

Portland International Airport Master Plan Summary Report

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September 2000



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Acknowledgments

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CHAPTER 1

INTRODUCTION

This Master Plan replaces the Plan that was adopted in 1993. The process of preparing this Plan began in 1995. Public involvement in the Plan began in 1996 and continued through the summer of 2000.

The 1990's were a period of steady economic expansion in Oregon and Southwest Washington. Growth in population and employment drove steady increases in passenger traffic at the Airport, both domestic and international. Cargo growth was also strong. Passenger and cargo growth spurred the need for the expansion of existing facilities to accommodate the demand for air transportation. Expansion included the terminal building and concourses. Additionally, much of the airfield infrastructure was repaired or upgraded. It was with this growth and development as a backdrop that the Master Plan was prepared.

As originally conceived, the Master Plan was to be a facility plan that would include a forecast for growth in passengers, cargo, and operations (take-offs and landings) followed by an analysis of alternative facility development scenarios to meet the projected growth. As the development of the Plan evolved, it became clear that more than a facility plan was needed. The community was (and is) concerned about growth as well as the environmental impacts of the Airport in terms of noise, air, and water quality. The Port of Portland shares those concerns.

As a result of public input, this Plan has evolved. While it still contains the Facility Plans Chapter that outlines how the Airport may be developed to meet demand, it also contains sections devoted to:

- § Strategies to Maintain PDX Viability. These are strategies the Port will follow to maintain and in some cases expand existing Airport facilities.
- § Strategies for Capacity Preservation. Capacity preservation includes maximizing the use of existing facilities before building new ones. It also looks at using other transportation modes or other airports to meet the air transportation needs of the region.
- § Environmental Planning. This section outlines the studies and programs that will be conducted to evaluate environmental impacts of the various airport expansion projects.
- § Communications. The communications section outlines how the Port will include the public in airport planning processes, as well as operational and environmental decisions. This section also includes how the Port will keep the region informed about existing operations as well as projected growth and development.



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The development of this Plan has been a collaborative process. As noted on the acknowledgment page, the process included a comprehensive public involvement program, Planning Advisory Committee and Regional Air Transportation Demand Task Force. Public meetings were held and briefings were provided to the Port of Portland Commission, local jurisdictions and civic organizations.

What comes next? This Plan includes a list of follow-on studies. One of the most important is an update of the PDX Noise Abatement Plan (Part 150 Plan). The Noise Plan outlines available strategies that may be used to mitigate the noise impact air traffic has on the region. The FAA Airspace Capacity Study will also be updated. The Capacity Study is prepared by the FAA and looks at the technical aspects of operating the runways and taxiways. There will also be studies of air and water quality impacts of the alternatives listed in this plan as well as maintenance of a variety of state and federal environmental permits. Generally, the Port prepares Master Plans for PDX every five or six years.



CHAPTER 2
FACILITY PLANS

INTRODUCTION

***BACKGROUND AND PURPOSE OF
MASTER PLAN STUDY***

Portland International Airport (PDX), owned and operated by the Port of Portland, ranked 32nd in passengers served and 27th in cargo among U.S. airports in 1999. Thirty-three passenger airlines and cargo carriers provide services to over 120 cities worldwide.

Passenger demand at Portland International Airport grew from 6.3 million annual passengers in 1991 to 13.7 million in 1999, an average annual growth rate of 10.2 percent. Significant increases were also experienced in air cargo and aircraft operations activity. In response to this growth, which is expected to continue (although at a smaller rate of growth), and the need to serve the long term aviation needs of the greater Portland area, an Airport Master Plan was initiated by the Port of Portland in September 1996.

The objective of the Airport Master Plan is to provide a 20-year road-map for improvements at the Airport. The recommended development must satisfy aviation demand, yet be compatible with the environment, community development and other transportation modes. Furthermore, the Master Plan must be technically sound, practical, and economically feasible.

THE MASTER PLANNING PROCESS

The Master Plan study followed several fundamental steps (Figure 1). The initial step involved taking inventories of existing facilities and systems, conducting surveys of existing and potential users, documenting existing conditions, and coordinating activities with other agencies. An important part of the first element was to solicit viewpoints regarding goals for the study and important criteria to be considered. Next, forecasts of air traffic demand were prepared, and a list of facilities needed to satisfy the demand was developed. These requirements were compared with existing facilities to identify deficiencies. Alternative development concepts satisfying the deficiencies were then developed and evaluated, and recommended improvements were identified. Plans were prepared for the recommended improvements, including phasing, capital cost estimates and environmental screening.

Workshops

The development and evaluation of alternative long-term development concepts for PDX was performed through a series of workshops, augmented by technical analyses by the planning team.

Workshops were held with three groups: (1) the Planning Advisory Committee, a group of representatives from government agencies and



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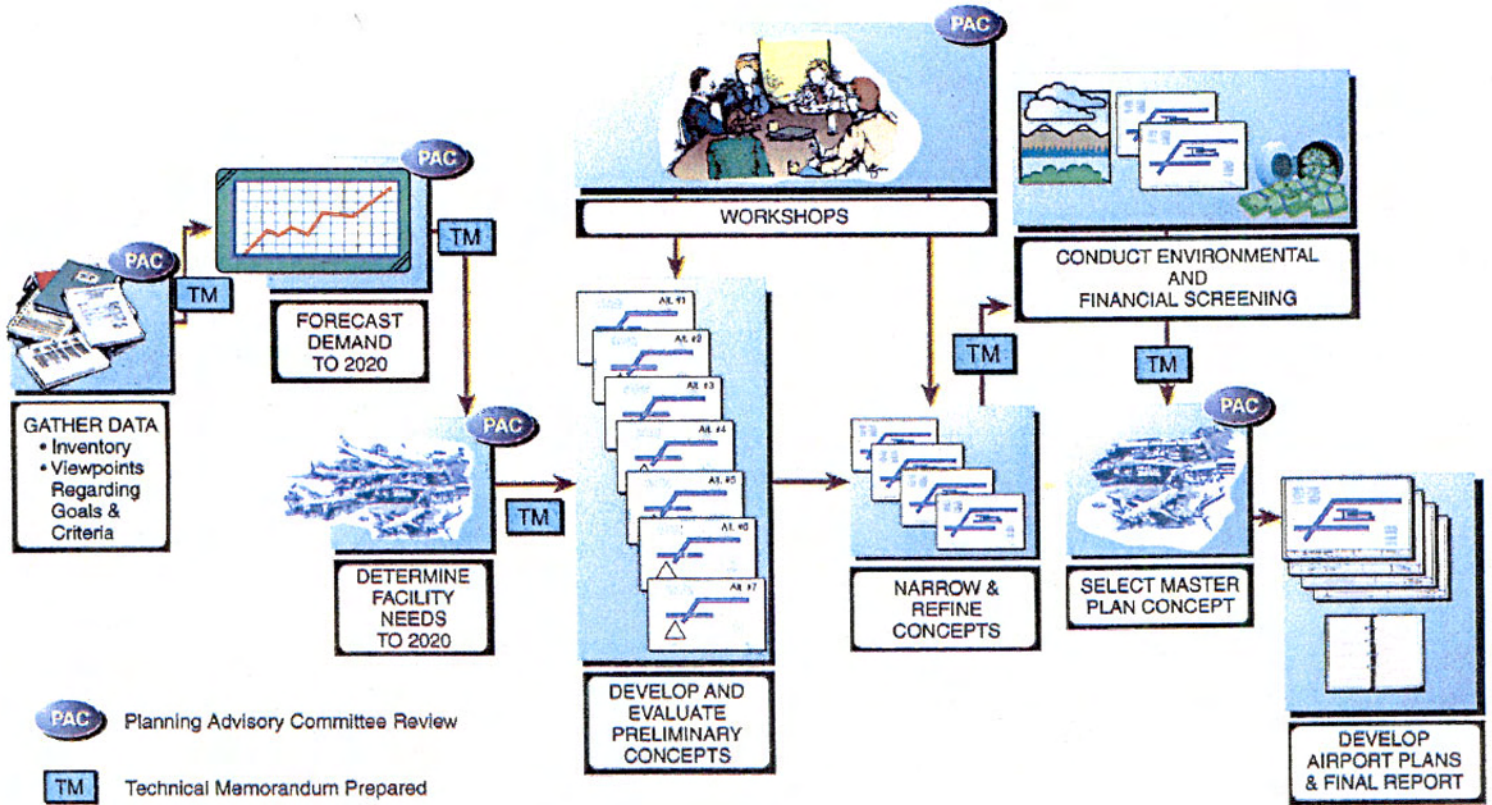


Figure 1
MASTER PLAN EVALUATION PROCESS



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the community; (2) the Port of Portland staff members in key positions across the spectrum of airport management, planning, engineering, operations and finance; and (3) The Airline Technical Committee, made up of representatives of the airlines. Workshops with these groups were usually held on the same day or successive days during the study. The workshop format generally consisted of presentations, followed by small group discussions. Eleven master planning workshops were conducted between November 1, 1996 and November 20, 1997.

In addition to these workshops, open house community meetings were held throughout the planning process, to obtain further general input on the plan, as well as input on the final two alternative development concepts.

MASTER PLANNING OBJECTIVES

Master planning objectives and guidelines were a result of the discussions in Workshops 1 and 2. The guidelines were categorized under six major headings.

Passenger and Terminal Facilities

- § Increase terminal building capacity.
- § Avoid closure of airfield and terminal facilities and disruption of operations in planning concepts.
- § Address tenant needs that are compatible with the overall mission of PDX.
- § Explore improved technologies that better utilize terminal facilities.
- § Make the use of common gates and check-in facilities a high priority.
- § Continue to use Northwest “theme” elements and scale.
- § Retain central market place concept.

Airport Facilities

- § Passenger, cargo and commercial facilities development should be stressed.
- § General aviation and military uses should not interfere with other development.
- § Aviation related needs should be balanced against financial, social and environmental limits.
- § Address PDX’s role as a full-service regional airport serving international, domestic, cargo and commercial requirements in long-range plans.
- § Avoid the closing of airfield and terminal facilities and the disruption of operations.
- § Address tenant needs within the overall mission of PDX.
- § Explore improved technologies that optimize airfield facility use.
- § Use existing facilities better.
- § The master plan should make it easy for PDX to be flexible in meeting tenant demands.
- § Improving airside operations is a high priority.
- § Address technologies to improve airfield visual enhancement during poor weather and emergencies.

Community Relations and Surrounding Land Uses

- § Satisfy current federal, state and local environmental and planning requirements.
- § Incorporate and support community input regarding PDX services, operations and expansion.
- § Continue use of Northwest “theme” elements.
- § Consistently solicit public involvement in PDX planning programs.



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Transportation

- § Increase roadway and parking capacity.
- § Minimize pedestrian/vehicular conflicts.
- § Integrate light rail with terminal facilities.

Environmental

- § Meet or exceed current federal, state and local environmental and planning requirements.
- § Protect adjacent land uses from aviation operations impacts.
- § Community concerns regarding air, noise, and transportation impacts are critical to developing a sound Master Plan.
- § Master Plan facilities should address areas of environmental concerns.

Financial Development

- § Master Plan concepts should be cost sensitive.
- § Master Plan concepts should take advantage of Passenger Facility Charges (PFCs).
- § Increase non-airline revenues.
- § Use existing facilities better.
- § Maintain or improve the percentage of non-airline revenues.

These objectives guided the development and evaluation of master planning alternatives and the preparation of the recommended Master Plan.

DOCUMENTS PREPARED

Technical Memoranda were prepared at important milestones during the study to document interim findings. These Memoranda facilitated the review of study results and allowed study participants to comment on

interim findings. The following Technical Memoranda were issued:

- § Technical Memorandum 1, Aviation Demand Forecasts, January 14, 1997.
- § Aviation Demand Forecast Update, November 4, 1999.
- § Technical Memorandum 2, Planning Policies, Guidelines and Evaluation Criteria, January 22, 1997.
- § Technical Memorandum 3, Inventory of Existing Facilities, February 28, 1997.
- § Technical Memorandum 4, Airport Facility Requirements, March 5, 1997.
- § Technical Memorandum 5, Evaluation of Alternative Development Concepts, April 15, 1998.

This report summarizes the research, analyses, findings and conclusions of the study. Some information in Technical Memoranda has been updated in this Summary Report to reflect changes since the preparation of those reports.

Appendix C provides a glossary of terms and abbreviations used throughout the master planning study.

PORTLAND INTERNATIONAL AIRPORT TODAY

Portland International Airport is located on the south shore of the Columbia River five miles northeast of downtown Portland. It provides commercial air passenger and cargo service to northwest Oregon and southwest Washington (Figure 2). The Airport is served by 18 passenger carriers and 15 cargo carriers. In



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Figure 2
PORTLAND INTERNATIONAL AIRPORT SERVICE AREA



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1999, PDX handled 13.7 million passengers and 270,000 tons of freight. Airport property encompasses about 3,200 acres (Figure 3). The Airport's two parallel primary runways are oriented in a northwest-southeast direction and are 11,000 and 8,000 feet long. A third runway, oriented northeast-southwest, is 7,000 feet long.

The passenger terminal building and surrounding roadway and parking facilities are being expanded. When the current expansion project is completed in 2001, the terminal building will measure about 1.3 million square feet. It will have 43 jet gate positions with passenger loading bridges and approximately 31 commuter aircraft ground-loading positions. Pedestrian bridges and tunnels connect the parking structure with the main terminal building.

FORECASTS OF AVIATION ACTIVITY

INTRODUCTION

Forecasts of activity at the Airport were prepared in January 1997 and updated in November 1999. These forecasts were used in the master planning process to develop airport facility requirements and to estimate timeframes when future improvements may be needed. Activity at the Airport was projected for the years 2000, 2005, 2010 and 2020. Forecasts were prepared for three elements of airport activity: passengers, air cargo, and aircraft operations (takeoffs and landings).

Forecast Objective

The objective of forecasting is to estimate future levels of airport activity from which the demand

for facilities can be derived. By comparing the demand for future facilities with existing facilities, it is possible to identify airport facility deficiencies. From these efforts, cost-effective facilities that meet existing and future demand can be planned. As with any forecast, the level of uncertainty increases with the number of years. ***In the final analysis, forecasts serve only as guidelines. Deviations from them will almost certainly occur.***

Forecast Updates

At the time the 1997 forecasts¹ were prepared, the Airport was experiencing rapid growth in demand for air passenger and air cargo services. This rapidly increasing demand resulted in additional commercial aircraft operations. The aviation demand forecasts anticipated a continuation of this trend for several years, after which the rate of increase in demand was expected to decline.

However, since that time, while demand has continued to increase, it has increased at a significantly slower rate than anticipated in the 1997 forecasts. In response to this change in activity growth, the Airport forecasts were updated in November 1999.²

Forecast Approach

Many factors influence the demand for aviation services (including passenger service, cargo and general aviation) at PDX. Some of these factors are local, some relate to the national

¹ Technical Memorandum 1, Aviation Demand Forecasts, Portland International Airport Master Plan, P&D Aviation, January 14, 1997, as revised in Memorandum to Port of Portland dated February 28, 1997.

² Aviation Demand Forecast Update, Portland International Airport, P&D Aviation, November 4, 1999.



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This drawing is for illustration purposes only. Improvements illustrated on this drawing may change and do not necessarily indicate a commitment to implement the improvements by the Port of Portland or the Federal Aviation Administration.

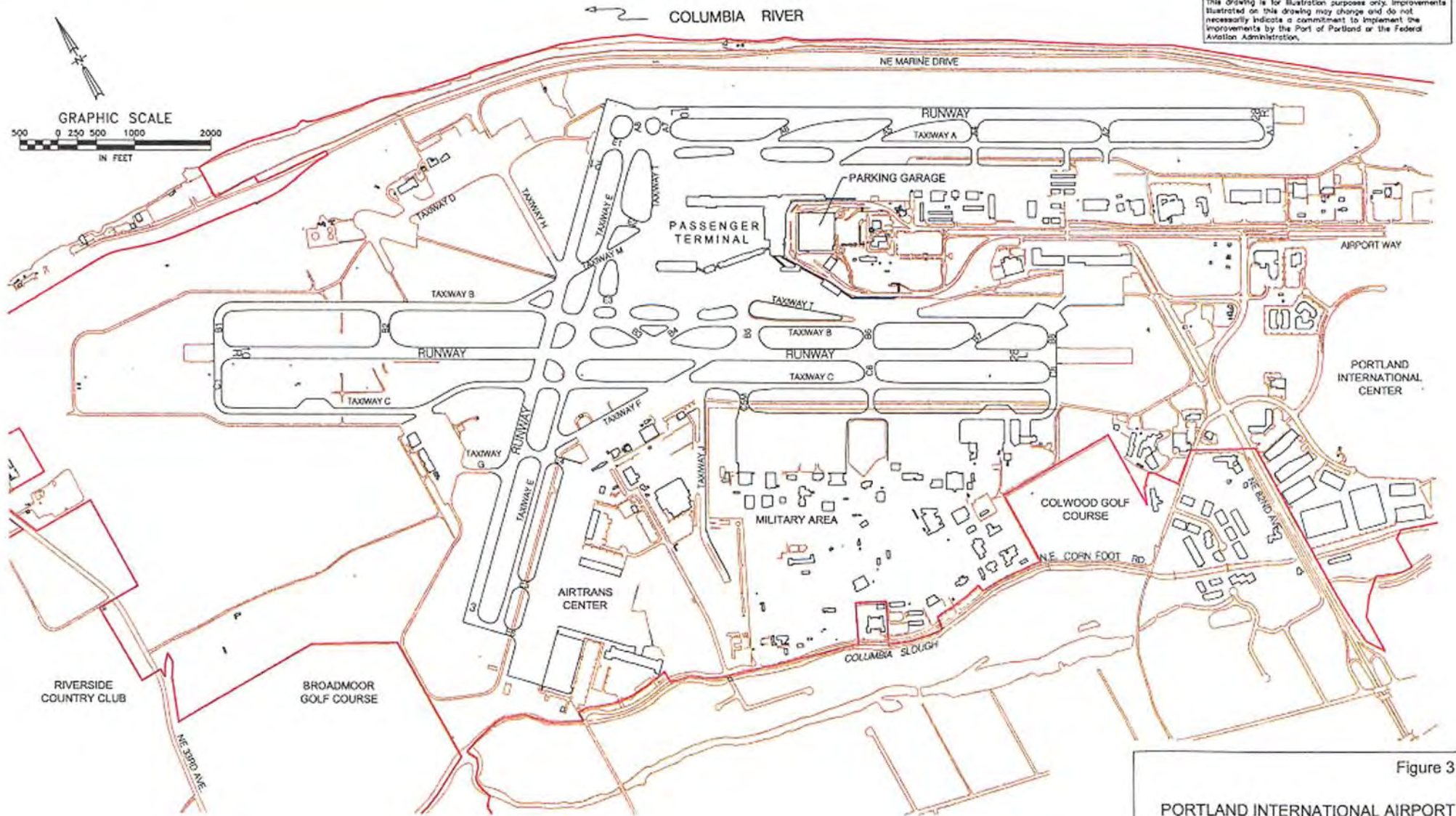


Figure 3
PORTLAND INTERNATIONAL AIRPORT



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economy and aviation industry, and some are global in nature. Furthermore, some factors have long-term influences on demand, while others have short-term effects. The primary factors likely to affect aviation demand in the Portland market include:

- § Local factors
 - Economy of the Portland region
 - Changes in airline service
 - Availability of high-speed ground transportation service
 - Changes in airfares
- § National factors
 - National economy
 - Technology advances in communications
- § International Factors
 - International economic growth
 - Bilateral agreements allowing air service between nations
 - International airfares and rates of exchange

The forecast approach considered variables which have been found to influence demand for aviation services, have a proven historical relationship with aviation demand, and are quantifiable (such as population, employment, personal income and airfares). Some of the influencing factors described above have been explicitly considered in the forecast assessment. Other factors are implicitly considered because they relate to quantitative data that was used in the analysis.

