foot shift of the Runway 36 end to the south to replace the pavement lost behind the Runway 18 end (which allowed for the EMAS installation) and to provide for additional runway length. This results in a total pavement length of 5,800 feet. The Runway 36 shift requires the mitigation of wetlands located south of Runway 36. The on-airport service road must also be relocated to clear the RSA and provide for the new pavement as shown on the exhibit.

In contrast with Alternative 3A, this alternative assumes a precision approach to Runway 36 with three-quarter mile visibility minimums instead of the one-half mile visibility minimums assumed in Alternative 3A. This eliminates the requirement for an approach lighting system to Runway 36, reduces the size of the Runway 36 approach RPZ, and reduces the runway/taxiway separation distance to 300, but it does not change the size of the RSA. For this alternative, the RSA extends 200 feet on each side of the runaway centerline and 1,000 feet beyond each runway end, the same as Alternative 3A.

Taxiway C is relocated 300 feet west of Runway 18-36 and extended to the new Runway 36 end. The relocated taxiway would impact existing aircraft parking on the general aviation apron west of Runway 36 and the existing service road on this apron. To maintain appropriate wingtip clearance, the service road and aircraft parking must be located at least 500 feet from the runway centerline. Several tie-down locations would be lost and the service road located on the apron relocated to maintain this clearance. Three feeder aircraft parking positions on the west side of the cargo apron might also need to be relocated to meet a clearance standard for the location of parked aircraft. Extending Taxiway C the full length of Runway 18-36 impacts a large drainage area and existing wetlands in the area between Taxiway A and Taxiway G.

This alternative implements declared distances to ensure the appropriate RSA standards are met during takeoff and landings since existing site constraints prevent the RSA from extending the standard distance beyond the physical ends of the runway. As shown on **Exhibit B5**, the ASDA (departure length) for Runway 18 is 4,900 feet. For Runway 36, the ASDA is 5,800 feet. The ASDA for Runway 18 is reduced by 900 feet, the distance necessary to provide the RSA at the far end of the departure operation. There is no reduction in ASDA for Runway 36 due to the EMAS installed behind the Runway 18 end.

In this alternative, the LDA must provide at least 600 feet of RSA at the approach end of the runway, as well as 1,000 feet at the rollout end of the runway for landing operations to Runway 18. This reduces the LDA to 4,700 feet for Runway 18. The Runway 18 LDA is reduced by 200 feet, the length necessary to provide for the RSA prior to the Runway 18 landing threshold plus an additional 900 feet, the length necessary to provide for the RSA at the roll-out end of the runway. For Runway 36, the LDA is 5,300 feet. The Runway 36 LDA is reduced by 500 feet, the length necessary to provide for the RSA prior to the Runway 36 landing threshold.

The Runway 18 departure RPZ contains approximately four residential home site. The Runway 36 departure RPZ also encompasses approximately eight home sites.

The approach RPZ is based upon the visibility minimums to the runway end. For Runway 18, the approach RPZ is based on one-mile visibility minimums. This approach RPZ may include approximately five residential home sites. The approach RPZ to Runway 36 is much larger as it is sized for a three-quarter mile visibility minimum approach. This RPZ contains approximately seven home sites. Residential home sites are considered by AC 150/5300-13 to be incompatible with the RPZ.

This alternative would require the relocation of an existing FAA antenna farm located west of an extended runway centerline near the airport's southwestern property line. A suitable relocation area is available southeast of the Runway 11-29/Runway 18-36 intersection.

SUMMARY

RUNWAY 29

Table B summarizes estimated development costs for Runway 29 Alternatives A, B, and C. While Alterative A, the existing condition at the airport, does not have any further costs to implement, this alternative results in a disparity between departure and landing distances on Runway 11 and Runway 29. This can result in different operating requirements for the airlines depending upon which runway is in use. Alternative B complies with the intent of FAA Order 5200.8, which states, "The first alternative that must be considered in every case is constructing the traditional graded runway safety area surrounding the runway." While this alternative impacts approximately 3.1 acres of wetlands, these wetlands will need to be removed anyway. As stated previously, the United States Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), has recommended the removal of the wetlands behind the Runway 29 end to reduce the potential for bird strikes. Alternative C, which utilizes EMAS, is the most expensive option. While Alternatives A and C do not impact the wetlands east of the Runway 29 end, the wetlands would still need to be removed to reduce the potential for bird strikes. Thus, Alternative B is the preferred alternative as it provides for the additional safety area and also improves safety by removing wetlands deemed to be a bird attractant.

TABLE B
Summary of Salient Features and Construction Costs
Runway 11-29

Alternative	ARC	Estimated Construction Cost
Exhibit B2 – Alternative A Runway 11 ASDA – 6,800’ Runway 11 LDA – 6,800’ Runway 29 ASDA – 7,200’ Runway 29 LDA – 7,200’	D-IV	$0
Exhibit B2 –Alternative B Runway 11 ASDA – 7,200’ Runway 11 LDA – 7,200’ Runway 29 ASDA - 7,200’ Runway 29 LDA – 7,200’	D-IV	$1,750,000
Exhibit B2 –Alternative C Runway 11 ASDA – 7,200’ Runway 11 LDA – 7,200’ Runway 29 ASDA - 7,200’ Runway 29 LDA – 7,200’	D-IV	$7,250,000

Source: Stantec

RUNWAY 18-36

Table C summarizes estimated development costs for the Runway 18-36 alternatives. While the base alternative (**Exhibit B3**) improves the RSA behind both the Runway 18 and Runway 36 ends, this alternative does not meet some of the other planning requirements identified in this analysis. This alternative does not provide for a wider or longer RSA, nor does it increase runway length or improve the instrument approach capability to the Runway 36 end. Alternatives 1A, 2A, 2B, and 3C result in shorter runway lengths than currently available at the airport. The precision instrument approach with one-half mile visibility minimums assumed in Alternatives 1A, 2A, and 3A directly impacts numerous home sites south of I-295. Alternative 1B has the least impact on home sites south of I-295. This alternative meets all the planning requirements for a wider and longer RSA, increased takeoff distance, and for improved instrument approach capability to Runway 36.

TABLE C
Summary of Salient Features and Construction Costs
Runway 18-36

Alternative	ARC	Structures In RPZ: 18 App.	18 Dep.	36 App.	36 Dep.	Est. Costs
Exhibit B3 – Alternative A Runway 18 ASDA – 5,001' Runway 18 LDA - 5,001' Runway 36 ASDA - 5,001' Runway 36 LDA - 5,001'	B-II	±2	N/A	0	N/A	$3,450,000
Exhibit B4 – Alternative 1A Runway 18 ASDA – 5,460' Runway 18 LDA – 4,860' Runway 36 ASDA - 5,360' Runway 36 LDA – 4,860'	B-III	±2	±2	±45	1	$7,200,000
Exhibit B4 – Alternative 1B Runway 18 ASDA – 5,600' Runway 18 LDA - 5,150' Runway 36 ASDA – 5,650' Runway 36 LDA - 5,150'	B-III	±2	±2	±7	1	$7,850,000
Exhibit B5– Alternative 2A Runway 18 ASDA – 5,200' Runway 18 LDA – 4,700' Runway 36 ASDA - 5,000' Runway 36 LDA – 4,700'	C-II	±4	±3	±45	±5	$7,350,000
Exhibit B5 – Alternative 2B Runway 18 ASDA – 5200' Runway 18 LDA – 4,700' Runway 36 ASDA - 5,200' Runway 36 LDA - 4,700'	C-II	±4	±3	±7	±8	$7,850,000
Exhibit B6 – Alternative 3A Runway 18 ASDA – 5,500' Runway 18 LDA - 5,300' Runway 36 ASDA - 5,500' Runway 36 LDA - 5,300'	C-II	±5	±4	±45	±6	$17,400,000
Exhibit B6 – Alternative 3B Runway 18 ASDA – 4,900' Runway 18 LDA – 4,700' Runway 36 ASDA - 5,800' Runway 36 LDA - 5,300'	C-II	±5	±4	±7	±8	$12,800,000

PORTLAND INTERNATIONAL JETPORT

Appendix C

ECONOMIC BENEFIT ANALYSIS

EXECUTIVE SUMMARY

This report presents an analysis of the economic benefits of Portland International Jetport. The Jetport is an essential gateway for travelers to and from Maine. The Jetport's economic influence extends beyond the immediate Portland metropolitan area to include most of the entire state.

Total Economic Benefits

Economic benefits (revenues, employment and earnings) are created when economic activity takes place both on and off the airport. The economic benefits of Portland International Jetport are shown in Table C1.

For 2005, the total benefits of the airport, including on-airport, air visitor, and secondary benefits (which result as dollars recirculate in the regional economy), were calculated to be:

- **$867.9 Million Revenues**
- **$295.0 Million Earnings**
- **11,591 Total Employment**

Measuring Economic Benefits

Portland International Jetport serves as a portal that welcomes commerce and visitors into the region and provides access for the citizens and businesses of Maine and the greater Portland area to travel outward to the economy at large.

Commercial airline travelers from the Jetport can fly to major U. S. cities and also make connections for national and global flights. General aviation from the Jetport allows business travelers to reach destinations without the delays and uncertainty of today's airline flights and provides access to more than 5,300 airports in the nation, compared to approximately 565 served by scheduled airlines.

The presence of an airport creates benefits for a community in other ways. Airports bring essential services, including enhanced medical care (such as air ambulance service), support for law enforcement and fire control, and courier delivery of mail and high value parcels. These services raise the quality of life for residents and maintain a competitive environment for economic development.

Although qualitative advantages created by the presence of an airport are important, they are also difficult to measure. In studying airport benefits, regional analysts have emphasized indicators of economic activity for airports that can be quantified, such as dollar value of output, number of jobs created, and earnings of workers and proprietors of businesses.

Economic benefit studies differ from cost-benefit analyses, which are often called for to support decision-making, typically for public sector capital projects. Study of economic benefit is synonymous with measurement of economic performance. The methodology was standardized in the publication by the Federal Aviation Administration, *Estimating the Regional Economic Significance of Airports*, Washington DC, 1992.

TABLE C1
Summary of Economic Benefits: 2005
Portland International Jetport

	BENEFIT MEASURES		
Source	**Revenues**	**Earnings**	**Employment**
All On-Airport Economic Benefits	**$196,290,000**	**$45,399,000**	**1,184**
Air Visitor Benefits	**221,788,000**	**84,544,000**	**4,456**
Primary Benefits: Sum of On-Airport & Air Visitor Benefits	**418,078,000**	**129,943,000**	**5,640**
Secondary Benefits (Multiplier Effects)	***449,824,000***	***165,100,000***	***5,951***
TOTAL BENEFITS	**$867,902,000**	**$295,043,000**	**11,591**

Following the FAA methodology, this study views Portland International Jetport as a source of measurable economic output (the production of aviation services) that creates revenues for firms, and employment and earnings for workers on and off the airport.

Aviation spending on the airport injects revenues into the community when firms buy products from suppliers and again when employees of the airport spend for household goods and services. In addition, spending by air visitors produces revenues for firms in the hospitality sector as well as employment and earnings for workers.

Benefit Measures

The quantitative measures of economic benefits of the Portland International Jetport are each described below.

Revenue is the value in dollars of the output of goods and services produced by businesses. For government units, the budget is used as the value of output.

Output is equivalent to revenue or spending or sales. From the perspective of the business that is the supplier of goods and services, the dollar value of output is equal to the revenues received by that producer. From the viewpoint of the consumer, the dollar value of the output is equal to the amount that the consumer spent to purchase those goods and services from the business.

Earnings are a second benefit measure, made up of employee compensation (the dollar value of payments received by workers as wages and benefits) and proprietor's income of business owners.

Employment is the third benefit measure, the number of jobs supported by the revenues created by the airport.

To measure the economic benefits of the airport, information on revenues, employment and earnings was obtained directly from suppliers and users of aviation services through on-site interviews and mailed survey forms. Those contacted included private sector firms on the airport, government agencies, commercial airline visitors and general aviation air travelers. Portland International Jetport staff provided valuable assistance with data collection.

On-Airport Benefits

Operations on Portland International Jetport supported a total of 29 private and public employers including passenger services such as airline ticketing and auto rental, FBO services, pilot training, avionics, maintenance, storage, air cargo and express delivery services as well as government agencies such as police, fire, airport administration, the air traffic control tower, and the Transportation Security Administration. In addition to the above, on-going airport capital improvement projects created benefits on the airport during the year.

Including the revenues and employment created by outlays for airport capital projects, these economic units were responsible for on-airport benefits of:

- **$196.3 Million Revenues**
- **$45.4 Million Earnings**
- **1,184 On-Airport Jobs**

Air Visitor Benefits

An important source of aviation-related spending comes from the more than 350,000 air visitors that arrive at the airport each year on commercial, private, or chartered aircraft.

In 2005, Portland International Jetport recorded more than 725,000 commercial airline passenger enplanements. Five out of ten of these (49%) were visitors to the region.

Visitors traveling as tourists or for business or personal reasons spend for lodging, food and drink, entertainment, retail goods and services, and ground transportation including auto rental and taxis, creating annual airport service area output, employment and earnings of:

- **$221.8 Million Revenues**
- **$84.5 Million Earnings**
- **4,456 Off-Airport Jobs**

Primary Benefits

The primary benefits represent the initial on-airport and air visitor revenues, earnings and employment due to the presence of the airport. Primary benefits are the "first round" impacts and do not include any multiplier effects of secondary spending. The primary benefits of on-airport and air visitor economic activity related to Portland International Jetport were:

- **$418.1 Million Revenues**
- **$129.9 Million Earnings**
- **5,640 Jobs**

Combined revenue flows for businesses and employers on and off the airport sum to a value of $418.1 million. The airport presence created benefits to workers by providing incomes of $129.9 million. There were 5,640 jobs supported directly by the suppliers and users of aviation services.

Secondary Benefits

Secondary benefits or multiplier effects are created when the initial spending by airport employers or visitors circulates and recycles through the economy. In contrast to initial or primary benefits, the secondary benefits measure the magnitude of successive rounds of re-spending as those who work for or sell products to airport employers or the hospitality sector spend dollars. Additionally, when aviation firms buy intermediate goods and services from their suppliers, this also contributes to the secondary or multiplier effects set into motion by the initial economic activity on the airport.

For example, when an aircraft mechanic's wages are spent to purchase food, housing, clothing, and medical services, these dollars create more jobs and income in the general economy of the region through multiplier effects of re-spending.

Input-output analysis shows the initial revenue stream of $418.1 million created by the presence of the airport stimulated secondary benefits from multiplier effects within the service area of:

- **$449.8 Million Revenues**
- **$165.1 Million Earnings**
- **5,951 Jobs**

Comparison With 1994

The current economic benefit study uses methodology similar to that of the previous study, completed in 1994. Comparison of the two studies allows an assessment of growth of the economic benefits associated with the Jetport over time.

Surveys of employers on Portland International Jetport in 1994 showed 865 jobs on the airport, with payroll of $21.3 million and revenues to firms and agencies of $140.2 million. The 2005 survey found 1,184 jobs, an increase of 37 percent in employment.

The 2005 earnings or income to workers was reported as $45.4 million. After adjustment for inflation, the 1994 figure for payroll in 2005 dollars is $28 million, and an average wage of $32,370. The 2005 average wage is $38,345 for all Jetport workers, an increase in real wages of 18 percent.

The on-airport 1994 revenues in 2005 dollars are $184 million. On-airport revenues in 2005 are $196.3 million, an inflation adjusted growth rate of 7 percent.

ON-AIRPORT BENEFITS

This section provides more detail on the economic benefits associated with activity on site at Portland International Jetport.

Table C2 illustrates the annualized employment, earnings and value of output (revenues) produced by airport tenants in 2005. Values shown for revenues, employment and earnings are the primary or initial benefits and do not include multiplier effects of secondary benefits.

On-airport economic activity created annual output of $196.3 million (including $5.2 million budgeted for capital projects). Private sector revenues were $162.3 million and governmental budgets were $28.8 million.

Economic activity is discussed below for (a) suppliers of aviation services, (b) other private on-airport employers, (c) capital projects and (d) government agencies on the Jetport

Suppliers of Aviation Services

Suppliers of aviation services are those private firms that offer airline passenger services, support the general aviation flyer, or transport air cargo.

Six major air carriers offer flights throughout the Northeastern part of the nation. Non-stop flights are available to Chicago to the West and Atlanta to the South. A total of 1.5 million passengers moved through the terminal in 2005. Based on figures from the U. S. Department of Transportation, the dollar value of outbound airline travel from Portland International Jetport was $60 million in 2005.

Full FBO services available for the aviation community include general aviation aircraft maintenance, avionics, and fueling for various categories of aircraft including piston, turboprop, jet and rotary.

General aviation services on the airport include hangars for private aircraft, flight training, aircraft charter and rental, sales, leasing and exchange of aircraft, as well as pilot supplies.

Air cargo and expedited delivery services are available for consumers, business, and medical users requiring secure and speedy transport of packages and products. Over 34 million pounds of cargo were shipped in 2005.

The 11 private suppliers of aviation services reported economic activity of $132.2 million of revenues or output, employing 604 workers with payroll of $22.9 million.

Other On-Airport Private Firms

Airports serve the traveling public with other "non-aviation" firms offering retail goods and services to travelers. On-site auto rental is available, for example, conveniently located within the Jetport terminal. Other ground transport options to destinations in the greater Portland area or to other points in Maine are available as well.

Retail goods may be purchased in the terminal, along with food and drink. Private security and janitorial services also contribute to revenues and employment created by the presence of the Jetport.

The 12 non-aviation employers on the airport created 257 jobs, with $6.4 million of payroll. The firms reported revenues of $30.1 million.

Capital Projects

Capital projects are vital for airports to maintain safety and provide for growth. Capital spending for airport improvements also creates jobs and injects dollars into the local economy.

Major projects during recent years include the following:

- New multi-level parking garage
- Terminal expansion
- Baggage transport system
- Aircraft parking apron improvements
- Runway extension
- Roadway improvements

Although it is recognized that capital spending varies from year to year, for purposes of assessing the annual economic impact of such outlays the proper methodology is to either use average annual spending over some given time period or identify a typical year to represent capital expenditures.

After reviewing capital outlays in recent years, it was decided to use $5.2 million as representing a typical figure for expansion and improvements. Note this figure would not include land acquisition.

Based on the construction labor and output ratios for the Portland area, the $5.2 million of capital expenditures at the Jetport created the equivalent of 73 jobs on the airport, with payroll of $2.2 million for the year.

Government Agencies

There are several government agencies supporting aviation, including the Portland International Jetport staff. The airport is owned and operated by the City of Portland Some 40 staff members report to an airport manager who in turn reports to the director of Department of Transportation and Waterfront.

Other governmental units on the airport include Airport Rescue and Firefighting (ARFF), the Transportation Security Administration (TSA) and FAA including the air traffic control tower.

Combined budgets of government units on the airport in 2005 summed to $28.8 million. There were 250 employees of government offices, with earnings of $13.9 million.

On-Airport Summary

Private suppliers of aviation services and other related private employers created economic activity on the Jetport that summed to $162.3 million of on-airport revenues (not including capital expenditures). Capital expenditures to support aviation were estimated as $5.2 million. Private firms thus accounted for 85 percent of revenues on the Jetport in 2005.

Including government agencies and their budgets, the on-airport economic activity in 2005 summed to $196.2 million in revenues, with 1,184 jobs and payroll of $45.4 million to on-airport workers.

The value of output per worker was $165,785. The average wage for all workers at the Jetport was $38,345.

TABLE C2
On-Airport Benefits: Revenues, Earnings and Employment
Portland International Jetport

	BENEFIT MEASURES		
Sources of On-Airport Benefits	**Revenues**	**Earnings**	**Employment**
Private Aviation Employers Commercial Airlines FBO Services & Fueling Aircraft Rental & Sales Aircraft Storage Pilot Training & Supplies Air Cargo/Courier Corporate Aviation	$132,200,000	$22,912,000	604
Other Private On-Airport Employers Food Services Retail Shops & Services On-site Auto Rental Other Ground Transport Parking	30,105,000	6,370,000	257
Capital Projects	5,215,000	2,243,000	73
Government Agencies/Services Airport Staff TSA FAA & Tower Other federal, state, local	28,770,000	13,874,000	250
ON-AIRPORT BENEFITS	196,290,000	45,399,000	1,184

Source: Survey of Employers, Portland International Jetport

AIR VISITOR BENEFITS

Portland International Jetport attracts commercial airline and general aviation visitors from throughout the region and the nation who come to the area for business, recreational and personal travel.

This section provides detail on economic benefits from commercial and general aviation air travelers who use the airport. Values shown for spending (revenues), employment and earnings are benefits of initial visitor outlays and do not include secondary benefits of multiplier effects.

Commercial Airline Visitors

During the most recent complete year there were 727,014 airline enplanements at Portland International Jetport. According to an analysis of the air traveler origin and destination data bank of the U. S. Department of Transportation, 49 percent or 356,237 enplaning passengers were visitors to the area (Table C3).

To obtain information on travel patterns of airline visitors to Maine, surveys were administered to more than 1,000 enplaning visitors in the Jetport Terminal during 2005. Surveys were distributed at various hours of the day and during different days of the week, including weekends.

Travel party information on air visitor spending for lodging, food, retail goods and services and ground transportation was provided by visitors, as well as purpose of the trip. The average length of stay for travel parties was 5.4 days. The average spending per visitor per trip was $614.

Multiplication of $614 by 356,237 annual airline passenger visitors yields total airline visitor spending of $218.8 million for the year.

TABLE C3
Airline Visitor Travel Patterns
Portland International Jetport

Category	Value
Enplanements	727,014
Percent Visitors	49%
Number of Visitors	356,237
Average Stay (Days)	5.4
Avg. Spending per Visitor per trip	$614
Visitor Spending	$218,729,000

Source: Jetport Passenger Survey

The figures for spending per person per trip can be used to derive the economic value of visitor expenditures from a typical passenger aircraft arriving at Portland International Jetport (Table C4).

Based on current characteristics of arriving passenger aircraft, the average number of passengers is 37. The average number of visitors per aircraft is 49 percent, or 18. These 18 visitors per aircraft will spend on average $614 per person per trip to the state of Maine.

Total airline visitor spending of $11,052 is injected into the local economy for each arriving airliner, on average.

TABLE C4
Economic Value of Arriving Airliner
Portland International Jetport

Item	Value
Average Passengers Per Aircraft	37
Percent Visitors	49%
Number of Visitors Per Aircraft	18
Trip Expenditures/Person	$614
Value of Arriving Airliner	$11,052

Source: US Dept. of Transportation and Jetport Passenger Survey

Spending by category and resulting economic benefits from all airline visitors are shown in Table C5. The largest spending category is lodging ($295 per person per trip), which is also the source of the greatest annual revenues (at $105 million), earnings ($42.4 million) and employment (2,229workers).

Each visitor spent $144 for food and drink during their stay in Maine. Airline visitor spending in eating and drinking places created the second largest revenues ($51.3 million), earnings ($17 million) and number of jobs (1,142).

The $218.8 million of visitor spending by airline travelers created a total of 4,394 jobs in the state, with earnings to workers and proprietors of $83.4 million.

TABLE C5
Economic Benefits from Airline Visitors: Revenues, Earnings and Employment
Portland International Jetport

Category	Spending Per Trip	Revenues	Earnings	Jobs
Lodging	$295	$105,090,000	$42,374,000	2,229
Food/Drink	144	51,298,000	17,004,000	1,142
Retail Sales	75	26,718,000	13,587,000	632
Entertainment	49	17,455,000	6,040,000	285
Ground Trans.	51	18,168,000	4,342,000	106
TOTAL	$614	$218,729,000	$83,347,000	4,394

Note: Earnings and employment figures were derived from the IMPLAN input-output model based on data from the Maine Department of Labor and the United States Bureau of Economic Analysis. Ground Transport has been adjusted to remove on-airport auto rental figures.

TABLE C6
Airline Visitor Summary Information by Purpose of Travel
Portland International Jetport

	Business	Personal	Tourism	Overall
Visitors (2005)	121,121	110,443	124,663	356,237
Percent of Visitors	34%	31%	35%	100%
Party Size	1.8	2.2	2.3	2.1
Length of Stay (Days)	3.5	7.0	6.2	5.4
Visitor Days	423,923	773,101	772,910	1,969,934
Percent of Days	22%	39%	39%	100%
Spending: Person/Trip	$557	$384	$874	$614
Visitor Spending	$67,464,000	$42,410,000	$108,973,000	$218,729,000

Source: Jetport Passenger Survey

Table C6 presents summary information on purpose of travel by airline visitors to Maine during 2005. Although the survey was administered in the summer of 2005, results were adjusted to reflect all four quarters of the year, drawing from alternative sources including the Maine Office of Tourism and D. K. Shifflet and Associates.

