Portland International Jetport

SUSTAINABLE AIRPORT MASTER PLAN




SUSTAINABLE AIRPORT MASTER PLAN

For

PORTLAND INTERNATIONAL JETPORT
Portland, Maine

Prepared for the

CITY OF PORTLAND

By

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In Association with

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vhb

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INTRODUCTION AND SUMMARY

SUSTAINABLE AIRPORT MASTER PLAN

INTRODUCTION AND SUMMARY

Portland Interna. onal Jetport (PWM) is a thriving small hub, commercial service airport serving the aviation demand of the greater Portland region and much of the State of Maine. In fact, the Jetport's Vision is to ***"Be the Airport of Choice for Maine!"*** From this vision, the Jetport has adopted the following as its Mission Statement:

"The Portland International Jetport commits to be a premier New England Airport. We will provide a convenient, safe, and environmentally conscious gateway that exceeds our travelers' expectations while reflecting the essence of the Maine experience."

This airport master plan update has been undertaken to evaluate the airport's capabilities and role, to review forecasts of future aviation demand, and to plan for the timely improvement of facilities that may best meet that demand and maintain compatibility with the environs. The airport master plan will provide systematic guidelines for the airport's overall development, maintenance, and operation for the next 20 years.

The master plan is intended to be a proactive document which identif es and then plans for future facility needs well in advance of the actual need for the improvements. This is done to ensure that the City of Portland and airport administration can coordinate environmental reviews, project approvals, design, f nancing, and construction to minimize the detrimental effects of maintaining and operating inadequate or inefficient facilities.

This study will follow a systematic approach outlined by the Federal Aviation Administration (FAA) to identify existing and future airport needs. The intended result is a recommended development concept



which outlines the proposed uses for all areas of airport property, including areas which may be required for environmental mitigation/preservation. This master plan update will differ from those before in that the analysis will include airport sustainability measures. The sustainability analysis will include a baseline assessment outlining historical and current sustainability achievements, as well as integration of proposed sustainability goals and objectives into future airport plans.

The City of Portland considers sustainability an integral part of the community. Accordingly, it commissioned an airport master plan update that incorporates sustainability and commits the Jetport to a long-term, comprehensive, and integrated approach that considers economic viability, operational efficiency, social responsibility, and natural resource conservation. Through this approach, the Jetport is also embracing a leadership role within the region and the airport industry to promote sustainability and improve related performance.

In recent years, the Jetport has demonstrated its commitment to sustainability through various activities. These notably include a terminal expansion that achieved Leadership in Energy and Environmental Design (LEED®) Gold certification, the installation of a geo-thermal heating and cooling system, the establishment of a deicing fluid recycling program to treat onsite and offsite spent glycol, wildlife deterrent and relocation efforts, and the creation of an exemplary customer service program.

In recognition of its historical and ongoing commitment to sustainability, the Jetport received a grant through the Federal Aviation Administration's Sustainable Master Plan Pilot Program to prepare this Sustainable Airport Master Plan (SAMP). With its first official sustainable master plan, the Jetport is taking the next step toward full sustainability integration and is recognizing the potential to improve its overall operating efficiency in an environmentally, economically, and socially responsible manner.

MASTER PLAN GOALS AND OBJECTIVES

The primary objective of the sustainable airport master plan (SAMP) is to provide the community, City of Portland and its airport administration with proper guidance for future improvements and processes that incorporate sustainability principles in addressing aviation demand and airport operations in a manner that is wholly compatible with the environment. Making sustainability a part of the core objective of the planning process will promote design, project implementation, and financial decisions that will help the airport identify ways to reduce energy consumption, environmental impacts, and carbon footprint. As a result of incorporating sustainability issues into the master planning process, the airport can become a more environmentally friendly business place and neighbor. The

As a result of incorporating sustainability issues into the master planning process, the airport can become a more environmentally friendly business place and neighbor. The plan will benefit all residents of the area by providing a single comprehensive plan which supports and balances aviation activities and the environmental preservation of the surrounding environs. This includes but is not limited to the immediately adjacent neighborhoods of historic Stroudwater in Portland and Redbank in South Portland.

plan will benefit all residents of the area by providing a single comprehensive plan which supports and balances aviation activities and the environmental preservation of the surrounding environs. This includes but is not limited to the immediately adjacent neighborhoods of historic Stroudwater in Portland and Redbank in South Portland.

Accomplishing this objective requires an evaluation of the existing airport so as to make a determination of what actions should be taken to maintain an adequate, safe, and reliable airport facility. The completed airport master plan will produce a development plan which will provide airport officials with a program for future capital needs to aid in planning, scheduling, and budgeting.

An airport master plan must be developed according to FAA requirements; however, the airport master plan can also be prepared in a manner which makes it useful in strategic planning for the airport. The FAA requires specific components within a master plan. The components, to be detailed in the following section, are guidelines which allow for a systematic and technical approach to reach the final recommended plan.

This sustainable master plan will provide a vision for the airport covering the next 20 years and, in some cases, beyond. With this vision, the City of Portland will have advance notice of potential future airport funding needs so that appropriate steps can be taken to ensure that adequate funds are budgeted and planned.

The specific objectives to be considered in the airport master plan include:

- To review or develop a written sustainability policy mission statement;
- To define sustainability categories at the airport and conduct a baseline inventory and assessment;
- To research and evaluate transportation industry and socioeconomic factors likely to affect the air transportation demand in the region;
- To determine the projected needs of airport users through the year 2035;
- To establish measurable goals to minimize the impact on consumption, and to identify specific sustainability initiatives to help in achieving each goal;
- To recommend improvements that will enhance the airport's safety, efficiency, and capability to serve the community's aviation needs;
- To establish a schedule of priorities and a financial plan for the improvements proposed by this master planning effort;
- To determine the required level of environmental documentation to move forward with each recommendation of the master plan;
- To prepare an updated Airport Layout Plan in accordance with FAA guidelines, and incorporating GIS databases; and
- To incorporate an active and productive public involvement and community outreach throughout the sustainable master planning process.

INTRODUCTION TO SUSTAINABILITY

The City of Portland, Maine, which owns and operates the Jetport, considers sustainability an integral part of the Airport's organization. Accordingly, it has commissioned a master plan update that integrates sustainability and commits PWM to a long-term, comprehensive, and integrated approach that considers economic viability, operational efficiency, social responsibility, and natural resource conservation. Through this approach, PWM is also embracing a leadership role within its region and the airport industry to promote sustainability and improve related performance.

Figure A: The Triple Bottom Line Approach

WHAT IS SUSTAINABILITY?

Consideration of sustainability is helping to reshape the values and criteria for measuring organizational success across the world by offering the means to address the resource areas where an organization has impact. These resource areas are often referred to as "the three responsibilities" or "the triple bottom line," and include economic, social, and environmental performance measures (see **Figure A**). First referenced in 1994 and according to *The Economist* article entitled, "Triple Bottom Line," the "triple bottom line" approach has been used for over two decades as the defining principle of sustainability, and is a practical way to optimize economic, social, and environmental capital.

The Brundtland Commission, also known as the World Commission on Environment and Development, put forth one of the earliest and widely accepted definitions of sustainability:
"Development that meets the needs of current generations without compromising the ability of future generations to meet their own needs."

The Jetport is adopting a tailored view of sustainability, one that considers its unique circumstances as an airport. The Airport Cooperative Research Program (ACRP) in *ACRP Synthesis 10: Project 11-03, Topic S02-02* has defined sustainability as: "A broad term that encompasses a wide variety of practices applicable to the management of airports." Alongside this definition, ACRP preserves the essential elements of the "triple bottom line" approach by compelling airports to maintain high and stable levels of economic growth and employment, ensure social progress that recognizes the needs of all stakeholders, and protect the environment, including the conservation of natural resources.

The Airports Council International-North America (ACI-NA) builds upon ACRP's airport-specific approach in its publication, *Airport Sustainability: A Holistic Approach to Effective Airport Management*. According to the report, ACI-NA defines sustainability as: "A holistic approach to managing an airport so as to ensure the integrity of the **E**conomic viability, **O**perational efficiency, **N**atural resource conservation, and **S**ocial responsibility [EONS] of the airport." In addition to the traditional "triple bottom line," ACI-NA includes the operational aspects of an airport, such as its management structure and ability to leverage operations and maintenance monies to promote sustainability (see **Figure B**).

Figure B: ACI-NA's EONS Approach to Sustainability

A fundamental principle of sustainability is recognizing that addressing one resource area does not necessarily come at the expense of another. Optimally, evaluating a project or activity based on environmental and social concerns would spur innovation that ultimately reduces costs and enhances benefits over the life of the project.

Sustainability, as part of an organizational strategy, has demonstrated measurable benefits at airports across the world. Some of these benefits include:

- Improved passenger experience;
- Better use of assets;
- Reduced development and/or operations and maintenance costs;
- Reduced environmental/ecological footprint;
- Facilitation of environmental approvals/permitting;
- Improved relationships within communities;
- Enhancement of regional economies;
- Creation of an engaged and enriched place to work; and
- Creation and utilization of new technologies through increased demand and investment in technologies that facilitate sustainable solutions.

SUSTAINABILITY AND THE FEDERAL AVIATION ADMINISTRATION

In recognition of the Jetport's commitment to sustainability, the Airport received a grant through the Federal Aviation Administration's (FAA's) Sustainable Master Plan Pilot Program to prepare a Sustainable Master Plan. Through this program, FAA provides funding for the development of sustainable master plans or sustainable management plans, which are standalone documents that integrate sustainability principles into the airport planning process. Sustainable master and management plans make sustainability a central focus in the planning process, which generates strategies to achieve economic benefits, enhance operational efficiency, increase community involvement, and reduce negative environmental impacts. Further information on the FAA's Sustainable Master Plan Pilot Program can be accessed at: http://www.faa.gov/airports/environmental/sustainability/.

THE MASTER PLAN AND THE SUSTAINABILITY PLANNING PROCESS

The sustainability airport master planning process integrates sustainability planning elements into the traditional airport master plan process (see **Figure C**). When combined, the sustainability and master planning processes provide the flexibility necessary to consider the Jetport's operational and financial constraints. They also provide a powerful planning tool that will create a long-term development vision for the Jetport that considers sustainability performance measures. The purpose of the unified approach is to:

- Ensure goals and initiatives developed as part of the sustainability planning process are used to drive the recommendations of the master plan; and
- Ensure standalone sustainability strategies are not at odds with the recommendations of the master planning process.

Figure C: Integration of sustainability into the master planning process

The sustainability planning process incorporates input from three main stakeholder groups: 1) City and Jetport leadership, 2) the study's Planning Advisory Committee (PAC), and 3) Jetport tenants, such as airlines, concessionaires, and fixed base operators (FBOs). The PAC is composed of 24 members, including representatives from local municipalities, tenants and pilot organizations, and regional tourism organizations, among others.

The combined PWM SAMP planning process began in the summer of 2014 and is expected to conclude in the spring of 2016.

PUBLIC PARTICIPATION

The Portland International Jetport Sustainable Airport Master Plan is of interest to many within the region. This includes local citizens, community organizations, airport users, airport tenants, area-wide planning agencies, and aviation organizations. As the Airport is a strategic component of the regional, state, and national aviation systems, the Jetport Master Plan is of importance to both state and federal agencies responsible for overseeing air transportation.

To assist in the development of the SAMP, the City identified a group of community members and aviation interest groups (i.e., the PAC) to act in an advisory role in the development of the Sustainable Airport Master Plan. To assist in review, draft working papers were prepared at various milestones in the planning process. The working papers allowed for timely input and review during each step of the SAMP process to ensure that all planning issues were fully addressed as the recommended program developed. Members of the PAC reviewed draft working papers and provided comments throughout the process to help ensure that a realistic, viable plan was developed.

A series of public information workshops were also held as part of the coordination effort. The public information workshops were designed to allow any and all interested persons to become informed and provide input concerning the Sustainable Airport Master Plan. Notices of meeting times and locations were advertised through local media as well as social media outlets. The draft working papers were made available to the public through an Airport Master Plan link on the Jetport's website and directly at www.thejetport.airportstudy.com.

SUMMARY AND RECOMMENDATIONS

The definition of demand that may reasonably be expected to occur during the useful life of an airport's key components (e.g., runways, taxiways, terminal buildings, etc.) is an important factor in facility planning. In airport master planning, this involves projecting potential aviation activity for at least a 20-year timeframe. Aviation demand forecasting for Portland International Jetport must consider commercial passenger service, air cargo, based aircraft, and aircraft operational activity forecasts.

Because of the cyclical nature of the economy, it is virtually impossible to predict with certainty year-to-year fluctuations in activity when looking five, ten, and twenty years into the future. Cost-effective, efficient, and orderly development of an airport should rely more upon actual demand at an airport than on a time-based forecast figure. In order to develop a master plan that is demand-based rather than time-based, a series of planning horizon milestones have been established that take into consideration the reasonable range of aviation demand projections. The planning horizons will be segmented as the Short Term (approximately years 1-6), the Intermediate Term (approximately years 7-11), and the Long Term (years 12-20 and possibly beyond).

Exhibit A presents a summary of the aviation forecasts selected in this study. The 2013 FAA *Terminal Area Forecasts* form the basis for many of the demand elements presented. The only variations are those of the air carrier, air cargo, and other air taxi operations which constitute the air carrier and commuter plus air taxi forecasts in the TAF. The variation has to do with the Master Plan evaluation of the aircraft mix, boarding load factors, and those that can be expected in the future. This results in a lower operational forecast than the TAF.

SUSTAINABILITY GOALS

The Baseline Assessment in **Chapter Three** provided a look into the Jetport's current sustainability performance as determined by its related activities, policies, and procedures. This evaluation was an important first step in the development of the Jetport's long-term sustainability strategy to enable the Jetport to focus its future sustainability work on areas that are of importance and interest to the Jetport and the City, thereby ensuring the efficient use of limited resources. It will also enable the Jetport to measure, through existing and new metrics, its overall sustainability performance over time as well as the impact of individual initiatives.

To determine the focus areas for this sustainability plan, the consultants first worked with the Jetport and its stakeholders to develop six priority categories for the PWM SAMP. These priority categories were those considered areas of primary importance that possess the greatest potential for improvement to the Jetport and its stakeholders. The Baseline Assessment then evaluated the Jetport's performance related to these categories, which include:

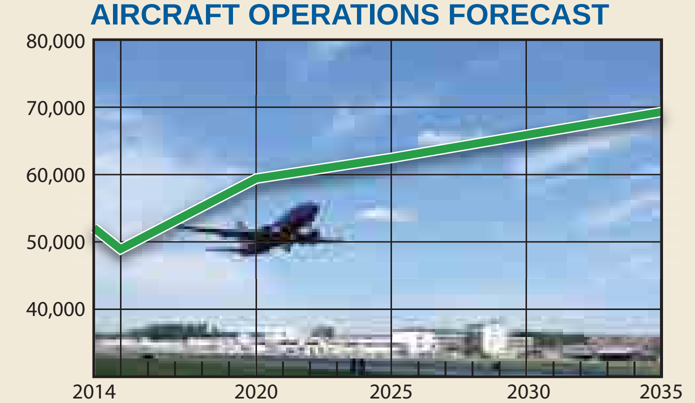
- Greenhouse Gas Emissions;
- Energy;
- Waste Management and Recycling;
- Ground Access and Transportation;
- Social Responsibility; and
- Governance.

	Baseline 2013	2015	2020	2025	2035
COMMERCIAL AIRLINE BOARDINGS					
PASSENGER ENPLANEMENTS	***843,944***	***869,710***	***971,324***	***1,010,139***	***1,187,969***
AIR CARGO SHIPMENTS					
Enplaned (Tons)	4,865	4,889	5,700	6,000	6,700
Deplaned (Tons)	7,396	8,021	7,800	8,200	9,200
TOTAL AIR CARGO SHIPPED	***12,261***	***12,910***	***13,500***	***14,200***	***15,900***
ANNUAL AIRCRAFT OPERATIONS					
ITINERANT OPERATIONS					
Air Carrier	26,068	24,848	28,800	29,800	32,000
Air Cargo	3,162	3,092	3,300	3,400	3,700
Other Air Taxi	5,299	2,475	5,900	6,900	9,000
General Aviation	15,173	15,233	17,400	18,400	20,500
Military	464	551	500	500	500
TOTAL ITINERANT OPERATIONS	*50,166*	*46,199*	*55,900*	*59,000*	*65,700*
LOCAL OPERATIONS					
General Aviation	1,890	2,683	3,400	3,400	3,500
Military	34	16	100	100	100
Total Local Operations	*1,924*	*2,699*	*3,500*	*3,500*	*3,600*
TOTAL OPERATIONS	***52,090***	***48,898***	***59,400***	***62,500***	***69,300***
BASED AIRCRAFT	***50***	***50***	***56***	***62***	***76***

PASSENGER ENPLANEMENTS FORECAST

AIR CARGO SHIPMENT FORECAST (TONS)

AIRCRAFT OPERATIONS FORECAST



BASED AIRCRAFT FORECAST

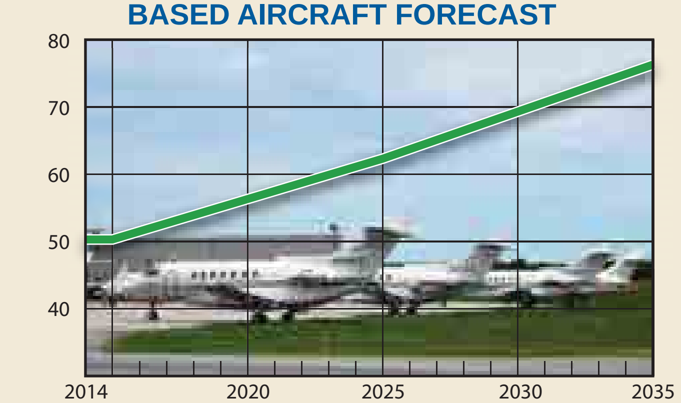


Exhibit A

While noise and water quality remain areas of importance, the Jetport already performs well with respect to water quality (deicing recycling, use of water quality filters and a large water quality pond) and noise (standing Noise Advisory Committee and separate evaluation process available through *14 CFR Part 150 – Airport Noise Compatibility*). Therefore, they were not included to allow a greater focus on the other six categories. This does not mean that improvements will not be made to water quality and noise going forward. In fact, the recommendations within this master plan consider both.

A baseline assessment was conducted for each priority category to benchmark its sustainability performance, as determined by past and current activities, policies, and procedures. Through this process, along with feedback obtained from stakeholder groups, the Jetport established sustainability goals and objectives to reflect the unique operating conditions of the Jetport and align with the environmental priorities of the City of Portland, State of Maine, and larger airport industry. The following highlights the Jetport's goals for each priority sustainability category:

Greenhouse Gas Emissions – Become a national airport leader in climate change mitigation by supporting the reduction of greenhouse gas emissions generated from Jetport-controlled and influenced sources.

Energy - Become a national airport leader in energy conservation while considering opportunities for on-site renewable energy.

Waste Management and Recycling – Augment the Jetport's existing waste management practices to reduce waste generation and land disposal, and continuously improve its exemplary deicing fluid recovery and recycling program.

Ground Transportation and Access – Enhance the efficiency of regional and local access to and from the Jetport with an emphasis on high-occupancy modes of transportation and parking infrastructure that meets the needs of Jetport users.

Social Responsibility – Promote the well-being of the Jetport's employees and customers, while reflecting and supporting the social, economic, and cultural assets of the local community and greater region.

Governance – Integrate sustainability throughout the Jetport's organizational framework.

PROPOSED MASTER PLAN CONCEPT

The short term recommendations of the 2008 Master Plan led to the improvements that have occurred at the Jetport over the last several years. The major airfield improvements were the Runway 18-36 improvements and the construction of the east extended runway safety area on Runway 11-29. The terminal building and apron were expanded along with the parking garage. In addition, the south general aviation apron and access road were developed, setting the stage for a second full-service fixed base operator (Maine Aviation).

The updated concept ensures that the Jetport can maintain its vision to *"Be the Airport of Choice for Maine"* and is driven by its mission statement: *"The Portland International Jetport commits to be a premier New England airport. We will provide a convenient, safe, and environmentally conscious gateway that exceeds our travelers' expectations while reflecting the essence of the Maine experience."* The recommended master plan concept, as shown on **Exhibit B**, presents a long term configuration for the airport which preserves and enhances the role of the airport while meeting FAA design standards.

Airfield Improvements

Improvements undertaken from the previous two master plans have essentially taken care of the physical requirements of the two runways, including their safety areas. **Chapter Four** outlines the basic needs of the airfield through the planning period

Runways - Based on existing and projected uses, both runways are adequately sized to meet existing and long term demand. Moreover, both provide adequate safety areas to meet FAA design criteria. The long term plan maintains both runway pavements at their current lengths and widths.

The existing pavement strength rating for Runway 11-29 is adequate to accommodate existing demand; however, it may need to be increased to meet future commercial airline operations. The Airbus 321 and Boeing 737-800 and -900 models have maximum take-off weights above the current airport design strength. FedEx could utilize a Boeing 767-200 or the Airbus 300 and 310 more.

Taxiways – Several taxiway projects have been identified to satisfy FAA's airfield geometrical standards as well as improve airfield efficiency. Proposed taxiway improvements shown on **Exhibit B** include:

- Realign the eastern portion of Taxiway A outside the glide slope critical area;
- Realignment of parallel Taxiway C to be fully parallel to Runway 18-36;
- Construction of a partial parallel taxiway on the east side of Runway 18-36 linking the cargo apron with parallel Taxiway A;
- Construction of a new connector taxiway linking Taxiway B to Runway 29 and a new aircraft run-up apron; and
- Closure of the Runway 11 hold apron to be replaced by a by-pass taxiway and enlarged long term holding/deicing apron

Landside Improvements

The primary goal of landside facility planning is to provide adequate space to meet reasonably anticipated passenger, cargo, and general aviation needs, while also optimizing operational efficiency and land use. Achieving these goals yields a development scheme which segregates functional uses while maximizing the airport's revenue potential. **Exhibit B** also presents the planned landside development for the Jetport.

Commercial Passenger Terminal Building – In accordance with previous terminal planning, the recommended plan provides for an additional three gates to the northwest. The plan also includes an easterly extension of the second level concourse to ultimately replace the Gate 1 boarding bridge structure.

Other terminal building modifications proposed include: 1) Add baggage claim to the west into the current first level restaurant location to meet existing and long term needs; 2) Realign the existing aircraft gates to provide for the increased wingspans of the airline fleet, primarily due to increasing use of winglets that improve aircraft fuel efficiency. This change will only involve moving the loading bridges and applying new markings for aircraft parking positions. No internal building changes would be required; 3) Provide for the secure U.S. Border Protection and Customs space that would be needed for scheduled non-stop international flights at PWM. The plan would allow for international air service out of gate areas 4 and/or 5 and secured arrival passage to facilities on the main floor beneath the gate areas.

Automobile Parking Garage – The existing parking garage includes both public parking as well as rental car ready/return. The long term plan proposes the expansion of the garage to better serve rental car needs as well as provide additional public parking spaces. Consideration is also given to improving pedestrian access between the rental car ready/return and the terminal building.

Commercial Aircraft Apron - The commercial terminal apron is planned to be reconfigured to provide more parking width at all gates. The plan also includes an increased apron area adjacent to Gate 1 that would be feasible only if Taxiway C is reconfigured as proposed. The larger apron would be sufficient for Gate 1 to serve the full range of passenger aircraft operating or projected to operate at the Jetport. Ultimately, the plan considers the northwesterly expansion of the commercial ramp to serve future need for more gates. Again, the northwesterly growth would only occur as a response to increased demand generating a need for the gates and space.

Deicing Apron - The commercial terminal apron currently supports two deicing positions. These positions are generally adequate but do not meet demand during peak morning departures. The ultimate plan is for the apron to be equipped for “at-gate” de-icing and fluid recapture. This will be installed over time when pavement reconstruction is necessary. In the near term, additional deicing positions are planned to the west of the existing deicing area. As proposed, the apron would allow for two additional deicing positions, as well as serve long term holding and aircraft that remain overnight (RON).

Runway 11 Holding Apron - The existing configuration of the Runway 11 holding apron no longer conforms to FAA design standards and does not leave sufficient clearance for a perimeter roadway outside the aircraft movement area. This will become more critical when the fixed base operator opens on the south side of the airport. A by-pass taxiway would be installed to replace the holding apron.

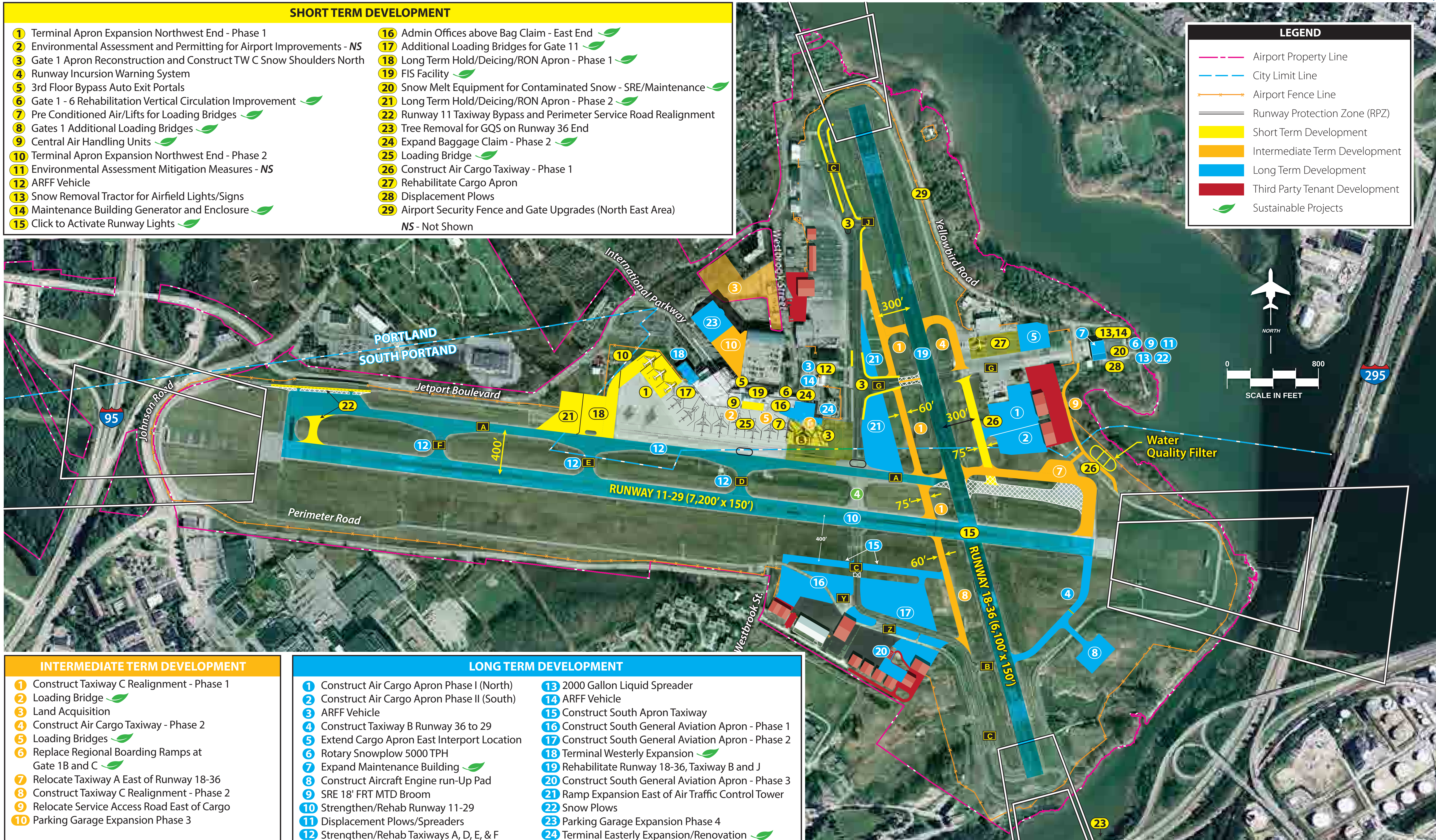
Commercial Air Cargo - The recommended plan for future air cargo development is similar to the previous plan. As proposed, the plan provides for cargo apron fronting two future buildings. If the plan is followed, the existing air cargo building currently utilized by FedEx could be repurposed for airport maintenance.