Based on past experience and forecasting practices accepted in the aviation industry, the forecast approach consisted of the following:

- § Econometric (regression analysis) forecast models were tested and the best models were selected to prepare a range of new forecasts. In addition to using proven causal

factors in the model (such as population, personal income and average airfares), other potentially relevant factors which are believed to influence aviation demand were examined.

- § The forecasts were based on data from 1970 to 1998 (more than twenty-five years of historical data) to account for long term cycles in the airline industry and the economy.
- § The sensitivity of the forecasts to projections of the model variables was tested. High, low and baseline forecasts were prepared to bracket the possible range of future activity at the Airport.

Summary of Forecasts

The PDX baseline Airport Master Plan forecasts to 2020 are summarized in Table 1. The methodology and important conclusions of the forecast analyses are described below.

PASSENGER FORECAST

The methodology employed to forecast air passenger demand utilized multiple regression analysis to correlate explained air passenger activity at PDX with variables related to the Airport's service area known to influence the level of air passenger activity. The service area of PDX used for passenger and cargo forecasts is the five-county Portland-Vancouver metropolitan region.³ Variables evaluated during this process include population, employment (total and high-technology), personal income, and average domestic airfares (for both PDX and the U.S.). ***Of these***

³ Metro Regional Data Book, July 1998.



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Table 1
SUMMARY OF BASELINE PASSENGER AND OPERATIONS FORECASTS
FOR PORTLAND INTERNATIONAL AIRPORT, 1998 TO 2020

Description	1998 [a]	Baseline Forecast [b]		
		2005	2010	2020
Enplaned Passengers (Thousands)				
Domestic Enplaned Passengers				
Major and National	5,020	6,440	7,430	10,130
Regional and Commuter	1,178	1,510	1,740	2,370
Subtotal Domestic	6,198	7,950	9,170	12,500
International Enplaned Passengers				
Major and National	203	410	590	810
Regional and Commuter	87	100	150	200
Subtotal International	290	510	740	1,010
Total Enplaned Passengers	6,487	8,460	9,910	13,510
Total Million Annual Passengers (MAP) [c]	13.0	16.9	19.8	27.0
Average Annual Growth Rate (Percent)	--	3.9%	3.2%	3.1%
Percent Major and National	80.5%	81.0%	80.9%	80.9%
Percent International	4.5%	6.0%	7.5%	7.5%
Inbound and Outbound Air Cargo (Thousands of Short Tons)				
Freight	268	398	511	814
Mail	54	70	90	144
Total Air Cargo	322	468	601	958
Average Annual Growth Rate	--	5.5%	5.3%	4.8%
Aircraft Operations by FAA Air Traffic Control Categories (Thousands)				
Major and National	123	148	167	217
Regional and Commuter	128	161	180	212
General Aviation	66	50	47	45
Military	9	10	10	10
Total Airport Operations	326	369	404	485

[a] Source: Port of Portland and estimates by P&D Aviation from data by Port of Portland.

[b] Source: *Aviation Demand Forecast Update*, November 4, 1999.

[c] Million annual enplaned and deplaned passengers.



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variables, domestic airfares and total personal income were determined to be the most statistically relevant for use in predicting air passenger demand at PDX.

Airfares

Airfares have been an important factor in the growth in air transportation at PDX. Historically there has been a strong relationship between declining real airfares (after adjusting for inflation) and growth in passenger traffic at PDX (Figure 4). Of particular note, is the significant decline in real airfares which began in 1992 and which contributed significantly to the dramatic growth in passenger activity at PDX starting in that same year.

Because airfares (as measured by yield per revenue passenger mile) have such a significant influence on passenger activity at the Airport, estimating future trends in fares at PDX is an important step in predicting future passenger activity there. In order to make this prediction, historic fares at PDX were compared with those of the U.S. as a whole and with projections of future U.S. airfares by the FAA (Figure 5). Between 1992 and 1996, airfares at PDX declined significantly compared to the nation overall. Much of this difference is attributed to the market penetration of low-cost carriers, such as Southwest Airlines and the former Reno Airlines, in the western region in general and Portland in particular.

As the penetration of the low cost carriers spreads to markets elsewhere in the country, it is likely that further reductions in fares at PDX will begin to parallel those forecast for the nation. Future fares at PDX are forecast to decline by approximately 1.0 percent a year, the same rate as forecast for the nation by the

FAA. Some of the future decline in fares may result from further unit cost reductions stemming from both an increase in the average trip length as well as from the use of larger, higher capacity aircraft.

Baseline Passenger Forecast

The forecast of airline fares at PDX was combined with the high-growth, low-growth, and medium-growth (baseline) demographic and economic forecasts prepared by Metro for the five-county region⁴ to estimate the potential future passenger demand at PDX. The resulting baseline projections were used for master planning (Figure 6).

The baseline forecast combines the fare forecasts noted previously with the medium-growth economic forecasts prepared by Metro. These forecasting assumptions suggest Airport passenger enplanements will increase from 6.86 million in 1999 to approximately 13.5 million by the year 2020 (Table 2). Total passenger growth is expected to average 3.9 percent a year through the year 2005, declining to an annual rate of approximately 3.1 percent per year from 2010 to 2020. International passengers are expected to account for a greater percentage of the total, increasing from about 0.3 million in 1999 to 1.0 million in 2020.

Affect of Changes in Fuel Cost

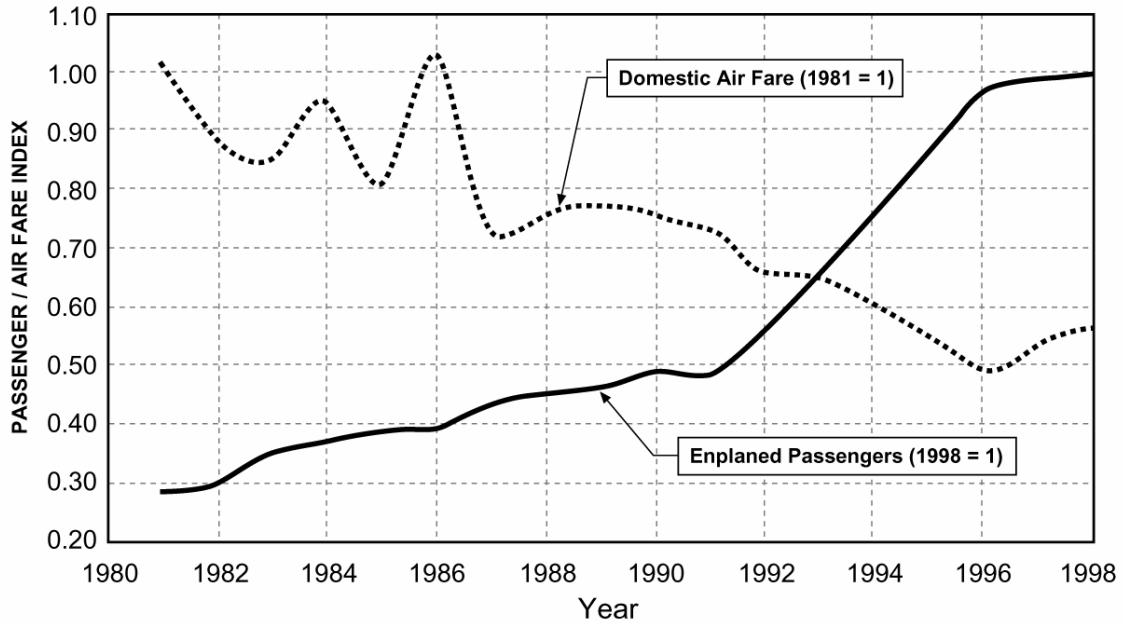
The projected continued decline in real airfares is dependent, in part, upon stable fuel prices (in constant dollar terms). The impact on the forecast of rising airline fuel cost was tested. Airlines have several options if the real cost of fuel rises significantly. First, the cost increases could be passed directly on to the air traveler in

⁴ Ibid.



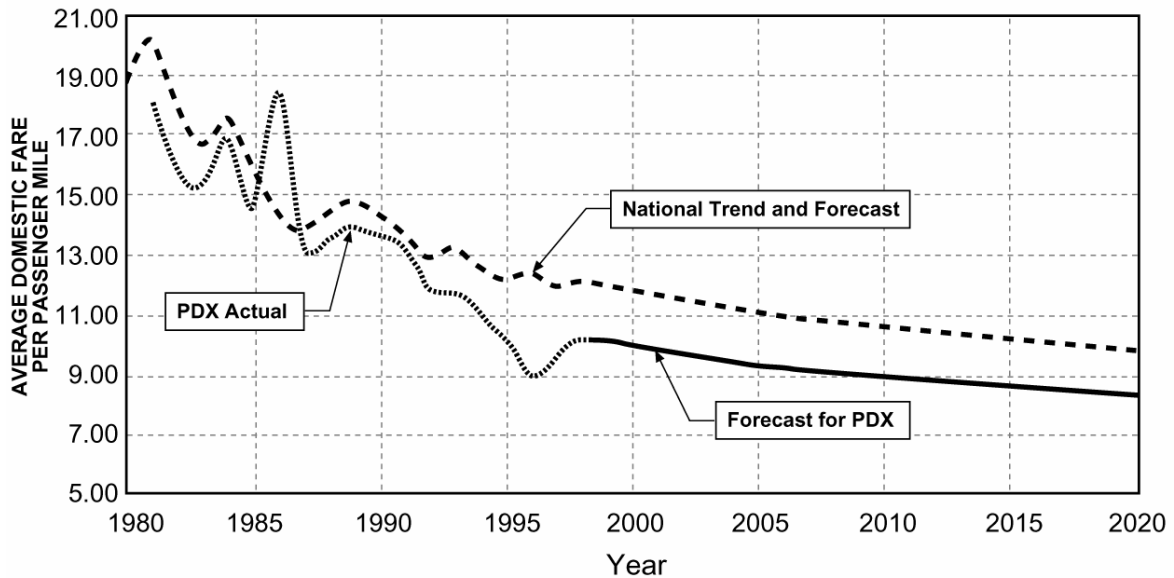
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Source: Aviation Demand Forecast Update, November 4, 1999.

Figure 4
DOMESTIC AIRFARE VERSUS
ENPLANED PASSENGERS AT PORTLAND INTERNATIONAL AIRPORT



Source: Aviation Demand Forecast Update, November 4, 1999.

Figure 5
FORECAST OF AVERAGE AIR TRAVEL COST



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Table 2
BASELINE FORECAST OF ENPLANED PASSENGERS BY TYPE OF CARRIER
AT PORTLAND INTERNATIONAL AIRPORT, 1998 TO 2020

Description	1998 [a]	Baseline Forecast [b]		
		2005	2010	2020
Domestic Enplaned Passengers				
Domestic Enplaned Passengers (Thousands)				
Major and National	5,020	6,440	7,430	10,130
Regional and Commuter	1,178	1,510	1,740	2,370
Subtotal Domestic	6,198	7,950	9,170	12,500
Average Annual Growth Rate (Percent)	--	3.6%	2.9%	3.1%
Percent Major and National	81.0%	81.0%	81.0%	81.0%
International Enplaned Passengers				
International Enplaned Passengers (Thousands)				
Major and National	203	410	590	810
Regional and Commuter	87	100	150	200
Subtotal International	290	510	740	1,010
Average Annual Growth Rate (Percent)	--	8.4%	7.7%	3.2%
Percent Major and National	70.0%	80.0%	80.0%	80.0%
Total Enplaned Passengers				
Total Enplaned Passengers (Thousands)				
Major and National	5,223	6,850	8,020	10,940
Regional and Commuter	1,264	1,610	1,890	2,570
Total	6,487	8,460	9,910	13,510
Total Million Annual Passengers (MAP) [c]	13.0	16.9	19.8	27.0
Average Annual Growth Rate (Percent)	--	3.9%	3.2%	3.1%
Percent Major and National	80.5%	81.0%	80.9%	80.9%
Percent International	4.5%	6.0%	7.5%	7.5%

[a] Source: Port of Portland and estimates by P&D Aviation from data by Port of Portland.

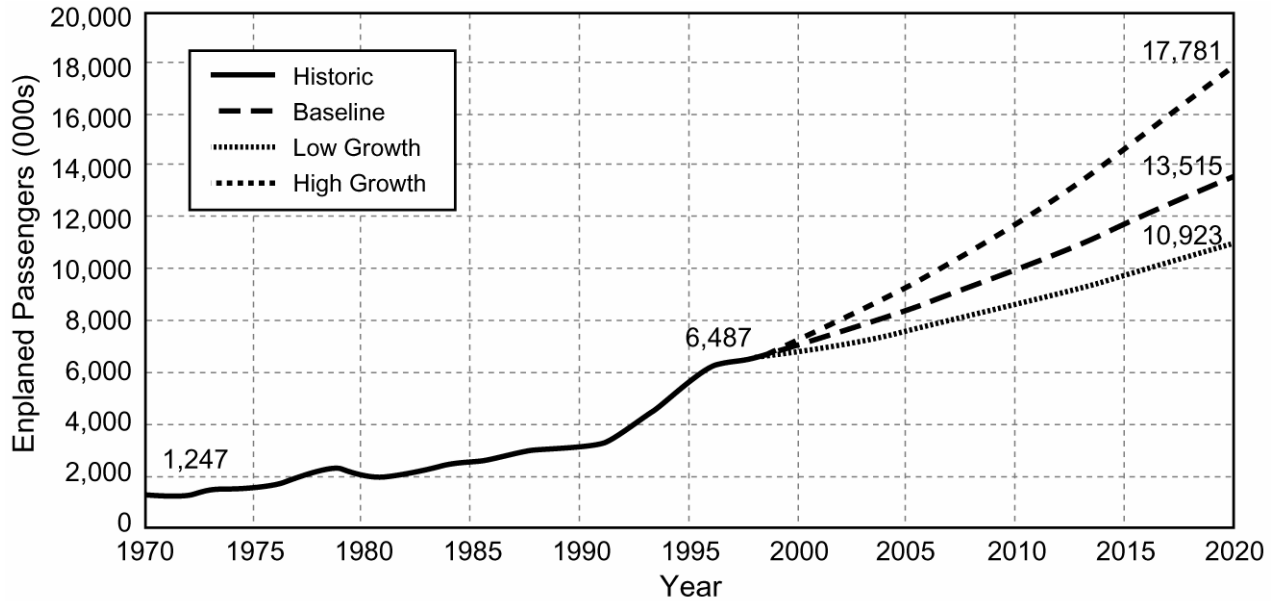
[b] Source: Aviation Demand Forecast Update, November 4, 1999.

[c] Million annual enplaned and deplaned passengers.



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Source: Aviation Demand Forecast Update, November 4, 1999.

Figure 6
PASSENGER DEMAND FORECAST

the form of higher airfares. Second, the airline could absorb the cost increase in the reductions in other operational or overhead areas. The actual response would be dependent on airline and industry conditions at the time of the increase, but would most likely involve some combination of the three factors.

The potential impact of a 50 to 100 percent increase in the real cost of fuel on the baseline passenger demand forecast at PDX was evaluated. Two options were tested for each level of increase. The first option assumed that the entire cost increase was passed on the air traveler through higher airfares, and that operating profit margins are maintained. The second option assumed that 75 percent of the cost increase was passed on and that 25 percent was absorbed by the airline through reductions in profit margins or other cost centers.

Based on cost and revenue data contained in the Aviation & Aerospace Almanac, 1999, a 50 percent to 100 percent increase in the cost of fuel would increase the cost of air travel (as measured by yield) by 5 percent to 15 percent.⁵ This increase would reduce the baseline passenger forecast in 2020 by 4 percent to 12 percent, or from 13.5 million enplanements to between 11.9 and 13.0 million enplanements. This reduction is within the range of the low growth forecast of 10.9 million enplanements.

⁵ According to data reported in the Aviation and Aerospace Almanac, 1999, fuel accounted for 13.4 percent of the cost of passenger operations, and that net operating revenue margins (total operating revenues net of operating costs) averaged almost 10 percent.



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CARGO FORECAST

The air cargo forecast used multiple linear regression analysis to relate historic air cargo volume at Portland International Airport (including airfreight and airmail) with variables known to influence the level of air cargo activity. This approach follows generally accepted practices in the aviation industry for long range forecasting of air cargo demand.

A variety of demographic and economic variables were evaluated. The model forecasts air cargo based on service area employment (total non-agricultural) and average air freight yield.

The baseline (medium growth) forecast is based on the following:

- § Total regional employment will increase as projected under Metro's adopted medium growth scenario for the Portland-Vancouver Metropolitan Area.⁶
- § The decline in freight yield will average 1.0 percent per year over the forecast period, as projected by Boeing Aircraft Company.⁷

Due to a variety of factors, such as increased competition from integrated air freight carriers (i.e., Federal Express, Airborne, etc.) and increased use of facsimile and electronic mail, air mail's share of total air cargo volume has been steadily declining over the years. However, the rate of decline has been slowing in recent years and appears to be stabilizing. Due to recent plans by the United States Postal Service (USPS) to increase activity at PDX and the stated USPS goal to compete for a share of the

⁶ Metro Regional Data Book, July 1998.

⁷ Boeing Commercial Airplane Group.

express mail market, it was estimated that air mail would capture 15 percent of the air cargo market over the forecast period.

Using the forecast variables described above, total air cargo at PDX is projected (baseline forecast) to increase to approximately 958,000 tons in 2020 from approximately 322,000 tons in 1998 (Table 1 and Figure 7).

AIRCRAFT OPERATIONS FORECAST

Aircraft operation forecasts were developed for passenger aircraft, all-cargo aircraft, general aviation aircraft and military aircraft (Table 3). Each of these components is discussed below.

Passenger Aircraft Operations Forecast

The number of aircraft operations in each of the four passenger service categories (domestic major/national airlines, domestic regional/commuter airlines, international major/national airlines, and international regional/commuter airlines) was projected by developing estimates of future aircraft size (average seats per departure) and aircraft boarding load factor (percentage of seats occupied by enplaning passengers). The average number of enplanements per passenger aircraft departure was derived by multiplying the average seats per departure by the boarding load factor.