Business travel is the main purpose stated for just over one third (34%) of airline visitors to Maine. The remaining two thirds of visitors are divided between those traveling for personal reasons (the most frequent reason given for personal travel was visiting relatives) or tourism.

Those traveling for personal reasons had the longest stay, possibly related to the fact that these travelers most often stayed at the private home of the person they were visiting.

Business travelers reported the shortest average stay in Maine (3.5 days), and thus accounted for only 22 percent of visitor days recorded. Overall, airline visitors contributed to nearly two million visitor days during the year. On an average day, there are more than 5,000 airline travelers visiting in Maine.

Those traveling as tourists had the greatest spending per person per trip ($874). Business travelers reported the smallest outlays per trip.

Detail on spending by category by those traveling for various purposes is set out in Table C7.

Those describing themselves as "tourists" had the largest expenditures per trip for every category of spending. Business travelers reported the lowest spending per person for retail and entertainment. As noted above, those traveling for personal reasons had the lowest outlays for lodging as well as food, consistent with a visit to a private home.

Although business travelers had the shortest stay in Maine (3.5 days) their average per person lodging expense was $307. Business travelers have the highest likelihood (over 95 percent) of reporting a stay at a hotel or other accommodation.

The economic value of an airline tourist party can be calculated from the survey data provided here. The typical tourist party consists of 2.3 persons who stay in Maine for 6.2 days.

During their trip they will spend on average $1,032 for lodging and $430 for food. Retail spending for the tourist travel party will sum to $230 on average and the group will spend $168 on entertainment.

Including all categories of spending, the tourist party traveling by air will spend $2,010 in Maine during their trip. The typical business travel party of 1.8 persons will spend half this amount, $1,002. Those visitors traveling for personal reasons will spend $845 as a travel party during their trip.

TABLE C7
Airline Visitor Spending Per Person Per Trip
Portland International Jetport

Category	Business	Personal	Tourism	Overall
Lodging/Trip	$307	$107	$449	$295
Food/Trip	$131	$109	$187	$144
Retail/Trip	$42	$83	$100	$75
Entertainment/Trip	$31	$43	$73	$49
Ground Trans/Trip	$46	42	65	51
Total: Person/Trip	$557	$384	$874	$614

Notes: Ground Transportation has been adjusted to remove on-airport auto rental. On-airport auto rental appears as a source of revenue and employment in Tables C1 and C2. Overall column weighted by percentage of visitors reporting each purpose of travel

TABLE C8
Airline Visitor Origination
Portland International Jetport

Rank and Origin	Visitors
1 Washington	40,295
2 New York/Newark	30,270
3 Atlanta	14,805
4 Chicago	13,160
5 Philadelphia/Ca	10,535
6 Tampa	6,890
7 Detroit	6,770
8 Denver	6,165
9 Minneapolis	5,820
10 Pittsburgh	5,615

Source: U. S. Department of Transportation Data Base and Portland International Jetport Records

During 2005, 49 percent of passengers enplaning at Portland International Jetport were visitors to Maine and the greater Portland area.

The greatest numbers of visitors (40,000) came from Washington D. C., according to origin and destination data on airline tickets maintained by the U. S. Department of Transportation (Table C8).

New York/Newark was second in importance as a source of airline visitors, followed by Atlanta, then Chicago and Philadelphia.

In the 1994 study, Washington D. C. ranked fifth as a source of airline visitors and the New York/Newark area was first. San Francisco, ranked sixth in 1994, does not appear in the top ten originating cities in 2005. Denver, eighth in the current ranking, was not among the top twenty in 1994.

General Aviation Visitors

In order to analyze general aviation traffic patterns at the airport, a database of 3,000 general aviation flight plans involving Portland International Jetport as either destination or origin for travel was obtained from the FAA.

The decade of the 1990s often saw more than 35,000 itinerant general aviation operations annually at Portland International Jetport. Recently itinerant operations have been below 30,000 per year.

Operations involve both arrivals and departures. It is necessary to differentiate between itinerant operations by based and transient aircraft. An itinerant operation involves an origination or destination airport other than Portland International Jetport. However, both based and non-based aircraft contribute to itinerant activity in any given day.

When a based aircraft returns to Portland International Jetport from Philadelphia, for example, that is an itinerant operation. When an aircraft based at an airport other than Portland Jetport arrives, that aircraft is classified as a transient itinerant.

According to analysis of flight records, there were 10,722 transient aircraft arrivals at Portland International Jetport in 2005. Of these, 2,333 brought overnight visitors and 8,389 were one-day visitors (Table C9).

Separate analyses were conducted for those GA visitors with an overnight stay and those whose visit was one day or less in duration. To compute economic benefits based on visitor spending, one day aircraft were further partitioned into those staying less than 4 hours and 4 hours or more.

Visitor spending estimates were computed only for those aircraft staying 4 hours or longer at Portland International Jetport to account for the fact that many aircraft stop only for fuel and travelers do not spend for food, retail shopping, or ground transportation off the airport. There were 1,852 general aviation aircraft that stayed on the ground 4 hours or more during the year (see below, Table C12).

TABLE C9
General Aviation Transient Aircraft
Portland International Jetport

Item	Annual Value
Itinerant AC Arrivals	12,467
Transient AC Arrivals	10,722
Overnight Transient AC	2,333
One Day Transient AC	8,389

Source: Derived from FAA Flight Plan Data Base and Portland International Jetport Records

Overnight GA Visitors

Information on visiting general aviation aircraft was derived from a mail survey of visiting aircraft owners and pilots. Visitors were asked about the purpose of their trip, the size of the travel party, length of stay, type of lodging, and outlays by category.

The travel patterns underlying the calculation of overnight GA visitor economic benefits are shown in Table C10, for the 2,333 transient overnight aircraft arrivals during the year.

The average party size was 2.9 persons and the average overnight travel party stayed in the area for 2.6 days. There were 6,766 overnight visitors for the year, with a combined total of 17,591 visitor days. Spending per travel party per aircraft averaged $1,042. Total spending by all GA overnight visitors summed to $2.4 million for the year.

TABLE C10
General Aviation Overnight Visitors
Portland International Jetport

Item	Annual Value
Transient AC Arrivals	10,722
Overnight Transient AC	2,333
Avg. Party Size	2.9
Number of Visitors	6,766
Average Stay (Days)	2.6
Visitor Days	17,591
Spending per Aircraft	$1,042
Total Expenditures	$2,430,000

Source: Derived from FAA Flight Plan Data Base, Portland International Jetport Records and GA Visitor Survey

Table C11 shows the percentage distribution of outlays by overnight travel parties at Portland International Jetport. Food and drink accounts for 29 percent of visitor spending, averaging $297 per aircraft travel party.

Lodging was $293 per party, or 28 percent. The somewhat smaller magnitude of lodging compared to food and drink is consistent with overnight visitors staying at private homes, either with friends and relatives or in their own vacation property.

Retail spending accounted for 25 percent of reported expenditures by overnight GA travel parties, followed in size by ground transportation. Entertainment was the smallest expenditure category, at $64 for each visiting overnight general aviation travel party.

TABLE C11
Spending Per Overnight GA Aircraft
Portland International Jetport

Category	Spending	Percent
Lodging	$293	28
Food/Drink	297	29
Retail	262	25
Entertainment	64	6
Transportation	126	12
TOTAL	$1,042	100

Source: GA Visitor Survey

Day GA Visitors

According to flight operations records, 68 percent of itinerant general aviation aircraft arriving at Portland International Jetport were transients that stayed on the airport for one day or less.

During the year, there were 10,722 transient aircraft that stopped at the airport for one day. Some were only on the ground for a few minutes while others were parked several hours when the travel party had their aircraft serviced, pursued a personal activity or conducted business.

The economic benefits from arriving aircraft travel parties are of two types. Those pilots or aircraft owners that buy fuel or have their aircraft serviced on the airport are making purchases which contribute to the revenue stream received by aviation businesses on the airport. That type of spending creates output, employment, and earning on the airport. Those economic benefits are shown in Table C2 as on-airport benefits.

TABLE C12
General Aviation Day Visitors
Portland International Jetport

Item	Annual Value
Transient AC Arrivals	10,722
One Day Transient AC	8,389
Stay >/= 4 Hours	1,852
Average Stay (Hours)	6.0
Avg. Party Size	3.4
Number of GA Visitors	6,296
Spending per Aircraft	$339
Total Expenditures	$627,000

Source: Source: Derived from FAA Flight Plan Data Base and GA Visitor Survey

However, if the aircraft travel party leaves the airport to visit a corporate site, conduct a business meeting, go shopping, or attend a sporting or cultural event, these off-airport activities generate off-airport spending that creates jobs and earnings in the local community.

For the purposes of this study, those travel parties that arrived and departed within four hours were assumed to have not left the airport and not contributed any significant spending off the airport.

Of the 10,722 transient aircraft that stopped at Portland International Jetport during the past year, there were 1,852 that were parked for more than four hours but not overnight (Table C12).

The average stay in the area for those travel parties was 6.0 hours, according to arrival and departure records, with a range of 4 to 12 hours.

TABLE C13
Spending Per Day Visitor Aircraft
Portland International Jetport

Category	Spending	Percent
Food/Drink	$112	33
Retail	175	52
Entertainment	10	3
Transportation	42	12
TOTAL	$339	100

Source: GA Visitor Survey

Day trip aircraft brought 6,296 visitors to the greater Portland area during the year. The average spending per one-day aircraft averaged $339. The total economic benefits created by off-airport spending by one-day general aviation visitors tallied to $627,000 of output (revenues or sales off the airport).

The largest expenditure category for one-day visiting travel parties was retail, which averaged $175 per aircraft travel party for the day and accounted for 52 percent of outlays (Table C13). Spending for food and drink was the second largest category, at $112 per aircraft.

Combined GA Visitor Spending

Table C14 shows the economic benefits resulting from spending in the region by combined overnight and day general aviation visitors arriving at Portland International Jetport.

To recap, there were 10,722 transient general aviation aircraft that brought visitors to the airport during the year. Of these, 2,333 were arriving overnight general aviation aircraft and 1,852 were one day visiting aircraft that were parked more than 4 hours, long enough to make off-airport expenditures.

Each overnight travel party spent an average of $1,042 during their trip to the airport service area and travelers on each day visitor aircraft reported spending $339 per trip.

Multiplying the expenditures for each category of spending by the number of aircraft yields the total outlays for lodging, food and drink, entertainment, retail spending and ground transportation due to GA visitors during the year. This spending summed to $3.0 million in revenues.

There were 23,887 visitor days attributable to general aviation travelers during the year. Seventy four percent of visitor days (17,591) were due to overnight GA travelers and twenty six percent (6,296) were from one-day visitors.

On an average day, there were 65 visitors in the service area that had arrived by general aviation aircraft. Average daily spending by all GA air travelers was $8,378 within the airport service area. The average economic impact of any arriving GA transient aircraft (combined overnight and day visitors staying more than 4 hours) was $730.

The attraction of the greater Portland area as a shopping destination can be seen from the size of total retail sales, the largest spending category for GA visitors, at $935,000 of outlays. Food and drink was second in magnitude at $900,000 of visitor spending, followed by lodging at $683,000.

Of total spending of $3.0 million created by GA visitors, an average of 40 cents of each dollar was used within the service area by employers as earnings paid out to workers. Wages taken home by tourism/visitor sector workers for spending in their own community summed to $1,196,000 during the year. Earnings in the retail goods industry accounted for 40 percent of total earnings from visitor spending.

Expenditures by GA visitors created 62 jobs in the tourist sector in the Portland International Jetport service area. Retail sales spending created the greatest number of jobs, 22, followed by food and drink with 20 workers.

TABLE C14
Economic Benefits from GA Visitors: Revenues, Earnings and Employment
Portland International Jetport

Category	Spending per AC		Revenues	Earnings	Employment
	Overnight	Day			
Lodging	$293		$683,000	$275,000	14
Food/Drink	297	$112	900,000	298,000	20
Retail Sales	262	175	935,000	476,000	22
Entertainment	64	10	168,000	58,000	3
Ground Trans.	126	4 2	372,000	89,000	2
TOTAL	$1,042	$339	$3,058,000	$1,196,000	62

Note: Earnings and employment figures were derived from the IMPLAN input-output model based on data for Maine from the Main Department of Labor and the United States Bureau of Economic Analysis. Employment is not necessarily full time equivalents; includes full and some part time workers, figures rounded to head counts.

Combined Airline and GA Visitors

Combined airline and general aviation visitors spent $221.8 million in Maine during the year (Table C15). These expenditures created 4,456 jobs in the state, with earnings to workers of $84.5 million.

On an average day, there were 5,335 air visitors in the state who had arrived at Portland International Jetport. Average daily spending by all air travelers was over $600,000.

Table C15 shows that the largest spending category by aviation visitors was expenditures for lodging, with outlays of $105.8 million, or 48 percent of the total. Spending for food and drink accounted for 24 percent of visitor spending and was the second largest category, with outlays of $52.2 million for the year.

(Although ground transport is shown as accounting for $18.5 million in spending, it should be noted that on-airport auto rental firms reported an additional $19 million of revenues included in on-airport figures.)

TABLE C15
Economic Benefits from Airline and GA Visitors: Revenues, Earnings and Employment
Portland International Jetport

Category	Revenues	Earnings	Employment
Lodging	$105,773,000	$42,649,000	2,243
Food/Drink	52,198,000	17,302,000	1,162
Retail Sales	27,653,000	14,063,000	654
Entertainment	17,623,000	6,098,000	288
Ground Transport	18,540,000	4,431,000	109
TOTAL	$221,788,000	$84,544,000	4,456

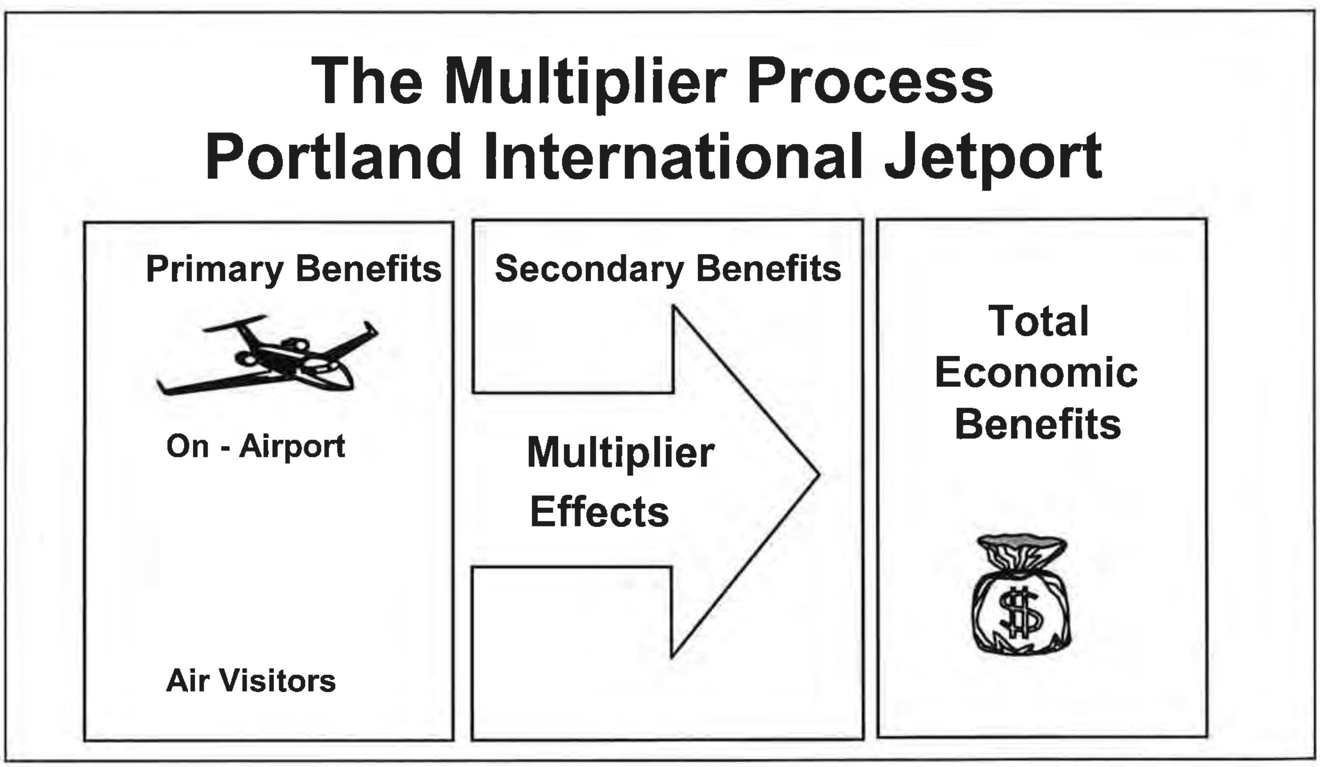
Note: Earnings and employment figures were derived from the IMPLAN input-output model based on data for Maine from Maine Department of Labor and the United States Bureau of Economic Analysis. Employment is not necessarily full time equivalents; includes full and some part time workers, figures rounded to head counts.

SECONDARY BENEFITS: MULTIPLIER EFFECTS

The output, employment, and earnings from on-airport activity and off-airport visitor spending represent the initial or primary economic benefits from the presence of Portland International Jetport. These benefits summed to $418.1 million of output (measured as revenues to firms and budgets of government units), 5,640 jobs, and earnings to workers and proprietors of $129.9 million. These figures for initial economic activity created by the presence of the airport do not include the "multiplier effects" that result from secondary spending induced in the economy to produce the initial goods and services.

Production of aviation output requires inputs in the form of supplies and labor. Purchase of inputs by aviation firms has the effect of creating secondary or multiplier revenues and employment that should be included in total benefits of the airport. Airport benefit studies rely on multiplier factors from input-output models to estimate the impact of secondary spending on output, earnings and employment to determine benefits, as illustrated in the figure below.

The multipliers used for this study were from the IMPLAN input-output model based on data for the state of Maine from the Maine Department of Labor and the U. S. Bureau of Economic Analysis. The multipliers for output, earnings and employment used in the study are shown in Table C16.



The multipliers represent weighted averages for combined industries in each category. This methodology was adopted in collaboration with Wilbur Smith Associates, a research firm currently conducting a study of overall impact of aviation, airports, and air travel within the state of Maine. The results for Portland International Jetport should be consistent and comparable to those reported for other airports in the state due to a similar methodology of analysis.

The multipliers for "Aviation Suppliers" combine multipliers for air transport and aviation maintenance. The "Other On-Airport" category (sometimes referred to as "concessions") combines other private businesses such as retail and food services. The "Construction" multipliers combine commercial building, maintenance and repair of structures, and architecture and engineering services. "Government" includes state and local and federal government multipliers. The "Air Visitor" multipliers combine lodging, food services, retailing, and auto rental multipliers.

The multipliers in this table illustrate the process for calculating the secondary and total impacts on all industries of the regional economy resulting from the initial impact of each aviation related industry. The multipliers for output show the average dollar change in revenues for all firms due to a one-dollar increase in revenues either on the airport or through visitor spending.

For example, each dollar of new output (revenue) created by Aviation Suppliers circulates through the economy until it has stimulated *total* output in all industries in the service area of $1.9689 or, put differently, the revenue multiplier of 1.9689 for Aviation Suppliers shows that for each dollar spent on the airport there is *additional* spending created as $.97 of secondary or multiplier spending.

Primary revenues from all sources associated with the presence of Portland International Jetport were $418.1 million for the year. After accounting for the multiplier effect, total revenues created within the service area were $867.9 million. Secondary revenues were $449.8 million, the difference between total and initial revenues.

The multipliers for earnings show the dollar change in earnings for the economy due to a one-dollar increase in earnings either on the airport or in the visitor sector. The earnings multipliers determine how wages paid to workers on or off the airport stay within the economy and create additional spending and earnings for workers in other industries. For example, each dollar of wages paid for Aviation Suppliers on the airport stimulates an additional $1.56 of earnings in the total economy.

The multipliers for employment show the total change in jobs for the service area due to an increase of one job on or off the airport. Each Aviation Supplier job on the airport is associated with 2.9403 total jobs in the state of Maine. That is, each Aviation Supplier job supports 1.9403 additional jobs in the general economy, summing to a total of 2.9403 jobs when the initial and secondary jobs are combined.

The overall result is that the 5,640 initial jobs created by the presence of Portland International Jetport airport supported an additional 5,951 jobs throughout the state as secondary employment. The sum of the initial 5,640 jobs and 5,951 secondary jobs created in the general economy is the total employment of 11,591 workers that can be attributed to the presence of the airport.

TABLE C16
Impact Multipliers and Secondary Benefits
Portland International Jetport

Revenue Source	Primary Revenues	Output Multipliers	Secondary Revenues	Total Revenues
Aviation Suppliers	$132,200,000	1.9689	$128,088,000	$260,288,000
Other On-Airport	30,105,000	2.0864	32,707,000	62,812,000
Capital Projects	5,215,000	2.0760	5,611,000	10,826,000
Government	28,770,000	2.1772	33,868,000	62,638,000
Air Visitors	221,788,000	2.1252	249,549,000	471,337,000
Revenues	$418,078,000		$449,824,000	$867,902,000
Earnings Source	**Primary Earnings**	**Earnings Multipliers**	**Secondary Earnings**	**Total Earnings**
Aviation Suppliers	$22,912,000	2.5640	$35,834,000	$58,746,000
Other On-Airport	6,370,000	2.4950	9,523,000	15,893,000
Capital Projects	2,243,000	1.9513	2,134,000	4,377,000
Government	13,874,000	1.5664	7,858,000	21,732,000
Air Visitors	84,544,000	2.2981	109,750,000	194,294,000
Earnings	$129,943,000		$165,100,000	$ 295,043,000
Employment Source	**Primary Employment**	**Employment Multipliers**	**Secondary Employment**	**Total Employment**
Aviation Suppliers	604	2.9403	1,172	1,776
Other On-Airport	257	1.8504	219	476
Capital Projects	73	1.9785	71	144
Government	250	1.7768	194	444
Air Visitors	4,456	1.9639	4,295	8,751
Employment	5,640		5,951	11,591

Source: IMPLAN input-output model , U. S. Bureau of Economic Analysis and Wilbur Smith Associates

SUMMARY & FUTURE BENEFITS

Airports are available to serve the flying public and support the regional economy every day of the year. On a typical day at Portland International Jetport, there are some 250 operations by aircraft involved in local or itinerant activity including flight training, cargo and courier service, corporate travel, or commercial aircraft bringing passengers visiting the area for personal travel, on business, or as tourists.

During each day of the year, Portland International Jetport generates $2,378,000 of revenues within its service area (see box). Revenues and production support jobs, not only for the suppliers and users of aviation services, but throughout the economy.

Each day Portland International Jetport provides 1,184 jobs on the airport and in total supports 11,591 Maine workers who bring home daily earnings of $808,000 for spending in their home communities.

On an average day during the year, there are 5,335 visitors in the area who arrived at Portland International Jetport. Some will stay in the Portland area for only a few hours while they conduct their business, and others will stay overnight at destinations throughout the state. The average spending by these visitors on a typical day injects $600,000 into the Maine economy.

Table C17 summarizes current economic benefits associated with the airport. Primary benefits, without multiplier effects, include revenues of $418.1 million, 5,640 jobs and earnings to workers and proprietors of $129.9 million.

Portland International Jetport Daily Economic Benefits

- **$2,378,000 Daily Revenue**
- **11,591 Maine Jobs Supported**
- **$600,000 Visitor Spending**
- **5,335 Air Visitors**

TABLE C17
Summary of Economic Benefits: 2005
Portland International Jetport

	Revenues	Earnings	Employment
On-Airport Activity	**$196,290,000**	**$45,399,000**	**1,184**
Air Visitors	**221,788,000**	**84,543,000**	**4,456**
Primary Benefits	**418,078,000**	**129,943,000**	**5,640**
Secondary Benefits	**449,824,000**	**165,100,000**	**5,951**
Total Benefits	**$867,902,000**	**$295,043,000**	**11,591**

Note: Revenues, earnings and employment benefits reflect activity associated with 356,237 commercial air passenger visitors and average capital improvement budget of $5.2 million.

Including secondary or multiplier effects, total benefits due to the Jetport are $867.9 million in revenues, 11,591 jobs and earnings of $295 million to workers.

It is important for citizens and policy makers to be aware that there are additional but unmeasured benefits from aviation that represent significant social and economic value created by airports for the regions which they serve. Besides exerting a positive influence on economic development in general, aviation often reduces costs and increases efficiency in individual firms. Annual studies by the National Business Aviation Association show that those firms with business aircraft have sales 4 to 5 times larger than those that do not operate aircraft.