General Aviation - The bulk of the Jetport’s general aviation facilities are currently located on the north general aviation ramp, with some facilities on the cargo, or FSDO ramp. Recently, the airport approved

SHORT TERM DEVELOPMENT

1. Terminal Apron Expansion Northwest End - Phase 1
2. Environmental Assessment and Permitting for Airport Improvements - *NS*
3. Gate 1 Apron Reconstruction and Construct TW C Snow Shoulders North
4. Runway Incursion Warning System
5. 3rd Floor Bypass Auto Exit Portals
6. Gate 1 - 6 Rehabilitation Vertical Circulation Improvement
7. Pre Conditioned Air/Lifts for Loading Bridges
8. Gates 1 Additional Loading Bridges
9. Central Air Handling Units
10. Terminal Apron Expansion Northwest End - Phase 2
11. Environmental Assessment Mitigation Measures - *NS*
12. ARFF Vehicle
13. Snow Removal Tractor for Airfield Lights/Signs
14. Maintenance Building Generator and Enclosure
15. Click to Activate Runway Lights
16. Admin Offices above Bag Claim - East End
17. Additional Loading Bridges for Gate 11
18. Long Term Hold/Deicing/RON Apron - Phase 1
19. FIS Facility
20. Snow Melt Equipment for Contaminated Snow - SRE/Maintenance
21. Long Term Hold/Deicing/RON Apron - Phase 2
22. Runway 11 Taxiway Bypass and Perimeter Service Road Realignment
23. Tree Removal for GQS on Runway 36 End
24. Expand Baggage Claim - Phase 2
25. Loading Bridge
26. Construct Air Cargo Taxiway - Phase 1
27. Rehabilitate Cargo Apron
28. Displacement Plows
29. Airport Security Fence and Gate Upgrades (North East Area)

NS - Not Shown



INTERMEDIATE TERM DEVELOPMENT

1. Construct Taxiway C Realignment - Phase 1
2. Loading Bridge
3. Land Acquisition
4. Construct Air Cargo Taxiway - Phase 2
5. Loading Bridges
6. Replace Regional Boarding Ramps at Gate 1B and C
7. Relocate Taxiway A East of Runway 18-36
8. Construct Taxiway C Realignment - Phase 2
9. Relocate Service Access Road East of Cargo
10. Parking Garage Expansion Phase 3

LONG TERM DEVELOPMENT

1. Construct Air Cargo Apron Phase I (North)
2. Construct Air Cargo Apron Phase II (South)
3. ARFF Vehicle
4. Construct Taxiway B Runway 36 to 29
5. Extend Cargo Apron East Interport Location
6. Rotary Snowplow 5000 TPH
7. Expand Maintenance Building
8. Construct Aircraft Engine run-Up Pad
9. SRE 18' FRT MTD Broom
10. Strengthen/Rehab Runway 11-29
11. Displacement Plows/Spreaders
12. Strengthen/Rehab Taxiways A, D, E, & F
13. 2000 Gallon Liquid Spreader
14. ARFF Vehicle
15. Construct South Apron Taxiway
16. Construct South General Aviation Apron - Phase 1
17. Construct South General Aviation Apron - Phase 2
18. Terminal Westerly Expansion
19. Rehabilitate Runway 18-36, Taxiway B and J
20. Construct South General Aviation Apron - Phase 3
21. Ramp Expansion East of Air Traffic Control Tower
22. Snow Plows
23. Parking Garage Expansion Phase 4
24. Terminal Easterly Expansion/Renovation

Exhibit B

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a leasehold development for general aviation facility development south of Runway 11-29, as shown on **Exhibit B**. Some additional general aviation needs can also be accommodated on the north ramp. These areas should be more than adequate to accommodate projected general aviation aircraft and associated facility needs.

SUSTAINABILITY MANAGEMENT PLAN

Through the stakeholder engagement process, the Jetport developed a list of potential sustainability initiatives that would improve its sustainability performance relative to its goals and objectives. Input was solicited from stakeholders to develop this list, which was then evaluated using the custom-built *Sustainability Action Evaluation Tool* to assess the estimated benefits of the actions (e.g., GHG emissions reductions, increases in energy conservation) relative to their estimated costs (i.e., initial capital costs, operations and maintenance, staffing hours, and return on investment).

This *Sustainable Airport Master Plan* includes sustainability targets that will assist the Jetport in understanding the level of success it is achieving through the implementation of its sustainability program. In developing the sustainability targets presented on **Table A**, the Jetport considered its current performance and the potential effects of its identified sustainability actions, among other factors.

TABLE A
Sustainability Targets
Portland International Jetport

Sustainability Category	Sustainability Targets
Greenhouse Gas (GHG) Emissions	• Install pre-conditioned air at 100 percent of all loading bridges by 2018 • Reduce Jetport-owned and controlled GHG emissions (scopes 1 and 2), as reported in the 2013 baseline, on a per square foot basis by 5 percent by 2025 and 20 percent by 2035. • Work with tenants to develop a baseline of the Jetport's scope 3 GHG emissions by 2018
Energy	• Begin to measure percent of energy generated from renewable sources by 2018 • Reduce the Jetport's energy use intensity below 2013 levels 5 percent by 2025 and 15 percent by 2035.
Waste Management and Recycling	• Begin to measure the Jetport's composting rate by 2017 • Increase the Jetport's municipal solid waste recycling rate to 30 percent by 2020 • Continuously divert at least 90 percent of construction and demolition waste from landfills • Recapture and recycle at least 70 percent of deicing fluid which is able to be captured • Reduce deicing fluid recycling operations cost
Ground Access and Transportation	• Appoint a transportation coordinator by 2017 • Identify the mode distribution of Jetport employees by 2018 • Identify the mode distribution of Jetport passengers by 2020
Social Responsibility	• Increase the number of Jetport employees participating in Jetport-sponsored health and wellness programs to 80 percent by 2020 • Hold three employee appreciation events per year beginning in 2016 • Continuously improve Airport Service Quality rankings, as applicable and where possible
Governance	• Present two sustainability-based employee recognition awards per year beginning in 2016 • Establish an internal Sustainability Working Group by 2017 • Ensure that 100 percent of capital projects are evaluated using sustainability criteria by 2017 • Engage three local organizations per year on the Jetport's sustainability program beginning 2017 • Participate in or establish a regional task force focused on sustainability by 2018

The Jetport is committed to report on its sustainability program on an annual basis. Through annual reporting, the Jetport will enhance transparency, promote accountability, build stakeholder trust, and convey its leadership in sustainability within its region and the larger airport industry.

CAPITAL IMPROVEMENT PLAN AND COST SUMMARIES

From the specific needs and improvements that have been established for the Jetport, a realistic schedule and the associated costs for implementing the plan were determined. The implementation plan considers the interrelationships among the projects in the recommended plan in order to determine a logistics sequence to minimize conflicts and establish a master schedule.

The capital improvement plan (CIP) covers the same years as the forecasts in the planning effort. The Short Term is programmed annually through the first six years of the plan. The remaining projects are grouped into Intermediate (years 7-11) and Long (years 12-20) Term planning horizons. By utilizing planning horizons instead of specific years for Intermediate and Long Term development, the Jetport will have greater flexibility to adjust capital needs as demand dictates. Exhibit B also presents the staging of the master plan projects color-coded by short term, intermediate, and long term planning horizons.

The CIP was reviewed from a sustainability perspective, identifying opportunities where sustainability practices could improve the economic, environmental, and social performance of included projects. As these projects move forward, the Jetport will consider the identified sustainability enhancements for potential inclusion into project specifications. Some of these enhancements include pervious and permeable pavements to improve stormwater management; incorporating resiliency measures to protect the Jetport's investments and minimize future operational disruptions; incorporating material reuse and recyclables in infrastructure construction; and designing for deconstruction. Exhibit B includes the CIP projects and denotes those projects where potential sustainability enhancements were identified. The Jetport will also consider sustainable alternatives and life cycle costing in future CIP projects and other Jetport purchasing.

A detailed financial evaluation was also completed. **Table B** presents the recommended CIP and its corresponding cost estimates in 2016 dollars, inflated at 2.7 percent annually and also include contingencies, design costs, and construction management costs. As shown in the table, the CIP is estimated at approximately $193.3 million in 2016 dollars and approximately $271.8 million in inflated dollars.

The master plan's financial analysis factored all proposed capital and operation/maintenance costs against proposed incomes. The result indicated that the Jetport is fully capable of generating sufficient revenues to offset future expenditures without the need for financial assistance from City of Portland taxing resources. The airport is currently and projected to remain financially self-sufficient.

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TABLE B Jetport Capital Improvement Program (CIP) Portland International Jetport	Planning Horizons			Total CIP
	Short	Intermediate	Long	
Project Costs (Million$)				
2016 Dollars	$51,665	$37,302	$104,355	$193,322
Inflated	$56,827	$48,661	$166,264	$271,752
Funding Sources (Million$)				
FAA AIP Grants	$28,076	$22,197	$78,842	$129,115
MDOT Grants	$1,512	$1,233	$4,380	$7,125
PFC's	$21,180	$3,889	$42,358	$67,427
Jetport Revenues	$6,058	$21,341	$40,685	$68,084

THE JETPORT'S ECONOMIC BENEFIT

The Jetport is the primary aviation gateway for the State of Maine, welcoming commerce and visitors, while providing residents with access for outward travel to national and intercontinental destinations. The Jetport creates significant benefits that extend beyond the aviation community to impact economic growth and development as well as the quality of life of Maine residents. The availability of air transport is invariably listed by business executives as a key criterion for business location and expansion. Public safety and national security objectives are supported by aviation operations of police officers and government agencies. Medical transport, search and rescue, aerial mapping, air cargo, and express delivery services are all essential functions provided at Portland International Jetport every day of the year.

The Jetport creates significant benefits that extend beyond the aviation community to impact economic growth as well as the quality of life of Maine residents.

Airline travelers from across the nation or around the globe come to Maine to conduct business, meet with clients and suppliers, and place orders for goods and services produced in the state. Even greater numbers come for personal reasons, to visit friends and relatives, or to hike, fish, hunt, or simply vacation in the midst of world class scenery and recreation opportunities. General aviation flyers based at PWM enjoy the benefits of on-demand flight schedules to destinations within the state or any of the nearly 3,000 general aviation airports that provide access to large and small communities across the country.

Although qualitative advantages created by an airport are important, they are also challenging to measure. In studying the economic benefits of airports and aviation, regional analysts have emphasized economic benefits that can be quantified:

- **Employment** is the number of jobs supported by economic activity created by the presence of the Portland International Jetport.

- **Payroll** includes income to workers as employee compensation (the dollar value of payments received by workers as wages and benefits) and proprietor's income to business owners.

- **Output** is the value of the production of private firms and public agencies. For a private firm, output is equal to the annual value of revenue or gross sales at producer prices (before addition of further margins or transportation costs), including sales or excise taxes. Output, revenue, and sales are interchangeable synonymous terms used throughout this study and, in turn, these are equal to spending or expenditures from the perspective of the buyer. For government units, the agency budget is used as the measure of output.

The total annual economic benefits of the Portland International Jetport include 8,261 jobs with payroll of $269.6 million and output of $1.0 billion, incorporating all multiplier or secondary benefits. The secondary and total economic benefits flowing from the initial direct benefits of on-airport commercial service and general aviation activity are set out in **Table C**.

TABLE C
Summary of Economic Benefits
Portland International Jetport

SOURCE	EMPLOYMENT	PAYROLL	OUTPUT
Direct Economic Benefits			
On-Airport Direct Benefits: *Private Firms, Government Agencies & Capital Improvement Projects*	1,329	$54,061,000	$287,999,000
Air Visitor Direct Benefits: *Commercial Service and General Aviation Travelers*	3,929	92,960,000	351,702,000
Direct Benefits	**5,258**	**147,021,000**	**639,701,000**
Secondary Economic Benefits			
Indirect Benefits: *Activity by Suppliers & Vendors*	1,571	65,877,000	225,311,000
Induced Benefits: *Activity by Workers as Consumers*	1,432	56,667,000	178,129,000
Secondary Benefits	**3,003**	**122,544,000**	**403,440,000**
Total Economic Benefits			
Total Benefits	**8,261**	**$269,565,000**	**$1,043,141,000**

Note: On-airport spending for auto rental is included as on-airport benefits and not included as air visitor spending off-airport. Secondary benefits are computed from the IMPLAN input-output model with Maine coefficients. Figures are in 2015 dollars.

Portland International Jetport

CHAPTER ONE
INVENTORY

CHAPTER ONE

INVENTORY

The ini. al step in the preparation of the master plan update for Portland International Jetport (PWM) is the collection of information pertaining directly to or inf uencing the airport and the area it serves. The information summarized in this chapter will be used in subsequent analyses within this study and includes:

- Background information related to the Greater Portland Region, including descriptions of the local geography, regional climate, and surface transportation systems.
- Physical inventories and descriptions of current facilities and services offered at PWM. The analysis will include airf eld and landside infrastructure and services as well as local and regional airspace, competing airport facilities, air traffic control, and aircraft operating procedures.
- Portland International Jetport's role in regional, state, and national aviation systems. Development at the airport since the completion of the previous master plan will also be discussed.
- Socioeconomic data including population, employment, and income activity sectors will be analyzed. These sectors typically offer an indication of future trends that could inf uence commercial and general aviation activity at the airport.



- A review of existing local and regional plans and studies which will be utilized later in the process to determine their potential influence on the development and implementation of the airport master plan.

- Review of existing environmental conditions and sensitivities, on or near the airport, so as to be factored in the recommended development plan.

The information outlined in this chapter provides a foundation for all subsequent chapters. Much of the information was obtained through on-site inspections of the airport and personal interviews with airport staff, commercial operators, and other tenants. Information was also obtained from outside resources including documents prepared by the Federal Aviation Administration (FAA), Maine Department of Transportation – Office of Passenger Transportation (OPT), City of Portland, City of South Portland, Cumberland County, and other pertinent regional planning and economic agencies.

REGIONAL SETTING

The Greater Portland area is located on the beautiful Maine coastline, but is also within close proximity of the State's rugged interior. While the City of Portland is situated on a peninsula that juts out into Casco Bay, the mountains of Western Maine are located within a short 45 minute drive to the west. As such, the region offers an appealing mix of activities associated with mountainous locales, including hiking and skiing, as well as coastal activities associated with the beach and watercraft. The regional setting is ideal for supporting tourism as well as local resident lifestyles.

Originally called "Machigonne," meaning, "Great Neck," by the Native Americans, the Portland peninsula was established as a trading and fishing settlement by the British in 1632. Portland's waterfront became a hub for shipping and trading companies in support of Colonial industry. After the Great Fire of 1866 leveled the city for the fourth time, the rebuilt City displayed the architectural flair of the Victorian era, which has been maintained to this day. The City of Portland's Waterfront has been the focal point of recent redevelopment in support of exporting and fishing industries, revitalizing Maine's largest metropolitan center. Working with careful attention to landmark preservation, the City of Portland has successfully merged historic character within a modern urban environment.

With a combined population of approximately 91,600 residents, Portland and South Portland rank as the state's most populated locale. Cumberland County boasts a population of three times that amount, with nearly 300,000 residents. The Portland-South Portland Metropolitan Statistical Area (MSA), identified as Cumberland, Sagadahoc, and York Counties, contains a resident population of approximately 533,000 people. Larger regional population centers are situated relatively close and include Boston, MA 102 miles south and New York City, NY 277 miles southwest.

AIRPORT LOCATION

As depicted on **Exhibit 1A**, Portland International Jetport is located in the southeastern portion of Cumberland County, approximately three miles from downtown Portland. The airport is situated on 769 acres of property within both Portland and South Portland. The primary runway and the southern half of the crosswind runway are located in South Portland. The north half of the crosswind runway and the majority of the existing landside facilities are located in Portland. The airport property protecting the west approach to the primary runway abuts the Westbrook corporate limits. The airport's elevation is 75.7 feet above mean sea level (MSL).

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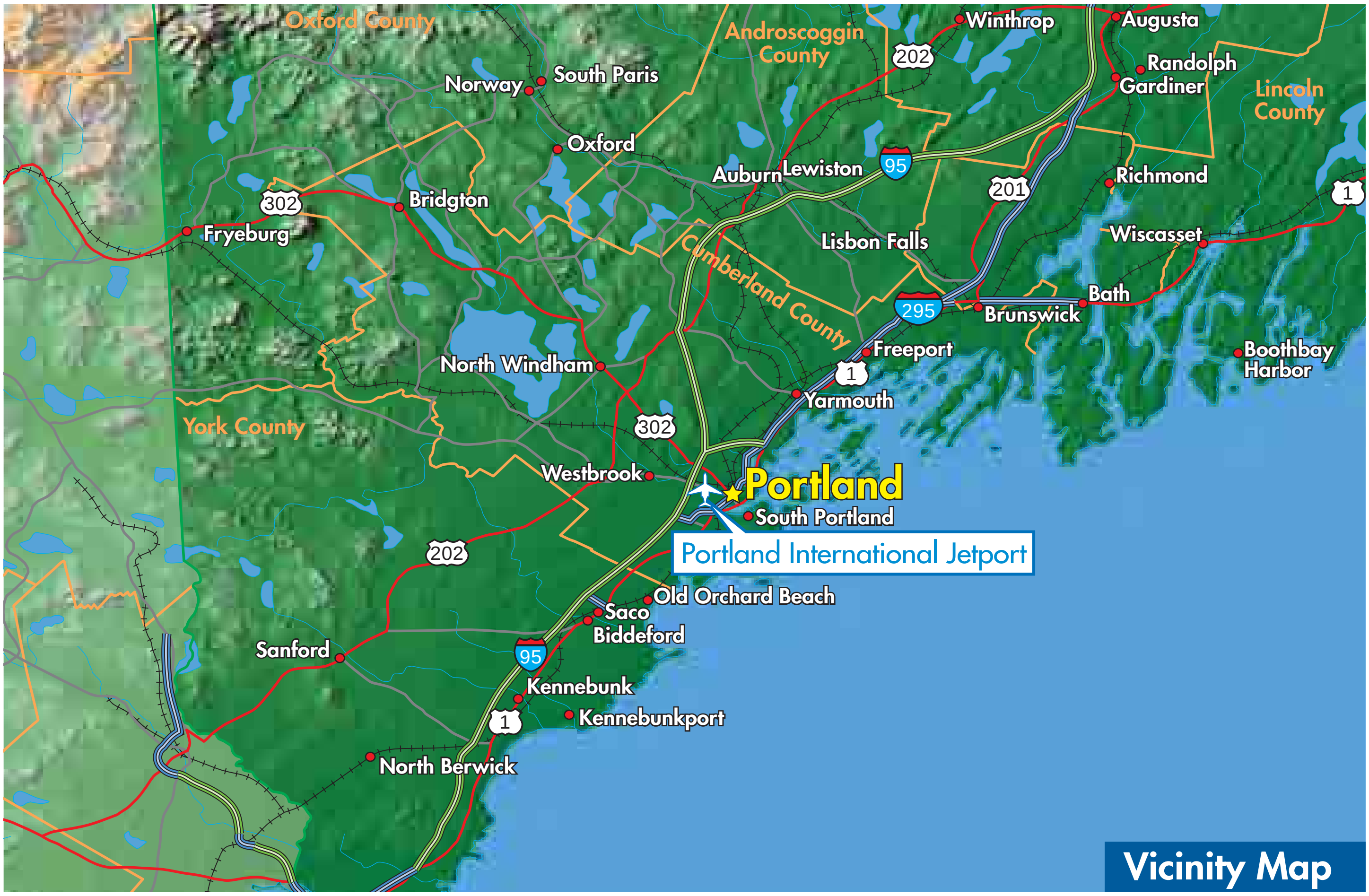
REGIONAL TRANSPORTATION NETWORK

Primary regional access to the City of Portland is provided by U.S. Interstate 95 (I-95). Interstate 95 routes along the entire eastern coast of the United States, having a northern terminus at the Maine border with New Brunswick and a southern terminus in Miami, FL. It is the longest spanning north/south interstate in the United States and directly links Portland with Augusta and Bangor to the north and most major east coast cities to the south. In Maine, I-95 is operated as a toll road by the Maine Turnpike Authority.

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


Vicinity Map
Oxford County
Androscoggin County
Lincoln County
Cumberland County
York County
Winthrop
Augusta
Randolph
Gardiner
Norway
South Paris
Oxford
Auburn
Lewiston
Richmond
Bridgton
Fryeburg
Lisbon Falls
Wiscasset
Bath
Brunswick
Freeport
Boothbay Harbor
North Windham
Yarmouth
Westbrook
Portland
South Portland
Portland International Jetport
Old Orchard Beach
Saco
Biddeford
Sanford
Kennebunk
Kennebunkport
North Berwick
202
95
201
1
302
295
202

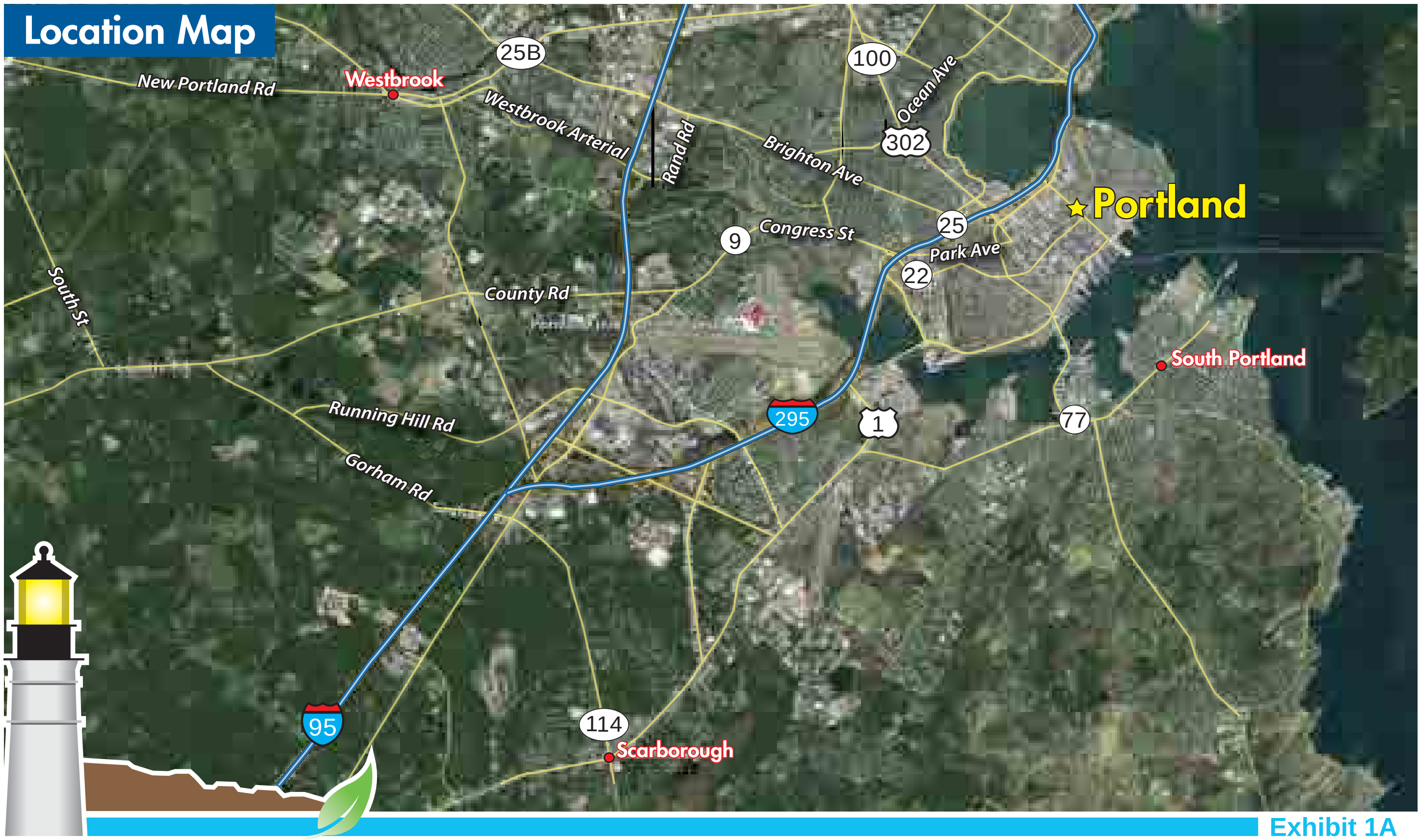

Location Map
New Portland Rd
Westbrook
25B
Westbrook Arterial
Rand Rd
100
Ocean Ave
302
Brighton Ave
Portland
9
Congress St
25
Park Ave
22
South St
County Rd
South Portland
Running Hill Rd
295
1
77
Gorham Rd
95
114
Scarborough

Exhibit 1A

The airport is situated directly across the Fore River from the Portland Transportation Center. The Center is located on Thompson's Point directly off of Fore River Parkway and the Congress Street intersection and nearby I-95. The Center is a bus and train station primarily serving Concord Coach Lines and Amtrak Downeaster passenger trains. It is also serves Megabus and the Greater Portland Metro Bus Route 5.