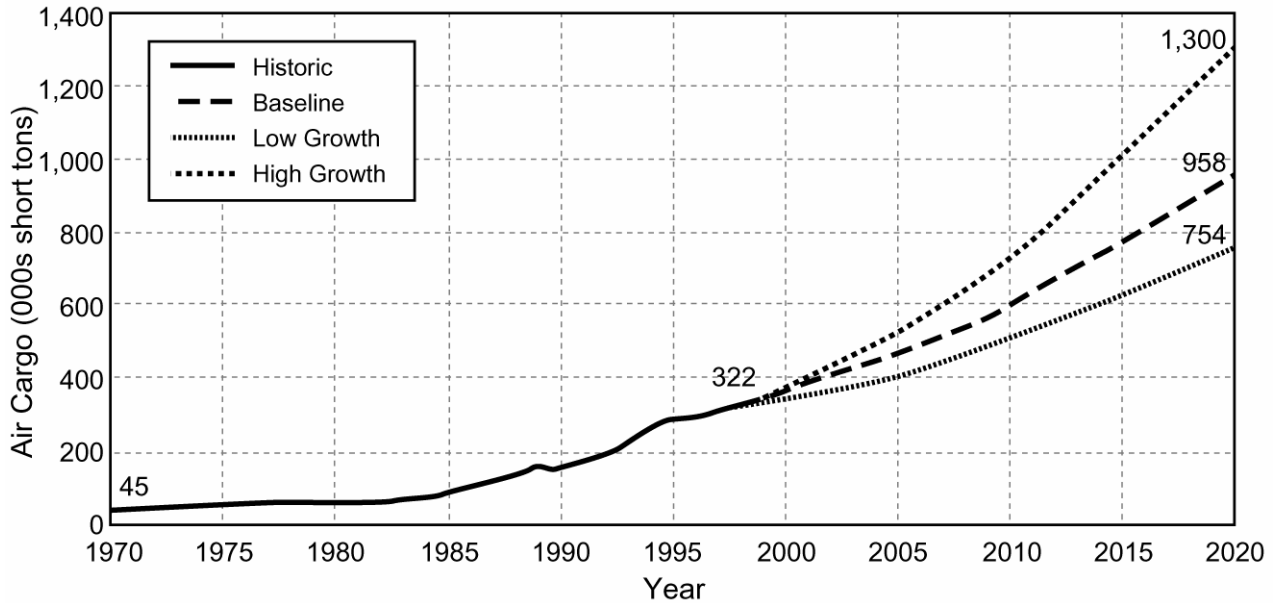
The number of aircraft departures was obtained by dividing the number of enplaned passengers by the number of enplanements per departure.

Existing Conditions Related to PDX Passenger Operations. Estimates of the factors described above were prepared for PDX activity in 1998, the base year for making future projections. Average enplanements per departure in 1998 were 91 for domestic major/national airlines, 27 for domestic regional/commuter airlines, 141 for



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Source: Aviation Demand Forecast Update, November 4, 1999.

Figure 7
AIR CARGO FORECAST

international major/national airlines and 21 for international regional/commuter airlines. Boarding load factors ranged from 64 percent on domestic major/national and regional/commuter operations to 70 percent on international major/national operations. Overall in 1998, the Airport averaged 62 enplanements per passenger departure.

Passenger Aircraft Size. The average number of seats per departure in each service category was projected on the basis of estimates by the FAA⁸ modified to reflect local conditions. The average seats per departure for domestic major and national service at PDX was estimated to increase from 143 in 1998 to 161 in 2020 (an average increase of approximately 0.8 seats per year). The average seat size for international service by major and national

airlines at Portland is estimated to increase from 200 in 1998 to 232 in 2020 (an increase of about 1.5 seats per year).

The average aircraft size of domestic regional and commuter airlines was estimated to increase from 41 in 1998 to 51 in 2020 (an average 0.5 additional seats per year). The average aircraft size of international regional and commuter airlines was estimated to increase from 33 in 1998 to 51 in 2020 (an increase of about 0.8 seats per year).

Passenger Load Factors. Load factor projections were based on FAA forecasts modified to reflect local conditions. The FAA projects that domestic air carrier load factors will increase to 69 percent and remain at that level. The projected load factor for domestic major and national airline service at PDX similarly assumes that the load factor will increase from 64 percent in 1998 to 69 percent and remain there.

⁸ Federal Aviation Administration, FAA Aviation Forecasts, Fiscal Years 1999-2010, March 1999; and FAA Long-Range Aerospace Forecasts, Fiscal Years 2015, 2020 and 2025, June 1999.



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The FAA projects international air carrier load factors will increase to 74 percent by 2005 and remain at that level thereafter, and that average load factors in regional and commuter airline service will increase from 57 percent in 1998 to 65 percent in 2020. Domestic and international regional and commuter airline service at Portland had load factors in 1998 of 64 percent and 65 percent, respectively. It was assumed that the load factor for domestic regional and commuter airline service would increase to 65 percent and the load factor for international regional and commuter airline service would remain constant at 65 percent.

Passenger Aircraft Operations. The resulting numbers of operations under the Baseline Forecast are shown in Table 3. Passenger aircraft operations are expected to increase from approximately 210,000 in 1998 to 348,000 in 2020. International operations are expected to account for a greater percentage in the future because that sector is projected to account for a greater percentage of the Airport's total passengers in the future.

The average number of enplanements per departure (for domestic and international service combined) is projected to increase from 26 in 1998 to 33 in 2020 for regional and commuter airlines, and from 93 in 1998 to 114 in 2020 for major and national airlines. The average number of enplanements per departure for all passenger service at PDX is projected to increase from 62 in 1998 to 78 in 2020. A change in the projected value of any of the three factors directly affecting passenger aircraft operations (number of passengers, average aircraft size, or boarding load factor) would change the projected number of operations.

All-Cargo Aircraft Operations Forecast

The number of all-cargo operations was determined by estimating the amount of freight and mail carried by all-cargo flights (on jets and turbo-props) and the amount of freight and mail per all-cargo operation.

Currently 73.5 percent of airfreight is handled on all-cargo flights. The airfreight carried per cargo operation averages approximately 22.8 tons on jet freighters and 0.6 tons on turboprop cargo aircraft.

The trend of all-cargo aircraft carrying an increasing percentage of the cargo tonnage is expected to continue. By 2020, all-cargo flights are anticipated to handle 80 percent of air cargo. The remaining 20 percent of cargo would be carried on passenger flights. The average cargo carried per all-cargo flight is projected to increase from 22.8 tons in 1998 to 28.6 tons in 2020 for jet freighters and from 0.6 tons in 1998 to 1.0 tons in 2020 for turbo-prop cargo aircraft.

Based on the assumptions described above, the baseline (medium growth) forecast anticipates that all-cargo operations will increase from approximately 31,700 in 1998 to 64,000 in 2020 (Table 3). Approximately 95 percent of cargo carried on all-cargo flights is carried on jet freighters. In the future, jet freighters are expected to continue to handle 95 percent of the cargo carried on all-cargo flights.

General Aviation Operations Forecast

The Master Plan forecast projects general aviation operations will be 50,000 in 2005, then decline to 45,000 in 2020.



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Military Aircraft Operations Forecast

Military operations were approximately 9,000 in 1999. The Oregon Air National Guard and Air Force Reserve units located at the Airport conduct most of these operations. Discussions with these organizations indicated that they expected their operations to remain at approximately 10,000 per year in the future.

Unscheduled Air Taxi Operations Forecast

Unscheduled air taxi operations were approximately 9,000 in 1999. These are expected to reach 18,000 in 2020.

Total Aircraft Operations Forecast

PDX handled approximately 322,000 commercial, general aviation and military aircraft operations in 1999. Under the baseline forecast, this total is expected to reach 485,000 by 2020 (Table 3). Commercial aircraft operations are projected to account for 430,000 (89 percent) of total operations at PDX in 2020; general aviation for 9 percent; and military for the remaining two percent.

AIRPORT FACILITY REQUIREMENTS

INTRODUCTION

This section summarizes the key airport facilities needed to satisfy the projected demand at PDX to the year 2020. Technical Memorandum 4, Airport Facility Requirements, March 5, 1997, describes the development of facility requirements in greater detail.

The process of determining facility requirements involves the application of FAA and other established airport planning standards to the various forecast components to identify facility needs. These needs are then compared with existing facility capacities (a demand/capacity analysis) to determine new facility requirements. The Federal Aviation Administration (FAA) has developed extensive standards and regulations for airport planning and design, which are documented in FAA Advisory Circulars and Federal Aviation Regulations. In addition to FAA regulations and standards, various industry standards have been developed to estimate typical facility needs.

AIRFIELD REQUIREMENTS

Design Aircraft and Design Criteria

Design Aircraft. Today, the Boeing 747-400 is the most demanding aircraft, in terms of airport facility requirements and clearances, operating at the Airport. With a 213-foot wingspan, the B747-400 is the largest civil transport used at major airports worldwide. Because of the possible advent of even larger aircraft, with seating capacities from 500 to 800 passengers, airfield standards for the B747-400 will not be adequate for the next generation "new large airplanes". For example, the wingspans being considered for new large airplanes are in the 260 to 280 foot range.

Since operations at Portland by the new large airplanes during the master plan period are possible, some future facilities are needed to accommodate these aircraft. For this Master Plan, the Boeing 747-600 (as proposed before the Boeing program was suspended) and



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Table 3
SUMMARY OF BASELINE AIRCRAFT OPERATIONS FORECAST
FOR PORTLAND INTERNATIONAL AIRPORT, 1998 TO 2020

Description	1998 [a]	Baseline Forecast [b]		
		2005	2010	2020
Airline Aircraft Operations (Operations in Thousands)				
Passenger Aircraft Operations				
Major and National	113	134	150	192
Regional and Commuter	97	120	134	156
Subtotal Passenger	210	254	284	348
All-Cargo Aircraft Operations				
Jet/Air Carrier	10	14	17	25
Turboprop/Commuter	22	25	29	38
Subtotal All-Cargo	32	39	46	64
Unscheduled Air Taxi Operations	9	16	17	18
Total Airline Aircraft Operations	252	309	347	430
Average Annual Growth Rate (Percent)	--	3.0%	2.3%	2.2%
Other Aircraft Operations (Operations in Thousands)				
General Aviation Operations	66	50	47	45
Military Aircraft Operations	9	10	10	10
Total Airport Operations	326	369	404	485
Average Annual Growth Rate (Percent)	--	1.8%	1.8%	1.8%
Aircraft Operations Summary (Thousands)				
Major and National	123	148	167	217
Regional and Commuter	128	161	180	212
General Aviation	66	50	47	45
Military	9	10	10	10
Total Airport Operations	326	369	404	485

[a] Source: Port of Portland and estimates by P&D Aviation from data by Port of Portland.

[b] Source: Aviation Demand Forecast Update, November 4, 1999.



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Airbus A3XX-200 are assumed as typical next generation large airplane models.

Design Criteria. Specific airfield criteria needed to serve new large airplanes are:

- § Runway width: 200 feet (compared with 150 feet for B747-400)
- § Taxiway width: 100 feet (compared with 75 feet for B747-400)
- § Separation between runway and parallel taxiway centerlines: 600 feet (compared with 400 feet for B747-400)

Some terminal areas must also be designed to provide use by new large airplanes.

Airfield Capacity

Airfield Capacity and Delay. Airfield capacity is defined as the number of aircraft operations a runway system can accommodate given a certain level of delay. The major factors influencing airfield operations delays are airfield and air traffic control (ATC) system demand, weather conditions, physical characteristics of the airfield, air traffic control procedures, and aircraft operational characteristics. Airfield capacity has little meaning if it is not associated with a level of delay; the capacity of a facility can be increased if users accept greater levels of congestion and inconvenience, and associated inefficiencies.

Existing Airfield Capacity. A common measure used in the evaluation of demand and capacity is the average delay per aircraft operation. The current National Plan of Integrated Airport Systems (NPIAS) states:

“... Experience shows that delay increases gradually with rising levels of traffic until the practical capacity of

an airport is reached, at which point the average delay per aircraft operation is in the range of 4 to 6 minutes. Delays increase rapidly if traffic demand increases beyond this level. An airport is considered to be severely congested when average delays exceed 9 minutes per operation...”

Using the definitions of capacity in the NPIAS, the practical capacity (associated with average delays between 4 and 6 minutes) of the existing airfield is between 350,000 and 380,000 operations a year (1999 operations totaled about 322,000). The Airport would be categorized as severely congested if average delays exceed 9 minutes, which would occur at approximately 410,000 operations.

Potential Means of Increasing Airfield Capacity.

The capacity of the existing airfield is limited by the ability to conduct parallel and simultaneous approaches during periods of reduced ceilings and visibility. Based on recently approved FAA procedures, simultaneous ILS approaches can be conducted to parallel runways separated by 3,000 feet if one of the localizer courses is offset by 2.5 degrees. The existing runway separation at PDX meets this criterion, and implementation of these procedures appears possible, but would require an offset localizer and special radar monitoring equipment (Precision Radar Monitor, PRM).

The upper limit of the capacity of the existing airfield, with simultaneous instrument approaches, is estimated to be 500,000 annual operations.

Future Requirement for Additional Runway.

The comparison of airfield capacity (assuming



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simultaneous instrument approaches) with the forecast of demand, indicates that additional runway capacity will be needed after 2020. The projected baseline operations demand in 2020 is 485,000. The only airfield improvement that could provide the increase in capacity needed after 2020 would be a third parallel runway. Although the need for a third runway is beyond the 2020 planning horizon of this Master Plan, the potential location of a third parallel runway has been considered in the Master Plan because it would affect the ultimate location of other airport facilities. The new runway should be planned to meet the standards for new large aircraft.

Runway Length

Data contained in [Boeing 747-400 Airplane Characteristics for Airport Planning](#) suggests that the current length of Runway 10R/28L (11,000 feet) is adequate for existing and future operations. This was verified through performance data provided by Jeppesen-Sanderson that indicated that the B747-400 can operate at the Airport without weight restrictions under most temperature conditions. Weight restrictions occur at temperatures above 90°F, but the restrictions would not necessarily result in the need to reduce the number of passenger carried. Aircraft manufacturers currently expect that new large airplanes will have runway length requirements similar to the B747-400. Therefore, the new runway should be designed for a takeoff length of 11,000 feet.

TERMINAL REQUIREMENTS

The initial work on terminal requirements was done using the January 1997 Forecast. The 1997 forecast was for 29 million annual passengers (MAP) in the year 2020. The

November 1999 Forecast Update revised that number down to 27 MAP for 2020. The difference of 2 MAP between the 1997 and 1999 Forecasts was not thought to be enough to warrant a revision in the terminal requirements analysis. Throughout this analysis, there will be references to 29 MAP. Projecting the November 1999 Forecast, 29 MAP would occur in 2023.

Terminal programming criteria were selected to reflect the size and operating characteristics of PDX and are a combination of existing supply/demand ratios, common industry planning standards, and criteria developed by comparison with other airports around the U.S. and the world. In the programming of terminal elements, there is also consideration given to the need to accommodate an increased number of airlines at the terminal in the future.

Questionnaires requesting information on their existing and forecast terminal facility requirements were distributed to the airlines serving the Airport in January 1997. While these questionnaires provided useful information on individual airline interest in specific terminal improvements, the requirements for terminal facilities were based upon an aggregate independent estimates, rather than the summation of individual airline requests.

Terminal requirements are summarized in Table 4. The terminal requirements are referenced to numbers of million annual passengers (MAP). Terminal requirements were determined for these MAP levels based on the January 1997 forecasts. According to the updated forecast (November 1999), 20 MAP will occur about 2010, 23 MAP about 2015, and 29 MAP by 2023.



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**Table 4
SUMMARY OF TERMINAL AREA REQUIREMENTS
FOR PORTLAND INTERNATIONAL AIRPORT**

Description	Actual 1999 [a] 13.7 MAP	Requirements [b]		
		20 MAP (2000)	23 MAP (2015)	29 MAP (2023) [d]
Jet Gate Requirement				
Jet Gates (With Loading Bridges)				
ADG III (Narrowbody)	26	48	51	55
ADG IV (Widebody)	17	12	15	20
ADG V (Jumbo)	0	0	1	2
Total Jet Gates	43	60	67	77
Commuter Aircraft Parking Positions [c]	23	30	30	30
Terminal Area Requirement (Thousand Square Feet)				
Holdrooms	124.3	151.9	163.9	176.5
Airline Passenger Lounges	27.8	37.5	42.5	50.0
Airline Operations	177.5	195.4	211.6	240.9
Ticketing Area	85.4	106.8	118.1	140.1
Baggage Processing Area	163.9	164.1	177.8	202.4
Baggage Claim Area	60.0	79.0	88.0	108.5
International Arrivals (FIS) Area	41.0	62.2	71.8	75.2
Concessions Area	142.4	182.1	206.6	258.0
General Port Areas	142.8	170.4	188.0	217.8
Federal Aviation Administration	12.7	12.7	12.7	12.7
Public Circulation	265.2	315.3	347.9	403.0
Building Utilities and Related	95.6	113.6	125.3	145.2
Total Terminal Area	1,338.7	1,590.9	1,754.2	2,030.0
Terminal Area Ratio Analyses				
Enplaned Passengers per Square Foot	6.0	6.3	6.5	7.0
Total Passengers per Jet Gate	319,000	333,000	343,000	377,000
Square Feet per Peak Hour Passenger	305	298	296	281

[a] Source: Estimated by P&D Aviation from data by Port of Portland. Assumes completion of Concourse C improvements.

[b] Source: Analysis by P&D Aviation.

[c] Commuter parking positions serve the same purpose as jet gates but are smaller in size and more flexible in their layout, and do not have elevated passenger loading bridges.

[d] The initial work on terminal requirements was done using the January 1997 Forecast. The 1997 forecast was for 29 MAP in the year 2020. The November 1999 Forecast Update revised that number down to 27 MAP for 2020. The difference of 2 MAP between the 1997 and 1999 Forecasts was not thought to be enough to warrant a revision in the terminal requirements analysis. Throughout this analysis, there will be references to 29 MAP. Projecting the November 1999 Forecast, 29 MAP would occur in 2023.



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Gate Requirements

The aircraft gate forecast was determined from the forecast of passengers and the assumption that the number of departures per gate per day will remain approximately the same. Although the jet gate turnover is not projected to increase, it is anticipated that the efficiency of the gates, as measured by the number of passengers per gate, will increase with the utilization of larger aircraft. Based on this approach, the number of jet gates at the terminal will need to increase from 43, with the completion of the current Concourse C construction, to 77 at 29 MAP.

Terminal Building Requirements

The terminal building facilities needed to support the future passenger volumes at the Airport are summarized in Table 4. The size of the terminal will need to increase from about 1.3 million square feet (with completion of the current Concourse C construction) to 2.0 million square feet at 29 MAP. Many of the passenger facility requirements are keyed to enplaned or deplaned peak hour activity. This ensures that facilities increase in direct proportion with the increase in peak activity rather than average daily activity.

GROUND ACCESS REQUIREMENTS

Ground access requirements at PDX are based on analyses of passenger and vehicle patterns. Specific improvements are dependent on the Airport development concept chosen. General long-term needs identified are:

- § Regional Road Improvements Needed -- Improvements to roads in the vicinity of the

Airport needed partially to support increased Airport traffic are: interchange of I-205 and Columbia Boulevard, Airport Way improvements, Columbia Boulevard improvements, Alderwood Road improvements, and improvements to other regional roadways providing access to the Airport. Funding for these improvements has not been identified.

- § Terminal Road and Curbside Improvements Needed -- Long-term improvements identified include the widening of Airport Way, increased terminal curb capacity, and access and circulation roads for new terminal areas.

- § Parking Improvements Needed -- Long-term parking requirements include about 6,300 additional public parking spaces, over 1,500 additional rental car spaces and over 1,000 additional employee parking spaces.

SUPPORT FACILITY REQUIREMENTS

Long-term support facility requirements include the following:

- § Air Freight Facilities -- Based on the forecast of cargo tonnage, the cargo area requirement (exclusive of U.S. Postal Service needs) is projected to increase from about 50 acres today to 138 acres in the long term.

- § Air Mail Facility -- The U.S. Postal Service occupies a 4.8-acre site for its air mail processing facility located east of the terminal complex on the south side of NE Airport Way. The estimated long-term requirement is for a site encompassing 10 acres.