In 2005, the net income of aircraft operating companies was 6 times larger than non-operators. Two thirds of the *Fortune* 500 firms operate aircraft and 88 percent of the top100 have business aircraft (see National Business Aviation Association, *Fact Book*, 2005).

As aviation activity increases in the airport service area, the economic benefits of the Jetport to the regional economy can be expected to increase, as illustrated in the following section.

Demand Based Projections

Given certain assumptions about airport activity levels, the dollar value of aviation economic benefits can be estimated as activity levels change. The Master Plan utilizes a demand based planning approach that links airport facility requirements to airport activity as it grows over time.

This section provides estimates of the economic benefits associated with each of three demand based planning horizons.
Table C18 shows activity levels for enplanements, cargo, and operations for the

short term, intermediate term, and long term planning horizons as developed in Chapter 3 of the Master Plan, along with estimated revenues resulting from each category of airport activity at each level.

The objective of Table C18 is to illustrate that future capital outlays to accommodate growth in the airport service area will be accompanied by higher levels of employment and revenues from expansion of airport activity levels. Through investment in airport infrastructure, the capacity of the Jetport as a source of economic benefits continues to increase.

Enplanements

Passenger enplanements increase from the current level to 970,000 in the short term planning horizon, then to 1,260,000 in the intermediate term, and to 1,570,000 in the long term.

Increased passenger activity will increase revenues, employment and earnings in the service area through two channels. One response will be that airline employment and revenues will increase as flights are added to accommodate more passengers.

To estimate future passenger characteristics, it is assumed that 50 percent of passengers are visitors and 50 percent are residents. Based on current ticket revenues of $170 per person per trip, 485,000 originating trips for Maine residents would create revenues of $82.5 million in the short run planning period. Airline revenues rise to $133.5 million (in 2005 dollars) when long term enplanements increase to 1,570,000, resulting in 785,000 originating ticket purchases.

Secondly, visitor spending would increase as persons travel to Maine from outside the service area. Average spending per airline visitor to the airport is $614 per trip. Airline visitor spending is $297.8 million at 970,000 enplanements in the short term, and rises to $482 million at the long term planning level of 1,570,000 enplanements.

Air Cargo

Cargo tonnage increases to 21,200 tons in the short term planning horizon, reaches 24,200 tons in the intermediate term, and 31,600 tons in the long term. Nationally, conservative estimates of revenue from air cargo average $600 per ton. Short term air cargo revenues are estimated as $12.7 million, rising to $19 million in the long term.

Airport Operations

Increasing operations (aircraft arrivals and departures) imply more revenues for on-airport businesses as well as additional visitor spending from general aviation travelers.

To estimate increased economic benefit to on-airport employers from increased operations, the projected rates of change of total operations were applied to the current sum of revenues created by FBO services, all other on-airport business airport (not including airlines and air cargo), and government agencies on the Jetport.

The short term is associated with 110,100 operations. Compared to current activity, this level of operations would stimulate greater revenues for FBO services, and would also be accompanied by an expansion of activity by Jetport businesses and government services. Revenues for airport operations would be $144.1 million in the short term.

TABLE C18
Economic Benefits At Demand Based Planning Horizons
Portland International Jetport

	Short Term	Intermediate Term	Long Term
Annual Enplanements	970,000	1,260,000	1,570,000
Airline Visitor Spending	$297,790,000	$386,820,000	$481,990,000
Airline Revenues	$82,450,000	$107,100,000	$133,450,000
Annual Air Cargo Tons	21,200	24,200	31,600
Air Cargo Revenue	$12,720,000	$14,520,000	$18,960,000
Annual Operations	110,100	122,000	140,400
Airline	43,400	48,200	54,700
Air Cargo	4,800	5,000	5,500
Air Taxi	6,900	7,800	9,200
Military	2,000	2,000	2,000
General Aviation	53,000	59,000	69,000
Itinerant	38,000	42,000	50,000
Local	15,000	17,000	19,000
Operations Revenues	$144,126,000	$159,704,000	$183,790,000
GA Visitor Spending	$6,309,000	$6,974,000	$8,300,000
Primary Benefits	$543,396,000	$675,118,000	$826,493,000
Total Benefits	$1,119,534,000	$1,393,198,000	$1,707,030,000

Note: Enplanements, cargo, and operations based on *Master Plan*, Chapter 3; all revenues are in constant 2005 dollars.

In the intermediate term, operations rise to 122,000, an increase of eleven percent. The associated airport operations revenues rise to $159.7 million. The long term demand level is based on increased activity of 140,400 operations, an increase of 15 percent. At this increased level of demand for aviation services, on-airport revenues are projected to increase to $183.8 million in 2005 dollars.

GA Visitors

As itinerant operations increase, more visitors will arrive by general aviation aircraft. From recent levels of itinerant operations under 30,000 per year, the short term planning period provides for 38,000 itinerant operations, rising to 50,000 in the long term.

At 38,000 itinerant operations per year, there are 19,000 arrivals. Assuming 45 percent of arrivals are visitors that conduct business or stay overnight in the area, there are 8,550 transient aircraft. To estimate visitor revenues, a weighted average of day and overnight spending of $738 was applied.

In the short term period, with 38,000 itinerant operations, general aviation visitor spending is $6.3 million in 2005 dollars. At 50,000 operations in the long term period, GA visitor spending increases to $8.3 million.

Conclusions

The above projections are based on demand driven activity levels for enplanements, air cargo, and aircraft operations as developed for the Master Plan. The economic benefit calculations do not take into account commercial projects or land use plans not incorporated into the Jetport Master Plan.

The potential economic benefits of continued aviation growth are significant. Additional detail on projected aviation related earnings, employment, and total revenues by source at each demand driven planning level is provided in an Appendix as tables C21 – C23.

For comparison, the base year economic benefit figures are shown in Table C20.

At the short term level of demand, with 970,000 passenger enplanements and 110,100 annual operations, the primary economic benefits from on-airport activity and air visitors exceed $540 million (Table C21). This is an increase of 30 percent over current primary benefits of $418 million.

Not including outlays for capital projects, on-airport revenues will be $239.3 million in the short term. Employment on the Jetport will be 1,444 workers and jobs related to air visitors will increase to 6,108.

Visitor spending will reach $304.1 million (measured in 2005 dollars) and the revenue benefits due to the presence of the airport will rise to $1.1 billion, including all multiplier effects.

The intermediate term planning horizon is based on 1,260,000 enplanements and 122,000 operations (Table C22). Employment on the Jetport will rise to 1,697 jobs and the total employment impact on and off the airport after all multiplier effects is 18,607 jobs, with earnings rising to $473.6 million. Revenues will increase to $1.4 billion (2005 dollars) in the intermediate term.

The long term demand horizon is defined as an airport activity level of 1,570,000 enplanements and 140,400 operations per year (Table C23).

The long-term projections imply employment of 2,028 workers on the Jetport, with earnings from on-airport jobs reaching $77.6 million. Spending by air visitors will be $490 million, with employment of 9,848 workers in visitor industries.

Accounting for all multiplier effects, jobs supported in the airport service area under the long-term assumptions total 22,798. Revenues will be $1.7 billion, and earnings will be $580.3 million, measured in 2005 dollars.

Tax Impacts

Because of the spending, jobs, and earnings created by the presence of Portland International Jetport, the facility is an important source of public revenues. As airport activity expands, tax revenues will continue to grow.

Estimated tax potential is set out in Table C19. The table shows the revenues for each tax category based on current average tax rates relative to output and personal income (earnings) for Portland, Cumberland County, and Maine. Federal taxes are applied using current federal rates.

The first column in Table C19 shows tax revenues associated with the current level of airport activity and total economic benefits of $867.9 million. The 11,591 workers in the service area have earnings of $295 million.

Current federal social security taxes are estimated at $36 million, the largest component of federal taxes. The second largest federal tax category is the personal income tax of $31 million.

Overall, federal tax revenues currently collected due to economic activity associated with Portland International Jetport are estimated to be $81 million.

State and local tax revenues are shown in the lower portion of the table. Tax revenues sum to $57 million for the current level of operations.

The largest single component for state and local taxes is sales taxes of $18 million, followed in magnitude by property taxes and personal income taxes. Combined federal, state, and local taxes are $138.1 million at the current level of operations.

Projected taxes for future demand based activity levels rise to $178 million in the short term. The state and local share is estimated as $73.6 million.

In the long term planning period, total tax collections exceed $270 million. The federal portion is $159 million and state and local tax revenues due to the presence of Portland International Jetport are estimated as $112 million.

TABLE C19
Tax Impacts From Current and Future Activity
Portland International Jetport

Federal Taxes				
Revenue Category	**2005**	**Short Term**	**Intermediate Term**	**Long Term**
Corporate Profits Tax	$8,146,000	$10,501,000	$13,063,000	$16,002,000
Personal Income Tax	31,162,000	40,168,000	49,969,000	61,212,000
Social Security Taxes	36,048,000	46,466,000	57,803,000	70,809,000
All Other Federal Taxes	5,704,000	7,353,000	9,147,000	11,205,000
Total Federal Taxes	$81,060,000	$104,488,000	$129,982,000	$159,228,000
State and Local Taxes				
Revenue Category	**2005**	**Short Term**	**Intermediate Term**	**Long Term**
Corporate Profits Tax	1,216,000	1,568,000	1,950,000	2,389,000
Motor Vehicle Taxes	2,615,000	3,370,000	4,193,000	5,136,000
Property Taxes	15,357,000	19,795,000	24,625,000	30,166,000
Sales Taxes	18,331,000	23,629,000	29,394,000	36,008,000
Personal Income Tax	8,604,000	11,091,000	13,797,000	16,902,000
All Other State & Local Taxes	10,951,000	14,116,000	17,561,000	21,512,000
Total State & Local Taxes	57,075,000	73,570,000	91,521,000	112,114,000
TOTAL TAX REVENUES	$138,137,000	$178,058,000	$221,504,000	$271,343,000

Notes: All figures in 2005 dollars; derived from average tax rates in Maine, Portland, Cumberland County and Federal tax schedules; short term based on 970,000 enplanements and 110,100 operations; intermediate term based on 1,260,000 enplanements and 122,000 operations; long term based on 1,570,000 enplanements and 140,400 operations.

Appendix

Aviation Related Economic Benefits: 2005 and Future Projections

TABLE C20
Economic Benefits: 2005
Portland International Jetport

	Revenues	Earnings	Employment
On-Airport Benefits	$196,290,000	$45,399,000	1,184
Visitor Benefits	221,788,000	84,543,000	4,456
Primary Benefits	418,078,000	129,943,000	5,640
Secondary Benefits	449,824,000	165,100,000	5,951
Total Benefits	$867,902,000	$295,043,000	11,591

Note: Revenues, earnings and employment benefit include capital projects of $5.2 million.

TABLE C21
Economic Benefits: Short Term Demand Planning Horizon
Portland International Jetport

	Revenues	Earnings	Employment
On-Airport Benefits	$239,296,000	$55,346,000	1,444
Visitor Benefits	304,100,000	115,923,000	6,108
Primary Benefits	543,396,000	171,269,000	7,552
Secondary Benefits	576,137,000	209,316,000	7,400
Total Benefits	$1,119,533,000	$380,585,000	14,952

Note: Revenues, earnings and employment benefits exclude capital projects. Values shown are constant 2005 dollars.

TABLE C22
Economic Benefits: Intermediate Term Demand Planning Horizon
Portland International Jetport

	Revenues	Earnings	Employment
On-Airport Benefits	$281,324,000	$65,066,000	1,697
Visitor Benefits	393,794,000	150,114,000	7,910
Primary Benefits	675,118,000	215,180,000	9,607
Secondary Benefits	718,080,000	258,437,000	9,000
Total Benefits	$1,393,198,000	$473,617,000	18,607

Note: Revenues, earnings and employment benefits exclude capital projects. Values shown are constant 2005 dollars.

TABLE C23
Economic Benefits: Long Term Demand Planning Horizon
Portland International Jetport

	Revenues	Earnings	Employment
On-Airport Benefits	$336,200,000	$77,758,000	2,028
Visitor Benefits	490,292,000	186,899,000	9,848
Primary Benefits	826,493,000	264,661,000	11,876
Secondary Benefits	880,537,000	315,647,000	10,922
Total Benefits	$1,707,030,000	$580,304,000	22,798

Note: Revenues, earnings and employment benefits exclude capital projects. Values shown are constant 2005 dollars.

PORTLAND INTERNATIONAL JETPORT

Appendix D

RUNWAY SAFETY AREA DETERMINATION

U.S. Department
of Transportation
Federal Aviation Administration

Federal Aviation Administration
New England Region

12 New England Executive Park
Burlington, MA 01803

Runway Safety Area Determination
Portland International Jetport
Portland, Maine
August 2007

Portland International Jetport is a small hub primary airport which holds a Part 139 airport operating certificate for operation as a Class 1 airport. The airport has two runways: Runway 11-29, the primary instrument runway and Runway 18-36, the crosswind runway. Operations at this airport, including scheduled commercial service, are in excess of 100,000 annually.

An initial runway safety area (RSA) determination was signed September 20, 2000. This determination concluded that it was practicable to meet standard for Runway 11-29 and that Runway 18-36 needed to further study the feasibility of a runway shift to gain standard safety areas. At that time the design aircraft category for this runway was B-II.

In fiscal year 2005, a master plan update began and was completed in 2007. One of the primary issues was safety areas for Runway 18-36. Also, the study assessed the feasibility of regaining physical safety area for Runway 29, which currently meets RSA standards through the use of declared distances.

Forecast determined the critical aircraft (ARC) for both runways: Runway 11-29 remained D-IV; Runway 18-36 has been changed to a B-III ARC. Operational runway length needs were evaluated and safety areas were studied in accordance with FAA Order 5200.8, *Runway Safety Area Program* (see Appendix B of the AMPU attached).

Based on the operational needs of the airport and evaluation of Engineered Material Arresting System (EMAS) and other alternatives to meet standard, it is determined that both runways can be improved to meet standard.

Runway 11-29 Improvements – Currently meets standards.

This primary runway is 7,200' x 150' with a CAT III ILS approach. The critical design aircraft classification for this runway is determined to be D-IV which requires safety area dimensions of 500'W x 1000'L. This runway is currently in compliance through the use of declared distance operations. Some of the physical issues that led to declared distances are: sub-standard grade; 3.1 acres of wetland impact; service road in RSA; and localizer in RSA. Under declared distance operations, landing distance available and accelerated stop distance available on Runway 11 is reduced to 6,800'.

There are two major concerns with the use of declared distances however. The first concern is operational. Given the disparity between departure and landing distances depending which runway is in use, airlines are subjected to different operating requirements. Providing a traditional graded runway safety area will allow for standard operating requirements regardless of which runway is in use. This will improve operational safety and reduce the opportunity for pilot error.

The second concern is with respect to the wetlands off the Runway 29 end. Declared distance operations were put in place to meet standard by avoiding impacts to the wetlands. More recently, a wildlife assessment as required by Part 139 was conducted by U.S. Department of Agriculture (USDA). The results of this study recommended that the wetlands be removed to reduce the potential for gathering flocks which could in turn cause bird strikes.

The following three alternatives were analyzed: 1) retain declared distances at $0; 2) create a traditional graded safety area, including relocation of road and localizer as well as wetland impacts at $1.8M; or 3) install EMAS at $7.3M, including maintenance costs.

The ideal alternative with respect solely to aviation safety would be option 2 above. This alternative requires further environmental assessment in order to implement. An environmental assessment will begin in fiscal year 2007. If the EA determines it is not feasible to mitigate for wetland impacts, the second favorable alternative is to retain declared distance operations.

Runway 18-36 Improvements – Practicable to meet standards.

This secondary runway is 5,001' x 150' with a GPS approach to Runway 18 with visibility minimums of 1 mile/500 HAT.

Seven alternatives were assessed for the runway safety areas. Reference Appendix B (attached) for further discussion of these alternatives. Of these seven, the three most feasible were analyzed in the master plan.

The master plan determined the ARC for Runway 18-36 to be B-III based on current and forecasted operations. This runway does have some C and D aircraft operations, but these do not meet the annual operational thresholds for design aircraft.

Three alternatives were identified for safety areas with an ARC of B-III: no build, declared distances and EMAS. The EMAS alternative was requested by FAA outside of the master plan document since it was not analyzed there. Due to geographical constraints at this airport, including wetlands and a river, full build was dismissed and not analyzed further.

The baseline, or no build alternative, was also dismissed since it does not meet safety area standards or operational efficiency.

For the other two alternatives, all assumptions were held equal, meaning, both looked at increased runway length through displaced thresholds, meeting standard safety area requirements and improving approach minima (1 mile for 18; ¾ mile 36) for B-III aircraft.

It is assumed that approach minima will be higher for larger C and D operations given the runway/taxiway separation will meet B-III design standards. However, these operations will be infrequent, if even at all.

Wetland, service road, obstructions (FAA antenna) and community impacts were the same for each alternative. The decisive factors therefore were primarily ability to achieve standards, preparation for future precision capability and finally, cost.

ARC	Alternative	Total Pavement	LDA	Standard RSA	Estimated Costs
B-III	No build	5,001'	5,001'	does not meet	$0.0
B-III	Declared distance	6,100'	5,150'	300' x 600'	$7.8M
B-III	EMAS	5,800'	5,400'	300' x 600' Rwy18 EMAS Rwy 36	$15.3M

The master plan looked not only safety area compliance, but also at maximizing the utilization of this runway. Considerations were: current fleet mix and trends; wind/weather conditions; terrain constraints; and mitigation of noise impacts. Of particular concern is the community of Stroudwater which has been an adversary regarding airport noise.

Utilizing displaced thresholds in lieu of relocated thresholds will allow for longer takeoff distance available. This will increase operational efficiency on the infrequent occasions that regional jets to use this runway when 11-29 is unavailable. This final pavement length of Runway 18-36 does not meet runway length requirements identified for the regional jet operations at Portland; it is forecasted that the runway can only be used by these aircraft under limited operating conditions.

Also, moving the runway operations more to the south allows aircraft to be at a higher altitude when they are over the Stroudwater area. This will abate some of the adverse noise impacts to this community.

Based on all these considerations, the declared distance alternative meets all design standards and operational efficiency needs of the airport. Declared distances are:

	RWY 18	RWY 36
LDA	5,150'	5,150'
ASDA	5,650'	5,650'
TODA	6,100'	6,100'
TORA	6,100'	6,100'

Runway safety area dimensions will be 300' W x 600' L for each runway end, meeting the B-III standard (improved from existing safety area dimensions of 150'W x 300'L).

Based on the findings of the master plan update, it is practicable to meet standard with an ARC of B-III for Runway 18-36. Feasibility of this alternative will require further environmental assessment in order to implement.

Of some concern is that the increase in takeoff distance available under this development will increase the usage of this runway by smaller C design category aircraft. Therefore this safety area determination also recommends that operations on Runway 18-36 are evaluated in approximately 5 years (anticipating construction within 2 years of this determination date). If operations of C aircraft on this runway do in fact increase, a focused master plan should be conducted to update forecast, design aircraft and safety area standards. It is also recommended that on-airport dimensional standards such as runway/taxiway separation and parking limitations are protected at this time in anticipation of future C-II standards. As long as development is consistent with the master plan alternatives, these surfaces, by default, will be protected.

Construction of this B-III alternative support by the master plan findings will not prohibit or constrain the ability to meet C safety area standards in the future if operations indicate a change in design aircraft is warranted.

Recommended by: ______________________ Date: 8/10/07
Project Manager, Planning

Coordination: Engineering project manager: ______

______________________ Date: 8/10/07
Lead Certification & Safety Inspector

______________________ Date: 8/10/07
Senior Engineer

Approved: ______________________ Date: 8/10/07
LaVerne Reid, Division Manager, ANE-600

PORTLAND INTERNATIONAL JETPORT

Appendix E

FORECAST APPROVAL

U.S. Department
of Transportation
**Federal Aviation
Administration**

Federal Aviation Administration
New England Region

12 New England Executive Park
Burlington, MA 01803

November 3, 2005

Mr. Jeff Schultes
Airport Director
Portland International Jetport
1001 Westbrook Street
Portland, Maine 04102

Dear Mr. Schultes:

The Federal Aviation Administration (FAA) has reviewed the forecast chapter of the Airport Master Plan Update (AMPU) under AIP Project 3-23-0038-57-2005. The concluded results of the forecasted data reasonably represent anticipate growth for Portland International Jetport, and are accepted by FAA.

As previously discussed, executive summary forecast data for this AMPU should include Portland-area specific details in lieu of generic aviation trends.

Sincerely,

ORIGINAL SIGNED BY:

Lisa J. Lesperance
Airports Program Specialist

Cc: Steve Benson, Coffman Associates, Inc.
Ron Roy, Maine Department of Transportation

PORTLAND INTERNATIONAL JETPORT

Appendix F

WRITTEN COMMENTS

HEWINS/CarlsonWagonlit Travel

Portland International Jetport
Airport Master Plan
May 25, 2005

Initial Comments by:
Steven W. Hewins
President
Hewins Travel Consultants, Inc.

There is very little that I am in a position to dispute regarding Chapters One and Two of the planning documents. I appreciated the general information about the facilities at the Jetport, the scope of the operations, and the technical aspects of flying to/from PWM.

Most importantly, I find that I am in complete agreement as to the passenger count projections, which was one of the more contentious discussions during the opening meeting. I am aware that 2005 actual enplanements are up dramatically, and, in fact, I suspect that the growth projections in succeeding years could even be larger than forecasted.

Clearly, the demographic information presented in the plan highlight the significant growth in Southern Maine, and the other primary service areas of the Jetport. Much of the committee's discussion on the plan's statistical information focused on the impact of the Manchester Airport on Portland's growth, and whether the continued 'siphoning off' of passengers will, in some way, mitigate the plan's passenger growth projections and, therefore, have an impact on the facility needs of the airport going forward.

My point of view on this, as the operator of the state's largest travel agency, and as a travel agent for over 25 years, is that the run up in MHT is, more or less, completed. The airline industry is swiftly moving to a low cost model that is flattening out fare and price differentials between competing airports. The widely-quoted Southwest Effect, where lower fares for an entire airport are driven by SW's fare structure, has largely played itself out to the point where SW is often NOT the lowest priced travel alternative.

To be sure, there are still some pricing issues in Portland, and less frequently a significantly lower fare can be achieved by flying out of MHT. However, the point is that with airline consolidation rapidly forming (USAirways and America West announced their merger yesterday), and all legacy carriers restructuring their cost structures to compete against the low cost carriers (LCCs), Portland stands to continue the growth pattern that was temporarily slowed by MHT and by 9/11/01.

My biggest concern is that the Master Plan must adequately address the substandard terminal facility. Over the past few years the airport has addressed the field deficiencies with the improved runway lighting, and the parking and rental car problems with a state of the art building. It is now time to take care of the passenger experience, especially with regard to security screening, baggage handling and the changing nature of airline check-in procedures.

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An excellent, nearby model to take a close look at is the new Terminal A at Logan that houses Delta Air Lines. This is the current standard for airline passenger terminals. We need to closely examine our aging, inadequate facilities and determine what we can afford and how we want to enhance this key transportation portal to Maine. Adopting elements of the best terminals is the way to achieve a new experience for Maine travelers, and not simply another add-on to the oddly designed terminal with which we now serve our customers.

COMMENT SHEET

PORTLAND INTERNATIONAL JETPORT
Airport Master Plan

Please use this response sheet to submit any comments you may have on the following chapters:

Introduction
Chapter One – Inventory
Chapter Two – Forecasts ~~[illegible]~~
Appendix A – Glossary

☐ *I have read the material and have no comments.*

☒ *I have read the material and have the following comments:*
(Attach separate sheets, as necessary.)

I appreciate the FORECASTS are DEMAND BASED.

On page ii – "Developing a realistic, common sense plan .... is well put!

Page 1-2 – "disagreeable springs". Yup 5 weekends in a row of rain.

The balance of what I read is well laid out & presented. I wish I had been able to read it prior to our meeting.

Mail comments to:

COFFMAN ASSOCIATES, INC.
237 N.W. Blue Parkway, Suite 100
Lee's Summit, MO 64063
Attn: Steve Benson
FAX: 816.524.2575; Email: stevebenson@coffmanassociates.com

Name: Terry Angier
Representing: Portland Regional Chamber
Phone: (W) 207-772-2333

Please mail, fax or email by May 31, 2005.

From: "Jeff Schultes" <j.schultes@worldnet.att.net>
To: "jls" <jls@portlandmaine.gov>
Date: 5/31/2005 1:09:34 PM
Subject: Fw: Jetport report comment

----- Original Message -----
From: "Steve Benson" <sbenson@coffmanassociates.com>
To: "John Duncan" <jduncan@gpcog.org>
Cc: "Jeff Schultes" <j.schultes@worldnet.att.net>; "Jeff Bourk" <jpb@portlandmaine.gov>
Sent: Tuesday, May 31, 2005 10:23 AM
Subject: RE: Jetport report comment

John,

Thanks for the comments. You were right on the roadway. While we are putting together new photography of the immediate airport area, we have had a tough time getting updated GIS information for the larger mapping. Thanks for the contacts.