Greater Portland Transit District METRO provides bus service throughout Portland, Westbrook, Falmouth, and the Maine Mall area of South Portland. Portland Metro Bus Route 5 travels to and from the Portland Jetport into downtown Portland with connections to other METRO routes, Amtrak, South Portland Bus, and ShuttleBus ZOOM (with connections to Biddeford, Saco and Old Orchard Beach). The airport is also situated adjacent to the Fore River and the Portland Harbor.

CLIMATE

Weather conditions are important to the planning and development of an airport. Temperature is an important factor in determining runway length requirements, while wind direction and speed are used to determine optimum runway orientation. The need for navigational aids and lighting is determined by the percentage of time that visibility is impaired due to cloud coverage or other conditions.

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

Heavy seasonal snowfalls, over 100 inches, normally occur about every 10 years. True blizzards are very rare. The White Mountains to the northwest keep larger snow accumulations from reaching the Portland area and help to moderate the temperature. Normal monthly precipitation is remarkably uniform throughout the year, having a monthly range between a low of 2.95 and high of 4.18 inches. Annually, the area experiences 43.77 inches of precipitation. Winds are generally quite light, with the highest velocities being recorded from February through April. Even in these months, the occasional northeasterly gales usually lose much of their severity before reaching the coast of Maine.

Temperatures well below zero are recorded frequently each winter. Cold waves sometimes come in on strong winds, but extremely low temperatures are generally accompanied by light winds. The average freeze-free season at the airport is 139 days. Mid-May is the average occurrence of the last freeze in spring, and the average occurrence of the first freeze in fall is late September. The freeze-free period is longer in the city proper, but may be even shorter at susceptible places further inland. Snowfall is normal between the months of October and March, peaking in January, and averaging 69.5 inches per year. Summer months are generally pleasant with periods of hot temperatures. July is typically the hottest month with a normal maximum temperature of 77.86 degrees Fahrenheit (F).

Table 1A lists common climate data for Portland, Maine. Information pertaining to temperature and precipitation were obtained from the National Oceanic and Atmospheric Administration (NOAA), while the wind speed, percent of time in instrument and visual flight rule conditions, and sky clear data was pulled from the PWM automated surface observation service (ASOS). Visual flight rules (VFR) conditions are those when the pilot is allowed to fly with visual reference having a minimum of three miles visibility and at least 1,000-foot cloud ceilings. Instrument flight rules (IFR) conditions are those times where either visibility or cloud heights fall below VFR conditions.

TABLE 1A
Historic Climate Data
Portland, Maine

Period	Average Precipitation (in.)[1]	Normal Daily Max Temp (F)[1]	Average Snowfall (in.)[2]	Average Wind Speed (mph)[3]	Percent IFR[3]	Percent VFR[3]	Sky Clear[3]
January	3.81	31.04	19.18	7.57	22.10%	77.90%	54.25%
February	3.64	32.68	16.8	8.68	21.05%	78.95%	55.98%
March	4.1	40.96	12.93	8.96	20.17%	79.83%	55.05%
April	3.91	51.85	2.75	8.79	21.17%	78.83%	55.18%
May	3.5	62.59	0.12	7.56	30.10%	69.90%	47.19%
June	3.41	71.93	0	6.45	30.43%	69.57%	48.57%
July	3.14	77.86	0	6.16	25.03%	74.97%	60.29%
August	2.95	76.23	0	5.82	19.54%	80.46%	63.84%
September	3.36	68.99	0	5.95	19.91%	80.09%	63.03%
October	3.66	58.61	0.23	7.01	20.64%	79.36%	53.74%
November	4.18	48.86	2.7	7.14	19.82%	80.18%	56.97%
December	4.11	35.39	14.79	7.33	23.64%	76.36%	49.17%
Total	***43.77***	***54.75***	***69.5***	***7.29***	***22.91%***	***77.09%***	***55.27%***

[1] *Source: National Oceanic and Atmospheric Administration (NOAA) for Portland, Maine; Data Range of 1895-2013*
[2] *Source: National Oceanic and Atmospheric Administration (NOAA) for Portland, Maine; Data Range of 1941-2013*
[3] *Source: PWM Automated Surface Observation System (ASOS) via 136,267 total observations; Data Range: 2004-2013*

KEY:
In. – Inches
MPH – Miles per hour
F – Degrees Fahrenheit
IFR – Instrument Flight Rules
VFR – Visual Flight Rules

AIRPORT HISTORY

Portland International Jetport was originally known as Stroudwater Airport, which was privately owned by the Portland Airport Company. The City of Portland purchased the airport in 1934 for $52,000 and changed the name to Portland Municipal Airport. The original airline passenger terminal building was built in 1939, and enlarged three times, most recently in 1949. That building is currently used as the general aviation terminal. The present passenger terminal building was constructed in 1968, at a cost of $850,000.

In 1969, the Portland Municipal Airport was renamed Portland International Jetport. Other significant airport improvements that occurred prior to 2000 included:

- Runway 11-29 in 1957, with an extension in 1966;
- Runway 18-36 in 1969;

- Airport rescue and firefighting (ARFF) station in 1972;
- A new control tower in 1975;
- An airport surveillance radar in 1977;
- In 1980, the passenger terminal was expanded to the east with the addition of two baggage carousels. The building was also expanded to the west by adding three second-level passenger jetways and a hold room;
- A terminal building improvement project was undertaken to add two second-level boarding gates, as well as additional space for ticketing, operations, departure lounge, concessions, and an international customs in 1995;
- In 2001, a new multilevel parking garage was constructed, adding more than 1,300 parking spaces and expanding long-term parking. A new access road (International Parkway) was developed off Congress Street, and the former access road (Westbrook Street) through the Stroudwater neighborhood was closed to through traffic;
- In 2004, the runway safety areas beyond each end of Runway 11-29 were upgraded to FAA design standards by extending the runway 400 feet to the west and grading additional safety area. The project was done in conjunction with the relocation and widening of Johnson Road.

The airport has undergone several improvements since the last master plan in 2008 including:

- Runway 18-36 extended 1,100 feet to the south to provide adequate runway safety areas and an effective runway length of 6,100 feet for takeoff.
- Terminal expansion of 137,000 square feet and three gates.
- Expansion of main terminal ramp.
- Additional automobile parking/modification of surface lots.
- Parking ramp on south side for general aviation use.
- Construction of new deicing ramp and reclamation facilities.
- Improve Runway 29 safety area and implement wildlife hazard management plan
- Installation of ground source heat sink to support heating and cooling of Terminal Building

Exhibit 1B presents a listing of major capital improvement projects completed since the last master plan. Included is a description of the projects as well as the funding source. The funding sources included FAA grant-in-aid programs as well as other resources including those from the State of Maine, passenger facility charges (PFC), transportation security agency (TSA) funds, and voluntary airport low emissions (VALE) program funds.

HISTORICAL AERONAUTICAL ACTIVITY

At commercial service airports, the number of passenger boardings (enplanements) is a key indicator of operational strength as they are typically the basis for federal grants-in-aid. Enplanement activity is also a good barometer of operational conditions as they can be used to measure the strength of commercial passenger airline services. Another commercial airline indicator is the measure of air cargo shipped,

FEDERAL FISCAL YEAR[1]	PROJECT	TOTAL COST	FAA	PFC	TSA	STATE	AIRPORT
F.Y. 2005							
AIP 57	Master Plan Update	678,037.61	639,953.00	0.00	0.00	16,840.87	21,243.74
AIP 58	Taxiway Widening	6,411,260.86	6,036,586.00	158,857.55	0.00	158,857.54	56,959.77
JTPC20	Bag Claim Expansion & Improvement	8,166,294.58	0.00	8,166,294.58	0.00	0.00	0.00
Subtotal 2005		**15,255,593.05**	**6,676,539.00**	**8,325,152.13**	**0.00**	**175,698.41**	**78,203.51**
F.Y. 2006							
AIP 59	Interactive Training System & Noise Monitoring System	714,482.15	561,817.00	0.00	0.00	14,784.66	137,880.49
JT0601	Westbrook St. Reconstruction	428,000.00	0.00	0.00	0.00	0.00	428,000.00
JT0603	Construction of the South General Aviation Road	771,142.77	0.00	0.00	0.00	0.00	771,142.77
JT0605	Phase II Garage Expansion Design	952,255.80	0.00	0.00	0.00	0.00	952,255.80
JTPC25	Snow Removal Equipment	1,694,362.96	0.00	1,694,362.96	0.00	0.00	0.00
Subtotal 2006		**4,560,243.68**	**561,817.00**	**1,694,362.96**	**0.00**	**14,784.66**	**2,289,279.06**
F.Y. 2007							
AIP 60	This was used for land acquisition, but all costs were transferred to AIP 54	0.00	0.00	0.00	0.00	0.00	0.00
AIP 61	Environmental Assessment	932,692.78	886,058.00	0.00	0.00	23,317.32	23,317.46
Subtotal 2007		**932,692.78**	**886,058.00**	**0.00**	**0.00**	**23,317.32**	**23,317.46**
F.Y. 2008							
JTRB03	Parking Garage Phase II, Jetport Boulevard Parking Area & Remote Lot Drainage Improvements	22,260,480.00	0.00	0.00	0.00	0.00	22,260,480.00
AIP 62	Construct South G.A. Apron	1,657,497.54	1,557,813.00	0.00	0.00	40,995.09	58,689.45
AIP 63	Engineering for Terminal Ramp Expansion	1,246,999.91	1,183,990.00	0.00	0.00	31,157.66	31,852.25
JT0801	Terminal Circulation Improvements	3,005,688.41	0.00	0.00	0.00	0.00	3,005,688.41
Subtotal 2008		**28,170,665.86**	**2,741,803.00**	**0.00**	**0.00**	**72,152.75**	**25,356,710.11**
F.Y. 2009							
AIP 64	Runway 18-36 Wetlands Mitigation - Phase 1	1,521,489.62	1,445,415.00	0.00	0.00	38,037.24	38,037.38
AIP 65	Runway 18-36 Improvements & Runway 11-29 Safety Area	1,136,038.00	1,077,062.98	0.00	0.00	28,594.12	30,380.90
AIP 66	Terminal Apron - Phase 1 & Deicing Capture	2,136,419.00	2,136,139.00	0.00	0.00	0.00	280.00
AIP 67	Runway 18-36 Wetlands Mitigation - Phase 2 & Wildlife Mitigation	2,481,087.48	2,157,033.00	0.00	0.00	62,027.19	262,027.29
Subtotal 2009		**7,275,034.10**	**6,815,649.98**	**0.00**	**0.00**	**128,658.55**	**330,725.57**
F.Y. 2010							
AIP 69*	Runway 11-29 Safety Area Construction & Wildlife Hazard Management Plan	2,318,667.10	2,179,784.23	0.00	0.00	57,362.74	81,520.13
JTPC28	Terminal Expansion - PFC funded	59,186,742.00	0.00	59,186,742.00	0.00	0.00	0.00
JTRB04	Terminal Expansion - Local Share	7,419,990.00	0.00	0.00	0.00	0.00	7,419,990.00
JTPC29	Terminal Expansion - Roadway Improvements	4,143,165.00	0.00	4,143,165.00	0.00	0.00	0.00
JTPC30	Terminal Expansion - Passenger Boarding Bridges	1,560,103.00	0.00	1,560,103.00	0.00	0.00	0.00
JT1002*	Terminal Expansion - Parking Lots and Ineligible Costs	7,192,166.59	0.00	0.00	0.00	0.00	7,192,166.59
GR1081	Terminal Expansion - EDS Baggage Handling System	9,028,222.34	0.00	0.00	9,025,781.24	0.00	2,441.10
AIP 70	Terminal Expansion - Installation of Geothermal Heating & Cooling System	2,974,280.45	2,503,089.07	0.00	0.00	66,171.05	405,020.33
AIP 71*	Runway 18-36 Extension	4,598,253.34	4,316,885.86	0.00	0.00	113,602.26	167,765.22
Subtotal 2010		**98,421,589.82**	**8,999,759.16**	**64,890,010.00**	**9,025,781.24**	**237,136.05**	**15,268,903.37**
F.Y. 2011							
AIP 72*	Runway 18-36 Extension & Taxiway C Rehab / Extension	14,105,278.91	13,307,871.61	0.00	0.00	350,207.15	447,200.15
Subtotal 2011		**14,105,278.91**	**13,307,871.61**	**0.00**	**0.00**	**350,207.15**	**447,200.15**
F.Y. 2012							
AIP 73	Airfield Deicing Facility and Terminal Apron, Phase III	10,935,922.12	9,353,902.87	0.00	0.00	519,661.27	1,062,357.98
Subtotal 2012		**10,935,922.12**	**9,353,902.87**	**0.00**	**0.00**	**519,661.27**	**1,062,357.98**
F.Y. 2013							
AIP 74*	Snow Removal Equipment (2 sweepers & 2 blowers)	1,538,861.88	1,384,975.70	0.00	0.00	76,943.09	76,943.09
AIP075*	Master Plan Update Phase 1 - Sustainable Master Plan (Discretionary AIP)	5,733.76	5,160.38	0.00	0.00	286.69	286.69
AIP075*	Master Plan Update Phase 2 - ($620,000 Reimbursed in FY 2015)	0.00	0.00	0.00	0.00	0.00	0.00
JT1301	TSA Office Space Improvements	250,464.59	0.00	0.00	250,464.59	0.00	0.00
Subtotal 2013		**1,795,060.23**	**1,390,136.08**	**0.00**	**250,464.59**	**77,229.78**	**77,229.78**
F.Y. 2014							
AIP076*	Snow Removal Equipment - (Snow-blower)	1,821.00	1,638.90	0.00	0.00	91.05	91.05
Subtotal 2014		**1,821.00**	**1,638.90**	**0.00**	**0.00**	**91.05**	**91.05**
TOTALS		**181,453,901.55**	**50,735,175.60**	**74,909,525.09**	**9,276,245.83**	**1,598,936.99**	**44,934,018.04**

[1] For projects that have approved grants, the grant number has been listed in place of the federal fiscal year.
* Indicates that the project is still open and costs shown are costs to date.

Exhibit 1B
HISTORIC CAPITAL IMPROVEMENT PROJECTS

typically recorded in annual enplaned tonnage. The airport's based aircraft and annual operations (take-offs and landings) in aggregate and type are also important aeronautical activity measures to factor. These indicators will be used in subsequent analyses in this master plan to project future aeronautical activity and determine future facility needs. Each of the activity segments is briefly described below.

PASSENGER ENPLANEMENTS

Commercial service airports provide local and regional access to the national and international aviation systems. As such, these airports are vital to interstate commerce as well as a key component to local and regional economic infrastructure. These facilities support and can even drive growth in all socioeconomic categories.

An enplanement includes any revenue passengers that board an aircraft for a fare at the airport. This statistic is important in that it is utilized by the FAA to determine the annual level of entitlement funding dedicated to the airport under the Airport Improvement Program (AIP). An airport must reach 10,000 annual enplanements to be eligible for a minimum one million dollars in annual entitlement funds. Historical enplanement data is provided on **Exhibit 1C**. Airline passenger enplanements will typically be influenced by many factors, including number of airlines serving the airport, frequency of daily departures, types of aircraft used, and diversity of number of non-stop destinations.

PWM is currently served by five regularly scheduled airlines offering an average of 42 daily departures at the time of this writing (August 2014). The airport also hosts on-demand or irregularly scheduled commercial airlines commonly destined for locales supported by the gaming industry. The airlines currently providing daily non-stop flights at the airport include:

PWM is currently served by five regularly scheduled airlines offering an average of 42 daily departures at the time of this writing (August 2014).

- American (U. S. Airways)
- Delta
- Jet Blue
- Southwest
- United

Portland and the rest of Maine are popular for vacations from late spring through summer and early fall. As such, the airlines will typically add daily flights during this period, and then return to fewer flights during winter. For

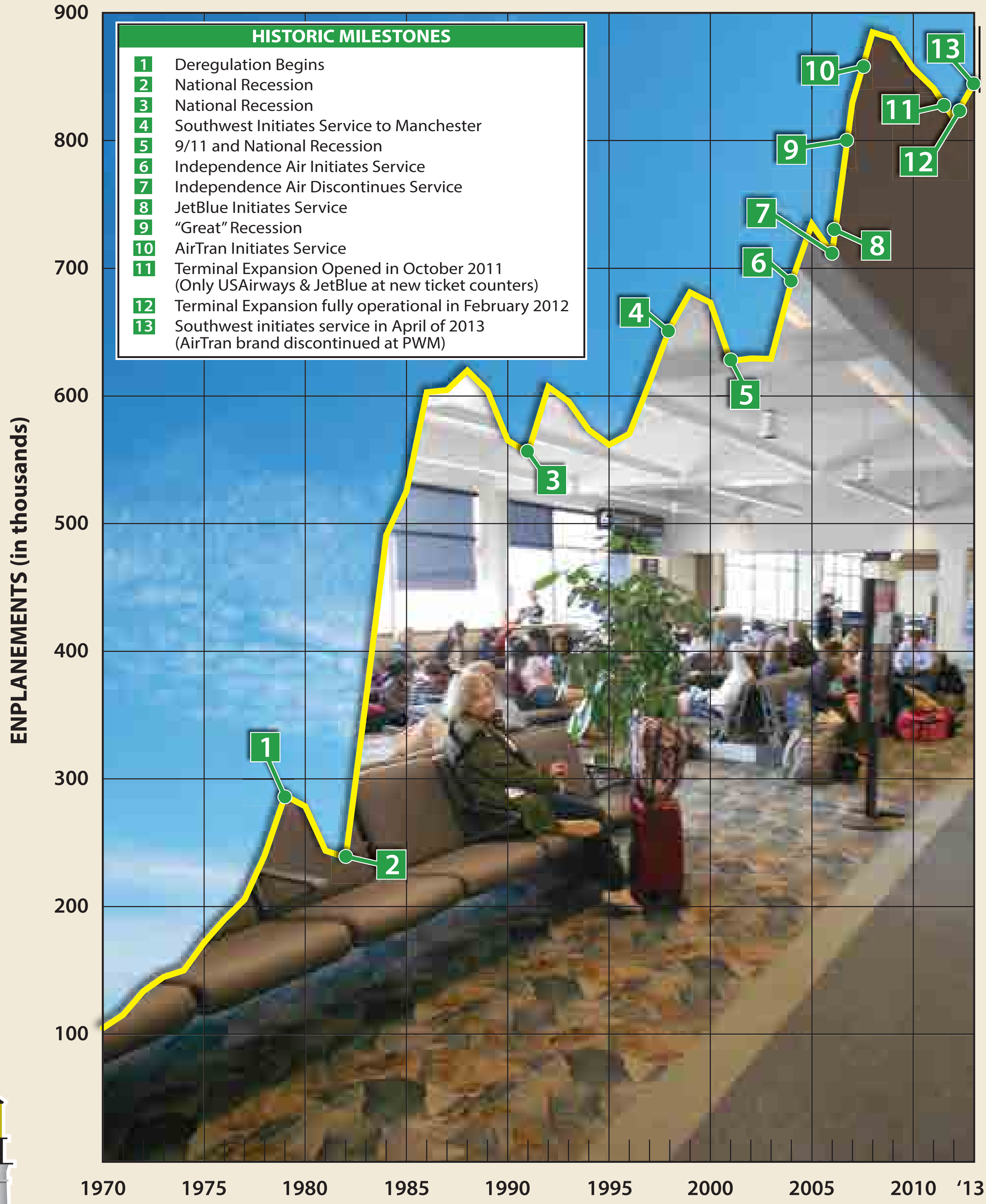

HISTORIC MILESTONES
1 Deregulation Begins
2 National Recession
3 National Recession
4 Southwest Initiates Service to Manchester
5 9/11 and National Recession
6 Independence Air Initiates Service
7 Independence Air Discontinues Service
8 JetBlue Initiates Service
9 "Great" Recession
10 AirTran Initiates Service
11 Terminal Expansion Opened in October 2011 (Only USAirways & JetBlue at new ticket counters)
12 Terminal Expansion fully operational in February 2012
13 Southwest initiates service in April of 2013 (AirTran brand discontinued at PWM)
ENPLANEMENTS (in thousands)
900
800
700
600
500
400
300
200
100
1970
1975
1980
1985
1990
1995
2000
2005
2010
'13

Exhibit 1C

example, during the winter months, daily airline departures are typically reduced to as few as 28 (January 2014).

Currently, passenger commercial service airlines operating at PWM utilize a wide array of commercial airline aircraft including turboprop, regional jets, and narrow body commercial jet aircraft. Over the last few years, the five airlines operating at PWM have offered non-stop service to 11 locations, with seasonal additions such as Orlando, FL. The current non-stop destinations served from PWM include:

- Atlanta, GA
- Baltimore, MD
- Charlotte, NC
- Chicago, IL
- Detroit, MI
- New York, NY (LaGuardia and JFK Airports)
- Newark, NJ
- Philadelphia, PA
- Washington, DC (Dulles and Reagan Airports)

AIR CARGO

Historically, dedicated air cargo operations have included more than one airline. Currently, however, the airport is served only by FedEx air cargo. FedEx operates one daily departure by a Boeing 757 aircraft. The Boeing 757 departs Monday-Friday at 9:30 p.m. for the FedEx hub in Memphis, TN and returns to PWM on Tuesday-Saturday mornings. During peak periods (i.e., Christmas), another aircraft such as an Airbus 300/310 may be used in place of or in addition to the Boeing 757. A regional airline, Wiggans, also carries the FedEx banner for three daily cargo departures by Cessna 208 Grand Caravan turboprop aircraft to and from other Maine airports. Enplaned and deplaned air cargo is summarized in **Table 1B**.

TABLE 1B
Historical Air Cargo Activity (Reported in Tons)
Portland International Jetport

	2007		2008		2009		2010		2011		2012		2013	
	Enp.	Dep.	Enp.	Dep.	Enp.	Dep.	Enp.	Dep.	Enp.	Dep.	Enp.	Dep.	Enp.	Dep.
Jan	648.1	864.2	664.9	871.5	457.0	740.9	399.7	638.8	346.6	432.3	367.5	470.2	405.4	542.4
Feb	662.2	840.6	590.4	900.8	406.7	692.1	386.7	608.6	379.6	420.7	390.7	485.2	371.3	517.2
Mar	767.7	986.0	587.8	860.6	382.2	598.7	421.2	515.7	444.7	534.5	433.1	519.4	435.9	702.1
Apr	612.2	849.2	590.5	825.1	393.6	642.9	392.8	510.4	401.2	477.4	351.8	457.8	468.5	590.0
May	687.1	1033.1	636.1	876.2	415.1	663.3	388.1	495.4	368.1	472.0	395.1	542.2	402.5	577.9
Jun	714.7	1041.7	586.3	836.4	399.7	682.7	373.2	538.7	435.5	552.7	424.8	541.9	401.0	550.3
Jul	638.6	950.2	584.8	948.3	384.6	662.3	408.9	551.7	402.1	492.6	390.1	509.3	386.5	663.7
Aug	752.8	1050.1	591.4	878.9	401.9	589.4	389.7	531.7	425.4	542.4	451.7	571.1	434.0	670.2
Sep	667.8	917.2	538.1	825.8	428.6	675.7	389.0	513.7	413.6	529.2	404.3	523.0	372.8	601.5
Oct	670.5	1041.7	562.0	942.9	455.7	675.7	408.9	510.8	409.9	494.6	421.3	528.6	385.3	662.5
Nov	674.9	964.3	475.6	738.1	394.3	590.8	377.1	460.1	387.4	506.0	405.6	513.2	361.9	581.2
Dec	1094.6	999.4	838.5	896.7	606.1	809.8	503.2	622.8	477.5	659.8	456.7	648.3	439.5	737.3
Total	8,591.0	11,537.9	7,246.3	10,401.3	5,125.4	8,024.3	4,838.5	6,498.5	4,891.7	6,114.2	4,892.7	6,310.2	4,864.6	7,396.4

Source: Airport Management Records
Enp. - Enplaned Cargo
Dep. - Deplaned Cargo

AIRCRAFT OPERATIONS

Aircraft operations, being a take-off or landing, are classified as either local or itinerant. Local operations consist mostly of aircraft training operations conducted within the airport traffic pattern and touch-and-go and stop-and-go operations. Itinerant operations are arriving or departing aircraft which have an origin or destination away from the airport.

Aircraft operations are further sub-classified into four general categories: air carrier, air taxi, general aviation, and military. Air carrier operations are defined as those conducted commercially by aircraft having a seating capacity of 60 or more and/or a maximum payload capacity of 18,000 pounds. Air taxi operations can include small commercial service aircraft operations as well as general aviation type aircraft for the “on-demand” commercial transport of persons and property in accordance with 14 Code of Federal Regulations (CFR) Part 135 and Subchapter K of 14 CFR Part 91.

Exhibit 1D presents the annual aircraft operations as counted by the air traffic control tower (ATCT) at PWM since 1995. The exhibit includes two categories of itinerant operations: IFR and VFR operations. IFR operations are those conducted during instrument weather conditions or during VFR but under a completed instrument flight plan.

Commercial service operations at PWM fall under both air carrier and air taxi categories. Air carrier operations typically include mainline passenger and cargo airlines. Commercial service operations counted as air taxi are represented by regional airlines utilizing small regional jets or turboprop aircraft while hauling under the banner of the mainline carriers. General aviation operations include a wide array of aircraft use ranging from personal to business and corporate uses. Military aircraft also operate at the airport, as detailed on **Exhibit 1D**.

BASED AIRCRAFT

There are currently 50 aircraft based at the airport, including four turboprop and eight business jet aircraft.

Identifying the current number of based aircraft is important to master plan analysis, yet it can be challenging because of the transient nature of aircraft storage. The airport maintains a record of aircraft based on the airport. There are currently 50 aircraft based at the airport, including four turboprop and eight business jet aircraft. Historical based aircraft information is also presented on **Exhibit 1D**.