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- § Military Area -- The U.S. Air Force Reserve and the Oregon Air National Guard currently share a 227-acre site south of Runway 10R/28L and east of Runway 3/21.
- § Airline Maintenance Facilities -- About 20 to 25 acres is allocated in the long-term for airline maintenance activities.
- § In-flight Catering Facilities -- Flight kitchen requirements are estimated to grow to about 12 acres (170,000 square feet of building area), compared to 6.5 acres (92,000 square feet of building area) today.
- § General Aviation Area -- Long-term requirements for operators of personal and corporate aircraft include: (a) an increase of about 46,000 square feet in cabin class hangars for based and transient aircraft, (b) an increase of 73 vehicle parking spaces, (c) a new wash rack to accommodate larger aircraft, (d) a new 133,000 square-foot maintenance hangar, and (e) an expansion of the transient parking ramp to include parking spaces for several charter aircraft, including large passenger jets.
- § Airport Maintenance Area -- Additional airport maintenance area will be needed for office, shop, vehicle storage, parking, and storage yard space. Total long-term requirements are projected to increase to roughly 20 acres.
- § Airport Rescue and Fire-fighting -- A new airport rescue and fire-fighting (ARFF) facility was recently constructed in the northwest corner of the Airport near Taxiway D. The new ARFF facilities occupy approximately 5.8 acres. There is some room on this site for future expansion and this site could serve the long-term ARFF

needs of the Airport. If relocation of the ARFF facility is necessary, nine acres will be set aside for the future facility.

- § Fuel Storage -- An estimated 1.18 million gallons of jet fuel per day will be consumed at PDX at 29 MAP. Based on a 6-day storage requirement, approximately seven million gallons of Jet-A fuel storage tank capacity will be needed in the long term. This suggests that the existing fuel storage tank area will need to increase to about 15 acres by 2020.
- § Utilities -- The electrical, natural gas, telephone, and sanitary sewer systems serving the Airport are generally in good condition. As user demands on these systems increase, some capacity upgrades will be required. Facility expansion into undeveloped areas of the Airport will require new service extensions.

ALTERNATIVE DEVELOPMENT CONCEPTS

INTRODUCTION

The preparation and evaluation of alternative long-term development concepts for PDX was accomplished through a series of public and advisory committee workshops, augmented by technical analyses by the project consulting team (Figure 1 on page 4). Studies conducted to analyze the technical merits of the alternatives included airfield capacity and delay studies, roadway and vehicle parking studies, and cost estimates. An environmental and financial screening of the final two alternatives considered aircraft noise, air quality, water quality, wetlands, flora and fauna, land use,



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surface traffic, and preliminary financial feasibility. Planning goals and guidelines for developing and evaluating the Master Plan alternatives were developed in the workshops, as described earlier.⁹

Many airfield and terminal expansion options were initially considered. These were eventually combined and narrowed to a smaller number of development concepts, then finally reduced to two alternatives. The evaluation of the final two alternatives produced a recommended plan that became the Master Plan of future Airport development.

INITIAL DEVELOPMENT CONCEPTS

Initial Airfield Concepts

The Master Plan alternatives were developed to address the ultimate need (after 2020) for a third parallel runway. A number of potential new parallel runway configurations were analyzed. All new parallel runways would be on the south side of Runway 10R/28L, utilizing existing Airport property to the greatest extent possible.

Airfield Characteristics. There are several airfield characteristics that were included in the formulation of one or more airfield alternative:

§ Runway sizes considered for the new runway included a commuter runway and an air carrier runway.

- A new parallel commuter runway was considered, which would be 5,500 feet long and 150 feet wide. It would be built with Airplane Design Group (ADG) V (B747) separation standards to allow it

to ultimately be converted to an ADG V air carrier runway. The commuter runway could be considered the first phase of an air carrier runway.

- A new parallel air carrier runway was evaluated, which would be 8,000 feet long and 150 feet wide. It would be built to ADG V standards. Runway 10R/28L could be developed to meet ADG VI (New Large Aircraft) standards, and New Large Aircraft would use only that runway.

§ Runway separations for the new runway vary from close-spaced to wide-spaced.

- A 1,267-foot separation would allow for dual taxiways between Runway 10R/28L and the new runway, an ADG V taxiway adjacent to the new runway and an ADG VI taxiway adjacent to Runway 10R/28L, separated by 267 feet (ADG V standards). This separation would allow simultaneous VFR operations on both runways by ADG V and VI aircraft, which requires a 1,200-foot separation.
- A 2,500-foot separation would allow for dependent IFR operations (simultaneous departures or simultaneous approach and departure) on Runway 10R/28L and the new runway. This separation (2,500 feet) would also allow simultaneous VFR operations where wake turbulence is a factor.
- A 3,250-foot separation would allow the maximum area to be developed between Runway 10R/28L and the new runway, while essentially keeping the new runway on existing Airport property.

⁹ See Technical Memorandum 5, Evaluation of Alternative Development Concepts, Portland International Airport Master Plan, P&D Aviation, April 15, 1998



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Some land acquisition could be needed for runway protection zones.

- § Options included the removal of Runway 3/21, the crosswind runway. It was determined from a review of weather data and operational considerations that the crosswind runway can be eliminated, and this would allow more room for terminal expansion between the parallel runways. Removal of the crosswind runway could be considered with any of the runway Alternatives 1 through 6 described below.
- § Options also included the relocation of the crosswind runway. This would provide the additional terminal expansion area between the parallel runways while retaining a crosswind runway. Relocation of the crosswind runway could be considered with any of the runway Alternatives 1 through 6 described below.

Alternative Runway Configurations. Seven runway configurations, some with variations, were initially considered in the master planning process. These alternatives were then refined and reduced in number as further data were developed on the airfield capacities and other effects of each. Brief descriptions of the initial alternatives follow.

- § Airfield Alternative 1A, New Close Commuter Runway -- In this alternative, a new 5,500-foot commuter runway would be located 1,267 feet from Runway 10R/28L, centered between the military area and the western boundary of the Airport.
- § Airfield Alternative 1B, New Close Commuter Runway -- In this alternative, a new 5,500-foot commuter runway would be located 1,267 feet from Runway 10R/28L, with the end of the runway protection zone at the western boundary of the Airport.
- § Airfield Alternative 2, New Close Air Carrier Runway -- In this alternative, a new 8,000-foot air carrier runway would be located 1,267 feet from Runway 10R/28L.
- § Airfield Alternative 3A, New Dependent Commuter Runway -- In this alternative, a new 5,500-foot commuter runway would be located 2,500 feet from Runway 10R/28L, centered in the existing military area.
- § Airfield Alternative 3B, New Dependent Commuter Runway -- In this alternative, a new 5,500-foot commuter runway would be located 2,500 feet from Runway 10R/28L, to the western edge of the Airport.
- § Airfield Alternative 4, New Dependent Air Carrier Runway -- In this alternative, a new 8,000-foot air carrier runway would be located 2,500 feet from Runway 10R/28L.
- § Airfield Alternative 5, New Wide Spaced Commuter Runway -- In this alternative, a new 5,500-foot commuter runway would be located 3,250 feet from Runway 10R/28L.
- § Airfield Alternative 6, New Wide Spaced Air Carrier Runway -- In this alternative, a new 8,000-foot to 11,000-foot air carrier runway would be located 3,250 feet from Runway 10R/28L.
- § Airfield Alternative 7, New Commuter Crosswind Runway -- In this alternative, the existing crosswind runway would be replaced by a new 5,000-foot commuter crosswind runway located at the west end of the Airport.



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Initial Terminal Concepts

Six individual passenger terminal concepts were developed as options to accommodate the long-term aircraft gate and terminal building requirements contained in Technical Memorandum 4, Airport Facility Requirements. Each concept provided approximately 77 jet gates and could handle 29 million annual passengers. The concepts are described below.

- § Terminal Concept A, Expansion of Previous Master Plan – In this concept, Concourses B and E would be extended to the east, and a new terminal would be constructed on the south side of the terminal loop road, adjacent to the extended Concourse B.
- § Terminal Concept B, Symmetrical Expansion of Existing Terminal – This concept would be similar to Concept A, with the exception that the new terminal would be in the center of the terminal loop road, between the extended Concourses B and E.
- § Terminal Concept C, Westside Expansion with Satellite Concourses – In this concept, new terminals would be added to the ends of Concourses B and E. The new terminals would be connected by an underground people-mover system to multiple satellite concourses located west of the main terminal.
- § Terminal Concept D, Eastside Expansion with Satellite Concourses – This concept envisions a new central terminal to replace the existing terminal located east of the existing terminal. The new terminal would be connected to multiple remote concourses as in Concept C by an underground people-mover system.

- § Terminal Concept E, Southside Expansion with Satellite Concourse – In this concept, a new terminal would be built at the end of Concourse B. The new terminal would be connected by a people-mover system (that could be either above or below ground) to a linear concourse located between Runway 10R/28L and the new runway. This concept would work only with Airfield Alternatives 5 and 6, which provide that the new runway is widely-spaced from Runway 10R/28L (3,250 feet between centerlines).
- § Terminal Concept F, New Southside Terminal – This concept would replace or augment the existing terminal with a new terminal and long linear concourse between Runway 10R/28L and the new runway. A people-mover system would run the length of the concourse and connect underground to the main terminal. This concept would work only with Airfield Alternatives 5 and 6.

Initial Composite Airfield and Terminal Concepts

The initial airfield and terminal concepts were combined into the 11 composite concepts listed below:

- § Terminal Concepts A and B with closely-spaced runway.
- § Terminal Concepts A and B with dependent runway.
- § Terminal Concepts A and B with widely-spaced runway.
- § Terminal Concept C with closely-spaced runway.
- § Terminal Concept C with dependent runway.
- § Terminal Concept C with widely-spaced runway.
- § Terminal Concept D with closely-spaced runway.



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- § Terminal Concept D with dependent runway.
- § Terminal Concept D with widely-spaced runway.
- § Terminal Concept E with widely-spaced runway.
- § Terminal Concept F with widely-spaced runway.

Evaluation of Initial Concepts

The runway and terminal alternatives and the 11 composite concepts were reviewed in Workshops 6 (Planning Advisory Committee and Airline Technical Committee) and 7 (Port Internal Team), on June 17-18, 1997. The evaluations at this point in the study focused primarily on separate analyses of the airfield and terminal alternatives, although the composite concepts provided insight into how well the two would work together, particularly with respect to the location of non-terminal functions on the Airport.

Participants in the workshops generally concluded that the planned third parallel runway should be capable of accommodating air carrier operations and should be capable of independent IFR operations with Runway 10R/28L (Airfield Alternative 6). It was further concluded that the new runway should be approximately 11,000 feet long.

The workshops also concluded that two basic terminal development approaches should be pursued further in the refinement and development of subsequent concepts. These were:

- § A centralized approach in which all terminal development to 2020 would take place between the existing parallel runways.

- § A decentralized approach where additional terminal development takes place between Runway 10R/28L and the new runway, possibly connected by a people-mover system to the existing terminal complex.

Narrowing and Refinement of Initial Concepts

With the results of the June 1997 workshops and subsequent studies by the consulting team, the alternative concepts were narrowed and refined. The concept refinements were reviewed and evaluated during workshops held on September 18, 1997 (Planning Advisory Committee and Airline Technical Committee) and September 19, 1997 (Port Internal Team). Based on the input from these two workshops and further technical studies, two airport development alternatives emerged for the final round of evaluation, the Centralized Alternative and the Decentralized Alternative.

FINAL DEVELOPMENT ALTERNATIVES

Although the Centralized and Decentralized Alternatives would have similar airfield facility improvements, the alternatives differ significantly in their terminal and landside development. The Centralized Alternative has the development of all passenger terminal facilities between the existing parallel runways, and a single airport access route (Airport Way). This involves expanding the existing terminal building, and constructing a satellite concourse in the northwest quadrant of the Airport. The Decentralized Alternative is based on development of a second passenger terminal area between the existing Runway 10R/28L and the proposed new parallel runway to the south. A new access road would serve this area.



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Centralized Alternative

Airside Improvements. Future airfield development would include taxiway improvements associated with the satellite concourse, construction of exit taxiways for existing runways, construction of a cross taxiway between Runways 10R/28L and 10L/28R, a possible extension of Runway 10L/28R, and the accommodation of a new parallel runway with taxiway system (planned for after 2020) (Figure 8).

The future parallel east-west runway would be 11,925 feet long and 200 feet wide, and would be located south of the existing runways with a centerline-to-centerline separation with the present Runway 10R/28L of 3,250 feet. Both landing thresholds would be displaced 925 feet from the ends of the runway to provide the required safety areas. The runway would be located to provide similar takeoff and landing capabilities of the present Runway 10R/28L (i.e., 11,000 feet available for takeoff) and Category III¹⁰ landing capabilities from the west.

With the development of a third parallel runway, the use of the crosswind runway would conflict with traffic and detract from the benefits provided by triple parallel runways. Furthermore, it was found that the frequency of operationally limiting crosswinds for air carriers occurs less than 0.1 percent of the time. The future airfield layout was therefore based on the eventual abandoning of Runway 3/21.

Passenger Terminal Expansion. The passenger terminal development in the Centralized Alternative would involve expansion of the existing terminal building and development of a satellite concourse (Figure 9). Concourses D and E of the present terminal

would be extended. Concourse B would also be extended to the east to a new 400,000 square foot, three-level terminal building that would be developed on the south side of the airport roadway. This terminal would serve gates located in the satellite concourse and Concourse B. The future terminal configuration would require the demolition of the present Concourse A.

The primary feature in this alternative is a satellite concourse located in the northwest quadrant of the Airport. The long-term program requires the construction of approximately 430,000 square feet of concourse area, and ramp frontage to park 30 jet and additional commuter aircraft. Access to and from the satellite from the terminal building would be via a 7,000-foot long underground automated people mover system.

Other Features. Airport Way would continue to be the sole access to the passenger terminal west of NE 82nd Avenue. By 2005 Airport Way would be widened from its existing four lanes to six lanes, which will be sufficient to accommodate long-term traffic needs. The proposed south-side terminal would have a three-level road system (arrival, transit, and departures), with traffic separated from traffic accessing the existing terminal area. The development of a new parallel runway would require some of the existing Air National Guard site. Due to this and the greater separation now required for munitions storage and armed aircraft, two options were explored for the future military facilities: (a) retaining military activity at the present location and (b) relocation of the military to another site on the Airport.

The Centralized Alternative proposes the option of locating the military on the west side of the airfield, south of Runway 10R/28L. Under this option, air cargo would be located on approximately 190 acres south of Runway 10R/28L that is presently occupied by military

¹⁰ A Category III Instrument Landing System has the following minimums: no decision height, and runway visual range of from 0 to 700 feet depending on the type of Category III facility.



LEGEND

- EXISTING AIRFIELD PAVEMENT
- POSSIBLE FUTURE AIRFIELD PAVEMENT & TERMINAL ACCESS
- POSSIBLE ULTIMATE TERMINAL DEVELOPMENT
- POSSIBLE FUTURE RUNWAY/TAXIWAY (AFTER 2020)

This drawing is for illustration purposes only. Improvements illustrated on this drawing may change and do not necessarily indicate a commitment to implement the improvements by the Port of Portland or the Federal Aviation Administration.