SGB

-----Original Message-----
From: John Duncan [mailto:jduncan@gpcog.org]
Sent: Tuesday, May 31, 2005 7:45 AM
To: Steve Benson
Subject: Jetport report comment

Hi Steve,
Your report reads very easily and is very comprehensive. I congratulate you on that. Thank you for making it so good.
Exhibit 1K on generalized existing land use uses dated material regarding the area's highway system, including access to the Jetport, the relocation of Johnson Road and the I-295 ramps near the train station. It might not be important for your purposes, but I mention it. MaineDOT should be able to help you out on that. (My office could too, though we just lost our primary GIS guy.)
John

John Duncan
PACTS Director
207-774-9891
jduncan@gpcog.org

COMMENT SHEET

PORTLAND INTERNATIONAL JETPORT
Airport Master Plan

Please use this response sheet to submit any comments you may have on the following chapters:

Introduction
Chapter One – Inventory
Chapter Two – Forecasts
Appendix A – Glossary

☐ *I have read the material and have no comments.*

☑ *I have read the material and have the following comments:*
(Attach separate sheets, as necessary.)

Mail comments to:

COFFMAN ASSOCIATES, INC.
237 N.W. Blue Parkway, Suite 100
Lee's Summit, MO 64063
Attn: Steve Benson
FAX: 816.524.2575; Email: stevebenson@coffmanassociates.com

Name: DAVID RUSSELL
Representing: FAIRCHILD SEMICON
Phone: (207) 775-8339

Please mail, fax or email by May 31, 2005.

May 31, 2005

Re: Portland Jetport (Airport Master Plan) comments by Dave Russell

Attn: Steve Benson

Introduction:

- Master Plan Objectives (page ii) - I don't see anything in the objectives that specifically addresses concerns of "Cost Effectiveness" and being able to reduce customer rates, fees, etc. I assume "Security" is implied under bullet 2 which addresses "Safety", but it might want to be specifically noted as well.

Inventory:

- Airline Activity (page 1-7) – What are the primary reasons why so many airlines have left and when did they leave?
- Existing Airfield Facilities Map (Exhibit 1D) -- Now that the new Jetport Plaza Rd. is approved, funded, and underway, can it be added to the map so we can see how that might affect and/or benefit the Jetport? ✓

Forecasts:

- There is a tremendous and thorough amount of numerical data compiled and shown on charts and graphs. Although we can debate the accuracy of the numbers and whether the "Forecast" projection curves are too steep or too flat, they are all fine for planning purposes. What I feel is missing is the operational cost data broken down by the different types of aviation businesses or segments. With this economic data I feel there will be a better Master Plan developed, where decisions will be made to expand faster in one area of aviation business vs. another. Even to be able to make a decision to eliminate one segment of business by sending it to a more cost effective airport. This will significantly help focus the planning process and help reduce customer rates and fees.

PORTLAND INTERNATIONAL JETPORT

Appendix G

AIRPORT LAYOUT PLAN DRAWING SET

AIRPORT LAYOUT PLANS

FOR

PORTLAND INTERNATIONAL JETPORT

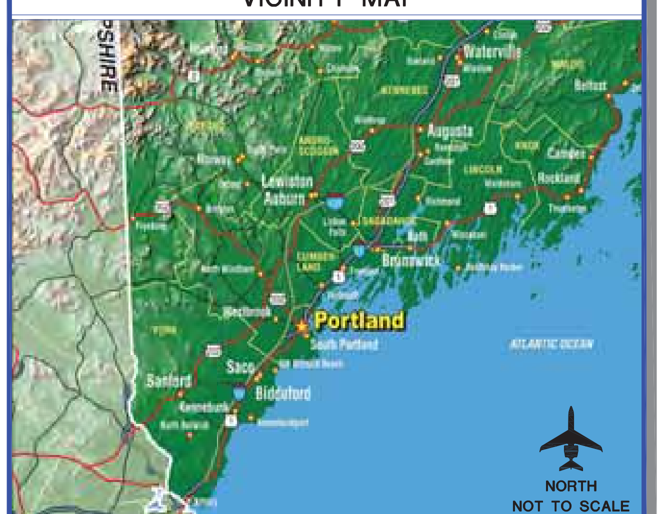
Prepared for the

City of
Portland, Maine

INDEX OF DRAWINGS

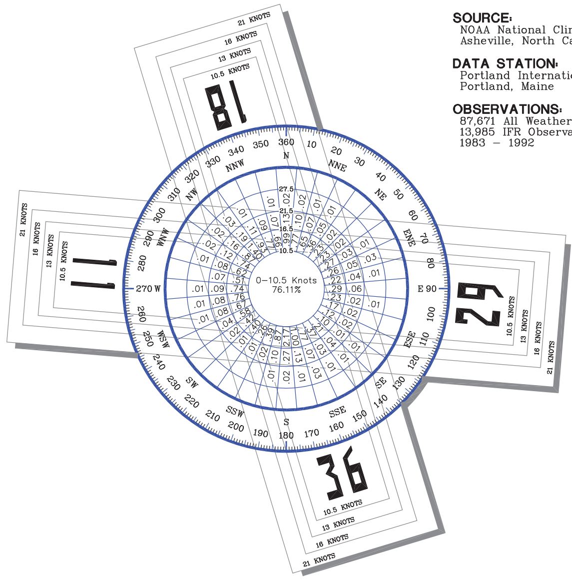
1. EXISTING FACILITIES PLAN
2. ULTIMATE FACILITIES PLAN
3. AIRSPACE PLAN
4. INNER PORTION OF RUNWAY 11 APPROACH SURFACE DRAWING
5. INNER PORTION OF RUNWAY 29 APPROACH SURFACE DRAWING
6. INNER PORTION OF RUNWAY 18 APPROACH SURFACE DRAWING
7. INNER PORTION OF RUNWAY 36 APPROACH SURFACE DRAWING
8. OBSTRUCTION DATA TABLE
9. TERMINAL AND AIR CARGO AREAS DRAWING
10. SOUTH GENERAL AVIATION AREA DRAWING
11. ON-AIRPORT LAND USE DRAWING
12. EXHIBIT A

VICINITY MAP



LOCATION MAP

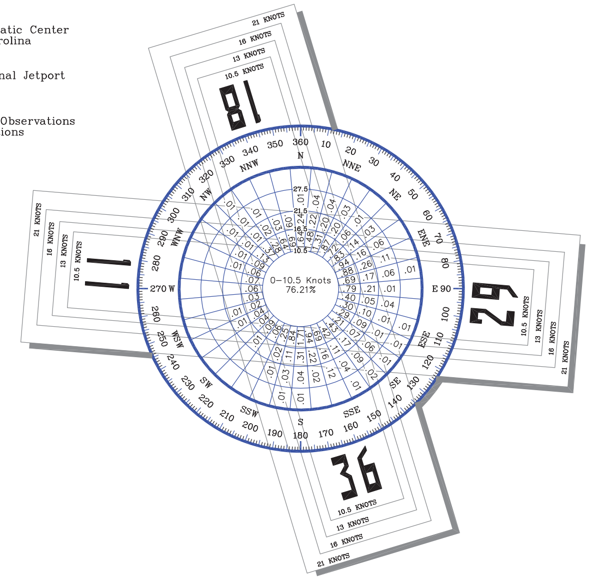
Coffman Associates
Airport Consultants

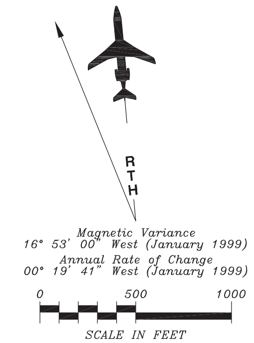


SOURCE:
NOAA National Climatic Center
Asheville, North Carolina

DATA STATION:
Portland International Jetport
Portland, Maine

OBSERVATIONS:
87,671 All Weather Observations
13,985 IFR Observations
1983 - 1992





ALL WEATHER WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	21 Knots
Runway 11-29	86.92%	92.69%	98.25%	99.82%
Runway 18-36	92.43%	95.97%	99.06%	99.87%
Runways Combined	98.68%	99.77%	99.96%	100.00%

IFR WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	21 Knots
Runway 11-29	87.36%	93.09%	98.47%	99.87%
Runway 18-36	92.53%	96.09%	99.18%	99.91%
Runways Combined	98.87%	99.85%	99.98%	100.00%

GENERAL NOTES:

1. Depiction of features and objects, including related elevations and clearances, within the runway protection zones are depicted on the PROTECTION ZONES PLANS.
2. Details concerning terminal improvements are depicted on the TERMINAL AREA PLAN.
3. Recommended land uses within the airport environs are depicted on the AIRPORT LAND USE PLAN.
4. Building Restriction Line (BRL) is established in accordance with F.A.R. Part 77 criteria, location utilizes 35 foot vertical object height. Building Restriction Line location may be reduced in accordance to Part 77 criteria, to limits of the Runway Object Free Area, Runway Safety Area, and/or Runway Protection Zone criteria.

AIRPORT DATA

PORTLAND INTERNATIONAL JETPORT (PWM)

		EXISTING
AIRPORT SERVICE LEVEL		Commercial Service
AIRPORT REFERENCE CODE		C-IV
AIRPORT ELEVATION		74 MSL
MEAN MAXIMUM TEMPERATURE OF HOTTEST MONTH		79° F (July)
AIRPORT REFERENCE POINT	Latitude	43° 38' 46.177" N
(ARP) COORDINATES (NAD 1983)	Longitude	70° 18' 33.404" W
AIRPORT ACREAGE		726
AIRPORT and TERMINAL NAVIGATIONAL AIDS		Rotating Beacon CAT-II ILS DME NDB ASR

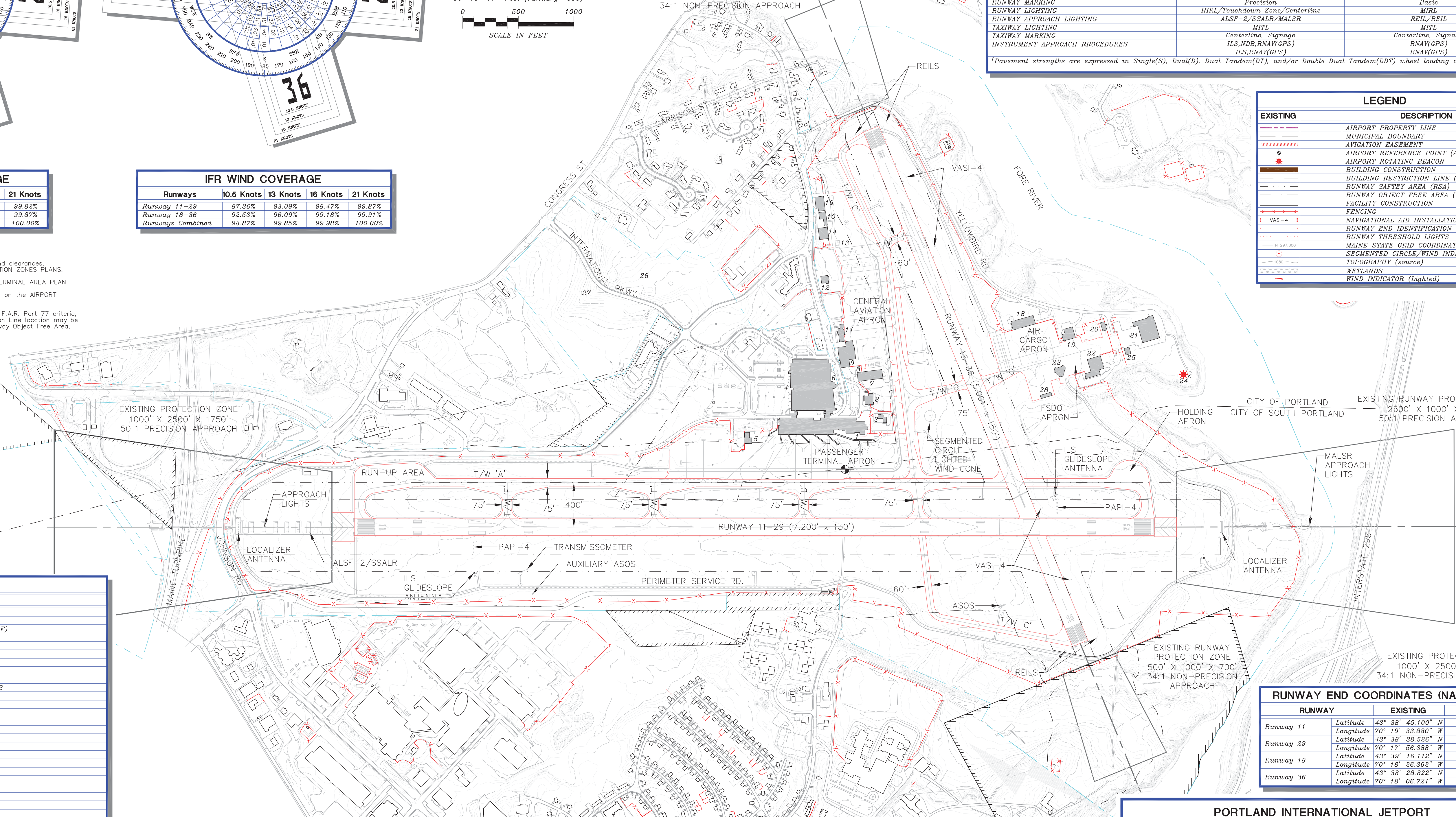
RUNWAY DATA

	RUNWAY 11-29	RUNWAY 18-36
	EXISTING	EXISTING
AIRCRAFT APPROACH CATEGORY-DESIGN GROUP	C-IV	B-II
CRITICAL AIRCRAFT	A300-600	Beachcraft 1900
RUNWAY BEARING	N 84.7833° W	N 16.7833° W
RUNWAY DIMENSIONS	7,200' x 150'	5,001' x 150'
RUNWAY INSTRUMENTATION	Precision	Non-Precision
RUNWAY APPROACH SURFACES	43:1/35:1	23:1/23:1
RUNWAY THRESHOLD DISPLACEMENT	NA	NA
RUNWAY STOPWAY	NA	NA
RUNWAY SAFETY AREA	8,795' x 500'	5,231' x 150'
RUNWAY OBJECT FREE AREA (ROFA)	8,215' x 800'	4,957' x 500'
TAKEOFF RUN AVAILABLE (TORA)	7,200'/7,200'	Not Published
TAKEOFF DISTANCE AVAILABLE (TODA)	7,200'/7,200'	Not Published
ACCELERATE-STOP DISTANCE AVAILABLE (ASDA)	6,800'/7,200'	Not Published
LANDING DISTANCE AVAILABLE (LDA)	6,800'/7,200'	Not Published
PAVEMENT SURFACE	Asphalt/Grooved	Asphalt
PAVEMENT STRENGTH (in thousand lbs.)[1]	75(S)/169(D)/300(DT)	75(S)/165(D)/300(DT)
RUNWAY EFFECTIVE GRADIENT	0.47%	0.04%
RUNWAY ELEVATION	76.6 MSL/42.9 MSL	44.6 MSL/46.6 MSL
RUNWAY MARKING	Precision	Basic
RUNWAY LIGHTING	HIRL/Touchdown Zone/Centerline	MIRL
RUNWAY APPROACH LIGHTING	ALSF-2/SSALR/MALSR	REIL/REIL
TAXIWAY LIGHTING	MITL	MITL
TAXIWAY MARKING	Centerline, Signage	Centerline, Signage
INSTRUMENT APPROACH RROCEDURES	ILS,NDB,RNAV(GPS) ILS,RNAV(GPS)	RNAV(GPS) RNAV(GPS)

[1] Pavement strengths are expressed in Single(S), Dual(D), Dual Tandem(DT), and/or Double Dual Tandem(DDT) wheel loading capacities.

LEGEND

EXISTING		DESCRIPTION
		AIRPORT PROPERTY LINE
		MUNICIPAL BOUNDARY
		AVIGATION EASEMENT
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		BUILDING CONSTRUCTION
		BUILDING RESTRICTION LINE (BRL)
		RUNWAY SAFTEY AREA (RSA)
		RUNWAY OBJECT FREE AREA (ROFA)
		FACILITY CONSTRUCTION
		FENCING
VASI-4		NAVIGATIONAL AID INSTALLATION
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
N 297,000		MAINE STATE GRID COORDINATES TICK
		SEGMENTED CIRCLE/WIND INDICATOR
1080		TOPOGRAPHY (source)
		WETLANDS
		WIND INDICATOR (Lighted)



BUILDINGS/FACILITIES

EXISTING		DESCRIPTION
1		ADMINISTRATION/TERMINAL BUILDING
2		AIR TRAFFIC CONTROL TOWER (ATCT)
3		AIRPORT RESCUE and FIREFIGHTING (ARFF)
4		PARKING GARAGE
5		AIRLINE FREIGHT FACILITY
6		RENTAL CAR FACILITY
7		GENERAL AVIATION HANGAR
8		FUEL FARM FACILITY
9		GENERAL AVIATION HANGAR
11		GENERAL AVIATION TERMINAL/FAA OFFICES
12		RENTAL CAR FACILITY
13		FUEL FARM FACILITY
14		GENERAL AVIATION HANGAR
15		GENERAL AVIATION HANGAR
16		GENERAL AVIATION HANGAR
19		FIXED BASE OPERATION HANGAR
20		AIRIELD LIGHTING VAULT
21		AIRPORT MAINTENANCE BUILDING
22		CONVENTIONAL HANGAR/OFFICES
23		HEXAGONAL HANGAR
24		AIRPORT BEACON
25		SAND/SALT STORAGE FACILITY
26		SUPPORT PARCEL
27		SUPPORT PARCEL
28		AIR CARGO DHL

DEVIATIONS FROM FAA AIRPORT DESIGN STANDARDS

DEVIATION DESCRIPTION	EFFECTED DESIGN STANDARD	STANDARD	EXISTING	PROPOSED DISPOSITION
Existing/ Rwy 11 Safety Area	Runway Safety Area	1,000' Beyond Runway End	1,000' Beyond Runway End	
Existing/ Rwy 11 Object Free Area	Runway Object Free Area	1,000' Beyond Runway End	775' Beyond Runway End	
Existing/ Rwy 29 Safety Area	Runway Safety Area	1,000' Beyond Runway End	596' Beyond Runway End	
Existing/ Rwy 29 Object Free Area	Runway Object Free Area	1,000' Beyond Runway End	289' Beyond Runway End	
Existing/ Rwy 18 Safety Area	Runway Safety Area	300' Beyond Runway End	152' Beyond Runway End	
Existing/ Rwy 18 Object Free Area	Runway Object Free Area	600' Beyond Runway End	-8' Beyond Runway End	
Existing/ Rwy 36 Safety Area	Runway Safety Area	300' Beyond Runway End	78' Beyond Runway End	
Existing/ Rwy 36 Object Free Area	Runway Object Free Area	600' Beyond Runway End	-35' Beyond Runway End	

RUNWAY END COORDINATES (NAD 1983)

RUNWAY		EXISTING
Runway 11	Latitude	43° 38' 45.100" N
	Longitude	70° 19' 33.880" W
Runway 29	Latitude	43° 38' 38.526" N
	Longitude	70° 17' 56.388" W
Runway 18	Latitude	43° 39' 16.112" N
	Longitude	70° 18' 26.362" W
Runway 36	Latitude	43° 38' 28.822" N
	Longitude	70° 18' 06.721" W

No.	REVISIONS	DATE	BY	APP'D.

PORTLAND INTERNATIONAL JETPORT

EXISTING FACILITIES PLAN

PORTLAND, MAINE

Stantec Consulting Services Inc.
22 Free Street
Portland, ME
Tel. 207.775.3211
Fax.207.775.6434
Stantec

PLANNED BY: Jay Wood
DETAILED BY: Lance King
APPROVED BY: Steve Benson

Coffman Associates
Airport Consultants

January 29, 2008 SHEET 1 OF 9

APPROVED MODIFICATIONS TO DESIGN STANDARDS

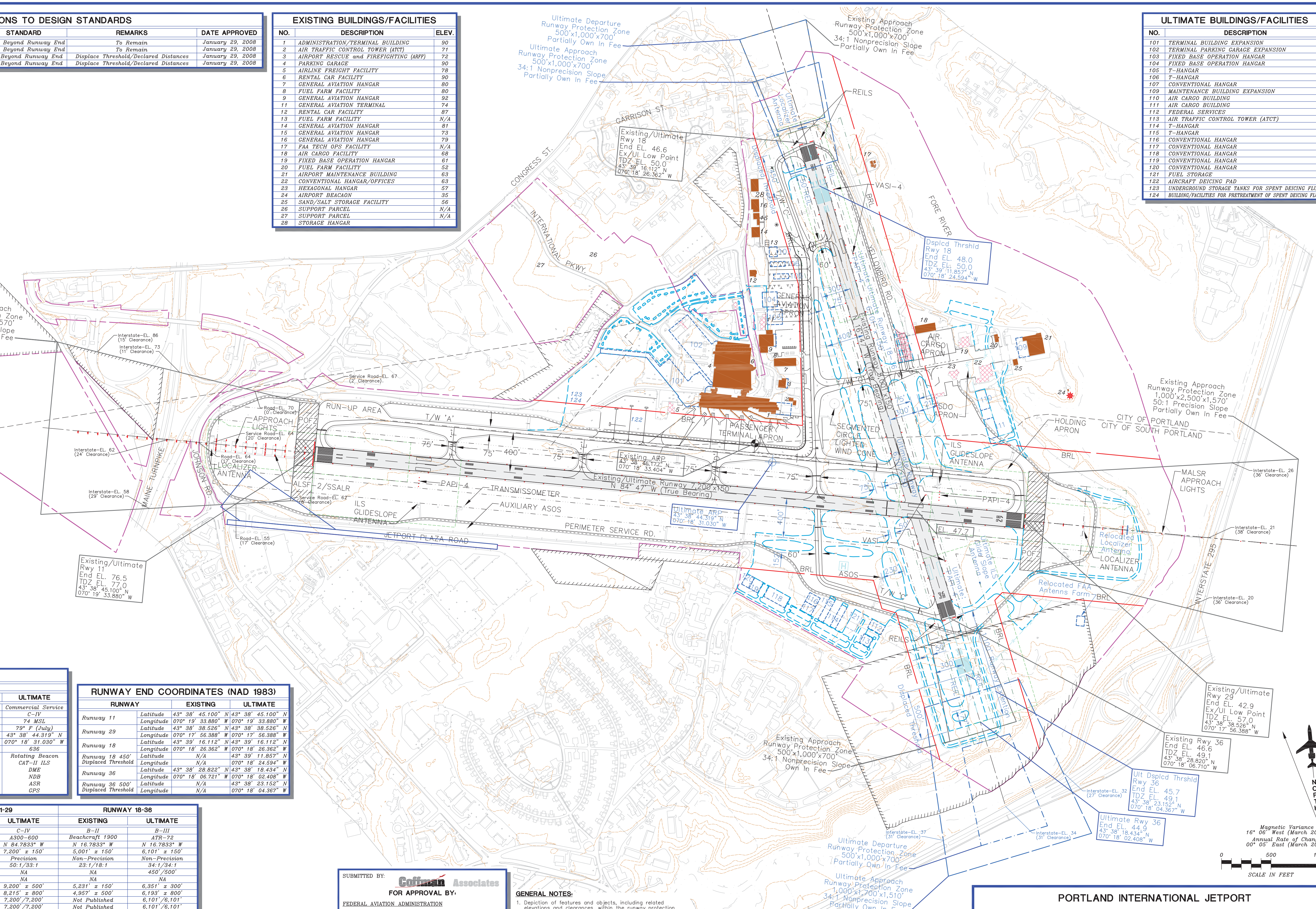
DESCRIPTION	EXISTING/PLANNED	STANDARD	REMARKS	DATE APPROVED
Runway 11 Object Free Area	775'/775'	1,000' Beyond Runway End	To Remain	January 29, 2008
Runway 29 Object Free Area	240'/240'	1,000' Beyond Runway End	To Remain	January 29, 2008
Runway 18 Object Free Area	–8'/–8'	600' Beyond Runway End	Displace Threshold/Declared Distances	January 29, 2008
Runway 36 Object Free Area	–36'/100'	600' Beyond Runway End	Displace Threshold/Declared Distances	January 29, 2008