AIRPORT ADMINISTRATION

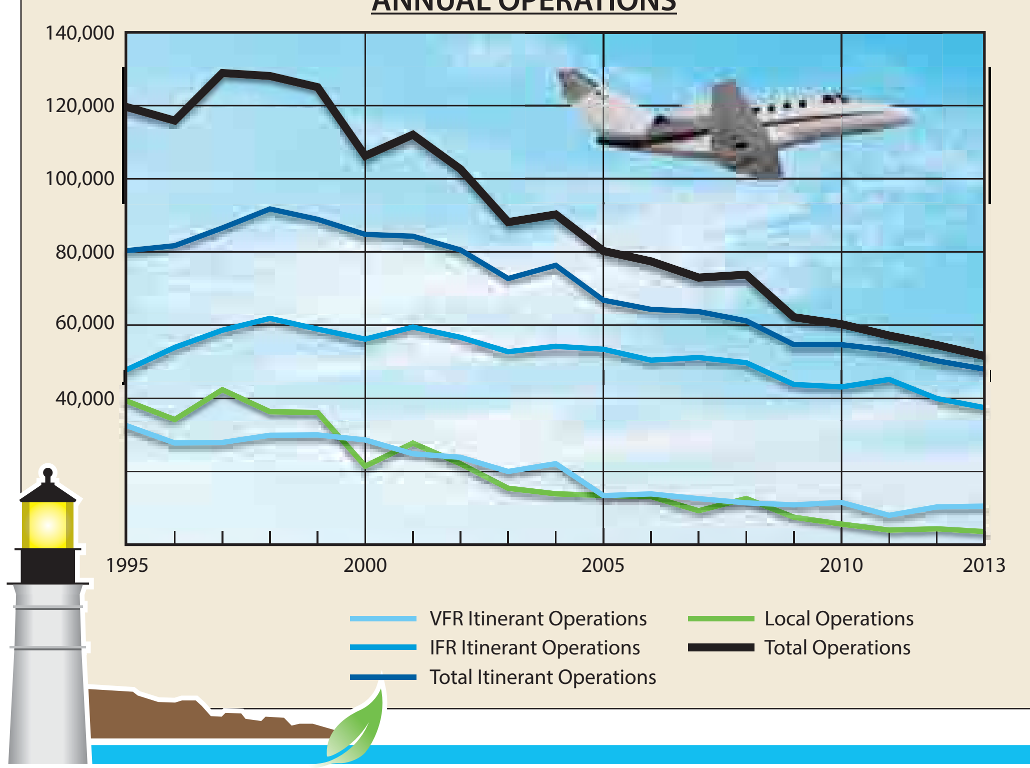
Portland International Jetport is owned and operated by the City of Portland. Portland has an elected mayor and city council form of government. A standing three-person transportation committee oversees the city-wide infrastructure for the council. A full-time Airport Director, who reports to the City Manager, runs the facility, with the help of 51 total employed staff members. **Exhibit 1E** presents the overall airport employee organizational chart.

Year	IFR Itinerant Operations					VFR Itinerant Operations					Total Itinerant Operations					Local Operations			Total Operations	Based Aircraft
	AC	AT	GA	MIL	SUB	AC	AT	GA	MIL	SUB	AC	AT	GA	MIL	SUB	GA	MIL	SUB		
1995	10,646	24,084	12,325	672	47,727	2,373	7,363	21,986	870	32,592	13,019	31,447	34,311	1542	80,319	37,489	1,851	39,340	119,659	54
1996	13,475	28,517	11,268	647	53,907	1,477	5,056	20,447	809	27,789	14,952	33,573	31,715	1456	81,696	32,961	1,224	34,185	115,881	54
1997	14,390	32,020	11,258	948	58,616	1,272	3,383	22,159	1,122	27,936	15,662	35,403	33,417	2070	86,552	40,011	2,334	42,345	128,897	44
1998	17,726	30,409	12,556	1,160	61,851	1,499	2,496	24,764	1,136	29,895	19,225	32,905	37,320	2296	91,746	34,075	2,257	36,332	128,078	44
1999	16,164	29,065	12,701	987	58,917	1,140	2,270	25,670	912	29,992	17,304	31,335	38,371	1899	88,909	35,055	1,062	36,117	125,026	44
2000	14,754	26,994	13,393	1,034	56,175	1,920	3,941	22,060	700	28,621	16,674	30,935	35,453	1734	84,796	21,118	338	21,456	106,252	44
2001	16,319	29,816	12,055	1,272	59,462	488	1,147	22,649	551	24,835	16,807	30,963	34,704	1823	84,297	27,310	436	27,746	112,043	56
2002	14,893	28,279	12,402	1,087	56,661	487	1,427	21,354	608	23,876	15,380	29,706	33,756	1695	80,537	21,823	270	22,093	102,630	56
2003	13,094	27,342	11,590	709	52,735	645	1,577	17,219	553	19,994	13,739	28,919	28,809	1262	72,729	15,227	187	15,414	88,143	56
2004	7,888	34,701	11,054	571	54,214	919	4,026	16,576	607	22,128	8,807	38,727	27,630	1178	76,342	13,737	162	13,899	90,241	43
2005	10,341	31,581	10,534	950	53,406	28	711	12,401	265	13,405	10,369	32,292	22,935	1215	66,811	13,256	190	13,446	80,257	43
2006	9,887	28,782	10,591	1,164	50,424	1	764	12,814	294	13,873	9,888	29,546	23,405	1458	64,297	12,975	150	13,125	77,422	43
2007	12,891	27,132	10,447	669	51,139	33	858	11,324	358	12,573	12,924	27,990	21,771	1027	63,712	9,082	191	9,273	72,985	43
2008	15,945	24,067	9,167	557	49,736	1	757	10,263	405	11,426	15,946	24,824	19,430	962	61,162	12,262	352	12,614	73,776	55
2009	19,954	15,590	7,926	313	43,783	4	361	10,177	335	10,877	19,958	15,951	18,103	648	54,660	7,370	130	7,500	62,160	55
2010	18,047	16,559	8,328	179	43,113	28	401	10,896	205	11,530	18,075	16,960	19,224	384	54,643	5,552	62	5,614	60,257	55
2011	17,163	17,554	10,060	376	45,153	12	428	7,449	127	8,016	17,175	17,982	17,509	503	53,169	3,944	30	3,974	57,143	37
2012	14,531	17,957	7,174	279	39,941	0	630	9,443	233	10,306	14,531	18,587	16,617	512	50,247	4,247	72	4,319	54,566	37
2013	17,445	13,231	6,564	209	37,449	4	396	9,930	206	10,536	17,449	13,627	16,494	415	47,985	3,527	56	3,583	51,568	38
2014*	7,086	6,113	2,671	155	16,025	0	191	3,350	101	3,642	7,086	6,304	6,021	256	19,667	785	16	801	20,468	50

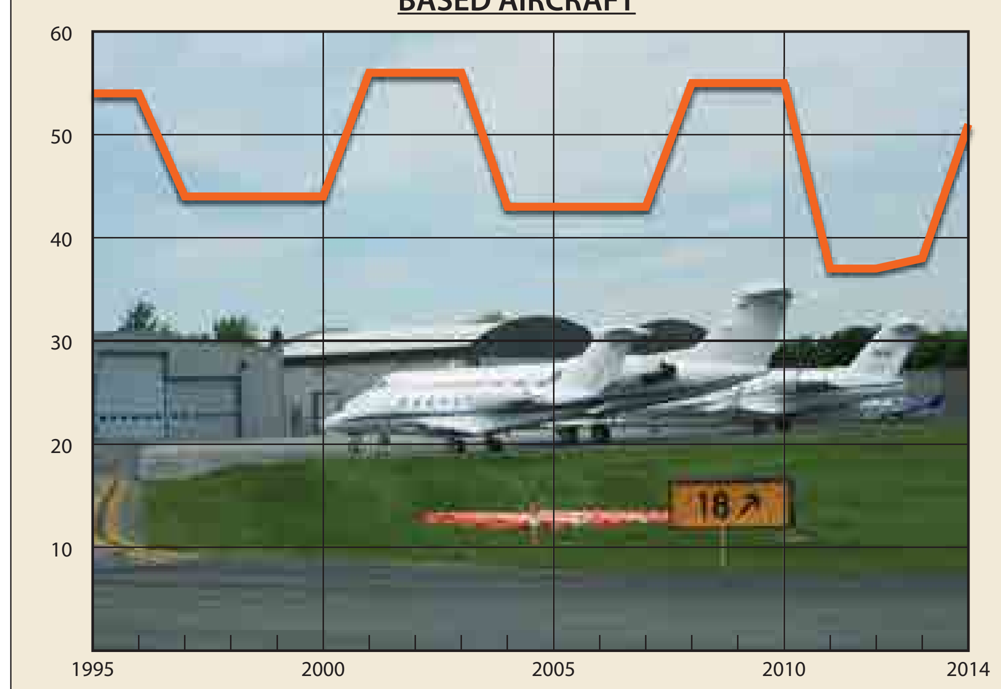
Source: FAA OPSNET per PWM ATCT counts
* Operations for 2014 include January through June (only available at time of report)

Key:
AC - Air Carrier (commercially operated aircraft having seating capacity more than 60 seats or a maximum payload capacity of 18,000 pounds)
AT - Air Taxi (commercially operated aircraft having 60 or fewer passenger seats or less than 18,000 pounds maximum payload capacity)
GA - General aviation
MIL - Military
SUB - Subtotals

ANNUAL OPERATIONS



BASED AIRCRAFT



BASED AIRCRAFT FLEET MIX

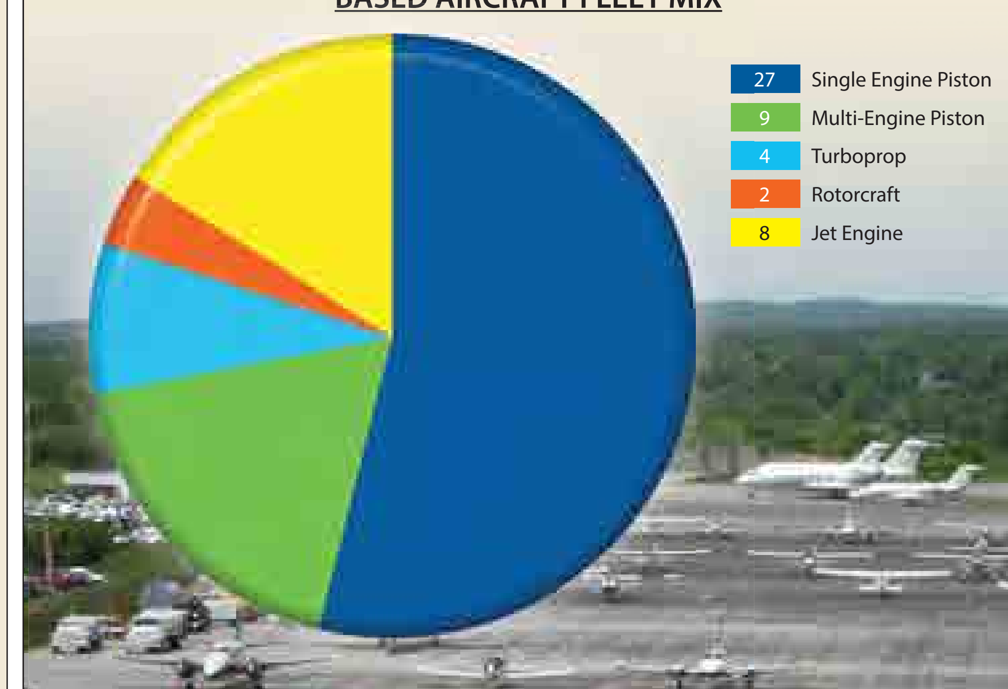


Exhibit 1D

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CITY OF PORTLAND, MAINE - DEPARTMENT OF AVIATION - PORTLAND INTERNATIONAL JETPORT
ORGANIZATION CHART

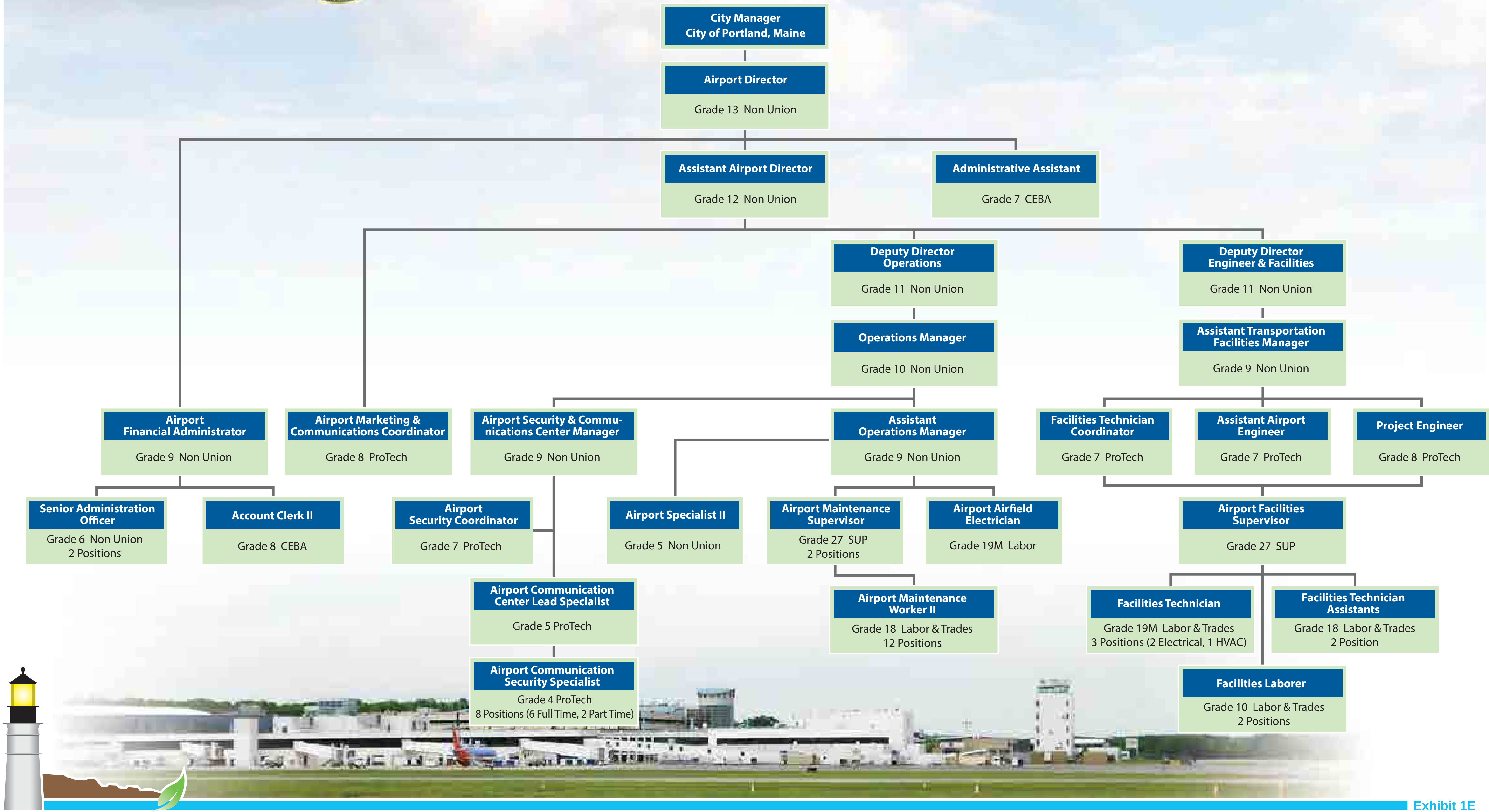

Exhibit 1E

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AIRPORT SYSTEM PLANNING ROLE

Airport planning exists on many levels: national, state, and local. Each level has a different emphasis and purpose. On the national level, the Portland International Jetport is included in the *National Plan of Integrated Airport Systems* (NPIAS). On the regional and state levels, the airport is included in the *Maine Aviation Systems Plan* (2001). The most recent local planning document is the Airport Master Plan, which was last updated in 2008.

FEDERAL AIRPORT PLANNING

The role of the federal government in the development of airports cannot be overstated. Many of the nation's existing airports were either initially constructed by the federal government or their development and maintenance was partially funded through various federal grant-in-aid programs to local communities. The system of airports existing today is due, in large part, to the existence of federal policy that promotes the development of civil aviation. As part of a continuing effort to develop a national airport system to meet the needs of civil aviation and promote air commerce, the United States Congress has continually maintained a national plan for the development and maintenance of airports.

On the national level, the Portland International Jetport is included in the NPIAS as a small hub, primary commercial service airport. This designation includes 74 airports nationwide that provide regularly scheduled passenger commercial service and record between 0.05 and 0.25 percent of total U.S. passenger enplanements annually.

On the national level, the Portland International Jetport is included in the NPIAS as a small hub, primary commercial service airport. This designation includes 74 airports nationwide that provide regularly scheduled passenger commercial service and record between 0.05 and 0.25 percent of total U.S. passenger enplanements annually. Overall, the NPIAS identifies 3,332 existing airports which are considered significant to the national air transportation system. The NPIAS is published and used by the FAA in administering the Airport Improvement Program (AIP), which is the source of federal funds for airport improvement projects across the country. The AIP program is funded exclusively by user fees and user taxes, such as those on fuel and airline tickets. The 2013-2017 NPIAS estimates that $42.5 billion worth of needed airport improvements are eligible for AIP funding across the country over the next five years. An airport must be included in the NPIAS to be eligible for federal funding assistance through the AIP.

The NPIAS supports the FAA's strategic goals for safety, system efficiency, and environmental compatibility by identifying specific airport improvements. The current issue of the NPIAS identifies approximately $29.7 million in development needs at Portland International Jetport for the five-year planning horizon. This figure is not a guarantee of federal funding; instead, this figure represents development needs as presented to the FAA by the airport administration in the annual airport capital improvement program. Of the $42.5 billion in airport development needs identified by the NPIAS nationally, approximately eight percent, or $3.6 billion, is proposed for the 74 small hub commercial service airports, which includes PWM.

Airports that apply for and accept AIP grants must adhere to various grant assurances. These assurances include maintaining the airport facility safely and efficiently in accordance with specific conditions. The duration of the assurances depends on the type of airport, the useful life of the facility being developed, and other factors. Typically, the useful life for an airport development project is a minimum of 20 years. Thus, when an airport accepts AIP grants, they are obligated to maintain that facility in accordance with FAA standards for at least that long.

REGIONAL SYSTEM PLANNING

In recognition that New Englanders fly 80 percent more frequently than the national average, an alliance was forged between regional state aviation agencies and its major airports. This alliance spurred the undertaking of a regional systems study to formulate a strategy for developing an airport system that supports the aspirations of the region's population and industries. The New England Regional Aviation System Plan (NERASP), initiated in 2002, describes both the analytical underpinnings and the specific actions comprising such a strategy for ensuring the vitality of the regional airport system through the next twenty years.

The NERASP study presented the following as PWM's functional role:

"Portland serves as an area of strong economic growth, with recent rates of population increase that are several times as high as the state as a whole. Recent improvements in highway access have improved its appeal to passengers within its catchment area. Portland plays an important role in providing access to tourists visiting the state."

The study presented a concern that PWM experiences significant passenger losses, or leakage, to Boston Logan, indicating up to 40 percent of potential passenger loss. It should be highlighted that the findings of the NERASP are relevant for comparisons only as they are out of date.

STATE AIRPORT PLANNING

The primary planning document for the State of Maine is the *Maine Aviation Systems Plan (MASP).* The plan was initiated in 2001 and continued through a three phased approach, with the third phase in 2005. The plan provides the MDOT, Office of Passenger Transportation staff with a tool to identify and monitor performance metrics; assess the needs of the state's airports; help justify funding for airport improvements; and provides information to airport sponsors and others concerning the value, use, and needs of the state's public use airports.

The *MASP* identified four airport types as serving varying roles for the Maine airport system and are defined as follows:

Level I (15): These airports accommodate scheduled major/national or regional/commuter commercial air service and a full range of general aviation activity, including business jets.

Level II (7): Airports capable of accommodating all business and personal use aircraft.

Level III (8): Airports designed primarily to serve local transportation needs capable of accommodating all single engine, and some small twin-engine, general aviation aircraft.

Level IV (6): These airports are the most basic, primarily intended to serve personal flying activities by single engine aircraft.

Portland International Jetport is classified as a Level I airport in the 2006 MASP.

Portland International Jetport is classified as a Level I airport in the *MASP*. The minimum facility and service requirements are listed in **Table 1C.** The current airport layout and available services at PWM meet and/or exceed the minimum recommendations in the study for all criteria.

TABLE 1C
Facility and Service Criteria
MASP Level I Airports

Airport Criteria	Minimum Objective
Aircraft Design Group	B or C Category Aircraft
Primary Runway	At least 5,000 feet long by 100 feet wide
Taxiway	Full Parallel Taxiway
Approach	Precision or Precision Capabilities
Lighting	HIRL and MITL
Visual Aids	Rotating Beacon, Segmented Circle, Lighted Wind Cone(s), REIL, and PAPI
Weather Reporting	On-site Weather Reporting System (AWOS/ASOS)
Based Aircraft Parking	75% in Covered Storage; 25% on Ramp
Transient Aircraft Parking	25% in Transient Covered Storage; 50% on Ramp
GA Automobile Parking	Equal to Number of Based Aircraft
Fuel	100LL (AvGas) and Jet A
Terminal	2,000 square-foot Terminal with Phone, Restrooms, Pilot Lounge, and Flight Planning
Aircraft Maintenance	Aircraft Repair and Avionics Available
FBO	Full Service
Food	Full Service Restaurant
Ground Transportation	On-site Rental Car
Security	Full Perimeter Fencing, Controlled Access, Night Guard
Airport Maintenance	Designated Building, Snow Removal Equipment, and De-icing Capabilities

REIL: Runway End Identification Lights
PAPI: Precision Approach Path Indicator
AWOS: Automated Weather Observation System
HIRL: High Intensity Runway Lighting
MITL: Medium Intensity Taxiway Lighting
ASOS: Automated Surface Observation System
ATCT: Airport Traffic Control Tower
FBO: Fixed Base Operator

Source: Maine Aviation Systems Plan (2005 MASP)

LOCAL AIRPORT PLANNING

The airport master plan is the primary local planning document. The master plan is intended to provide a 20-year vision for airport development based on aviation demand forecasts. The most recent update to the airport planning document is the 2008 Airport Master Plan. It should be noted that the study concluded in 2008 but the base year information was 2005 as the process typically takes two years to complete. Over time, the forecast element of an airport master plan typically becomes less reliable due to changes in aviation activity and/or the economy. As a result, the FAA recommends that airports update their master plans every five to ten years, or as necessary to address any significant changes. Therefore, this is an appropriate time to update the airport master plan and revisit the development assumptions from the previous planning study.

14 CFR PART 139 CERTIFICATION

An airport must have an Airport Operating Certificate (AOC) if it is serving air carrier aircraft with more than nine seats or serving unscheduled air carrier aircraft with more than 30 passenger seats. 14 CFR Part 139 (Part 139) describes the requirements for obtaining and maintaining an AOC. This includes meeting various Federal Aviation Regulations (FARs) now codified under the CFR.

Airports are classified in the following categories based on the type of air carrier operations served:

- **Class I Airport** – an airport certificated to serve scheduled operations of large air carrier aircraft that can also serve unscheduled passenger operations of large air carrier aircraft and/or scheduled operations of small air carrier aircraft.

- **Class II Airport** – an airport certificated to serve scheduled operations of small air carrier aircraft and the unscheduled passenger operations of large air carrier aircraft. A Class II airport cannot serve scheduled large air carrier aircraft.

- **Class III Airport** – an airport certificated to serve scheduled operations of small air carrier aircraft. A Class III airport cannot serve scheduled or unscheduled large air carrier aircraft.

- **Class IV Airport** – an airport certificated to serve unscheduled passenger operations of large air carrier aircraft. A Class IV airport cannot serve scheduled air carrier aircraft regulated under CFR Part 121.

PWM is currently classified as a Class I CFR Part 139 commercial service airport. This designation supports the regularly (or irregularly) scheduled operations of large and/or small air carrier aircraft conducting commercial passenger services at the airport.

PWM is currently classified as a Class I CFR Part 139 commercial service airport. This designation supports the regularly (or irregularly) scheduled operations of large and/or small air carrier aircraft conducting commercial passenger services at the airport.

Part 139 regulations (which implemented provisions of the *Airport and Airway Development Act of 1970*, as amended on November 27, 1971) set standards for: the marking and lighting of areas used for operations; firefighting and rescue equipment and services; the handling and storing of hazardous materials; the identification of obstructions; and safety inspection and reporting procedures. It also required airport operators to have an FAA-approved Airport Certification Manual (ACM).

The ACM is a required document that defines the procedures to be followed in the routine operation of the airport and for response to emergency situations. The ACM is a working document that is updated annually as necessary. It reflects the current condition and operation of the airport and establishes the responsibility, authority, and procedures as required. There are required sections for the ACM covering administrative detail and procedural detail. Portland International Jetport has a current, approved ACM. The ACM includes the following information:

- General Information
- Inspection Authority
- Deviation to Part 139 Requirements
- ACM Maintenance/Revisions
- Personnel Information
- Paved/Unpaved Areas
- Safety Areas
- Marking, Signs, and Lighting
- Snow and Ice Control
- ARFF Index, Equipment, Agents, and Operational Requirements
- Hazardous Materials
- Traffic and Wind Indicators
- Airport Emergency Plan
- Self-inspection Program
- Pedestrians and Ground Vehicles
- Obstructions
- Protection of NAVAIDS
- Public Protection
- Airport Condition Reporting
- Identifying, Marking, and Lighting Construction and Unserviceable Areas
- Letters of Agreement

AIRFIELD FACILITIES

Airfield facilities are those which facilitate aircraft movements between the air and ground. Generally, these facilities include runways, taxiways, airport lighting and markings, and navigational aids. **Exhibit 1F** summarizes and depicts airfield facility information atop an aerial photograph for visual reference.

RUNWAYS

Portland International Jetport is served by two runways which intersect. Runway 11-29 is the airport's primary runway, and Runway 18-36 is the crosswind runway. Both runways are capable and certified to accommodate air carrier aircraft operations; however, air carrier operations are primarily conducted on Runway 11-29, with the crosswind runway used during periods of high northerly/southerly winds, or when the primary runway is closed for any reason.