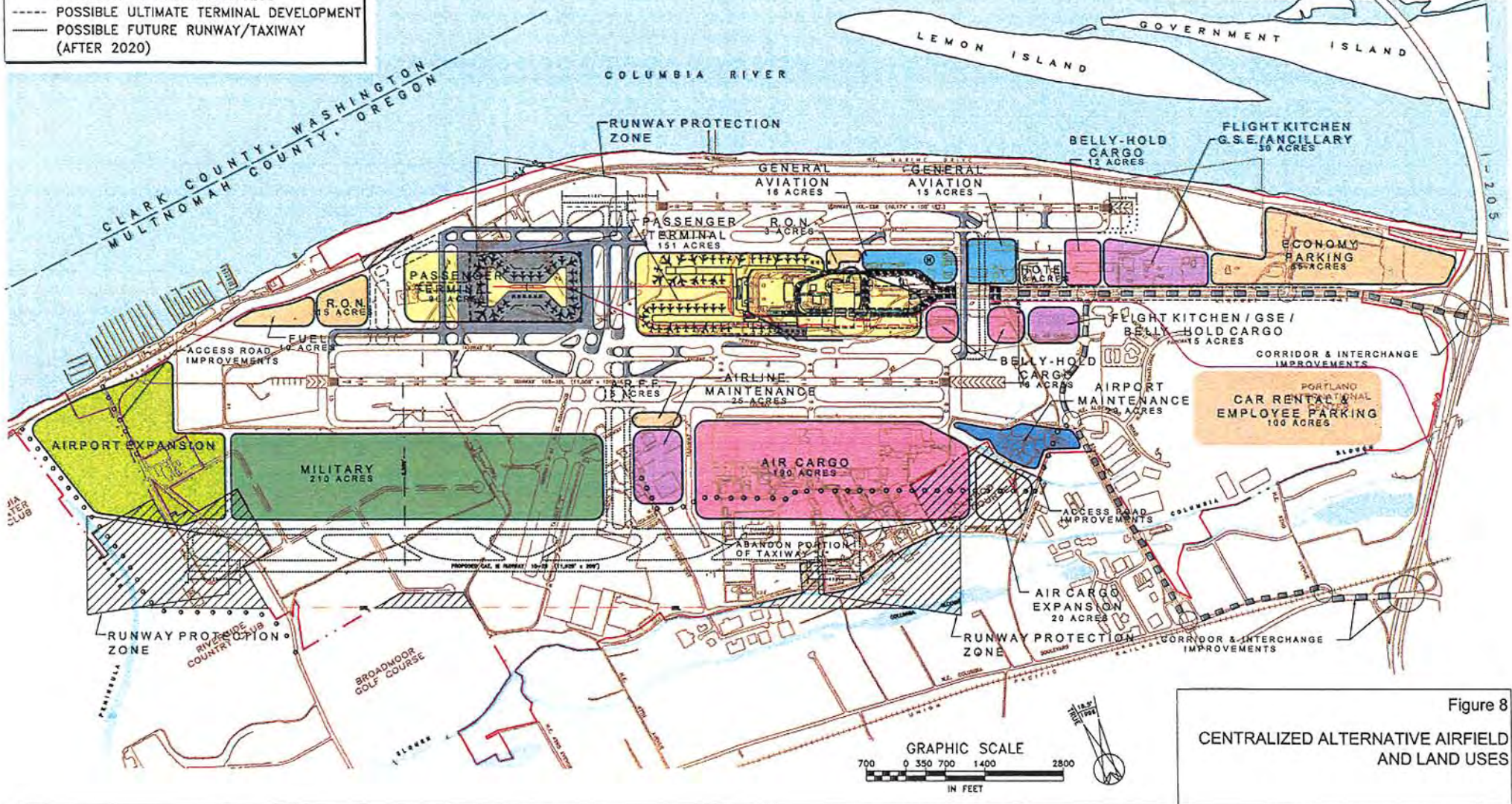


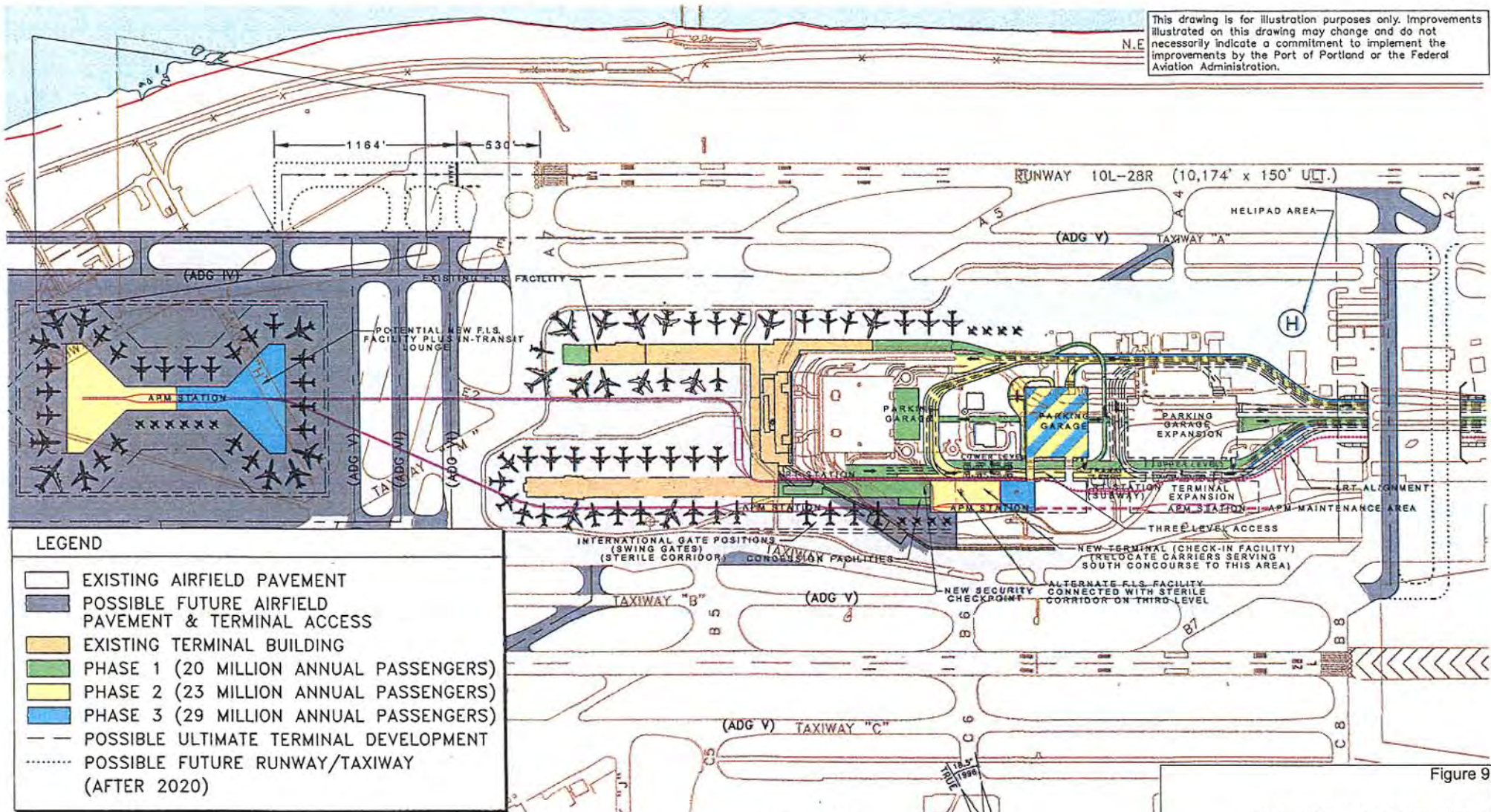
Figure 8
CENTRALIZED ALTERNATIVE AIRFIELD AND LAND USES



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LEGEND

- EXISTING AIRFIELD PAVEMENT
- POSSIBLE FUTURE AIRFIELD PAVEMENT & TERMINAL ACCESS
- EXISTING TERMINAL BUILDING
- PHASE 1 (20 MILLION ANNUAL PASSENGERS)
- PHASE 2 (23 MILLION ANNUAL PASSENGERS)
- PHASE 3 (29 MILLION ANNUAL PASSENGERS)
- POSSIBLE ULTIMATE TERMINAL DEVELOPMENT
- POSSIBLE FUTURE RUNWAY/TAXIWAY (AFTER 2020)

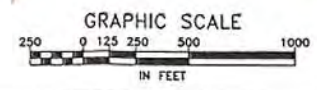


Figure 9
**CENTRALIZED ALTERNATIVE
TERMINAL AREA**



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facilities. This location also offers the potential reuse of the military apron for cargo aircraft. A potential expansion area for cargo has been identified to the east.

Decentralized Alternative

Airside Improvements. Future airfield development for the Decentralized Alternative would be similar in concept to the Centralized Alternative. However, the placement of terminal and other facilities calls for additional taxiway improvements (Figure 10). Since a passenger terminal would be located south of the existing Runway 10R/28L, high speed exit taxiways would be required on the south side of the runway. Also, a second parallel taxiway located south of Taxiway C would provide dual parallel taxiway capability for the north side of the new terminal. Since air cargo is proposed to be located south of the new runway, a partial parallel taxiway and exit taxiways would be included on the south side of the new runway.

In this alternative the existing crosswind runway would be used as a cross airfield taxiway. This would be possible because the extent of development of the new decentralized terminal required to meet the master plan program would not encroach upon the Runway 3/21 runway/taxiway system. Eventual extension of the decentralized terminal concourse to the west would be needed to meet demand projected to occur after the year 2020. At such time, use of Runway 3/21 for cross taxiway purposes would cease.

Passenger Terminal Expansion. The passenger terminal development in the Decentralized Alternative would involve expansion of the existing terminal building and development of a new terminal to the south (Figure 11). Concourses D and E of the present

terminal would be extended, as with the Centralized Alternative. Concourse B would also be extended to the east. The extension of Concourse B would be longer in this alternative than in the Centralized Alternative. A new 125,000 square foot, three-level terminal building would be developed on the south side of the airport roadway, and would serve Concourse B gates. As with the Centralized Alternative, this terminal configuration would require the demolition of the present Concourse A.

The major terminal feature in this alternative is the development of a new decentralized terminal south of Runway 10R/28L. After expansion of the existing terminal described above, the long-term program calls for the construction of 22 jet gates and additional commuter aircraft parking positions in the new terminal. The new decentralized terminal would consist of a single pier that could be extended to the west. The concourse would have an automated people mover on a mezzanine level to accommodate passenger movements from the terminal to the gates.

Other Features. Airport Way would continue to be the sole access to the existing passenger terminal west of NE 82nd Avenue. The proposed south-side terminal would have a three-level road system as in the Centralized Terminal Alternative.

The new decentralized terminal would initially connect to the regional road system via NE Alderwood Road, which is expected to have sufficient capacity through 2020. Beyond the year 2020, a high capacity connection from NE 82nd Avenue would be needed. Terminal curb access would be on three levels: arrival, transit and departure. Pedestrian sky-bridges would lead to a parking garage.



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LEGEND

- EXISTING AIRFIELD PAVEMENT
- POSSIBLE FUTURE AIRFIELD PAVEMENT & TERMINAL ACCESS
- POSSIBLE ULTIMATE TERMINAL DEVELOPMENT
- POSSIBLE FUTURE RUNWAY/TAXIWAY (AFTER 2020)

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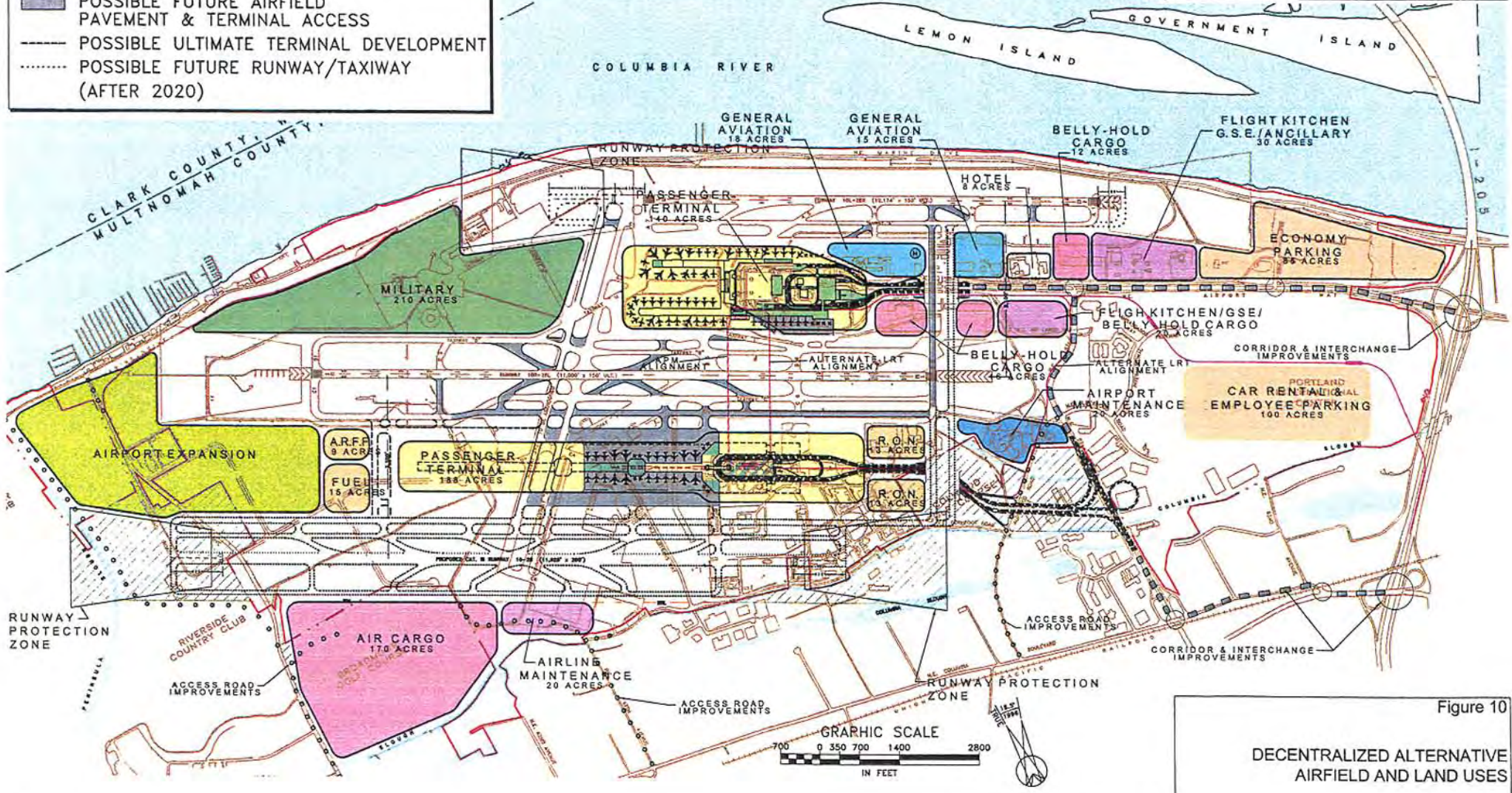
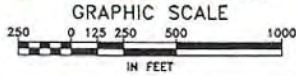
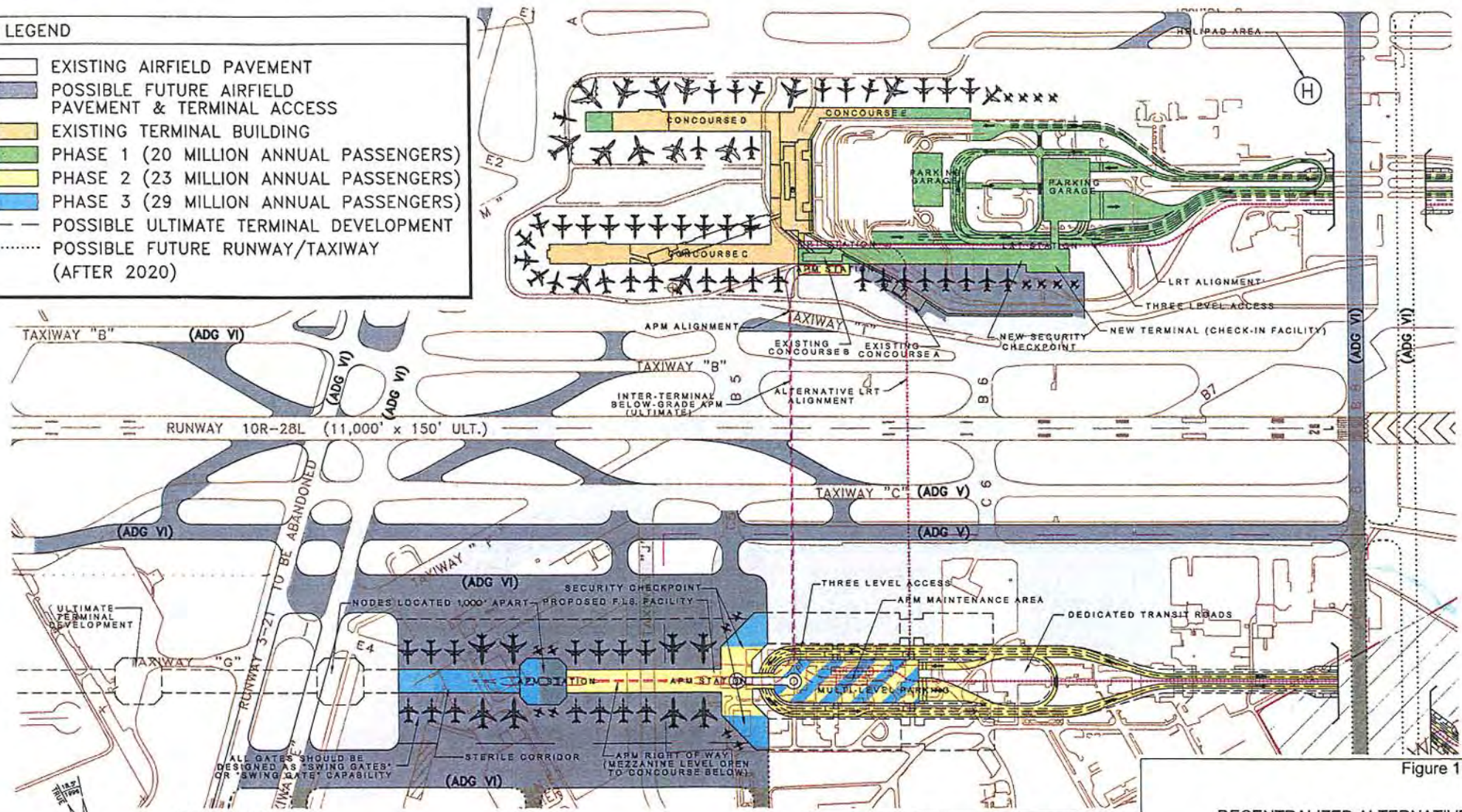


Figure 10
DECENTRALIZED ALTERNATIVE AIRFIELD AND LAND USES



LEGEND

- EXISTING AIRFIELD PAVEMENT
- POSSIBLE FUTURE AIRFIELD PAVEMENT & TERMINAL ACCESS
- EXISTING TERMINAL BUILDING
- PHASE 1 (20 MILLION ANNUAL PASSENGERS)
- PHASE 2 (23 MILLION ANNUAL PASSENGERS)
- PHASE 3 (29 MILLION ANNUAL PASSENGERS)
- POSSIBLE ULTIMATE TERMINAL DEVELOPMENT
- POSSIBLE FUTURE RUNWAY/TAXIWAY (AFTER 2020)



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Figure 11
DECENTRALIZED ALTERNATIVE TERMINAL AREA



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In this alternative, the military would be relocated to the northwest quadrant.

Approximately 170 acres would be dedicated for cargo use south of the new runway. This location would provide sufficient land area with close proximity to the airfield. This area is presently occupied by the Broadmoor Golf Course, which would need to be acquired, along with approximately 20 acres adjacent to the golf course along NE 33rd Drive.

EVALUATION OF FINAL ALTERNATIVES AND CONCLUSIONS

In the evaluation of the final two alternatives, evaluation criteria were grouped under the following six general categories:

- § Airfield facilities
- § Passenger and terminal facilities
- § Community impacts and surrounding land uses
- § Landside access
- § Environment
- § Financial

Major findings and conclusions of the evaluation process are:

- § Both alternatives would accommodate the 2020 requirements for passenger facilities and non-passenger needs such as cargo and military. More property would need to be acquired under the Decentralized Alternative to meet these requirements.
- § The Decentralized Alternative would provide for greater opportunity and flexibility to accommodate passenger demand after the year 2020.

§ The Decentralized Alternative would allow more efficient airfield operations through shorter taxi distances, fewer runway crossings, and better circulation on terminal aprons.

§ The Centralized Alternative is estimated to cost \$2.5 billion (in 1997 dollars) over 20 years. The Decentralized Alternative is estimated to cost \$3.5 billion. The differences in cost are primarily attributed to additional costs for land acquisition, airfield, and roadway improvements under the Decentralized Alternative.

§ The Decentralized Alternative would provide a second access route to a passenger terminal thus relieving traffic from Airport Way. This would also serve to better accommodate ground access growth in the long term.

§ Impacts on passengers during terminal construction would be less with the Decentralized Alternative. Passengers would not be disrupted during construction of the entrance roadway to the new decentralized terminal and during initial construction of the new decentralized terminal.

The differences between the two alternatives in terms of environmental and financial factors were not judged to be sufficient to drive the selection of a preferred alternative. Both alternatives offer opportunities to mitigate potential environmental impacts. This suggests that superiority in terms of operational factors, such as efficiency of aircraft operations and the ability to accommodate demand beyond 2020 are the most important. In this respect, the Decentralized Alternative offers the greatest opportunity for long-term airport development,



while best addressing the airport development goals established for this project.

MASTER PLAN IMPROVEMENTS

THE MASTER PLAN

The proposed Master Plan improvements, based on the Decentralized Alternative, are described below and illustrated in Figures 10 (airfield and land uses) and 11 (terminal area).

Airfield Improvements

The primary improvement in the airfield development program is the construction of a parallel east-west runway, planned for the post-2020 time period. The runway is planned to be 11,925 feet long and 200 feet wide, with a centerline-to-centerline separation of 3,250 feet with the present Runway 10R/28L. The landing threshold of each end will be displaced 925 feet. The runway will provide similar takeoff and landing capabilities to the present Runway 10R/28L, 11,000 feet available for takeoff and Category III¹¹ landing capabilities from the west.

The western location of the landing threshold is dictated by Category III requirements which allow no obstructions within a 50:1 final approach surface and approach light plane.

The eastern landing threshold will be displaced 925 feet in order to provide a 1,000-foot long extended Runway Safety Area (RSA) beyond the landing threshold. This provides 11,000 feet of runway for takeoffs in each direction. For arrivals, the landing distances will be 10,075 feet for Runway 10, and 11,000 feet for Runway 28.

¹¹ Ibid.

Dual parallel taxiways will be provided on the north side of the new runway to serve the decentralized terminal. One of these will be 100 feet wide with a runway-centerline-to-taxiway-centerline separation of 600 feet. This will accommodate unrestricted Aircraft Design Group VI operations. Since air cargo is proposed to be located south of the new runway, a partial parallel taxiway will be constructed on the south side of the new runway. The runway will be served by three high-speed exit taxiways in both operating directions to the north and two in each direction to the south.

Improvements to the existing main runways will include additional exit taxiways for both runways. For Runway 10R, three high-speed exits will be constructed, and on Runway 10L one high-speed and one right-angled exit taxiway are proposed. Three high-speed exit taxiways will also be added on Runway 28L.

A potential improvement is the extension of Runway 10L by approximately 1,694 feet and Runway 28R by approximately 530 feet. The additional length of Runway 10L/28R would expand the takeoff capability of the runway, which is used when the existing south runway is not available.

Various taxiway modifications are included in the vicinity of the existing terminal building to improve taxi flows. Taxiway facilities around the existing terminal building will continue to involve a single parallel taxiway and an apron edge taxiway along aircraft parking positions. Operations on the apron edge taxiway around the existing concourse will continue to be affected by aircraft being pushed back from the gates.