EXISTING BUILDINGS/FACILITIES

NO.	DESCRIPTION	ELEV.
1	ADMINISTRATION/TERMINAL BUILDING	90
2	AIR TRAFFIC CONTROL TOWER (ATCT)	71
3	AIRPORT RESCUE and FIREFIGHTING (ARFF)	72
4	PARKING GARAGE	90
5	AIRLINE FREIGHT FACILITY	78
6	RENTAL CAR FACILITY	90
7	GENERAL AVIATION HANGAR	80
8	FUEL FARM FACILITY	80
9	GENERAL AVIATION HANGAR	92
11	GENERAL AVIATION TERMINAL	74
12	RENTAL CAR FACILITY	87
13	FUEL FARM FACILITY	N/A
14	GENERAL AVIATION HANGAR	81
15	GENERAL AVIATION HANGAR	73
16	GENERAL AVIATION HANGAR	79
17	FAA TECH OPS FACILITY	N/A
18	AIR CARGO FACILITY	68
19	FIXED BASE OPERATION HANGAR	61
20	FUEL FARM FACILITY	52
21	AIRPORT MAINTENANCE BUILDING	63
22	CONVENTIONAL HANGAR/OFFICES	63
23	HEXAGONAL HANGAR	57
24	AIRPORT BEACAON	35
25	SAND/SALT STORAGE FACILITY	56
26	SUPPORT PARCEL	N/A
27	SUPPORT PARCEL	N/A
28	STORAGE HANGAR	

ULTIMATE BUILDINGS/FACILITIES

NO.	DESCRIPTION
101	TERMINAL BUILDING EXPANSION
102	TERMINAL PARKING GARAGE EXPANSION
103	FIXED BASE OPERATION HANGAR
104	FIXED BASE OPERATION HANGAR
105	T–HANGAR
106	T–HANGAR
107	CONVENTIONAL HANGAR
109	MAINTENANCE BUILDING EXPANSION
110	AIR CARGO BUILDING
111	AIR CARGO BUILDING
112	FEDERAL SERVICES
113	AIR TRAFFIC CONTROL TOWER (ATCT)
114	T–HANGAR
115	T–HANGAR
116	CONVENTIONAL HANGAR
117	CONVENTIONAL HANGAR
118	CONVENTIONAL HANGAR
119	CONVENTIONAL HANGAR
120	CONVENTIONAL HANGAR
121	FUEL STORAGE
122	AIRCRAFT DEICING PAD
123	UNDERGROUND STORAGE TANKS FOR SPENT DEICING FLUID
124	BUILDING/FACILITIES FOR PRETREATMENT OF SPENT DEICING FLUID



LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		MUNICIPAL BOUNDARY
		AVIGATION EASEMENT
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		BUILDING CONSTRUCTION
BRL	BRL	BUILDING RESTRICTION LINE (BRL)
POFZ	POFZ	PRECISION OBSTACLE FREE ZONE (POFZ)
		RUNWAY SAFTEY AREA (RSA)
		RUNWAY OBJECT FREE AREA (ROFA)
		RUNWAY OBJECT FREE ZONE (ROFZ)
		FACILITY CONSTRUCTION
		FENCING
VASI–4	PAPI–4	NAVIGATIONAL AID INSTALLATION
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
		SEGMENTED CIRCLE/WIND INDICATOR
1080		TOPOGRAPHY
		WIND INDICATOR (Lighted)

AIRPORT DATA

PORTLAND INTERNATIONAL JETPORT (PWM)

		EXISTING	ULTIMATE
AIRPORT SERVICE LEVEL		Commercial Service	Commercial Service
AIRPORT REFERENCE CODE		C–IV	C–IV
AIRPORT ELEVATION		74 MSL	74 MSL
MEAN MAXIMUM TEMPERATURE OF HOTTEST MONTH		79° F (July)	79° F (July)
AIRPORT REFERENCE POINT (ARP) COORDINATES (NAD 1983)	Latitude	43° 38' 46.177" N	43° 38' 44.319" N
	Longitude	070° 18' 33.404" W	070° 18' 31.030" W
AIRPORT ACREAGE		636	636
AIRPORT and TERMINAL NAVIGATIONAL AIDS		Rotating Beacon CAT–II ILS DME NDB ASR GPS	Rotating Beacon CAT–II ILS DME NDB ASR GPS

RUNWAY END COORDINATES (NAD 1983)

RUNWAY		EXISTING	ULTIMATE
Runway 11	Latitude	43° 38' 45.100" N	43° 38' 45.100" N
	Longitude	070° 19' 33.880" W	070° 19' 33.880" W
Runway 29	Latitude	43° 38' 38.526" N	43° 38' 38.526" N
	Longitude	070° 17' 56.388" W	070° 17' 56.388" W
Runway 18	Latitude	43° 39' 16.112" N	43° 39' 16.112" N
	Longitude	070° 18' 26.362" W	070° 18' 26.362" W
Runway 18 450' Displaced Threshold	Latitude	N/A	43° 39' 11.857" N
	Longitude	N/A	070° 18' 24.594" W
Runway 36	Latitude	43° 38' 28.822" N	43° 38' 18.434" N
	Longitude	070° 18' 06.721" W	070° 18' 02.408" W
Runway 36 500' Displaced Threshold	Latitude	N/A	43° 38' 23.152" N
	Longitude	N/A	070° 18' 04.367" W

RUNWAY DATA

	RUNWAY 11-29		RUNWAY 18-36	
	EXISTING	ULTIMATE	EXISTING	ULTIMATE
AIRCRAFT APPROACH CATEGORY–DESIGN GROUP	C–IV	C–IV	B–II	B–III
CRITICAL DESIGN AIRCRAFT	A300–600	A300–600	Beachcraft 1900	ATR–72
RUNWAY BEARING	N 84.7833° W	N 84.7833° W	N 16.7833° W	N 16.7833° W
RUNWAY DIMENSIONS	7,200' x 150'	7,200' x 150'	5,001' x 150'	6,101' x 150'
RUNWAY INSTRUMENTATION	Precision	Precision	Non–Precision	Non–Precision
RUNWAY APPROACH SURFACES	43:1/35:1	50:1/33:1	23:1/18:1	34:1/34:1
RUNWAY THRESHOLD DISPLACEMENT	NA	NA	NA	450'/500'
RUNWAY STOPWAY	NA	NA	NA	NA
RUNWAY SAFETY AREA	8,795' x 500'	9,200' x 500'	5,231' x 150'	6,351' x 300'
RUNWAY OBJECT FREE AREA (ROFA)	8,215' x 800'	8,215' x 800'	4,957' x 500'	6,193' x 800'
TAKEOFF RUN AVAILABLE (TORA)	7,200'/7,200'	7,200'/7,200'	Not Published	6,101'/6,101'
TAKEOFF DISTANCE AVAILABLE (TODA)	7,200'/7,200'	7,200'/7,200'	Not Published	6,101'/6,101'
ACCELERATE–STOP DISTANCE AVAILABLE (ASDA)	6,800'/7,200'	7,200'/7,200'	Not Published	5,650'/5,650'
LANDING DISTANCE AVAILABLE (LDA)	6,800'/7,200'	7,200'/7,200'	Not Published	5,150'/5,150'
PAVEMENT SURFACE	Asphalt/Grooved	Asphalt/Grooved	Asphalt	Asphalt/Grooved
PAVEMENT STRENGTH (in thousand lbs.)[1]	75(S)/169(D)/300(DT)	75(S)/169(D)/300(DT)	75(S)/165(D)/300(DT)	75(S)/165(D)/300(DT)
RUNWAY EFFECTIVE GRADIENT	0.47%	0.47%	0.04%	0.01%
RUNWAY ELEVATION	76.6 MSL/42.9 MSL	76.6 MSL/42.9 MSL	44.6 MSL/46.6 MSL	44.6 MSL/44.9 MSL
RUNWAY MARKING	Precision	Precision	Nonprecision	Nonprecision
RUNWAY LIGHTING	HIRL/Touchdown Zone/Centerline	HIRL/Touchdown Zone/Centerline	MIRL	MIRL
RUNWAY APPROACH LIGHTING	ALSF–2/SSALR/MALSR	ALSF–2/SSALR/MALSR	REIL/REIL	REIL/REIL
TAXIWAY LIGHTING	MITL	MITL	MITL	MITL
TAXIWAY MARKING	Centerline, Signage	Centerline, Signage	Centerline, Signage	Centerline, Signage
INSTRUMENT APPROACH RROCEDURES	ILS,NDB,RNAV(GPS) ILS,RNAV(GPS)	ILS,NDB,RNAV(GPS) ILS,RNAV(GPS)	RNAV(GPS) RNAV(GPS)	RNAV(GPS) ILS(36)

[1] Pavement strengths are expressed in Single(S), Dual(D), Dual Tandem(DT), and/or Double Dual Tandem(DDT) wheel loading capacities.

SUBMITTED BY: Coffman Associates

FOR APPROVAL BY:

FEDERAL AVIATION ADMINISTRATION

APPROVED: ______________________
Airport Planner, Airports Planning Branch

DATE: ______________

MAINE DEPARTMENT OF TRANSPORTATION

APPROVED: ______________________
Director, Air Transportation Division

DATE: ______________

CITY OF PORTLAND, MAINE

APPROVED: ______________________
Director Waterfront and Transportation

DATE: ______________

GENERAL NOTES:

1. Depiction of features and objects, including related elevations and clearances, within the runway protection zones are depicted on the INNER PORTION OF APPROACH SURFACE DRAWINGS.
2. Details concerning terminal improvements are depicted on the TERMINAL AND AIR CARGO AREAS DRAWING.
3. Recommended land uses within the airport environs are depicted on the ON–AIRPORT LAND USE DRAWING.
4. Building Restriction Line (BRL) is established in accordance with 14 C.F.R. Part 77 criteria, location utilizes 35 foot vertical object height. Building Restriction Line location may be reduced in accordance to Part 77 criteria, to limits of the Runway Object Free Area, Runway Safety Area, and/or Runway Protection Zone criteria.
5. RSA determination April, 2007 summarizes planned RSA improvements Runways 29, 18 and 36.

No.	REVISIONS	DATE	BY	APP'D.
1	ADDED DEICING FACILITIES, NO.'S 122, 123 AND 124	05/02/08	RAL	CMH

THE CONTENTS OF THIS PLAN DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THIS DOCUMENT BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS.

PORTLAND INTERNATIONAL JETPORT

ULTIMATE FACILITIES PLAN

PORTLAND, MAINE

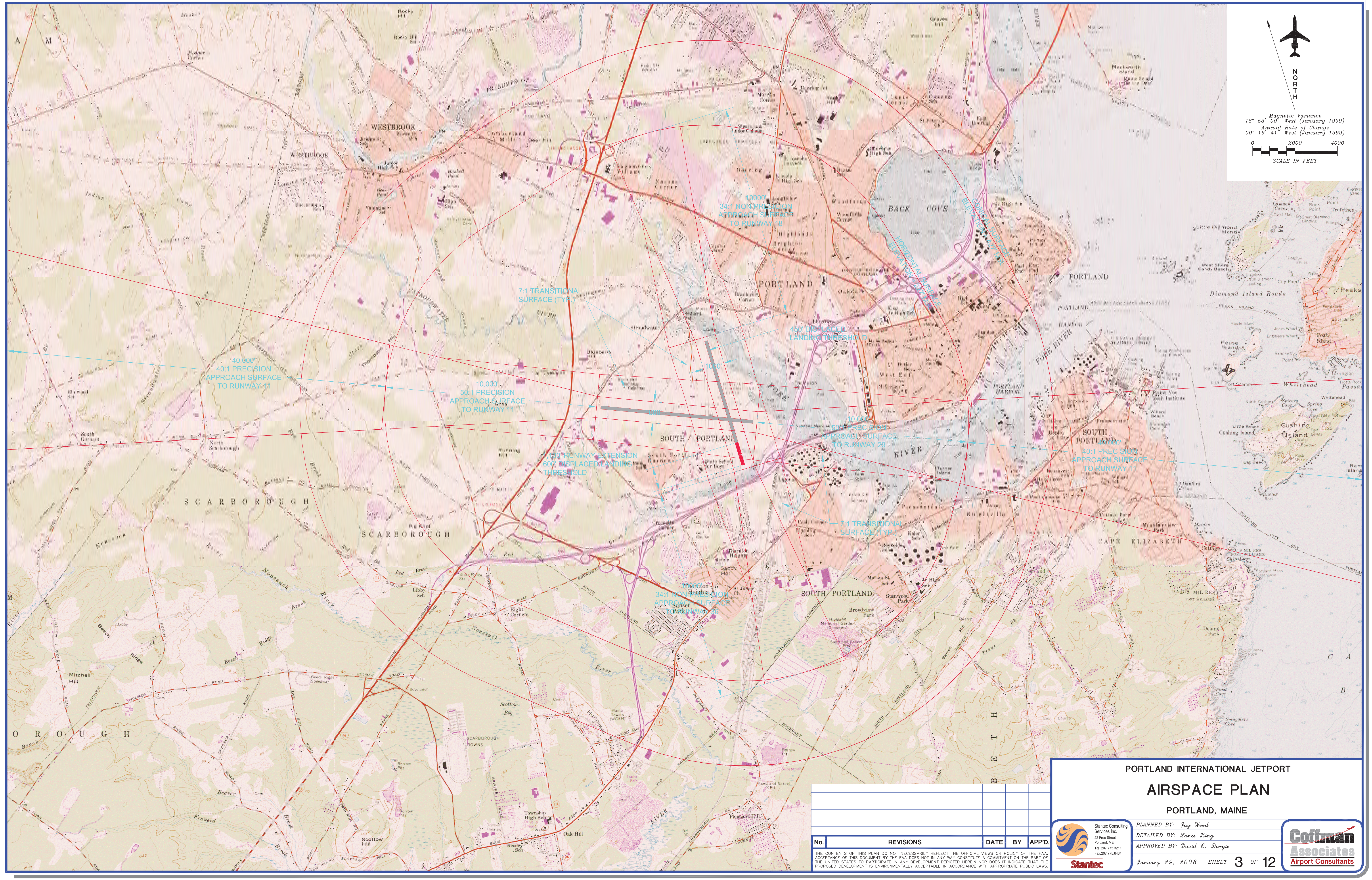
Stantec Consulting Services Inc.
22 Free Street
Portland, ME
Tel. 207.775.3211
Fax.207.775.6434
Stantec

PLANNED BY: Chris Hugunin
DETAILED BY: Richard Lally
APPROVED BY: Steve Benson

Coffman Associates Airport Consultants

January 29, 2008

SHEET 2 OF 12



No.	REVISIONS	DATE	BY	APP'D.

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PORTLAND INTERNATIONAL JETPORT

AIRSPACE PLAN

PORTLAND, MAINE

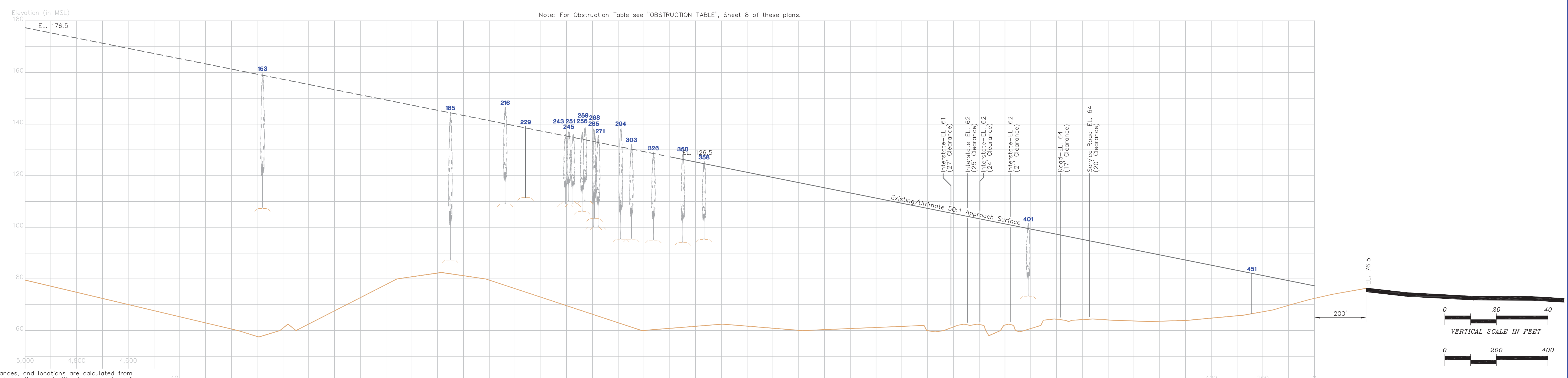
Stantec Consulting Services Inc.
22 Free Street
Portland, ME
Tel. 207.775.3211
Fax 207.775.6434
Stantec

PLANNED BY: Jay Wood
DETAILED BY: Lance King
APPROVED BY: David C. Dargie

January 29, 2008 SHEET 3 OF 12

Coffman Associates
Airport Consultants

Note: For Obstruction Table see "OBSTRUCTION TABLE", Sheet 8 of these plans.



GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
2. Depiction of features and objects within the primary, transitional, and horizontal Part 77 surfaces, is illustrated on the AIRSPACE PLAN of these plans.
3. Depiction of features and objects within the inner portion of the approach surfaces, is illustrated on the INNER PORTION OF RUNWAY APPROACH SURFACE DRAWINGS of these plans.
4. Distance for road obstructions and clearances reflect a safety clearance of 10' for airport service roads, 15' for noninterstate roads, 17' for interstate roads, and 23' for railroads.
5. Exising and future height and hazard ordinances are to be amended and/or referenced upon approval of updated PART 77 AIRSPACE DRAWING.
6. Additional obstruction data is illustrated on National Ocean Survey document PWM 329–9th Edition–July 1992, AIRPORT OBSTRUCTION CHART.

No.	REVISIONS	DATE	BY	APP'D.

THE CONTENTS OF THIS PLAN DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THIS DOCUMENT BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS.

PORTLAND INTERNATIONAL JETPORT

INNER PORTION OF RUNWAY 11 APPROACH SURFACE DRAWING

PORTLAND, MAINE

Stantec Consulting Services Inc.
22 Free Street
Portland, ME
Tel. 207.775.3211
Fax.207.775.6434
Stantec

PLANNED BY: Chris Hugunin
DETAILED BY: Richard Lally
APPROVED BY: Steve Benson

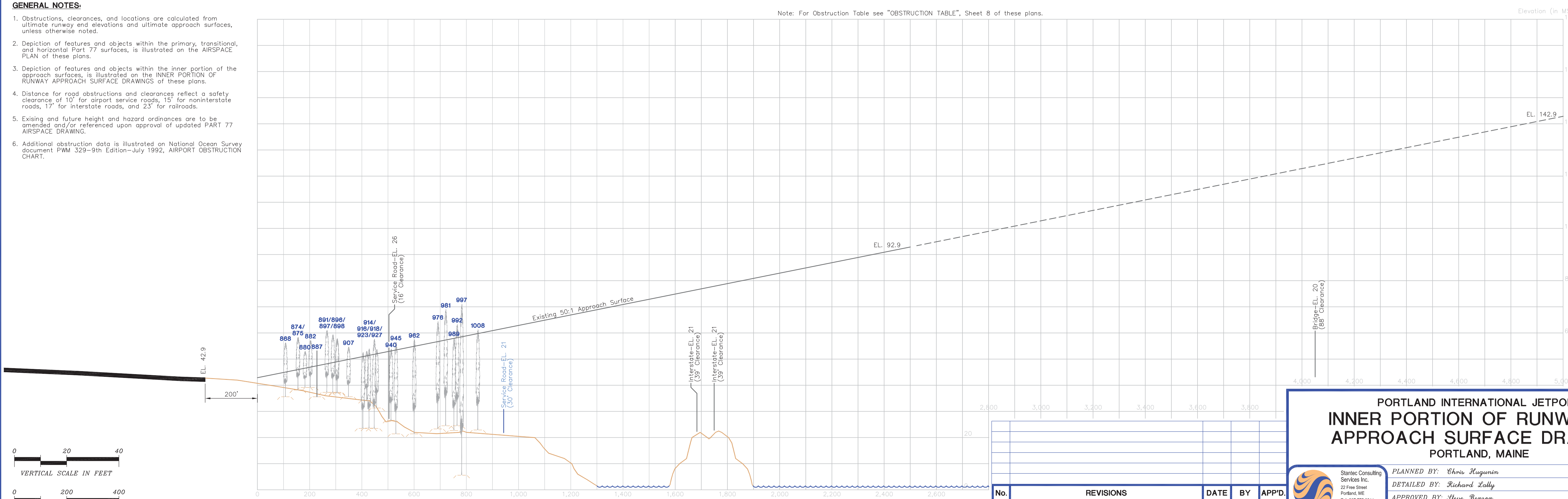
Coffman Associates Airport Consultants

January 29, 2008

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
2. Depiction of features and objects within the primary, transitional, and horizontal Part 77 surfaces, is illustrated on the AIRSPACE PLAN of these plans.
3. Depiction of features and objects within the inner portion of the approach surfaces, is illustrated on the INNER PORTION OF RUNWAY APPROACH SURFACE DRAWINGS of these plans.
4. Distance for road obstructions and clearances reflect a safety clearance of 10' for airport service roads, 15' for noninterstate roads, 17' for interstate roads, and 23' for railroads.
5. Exising and future height and hazard ordinances are to be amended and/or referenced upon approval of updated PART 77 AIRSPACE DRAWING.
6. Additional obstruction data is illustrated on National Ocean Survey document PWM 329–9th Edition–July 1992, AIRPORT OBSTRUCTION CHART.

Note: For Obstruction Table see "OBSTRUCTION TABLE", Sheet 8 of these plans.



VERTICAL SCALE IN FEET: 0, 20, 40

HORIZONTAL SCALE IN FEET: 0, 200, 400

No.	REVISIONS	DATE	BY	APP'D.

THE CONTENTS OF THIS PLAN DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THIS DOCUMENT BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS.

PORTLAND INTERNATIONAL JETPORT

INNER PORTION OF RUNWAY 29 APPROACH SURFACE DRAWING

PORTLAND, MAINE

Stantec Consulting Services Inc.
22 Free Street
Portland, ME
Tel. 207.775.3211
Fax.207.775.6434
Stantec

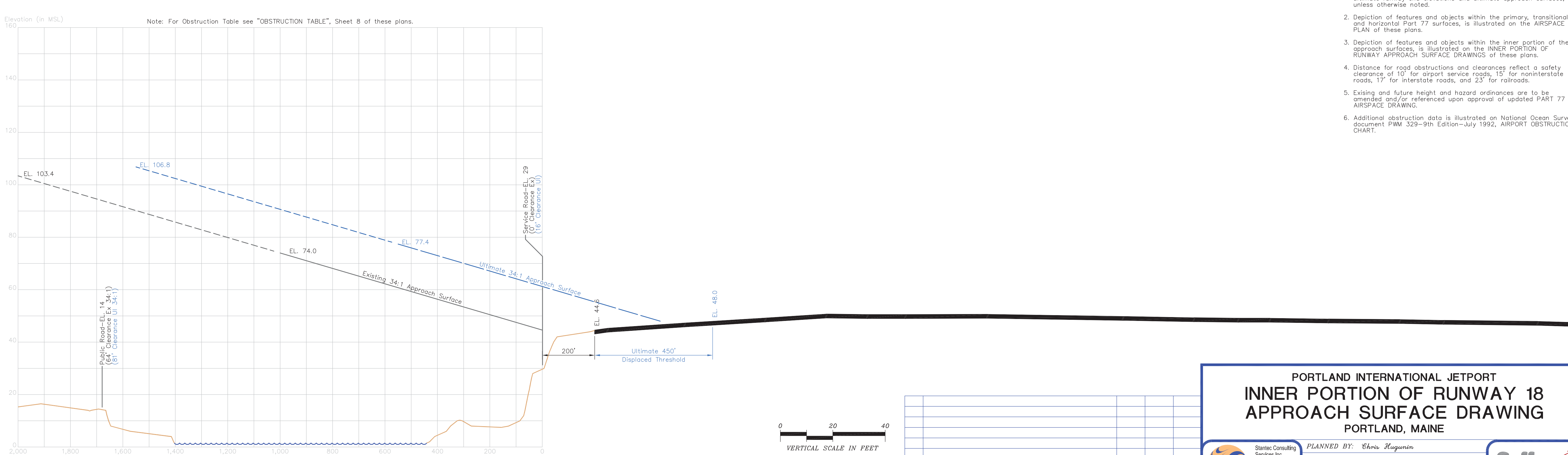
PLANNED BY: Chris Hugunin
DETAILED BY: Richard Lally
APPROVED BY: Steve Benson

Coffman Associates Airport Consultants

January 29, 2008

SHEET 5 OF 12

Note: For Obstruction Table see "OBSTRUCTION TABLE", Sheet 8 of these plans.



GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
2. Depiction of features and objects within the primary, transitional, and horizontal Part 77 surfaces, is illustrated on the AIRSPACE PLAN of these plans.
3. Depiction of features and objects within the inner portion of the approach surfaces, is illustrated on the INNER PORTION OF RUNWAY APPROACH SURFACE DRAWINGS of these plans.
4. Distance for road obstructions and clearances reflect a safety clearance of 10' for airport service roads, 15' for noninterstate roads, 17' for interstate roads, and 23' for railroads.
5. Exising and future height and hazard ordinances are to be amended and/or referenced upon approval of updated PART 77 AIRSPACE DRAWING.
6. Additional obstruction data is illustrated on National Ocean Survey document PWM 329–9th Edition–July 1992, AIRPORT OBSTRUCTION CHART.

No.	REVISIONS	DATE	BY	APP'D.

THE CONTENTS OF THIS PLAN DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THIS DOCUMENT BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS.

PORTLAND INTERNATIONAL JETPORT

INNER PORTION OF RUNWAY 18 APPROACH SURFACE DRAWING

PORTLAND, MAINE

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22 Free Street
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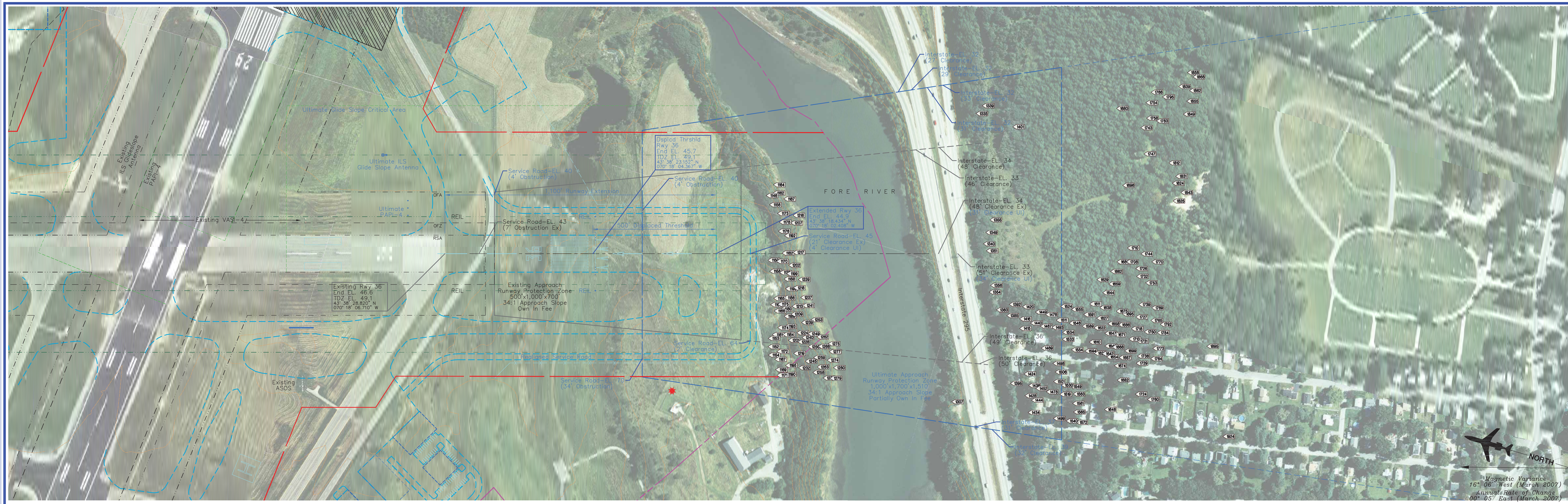
Stantec

PLANNED BY: Chris Hugunin
DETAILED BY: Richard Lalty
APPROVED BY: Steve Benson

January 29, 2008 SHEET 6 OF 12

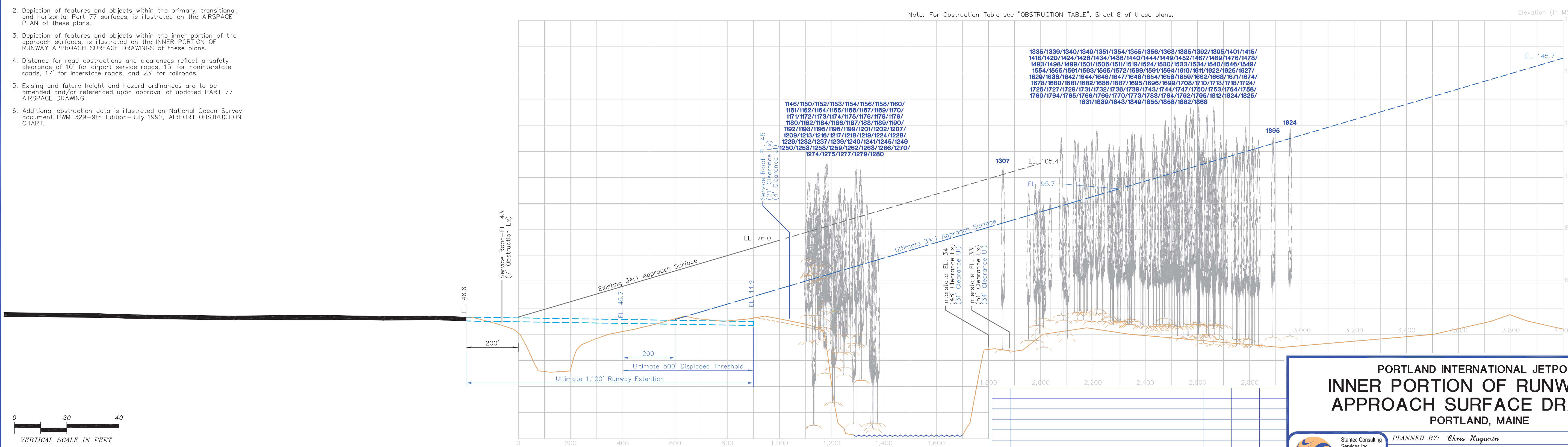
Coffman Associates Airport Consultants



GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
2. Depiction of features and objects within the primary, transitional, and horizontal Part 77 surfaces, is illustrated on the AIRSPACE PLAN of these plans.
3. Depiction of features and objects within the inner portion of the approach surfaces, is illustrated on the INNER PORTION OF RUNWAY APPROACH SURFACE DRAWINGS of these plans.
4. Distance for road obstructions and clearances reflect a safety clearance of 10' for airport service roads, 15' for noninterstate roads, 17' for interstate roads, and 23' for railroads.
5. Exising and future height and hazard ordinances are to be amended and/or referenced upon approval of updated PART 77 AIRSPACE DRAWING.
6. Additional obstruction data is illustrated on National Ocean Survey document PWM 329–9th Edition–July 1992, AIRPORT OBSTRUCTION CHART.

Note: For Obstruction Table see "OBSTRUCTION TABLE", Sheet 8 of these plans.



0 20 40
VERTICAL SCALE IN FEET

0 200 400
HORIZONTAL SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D.

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PORTLAND INTERNATIONAL JETPORT

INNER PORTION OF RUNWAY 36 APPROACH SURFACE DRAWING

PORTLAND, MAINE

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Stantec

PLANNED BY: Chris Hugunin
DETAILED BY: Richard Lally
APPROVED BY: Steve Benson

Coffman Associates
Airport Consultants

January 29, 2008

OBSTRUCTION DATA TABLE

OBJECT NO.	OBJECT DESCRIPTION	BASE ELEVATION	TOP ELEVATION	OBJECT HEIGHT	SURFACE ELEVATION	PENETRATION	SURFACE	PROPOSED DISPOSITION
RUNWAY 11								
21	TREE	111.1	176.2	65.1	174.9	1.3	50:1 APPROACH	TO BE TRIMMED OR REMOVED
24	TREE	111.1	175.4	64.3	174.4	1.0	50:1 APPROACH	TO BE TRIMMED OR REMOVED
125	TREE	108.3	163.6	55.3	161.8	1.8	50:1 APPROACH	TO BE TRIMMED OR REMOVED
153	TREE	107.3	159.9	52.6	157.5	2.4	50:1 APPROACH	TO BE TRIMMED OR REMOVED
185	TREE	87.3	144.7	57.4	142.9	1.8	50:1 APPROACH	TO BE TRIMMED OR REMOVED
216	TREE	109.0	146.7	37.7	138.6	8.1	50:1 APPROACH	TO BE TRIMMED OR REMOVED
229	POLE	110.6	138.3	27.7	137.0	1.3	50:1 APPROACH	FIX BY FUNCTIONAL PURPOSE
243	TREE	109.0	136.1	27.1	133.9	2.2	50:1 APPROACH	TO BE TRIMMED OR REMOVED
245	TREE	110.2	137.4	27.2	133.7	3.7	50:1 APPROACH	TO BE TRIMMED OR REMOVED
251	TREE	109.0	136.1	27.1	133.3	2.8	50:1 APPROACH	TO BE TRIMMED OR REMOVED
256	TREE	106.1	137.0	30.9	132.7	4.3	50:1 APPROACH	TO BE TRIMMED OR REMOVED
259	TREE	110.2	138.9	28.7	132.4	6.5	50:1 APPROACH	TO BE TRIMMED OR REMOVED
265	TREE	100.2	138.6	38.4	131.8	6.8	50:1 APPROACH	TO BE TRIMMED OR REMOVED
268	TREE	103.4	136.1	32.7	131.7	4.4	50:1 APPROACH	TO BE TRIMMED OR REMOVED
271	TREE	100.2	135.7	35.5	131.4	4.3	50:1 APPROACH	TO BE TRIMMED OR REMOVED
294	TREE	95.4	138.6	43.2	129.6	9.0	50:1 APPROACH	TO BE TRIMMED OR REMOVED
303	TREE	95.4	132.3	36.9	128.8	3.5	50:1 APPROACH	TO BE TRIMMED OR REMOVED
326	TREE	94.1	128.2	34.1	127.1	1.1	50:1 APPROACH	TO BE TRIMMED OR REMOVED
350	TREE	94.1	128.7	34.6	124.8	3.9	50:1 APPROACH	TO BE TRIMMED OR REMOVED
358	TREE	94.1	124.7	30.6	123.2	1.5	50:1 APPROACH	TO BE TRIMMED OR REMOVED
401	TREE	73.3	101.6	28.3	98.1	3.5	50:1 APPROACH	TO BE TRIMMED OR REMOVED
451	UNC	65.6	81.4	15.8	80.7	0.7	50:1 APPROACH	FIX BY FUNCTIONAL PURPOSE
RUNWAY 29								
868	TREE	35.6	56.3	20.7	45.1	11.2	50:1 APPROACH	TO BE TRIMMED OR REMOVED
874	TREE	38.2	58.4	20.2	46.1	12.3	50:1 APPROACH	TO BE TRIMMED OR REMOVED
875	TREE	38.2	58.4	20.2	46.0	12.4	50:1 APPROACH	TO BE TRIMMED OR REMOVED
880	TREE	39.2	53.0	13.8	46.6	6.4	50:1 APPROACH	TO BE TRIMMED OR REMOVED
882	TREE	39.2	57.2	18.0	47.0	10.2	50:1 APPROACH	TO BE TRIMMED OR REMOVED
887	POLE	35.6	53.2	17.6	47.5	5.7	50:1 APPROACH	FIX BY FUNCTIONAL PURPOSE
891	TREE	37.3	60.6	23.3	48.7	11.9	50:1 APPROACH	TO BE TRIMMED OR REMOVED
896	TREE	37.3	59.4	22.1	48.7	10.7	50:1 APPROACH	TO BE TRIMMED OR REMOVED
897	TREE	37.3	57.9	20.6	49.1	8.8	50:1 APPROACH	TO BE TRIMMED OR REMOVED
898	TREE	37.0	57.4	20.4	49.1	8.3	50:1 APPROACH	TO BE TRIMMED OR REMOVED
907	TREE	35.6	54.7	19.1	49.9	4.8	50:1 APPROACH	TO BE TRIMMED OR REMOVED
914	TREE	23.5	52.6	29.1	51.0	1.6	50:1 APPROACH	TO BE TRIMMED OR REMOVED
916	TREE	34.2	53.1	18.9	51.3	1.8	50:1 APPROACH	TO BE TRIMMED OR REMOVED
918	TREE	23.6	54.0	30.4	51.5	2.5	50:1 APPROACH	TO BE TRIMMED OR REMOVED
923	TREE	23.5	57.7	34.2	51.9	5.8	50:1 APPROACH	TO BE TRIMMED OR REMOVED
927	TREE	31.3	53.8	22.5	52.1	1.7	50:1 APPROACH	TO BE TRIMMED OR REMOVED
940	TREE	26.6	53.9	27.3	53.2	0.7	50:1 APPROACH	TO BE TRIMMED OR REMOVED
945	TREE	21.4	56.5	35.1	53.5	3.0	50:1 APPROACH	TO BE TRIMMED OR REMOVED
962	TREE	21.4	57.5	36.1	54.9	2.6	50:1 APPROACH	TO BE TRIMMED OR REMOVED
976	TREE	23.3	64.4	41.1	56.7	7.7	50:1 APPROACH	TO BE TRIMMED OR REMOVED
981	TREE	24.5	69.0	44.5	57.4	11.6	50:1 APPROACH	TO BE TRIMMED OR REMOVED
989	TREE	22.7	58.1	35.4	58.0	0.1	50:1 APPROACH	TO BE TRIMMED OR REMOVED
992	TREE	24.5	63.3	38.8	58.2	5.1	50:1 APPROACH	TO BE TRIMMED OR REMOVED
997	TREE	5.6	71.1	65.5	58.6	12.5	50:1 APPROACH	TO BE TRIMMED OR REMOVED
1008	TREE	22.9	61.3	38.4	59.8	1.5	50:1 APPROACH	TO BE TRIMMED OR REMOVED
RUNWAY 18								
	NONE						34:1 APPROACH	
RUNWAY 36								
1146	TREE	37.0	86.1	49.1	45.0	41.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1150	TREE	47.2	84.7	37.5	45.2	39.5	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1152	TREE	62.5	76.6	14.1	45.3	31.3	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1153	TREE	62.8	75.8	13.0	45.3	30.5	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1154	TREE	68.6	98.9	30.3	45.3	53.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1156	TREE	37.0	84.6	47.6	45.5	39.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1158	TREE	63.8	89.1	25.3	45.5	43.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1160	TREE	60.6	82.5	21.9	45.6	36.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1161	TREE	62.8	86.7	23.9	45.8	40.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1162	TREE	5.1	66.7	61.6	45.9	20.8	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1164	TREE	4.9	66.6	61.7	45.9	20.7	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1165	TREE	59.5	90.1	30.6	45.9	44.2	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1166	TREE	63.2	92.2	29.0	46.0	46.2	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1167	TREE	68.6	97.5	28.9	46.1	51.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1169	TREE	66.4	85.2	18.8	46.2	39.0	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1170	TREE	47.2	85.5	38.3	46.3	39.2	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1171	TREE	66.4	97.2	30.8	46.3	50.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1172	TREE	64.9	102.2	37.3	46.3	55.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1173	TREE	38.2	84.5	46.3	46.4	38.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1174	TREE	61.4	82.3	20.9	46.4	35.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1175	TREE	60.6	79.4	18.8	46.5	32.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1176	TREE	37.8	88.9	51.1	46.5	42.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1178	TREE	37.8	86.3	48.5	46.6	39.7	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1179	TREE	42.0	71.0	29.0	46.6	24.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1180	TREE	45.8	68.0	22.2	46.9	21.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1182	TREE	42.6	93.1	50.5	46.9	46.2	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1184	TREE	48.8	69.3	20.5	47.0	22.3	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1186	TREE	43.5	83.5	40.0	47.1	36.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1187	TREE	25.0	62.8	37.8	47.1	15.7	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1188	TREE	50.8	84.5	33.7	47.1	37.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1189	TREE	58.5	64.1	5.6	47.2	16.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1190	TREE	66.4	104.7	38.3	47.3	57.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1192	TREE	37.8	91.9	54.1	47.3	44.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1193	TREE	61.4	69.2	7.8	47.2	22.0	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1195	TREE	66.4	105.7	39.3	47.3	58.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1196	TREE	43.5	83.1	39.6	47.3	35.8	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1199	TREE	42.0	82.2	40.2	47.5	34.7	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1201	TREE	52.7	86.0	33.3	47.7	38.3	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1202	TREE	42.0	80.3	38.3	47.7	32.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1207	TREE	13.8	75.4	61.6	48.0	27.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1209	TREE	27.2	86.0	58.8	48.1	37.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1213	TREE	27.2	84.2	57.0	48.1	36.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1216	TREE	13.8	69.5	55.7	48.3	21.2	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1217	TREE	30.5	68.3	37.8	48.3	20.0	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1218	TREE	34.4	87.6	53.2	48.4	39.2	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1219	TREE	48.7	77.6	28.9	48.3	29.3	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1224	TREE	33.1	94.3	61.2	48.7	45.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1228	TREE	33.1	96.2	63.1	48.8	47.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1229	TREE	34.4	66.8	32.4	48.9	17.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1232	TREE	39.8	88.5	48.7	48.9	39.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1237	TREE	43.5	71.9	28.4	49.2	22.7	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1239	TREE	24.4	83.9	59.5	49.3	34.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1240	TREE	33.1	95.7	62.6	49.3	46.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1241	TREE	27.2	69.8	42.6	49.3	20.5	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1245	TREE	39.8	91.1	51.3	49.7	41.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1249	TREE	33.1	88.8	55.7	50.0	38.8	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1250	TREE	36.4	92.7	56.3	50.0	42.7	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1253	TREE	5.7	70.3	64.6	50.4	19.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1258	TREE	35.8	103.6	67.8	50.6	53.0	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1259	TREE	36.4	95.0	58.6	50.7	44.3	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1262	TREE	22.3	74.7	52.4	51.1	23.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1263	TREE	39.8	102.8	63.0	51.1	51.7	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1266	TREE	22.3	94.9	72.6	51.3	43.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1270	TREE	35.8	90.7	54.9	51.8	38.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1274	TREE	5.8	84.4	78.6	52.3	32.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1275	TREE	4.1	76.2	72.1	52.5	23.7	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1277	TREE	5.8	74.5	68.7	52.5	22.0	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1279	TREE	3.3	78.2	74.9	52.6	25.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1280	TREE	5.8	71.9	66.1	53.0	18.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1307	TREE	33.9	104.0	70.1	67.2	36.8	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1335	TREE	37.6	94.4	56.8	70.0	24.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1339	TREE	37.6	97.5	59.9	70.8	26.7	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1340	TREE	43.3	90.1	46.8	70.9	19.2	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1349	TREE	43.3	95.7	52.4	71.3	24.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1351	TREE	40.1	87.8	47.7	71.3	16.5	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1354	TREE	46.0	88.4	42.4	71.6	16.8	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1355	TREE	42.4	89.6	47.2	71.8	17.8	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1356	TREE	34.9	84.7	49.8	61.8	22.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1363	TREE	45.2	92.1	46.9	72.5	19.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1385	TREE	47.2	115.3	68.1	73.8	41.5	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1392	TREE	45.2	110.4	65.2	74.0	36.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED

OBSTRUCTION DATA TABLE

OBJECT NO.	OBJECT DESCRIPTION	BASE ELEVATION	TOP ELEVATION	OBJECT HEIGHT	SURFACE ELEVATION	PENETRATION	SURFACE	PROPOSED DISPOSITION
RUNWAY 36 (Continued)								
1395	TREE	40.5	91.0	50.5	74.2	16.8	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1401	TREE	38.2	92.4	54.2	74.5	17.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1415	TREE	48.2	105.7	57.5	75.3	30.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1416	TREE	48.2	115.2	67.0	75.3	39.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1420	TREE	45.3	113.8	68.5	75.7	38.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1424	TREE	48.4	97.7	49.3	75.8	21.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1428	TREE	48.9	93.0	44.1	75.9	17.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1434	TREE	45.4	101.9	56.5	76.3	25.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1436	TREE	48.1	111.1	63.0	76.3	34.8	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1440	TREE	48.2	111.9	63.7	76.6	35.3	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1444	TREE	48.9	108.3	59.4	76.7	31.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1449	TREE	44.9	104.5	59.6	77.1	27.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1452	TREE	48.1	114.8	66.7	77.2	37.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1467	TREE	47.7	118.6	70.9	77.8	40.8	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1469	TREE	49.4	97.2	47.8	77.8	19.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1476	TREE	44.9	107.2	62.3	78.3	28.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1478	TREE	48.0	104.8	56.8	78.4	26.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1493	TREE	46.5	113.0	66.5	79.1	33.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1498	TREE	46.2	102.0	55.8	79.2	22.8	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1499	TREE	46.9	103.4	56.5	79.3	24.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1501	TREE	44.6	107.7	63.1	79.3	28.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1506	TREE	45.2	95.3	50.1	79.5	15.8	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1511	TREE	43.6	112.4	68.8	79.6	32.8	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1519	TREE	44.6	101.2	56.6	80.0	21.2	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1524	TREE	44.9	100.3	55.4	80.2	20.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1530	TREE	44.6	111.8	67.2	80.2	31.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1533	TREE	45.1	103.9	58.8	80.3	23.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1534	TREE	45.1	105.6	60.5	80.4	25.2	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1540	TREE	44.9	102.4	57.5	80.8	21.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1546	TREE	43.6	114.7	71.1	81.2	33.5	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1549	TREE	43.7	102.7	59.0	81.3	21.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1554	TREE	43.8	97.4	53.6	81.5	15.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1555	TREE	43.6	101.0	57.4	81.5	19.5	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1561	TREE	45.7	109.1	63.4	81.6	27.5	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1563	TREE	43.7	115.0	71.3	81.7	33.3	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1565	TREE	45.7	117.6	71.9	81.7	35.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1572	TREE	44.9	116.5	71.6	82.0	34.5	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1589	TREE	43.1	116.7	73.6	82.7	34.0	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1591	TREE	43.5	111.7	68.2	82.9	28.8	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1594	TREE	43.2	104.4	61.2	83.1	21.3	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1610	TREE	43.2	102.1	58.9	83.6	18.5	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1611	TREE	43.1	99.7	56.6	83.6	16.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1622	TREE	42.9	116.6	73.7	84.1	32.5	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1625	TREE	41.4	107.8	66.4	84.2	23.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1627	TREE	43.1	112.2	69.1	84.5	27.7	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1629	TREE	43.8	104.6	60.8	84.5	20.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1638	TREE	43.1	104.6	61.5	84.8	19.8	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1642	TREE	43.3	114.0	70.7	85.1	28.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1644	TREE	43.8	105.7	61.9	85.1	20.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1646	TREE	46.0	103.6	57.6	85.4	18.2	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1647	TREE	42.9	111.0	68.1	85.5	25.5	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1648	TREE	41.4	122.1	80.7	85.5	36.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1654	TREE	43.3	102.4	59.1	85.6	16.8	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1658	TREE	42.9	119.2	76.3	85.8	33.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1659	TREE	43.8	104.6	60.8	85.9	18.7	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1662	TREE	43.8	105.1	61.3	86.1	19.0	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1668	TREE	43.3	118.6	75.3	86.4	32.2	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1671	TREE	42.9	124.4	81.5	86.5	37.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1674	TREE	43.2	109.5	66.3	86.5	23.0	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1678	TREE	42.9	115.7	72.8	86.8	28.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1680	TREE	39.4	106.1	66.7	86.8	19.3	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1681	TREE	39.3	103.3	64.0	86.9	16.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1682	TREE	44.7	103.1	58.4	86.9	16.2	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1686	TREE	42.9	119.0	76.1	87.1	31.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1687	TREE	43.2	108.9	65.7	87.2	21.7	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1695	TREE	42.9	114.6	71.7	87.5	27.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1696	TREE	38.4	103.3	64.9	87.6	15.7	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1699	TREE	43.2	124.1	80.9	87.8	36.3	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1708	TREE	39.3	105.7	66.4	88.0	17.7	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1710	TREE	39.3	107.5	68.2	88.2	19.3	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1713	TREE	43.8	126.7	82.9	88.3	38.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1718	TREE	43.8	125.9	82.1	88.6	37.3	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1724	TREE	44.5	106.1	61.6	89.1	17.0	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1726	TREE	39.8	111.2	71.4	89.1	22.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1727	TREE	43.8	112.3	68.5	89.2	23.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1729	TREE	44.0	108.0	64.0	89.2	18.8	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1731	TREE	43.8	127.3	83.5	89.2	38.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1732	TREE	39.8	115.8	76.0	89.2	26.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1736	TREE	43.8	110.9	67.1	89.3	21.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1739	TREE	43.3	110.6	67.3	89.5	21.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1743	TREE	39.4	106.8	67.4	89.7	17.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1744	TREE	36.5	114.9	78.4	89.7	25.2	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1747	TREE	39.9	107.3	67.4	90.1	17.2	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1750	TREE	43.8	124.4	80.6	90.1	34.3	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1753	TREE	39.8	106.4	66.6	90.3	16.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1754	TREE	39.4	107.5	68.1	90.4	17.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1758	TREE	38.9	106.7	67.8	90.4	16.3	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1760	TREE	44.7	107.7	63.0	90.5	17.2	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1764	TREE	42.0	106.5	64.5	90.9	15.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1765	TREE	43.3	127.2	83.9	91.0	36.2	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1766	TREE	36.2	107.6	71.4	91.0	16.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1769	TREE	43.3	115.0	71.7	91.0	24.0	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1770	TREE	39.8	111.7	71.9	91.0	20.7	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1773	TREE	43.8	109.2	65.4	91.2	18.0	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1783	TREE	38.0	109.2	71.2	91.6	17.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1784	TREE	43.3	116.3	73.0	91.7	24.6	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1792	TREE	43.3	111.0	67.7	92.1	18.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1795	TREE	36.2	114.5	78.3	92.3	22.2	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1812	TREE	38.2	110.3	72.1	93.0	17.3	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1824	TREE	35.9	115.4	79.5	93.5	21.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1825	TREE	38.0	113.1	75.1	93.6	19.5	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1831	TREE	35.9	109.6	73.7	93.8	15.8	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1839	TREE	36.2	112.5	76.3	94.2	18.3	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1843	TREE	38.3	119.4	81.1	94.5	24.9	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1849	TREE	38.0	111.9	73.9	94.8	17.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1855	TREE	36.0	111.3	75.3	95.2	16.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1858	TREE	36.0	115.4	79.4	95.3	20.1	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1862	TREE	36.0	112.9	76.9	95.5	17.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1868	TREE	36.0	114.4	78.4	96.0	18.4	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1895	TREE	38.7	115.6	76.9	97.6	18.0	34:1 APPROACH	TO BE TRIMMED OR REMOVED
1924	TREE	39.1	118.7	79.6	99.5	19.2	34:1 APPROACH	TO BE TRIMMED OR REMOVED

No.	REVISIONS	DATE	BY	APP'D.