In order to improve airport capacity, the ATCT has entered into a letter of agreement (LOA) for the purpose of allowing and managing land and hold short operations (LAHSO). LAHSO is an air traffic control procedure which permits the issuance of landing clearances to aircraft to land and hold short of an intersecting runway, taxiways, or other designated point on the runway. There are two designated LAHSO points on the airport: one on Runway 11 prior to the intersection with Runway 18-36, and the other on Runway 18 prior to the runways' intersection.

Primary Runway 11-29

Runway 11-29 is 7,200 feet long by 150 feet wide, oriented in an east-west manner. The pavement is constructed of asphalt with a grooved surface treatment and is reported as being in excellent condition by official FAA publications. Runway 11-29 is served with precision markings providing threshold bars, runway end designations, touchdown zone, aiming point, centerline, and edge markings. As the airport's longest runway and being served by precision instrument landing equipment, Runway 11-29 serves as the primary runway, especially for jet aircraft.

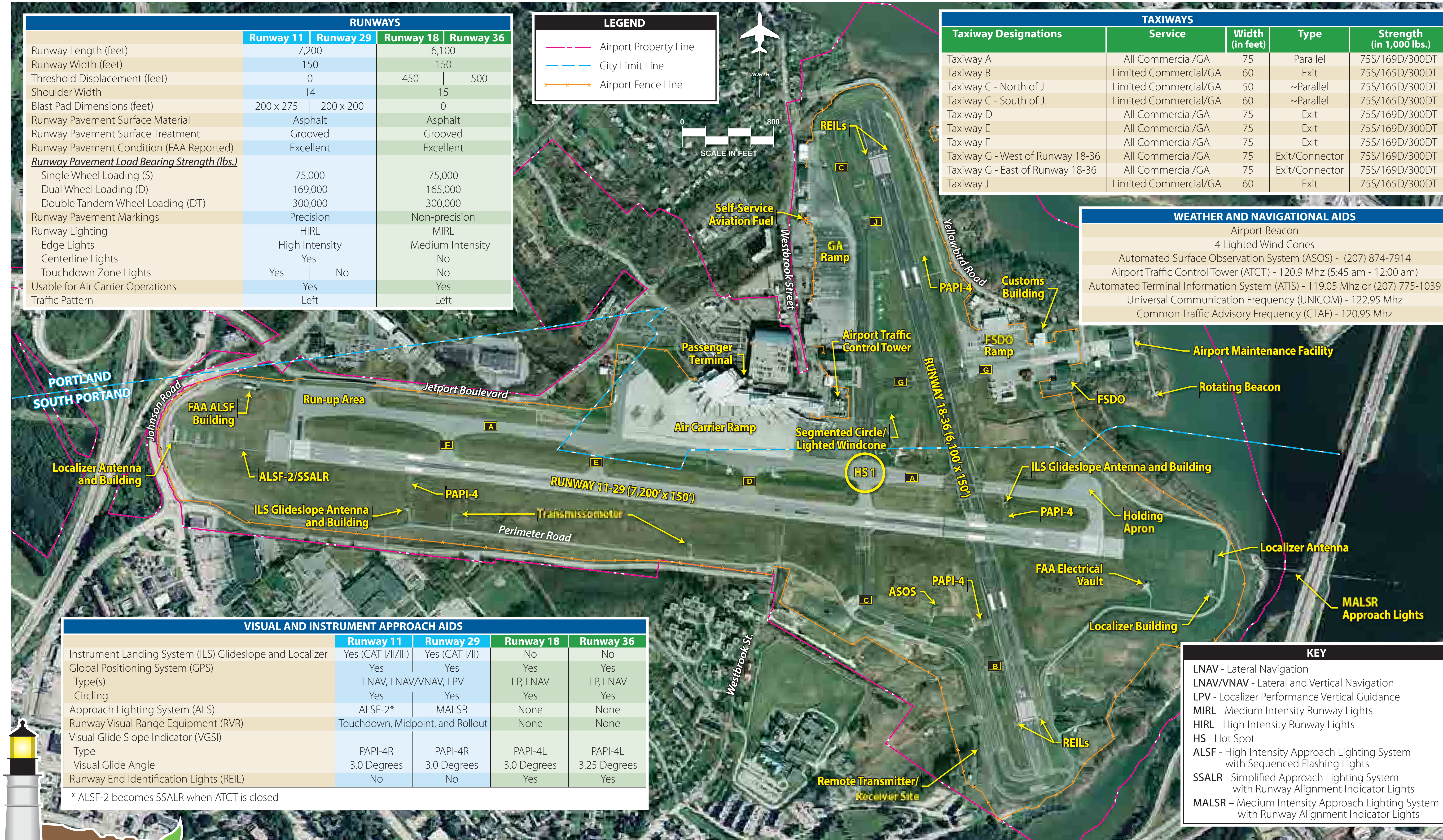
Runway 11-29 is 7,200 feet long by 150 feet wide, oriented in an east-west manner.

Runway 11-29 has a pavement strength of 75,000 pounds single wheel loading (S), which refers to the design of certain aircraft landing gear that has a single wheel on each main landing gear strut. The runway pavement has also been strength-rated at 169,000 pounds dual wheel (D), and 300,000 pounds for dual tandem wheel (DT).

Crosswind Runway 18-36

Oriented in a north-south manner, crosswind Runway 18-36 is 6,100 feet long and 150 feet wide. The runway is constructed of asphalt pavement with a grooved surface treatment and is reported in FAA publications as in excellent condition having been recently rehabilitated. The landing thresholds have been displaced at each runway end; 450 feet for Runway 18 and 500 feet for Runway 36. Runway 18-36 has non-precision markings which include threshold bars, runway end designations, touchdown zone, and centerline markings. The published pavement strength is 75,000 pounds S, 165,000 pounds D, and 300,000 pounds DT.

PWM Portland International Jetport



RUNWAYS

	Runway 11	Runway 29	Runway 18	Runway 36
Runway Length (feet)	7,200		6,100	
Runway Width (feet)	150		150	
Threshold Displacement (feet)	0		450	500
Shoulder Width	14		15	
Blast Pad Dimensions (feet)	200 x 275	200 x 200	0	
Runway Pavement Surface Material	Asphalt		Asphalt	
Runway Pavement Surface Treatment	Grooved		Grooved	
Runway Pavement Condition (FAA Reported)	Excellent		Excellent	
Runway Pavement Load Bearing Strength (lbs.)				
Single Wheel Loading (S)	75,000		75,000	
Dual Wheel Loading (D)	169,000		165,000	
Double Tandem Wheel Loading (DT)	300,000		300,000	
Runway Pavement Markings	Precision		Non-precision	
Runway Lighting	HIRL		MIRL	
Edge Lights	High Intensity		Medium Intensity	
Centerline Lights	Yes		No	
Touchdown Zone Lights	Yes	No	No	
Usable for Air Carrier Operations	Yes		Yes	
Traffic Pattern	Left		Left	

TAXIWAYS

Taxiway Designations	Service	Width (in feet)	Type	Strength (in 1,000 lbs.)
Taxiway A	All Commercial/GA	75	Parallel	75S/169D/300DT
Taxiway B	Limited Commercial/GA	60	Exit	75S/165D/300DT
Taxiway C - North of J	Limited Commercial/GA	50	~Parallel	75S/165D/300DT
Taxiway C - South of J	Limited Commercial/GA	60	~Parallel	75S/165D/300DT
Taxiway D	All Commercial/GA	75	Exit	75S/169D/300DT
Taxiway E	All Commercial/GA	75	Exit	75S/169D/300DT
Taxiway F	All Commercial/GA	75	Exit	75S/169D/300DT
Taxiway G - West of Runway 18-36	All Commercial/GA	75	Exit/Connector	75S/169D/300DT
Taxiway G - East of Runway 18-36	All Commercial/GA	75	Exit/Connector	75S/169D/300DT
Taxiway J	Limited Commercial/GA	60	Exit	75S/165D/300DT

WEATHER AND NAVIGATIONAL AIDS

Airport Beacon

4 Lighted Wind Cones

Automated Surface Observation System (ASOS) - (207) 874-7914

Airport Traffic Control Tower (ATCT) - 120.9 Mhz (5:45 am - 12:00 am)

Automated Terminal Information System (ATIS) - 119.05 Mhz or (207) 775-1039

Universal Communication Frequency (UNICOM) - 122.95 Mhz

Common Traffic Advisory Frequency (CTAF) - 120.95 Mhz

VISUAL AND INSTRUMENT APPROACH AIDS

	Runway 11	Runway 29	Runway 18	Runway 36
Instrument Landing System (ILS) Glideslope and Localizer	Yes (CAT I/II/III)	Yes (CAT I/II)	No	No
Global Positioning System (GPS)	Yes	Yes	Yes	Yes
Type(s)	LNAV, LNAV/VNAV, LPV		LP, LNAV	LP, LNAV
Circling	Yes	Yes	Yes	Yes
Approach Lighting System (ALS)	ALSF-2*	MALSR	None	None
Runway Visual Range Equipment (RVR)	Touchdown, Midpoint, and Rollout		None	None
Visual Glide Slope Indicator (VGSI)				
Type	PAPI-4R	PAPI-4R	PAPI-4L	PAPI-4L
Visual Glide Angle	3.0 Degrees	3.0 Degrees	3.0 Degrees	3.25 Degrees
Runway End Identification Lights (REIL)	No	No	Yes	Yes

* ALSF-2 becomes SSALR when ATCT is closed

KEY

LNAV - Lateral Navigation
LNAV/VNAV - Lateral and Vertical Navigation
LPV - Localizer Performance Vertical Guidance
MIRL - Medium Intensity Runway Lights
HIRL - High Intensity Runway Lights
HS - Hot Spot
ALSF - High Intensity Approach Lighting System with Sequenced Flashing Lights
SSALR - Simplified Approach Lighting System with Runway Alignment Indicator Lights
MALSR – Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights

Exhibit 1F

Source: Airport Records; GCR FAA Form 5010; AirNav

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TAXIWAYS

The taxiway system at PWM consists of parallel, connector, and entrance/exit taxiways. The width of each taxiway varies based on aircraft design and usage with each listed on **Exhibit 1F**.

Parallel taxiways are primarily designed to efficiently and quickly route aircraft between the runway and the originating/destination location. Taxiway A is the airport's only full length and fully parallel taxiway. It is located on the north side of primary Runway 11-29, 400 feet from the runway (centerline to centerline). Taxiway A is constructed of asphalt, is 75 feet wide, and offers holding/run-up ramp locations at each end of the runway.

The Taxiway A designator is also given to the entrance/exit taxiways at the east and west ends of Runway 11-29. These taxiways simply connect the two runway ends with the parallel taxiway. It should be noted that the Taxiway A interface with Runway 29 is slightly less than a 90-degree angle. As such, the aircraft holding position location is not fully parallel with the runway alignment. FAA standards suggest that all runway holding positions be aligned fully parallel with the runway centerline so that the pilot has full range of view in both runway directions. There are four other entrance/exit taxiways connecting Runway 11-29 with parallel Taxiway A. These taxiways are designated C, D, E, and F moving from the east to the west, as depicted on **Exhibit 1F**. All of these exit taxiways are constructed of asphalt and are 75 feet wide. Taxiways D, E, and F are aligned perpendicular with the runway, while Taxiway C is not. As such, the Taxiway C holding position is slightly less than parallel to the runway alignment.

Taxiway C also serves as a quasi-parallel taxiway serving the west side of Runway 18-36. The southernmost 1,200 feet is the only portion of the taxiway aligned fully parallel to the runway, with its centerline situated 300 feet west of the runway centerline. To the north, Taxiway C runs along the outer portions of the north general aviation ramp and main terminal ramp, and then extends through Runway 11-29 before bending to the east to be parallel with the runway. The taxiway is constructed of asphalt and varies in width, as presented on **Exhibit 1F**.

Taxiway C provides entrance/exit connections at each end of Runway 18-36, with the south end aligned at 90 degrees and the north end less than 90 degrees. The holding positions for Runway 18-36 are actually located on Taxiway C prior to the entrance taxiway locations. These holding positions were located on the parallel portion of the taxiway so that the pilots of a departing aircraft will look directly into the approach path of the runway end. There are three asphalt entrance/exit taxiways linking Runway 18-36 with parallel Taxiway C, identified as Taxiways B, G, and J. Taxiway B is an exit located at the south end of the runway, Taxiway J is located at the north end of the runway, and Taxiway G is located at approximately midfield. Both Taxiways B and J link to the west side of the runway only, whereas Taxiway G links to the east and west. As such, Taxiway G serves both as an entrance/exit taxiway and a connector linking the western terminal facilities with the eastern facilities including, amongst others, the FAA flight service district office (FSDO) ramp and U.S. Customs facility and associated ramp.

Pavement Markings

Runway 11-29 has precision markings which identify the runway designation, edges, centerline, threshold, touchdown zone, and aiming point. Runway 18-36 has non-precision markings that include edge lines, threshold bars, runway designation, centerline, and aiming points.

Taxiway and taxilane centerline markings are provided to assist pilots in maintaining proper clearance from pavement edges and objects near the taxiway/taxilane edges. Taxiway markings at PWM include the following:

- Centerline;
- Leadoff lines on normally used exits;
- Continuous type edge markings along paved shoulders; and
- Dashed type edge markings along the portion of Taxiway A which is contiguous to the terminal ramp.
- Dashed type edge markings Taxiway C by main terminal ramp and north general aviation ramp.

Taxiway markings also include aircraft holding positions located on the entrance/exit and connecting taxiways. Enhanced taxiway centerline markings have been installed at all holding positions. All holding position markings are glass beaded, highlighted in black, and double sized in accordance to FAA regulations. The hold-line positions function to keep aircraft from entering the runway environment without clearance. The location of hold-lines is established by the design aircraft for a runway. The hold-lines at PWM are set at 250 feet from runway centerline for Runway 11-29. As previously noted, the holding positions and markings for each end of the runway are set on the parallel portion of the taxiway and at 200 feet from runway centerline on Taxiways G and J for Runway 18-36.

Aircraft movement areas on various ramps are identified with centerline markings. Aircraft tie-down positions are identified on various ramp surfaces.

Airfield Safety

In the 2013 Runway Safety Action Plan (RSAP), three action items aimed at improving airfield safety and reducing/eliminating runway incursions. These actions supplement other historical improvements/modifications made to improve safety, including lighting and marking changes. The three action items as taken from the 2013 RASP are as follows:

- **Action Item PWM-2013-001:** Airport Parking Areas - The previous RSAT meeting determined there was a need to standardize the nomenclature for the various parking areas on the airport. There was the potential for confusion since the main FBO (Northeast Airmotive) is not actually located on the northeast part of the airport. Airport diagrams now designate the terms to be used for the various parking areas. Signs were also posted at the FBO directing pilots which turn to use for the appropriate parking area.

- **Action Item PWM-2013-002:** Hot Spots - Effective June 23, 2013, the intersection of Taxiways A and C was published on airport diagrams and charts as "HS 1." This area had been identified as a hot spot during the previous RSAT meeting.

- **Action Item PWM-2013-003:** Disabled Aircraft on the Movement Area - The Jetport had requested, in the event of a disabled aircraft on the movement area, the control tower should notify the Jetport Communications Center. The Communications Center would then be responsible for coordinating any needed assistance. The PWM ATCT standard operating procedure and checklists were updated to comply with this request.

The FAA defines an "airport surface hot spot" as a location on an aerodrome movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots/drivers is necessary. A hot spot is a runway safety related problem area on an airport that presents increased risk during surface operations. Typically, it is a complex or confusing taxiway/taxiway or taxiway/runway intersection. The area of increased risk has either a history of or potential for runway incursions or surface incidents, due to a variety of causes, such as but not limited to: airport layout, traffic flow, airport marking, signage and lighting, situational awareness, and training. Hot spots are depicted on airport diagrams as open circles or polygons designated as "HS 1," "HS 2," etc.

As indicated in the PWM 2013 RASP, HS 1 has been designated and is located at the intersection of Taxiways A and C. HS 1 also includes the Runway 11-29 holding position at Taxiway C. The location of HS 1 is depicted on **Exhibit 1F**.

As indicated in the PWM 2013 RASP, HS 1 has been designated and is located at the intersection of Taxiways A and C. HS 1 also includes the Runway 11-29 holding position at Taxiway C. The location of HS 1 is depicted on Exhibit 1F.

AIRFIELD LIGHTING

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

Identification Lighting: The location of the airport at night is universally identified by a rotating beacon. The rotating beacon projects two beams of light, one white and one green, 180 degrees apart. The rotating beacon at Portland International Jetport is located on the east side of the airport near the shoreline, as depicted on **Exhibit 1F**.

Runway and Taxiway Lighting/Signage: Runway and taxiway edge lighting utilize light fixtures placed near the edge of the pavement to define the lateral limits of the pavement. This lighting is essential for safe operations during night and/or times of low visibility in order to maintain safe and efficient access to and from the runways and aircraft parking areas.

Runway 11-29 is equipped with high intensity runway lights (HIRL) to include runway edge and centerline lighting. Runway 11 is also equipped with high intensity touchdown zone lighting, which is available only during ATCT operational hours. Runway 18-36 is served by medium intensity runway lights (MIRL). All runway edge light lenses are split white-yellow to mark the caution zone on the last 2,000 feet of each runway end. All taxiways associated with Runways 11-29 and 18-36 are equipped with medium intensity taxiway edge lighting (MITL).

The airport also has a runway/taxiway signage system. The presence of runway/taxiway signage is an essential component of a surface movement guidance control system necessary for the safe and efficient operation of the airport. The signage system installed at Portland International Jetport includes runway and taxiway designations, holding positions, instrument landing system (ILS) critical areas, routing/directional, runway end and exits, and runway distance remaining. All airfield signs are lit and were last replaced with LED signs in 2012. **Exhibit 1G** depicts the existing airfield signage system for PWM on an aerial base map.

In response to the historical runway incursion events and to minimize the potential for future runway incursions, supplemental lighting has been installed. Runway guard lights (RGLs) serve to raise situational awareness but do not provide or preclude authority to pass. They are commonly referred to as "wig-wags." In their basic form, they consist of a pair of unidirectional yellow lights which flash continuously. They are commonly positioned at each side of a taxiway at the marked and signed holding location position. Both aircraft and vehicles are required to wait at this point until given clearance by the ATCT to proceed. RGLs have been installed at all runway holding positions for both runways.

Visual Glide Slope Approach Aids: A four-box precision approach path indicator (PAPI-4) system is installed on both ends of Runways 11-29 and 18-36, as depicted on **Exhibit 1F**. The PAPI-4 is located on the right side of the approach ends of Runway 11-29 and the left side of the approach ends to Runway 18-36. The systems consist of four light box units that alert approaching pilots of their position relative to the desired three-degree glide slope. The visual glide angles set for the PAPI-4 systems at PWM are standard 3.0 degrees for all ends but Runway 36, which is set at a slightly higher 3.25 degrees.

Approach Lighting Systems (ALS): Runway 11 is equipped with a The ALSF-2/SSALR system which is a dual mode high intensity ALS providing visual approach lighting patterns for landing aircraft on Category

PWM Portland International Jetport

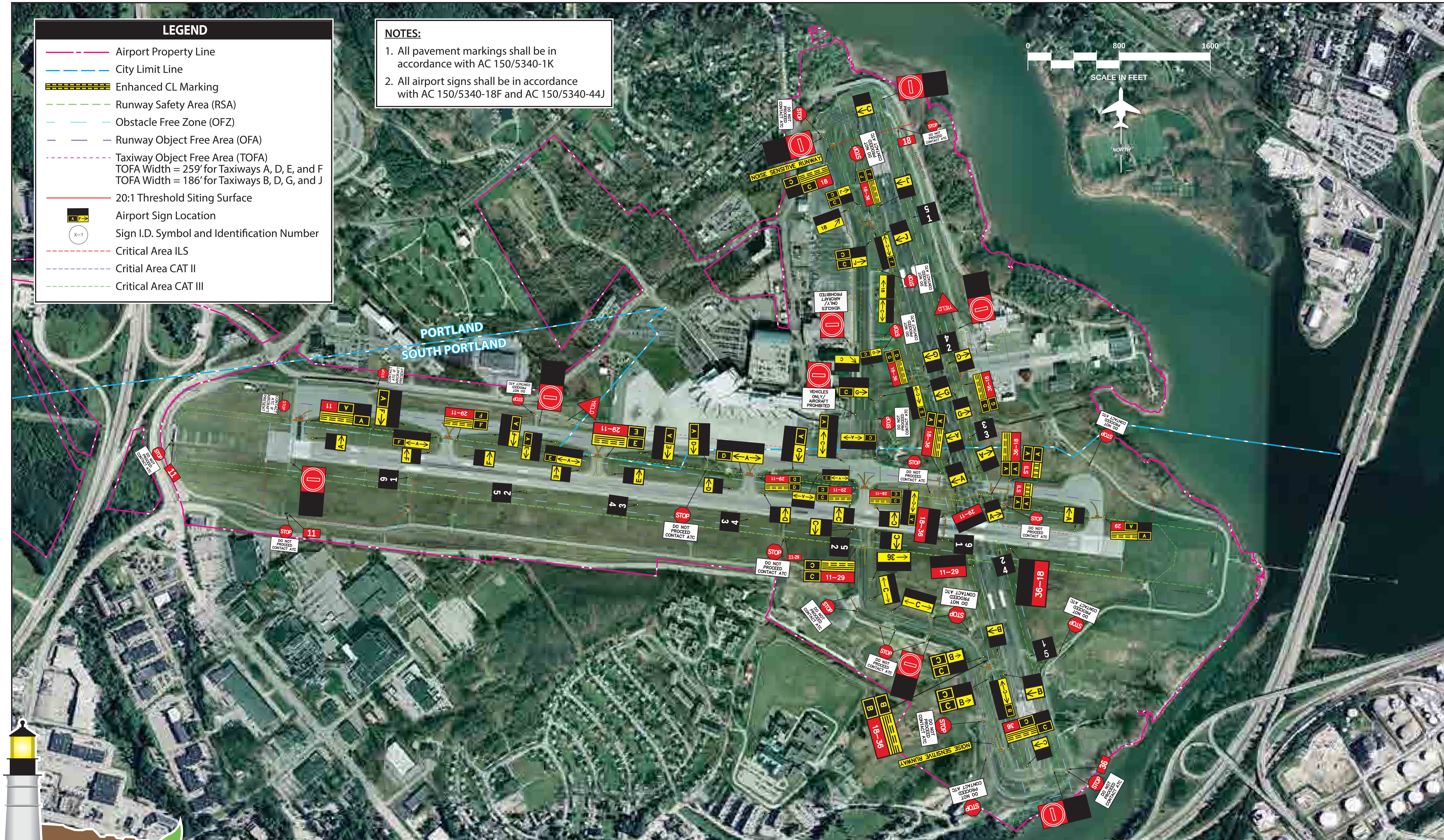

Exhibit 1G
AIRFIELD SIGNAGE

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II and Category III runways. The system operates in two modes: a high intensity approach lighting system with sequenced flashing lights (ALSF-2) and a simplified short approach lighting system with runway alignment indicator lights (SSALR). This ALS operates as an ALSF-2 during ATCT operating hours and a SSALR system until the weather goes below visual weather minimums, then operates as an ALSF-2. This system is 3,000 feet long.

Runway 29 is equipped with a medium intensity approach lighting system (MALS) which offers a lighted, visual grid for pilots to identify the runway end while on final approach. The MALS is supplemented with runway alignment indicator lights (RAIL). The combined MALS and RAIL is referred to as a MALSR. The RAIL portion of the MALSR is a linear progression of strobe lights which provides pilots with a rapid, visual cue of the runway centerline. The lights start 200 feet from the runway end and extend into the Fore River, for a total distance of 2,600 feet from the runway.

Both ends of Runway 18-36 are equipped with runway end identifier lights (REIL) which are located adjacent each side of the runway at the location of each displaced threshold, as depicted on **Exhibit 1F**.

After-Hours Lighting: When the ATCT is closed, pilots can activate airfield lights utilizing the pilot control lighting (PCL) system. The PCL will activate the MALSR on Runway 29 and REIL units on Runway 18-36 via a series of clicks with their microphone transponder on the common traffic advisory channel (CTAF) frequency 120.9 MHz.

WEATHER AND COMMUNICATION AIDS

Runway visual range (RVR) is the distance over which a pilot of an aircraft on the centerline of the runway can see the runway surface markings delineating the runway or identifying its centerline line. RVR is expressed in feet and is used as one of the main criteria for minima on instrument approaches. The maximum RVR reading is 6,000 feet, above which the reading becomes insignificant and does not need to be reported. RVR sensor equipment has been installed on the south side of Runway 11-29 to support Category II and III instrument approach procedures to the runway. There are three RVR sensors, located at Runway 11/29 touchdown, midpoint, and rollout.

Portland International Jetport is equipped with four windcones. The windcones provide information to pilots regarding wind conditions, such as direction and intensity, and are rated for 30 knot winds. Each of the four windcones are lighted.

Portland International Jetport is served by an Automated Surface Observing System (ASOS). An ASOS automatically records weather conditions such as temperature, dew point, wind speed, altimeter setting, visibility, sky condition, and precipitation. The ASOS updates observations each minute, 24 hours a day, and this information is transmitted to pilots in the airport vicinity via an FAA very high frequency (VHF) ground-to-air radio transmitter. Pilots can receive these broadcasts on the automated terminal information service (ATIS) frequency or via a dedicated ASOS local telephone number (207-874-7914), where a computer-generated voice will present airport weather information. ATIS broadcasts are updated hourly and provide arriving and departing pilots the current surface weather conditions, communication frequencies, and other important airport-specific information. The ATIS frequency at Portland International Jetport is 119.05 MHz or via telephone at 207-775-1039.

The Portland International Jetport CTAF radio frequency is 120.9 MHz. CTAF is used by pilots in the vicinity of the airport to communicate with each other about approaches to or departures from the airport when the ATCT is closed, as well as for PCL. In addition, a UNICOM frequency is also available (122.95 MHz), where a pilot can obtain information pertaining to the airport.