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The existing crosswind runway will be used as a cross taxiway, since the development of the new decentralized terminal will not encroach upon the Runway 3/21 runway/taxiway system. However, eventual extension of the decentralized terminal concourse to the west is envisioned in order to meet demand after the year 2020. Then use of Runway 3/21 as a cross taxiway will cease.

Passenger Terminal

The future passenger terminal development will involve expansion of the existing terminal building and development of a new decentralized terminal. Concourses D and E of the present terminal will be extended and will provide 19,200 and 35,200 square feet of concourse area, respectively. Concourse B will be realigned and extended to the east to provide an additional 145,000 square feet of concourse area. A new 125,000 square foot, three-level terminal building will be developed on the south side of the airport roadway, and will serve Concourse B gates. Concourse A will be removed.

After expansion of the existing terminal, a new decentralized terminal south of Runway 10R/28L will be constructed. The year 2020 program calls for the construction of 22 jet gates and additional commuter aircraft parking positions in the new terminal. This will consist of approximately 311,000 square feet of concourse area, and 475,000 square feet of terminal building. The concourse will consist of a single pier that can be extended to the west. An automated people mover will be provided on a mezzanine level to accommodate passenger movements from the terminal to the gates. Concession nodes will be spaced at 1,000 foot intervals in the concourse.

The concourse and apron layout allows for an apron edge taxiway capable of Airplane Design Group VI operations, apron service road, and a depth of 300 feet (from face of concourse to the edge of the service road) for aircraft parking and push-back.

Connections between the two terminals will be via shuttle bus, light rail, or a 2,800-foot long underground automated people mover system.

Passenger Terminal Access and Parking

Airport Way will continue to be the sole access to the existing passenger terminal west of NE 82nd Avenue. By 2005, Airport Way should be widened from its existing four lanes to six lanes, which should be sufficient to accommodate traffic in this concept. Access to the existing terminal complex will use the present roadway system, with realignment along the south side of the terminal area when Concourse A is demolished and Concourse B is extended. The proposed south-side terminal will have a three-level road system (arrival, transit and departures), with traffic separated from traffic accessing the existing terminal area.

The new decentralized terminal will initially connect to the regional road system via NE Alderwood Road, which is expected to have sufficient capacity through 2020. Beyond the year 2020, a high capacity connection from NE 82nd Avenue is proposed. A four-lane entrance road from NE Alderwood to the new decentralized terminal is planned. Terminal curb access will be on three levels: arrival, transit and departure. Pedestrian sky-bridges will lead to a parking garage.

In the long term, PDX will need a maximum of 18,000 public parking spaces as compared to 11,700 available in 2000. About 2,000 spaces will be added to the central parking garage, and



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2,000 spaces will be located adjacent to the satellite terminal. About 3,000 spaces will be located at the new south decentralized terminal. Other parking will be provided at the economy parking lot along Airport Way or at other on-site remote locations. Rental car facilities (about 3,000 spaces, plus support facilities) will be located at the Portland International Center, as will employee parking (about 3,000 spaces).

Light rail transit service will be provided with a station at the existing terminal's southwest corner, and might be extended to the new decentralized terminal.

Other Airport Facilities

Military. An area in the northwest part of the Airport has been identified for the relocation of the U.S. Air Force Reserve and the Oregon Air National Guard.

Cargo. Approximately 170 acres of space has been dedicated for cargo use south of the new runway. This area is presently occupied by the Broadmoor Golf Course, and must be acquired, along with approximately 20 acres adjacent to the golf course along NE 33rd Drive.

Airline Maintenance. The new decentralized terminal will require the relocation of the present Horizon maintenance facility in Phase 2. A new site encompassing twenty acres has been identified south of the new runway for airline maintenance facilities.

RON Apron. Apron areas (26 acres) for overnight parking have been identified on the east end of the new decentralized terminal area. The existing military apron area can be used for RON parking during interim periods of the master plan.

Fuel. A fuel storage area has been located between Runway 10R/28L and the new parallel runway. Fifteen acres is provided.

Airport Rescue and Fire-Fighting (ARFF). The airport rescue and fire-fighting building may be relocated when new military facilities are developed. A site adjacent to the new fuel storage area has been identified for a new ARFF. If an auxiliary station is required, space is available near the end of Runway 28R.

Land Acquisition

Approximately 158 acres of property may be acquired, including the Broadmoor and Colwood Golf Courses and some adjacent properties along NW 33rd, and land east of the Colwood Golf Course. The Broadmoor Golf Course may be needed for cargo development, and the area east of Colwood Golf Course may eventually be required for road right-of-way. The latter might be required after the year 2020 for connecting the new decentralized terminal access road with NE 82nd. All land acquisition will be contingent upon growth of the Airport and meeting environmental and funding needs.

On-Airport Relocations

The following is a list of on-airport facilities that will be displaced by airport development. The timing of the displacements will be driven by passenger growth and airport development.

- § General aviation T-hangars and FBO hangars -- impacted by realignment of the terminal roadway.
- § ARFF and burn pit -- displaced by the new military facilities.
- § Military -- required for new runway and to meet munitions setback requirements.



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- § Emery, Federal Express, UPS, and other central ramp tenants -- required for new runway and associated airfield development.
- § Airtrans Center maintenance hangar -- required for new runway.
- § Horizon Maintenance hangar -- required for new decentralized terminal.
- § Fuel Storage -- required when military facilities are relocated.
- § Airport Surveillance Radar -- required for new runway.

PHASING OF DEVELOPMENT

Future development under each of the alternative concepts would be phased over time according to user needs. Since the need for future facilities at PDX is primarily dependent on the passenger volume, the phasing of facility improvements is related to passenger growth, in millions of annual passengers (MAP). The timing of improvements is also contingent upon funding. While improvements are tied to specific activity levels, it must be remembered that it is the programming of the Airport Improvement Program (AIP), and Facilities and Equipment (F&E), as well as Passenger Facility Charges and Airport funds, that will determine the timing of many projects. The successful completion of environmental reviews will also play a role in project design and timing.

The proposed airfield phasing plan is presented in Figure 12. Figure 11 shows the phased development of terminal and roadway improvements. The development proposed for each phase is the development needed to accommodate the MAP level at the end of the phase (i.e., 20 MAP at the end of Phase 1).

Phase 1 (14 to 20 MAP)

Airfield improvements in the first phase will involve enhancement of the capacity of existing runways through the construction of exit taxiways, and apron expansion to accommodate the extension of Concourse B. Terminal development in this phase will involve the extension of Concourses D and E, and the extension of Concourse B. A small passenger terminal will be constructed at the end of Concourse B to serve gates in Concourses B and C. At the end of this phase, the buildout of gates at the existing terminal building will be achieved.

Phase 1 roadway projects include realignment of the terminal roadway due to Concourse B construction and development of the south side terminal. The existing parking garage will be expanded and a new parking structure will also be constructed east of the central utility plant. There will be no land acquisition completed in this phase. Acquisition for Phase 2 projects may be initiated during this period.








Airport facilities that must be relocated because they will be impacted by Phase 1 improvements include three T-hangars, an FBO hangar, the fuel farm, and possibly the ARFF facility and burn pit. It is assumed that the military will need to relocate in Phase 2, and therefore, relocation of the fuel farm, ARFF and burn pit must occur prior to the development of military facilities in the northwest quadrant.

The Phase 1 improvements would support either the Decentralized or Centralized Alternatives. Construction in Phases 2 and 3, as described below, would require a commitment to a new decentralized terminal (Decentralized Alternative) and ultimately the third runway.



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LEGEND	
	EXISTING AIRFIELD PAVEMENT
	PHASE 1 (20 MILLION ANNUAL PASSENGERS)
	PHASE 2 (23 MILLION ANNUAL PASSENGERS)
	PHASE 3 (29 MILLION ANNUAL PASSENGERS)
	POSSIBLE FUTURE RUNWAY/TAXIWAY (AFTER 2020)
	POSSIBLE ULTIMATE TERMINAL DEVELOPMENT
	POTENTIAL LAND ACQUISITION

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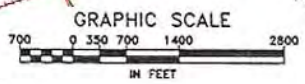
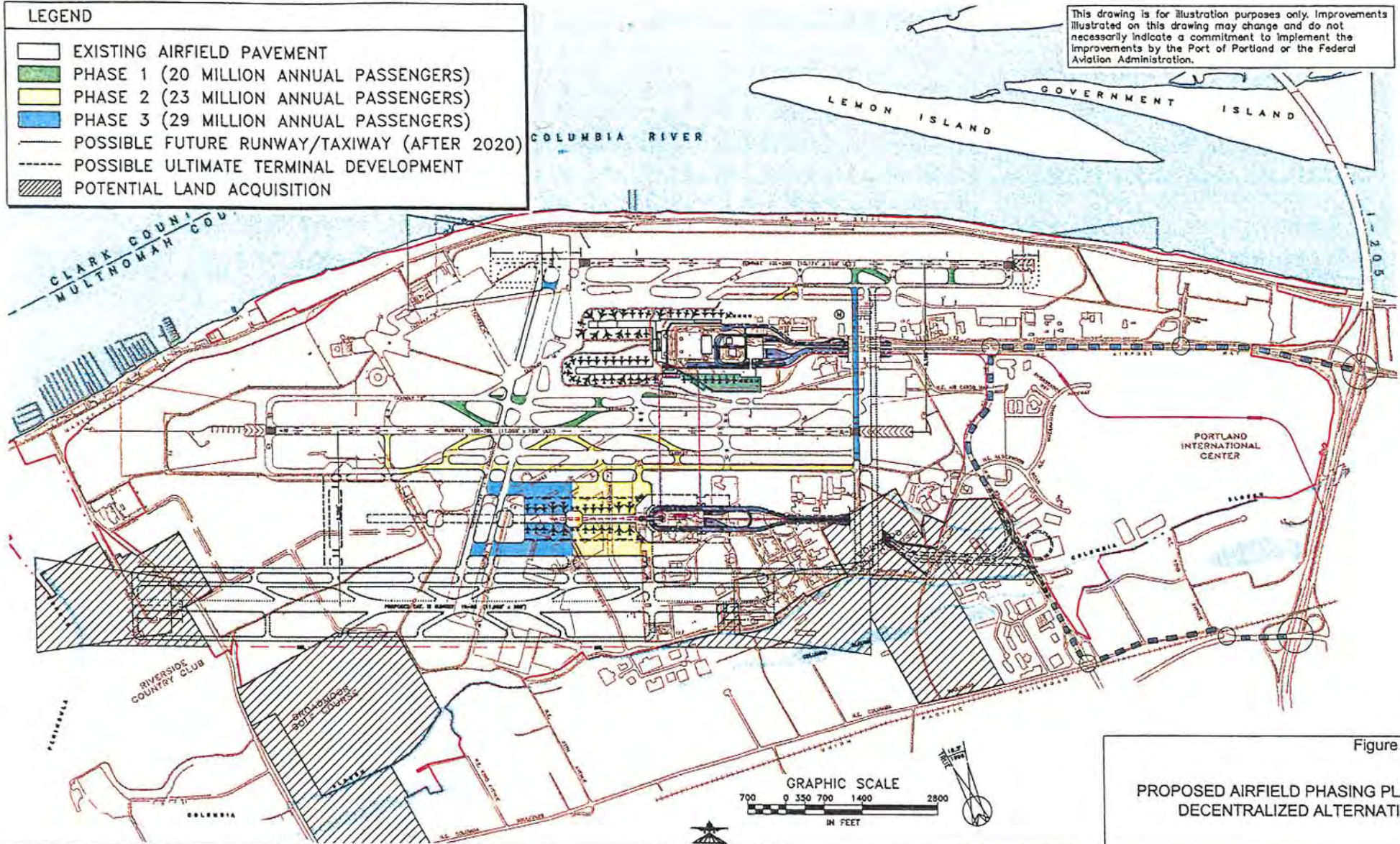


Figure 12

PROPOSED AIRFIELD PHASING PLAN
DECENTRALIZED ALTERNATIVE



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Phase 2 (21 to 23 MAP)

Phase 2 airfield improvements will support the new decentralized passenger terminal that is also developed in this phase. Airfield improvements will include the construction of a dual parallel taxiway south of Taxiway C, high-speed exit taxiways on the south side of Runway 10R/28L, and terminal apron for the decentralized terminal.

Terminal development in this phase will include the initial construction of the new decentralized terminal building (300,000 SF) and concourse (150,000 SF of concourse level area). In this phase the access road for the new decentralized terminal will be constructed, and the first stage of a multi-story parking structure will be built.

Land acquisition required in this phase includes the Colwood Golf Course and industrial property adjacent to NE Cornfoot and NE Alderwood Roads. This is required for future cross taxiway development and access to the new decentralized terminal.

Airport tenants that may be relocated in this phase include the military and Southwest Ramp tenants.

Phase 3 (24 to 29 MAP)

A cross taxiway at the east-end of the terminal area, connecting Runway 10L/28R with the new south terminal, is included in this phase. This requires taxiway bridges over Airport Way and the access roadway to the decentralized terminal.

Phase 3 terminal development includes the expansion of the decentralized terminal (175,000 SF) and extension of the concourse to meet program requirements (77 total jet gates).

Ground access improvements in this phase include the expansion of the parking structure for the decentralized terminal.

Phase 3 land acquisition includes: industrial areas south of Cornfoot Road (for the new runway and RPZ); Broadmoor Golf Course and adjacent properties along N.E. 33rd (for air cargo); the correctional institution and portion of the Riverside Country Club (for the new runway and RPZ); and, an aviation easement over part of the Columbia Edgewater Country Club (for the new runway RPZ).

Airport tenants and facilities that may be relocated in this phase include the Horizon maintenance hangar, the Central Ramp and some Central Ramp tenants west of the Horizon maintenance facility, the South Ramp and South Ramp tenants, general aviation hangars, and airport surveillance radar.

Long-term development of the airfield (after 2020) will include the construction of the new parallel runway and associated parallel and exit taxiway system. The parallel taxiway system for the new runway includes a dual parallel taxiway on the north side and partial parallel taxiway on the south side of the runway.

DEVELOPMENT COSTS

The total long-range development costs for the Master Plan improvements are estimated to be approximately \$3.5 billion, in 1997 dollars (Table 5). These costs include mobilization, architectural and engineering services and an allowance for contingencies. Costs for capital improvement projects that are identified in the Airport's Capital Improvement Program but not a master plan improvement are also included.

Not all of the costs reported here would be borne by the Port. Costs that could be provided



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by others include: (1) nav aids that are furnished by the Federal Aviation Administration through its Facilities and Equipment (F&E) program, (2) a portion of the costs of on-site access roads serving non-airport areas, and (3) a portion of the costs of off-site roadway improvements in the airport vicinity.

FINANCIAL CONSIDERATIONS

The capital cost estimates were prepared to give an idea of the order of magnitude of the long-term costs of the potential Airport improvements. Over time, the estimates will be refined as more is known about the details of the design.

The alternatives have been reviewed by the airlines. While the Decentralized Alternative has a higher capital cost, the proximity of the decentralized terminal to two runways may result in a lower operating cost to the airlines. At 2020 levels of demand when such a facility may be in place, congestion on the airfield may be a significant factor and the ability to access gates quickly may be an important advantage. The Decentralized Alternative also has greater long-term expandability to the west than does the Centralized Alternative. Westward expansion of the Centralized Alternative is limited by the Columbia River.

The impact of adding facilities over a 20-year period is that rates and charges are anticipated to rise. It will be important for the Port to manage the development program in such a way that the airline rates and charges remain at levels that are acceptable to the airlines and competitive with other airports. The Port will continue to manage its capital program to insure that the Airport remains financially self-sufficient and meets all financial requirements.

Table 5
ESTIMATED COSTS OF MASTER PLAN IMPROVEMENTS

Description	Estimated Cost (Millions of 1997 Dollars)
Terminals	1,477
Parking	489
Runway	526
Land Acquisition	353
Military Relocation	409
Roads and Transit	141
Other	165
Total	3,560

Sources: Estimates by P&D Aviation.

ENVIRONMENTAL CONSIDERATIONS

An initial environmental screening analysis was performed on the two airport development alternatives. The differences between the environmental impacts of each were not judged to be sufficient to drive the selection of a preferred alternative. Both alternatives offer opportunities to mitigate potential environmental impacts. Chapter 5 describes the environmental planning to be done as a follow-on to the Master Plan and the environmental regulations under which the Airport operates.



Chapter 3

Strategies to Maintain PDX Viability

INTRODUCTION

Regardless of the direction that is ultimately taken for the long-term development of PDX, it is important to maintain the viability of PDX both now and in anticipation of future growth. The strategies outlined below are intended to help maintain the Airport as a viable facility and enable the it to continue serve the air transportation needs of the region into the foreseeable future.

STRATEGIES

LAND ACQUISITION

The Port has a policy of acquiring land around the boundary of PDX as it becomes available and as funds are available. This land is used to buffer the Airport from existing incompatible surrounding uses, to prevent the development of incompatible uses, and in some cases, may be held for future airport development. This policy will continue.

FACILITY IMPROVEMENTS

The 1990's were a period of significant growth at PDX. Passenger traffic doubled and the Port was hard pressed to make improvements fast enough to accommodate that growth. It is important that incremental improvements

continue to be made to accommodate the transportation needs of the flying public and shippers of cargo. These improvements will be made **only when demand exists**, project funding is available, and the projects can be accomplished in an environmentally acceptable manner.

Examples of improvement projects underway in the year 2000 include:

- § Construction of light rail to the Airport.
- § Widening Airport Way between I-205 and 82nd Avenue.
- § Southward extension of the terminal building.
- § Expansion of Concourse C.
- § Expansion of the central utility plant that provides heating and cooling for the terminal.
- § Drainage improvements throughout the airfield.
- § Development of a system to capture aircraft and runway deicing fluids.
- § Repaving Taxiway A.
- § Development of a ground run-up enclosure for testing aircraft engines.

A combination of maintenance and facility expansion related projects will continue into the foreseeable future subject to availability of funding, environmental and land use compatibility, and compatibility with future airport growth needs.



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AIRPORT ACCESS IMPROVEMENTS AND FUNDING

Good, multi-modal access to the Airport is desirable to keep PDX viable. The Port is presently, and will continue to be, an active participant in the Metro sponsored regional transportation planning process to plan and implement a comprehensive system of transportation improvements throughout the Portland metro area.

The Port is a member of the following regional planning committees:

- § Joint Policy Advisory Committee on Transportation (JPACT). JPACT is a 17-member committee made up of elected officials and representatives of agencies involved in transportation. Their goal is to evaluate all transportation needs in the region and make recommendations to the Metro Council.
- § Transportation Policy Alternatives Committee (TPAC). TPAC's 21 members include technical staff from the same jurisdictions who are members of JPACT, plus representatives of the Federal Highway Administration, and six citizen members appointed by the Metro Council. TPAC makes recommendations on technical issues to the JPACT.

The access needs of the Airport are integrated into the broader regional transportation effort through the committee structure outlined above.

Annually, the Port prepares the Port Transportation Improvement Program (PTIP). The PTIP outlines transportation improvements needed to provide access to the Airport (and

other Port of Portland facilities). The PTIP is included in the Regional Transportation Plan (RTP) which is prepared by Metro. The RTP is the region's 20-year blue print for transportation improvements and includes not only a listing and prioritization of projects, but also funding strategies to pay for those improvements.

Funding of transportation improvements is a significant issue in the region. The Port will continue to participate in the regional planning process to develop the means to fund improvements regionally and for Port of Portland facilities, including PDX.