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PORTLAND INTERNATIONAL JETPORT

OBSTRUCTION DATA TABLE

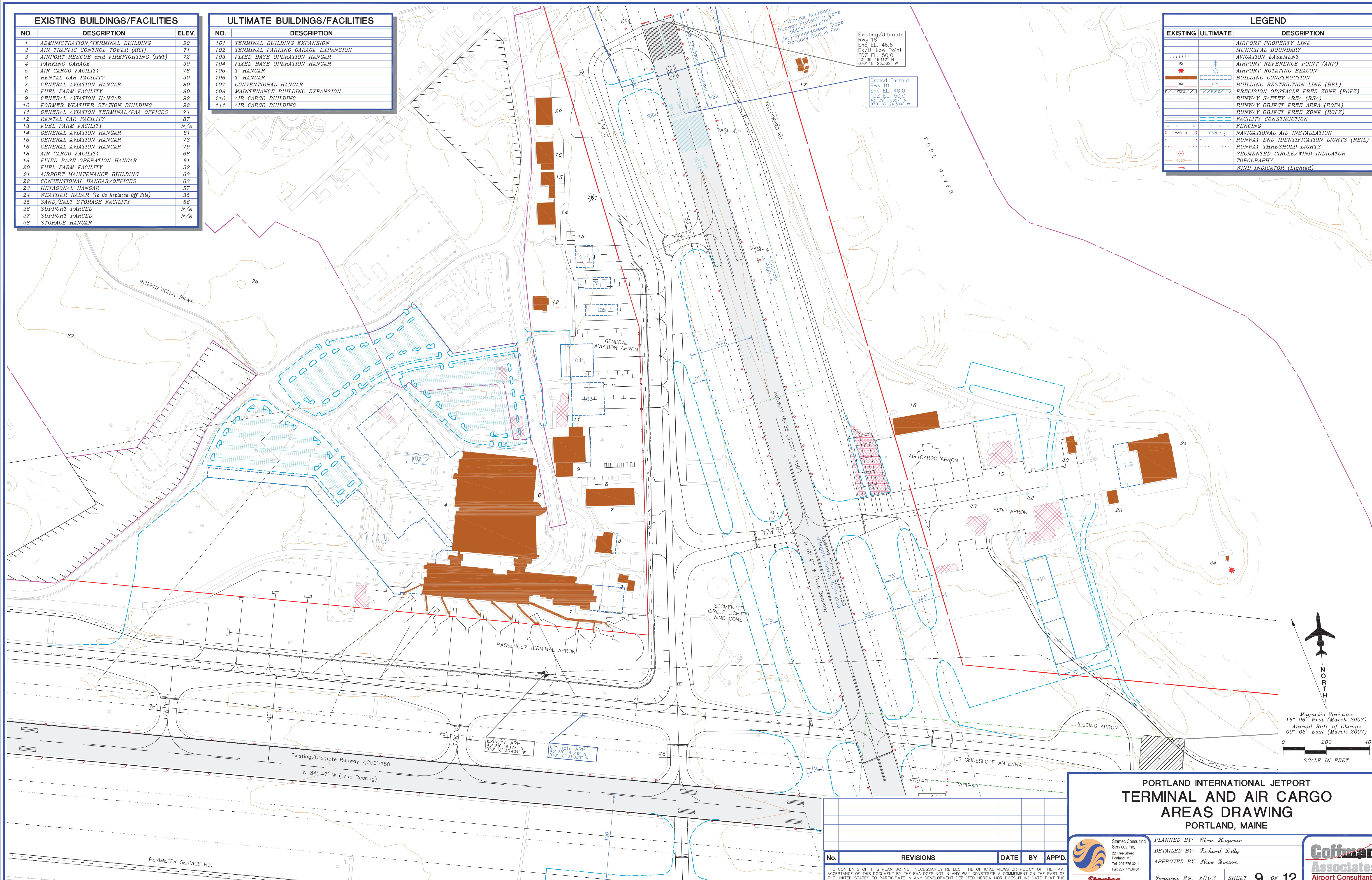
PORTLAND, MAINE

Stantec Consulting Services Inc.
22 Free Street
Portland, ME
Tel. 207.775.3211
Fax.207.775.6434
Stantec

PLANNED BY: Chris Huguenin
DETAILED BY: Richard Lally
APPROVED BY: Steve Benson

January 29, 2008

Coffman Associates
Airport Consultants



EXISTING BUILDINGS/FACILITIES

NO.	DESCRIPTION	ELEV.
1	ADMINISTRATION/TERMINAL BUILDING	90
2	AIR TRAFFIC CONTROL TOWER (ATCT)	71
3	AIRPORT RESCUE and FIREFIGHTING (ARFF)	72
4	PARKING GARAGE	90
5	AIR CARGO FACILITY	78
6	RENTAL CAR FACILITY	90
7	GENERAL AVIATION HANGAR	80
8	FUEL FARM FACILITY	80
9	GENERAL AVIATION HANGAR	92
10	FORMER WEATHER STATION BUILDING	92
11	GENERAL AVIATION TERMINAL/FAA OFFICES	74
12	RENTAL CAR FACILITY	87
13	FUEL FARM FACILITY	N/A
14	GENERAL AVIATION HANGAR	81
15	GENERAL AVIATION HANGAR	73
16	GENERAL AVIATION HANGAR	79
18	AIR CARGO FACILITY	68
19	FIXED BASE OPERATION HANGAR	61
20	FUEL FARM FACILITY	52
21	AIRPORT MAINTENANCE BUILDING	63
22	CONVENTIONAL HANGAR/OFFICES	63
23	HEXAGONAL HANGAR	57
24	WEATHER RADAR (To Be Replaced Off Site)	35
25	SAND/SALT STORAGE FACILITY	56
26	SUPPORT PARCEL	N/A
27	SUPPORT PARCEL	N/A
28	STORAGE HANGAR	–

ULTIMATE BUILDINGS/FACILITIES

NO.	DESCRIPTION
101	TERMINAL BUILDING EXPANSION
102	TERMINAL PARKING GARAGE EXPANSION
103	FIXED BASE OPERATION HANGAR
104	FIXED BASE OPERATION HANGAR
105	T-HANGAR
106	T-HANGAR
107	CONVENTIONAL HANGAR
109	MAINTENANCE BUILDING EXPANSION
110	AIR CARGO BUILDING
111	AIR CARGO BUILDING

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		MUNICIPAL BOUNDARY
		AVIGATION EASEMENT
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		BUILDING CONSTRUCTION
BRL	BRL	BUILDING RESTRICTION LINE (BRL)
POFZ	POFZ	PRECISION OBSTACLE FREE ZONE (POFZ)
		RUNWAY SAFTEY AREA (RSA)
		RUNWAY OBJECT FREE AREA (ROFA)
		RUNWAY OBJECT FREE ZONE (ROFZ)
		FACILITY CONSTRUCTION
		FENCING
VASI-4	PAPI-4	NAVIGATIONAL AID INSTALLATION
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
		SEGMENTED CIRCLE/WIND INDICATOR
1080		TOPOGRAPHY
		WIND INDICATOR (Lighted)

No.	REVISIONS	DATE	BY	APP'D.

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PORTLAND INTERNATIONAL JETPORT

TERMINAL AND AIR CARGO AREAS DRAWING

PORTLAND, MAINE

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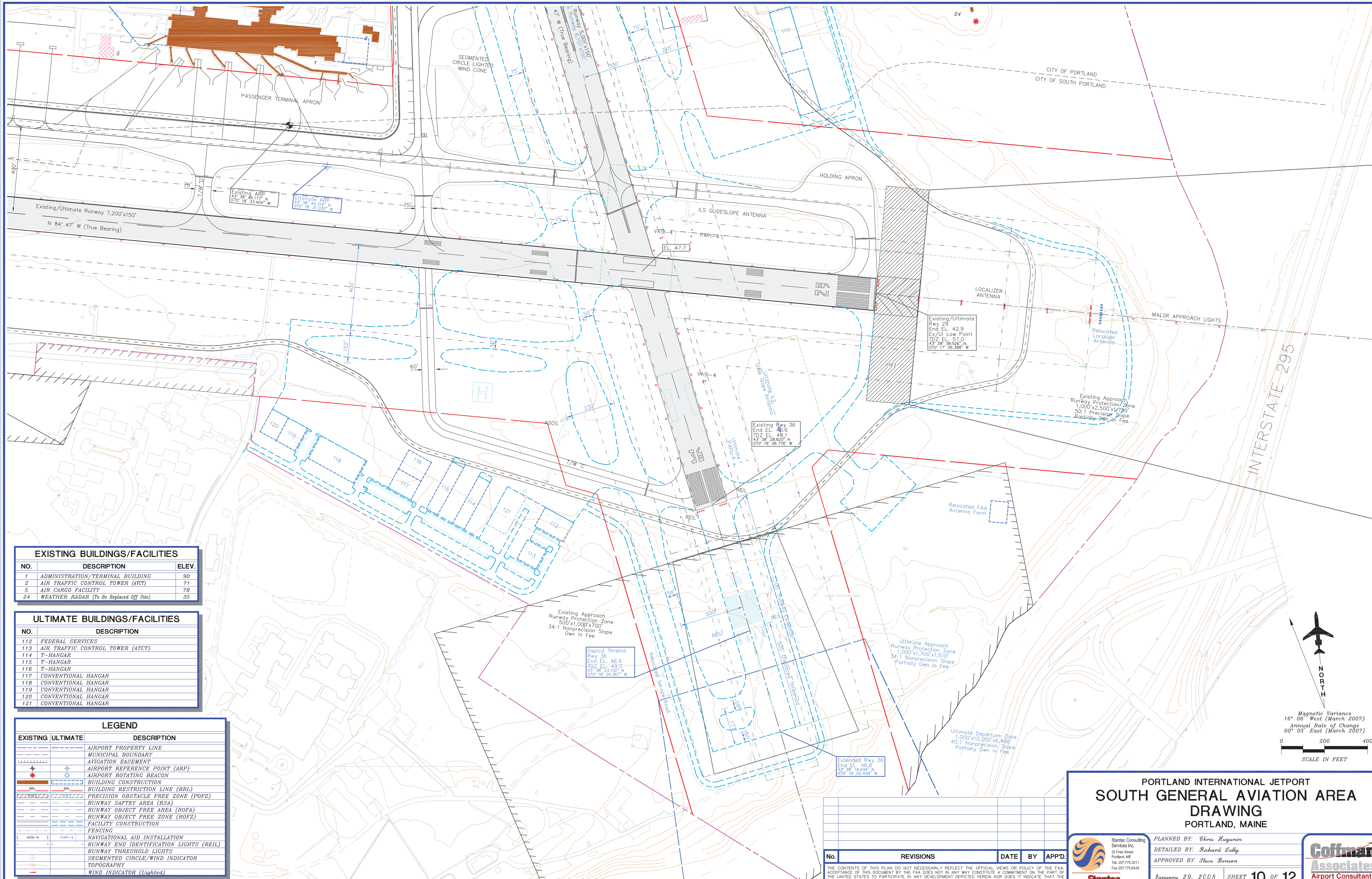
PLANNED BY: Chris Hugunin
DETAILED BY: Richard Lally
APPROVED BY: Steve Benson

Coffman Associates Airport Consultants

January 29, 2008



EXISTING BUILDINGS/FACILITIES

NO.	DESCRIPTION	ELEV.
1	ADMINISTRATION/TERMINAL BUILDING	90
2	AIR TRAFFIC CONTROL TOWER (ATCT)	71
5	AIR CARGO FACILITY	78
24	WEATHER RADAR (To Be Replaced Off Site)	35

ULTIMATE BUILDINGS/FACILITIES

NO.	DESCRIPTION
112	FEDERAL SERVICES
113	AIR TRAFFIC CONTROL TOWER (ATCT)
114	T-HANGAR
115	T-HANGAR
116	T-HANGAR
117	CONVENTIONAL HANGAR
118	CONVENTIONAL HANGAR
119	CONVENTIONAL HANGAR
120	CONVENTIONAL HANGAR
121	CONVENTIONAL HANGAR

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		MUNICIPAL BOUNDARY
		AVIGATION EASEMENT
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		BUILDING CONSTRUCTION
BRL	BRL	BUILDING RESTRICTION LINE (BRL)
POFZ	POFZ	PRECISION OBSTACLE FREE ZONE (POFZ)
		RUNWAY SAFTEY AREA (RSA)
		RUNWAY OBJECT FREE AREA (ROFA)
		RUNWAY OBJECT FREE ZONE (ROFZ)
		FACILITY CONSTRUCTION
		FENCING
VASI-4	PAPI-4	NAVIGATIONAL AID INSTALLATION
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
		SEGMENTED CIRCLE/WIND INDICATOR
1080		TOPOGRAPHY
		WIND INDICATOR (Lighted)

No.	REVISIONS	DATE	BY	APP'D.

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PORTLAND INTERNATIONAL JETPORT

SOUTH GENERAL AVIATION AREA DRAWING

PORTLAND, MAINE

Stantec Consulting Services Inc.
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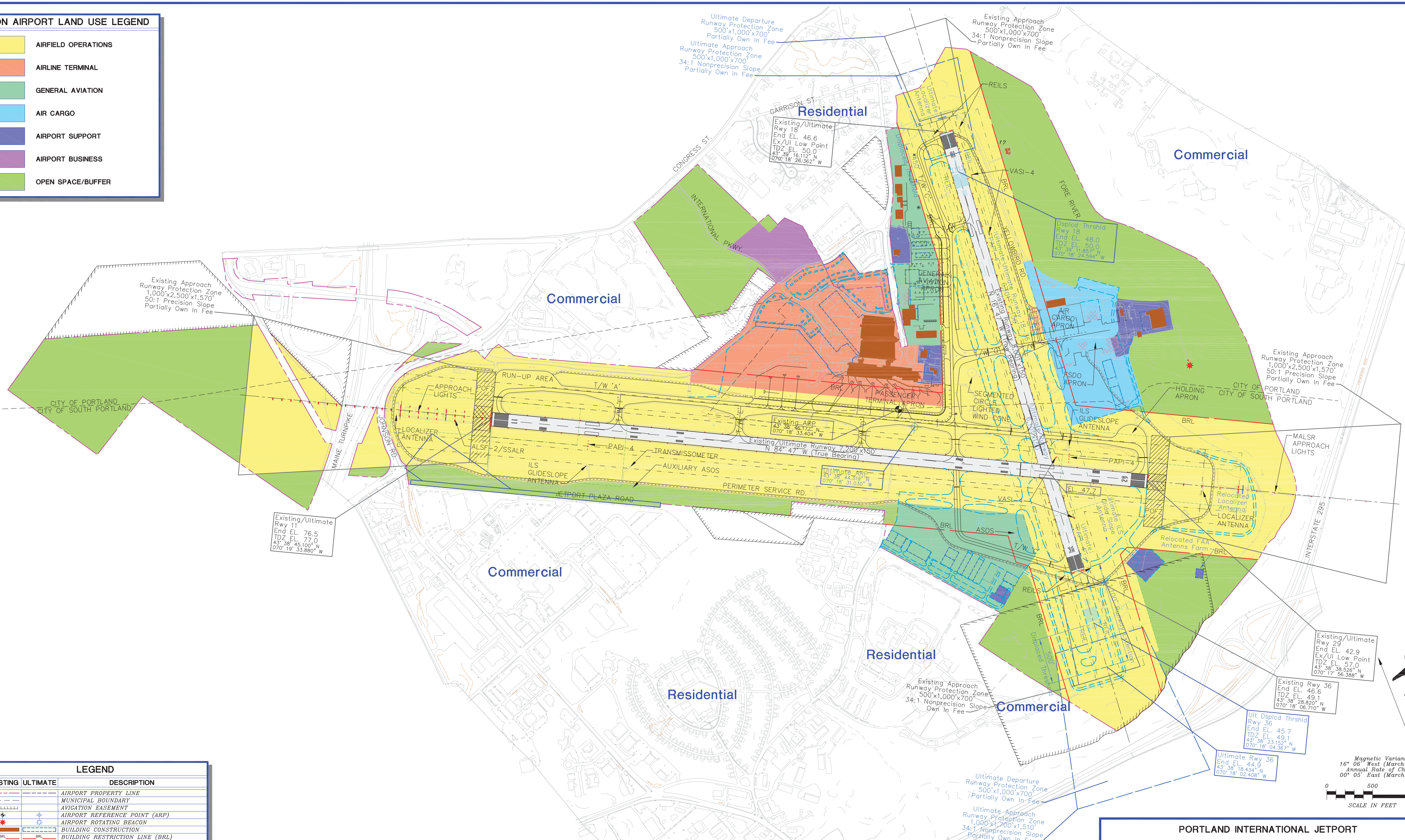
DETAILED BY: Richard Lally
APPROVED BY: Steve Benson

January 29, 2008

Coffman Associates
Airport Consultants

ON AIRPORT LAND USE LEGEND

- AIRFIELD OPERATIONS
- AIRLINE TERMINAL
- GENERAL AVIATION
- AIR CARGO
- AIRPORT SUPPORT
- AIRPORT BUSINESS
- OPEN SPACE/BUFFER



LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		MUNICIPAL BOUNDARY
		AVIGATION EASEMENT
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		BUILDING CONSTRUCTION
BRL	BRL	BUILDING RESTRICTION LINE (BRL)
POFZ	POFZ	PRECISION OBSTACLE FREE ZONE (POFZ)
		RUNWAY SAFTEY AREA (RSA)
		RUNWAY OBJECT FREE AREA (ROFA)
		RUNWAY OBJECT FREE ZONE (ROFZ)
		FACILITY CONSTRUCTION
		FENCING
VASI-4	PAPI-4	NAVIGATIONAL AID INSTALLATION
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
		SEGMENTED CIRCLE/WIND INDICATOR
1080		TOPOGRAPHY
		WIND INDICATOR (Lighted)

No.	REVISIONS	DATE	BY	APP'D.

PORTLAND INTERNATIONAL JETPORT

ON-AIRPORT LAND USE DRAWING

PORTLAND, MAINE

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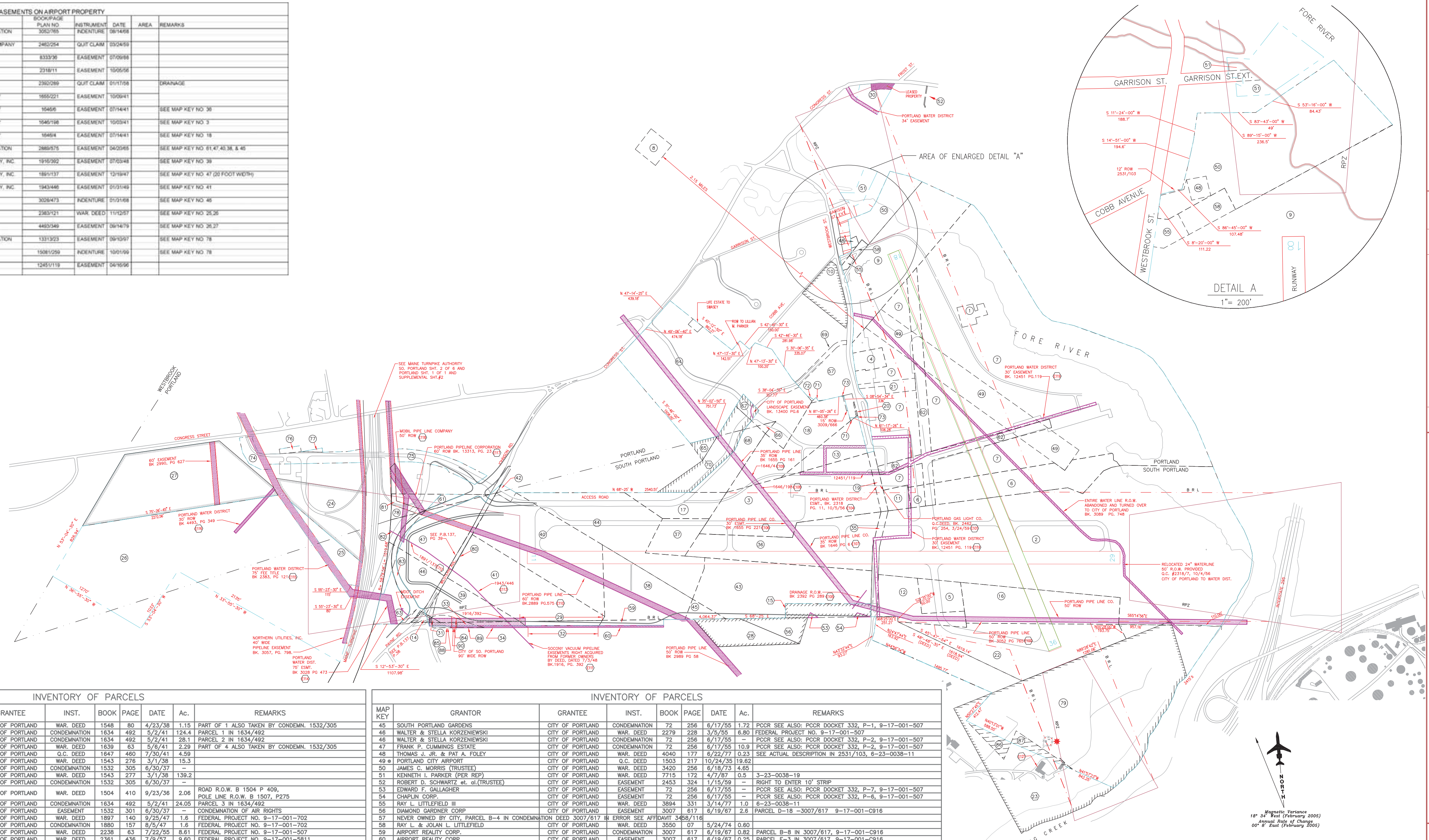
Coffman Associates
Airport Consultants