AREA AIRSPACE AND AIR TRAFFIC CONTROL

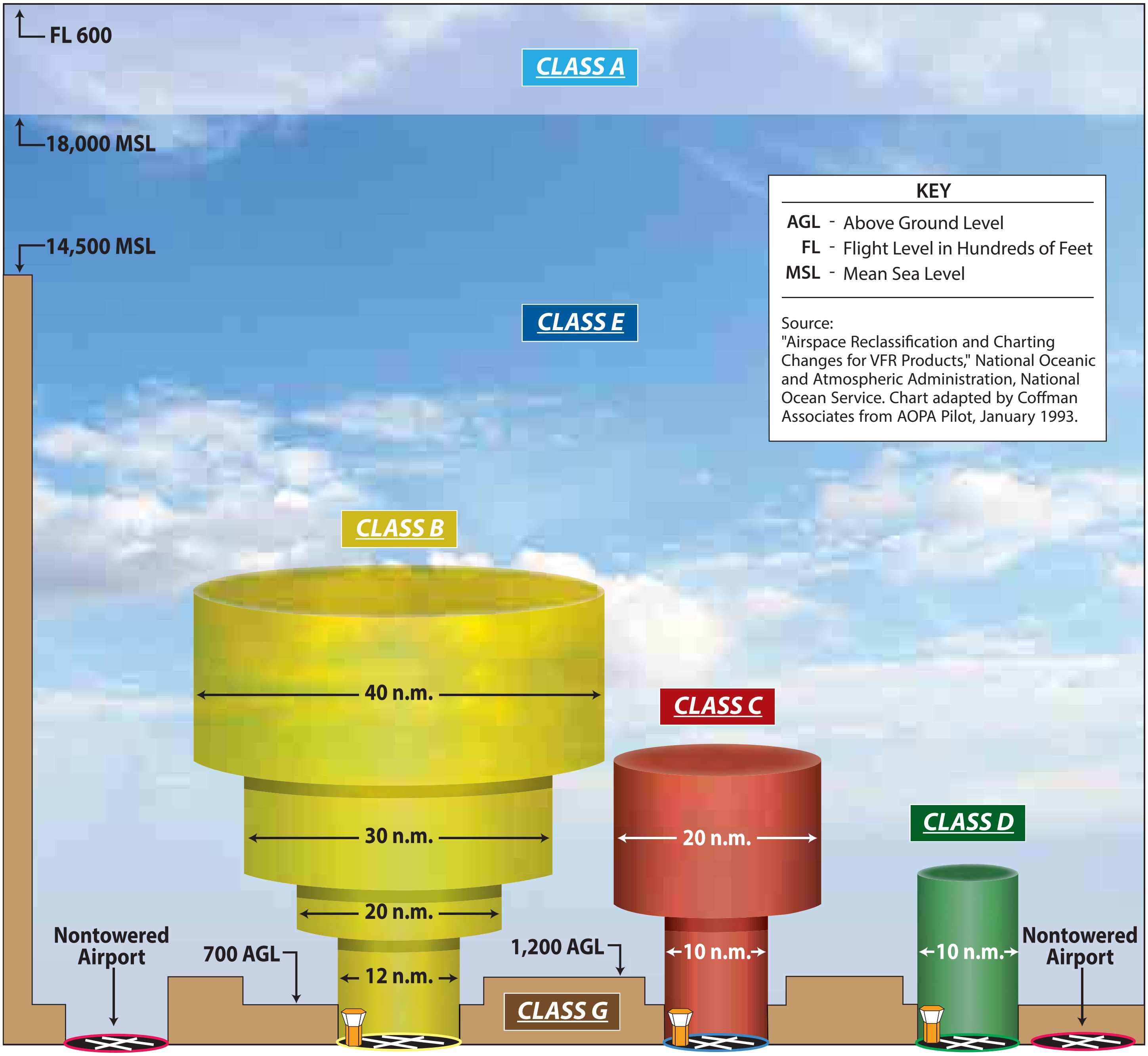
The *Federal Aviation Administration Act of 1958* established the FAA as the responsible agency for the control and use of navigable airspace within the United States. The FAA has established the National Airspace System (NAS) to protect persons and property on the ground and to establish a safe and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

AIRSPACE STRUCTURE

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

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

Class B Airspace: Class B airspace has been designated around some of the country's busiest commercial service airports, such as the Boston Logan International Airport. Class B airspace is designed to regulate the flow of uncontrolled traffic, above, around, and below the arrival and departure airspace required



DEFINITION OF AIRSPACE CLASSIFICATIONS

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

Exhibit 1H

AIRSPACE STRUCTURE

for high-performance, passenger-carrying aircraft at busy commercial service airports. This airspace is the most restrictive controlled airspace encountered by pilots operating under VFR.

In order to fly within Class B airspace, an aircraft must be equipped with special radio and navigation equipment and must obtain clearance from air traffic control. Moreover, a pilot must have at least a private pilot's certificate or be a student pilot who has met the requirements of F.A.R. Part 61.95, which requires special ground and flight training for Class B airspace. Helicopters do not need special navigation equipment or a transponder if they operate at or below 1,000 feet and have made prior arrangements in the form of a Letter of Agreement with the FAA controlling agency. Aircraft are also required to have and utilize a Mode C transponder within a 30-nautical mile (NM) range of the center of Class B airspace. A Mode C transponder allows the ATCT to track the altitude of the aircraft.

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

Class C Airspace: The FAA has established Class C airspace at 120 airports around the country, including PWM, as a means of regulating air traffic in these areas.

Class D Airspace: Class D airspace is controlled airspace surrounding airports with an ATCT, such as at Pease International Airport to the south. The Class D airspace typically constitutes a cylinder with a horizontal radius of five miles from the airport, extending from the surface up to a designated vertical limit, typically set at approximately 2,500 feet above the airport elevation. If an airport has an instrument approach or departure, the Class D airspace sometimes extends along the approach or departure path. During periods when the airport's ATCT is closed, Class D airspace typically reverts to Class E airspace.

Class E Airspace: Class E airspace consists of controlled airspace designed to contain IFR operations near an airport, and while aircraft are transitioning between the airport and en route environments. Unless otherwise specified, Class E airspace terminates at the base of the overlying airspace. Only aircraft operating under IFR are required to be in contact with air traffic control when operating in Class E airspace. While aircraft conducting visual flights in Class E airspace are not required to be in radio communications with air traffic control facilities, visual flight can only be conducted if minimum visibility and cloud ceilings exist. There are several airports supported by Class E airspace in the vicinity of Portland International Jetport.

Class G Airspace: Airspace not designated as Class A, B, C, D, or E is considered uncontrolled, or Class G, airspace. Air traffic control does not have the authority or responsibility to exercise control over air traffic within this airspace. Class G airspace lies between the surface and the overlaying Class E airspace (700 to 1,200 feet above ground level [AGL]).

Exhibit 1J shows the Class C and underlying Class E airspace surrounding Portland International Jetport. The inner ring of Class C airspace consists of controlled airspace extending upward from the surface to and including 4,100 feet MSL within a five-mile radius of Portland International Jetport. A second ring of Class C airspace with a floor of 1,500 feet and a ceiling of 4,100 feet MSL extends outward from the inner ring at a radius of another five nautical miles.

Portland International Jetport airspace converts to Class E airspace after the ATCT closes at midnight and remains in effect until the ATCT opens at 5:45 in the morning, when PWM airspace reverts to Class C airspace. The Class E airspace at PWM begins at 700 feet AGL, and extends to 4,100 feet AGL. The Class E airspace extends out from the airport with a radius of 8.5 nautical miles, and overlaps with the Biddeford Municipal Airport Class E airspace to the southwest. To allow for instrument approaches to Runway 11, there is an extended corridor of Class E airspace that extends out an additional 7.5 nautical miles to the west.

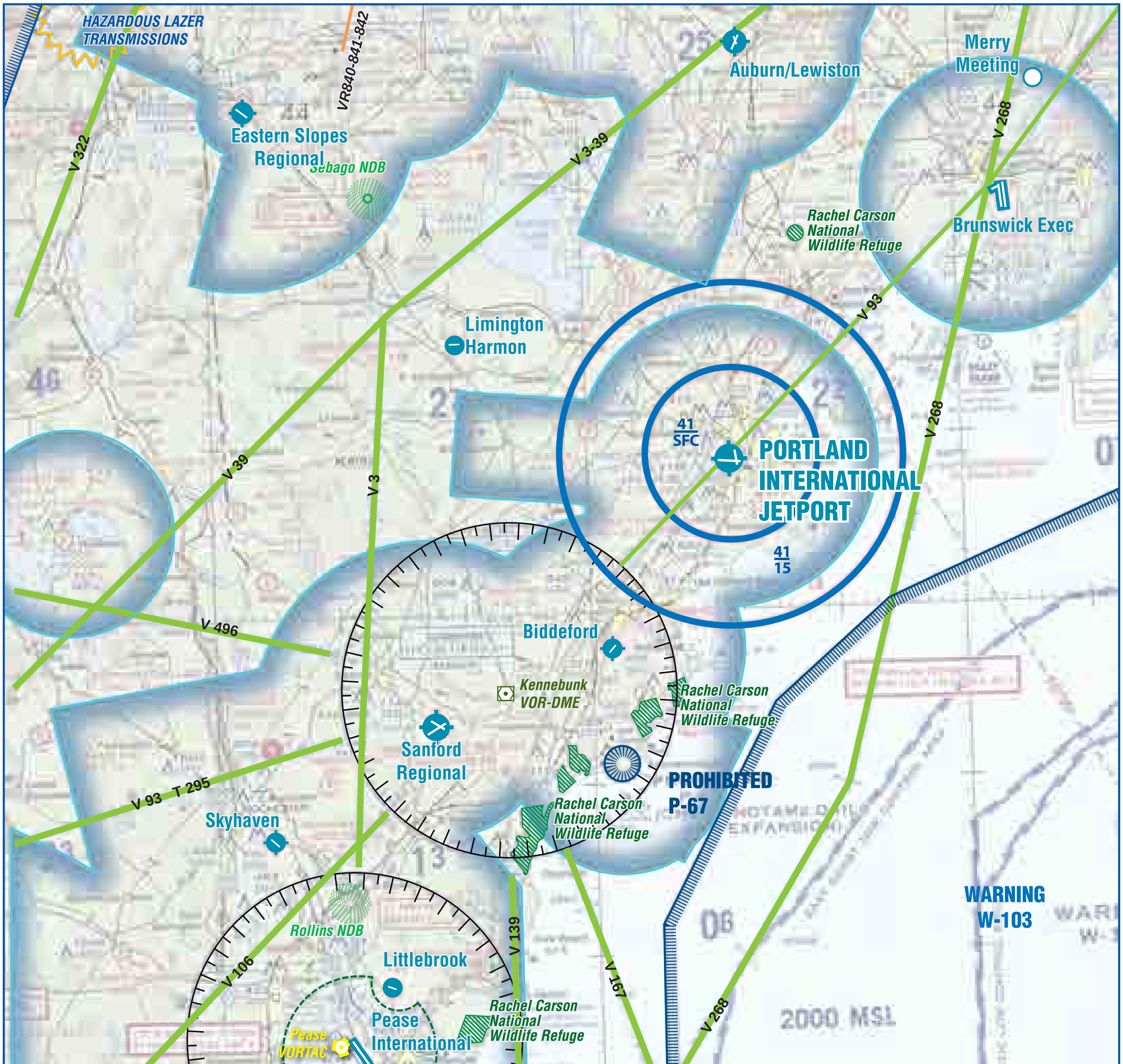
SPECIAL USE AIRSPACE

Special use airspace is defined as airspace where activities must be confined because of their nature or where limitations are imposed on aircraft not taking part in those activities. The designation of special use airspace identifies for other users the areas where military activity occurs, provides for segregation of that activity from other fliers, and allows charting to keep airspace users informed. These areas are depicted on **Exhibit 1J**.

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

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

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



LEGEND

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

NORTH

NOT TO SCALE

Exhibit 1J

VICINITY AIRSPACE

Source: New York Sectional Chart, US Department of Commerce, National Oceanic and Atmospheric Administration, May - November 2014

Warning Area: Portland International Jetport is approximately 13 nautical miles west of Warning Area 103. Warning areas are established beyond the three-mile limit along U.S. coastlines. Though the activities conducted within warning areas may be as hazardous as those in restricted areas, warning areas cannot be legally designated as restricted areas because they are over international waters.

Penetrations of warning areas during periods of activity may be hazardous to aircraft not participating in national defense operations. The controlling ATCT facility may authorize flights through these areas depending upon time of day and expected activity. Boston Center is the controlling ATCT facility for these special use areas.

Prohibited Area: Prohibited Airspace P-67 is a circular area with a diameter of two nautical miles located directly above Kennebunkport as depicted on **Exhibit 1J**. Airspace P-67 corresponds with a former President's residence. Penetrations into prohibited airspace are strictly forbidden at all times.

AIRSPACE CONTROL

The PWM airport traffic control tower, located east of the terminal building, operates from 5:45 a.m. to midnight, seven days a week. Tower controllers provide services to aircraft operating on the airport and generally within a five-mile radius of the airport, as approved by the collocated approach control facility. Primary air traffic services for the airport are provided within the airport's Class C airspace. Portland ATC also provides terminal radar coverage during the same periods the tower is open. When the tower and approach control close, the airspace is turned over to Boston Air Route Traffic Control Center (ARTCC).

In addition to the Class C airspace, Portland Approach Control's total area of responsibility covers an area extending north to Norridgewock, east to Rockland, west to Fryeburg, and south to Sanford. The FAA airport surveillance radar (ASR), ASR-9, is located at Bruce Hill in North Yarmouth, approximately 10 miles north of the Jetport. The ASR-9 has capabilities for distinguishing aircraft in storm situations, identifying intensity of storms, and requires less maintenance.

NAVIGATIONAL AIDS

Navigational aids are electronic devices that transmit radio frequencies, which pilots of properly equipped aircraft can translate into point-to-point guidance and position information. The types of electronic navigational aids available for aircraft flying to or from Portland International Jetport include a very high frequency omni-directional range (VOR) facility and the global positioning system (GPS). All navigational aids at the airport are owned and maintained by the FAA.

The VOR, in general, provides azimuth readings to pilots of properly equipped aircraft transmitting a radio signal at every degree to provide 360 individual navigational courses. Frequently, distance measuring equipment (DME) is combined with a VOR facility (VOR-DME) to provide distance as well as direction information to the pilot. Military tactical air navigation aids (TACANs) and civil VORs are commonly combined to form a VORTAC. The VORTAC provides distance and direction information to both civil and military pilots. The Kennebunk VOR-DME is located approximately 25 miles to the southwest and the August VOR-DME is located approximately 50 miles to the north of PWM.

GPS is an additional navigational aid for pilots. GPS was initially developed by the United States Department of Defense for military navigation around the world. GPS differs from a VOR, in that pilots are not required to navigate using a specific facility. GPS uses satellites placed in orbit around the earth to transmit electronic radio signals, which pilots of properly equipped aircraft use to determine altitude, speed, and other navigational information. With GPS, pilots can directly navigate to any airport in the country and are not required to navigate to a specific ground-based navigation facility.

Many commercial service airports are equipped with an Instrument Landing System (ILS). The ILS at each end of Runway 11-29 at PWM is comprised of dual transmitter localizer equipment and dual transmitter glideslope equipment. The localizers provide an instrument approach course for horizontal alignment with runway centerline and transmit on a 14 element antenna array. The glideslopes provide vertical guidance for landing aircraft and transmit on a 3 element capture effect antenna. Additionally, the Runway 11 ALSF II and Runway 29 MALSR high intensity approach light systems visually align the aircraft with the extended course centerline.

INSTRUMENT APPROACH PROCEDURES

Instrument approach procedures are a series of predetermined maneuvers established by the FAA, using electronic navigational aids that assist pilots in locating and landing at an airport, especially during instrument flight conditions. There are currently nine published instrument approach procedures, including five ILS instrument approaches, three for Runway 11 and two for Runway 29. Precision instrument approaches provide vertical descent information and course guidance information to the pilot. Non-precision approaches only provide course guidance to the pilot; however, the relatively new GPS localizer performance with vertical guidance (LPV) approaches are currently categorized by the FAA as a non-precision approach even though it provides vertical guidance.

The capability of an instrument approach procedure is defined by the visibility and cloud ceiling minimums associated with the approach. Visibility minimums define the horizontal distance the pilot must be able to see in order to complete the approach. Cloud ceilings define the lowest level a cloud layer (defined in feet above the ground) can be situated for the pilot to complete the approach. If the observed visibility or cloud ceilings are below the minimums prescribed for the approach, the pilot cannot complete the instrument approach. **Exhibit 1K** summarizes FAA approved and published instrument approach procedures, including associated weather minimums for Portland International Jetport.

The most sophisticated instrument approach procedures at Portland International Jetport are associated with the ILS to Runways 11 and 29. The ILS or LOC Runway 11 and 29 approaches provide visibility minimums as low as ½-mile (2,400 feet RVR) and cloud ceilings of 200 feet AGL (referred to as a Category I approach). Generally, this type of approach is considered the minimum for a commercial service airport. Larger hub airports will typically have even more sophisticated instrument approaches offering lower visibility minimums (Categories II and III), which is the case at PWM. Runways 11 and 29 are both served by Category II ILS approaches and Runway 11 offering Category III approaches. The minimums associated with each are depicted on **Exhibit 1K**.

The capability of an instrument approach procedure is defined by the visibility and cloud ceiling minimums associated with the approach.

Instrument approaches based on the global positioning system (GPS) have become very common across the country. GPS is inexpensive, as it does not require a significant investment in ground based systems by the airport or FAA. All four runway ends at Portland International Jetport are served by GPS approaches with associated minima presented on **Exhibit 1K**. GPS LPV approaches provide both horizontal and vertical guidance information to pilots. Advancements in GPS technology has allowed for instrument approach procedures to provide minimums nearly as low as more traditional ILS systems. Currently, the GPS approaches to Runways 11 and 29 include an LPV component, while those to Runways 18 and 36 offer only the LP portion but not the vertical component.

	WEATHER MINIMUMS BY AIRCRAFT TYPE							
	Category A		Category B		Category C		Category D	
	CH	VIS	CH	VIS	CH	VIS	CH	VIS
Runway 11 ILS Approaches								
Straight-In ILS (CAT I)	276	1,800	276	1,800	276	1,800	276	1,800
Straight-In ILS (SA CAT I)*	166	1,400	166	1,400	166	1,400	166	1,400
Straight-In ILS (CAT II)*	108	1,200	108	1,200	108	1,200	108	1,200
Straight-In ILS (CAT IIIa)*	0	700	0	700	0	700	0	700
Straight-In ILS (CAT IIIb)*	0	600	0	600	0	600	0	600
Straight-In LOC	700	2,400	700	2,400	700	1.375	700	1.375
Circling	700	1.0	700	1.0	700	1.75	800	2.25
Runway 29 ILS Approaches								
Straight-In ILS	242	2,400	242	2,400	242	2,400	242	2,400
Straight-In ILS (SA CAT I)*	157	1,400	157	1,400	157	1,400	157	1,400
Straight-In ILS (CAT II)*	116	1,200	116	1,200	116	1,200	116	1,200
Straight-In LOC	580	2,400	580	2,400	580	5,500	580	5,500
Circling	620	1.0	620	1.0	640	1.5	724	2.25
RNAV (GPS) 11								
LPV DA	276	2,400	276	2,400	276	2,400	276	2,400
LNAV/VNAV DA	417	3,000	417	3,000	417	3,000	417	3,000
LNAV MDA	560	2,400	560	2,400	560	5,000	560	5,000
Circling	620	1.0	620	1.0	640	1.5	800	2.25
RNAV (GPS) 18								
LP MDA	700	1.0	700	1.0	700	1.875	700	1.875
LNAV MDA	740	1.0	740	1.0	740	2.0	740	2.0
Circling	740	1.0	740	1.0	740	2.0	800	2.25
RNAV (GPS) 29								
LPV DA	242	2,400	242	2,400	242	2,400	242	2,400
LNAV/VNAV DA	620	1.5	620	1.5	620	1.5	620	1.5
LNAV MDA	580	2,400	580	2,400	580	5,500	580	5,500
Circling	620	1.0	620	1.0	640	1.5	800	2.25
RNAV (GPS) 36								
LP MDA	460	1.0	460	1.0	460	1.125	460	1.125
LNAV MDA	560	1.0	560	1.0	560	1.375	560	1.375
Circling	620	1.0	620	1.0	640	1.5	800	2.25

* Denotes approaches which require specialized aircrew and aircraft certification (aircraft must be equipped with radio altimeter)

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

Category A 0-90 knots (ex: Cessna 172)
Category B 91-120 knots (ex: Beechcraft KingAir)
Category C 121-140 knots (ex: Boeing 737, Airbus 319, Regional Jets, Canadair Challenger)
Category D 141-165 knots (ex: Gulfstream IV)

Abbreviations:

CH - Cloud Height as reported in feet above Mean Sea Level (MSL)
VIS - Visibility as Reported in Runway Visual Range (typical as hundreds or thousands of feet) or Statute Miles (typical as decimal)
LPV - Localizer Performance with Vertical Guidance (GPS approach providing vertical guidance)
DA - Decision Altitude (Used for vertically-guided approaches)
MDA - Minimum Descent Altitude (Used for non-precision approaches)
ILS - Instrument Landing System
LOC - Localizer
GPS - Global Positioning System
LNAV - Lateral Navigation
VNAV - Vertical Navigation
RNAV - Area Navigation

Source: U.S. Terminal Procedures, New England - 1, 24 July to 18 September 2014

Exhibit 1K

REGIONAL AIRPORTS

A review of public-use airports within the vicinity of Portland International Jetport has been made to identify and distinguish the type of air service provided in the area surrounding the airport. Information pertaining to each airport was obtained from FAA records with a summary provided on **Exhibit 1L**. Typically, airports within a 30-mile radius can influence aviation demand at the airport.

There are four public-use airports within a 30-mile radius, as presented on the exhibit. None of these airports offer similar facilities and/or aviation services as PWM. Moreover, PWM is the only airport served by commercial passenger service in the 30-mile radius. There are several commercial passenger service options at more distant locations in Bangor, ME to the north and Manchester, NH; Boston, ME; and New York, NY to the south.

LANDSIDE FACILITIES

Landside facilities support the aircraft and pilot/passenger transition between air and ground. Typical landside facilities include the passenger terminal complex, general aviation facilities, and support facilities, such as fuel storage, automobile parking, roadway access, snow removal facilities, and aircraft rescue and firefighting. The landside facilities at Portland International Jetport are depicted on **Exhibit 1M**.

The passenger terminal is centrally located on the airfield along the north side of Runway 11-29 and west of Runway 18-36. The terminal complex has experienced several upgrades with the most significant recently completed in 2012.

COMMERCIAL TERMINAL COMPLEX

The passenger terminal is centrally located on the airfield along the north side of Runway 11-29 and west of Runway 18-36. The terminal complex has experienced several upgrades with the most significant recently completed in 2012. The latest renovation completes the phased terminal complex renovation and expansion project which began in 1995. Over that period, improvements have included:

- Expansion of the building approximately 145,000 square feet;
- Renovation of main existing building;
- Addition of five passenger gates;
- New security screening checkpoint;
- Renovated and expanded baggage claim facilities;
- Addition of elevators and escalators (from ticket counter lobby to screening);
- Revised inbound/outbound passenger circulation;
- Enclosed bridge connection from parking garage to second level (near screening area);
- New food court;
- Increased retail spaces; and
- Increased development of surface parking lots

Terminal Building

The terminal is a three level linear design structure. Departing passengers enter the terminal on ground level, generally through the west end of the terminal where all airline ticket counters are located. Security processing and gates are on the second level and are accessed traveling east from the ticket counters and using stairs, an escalator, or elevator. Once through screening, the passengers can traverse the secured passenger area serving 10 passenger departure gates, as well as restaurants and retail concessionaires.

Arriving passengers exit the secured area via automated security doors which do not allow re-entry. Once outside of the secured area, arriving passengers must transition back to the first floor and then east to the baggage claim area. At the foot of the escalator serving arriving passengers, a new restaurant has been established to serve unsecured passengers, greeters, and airport employees. Rental car customers proceed to the east end of the new parking garage, lower level. **Exhibit 1N** illustrates the existing terminal building layout, including the first and second levels.

Terminal Access Roadways

The terminal can be accessed from two entrances. In the late 1990s, the access off Congress Street (Maine Route 9) was relocated from Westbrook Street to International Parkway. This entrance was developed to shift airport traffic away from driving through the adjacent Stroudwater neighborhood. The Westbrook Street access is now blocked by a gate accessible only by emergency vehicles. Congress Street is a four-lane bidirectional highway that extends from downtown Portland past the airport and the Maine Turnpike and beyond. Traffic approaching the airport from the east typically utilizes the International Parkway entrance. Traffic from the west and Interstate 95/295 would typically use the Jetport Boulevard entrance off Johnson Road. Both feed into the Jetport Access Road, which becomes a one-way loop around the parking lots, garage area, and terminal building entrances.