Most on-airport improvements, particularly airfield, airport roadways and parking, and terminal facilities, are self-funded by the Airport, the airlines, and the Federal Aviation Administration (FAA). There are often *off-airport* transportation improvements that are needed for which funding with airport funds is prohibited. The FAA and the US Government Accounting Office (GAO) have regulations which limit where airport generated funds can be spent. This prohibits the expenditure of airport generated funds off the airport proper (known as diversion of revenue). The Port will continue to analyze funding needs of off-airport transportation improvement projects and will work with the FAA to determine any potential opportunities for airport funds to be used while remaining within the legal constraints of FAA and GAO guidelines.

The most recent example of this type of activity was the funding to pay for the extension of TRIMET's light rail line to the Airport. It took a significant effort on the part of the Port to work through the issue of diversion of revenue to fund a portion of the new airport light rail system.



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PRESERVE OPTIONS TO IMPLEMENT THE FACILITY ELEMENT OF THE MASTER PLAN

The facility element of the Master Plan outlines the long-term (20+ year) needs of the Airport. Many of the improvements outlined in the facility element will not be needed for 15 – 20 years. It is important that all current projects be reviewed for their impact on long-term improvements outlined in the Master Plan.

The most recent example of this was an air cargo development that was permitted directly in the path of the possible 3rd parallel runway. The lease term for that transaction contained provisions for the Port to purchase the improvements under terms which would allow the cargo development to exist short term without foreclosing the possibility of the 3rd runway long term.

AIRPORT LAND USE PERMIT

The Airport is located in a City of Portland designated industrial zone and is not an “outright” permitted use. The Airport is allowed to exist through a “Conditional Use Permit” (CUP) which, as the name implies, places conditions on the use (the Airport) which make it acceptable within the industrial zone. The CUP was issued to the Port in August of 1993 and if no action is taken, it will expire in August of 2003, ten years after it was issued.

Prior to expiration of the CUP, the Port will make application to the City of Portland to renew the CUP or create an “airport zone” or other zoning update through the “plan district” provision of the City of Portland zoning code. The Port will apply for either the CUP or airport zone prior to the expiration date of the current CUP. The permit application will include a

community outreach process. The basis for the application will be this Master Plan update.

UPDATE PDX AIRSPACE CAPACITY STUDY

In 1993, the FAA prepared an Airspace Capacity Study for PDX. The study looked at how many aircraft were forecast to use PDX and whether or not the Airport had the capacity to handle that level of activity. One element of this Master Plan is the possibility that the Airport may one-day need a 3rd parallel runway. The 1993 Capacity study analyzed the Airport with its existing 3-runway configuration. An update of that study has been initiated (spring 2000) by the FAA Technical Center in Atlantic City, to evaluate the capacity implications of PDX with a 3rd parallel runway. The analysis will examine the design and operation of a 3rd parallel runway configuration detailing how the runways would be best used and how they might function with the two terminal alternatives – centralized and decentralized. The FAA anticipates completing the Capacity Study Update in the summer of 2001.

FISCAL ANALYSIS OF MASTER PLAN ALTERNATIVES

The Port of Portland prepares a capital plan on an annual basis that outlines a schedule of improvements for the coming five years. Master Plan improvements that would occur in the coming five years would be included within that plan. For improvements that are planned for implementation beyond five years, a 20-year capital plan developed specifically for the Master Plan is used to estimate the cost of Master Plan improvements. As master plans are refined, the capital estimates for those plans are updated.



Chapter 4

Strategies for Capacity Preservation

INTRODUCTION

One approach to accommodating the growth in the region for air transportation is to ensure that *all* facilities in the region are used to their fullest. The strategies for capacity preservation outlined in this chapter include steps that may be taken at PDX and at other airports and *other modes* in the region to meet the growth travel demand. These strategies may help to delay the need for costly and sometimes disruptive improvements throughout the aviation system, including at PDX.

STRATEGIES

COORDINATE WITH NORTHWEST AIRPORTS

The Regional Air Transportation Demand Task Force recommended that the Port meet with SEATAC Airport staff to discuss the possibility of coordination of air service between the two airports. The Port will meet with staff from SEATAC and other northwest airports such as Eugene and Redmond to discuss whether or not an opportunity exists for such coordination. Opportunities in this area will likely be limited since most air service is based upon the population of the service area. These meetings will be held by the end of 2001.

Another recommendation of the Task Force was to coordinate with the State aeronautics agencies in Oregon and Washington to ensure that steps are taken to coordinate the roles of airports within the respective states and to ensure that all airports in the Portland area have adequate Master Plans for long term preservation and development. It was also recommended that attention be given to strategies that ensure that adjacent land uses are compatible with those airports. The State of Oregon Department of Aeronautics has developed a series of model airport protection ordinances. The Port will work to see if those ordinances can be used in Cities adjacent to its airports and will encourage other airport operators in Oregon to do the same.

The airport staff will meet with Oregon and Washington State Aeronautics Departments to discuss coordination of airport services and airport protection issues by the end of 2001.

PASSENGER RAIL IN THE I-5 CORRIDOR

The Port of Portland is not involved in the passenger rail business. It is involved with businesses that use rail to transport raw materials and finished goods. Rail planners have recognized that access in the Interstate 5 corridor between Portland and Seattle is impacted by the railroad crossing of the Columbia River between Portland and Vancouver Washington. This railroad bridge is



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presently a major bottleneck for trains in this corridor. The Port is presently involved in planning efforts with the industry to develop an additional crossing for trains at that location. This improvement, when made, will improve rail access for all users in the I-5 corridor, including passenger rail. This activity is ongoing.

Both the State of Washington and Oregon have departments that are charged with planning and promoting rail service within those respective states. The federal government also has agencies with the same mission. The Port supports the development of other rail resources within the respective states including resources for both freight and passenger rail.

DISCUSS OTHER LOCATIONS FOR MILITARY

Alternatives under consideration with the PDX Master Plan 2000 require the relocation of the military. Plans call for the relocation of both the Oregon Air National Guard and the Air Force Reserve into the northwest quadrant of the Airport adjacent to Marine Drive and west of the existing terminal facilities.

As analysis of the decentralized terminal alternative continues, discussions will be held with the military about the feasibility and costs of relocation on PDX. In addition to discussions about relocating on PDX, the idea of relocating to an airport *other than PDX* will be explored.

Because the issue of relocating the military is very specialized, the Port anticipates hiring a consulting firm (or firms) with expertise in siting, relocation, and funding military base relocations. The consultant will work with a team made up of Port staff and staff from the military units located at PDX. The project team may also be joined by staff from the State of

Oregon Military Department located in Salem. The study is anticipated to take approximately one year to complete. Informal discussions with the military were initiated in September 2000. The start date for the project is anticipated to be early in the year 2001.

INVESTIGATE CARGO HANDLING AT OTHER AIRPORTS

Fourteen airlines currently provide air cargo service at PDX. Cargo service is provided domestically throughout Oregon and the United States and internationally including Europe and Asia. Some of the cargo flights occur at night and some result in over-flights of neighborhoods adjacent to the Airport having an adverse impact.

All of the cargo operators at PDX have either operating agreements and/or leases that permit them to conduct their operations at PDX. As those leases and or operating agreements come up for renewal, the Port will explore with the operator whether or not those operations might voluntarily move to another airport where there might be less impact to the community and minimal disruption to the cargo operation. Staff will also explore siting at other airports for any new operators who approach PDX for permission to start up new or expanded cargo handling operations. In looking at possible other airport locations, non-Port owned and operated airports will be considered as well as Port owned airports. This activity will be ongoing.

TERMINAL DEMAND MANAGEMENT STRATEGIES

A significant level of passenger activity associated with air travel occurs in the Airport terminal. Passengers buy tickets or check in for



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flights at a ticket counter. They pick up boarding passes and are processed onto and off of their aircraft at the aircraft gate. Baggage is retrieved after a flight at baggage claim. Historically, the airlines have wanted to have exclusive use of particular ticket counter and gate areas. This has allowed them to put up company advertising and help them “brand” their service at those locations. There are also technology issues involving how airlines access their computer reservation systems at the gates and ticket counters. Where an airline has a steady schedule of passengers and flights throughout the day, there is good utilization of those facilities. In some cases, there are gaps in the schedule or an airline may provide service in “banks” of flights that all come and go in a concentrated period of time with only limited activity throughout the balance of the day. In the latter case, facilities may remain unused for significant periods.

The use of terminal facilities (ticket counter, gates, bag claim) is governed by what is known as an “airline agreement”. The airline agreement is essentially a contract between the airlines and the Port which spells out how the Port and the airlines will operate the Airport, which spaces are used by which airlines, and how the airlines are charged for the spaces they use. In future airline agreements, there may be an opportunity to impose “use it or lose it” type clauses which would specify a minimum level of activity to justify the long-term rental of a gate or ticket counter. As an example, an airline with two flights a day might not be allowed to hold a gate for their exclusive use. A minimum gate utilization requirement might be established at “four” or more flights a day.

This concept is one that cannot be unilaterally imposed by the Port on the airlines. It will require negotiation and agreement by both parties. The airline agreement has fixed dates

and the next opportunity to negotiate this type of provision is in the 2003 to 2004 time frame.

There are also technological requirements for shared ticket counter and gate use. Common use systems must be hard wired into central processing systems. At this time, those systems do not exist at PDX and would have to be engineered and installed prior to implementation.

It is the intention of the Port to negotiate an agreement that gives the Port the greater latitude in utilizing terminal facilities. This will allow the Port to maximize the use of those facilities rather than building new ones. As noted above, the soonest this type of agreement could be put in place is 2003.

It should be noted, however, that the airlines sometimes share their gates among themselves through sub-lease agreements. The Port encourages these agreements for all the reasons stated above. Several airlines have such agreements at PDX today.

RUNWAY/AIRSPACE DEMAND MANAGEMENT STRATEGIES

The Federal Aviation Administration (FAA) has jurisdiction/control on aircraft movement on the ground and in the air. Since the airlines were deregulated in 1978, the FAA’s approach, with few exceptions,¹² is to allow the airlines to control their own schedules for arrivals and departures at an airport.

¹² Landing slot controls are in place at Washington Regan, New York Kennedy, New York LaGuardia, and Chicago O’Hare. The FAA has indicated their desire to remove those controls and allow free flight in and out of those airports without their regulation



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While there is very serious congestion at airports much larger than PDX, to date the FAA has been reluctant to consider re-regulating airline schedules in an effort to manage what is clearly a finite commodity – runway and airspace capacity. The airlines have also been insistent that re-regulation is not their desired approach to the problem of capacity.

Discussions are ongoing on this topic in the industry. PDX staff will become involved in those discussions to understand the potential to use congestion pricing. The Airport Council International (ACI), the primary airport trade association, has indicated a desire to form a committee to discuss this issue. Staff from PDX have contacted ACI and asked to participate. No date has been set for the meetings.

TECHNOLOGICAL CHANGES TO IMPROVE CAPACITY

Technology is having a positive impact on the capacity of the aviation industry both in the terminal, on runways and airspace around the airport. A brief overview of technological improvements that are occurring follows.

Terminal Improvements

Electronic ticketing is showing up in the airport terminal in the form of “e-ticket” check-in kiosks which allow a passenger to get their boarding pass for a flight, in some cases, without going to the ticket counter. Where e-ticket check-in is being done at a ticket counter, passenger and baggage processing is faster than at a conventional check-in counter. Both of these techniques reduce the need for ticket counters in the terminal. Instant Ticket Machines are also being used in terminals. These are systems that dispense tickets using credit card

payment. For a passenger with no luggage to check, this allows them to move directly to the gate to board a flight.

The Port is working with the Airlines to develop both the e-ticket check-in and the use of Instant Ticket Machines as a means to process passengers through the terminal more efficiently.

There are also discussions of installing e-ticket and Instant Ticket Machines at locations off airport. The Port supports these efforts also.

Runways/Airspace

Satellite navigation using the “Global Positioning System” (GPS) has the potential to change how aircraft navigate to and from airports and how they approach the airport for their landings. Navigation with GPS will allow aircraft to travel in a straight line to their destinations rather than using the existing systems that require aircraft to fly point to point, not necessarily on an efficient routing. This use of GPS could reduce flight times for a given route, and that could reduce the cost of the flight.

GPS also has the potential to replace existing instrument landing systems that provide direction to pilots as they land in bad weather. Replacement of existing systems would eliminate many of the development constraints that exist as a result of landing system radio signal interference.

Use of GPS for both of the uses above is in the developmental stages with full implementation possible in the next 5 to 10 years. Staff from the airport are involved with the FAA exploring these technologies and how they might be applied at PDX.



Chapter 5

Environmental Planning

INTRODUCTION

That PDX has an impact on the environment cannot be questioned. As with any large transportation hub, there are issues of air and water quality impacts. With the Airport, there is the added dimension of noise impacts caused by aircraft arriving and departing the Airport. These issues have become even more pressing in the last few years as the region has grappled with environmental issues such as the increasing impact of higher urban densities.

In the last five years, the Port has added substantially to its environmental staff in order to better respond to the environmental impacts of Port facilities. Environmental awareness within the Port has never been higher and concern for the impacts of Port operations on the region are a top priority.

PORT OF PORTLAND ENVIRONMENTAL POLICY

In its February 9, 2000 meeting, the Port of Portland Commission reviewed and adopted an Environmental Policy. The policy, reproduced below, provides the guidelines on how the Port will plan and operate its facilities. This policy will apply to all developments and operations at the airport.

Port of Portland Environmental Policy

The Port of Portland will achieve its mission through responsible environmental stewardship and the implementation of proactive environmental programs. The Port will integrate environmental considerations into all aspects of its strategic planning and business decision-making.

The Port will actively seek resolutions to environmental issues by endeavoring to achieve the following goals:

Compliance: *Comply fully and promptly with all applicable environmental laws, regulations, and Port policies.*

Planning: *Integrate environmental costs, risks, impacts, and public concerns into operating decisions and facility development planning processes.*

Natural Resources: *Minimize impacts and seek opportunities to enhance natural resources while carrying out Port projects.*

Pollution Prevention: *Minimize pollution and waste through source reduction, reuse, or recycling.*

Management Commitment: *Communicate this policy and its requirements and deliver the training, tools, and resources required to implement this policy.*

Continued...



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Government Relations: *Develop cooperative working relationships with agencies and promotes development of sound environmental legislation and regulation.*

Community Relations: *Provide community outreach and leadership on environmental issues and respond in a timely fashion to inquiries or expressions of concern regarding environmental issues related to Port and tenant activities.*

Performance: *Improve the Port's environmental performance through regular monitoring and evaluations.*

Quality: *Achieve superior environmental performance and work product.*

Continuous Improvement: *Continuously improves the effectiveness of the Port's environmental program.*

Implementation of this policy is the responsibility of all employees.

For the first time, the Master Plan has a chapter devoted to environmental planning and programs that address environmental impacts of the airport. What follows is a listing of those planning projects and ongoing environmental permits and programs. It should be noted that the descriptions are summary in nature and do not contain the full information that would be included in a planning project or operating program. The listings should, however, be descriptive enough to provide background on what is being done or will be done.

PDX NOISE ABATEMENT PROGRAM

PART 150 NOISE PLAN

That the aircraft using PDX generate noise that impacts the community is a given. The Port, the airlines and the FAA are all aware of and concerned about the impact the aviation system has on the surrounding community. The process that all airports use to manage this noise impact is a study conducted under the Federal Aviation Regulation Part 150 Program (FAR Part 150). FAR Part 150 refers to section of the Federal Aviation Regulations that spells out the procedure for preparing a noise study.

There are over 240 airports involved in the Part 150 process. Of that total, 195 have approved noise maps. PDX was the 7th airport in the country to get approval of their noise abatement plan. This occurred in 1985, and has been followed by updates in 1992 and 1997.

The Port is concerned about addressing noise impacts and has implemented several improvements. In 2000 six new permanent noise-monitoring microphones were purchased for placement in neighborhoods surrounding PDX. This brings the total to sixteen. The Port began construction of a Ground Run-up Enclosure (GRE), which reduces ground engine run-up testing noise impacts on surrounding neighborhoods. The GRE is scheduled for completion in the spring of 2001. The Port will also begin work on updating the Part 150 Noise Plan in 2001. This will provide the opportunity for the Port to explore the latest techniques to mitigate the impacts of aircraft noise.



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CITIZENS NOISE ADVISORY COMMITTEE (CNAC)

As part of the PDX noise abatement program, the Port sponsors a citizen noise advisory committee. The charge of this committee is to:

- § Act on behalf of local jurisdictions as the forum to address noise concerns.
- § Monitor the implementation of the current PDX noise plan.
- § Review noise issues and provide advice on issue resolution and follow-up action.
- § Develop ideas and recommend proposals for consideration in future noise plans.
- § Participate on advisory committees involved in long-range airport facilities and capital improvement planning.
- § Enhance citizen understanding of airport noise management through work on the Advisory Committee as a whole.

The committee meets monthly. An example of a recent activity of this committee is the successful pursuit of building the ground run-up enclosure (GRE) as well as air traffic pattern changes which will reduce noise impacts to the community.

AIR QUALITY

The Airport must meet a variety of air quality standards. What follows is a listing of the programs that govern air quality at the Airport.

OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ) AIR CONTAMINANT DISCHARGE PERMIT

The DEQ regulates air quality at the Airport through an Air Contaminant Discharge Permit. Compliance reports are submitted twice a year

to the DEQ measuring the emissions of the Airport against the limits provided by DEQ through the permit.

CLEAN AIR ACT GENERAL CONFORMITY REGULATIONS

Major construction projects at the Airport are subject to review under the Clean Air Act. This review is required from the Federal Aviation Administration to ensure that projects they fund conform to the "Oregon State Implementation Plan" (SIP). The SIP is a plan that provides for implementation, maintenance, and enforcement of the "Ambient Air Quality Standards" (AAQS), and includes emission limitations and control measures to attain and maintain the AAQS. Conformity is defined as demonstrating that a project conforms to the SIP's purpose of eliminating or reducing the severity and number of violations of the ambient air quality standards and achieving expeditious attainment of such standards. The Portland/Vancouver Air Quality Maintenance Area, including Portland International Airport (PDX), was re-designated from non-attainment for Carbon Monoxide (CO) and Ozone (O₃) in the fall of 1996 to maintenance; thus, the maintenance plan serves as an amendment to the SIP. This review process is ongoing.

ANALYSIS OF ALTERNATIVES

In addition to the regulatory programs listed above, additional analysis will be conducted for the two master plan facility alternatives – centralized terminal alternative and decentralized terminal alternative as well as the possible third parallel runway. The analysis of terminal alternatives will review existing conditions vs. development of the alternatives to determine if one or the other of the two has significant benefits or impacts when compared



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to each other and the existing condition. Efforts will be made to outline potential mitigation measures that might be needed to offset undesirable impacts.

The possible 3rd parallel runway will also be analyzed for its air quality impact. As with the terminal analysis, the analysis will focus on no-build vs. build conditions and will include a review of possible mitigation measures.

These studies will be completed prior to the next master plan update.

WATER QUALITY

The Airport must meet a variety of water quality standards. What follows is a listing of the programs and plans that govern water quality at the Airport.

DEICING PROJECT

PDX has begun construction on a stormwater management system which will significantly reduce the amount of deicing material reaching the Columbia Slough. The PDX Deicing Project is a \$35 million collection system which will improve water quality in the Slough and meet Federal and State water quality regulations.