January 29, 2008

EASEMENTS ON AIRPORT PROPERTY

MAP KEY	GRANTOR	GRANTEE	BOOK/PAGE PLAN NO.	INSTRUMENT	DATE	AREA	REMARKS
E100	STATE OF MAINE	PORTLAND PIPE LINE CORPORATION	3052/765	INDENTURE	08/14/68		
E101	CITY OF PORTLAND	PORTLAND GAS AND LIGHT COMPANY	2462/254	QUIT CLAIM	03/24/59		
E103	CITY OF PORTLAND	PORTLAND WATER DISTRICT	8333/36	EASEMENT	07/09/88		
E104	CITY OF PORTLAND	PORTLAND WATER DISTRICT	2318/11	EASEMENT	10/05/56		
E105	CITY OF PORTLAND	CHAPLIN CORPORATION	2392/289	QUIT CLAIM	01/17/58		DRAINAGE
E106	CITY OF PORTLAND	PORTLAND PIPE LINE COMPANY	1655/221	EASEMENT	10/09/41		
E107	BURTON DENSMORE & GERTRUDE L. DENSMORE	PORTLAND PIPE LINE COMPANY	1646/6	EASEMENT	07/14/41		SEE MAP KEY NO. 36
E108	WALTER C. & ELEANOR JOHNSON NIELSEN, NELLIE R. JOHNSON	PORTLAND PIPE LINE COMPANY	1646/198	EASEMENT	10/03/41		SEE MAP KEY NO. 3
E109	ISSAC FAIRWEATHER	PORTLAND PIPE LINE COMPANY	1646/4	EASEMENT	07/14/41		SEE MAP KEY NO. 18
E110	CITY OF PORTLAND	PORTLAND PIPE LINE CORPORATION	2869/575	EASEMENT	04/20/65		SEE MAP KEY NO. 61,47,40,38, & 45
E111	WILFRED A. HAY, TRUSTEE OF CLINTON C. PHINNEY	SOCONY-VACUUM OIL COMPANY, INC.	1916/392	EASEMENT	07/03/48		SEE MAP KEY NO. 39
E112	FRANK P. CUMMINGS, TRUSTEE OF LEON F. CUMMINGS	SOCONY-VACUUM OIL COMPANY, INC.	1891/137	EASEMENT	12/19/47		SEE MAP KEY NO. 47 (20 FOOT WIDTH)
E113	FRANCIS B. EVANS	SOCONY-VACUUM OIL COMPANY, INC.	1943/446	EASEMENT	01/31/49		SEE MAP KEY NO. 41
E114	CITY OF PORTLAND	PORTLAND WATER DISTRICT	3028/473	INDENTURE	01/31/68		SEE MAP KEY NO. 46
E115	EDWARD S. FINKS AND DOROTHY L. FINKS	PORTLAND WATER DISTRICT	2383/121	WAR. DEED	11/12/57		SEE MAP KEY NO. 25,26
E116	CITY OF PORTLAND	PORTLAND WATER DISTRICT	4493/349	EASEMENT	09/14/79		SEE MAP KEY NO. 26,27
E117	CITY OF PORTLAND	PORTLAND PIPE LINE CORPORATION	13313/23	EASEMENT	09/10/97		SEE MAP KEY NO. 78
E118	CITY OF PORTLAND	MOBIL PIPE LINE COMPANY	15081/259	INDENTURE	10/01/99		SEE MAP KEY NO. 78
E119	CITY OF PORTLAND	PORTLAND WATER DISTRICT	12451/119	EASEMENT	04/16/96		



NORTH

Magnetic Variance
18° 34' West (February 2005)
Annual Rate of Change
00° 8' East (February 2005)

INVENTORY OF PARCELS

MAP KEY	GRANTOR	GRANTEE	INST.	BOOK	PAGE	DATE	Ac.	REMARKS
1 ●	HAROLD SEIDERS	CITY OF PORTLAND	WAR. DEED	1548	80	4/23/38	1.15	PART OF 1 ALSO TAKEN BY CONDEMN. 1532/305
2 ●	HERBERT JACKSON	CITY OF PORTLAND	CONDEMNATION	1634	492	5/2/41	124.4	PARCEL 1 IN 1634/492
3 ●	FAIRWEATHER, NEILSON & LARRABEE	CITY OF PORTLAND	CONDEMNATION	1634	492	5/2/41	28.1	PARCEL 2 IN 1634/492
4 ●	GEORGE W. MILLS	CITY OF PORTLAND	WAR. DEED	1639	63	5/6/41	2.29	PART OF 4 ALSO TAKEN BY CONDEMN. 1532/305
5 ●	STATE OF MAINE	CITY OF PORTLAND	Q.C. DEED	1647	460	7/30/41	4.59	
6 ●	CLIFFORD STRANGE	CITY OF PORTLAND	WAR. DEED	1543	276	3/1/38	15.3	
6 ●	CLIFFORD STRANGE	CITY OF PORTLAND	CONDEMNATION	1532	305	6/30/37	–	
7 ●	PORTLAND CITY AIRPORT	CITY OF PORTLAND	WAR. DEED	1543	277	3/1/38	139.2	
7 ●	PORTLAND CITY AIRPORT	CITY OF PORTLAND	CONDEMNATION	1532	305	6/30/37	–	
8 ●	FLOELLA A. MAXWELL	CITY OF PORTLAND	WAR. DEED	1504	410	9/23/36	2.06	ROAD R.O.W. B 1504 P 409, POLE LINE R.O.W. B 1507, P275
9 ●	MILLIKEN HEIRS & CUMMINGS ESTATE	CITY OF PORTLAND	CONDEMNATION	1634	492	5/2/41	24.05	PARCEL 3 IN 1634/492
10 ●	ROBERT D. JACKSON	CITY OF PORTLAND	EASEMENT	1532	301	6/30/37	–	CONDEMNATION OF AIR RIGHTS
11	CLIFFORD STRANGE	CITY OF PORTLAND	WAR. DEED	1897	140	9/25/47	1.6	FEDERAL PROJECT NO. 9–17–001–702
11	CLIFFORD STRANGE	CITY OF PORTLAND	CONDEMNATION	1880	157	8/5/47	1.6	FEDERAL PROJECT NO. 9–17–001–702
12	STATE OF MAINE	CITY OF PORTLAND	WAR. DEED	2238	63	7/22/55	8.61	FEDERAL PROJECT NO. 9–17–001–507
13	ELEANOR J. NIELSON	CITY OF PORTLAND	WAR. DEED	2361	436	7/9/57	9.60	FEDERAL PROJECT NO. 9–17–001–5811
14	EDNA MAXFIELD	CITY OF PORTLAND	EASEMENT	72	256	6/17/55	–	PCCR SEE ALSO: PCCR DOCKET 332, P8. CONDEMNATION OF AIR RIGHTS, 9–17–001–507
15	MERLE P. CHAPLIN	CITY OF PORTLAND	EASEMENT	72	256	6/17/55	–	PCCR SEE ALSO: PCCR DOCKET 332, P5. CONDEMNATION OF AIR RIGHTS, 9–17–001–507
16	STATE OF MAINE	CITY OF PORTLAND	Q.C. DEED	3028	471	1/24/68	16.5	FEDERAL PROJECT NO. 9–17–001–C916
17	BROOKLAWN MEM. PARK	CITY OF PORTLAND	CONDEMNATION	3007	617	6/19/67	6.3	PARCEL B–3 IN 3007/617, 9–17–001–C916
18	BERTRAM J. FAIRWEATHER	CITY OF PORTLAND	WAR. DEED	3009	666	8/30/67	12.6	FEDERAL PROJECT NO. 9–17–001–C916
18	BERTRAM J. FAIRWEATHER	CITY OF PORTLAND	CONDEMNATION	3007	617	6/19/67	–	SEE PARCEL B–4 IN 3007/617, 9–17–001–C916
19	CUMBERLAND COUNTY COMMISSONERS	CITY OF PORTLAND	DISCONTINUED	DOCKET	1175	JAN.1957	1.18	CUMBERLAND CO. COMM. RECORDS, 9–17–001–508
20	LLEWELLYN PRESSLEY	CITY OF PORTLAND	EASEMENT	2365	139	7/18/57	792SF	GROWTH RESTRICTION, 9–17–001–5811
21 ●	PORTLAND CITY AIRPORT	CITY OF PORTLAND	Q.C. DEED	1503	216	7/13/36	1.30	
22	STATE OF MAINE	CITY OF PORTLAND	Q.C. DEED	3028	471	1/24/68	24.5	FEDERAL PROJECT NO. 9–17–001–C916
23	STATE OF MAINE	CITY OF PORTLAND	EASEMENT	3028	469	1/24/68	96	EASEMENT FOR UNOBSTRUCTED AIR SPACE 9–17–001–C916
24	HARRY HARMON & GEORGE HUTCHINS	CITY OF PORTLAND	EASEMENT	3010	683	8/31/67	9.2	EASEMENT FOR UNOBSTRUCTED AIR SPACE 9–17–001–C916
24	HARRY HARMON & GEORGE HUTCHINS	CITY OF PORTLAND	EASEMENT	3007	617	6/19/67	9.2	PARCEL D–1 IN 3007/617, 9–17–001–C916
25	EDWARD S. & DOROTHY L. FINKS	CITY OF PORTLAND	WAR. DEED	2457	262	2/13/59	4.30	FEDERAL PROJECT NO. 9–17–001–5912
26	EDWARD S. & DOROTHY L. FINKS	CITY OF PORTLAND	WAR. DEED	2457	262	2/13/59	86.09	FEDERAL PROJECT NO. 9–17–001–5912
27	CITY OF PORTLAND	W.H. NICHOLS CO.	WAR. DEED	2990	627	4/4/67	28.77	PARCEL SOLD–FAA RELEASE 2/27/67 AVIG. ESMT. RETAINED
28	BERGEN ASSOCIATES INC.	CITY OF PORTLAND	EASEMENT	3007	617	6/19/67	5.62	PARCEL D–1 IN 3007/617, 9–17–001–C916
29	ADC BUILDING FUND INC. et. als.	CITY OF PORTLAND	CONDEMNATION	3007	617	6/19/67	1.01	PARCEL B–2 IN 3007/617, 9–17–001–C916
30	OTIS J. & DOROTHY J. AUGUST	CITY OF PORTLAND	WAR. DEED	3909	306	9/17/76	2.25	6–23–0038–10
31	ADC BUILDING FUND INC.	CITY OF PORTLAND	CONDEMNATION	3007	617	6/17/67	0.11	PARCEL B–6 IN 3007/617, 9–17–001–C916
32	ADC BUILDING FUND INC.	CITY OF PORTLAND	EASEMENT	3007	617	6/17/67	0.28	PARCEL E–2 IN 3007/617, 9–17–001–C916
33	ADC BUILDING FUND INC.	CITY OF PORTLAND	CONDEMNATION	3007	617	6/17/67	1.31	PARCEL B–1 IN 3007/617, 9–17–001–C916
34	ADC BUILDING FUND INC.	CITY OF PORTLAND	EASEMENT	3007	617	6/17/67	0.32	PARCEL E–1 IN 3007/617, 9–17–001–C916
35	CUMBERLAND COUNTY COMMISSIONERS	CITY OF PORTLAND	DISCONTINUED	21	226	1955	2.30	SPCCR SEE ALSO: SO.PORTLAND ENG. DEPT. 9–17–001–508
36	BURTON DENSMORE	CITY OF PORTLAND	WAR. DEED	2236	399	7/12/55	20	FEDERAL PROJECT NO. 9–17–001–507
36	BURTON DENSMORE	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	–	PCCR SEE ALSO: PCCR DOCKET 332, P–1 9–17–001–507
37	BROOKLAWN MEM. PARK	CITY OF PORTLAND	WAR. DEED	2257	189	9/13/55	5.22	FEDERAL PROJECT NO. 9–17–001–507
37	BROOKLAWN MEM. PARK	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	–	PCCR SEE ALSO: PCCR DOCKET 332, P–1, 9–17–001–507
38	CLINTON C. PHINNEY & ROBERT D. SCHWARTZ	CITY OF PORTLAND	Q.C. DEED	2255	428/9	11/28/55	15.2	FEDERAL PROJECT NO. 9–17–001–507
38	CLINTON C. PHINNEY & ROBERT D. SCHWARTZ	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	–	PCCR SEE ALSO: PCCR DOCKET 332, P–1, 9–17–001–507
39	CLINTON C. PHINNEY & ROBERT D. SCHWARTZ	CITY OF PORTLAND	Q.C. DEED	2255	428/9	11/28/55	8.03	CONSTRUCTION EASEMENT, 9–17–001–507
39	CLINTON C. PHINNEY & ROBERT D. SCHWARTZ	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	–	PCCR SEE ALSO: PCCR DOCKET 332, P–1, 9–17–001–507
40	JOHN M. DENSMORE	CITY OF PORTLAND	WAR. DEED	2257	271	10/27/55	49	FEDERAL PROJECT NO. 9–17–001–507
40	JOHN M. DENSMORE	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	–	PCCR SEE ALSO: PCCR DOCKET 332, P–1, 9–17–001–507
41	JOHN M. DENSMORE	CITY OF PORTLAND	WAR. DEED	2257	271	10/27/55	49	FEDERAL PROJECT NO. 9–17–001–507
41	MOBIL PIPE LINE CO.	CITY OF PORTLAND	Q.C. DEED	3051	721	8/1/68	21.8	
41	FRANCIS B. EVANS	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	–	PCCR SEE ALSO: PCCR DOCKET 332, P–1, 9–17–001–507
42	JOHN E. DENSMORE	CITY OF PORTLAND	WAR. DEED	2241	473	8/8/55	0.50	FEDERAL PROJECT NO. 9–17–001–507
42	JOHN E. DENSMORE	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	0.50	SEE ALSO: PCCR DOCKET 332, P–1, P–3, 9–17–001–507
43	MERLE P. CHAPLIN	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	24.1	SEE ALSO: PCCR DOCKET 332, P–1, 9–17–001–507
44	CHRISTIAN KRAGELUND	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	22.9	SEE ALSO: PCCR DOCKET 332, P–1, 9–17–001–507

INVENTORY OF PARCELS

MAP KEY	GRANTOR	GRANTEE	INST.	BOOK	PAGE	DATE	Ac.	REMARKS
45	SOUTH PORTLAND GARDENS	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	1.72	PCCR SEE ALSO: PCCR DOCKET 332, P–1, 9–17–001–507
46	WALTER & STELLA KORZENIEWSKI	CITY OF PORTLAND	WAR. DEED	2279	228	3/5/55	6.80	FEDERAL PROJECT NO. 9–17–001–507
46	WALTER & STELLA KORZENIEWSKI	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	–	PCCR SEE ALSO: PCCR DOCKET 332, P–2, 9–17–001–507
47	FRANK P. CUMMINGS ESTATE	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	10.9	PCCR SEE ALSO: PCCR DOCKET 332, P–2, 9–17–001–507
48	THOMAS J. JR. & PAT A. FOLEY	CITY OF PORTLAND	WAR. DEED	4040	177	6/22/77	0.23	SEE ACTUAL DESCRIPTION IN 2531/103, 6–23–0038–11
49 ●	PORTLAND CITY AIRPORT	CITY OF PORTLAND	Q.C. DEED	1503	217	10/24/35	19.62	
50	JAMES C. MORRIS (TRUSTEE)	CITY OF PORTLAND	WAR. DEED	3420	256	6/18/73	4.65	
51	KENNETH I. PARKER (PER REP)	CITY OF PORTLAND	WAR. DEED	7715	172	4/7/87	0.5	3–23–0038–19
52	ROBERT D. SCHWARTZ et. al.(TRUSTEE)	CITY OF PORTLAND	EASEMENT	2453	324	1/15/59	–	RIGHT TO ENTER 10' STRIP
53	EDWARD F. GALLAGHER	CITY OF PORTLAND	EASEMENT	72	256	6/17/55	–	PCCR SEE ALSO: PCCR DOCKET 332, P–7, 9–17–001–507
54	CHAPLIN CORP.	CITY OF PORTLAND	EASEMENT	72	256	6/17/55	–	PCCR SEE ALSO: PCCR DOCKET 332, P–6, 9–17–001–507
55	RAY L. LITTLEFIELD III	CITY OF PORTLAND	WAR. DEED	3894	331	3/14/77	1.0	6–23–0038–11
56	DIAMOND GARDNER CORP	CITY OF PORTLAND	EASEMENT	3007	617	6/19/67	2.6	PARCEL D–18 –3007/617 9–17–001–C916
57	NEVER OWNED BY CITY, PARCEL B–4 IN CONDEMNATION DEED 3007/617 IN ERROR SEE AFFIDAVIT 3458/116							
58	RAY L. & JOLAN L. LITTLEFIELD	CITY OF PORTLAND	WAR. DEED	3550	07	5/24/74	0.60	
59	AIRPORT REALITY CORP.	CITY OF PORTLAND	CONDEMNATION	3007	617	6/19/67	0.82	PARCEL B–8 IN 3007/617, 9–17–001–C916
60	AIRPORT REALITY CORP.	CITY OF PORTLAND	EASEMENT	3007	617	6/19/67	0.25	PARCEL E–3 IN 3007/617, 9–17–001–C916
61	FRANK P. CUMMINGS ESTATE	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	3.79	PCCR SEE ALSO: PCCR DOCKET 332, P–1, 9–17–001–507
62 ●	PORTLAND CITY AIRPORT	CITY OF PORTLAND	WAR. DEED	1465	141	1/23/35	12.8	
63	CITY OF PORTLAND	STATE OF MAINE	CONDEMNATION	11456	276	5/31/94	0.13	
64	BCD AIRPORT PARTNERS	CITY OF PORTLAND	CONDEMNATION	9492	231	3/4/91	45.5	
65	APEX INC.	CITY OF PORTLAND	QUITCLAIM	10203	192	7/8/92	1.06	
65	CITY OF PORTLAND	BROOKLAWN MEM. PARK	Q.C. W/COVEN	13400	006	10/23/97	1.06	PART OF 64
65	BROOKLAWN MEMORIAL PARK	CITY OF PORTLAND	AVIG. ESMT.	13395	309	10/24/97	1.06	
66	APEX INC.	CITY OF PORTLAND	QUITCLAIM	10203	192	7/8/92	0.32	
67	CITY OF PORTLAND	BROOKLAWN MEM. PARK	Q.C. W/COVEN	13400	006	10/23/97	0.94	PART OF 64
67	BROOKLAWN MEMORIAL PARK	CITY OF PORTLAND	AVIG. ESMT.	13395	309	10/16/97	0.94	
68	BROOKLAWN MEMORIAL PARK	CITY OF PORTLAND	Q.C. W/COVEN	13395	305	10/16/97	7.48	3–23–0038–36 SUBJ. TO DRAINAGE ESMT BK. 8272, PG. 208
69	THOMAS A. TOYE , III	CITY OF PORTLAND	Q.C. W/COVEN	13434	266	10/16/97	1.28	
70	BROOKLAWN MEMORIAL PARK	CITY OF PORTLAND	AVIG. ESMT.	13395	309	10/24/97	6.23	
71	TOYE AIRPORT PARK LLC	CITY OF PORTLAND	WAR. DEED	16971	184	11/19/01	0.06	
72	TOYE REALTY HOLDINGS LLC	CITY OF PORTLAND	Q.C. W/COVEN	16971	190	11/19/01	0.03	
73	CITY OF PORTLAND	TOYE AIRPORT PARK LLC	QUITCLAIM	16971	193	11/19/01	0.02	
74	MAINE TURNPIKE AUTHORITY	CITY OF PORTLAND	Q.C. W/COVEN	21040	64	3/31/04	5.14	SUBJECT TO ALL EASEMENTS OF RECORD
75	MAINE TURNPIKE AUTHORITY	CITY OF PORTLAND	Q.C. W/COVEN	21040	64	3/31/04	3.47	SUBJECT TO ALL EASEMENTS OF RECORD
76	MAINE TURNPIKE AUTHORITY	CITY OF PORTLAND	Q.C. W/COVEN	21040	74	3/31/04	0.37	
77	MAINE TURNPIKE AUTHORITY	CITY OF PORTLAND	Q.C. W/COVEN	21040	74	3/31/04	0.13	
78	CITY OF PORTLAND	MAINE TURNPIKE AUTHORITY	Q.C. W/COVEN	21040	60	3/31/04	4.95	FEDERAL PROJECT NO. 9–17–001–507, SEE MAP KEY 61,47
79	STATE OF MAINE	CITY OF PORTLAND	RELEASE DEED	17126	328	12/26/01	70.4	ACQUIRED AIP 3–23–0038–54
79	STATE OF MAINE	CITY OF PORTLAND	AVIG. ESMT.	17126	332	12/26/01		ACQUIRED AIP 3–23–0038–54
80	STATE OF MAINE	CITY OF PORTLAND	VACATION	19510	56	6/06/03	–	VACATION OF JOHNSON ROAD/WESTERN AVENUE, LAND SWAP
81	PORTLAND PIPE LINE CORPORATION	CITY OF PORTLAND	RELEASE	14138	238	9/10/98		RELEASE OF EASEMENT WITH COVENANT
82	MOBIL PIPE LINE COMPANY	CITY OF PORTLAND	RELEASE	15081	274	10/01/99		RELEASE OF EASEMENT WITH COVENANT
83	CITY OF PORTLAND	STATE OF MAINE	CONDEMNATION	15801	296	10/24/00	5.91	JOHNSON ROAD/WESTERN AVENUE RELOCATION, LAND SWAP
84	CITY OF SOUTH PORTLAND	CITY OF PORTLAND	RELEASE	23141	42	8/01/05	2.32	RELEASE OF RIGHT, TITLE ANDINTEREST GRANTED IN 4940/8
85	CITY OF SOUTH PORTLAND		CITY COUNCIL ORDER	23154	238	9/15/05		DISCONTINUANCE OF A PORTION OF JETPORT PLAZA ROAD (290')
86	CITY OF PORTLAND	STATE OF MAINE	CONDEMNATION	24337	300	9/05/06	1.44	LAND SWAP RUNWAY 36 APPROACH
87	STATE OF MAINE	CITY OF PORTLAND	CONDEMNATION	24337	303	9/05/06	1.44	LAND SWAP RUNWAY 36 APPROACH
88	JETPORT PROPERTIES, LLC	CITY OF PORTLAND	LEASE	–	–	5/31/07	0.77	LEASE
89	JETPORT PROPERTIES, LLC	CITY OF PORTLAND	LEASE	–	–	5/31/07	0.40	LEASE
90	CITY OF PORTLAND	CITY OF PORTLAND	EASEMENT	–	–	5/31/07	0.16	RIGHT–OF–WAY

NOTES:

1. THIS IS AN EXHIBIT A PROPERTY MAP, PART OF THE AIRPORT IMPROVEMENT PROGRAM FEDERAL GRANT APPLICATION. IT IS NOT A BOUNDARY SURVEY. THE PRIMARY INTENT IS TO IDENTIFY ALL LAND WHICH IS DESIGNATED AIRPORT PROPERTY AND TO PROVIDE AN INVENTORY OF ALL PARCELS WHICH MAKE UP THE AIRPORT. PHYSICAL SURVEY OF BOUNDARIES IS GENERALLY NOT REQUIRED. REFER TO AC 150/5100–17.
2. THE DESCRIPTION OF PARCEL NO. 10 INCLUDES OTHER AVIGATIONAL EASEMENTS WHICH WERE LATER EXTINGUISHED WHEN THE PARCELS WERE ACQUIRED BY THE CITY OF PORTLAND.
3. PARCEL NO. 49 INCLUDES PORTIONS OF PARCEL NO. 62 WHICH HAD BEEN PREVIOUSLY CONVEYED.
4. "●" INDICATES PARCELS THAT COMPRISE LIMITS OF AP–4 AFFECTED LAND (C.A.A. DOCKET NO. S–904–17–19).
5. FOR PARCELS ACQUIRED UNDER CITY COUNCIL ORDER, DATED JUNE 20, 1955, RECORDED IN THE PORTLAND CITY CLERKS RECORDS IN VOLUME 72, PAGE 256, SEE AFFIDAVIT OF ELIZABETH L. BOYNTON, DATED AUGUST 4, 1997, RECORDED IN THE CUMBERLAND COUNTY REGISTRY OF DEEDS IN BOOK 13265, PAGE 102.
6. REFERENCE IS MADE TO THE EXHIBIT "A" DOCUMENT FOR THE PORTLAND INTERNATIONAL JETPORT ON FILE IN THE TERMINAL AT THE AIRPORT MANAGER'S OFFICE, 1001 WESTBROOK STREET, PORTLAND, MAINE 04102.

LEGEND

EXISTING	FUTURE	ITEM
		RUNWAY PROTECTION ZONE
		EASEMENT (AVIGATIONAL)
		AIRPORT PROPERTY LINE
		CITY LINE
		BUILDING RESTRICTION LINE (BRL)
		LOT LINES
		RIGHT OF WAY EASEMENTS–UTILITIES
XX		PROPERTY PARCEL
XX		EASEMENT PARCEL

GRAPHIC SCALE

600 0 300 600 1200

1 inch = 600 feet

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Portland, Maine
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www.dufresne-henry.com

Rev.	Description	By	Date

PORTLAND INTERNATIONAL JETPORT

EXIHIBIT 'A'

PORTLAND MAINE

Project No.	8140045.01
Proj. Manager	JW
Proj. Designer	CBK
Drawn By	MRS/CBK
Checked By	CBK
Scale	1" = 600'
Approved	DCD
Date	04-15-05

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Airport Consultants

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