Biddeford Municipal Airport (B19) - 13 miles SW of PWM

Airport Classification:

- NPIAS .... General Aviation
- Asset Study .... Local
- Elevation 157
- Weather Reporting .... None
- ATCT .... No
- Annual Operations 23,000
- Based Aircraft 39

RUNWAYS	6-24
Length	3,000
Width	75
Pavement Strength	
SWL	25,000
DWL	N/A
DTWL	N/A
Lighting	MIRL
Marking	Basic
Instrument Approach Aids	VASI-4L - 6
Instrument Approaches	RNAV (GPS) - 6; VOR - 6

Services Provided.......... Avgas, ramp tiedowns, hangars, passenger terminal, flight training, aircraft rental, maintenance

Brunswick Executive Airport (BXM) - 22 miles NE of PWM

Airport Classification:

- NPIAS .... General Aviation
- Asset Study .... Regional
- Elevation 75
- Weather Reporting .... AWOS-AV
- ATCT .... No
- Annual Operations .... N/A
- Based Aircraft 28

RUNWAYS	1L-19R (closed indefinitely)	1R-19L
Length	8,000	8,000
Width	200	200
Pavement Strength		
SWL	N/A	N/A
DWL	N/A	N/A
DTWL	N/A	N/A
Lighting	HIRL	HIRL
Marking	Precision	Precision
Instrument Approach Aids	PAPI-4	PAPI-4L; ALSF - 1R; REIL - 19L
Instrument Approaches	None	ILS or LOC/DME - 1R; RNAV (GPS) - 1R; RNAV (GPS) - 19L

Services Provided.......... Full service including AvGas/Jet A fuel, parking, hangars

Sanford Seacoast Regional Airport (SFM) - 23 miles SW of PWM

Airport Classification:

- NPIAS .... Reliever
- Asset Study .... Local
- Elevation 244
- Weather Reporting AWOS-3
- ATCT .... No
- Annual Operations 79,200
- Based Aircraft 97

RUNWAYS	7-25	14-32
Length	6,389	4,999
Width	100	100
Pavement Strength		
SWL	65,000	N/A
DWL	100,000	72,000
DTWL	N/A	N/A
Lighting	HIRL	MIRL
Marking	Precision - 7; Nonprecision - 25	Basic
Instrument Approach Aids	PAPI-4L; ODALS - (25)	PAPI-4L
Instrument Approaches	ILS or LOC - 7; RNAV (GPS); VOR	RNAV (GPS) - 32

Services Provided.......... Full service GA including AvGas/Jet A fuel, parking, hangars, flight training, aircraft rental, aircraft maintenance

Auburn/Lewiston Municipal Airport (LEW) - 24 miles north of PWM

Airport Classification:.......... General Aviation

- NPIAS .... Reliever
- Asset Study .... Regional
- Elevation 288
- Weather Reporting AWOS-3
- ATCT .... No
- Annual Operations 64,600
- Based Aircraft 71

RUNWAYS	4-22	17-35
Length	5,001	2,750
Width	100	75
Pavement Strength		
SWL	30,000	30,000
DWL	108,000	N/A
DTWL	180000	N/A
Lighting	HIRL	MIRL
Marking	Precision - 4; Nonprecision - 22	Basic
Instrument Approach Aids	PAPI-4L; MALSR - 4; REIL - 22	None
Instrument Approaches	ILS or LOC - 4; RNAV (GPS)	VOR/DME-A

Services Provided.......... Full service GA including AvGas/Jet A fuel, parking, hangars, flight training, aircraft rental, aircraft maintenance

KEY

ATCT	Airport Traffic Control Tower
AWOS	Automated Weather Observation System
DME	Distance Measuring Equipment
DWL	Dual Wheel Loading
DTWL	Dual Tandem Wheel Loading
HIRL	High Intensity Runway Lighting
ILS	Instrument Landing System
LOC	Localizer
MALSR	Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
MIRL	Medium Intensity Runway Lighting
NPIAS	National Plan of Integrated Airport Systems
ODALS	Omnidirectional Approach LIghting System
PAPI	Precision Approach Path Indicator
REIL	Runway End Identification Light
RNAV	Area Navigation
SWL	Single Wheel Loading
VASI	Visual Approach Slope Indicator
VOR	Very High Frequency Omnidirectional Range

Exhibit 1L
REGIONAL AIRPORT FACILITY DATA

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Exhibit 1M
LANDSIDE FACILITIES

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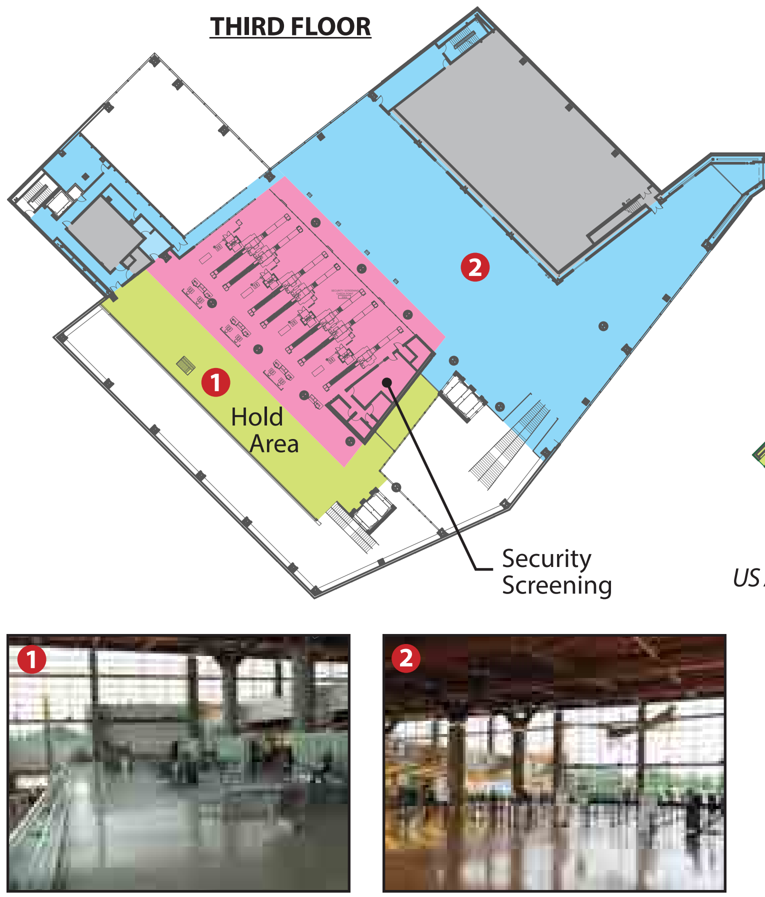
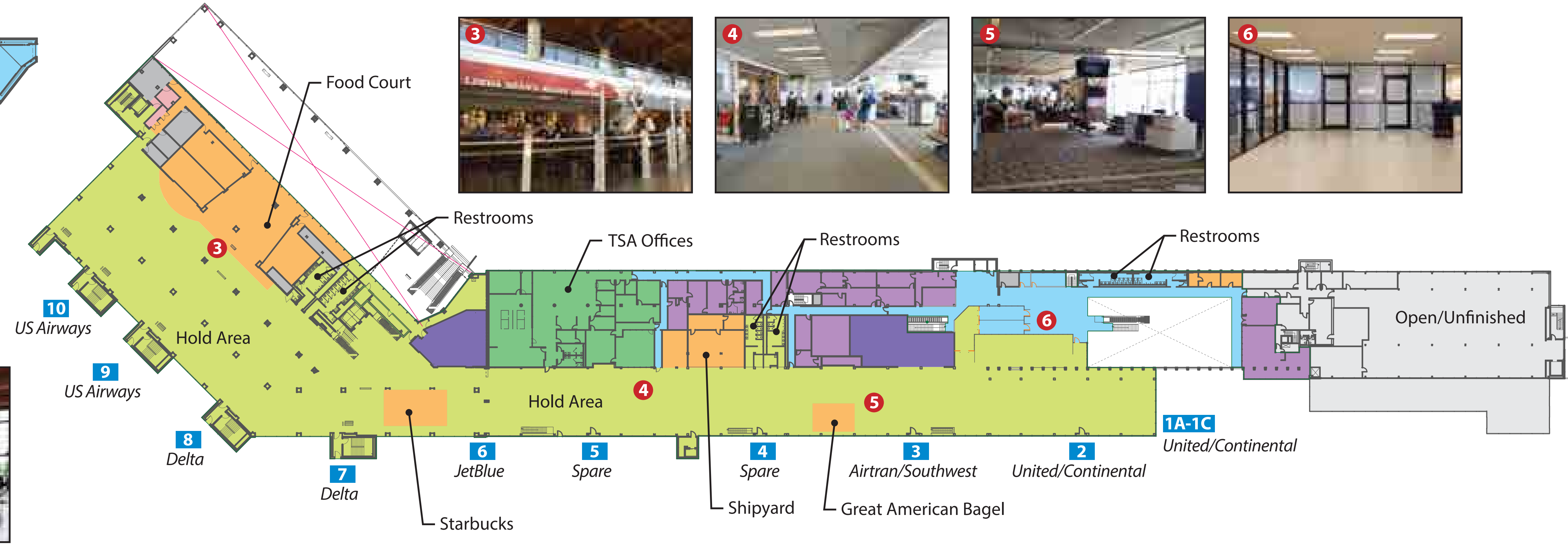
THIRD FLOOR



SECOND FLOOR



FIRST FLOOR

LEGEND

- Common Building Systems
- Public Areas
- Security
- Hold Areas
- City Offices
- Paradies Retail/Storage
- Host
- Ticketing
- TSA Offices
- USS-1 Office
- Vacant
- Open/Unfinished
- Baggage
  - Inbound
  - Outbound
  - Offices
- 7 Gate Number
- 1 Photograph Location

Exhibit 1N

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Terminal Curb Frontage

The Jetport Access Road divides into two two-lane roads approaching the terminal building. The left two lanes feed into both short- and long-term parking lots/garage, while the right lanes continue along the terminal building curb with ample room for passenger drop-off and pick-up. Transportation Security Administration (TSA) rules prohibit parking along this area; even short stays typically draw the attention of airport police and security personnel.

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

Vehicle Parking

The passenger terminal complex is served by several parking areas. The most substantial facility is the six-level parking garage. This garage has five public levels of parking with level one offering short term parking spaces. The underground level is utilized for rental car ready and return. There are 180 public short term spaces located on the first level of the original garage, closest to the terminal building. The sub-level of the garage includes 238 spaces for rental car ready and return. The garage also offers a total of 1,982 long term spaces as delineated by level in **Table 1D**. A surface long term parking lot immediately west of the parking garage offers 343 spaces. A cell phone parking lot is situated immediately north of the garage and offers 96 spaces. A discount parking lot offers 459 public spaces. Overall, the airport's lots provide a total parking capacity of 3,778 automobiles, including 63 handicap spaces. **Table 1D** presents the overall capacity of each parking lot.

TABLE 1D
Automobile Parking Lots
Portland International Jetport

Lot	Handicap Spaces	Regular Spaces	Capacity
Garage Short Term (First Floor)	8	172	180
Garage Long Term (Handicap)			
Level 1	2	191	193
Level 2	8	441	449
Level 3	8	442	450
Level 4	8	438	446
Level 5	8	436	444
Total Garage (Long Term)	34	1,948	1,982
Surface Long Term Lot	2	341	343
North Cell Phone Lot	0	96	96
Discount Long Term Lot	12	447	459
Public Short Term Total	8	172	180
Public Long Term Total	48	2,832	2,880
Employee Total	7	473	480
Rental Car Ready Total	**0**	**238**	**238**
Airport Total	**63**	**3,715**	**3,778**

Notes: Employee and rental car lots not open to public; Rental car ready return lot located in lowest level of parking garage structure.
Source: Airport Management

Main Terminal Ramp

Since the last update in 2008, the main terminal ramp has been expanded to the northwest in order to serve the expanded terminal building. The main terminal ramp abuts the commercial terminal building and provides approximately 96,000 square yards of ramp space. The ramp provides for 10 numbered gates with Gate 1 offering three separate boarding positions (1a, 1b, and 1c). As such, the ramp supports a total of 12 total boarding positions as depicted on **Exhibit 1P**.

As depicted on the exhibit, Gates 3 and 5 through 10 can support larger narrow-bodied commercial aircraft as well as regional aircraft. At present, Gates 4 and 5 are open and operated as a "common use gate" which allow them to be used by any airline during peak periods when available. These gates can also be utilized as a second location for deicing during peak periods. The three Gate 1 boarding positions are situated at ground level with specially designed boarding bridges. As such, these gates accommodate small regional aircraft.

The westernmost portion of the main terminal ramp hosts two functions. First, three parking spaces have been established for aircraft remaining overnight (RON) parking. Second, a demarked portion of the ramp has been developed as the commercial airline deicing facility. It is properly equipped to reclaim excess materials for recycling at the adjacent glycol treatment building depicted on **Exhibit 1Q**.

AIR CARGO FACILITIES

The primary air cargo facility is located on the FSDO ramp. An 16,500 square-foot air cargo building is utilized by one commercial air cargo carrier, FedEx. FedEx also utilizes the associated 16,900 square-yard ramp.

GENERAL AVIATION

A fixed base operator (FBO), Northeast Airmotive (Air), operates on the field, providing typical general aviation services. There are also two specialized aviation service operators (SASOs), Maine Aviation and Maine Aviation Sales, at the Jetport. The main offices of Northeast Air and Maine Aviation are located on the north general aviation ramp, west of Runway 18-36 and north of Runway 11-29, off Taxiway C. Public access to both businesses is off Westbrook Street. The primary offices for Maine Aviation Sales are located in a facility adjacent to the Jetport's FSDO ramp, which is situated at the end of Taxiway G, east of Runway 18-36. Public access to this business is off Yellowbird Road. **Table 1E** highlights the general services offered by Northeast Air and Maine Aviation.

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

AIRLINE GATE LOCATIONS

Gate #	Airline	Max Size Aircraft / Wingspan	Bridge Length (Aircraft/Actual/Max. Possible)
1A	United	Bombardier Q-400 / 93.50′	NA
1B	United	CRJ-701 / 76.28′	NA
1C	United	CRJ-701 / 76.28′	NA
2	United	Airbus A320 / 111.88′	737-700 / 135′ / 141′
3	Southwest	Boeing 737-800W / 117.42′	A319 / 136′ / 141′
4	Common Use	CRJ 701 / 76.28′	EMB-145 / 135′ / 141′
5	Common Use	Boeing 737-900 / 112.60′	EMB-145 / 137.5′ / 141′
6	JetBlue	Airbus A321 / 112.04′	EMB-175 / 118.5′ / 119′
7	Delta	Airbus A320 / 111.88	EMB-145 / 110′ / 119′
8	Delta	Airbus A320 / 111.88	EMB-145 / 135′ / 141′
9	American	Airbus A320 / 111.88	CRJ-200 / 139′ / 141′
10	American	Airbus A320 / 111.88	CRJ-200 / 137′ / 141′

Exhibit 1P

COMMERCIAL PASSENGER AIRLINE APRON AND GATE LOCATIONS

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0
100
200
SCALE IN FEET
NORTH
3,000 s.f. Deicing
Fluid Treatment Building
Jetport Blvd.
Water
Quality
Filter
Bottom
Underground
Storage Tank
for Spent
Deicing Fluid
Apron
Lights
Perimeter
Fence
RON 1
RON 2
RON 3
Asphalt
Asphalt
Concrete Apron
Deicing Pad Limits
Concrete Apron
Automatic Valve Pit
Perimeter Road
10
9
8
7
A

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

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

TABLE 1E
FBO Services
Portland International Jetport

Services	Northeast Air	Maine Aviation
Aircraft Charters	X	X
Aircraft Maintenance	X	X
Aircraft Modifications	X	X
Aircraft Parking	X	X
Aircraft Parts	X	X
Avionics Sales and Service	X	X
Car Rental	X	--
Deicing Service	X	--
Flight Training	--	--
Fuel	X	--
Ground Handling	X	X
Hangars	X	--
Oxygen Service	X	--
Passenger Terminal and Pilot Lounge	X	--
Weather Observation and Briefing Services	X	--

Source: Personal interviews with operators

East General Aviation Area

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

Public and user automobile parking for the FSDO ramp is very limited; however, the airport's commercial parking facilities are within walking distance, as is one of two hotels located in the local area.

West General Aviation Area

The north general aviation ramp is the main source of aircraft servicing for all non-air carrier aircraft. As discussed, it is the primary business address for Northeast Air and Maine Aviation, and contains the largest number of aircraft parking spaces, including 62 tie-downs. In addition, the only general aviation self-service fueling terminal is located on this ramp, as well as storage facilities for both aviation gasoline and jet fuel.

The FSDO ramp is 425,000 square feet east of Runway 18-36 and contains approximately 60 parking spaces for small aircraft, and a large maneuvering/parking ramp for larger corporate aircraft.

SUPPORT FACILITIES

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

Airport Rescue and Firefighting (ARFF)

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

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

TABLE 1F
ARFF Equipment Inventory
Portland International Jetport

Year-Make-Model	Dry Chemical (lbs.)	Water (gal.)	AFFF (gal.)	Halon 1211 (lbs.)	Halotron (lbs.)	Turret Gun Speed (GPM)
2011 Ford 350	450	100	100	N/A	N/A	N/A
1976 Walter CT4 1500 BSQG	N/A	1,500	150	N/A	N/A	Roof: 600 Bumper: 300
1989 Oshkosh T3000	N/A	3,000	405	500	N/A	Roof: 600/1200 Bumper: 300
2001 Oshkosh T1500	N/A	1,500	210	N/A	460	Roof: 750/375* Bumper: 300

* Snozzle elevated waterway
Source: Airport Certification Manual

Airport Maintenance and Snow Removal

Jetport personnel handle most airport maintenance and all snow removal operations, operating out of a large facility located on the eastern boundary of the airport, across from the FSDO ramp. The maintenance/SRE building was originally built in 1974, with a 5,300-square-foot floor plan. It has since been extended four times, bringing the total size to 35,600 square feet. **Table 1G** is the current SRE inventory.

TABLE 1G
SRE Inventory Portland International Jetport

Vehicle Type	Equipment/Function
4x4 Tractor	16' Front Mounted Broom
4x4 Tractor	18' Front Mounted Broom
4x4 Tractor	18' Front Mounted Broom
4x4 Tractor	5,000-ton-per-hour Snow Blower
4x4 Tractor	5,000-ton-per-hour Snow Blower
4x4 Front-end Loader	20' Blade with miscellaneous Buckets
4x4 Front-end Loader	20' Blade with miscellaneous Buckets
6x4 Truck	12' Plow (2) 11' wings, 11-cubic yard wet/dry spreader
6x4 Truck	14' Plow, 11-cubic yard wet/dry spreader
4x4 Truck	22' Plow
4x4 Truck	22' Plow
4x2 Truck	12' Plow, 11' Wing, 8 cubic yard spreader
4x4 Truck	400-ton-per-hour Snow Blower
4x4 Truck	400-ton-per-hour Snow Blower with 8' Plow
4x4 Truck	9' Plow with 1.5-cubic-yard Spreader
4x2 Truck	2,000-gallon Liquid Dispenser with 50' Spray Broom

Source: Airport Certification Manual

Aircraft Deicing Fluid Recycling Facility

Since completion of the previous master plan, a deicing fluid recycling facility was constructed immediately north/northwest of the air carrier ramp. The facility's primary role is to reclaim and recycle the deicing fluid spent from operations at PWM. The facility is also certified to recycle propylene glycol from any source as long as the chemical was not contaminated. The complex is supported by a 3,000 square-foot treatment building and associated infrastructure as highlighted on **Exhibit 1Q** with associated tank inventory presented in **Table 1H**.

TABLE 1H
Inventory of Storage Tanks Associated with Aircraft Deicing and Fluid Recycling Activities
Portland International Jetport

Qty of Tanks	Tank Size (gallons)	Purpose	Location
Glycol Recycling Facility (Outside Security Fence)			
1	500,000	Underground Storage Tank (UST) - Receives mix of water & spent aircraft deicing fluid from deicing pad	South of Recycling Facility Building
3 current / 10 max.	21,000	Frac tanks used for additional storage capacity for dilute mixed fluid when 500,000 UST is full	Satellite Parking Lot to West of the Turnpike
2	18,000	Low concentrate feed tanks	Recycling Facility at 140 Jetport Boulevard
2	12,000	Batch tanks for release of Distillate to POTW	Recycling Facility at 140 Jetport Boulevard
8	21,000	Holding tanks for 50/50 mix of water and propylene glycol	Recycling Facility at 140 Jetport Boulevard
1	5,000	Bottom waste glycol from distillation unit	Recycling Facility at 140 Jetport Boulevard
3	20,000	Pure recycled propylene glycol	Recycling Facility at 140 Jetport Boulevard
1	10,000	Pure recycled propylene glycol prepared for sale	Recycling Facility at 140 Jetport Boulevard
Aircraft Deicing Operations (Inside Security Fence)			
3	8,000	Type I Propylene Glycol Aircraft Deicing Fluid	North of Aircraft Deicing Pad
1	8,000	Type IV Propylene Glycol Aircraft Deicing Fluid	North of Aircraft Deicing Pad

Source: Airport Management

Fuel Storage

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

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

TABLE 1J
Fuel Storage
Portland International Jetport

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

Source: Airport management documents

Rental Car Service and Storage

Seven car rental agencies conduct business on the Jetport: Avis, Alamo, Budget, Dollar, Enterprise, Hertz, and National. All seven agencies have counter space in the lower level of the new parking garage located directly across from the terminal exit. All agencies have service and storage facilities on the Jetport or on private property adjacent to the airport.

Noise Wall

A concrete noise barrier was constructed in 1991, near the corner of Taxiway C and the Runway 18 end. The wall is designed to minimize noise impacts on the Stroudwater residential neighborhood located along the west side of Westbrook Street. A noise/blast wall structure has also been erected north of the western end of Runway 11. The wall is situated along the entirety of the run-up/hold ramp and provides protection from jet blast for vehicles on Jetport Boulevard.

Security Fencing

The entirety of airport property is enclosed with security fencing topped with three strands of barbed/razor wire.

The wall is designed to minimize noise impacts on the Stroudwater residential neighborhood located along the west side of Westbrook Street.

Airport Drainage

The nearest bodies of water to the Portland International Jetport are Long Creek to the south and the Fore River to the north and east. Stormwater at the site discharges to the Fore River and Long Creek via formal drainage systems, and ultimately discharges to Casco Bay. Personnel at the facility must be made aware that non-stormwater spills leaving the site can impact the water quality of the Fore River and Long Creek.

The Portland International Jetport has an extensive drainage system. There are three major and several minor outfalls that are tributary to the Fore River highlighted on **Exhibit 1R**. Additionally, there are three outfalls in the area east of the Runway 36 threshold that are tributary to Long Creek just above its confluence with the Fore River.

Five water quality units were installed in the year 2001 within the airfield drainage system located in drainage areas A, C, E, and H as shown on **Exhibit 1R**. In 2002, an additional water quality unit (WQU) was added in Area A for the parking garage and associated roadways. A brief description is as follows:

Drainage Area – A to Outfalls #3 and #5: This watershed encompasses approximately 157 acres and is comprised of a portion of Runway 11-29, the perimeter road, the terminal building and main terminal ramp, a portion of Jetport Boulevard, and a portion of the vehicle parking areas. The system is tributary to the larger depressions in between Taxiway C and Runway 18-36 that eventually outlets to the Fore River at Outfalls #3 and #5. During low flow (1 foot or less) in the 60-inch storm drain installed in 2012 east of Runway 18-36, this area discharges only to Outfall #3.


LEGEND
Airport Property Line
City Limit Line
Storm Drain Pipe
Water Quality Unit (WQU)
Water Quality Filter
Watershed Boundary
Watershed ID
0 800 1600
SCALE IN FEET
NORTH
PORTLAND
SOUTH PORTLAND
Outfall #1
Outfall #2
Outfall #3
Outfall #4
Outfall #5
Outfall #6
Outfall #7
Outfall #8
Outfall #9
Water Quality Filter
WQU 3
WQU 4
WQU 5
WQU 6
WQU 7
WQU 8
WQU 9
WQUS 1 & 2
A
A/B
B
C
D
E
F
G
H
I
J
K
L

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Drainage Area – B to Outfalls #3 and #5: This watershed encompasses approximately 59 acres. It encompasses the western portion of Runway 11-29 and the grassed infield areas. It is also tributary to the previously mentioned large depression in Area A.

Drainage Area – C to Outfalls #3 and #5: This watershed encompasses approximately 19 acres. It is predominately impervious surface and includes a portion of north General Aviation Terminal Ramp and General Aviation Parking. It is tributary to Outfalls #3 and #5 which outlet to the Fore River.

Drainage Area – D to Outfall #1: This watershed encompasses approximately 22 acres. It begins at the automobile parking lot and Northeast Air on the west side of Westbrook Street. This lot is tributary to a detention basin in the area of the parking lot, which in turn is piped across Westbrook Street into a storm drain system in the north general aviation ramp. This system has catch basins within the north general aviation ramp. The outlet piping from the north general aviation ramp traverses Taxiway C and Runway 18-36 to the FSDO Ramp. At this location, there are several catch basins within the FSDO Ramp that are connected to the system prior to the outlet on the east side of Yellowbird Road directed into the Fore River.

Drainage Area – E to Outfall #2: This watershed encompasses approximately 42 acres. It involves the Northeast Air "North Complex" buildings and ramp area, Taxiway C north extension, and a portion of Runway 18-36. Area E outlets north of Runway 18-36 under Yellowbird Road to the Fore River.

Drainage Area – F sheet flow to Fore River: This watershed encompasses approximately 36 acres. It includes a portion of Runway 18-36, Yellowbird Road, and the grassed area between Yellowbird Road and the perimeter road. There is mostly sheet flow to ditches on Yellowbird Road to culverts under Yellowbird Road to the Fore River.

Drainage Area – G to Outfall #4: This watershed encompasses approximately 17 acres. It includes a portion of FSDO ramp and PIJ maintenance building, parking lot for maintenance, and Yellowbird Road. Drainage is overland to ditches to outlets to the Fore River.

Drainage Area – H sheet flow to Fore River: This watershed encompasses approximately 12 acres. It is adjacent to the Fore River and outlets to the River through a series of catch basins and drainpipes.

Drainage Area – I to Outfall #3: This watershed encompasses approximately 5 acres. It is located behind the hexagonal hangar and is tributary to the Fore River.

Drainage Area – J to Outfall #7: This watershed encompasses approximately 23 acres. It includes portions of Runways 18-36 and 11-29 and the safety area for these runways. It discharges via a culvert that is tributary to Long Creek.

Drainage Area – K to Outfalls #8 and #9: This watershed encompasses approximately 144 acres. It includes a portion of Runway 18-36, the perimeter road, and the grass safety area. It is tributary to Long Creek east of the water quality pond.

Drainage Area – A/B to Outfalls #3 and #5: This watershed encompasses approximately 29 acres. It is located north of Runway 11-29 and east of Runway 18-36. Through a series of catch basins, it connects to the outlets of drainage areas A and B downstream of the large depression. Area A/B outlets to the Fore River at Outfalls #3 and #5.

SOCIOECONOMIC CHARACTERISTICS

For an airport planning study, socioeconomic characteristics are collected and examined to derive an understanding of the dynamics of growth within the study area. Socioeconomic information related to the approximate airport service area is an important consideration in the master planning process. The primary service area for PWM has been and will continue to be Cumberland County and the entirety of the Portland-South Portland metropolitan statistical area (MSA). The MSA is defined as Cumberland County, as well as York County to the south and Sagadahoc County to the northeast. Other nearby counties and communities influence aviation demand at PWM, but serve as a secondary service area.

The historic trend in elements such as population, employment, income, and earnings provides insight into the long term socioeconomic condition of the region. This information is essential in determining aviation service level requirements, as well as forecasting aviation demand elements for airports. Aviation forecasts are typically related to the population base, economic strength of the region, and the ability of the region to sustain a strong economic base over an extended period of time.