WETLAND FILL PERMITS

Filling wetlands requires a joint wetland fill permit from the U.S. Army Corps of Engineers and the State of Oregon Division of State Lands. If filling wetlands cannot be avoided, the Port applies for a permit through the regulatory agencies. Depending upon the size and ecological value of the area filled, mitigation is required. Regulatory agencies prefer that the mitigation be accomplished

within the same watershed as the wetland fill takes place. This is increasingly difficult given that the Airport is surrounded on the east, south, and west by urban development. The requirement for wetland fill permits is ongoing.

STORMWATER DISCHARGE REGULATIONS

The Oregon Department of Environmental Quality (DEQ) regulates storm water at the Airport through National Pollutant Discharge Elimination System (NPDES) permits. In addition, storm water from PDX and water quality in the Columbia Slough are regulated through approved Total Maximum Daily Loads (TMDLs) for the Columbia Slough. The following NPDES permits apply at PDX:

- § Deicing and Anti-icing Waste Discharge Permit
- § General 1200-COLS Storm Water Discharge Permit
- § General 1200-T Construction Storm Water Discharge Permit
- § Construction De-watering Permit
- § Municipal Separate Storm Sewer System Discharge Permit.

Compliance reports are submitted monthly to annually, depending upon the specific permit. Several of the PDX NPDES permits have limits or benchmarks that must be met at each of the 9 PDX outfalls; other permits require implementation of best management practices (BMPs).

These permit requirements are ongoing.



ANALYSIS OF MASTER PLAN ALTERNATIVES

In addition to the regulatory programs listed above, additional analysis will be conducted for the two master plan alternatives – centralized terminal alternative and decentralized terminal alternative as well as the possible 3rd parallel runway. The analysis of the terminal alternatives will review existing conditions vs. development of the two alternatives to determine if one or the other of the two has significant benefits or impacts when compared to each other and the existing condition. Efforts will be made to outline potential environmental and property mitigation measures that might be needed to offset undesirable impacts. This analysis will include public discussion and involvement.

The possible 3rd parallel runway will also be analyzed for its water quality impact. As with the terminal analysis, the analysis will focus on no-build vs. build conditions and will include a review of possible mitigation measures.

These studies will be completed prior to the next master plan update.

NATIONAL ENVIRONMENTAL POLICY ACT

Compliance with the National Environmental Policy Act (“NEPA”) in conjunction with the implementation of major components of this plan will result in the future preparation of detailed environmental analysis which are likely to include one or more full Environmental Impact Statements (“EIS”). Both the Port and the FAA are committed to full public NEPA environmental review in conjunction with the

implementation of any major capacity expanding projects at PDX. Such environmental review, to be meaningful and relevant needs to be undertaken closer in time to a decision to design and implement those projects. In this way, full and detailed information and plans will be available for community consideration and review within the NEPA process.

It has been suggested that the Port begin preparation of an EIS for the possible 3rd parallel runway or other significant components of the Plan, such as the decentralized terminal as an immediate follow-on to this planning process. These suggestions have been carefully considered and discussed with the FAA who will be the federal agency responsible for ensuring NEPA compliance. It is our shared view that the environmental review, complying with NEPA, will come later when serious consideration is being given by the Port and the FAA to a proposal to implement elements of the Plan. Factors that led to this conclusion include:

- The need for the 3rd parallel runway project, the decentralized terminal, and other major capacity expanding projects may never materialize. As an example, with today’s base line forecasts, the runway project is estimated to be 20+ years away.
- The federal agencies that would be involved in an EIS would not be able to commit the time and effort necessary because the project is so far off in time and because the Port is not currently seeking federal approval or funding for the runway or any other Plan components. The reviewing federal agencies generally prioritize projects that are in the process of being implemented within the next 2 to 3 years.



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- Both environmental conditions and concerns, as well as environmental regulations are likely to change significantly within the coming 15 to 20 years and the Port would need to address the then current requirements and conditions in any NEPA process. Thus an EIS prepared today would likely need to be entirely replaced in conjunction with implementation of components like the potential 3rd parallel runway.
- NEPA environmental reviews do not have an unlimited viability. The Port would not propose reliance upon NEPA documentation that is for instance more than 5 years old.

The need for commencement of NEPA environmental review will be regularly reviewed by the Port and discussed with the FAA so that timely analysis and compliance is achieved in conjunction with the long term implementation of the Plan.



Chapter 6

Communications

The Port has an active citizen outreach program to generate public dialog on Port projects and operations. Our goal is to continuously improve communications with the public by being inclusive in our planning processes, and finding new ways to interact with the community on key airport issues.

During the Master Plan public outreach process, The Regional Air Transportation Demand Task Force also recognized the importance of public communication and recommended that the Port improve on our efforts of ongoing public dialogue regarding the airport planning process and operations. The Port embraces this recommendation and will strive to continue to improve its public outreach program.

The PDX Community Outreach Program is not static. Rather, it is flexible in order to adapt to the changing dynamics of the community, and to address projects and issues which occur over time. The following outlines key elements of the Port's community outreach and communications plan.

GENERAL COMMUNITY OUTREACH

CITIZENS NOISE ADVISORY COMMITTEE (CNAC)

This is a committee that has been in existence as the Noise Abatement Advisory Committee (NAAC), and the CNAC for over 15 years.

This committee was organized to replace the former Noise Abatement Advisory Committee. Among the goals for this change included:

- Creating a body which had balanced representation from jurisdictional/residential districts in the metropolitan area
- Consistent citizen representation for a set duration (which can be reinstated)

A committee entirely represented by citizens, with a technical, non-voting support group.

The CNAC's purpose is to advise the Port on programs, projects and ideas to reduce the impacts of noise on surrounding areas. The CNAC provides an important forum to the public on aircraft noise issues.

The CNAC charter includes the following:

- Act on behalf of local jurisdictions as the official forum to address community noise concerns.
- Monitor the implementation of the current Portland International Airport noise plan.
- Review airport noise issues and provide advice on issue resolution and follow-up action.



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- Develop ideas and recommend proposals for consideration in future airport noise plans.
- Participate on advisory committees involved in long-range airport facilities and capital improvement planning.
- Enhance citizen understanding of airport noise management through the work of the Advisory Committee as a whole.

Organization of the committee includes eleven committee members selected by local jurisdictions in the region, and four Port-appointed positions. The jurisdictional representation is as follows:

- City of Portland - 3
- City of Vancouver - 2
- City of Gresham -1
- Combined cities of Fairview Troutdale and Wood Village -1
- Multnomah County (outside Portland) -1
- Clark County (from the Camas/Washougal area) -1
- Washington County - 1
- Clackamas County -1

The Port appoints four members from within the four-county region to provide geographic balance to and environmental representation on the Advisory Committee. The Advisory Committee chair is elected by the members of the Committee.

Appointment and Service Criteria includes the following:

- Participate in the resolution of noise issues.
- Commit to a full term.

- Regularly attend meetings. After two consecutive absences without advance notice, membership will be reviewed by appointing jurisdictions.
- Be responsible for reporting to appointing jurisdictions.
- Participate in Port of Portland noise-related community outreach programs.

The CNAC also has the support of a Technical Advisory Group (TAG) which includes agencies and organizations with regulatory and operating responsibilities tied to the airport and other technical consultants.

TAG membership may include representatives of the Federal Aviation Administration (FAA), Oregon Dept. of Environmental Quality (DEQ), State Aeronautics Division, Oregon Air Guard, City of Portland noise office, airlines and pilots operating at the airport, the airport fixed base operator, and technical consultants.

AIRPORT UPDATES AT PORT OF PORTLAND COMMISSION MEETINGS

The Port of Portland Commission is the governing body for the Port. As such, they have the responsibility for oversight of the planning and operations of PDX and are the most suited to monitor the progress being made on the recommendations of the Regional Air Transportation Demand Task Force, regarding ongoing public outreach.

The Commission holds a public meeting once a month where opportunity is provided for public input or comment on actions being taken. Additionally, the Commission will be provided



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briefings on individual projects as well as given updates for the Airport as a whole.

COMMUNITY FORUMS

In 1999, the Port began holding regular Community Forums. These meetings are designed to bring a variety of Port operational, planning and development projects and issues to the public, in one meeting. The goal of the Forums is for the Port to be regularly accessible to the public, to discuss a variety of issues.

The Port's executive management leads an open discussion with meeting attendees on a variety of Port projects. An open-house format is also used, in order to accommodate additional information and staff representation from the Port operations and projects.

WEB-SITE

The Port maintains a web-site. PDX web pages include a Noise Department page, flight information, construction updates and information on the Master Plan. The site also includes a link to the Regional Air Transportation Demand Task Force and the Port's response to their recommendations and status of actions related to that response.

THE CITY OF PORTLAND OFFICE OF NEIGHBORHOOD INVOLVEMENT AIRPORT ISSUES ROUNDTABLE (AIR)

AIR is a newly-formed, citizen based group. It is an independent community group under the auspices of the City of Portland's Office of Neighborhood Involvement.

AIR is the advisory body to the Portland City Council regarding the PDX land use permitting process. AIR will be actively involved in the Port's public outreach efforts during the permit renewal process.

The Port will continue to actively participate in this group, and include its members in noise and PDX planning efforts. The Port will keep the group updated on PDX and national trends on noise research, legislation and technical advances.

ONGOING NEIGHBORHOOD RELATIONS

The Port regularly communicates with and attends neighborhood meetings to discuss airport issues and update the public on PDX projects, operations, construction and planning.

PDX FACILITY TOURS/PUBLIC EDUCATION

The Port conducts free tours of PDX to students and adults. The tour program includes an accompanying aviation activity and packets, designed for children.

SPEAKER'S BUREAU

The Port provides presentations to neighborhood groups, civic organizations, special interest groups and others. These presentations are an opportunity to deliver information to the public on PDX issues and projects, and a forum to collect community input.



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NEWSLETTER

The Port's PDX Community Focus newsletter includes information about the PDX Noise Program, Master Plan and other airport issues. It is circulated to approximately 2,100 people (including neighborhood associations) on a direct mail list, every other month.

Topics within the newsletter include updates on CNAC, PDX projects, national noise legislation and technological advances, airfield operational changes, construction and other key information.

PUBLIC EVENTS

The Port occasionally conducts public events at Port facilities. These events provide an opportunity to educate the public on airport operations and issues, as well as provide a forum to take public input.

In October 1999, the Port held "Portside Sunday" as a public open house to the Port. Information on the PDX Master Plan, noise and deicing programs were included in this event. In the fall of 2001, the Port is planning another public event to commemorate the completion of the Airport MAX.

PDX NOISE

This is an on-going program which includes a noise hot line, noise monitoring system (which is slated for expansion), public meetings, ANOMS radar flight tracking system, and newsletter.

The Port has also completed a one-year Strategic Noise Plan. The following outlines key elements of the plan:

PDX NOISE OFFICE PLAN (DRAFT)

PDX Noise Abatement Office has developed the following draft plan for the next year's focus, keying on five primary areas:

1. Customer Service
2. Community Relations/Education
3. Technology
4. Environmental
5. Noise Management
6. Aviation Industry

The program's roots are based upon the Port's Mission Statement, outlined below:

The mission of the Port of Portland is to provide competitive cargo and passenger access to regional, national, and international markets while enhancing the region's quality of life.

PDX Noise Office Mission

Committed first and foremost, to community outreach, in coordination with, federal agencies, airlines, local jurisdictions, and elected officials, to track, monitor and reduce the impacts of aircraft noise.

Each area of focus has objectives to be completed or significantly worked toward completion by fiscal year's end (June 30, 2001).



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Customer Service

Respond to citizens' complaints in a timely fashion.

- *Noise complaint resolution*: timely and accurately respond, with follow-up where needed.
- Publish an *Annual Noise Abatement Report*.
- Continually train staff on latest noise management technology and noise abatement procedures.

Community Relations/Education

Maintain a close relationship with local community, civic, and business organizations, providing updated information about noise issues.

- *Noise Van*: Schedule visits to key neighborhoods, and publish schedule and results on web.
- Continue proactive community outreach through open houses and community meetings.
- Keep web page updated with latest CNAC decisions and latest PDX Community Focus newsletter.
- Open a store-front AIRPORT INTERACTIVE DISPLAY area in the main terminal.
- Continue Airport 101 class.

Technology

Use the best, most efficient technological tools available to improve productivity, manage and track aircraft noise, reduce and measure noise impacts, and respond to community interests about technical information.

- Increase the number of portable sound monitors and permanent microphones for noise monitoring.
- Expand ANOMS capability to allow internet access to citizens.
- Explore differential GPS/FMS and its potential effect on approaches and departures.

Environmental

Monitor community concerns related to aircraft noise and support mitigation where feasible, balancing regional transportation needs.

- Update Part 150 Noise Plan.
- Proceed with acquisition of federal funds for insulation and other noise program elements.
- Construct the Ground Run-up Enclosure.

Noise Management

Develop operational procedures designed to reduce the effect of aircraft noise on residents of the surrounding area.

- Preferential nighttime runway procedures.
- Turbo prop routing procedures.



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- Work with CNAC to develop voluntary noise mitigation measures to be implemented by air carriers.
- Area arrival – departure procedures, in conjunction with new navigation aids.

Aviation Industry

Foster good working relations between Port, FAA, and the airlines.

- Inform FAA and airlines of our community plans and feedback from citizens regarding noise issues.
- Encourage agencies to attend CNAC and other public meetings.
- Support Congressional Legislators with information regarding noise policies.
- Continually monitor industry trends and direction regarding aircraft noise.

PDX NOISE COMPLAINTS

The PDX Noise Abatement Office continues to maintain a 24-hour noise complaint hotline. The office is staffed during normal business hours (8:00 a.m. to 5:00 p.m., Monday - Friday) to receive citizen calls. A voice mail system is activated to receive complaints during all other hours, including weekends, and holidays.

Hotline messages that require a response are reviewed by Noise Abatement Office staff within 1 – 2 days. Staff strives to contact each caller by phone within five working days of the call. The office receives about 150 calls per month.

Often times, callers request additional information which requires research, including the use of the Port's ANOMS radar tracking system. Noise office staff strives to locate and

provide written information within a reasonable time frame (average 2 weeks).

All complaints are recorded in a data base. The noise office then provides CNAC representatives with monthly updates of calls and complaints from their jurisdictions.

The noise hotline phone numbers (Portland and Vancouver) are published under the PDX listing of the phone directory.

AIRPORT 101

This is an after-hours public education program, consisting of an evening of presentations by Port staff and management on planning, operating, managing wildlife, marketing and managing noise at PDX. The program includes several presentations and opportunities for discussion, followed by a tour of the airfield.

This is a new program, which is scheduled to be an on-going, open opportunity for the public to learn about the operations of the airport, while affording an opportunity to discuss noise and environmental impacts, as well as other community issues.

PLANNING & PROJECT DIRECTED COMMUNITY OUTREACH

Planning and project directed outreach has been one of the focal points of the PDX Outreach Program. Extensive outreach is conducted on the airport's Master Plan, Capacity Study, Part 150 Noise Plan and other planning-related projects.



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2000 PDX MASTER PLAN

The Port conducted the most comprehensive public outreach program for a master planning process, to date. Community interest was extremely high, making it critical for the Port to employ innovative ways of reaching the public and encouraging public dialog.

The outreach program has included direct mailings, attending neighborhood meetings, open houses, a planning advisory committee, Community Forums and open houses, an appearance on "Town Hall", and a separate, independent analysis by Portland State University (PSU).

The PSU Regional Air Transportation Demand Task Force was a 6-month review process of the Port's forecasts and assumptions regarding PDX's future. The Task Force made several recommendations to the Port's Commission in May. The Port has developed a response to these recommendations which has resulted in a more thoughtful, comprehensive approach to the PDX planning program.

For a complete overview and documentation of this outreach program, see the appendix of the Master Plan outreach summary.

PDX DEICING PROJECT

Public outreach has included newsletters, neighborhood and environmental interest briefings, formation of an external task force (Long Term Solution Task Force), on-airport public tours of the winter deicing program and other forms of public dialog.

The Task Force included members of the surrounding community, environmental advocates, regulatory representatives, aviation industry representatives and others, in order to achieve a shared product.

The final solution for this project (called the "Near Apron Collection System") received full approval from the Task Force and the Department of Environmental Quality. This system will enable the Port to meet its regulatory requirements one year earlier than originally planned.

PDX WILDLIFE MANAGEMENT PROGRAM

This is an ongoing program to reduce conflicts between aircraft and birds/wildlife. The Wildlife Program formed an advisory committee in the mid-90's when a surge in coyote appearances on the airfield became a major safety issue.

A citizen and environmental/wildlife advisory committee was formed to find safe, non-lethal ways to control wildlife on the airfield. The program is reviewed regularly, with the assistance of this committee.

PDX TERMINAL ACCESS PLAN

This Plan was completed in 1997 and is well underway in the construction phase. The Advisory Committee for this plan has completed its work and included representatives from mass transit advocacy groups, bicycle advocacy representatives, Tri-Met, private PDX transportation providers, ODOT, and Port planners.



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Citizens have been informed on progress and implementation of the access plan through direct mailings, media communication, Port Community Forums and speaker's bureau/neighborhood presentations.

PDX RUNWAY OVERLAY AND CONSTRUCTION PROJECTS

Runway safety maintenance has continued during summer construction months, since 1994. The Port has kept citizens informed of any runway closures by using one or more of the following:

- Informing the media (news releases)
- Direct mail notification
- PDX Community Focus Newsletter
- Attending neighborhood meetings
- Informing CNAC
- Advertisements

In 2000, runway projects include a new Runway Safety Area extension on runway 3-21, and additional taxiway work.

GROUND RUN-UP ENCLOSURE

This is a facility which benefited from over 4 years of public involvement. Members of the former NAAC recommended to the Port, to investigate compliance with on-ground industrial noise regulations, and the opportunity to address engine maintenance run-up noise impacts to surrounding neighborhoods.

Area residents indicated to the Port that this was a priority issue, within State noise regulations, which required improvements to noise impacts to surrounding neighborhoods. Funding from PDX airlines was pursued and secured in order to construct this facility -only the third of its kind in the United States. A CNAC sub-committee was formed to assist the Port in identifying construction, siting and design issues and finding the best solution for our community.

In the spring of 2000, the Port's Commission approved the contract to begin construction of this facility. The groundbreaking was held in collaboration with the citizens who helped bring the project to fruition.

1996 EARLY TURN TEST

In the spring of 1996, the Federal Aviation Administration, with the cooperative efforts of the Port and the former NAAC, undertook a significant operational study. The NAAC asked the Port and the FAA to implement a test which included an incline and "early turn" operational change to normal flight paths at PDX. The goal of the experiment was to measure community impacts with a more "scattered" departure pattern, which spread noise impacts more evenly through the Portland/Vancouver area.

This test was met by significant community resistance and was halted early, due to the high level of complaints. CNAC is currently investigating the effectiveness of the test and may give additional recommendations to the Port and the FAA, in the near future.



CITY OF PORTLAND LAND USE PROCESS

Prior to August 2003, the Port will apply to the City to update its land use approval for the Airport. This will occur within the City of Portland land use process that incorporates public input. The Port will conduct public outreach on the process in order to facilitate dialog on the permitting process and PDX planning. The CNAC and AIR groups will be highly involved in the renewal of the permit.

FAR PART 150 NOISE PROGRAM UPDATE

The update of the PDX noise abatement program is scheduled for early 2001. The public outreach program for the Plan will be inclusive and comprehensive.

The public outreach program will include public meetings, collaboration with the CNAC, and City of Portland Airport Issues Roundtable. The web, public meetings, direct mailings, the media and other means will be used to interact with, and collect public input on this very important project.

The Part 150 Noise Plan Update will include, for the first time, aggressive efforts to secure Federal funding to initiate a home noise insulation program for those living within the highest-impact residential areas.