Portland International Jetport is located in a mature area with most of the surrounding communities fully developed. Not unlike all urban airports in the United States, area land use surrounding PWM can have a significant impact on airport operations and growth.

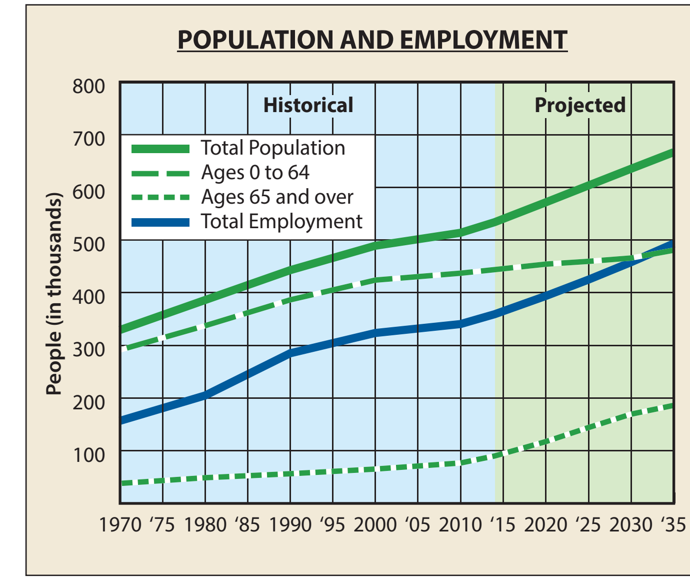
Historical and forecast socioeconomic data for Cumberland County was obtained from Woods & Poole Economics - *Complete Economic and Demographic Data Source*, 2014. Woods & Poole utilizes information from the U.S. Census Bureau, as well as other national and state organizations for historic data to project future conditions. The information is presented on **Exhibit 1S**.

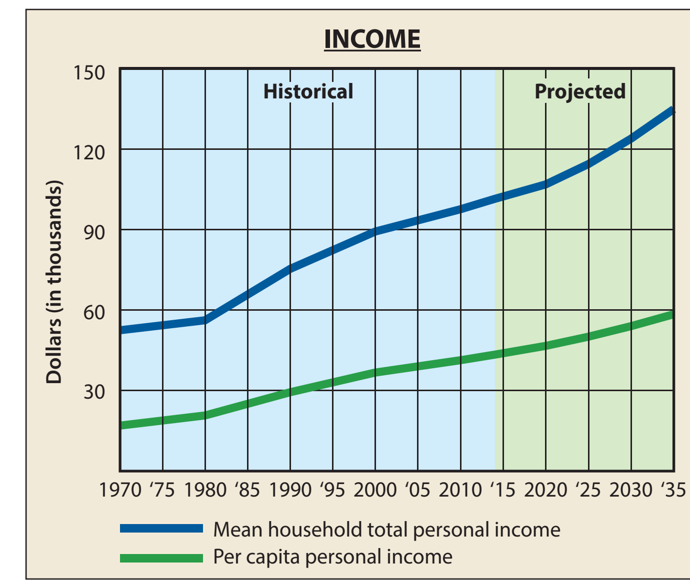
AREA LAND USE

Portland International Jetport is located in a mature area with most of the surrounding communities fully developed. Not unlike other urban airports in the United States, area land use surrounding PWM can have a significant impact on airport operations and growth. **Exhibit 1T** illustrates the generalized land uses in the vicinity of the airport. By understanding the land use issues surrounding the airport, more appropriate recommendations can be made for the future of the airport.

Land surrounding Portland International Jetport falls primarily under two jurisdictions: Portland and South Portland. Westbrook is located to the northwest of PWM. A large majority of existing land use

	HISTORICAL							PROJECTED				
	1970	1980	1990	2000	2010	2014	AAGR	2020	2025	2030	2035	AAGR (2014-2035)
POPULATION												
Total Population	329,252	386,092	442,790	489,179	513,741	533,919	1.10%	571,567	603,515	635,294	666,728	1.06%
Median Age (Years)	28.67	30.78	33.66	38.03	42.04	43.41	0.95%	44.47	45.1	45.75	46.19	0.30%
Ages 0 to 64 (in thousands)	291,297	337,310	386,454	423,949	437,017	443,831	0.96%	454,225	459,510	465,827	480,608	0.38%
Ages 65 and over (in thousands)	37,955	48,782	56,336	65,230	76,724	90,088	1.98%	117,342	144,005	169,467	186,120	3.52%
Male	159,565	186,193	214,234	237,411	249,685	259,457	1.11%	277,278	292,170	306,827	321,235	1.02%
Female	169,687	199,899	228,556	251,768	264,056	274,462	1.10%	294,289	311,345	328,467	345,493	1.10%
Total Households	103,014	139,104	169,461	197,505	213,301	223,787	1.78%	244,557	258,751	271,195	282,720	1.12%
Persons Per Household	3.07	2.69	2.55	2.42	2.35	2.33	-0.62%	2.28	2.27	2.28	2.29	-0.08%
EMPLOYMENT												
Total Employment (In Thousands)	156,769	204,839	285,041	323,554	340,471	359,163	1.90%	393,755	424,783	457,919	493,246	1.52%
Farm	2,119	2,552	1,855	1,710	1,769	1,807	-0.36%	1,822	1,831	1,837	1,838	0.08%
Forestry, Fishing, Related Activities And Other	1,184	2,668	2,888	2,657	2,091	2,049	1.25%	2,127	2,190	2,253	2,314	0.58%
Mining	156	170	167	178	258	303	1.52%	306	308	309	309	0.09%
Utilities	1,312	1,388	1,600	956	860	767	-1.21%	720	680	642	603	-1.14%
Construction	8,883	10,496	18,120	20,366	20,365	21,163	1.99%	22,546	23,747	24,994	26,288	1.04%
Manufacturing	32,882	37,474	40,587	34,619	23,300	23,132	-0.80%	22,778	22,465	22,137	21,794	-0.28%
Wholesale Trade	6,512	8,188	10,488	11,202	10,714	11,103	1.22%	11,597	11,996	12,382	12,754	0.66%
Retail Trade	16,110	22,665	36,348	42,806	39,923	41,720	2.19%	45,920	49,646	53,589	57,757	1.56%
Transportation And Warehousing	5,496	5,702	6,565	7,705	8,153	8,728	1.06%	9,672	10,480	11,305	12,144	1.59%
Information	3,079	3,958	5,346	6,412	5,638	5,030	1.12%	5,192	5,318	5,434	5,541	0.46%
Finance And Insurance	7,545	9,496	15,879	17,546	18,937	20,299	2.27%	21,215	21,975	22,733	23,485	0.70%
Real Estate And Rental And Lease	4,109	5,239	8,624	10,271	14,649	15,548	3.07%	17,086	18,433	19,841	21,306	1.51%
Professional And Technical Services	5,006	8,119	13,408	18,517	22,695	24,234	3.65%	27,011	29,475	32,074	34,813	1.74%
Management Of Companies And Enterprises	487	782	1,298	2,932	4,220	4,818	5.35%	5,914	6,971	8,176	9,542	3.31%
Administrative And Waste Services	4,122	6,135	9,677	15,707	17,060	19,471	3.59%	22,691	25,684	28,980	32,595	2.48%
Educational Services	1,779	2,895	4,783	6,193	8,740	9,707	3.93%	11,243	12,663	14,218	15,915	2.38%
Health Care And Social Assistance	9,370	15,248	25,189	37,208	46,117	50,135	3.89%	57,939	65,063	72,773	81,088	2.32%
Arts, Entertainment, And Recreation	2,028	3,102	5,058	7,412	8,943	9,652	3.61%	10,917	12,054	13,274	14,576	1.98%
Accommodation And Food Services	8,401	12,894	21,053	24,133	27,721	29,258	2.88%	31,678	33,806	36,037	38,378	1.30%
Other Services, Except Public Administration	5,008	8,327	13,417	14,604	16,247	18,101	2.96%	21,492	24,666	28,180	32,061	2.76%
Federal Civilian Government	9,453	10,951	12,136	7,985	8,324	8,197	-0.32%	8,424	8,593	8,742	8,872	0.38%
Federal Military	8,247	7,991	7,578	5,909	4,933	4,534	-1.35%	4,569	4,594	4,613	4,627	0.10%
State And Local Government	13,481	18,399	22,977	26,526	28,814	29,407	1.79%	30,896	32,145	33,396	34,646	0.78%
INCOME & SPENDING												
Total Earnings (millions of 2009 Dollars)	$4,677.328	$6,463.562	$10,382.259	$13,472.378	$15,702.106	$16,967.792	2.97%	$19,637.567	$22,168.983	$25,014.320	$28,210.517	2.45%
Per Capita Personal Income (2009 Dollars)	$16,952	$20,728	$29,385	$36,716	$41,304	$43,372	2.16%	$46,646	$50,068	$53,995	$58,420	1.43%
Mean Household Total Personal Income (in 2009 dollars)	$52,466	$56,180	$75,335	$89,245	$97,537	$101,403	1.51%	$106,800	$114,372	$123,840	$134,836	1.37%
Gross Regional Product (millions of 2009 Dollars)	$6,586.607	$9,099.382	$15,089.997	$20,201.359	$24,115.040	$26,022.470	3.17%	$30,127.051	$34,033.608	$38,442.194	$43,416.657	2.47%
Total Retail Sales (in millions of 2009 dollars)	$2,973.174	$4,465.271	$6,509.415	$8,270.999	$8,254.735	$9,192.982	2.60%	$10,410.024	$11,537.861	$12,779.340	$14,144.912	2.07%
Total Retail Sales Per Household (in 2009 dollars)	$28,862	$32,100	$38,412	$41,877	$38,700	$41,079	0.81%	$42,567	$44,591	$47,122	$50,032	0.94%





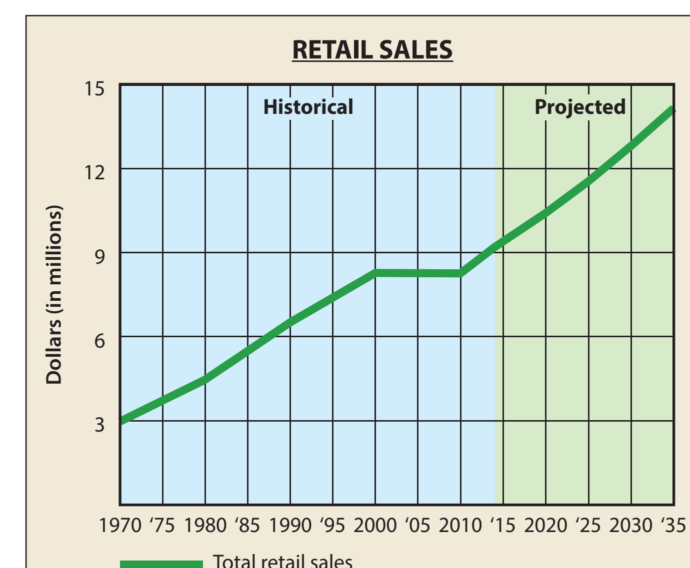


Exhibit 1S

Source: Woods & Poole Complete Economic and Demographic Data Source (CEEDS) 2014

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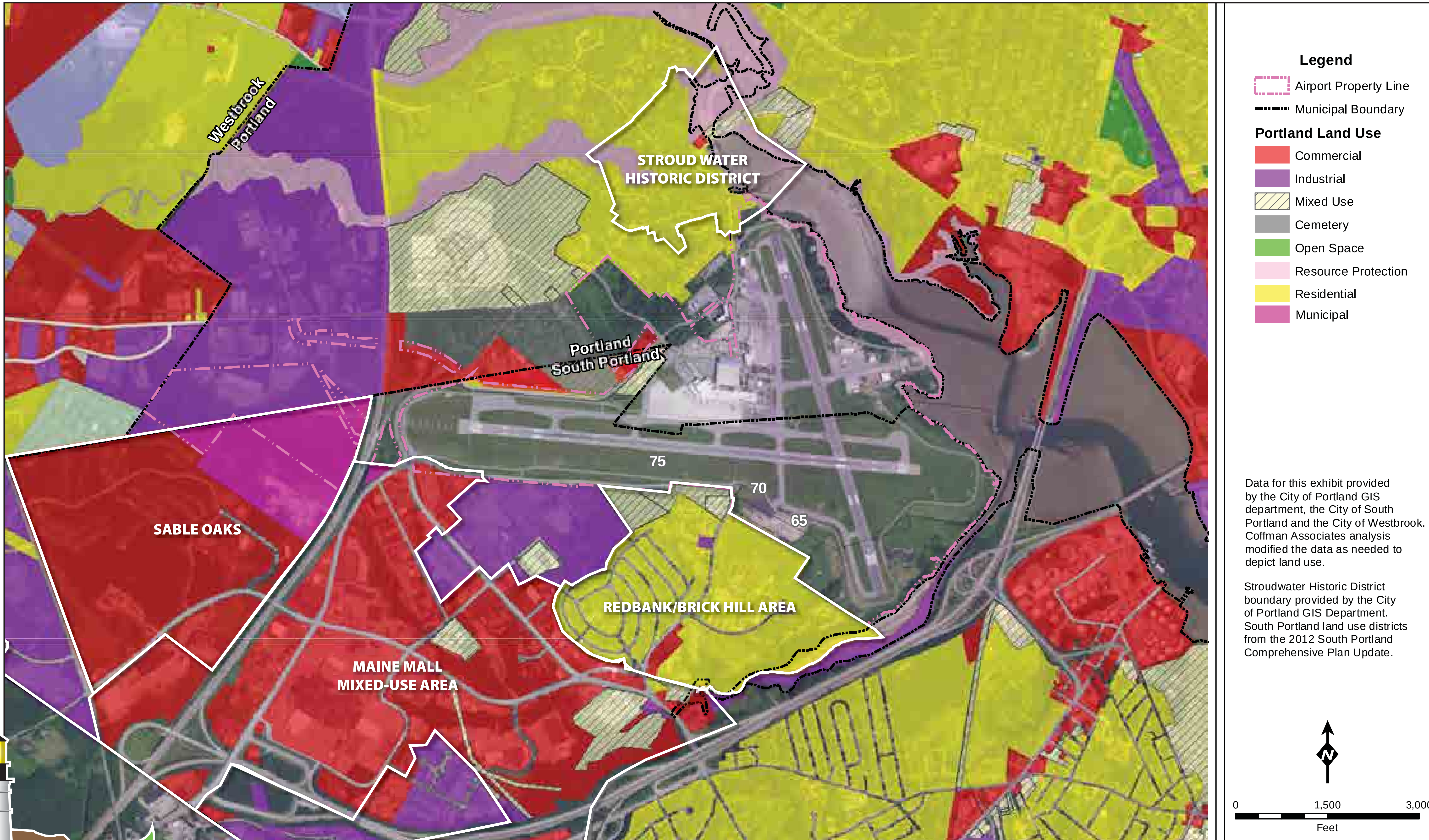

Exhibit 1T
EXISTING GENERALIZED LAND USES

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adjacent to the north and northeast of the airport is in residential uses. This includes the Stroudwater Historic District which abuts the Jetport. Smaller pockets of residential areas are also located to the east and south/southeast. Commercial land use is heaviest to the west and southwest with smaller pockets to the east and southeast. Industrial uses spot the airport vicinity with a large area immediately west/northwest of the airport. Coastal and other environmentally sensitive areas are indicated as "Resource Protection" on the exhibit.

ENVIRONMENTAL INVENTORY

The purpose of the following environmental inventory is to identify potential environmental sensitivities at or within the vicinity of Portland International Jetport. The resource categories listed below are based on guidance provided within the FAA's Order 1050.1E, *Environmental Impacts: Policies and Procedures.* Resources not present within the vicinity, but included in FAA environmental guidance, are not included in this inventory. The information contained in this section was obtained from internet resources, agency maps, and existing literature.

AIR QUALITY

As required by the Federal *Clean Air Act* (CAA), the Environmental Protection Agency (EPA) establishes National Ambient Air Quality Standards (NAAQS) for pollutants that, based on current and best available scientific evidence, cause or contribute to the degradation of human health (primary NAAQS) or environmental welfare (secondary NAAQS). To date, EPA has established NAAQS for six pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), respirable particulate matter with particle sizes measuring 10 micrometers or less (PM_{10}), fine particulate matter with particle sizes measuring 2.5 micrometers or less ($PM_{2.5}$), ground-level ozone (O_3), and sulfur dioxide (SO_2).

EPA classifies areas based on air pollutant concentrations in comparison to the NAAQS for a specified pollutant as follows: "non-attainment" – the area exceeds the NAAQS; "attainment" – the area is below the NAAQS; and "maintenance" – the area was previously designated as non-attainment, but has taken corrective measures to remedy violations. The maintenance designation remains until sufficient monitoring demonstrates that no additional infractions have occurred. PWM is located within Cumberland County, which is classified as an attainment area for all criteria pollutants.

COASTAL RESOURCES

Under the *Coastal Zone Management Act of 1972*, states with coastal lands may prepare and submit a Coastal Zone Management Plan (CZM) for approval with the National Oceanic and Atmospheric Administration (NOAA). These plans/programs are intended to preserve, protect, and enhance designated coastal areas. In 1978, the State of Maine initiated a coastal management program in accordance with the *Coastal Zone Management Act of 1972*. Coastal management policies are found within Title 38 of

Maine Revised Statutes, *Water and Navigation*, Chapter 19, *Coastal Management Policies*. Maine Revised Statutes Title 18, *Waters and Navigation*, Chapter 3, *Protection and Improvement of Waters*, Subchapter 1, *Environmental Protection Board*, Section 435, *Shoreland Areas*, establishes that shoreland areas in the State of Maine be subject to zoning and land use controls. Section 438-A, *Municipal Authority; State Oversight*, of Title 18, *Waters and Navigation*, Chapter 3, *Protection and Improvement of Waters*, Subchapter 1, *Environmental Protection Board*, compels municipalities to adopt zoning and land use controls for shoreland protection.

The City of Portland adopted Chapter 14, *Land Use*, Article, III *Zoning*, Division 26, *Shoreland Regulations* and the City of South Portland enacted Chapter 27, *Zoning*, Article XII, *Shoreland Area*, pursuant to Section 438-A of the state statutes. Consistent with state law, these ordinances establish shoreland protection areas. The limits of the shoreland protection areas are shown on **Exhibit 1U**.

DEPARTMENT OF TRANSPORTATION ACT: SECTION 4(f)

Section 4(f) of the *Department of Transportation Act of 1966* (Title 49 United States Code [USC], Section 303) protects against the loss of significant publicly owned parks and recreation areas, publicly owned wildlife and waterfowl refuges, and historic sites as a result of federally funded transportation projects. The Act states that a project that requires the "use" of such lands shall not be approved unless there is no "feasible and prudent" alternative and the project includes all possible planning to minimize the harm from such use. As outlined in FAA Order 1050.1E, use within the meaning of Section 4(f) includes not only actual physical takings of such lands but also adverse indirect impacts, also referred to as a constructive use.

Four properties within the vicinity of the airport environs meet the definition of a property protected under Section 4(f), each of which is included on the National Register of Historic Places.

Four properties within the vicinity of the airport environs meet the definition of a property protected under Section 4(f), each of which is included on the National Register of Historic Places. The listed properties include: the Tate House (the oldest building in Portland) and the Stroudwater Historic District located northwest of the approach end of Runway 18; the State Reform School/Brick Hill Historic District to the southwest of the approach end of Runway 36; and the Chapman, Leonard Bond House, located northeast of the approach end of Runway 18. The location of these properties is shown on **Exhibit 1U**.

Other properties within two miles of the airport potentially protected under Section 4(f) include: Dougherty Field (northeast); South Portland Municipal Golf Course (south); Fore River Sanctuary (north); and Capisic Pond Park (north). There are no wildlife or waterfowl refuges or national or state significance within two miles of the airport.

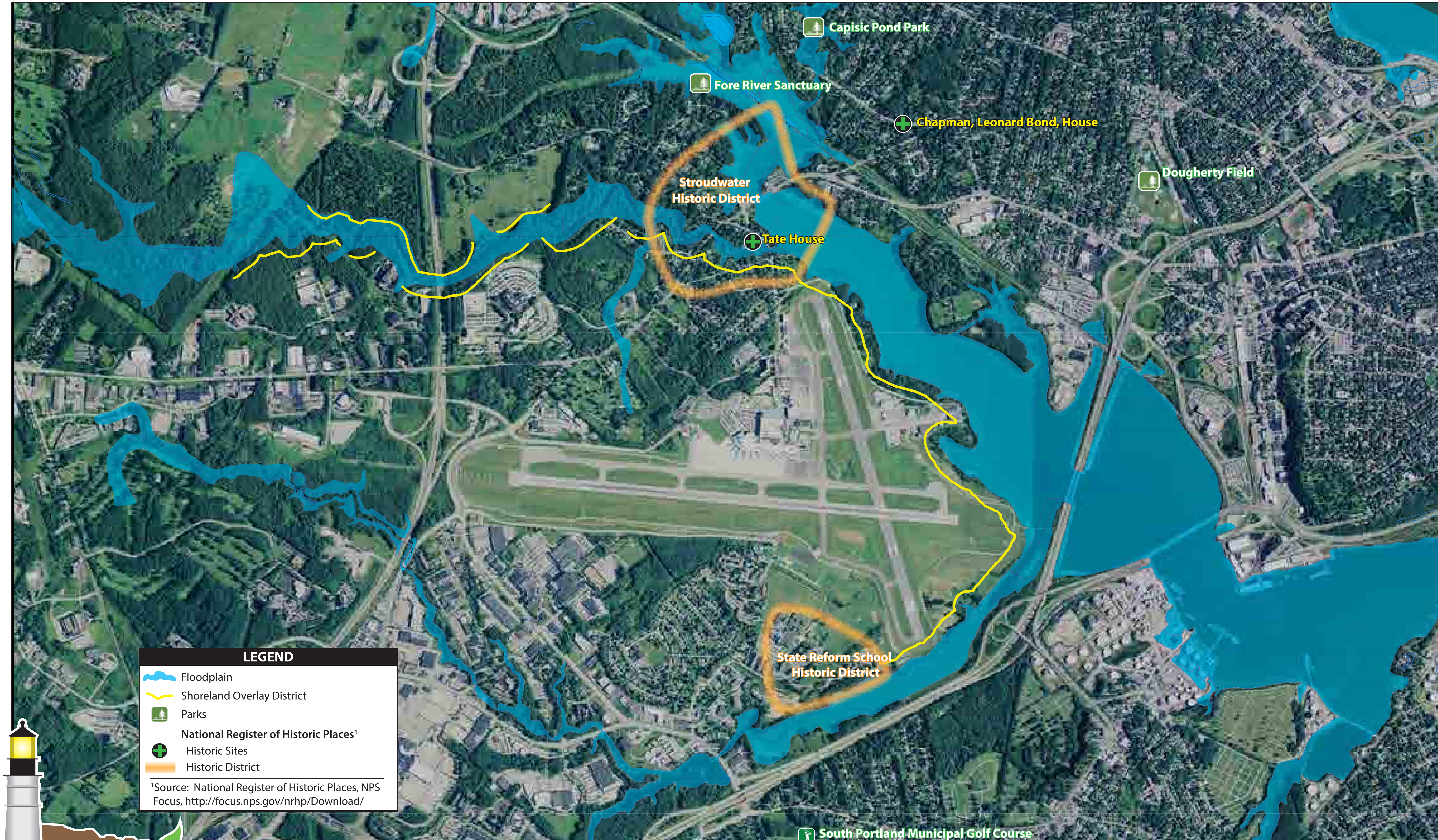
Capisic Pond Park
Fore River Sanctuary
Chapman, Leonard Bond, House
Dougherty Field
Stroudwater Historic District
Tate House
State Reform School Historic District
South Portland Municipal Golf Course
LEGEND
Floodplain
Shoreland Overlay District
Parks
National Register of Historic Places[1]
Historic Sites
Historic District
[1]Source: National Register of Historic Places, NPS Focus, http://focus.nps.gov/nrhp/Download/

Exhibit 1U

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FISH, WILDLIFE AND PLANTS

Section 7 of the *Endangered Species Act* (ESA), as amended, applies to federal agency actions and sets forth requirements for consultation to determine if the Proposed Action "may affect" a federally endangered or threatened species. If an agency determines that an action "may affect" a federally protected species, then Section 7(a)(2) requires each agency to consult with the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS), as appropriate, to ensure that any action the agency authorizes, funds, or carries out is not likely to jeopardize the continued existence of any federally listed endangered or threatened species, or result in the destruction or adverse modification of critical habitat. If a species has been listed as a candidate species, Sec. 7 (a)(4) states that each agency must confer with the USFWS and/or NMFS.

A Trust Resources List for the project area was prepared using the USFWS *Information, Planning, and Conservation* System (IPaC). The IPaC report indicates that one candidate species, the New England Cottontail rabbit, should be considered in future effects analyses for projects at the airport. This species is also classified as endangered under the *Maine Endangered Species Act*. Prior to previous projects at PWM, field surveys for the New England Cottontail rabbit indicated the presence of habitat to support this species, which includes on-airport wetland areas discussed below. During implementation of previous improvements at the airport, portions of the New England Cottontail rabbit habitat were removed; however, some habitat for this species may still be present.

In addition to the ESA, the *Migratory Bird Treaty Act* (MBTA) is also applicable at PWM as much of the airport property constitutes habitat for birds protected under the MBTA. The IPaC report for the airport lists 14 bird species that may be affected by projects at the airport. However, vegetation at the airport is not unique from a population standpoint for those species that occur in and adjacent to the project area. Bird species that breed regularly in and adjacent to the project area are likely to be common to the region because habitats in the area are widespread and largely disturbed.

Biological surveys conducted in 2008 indicated the presence of the Upland sandpiper, which is classified as a threatened species under the *Maine Endangered Species Act*. The Portland International Jetport's ongoing vegetation maintenance program helps sustain the habitat for this grassland shorebird. Based on coordination with the Maine Department of Inland Fisheries and Wildlife, Upland sandpipers require large (greater than 150 acres) fields with open, short grass areas and prefer a mix of short and tall (less than 24-inch) grass interspersed with patches of bare ground.

FLOODPLAINS

Executive Order 11988 directs federal agencies to take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values served by the floodplains. Department of Transportation (DOT) Order 5650.2 contains DOT policies and procedures for implementing the Executive Order. Agencies are required to make a finding that there is no practicable alternative before taking action that will encroach on a base floodplain.

FEMA's Flood Insurance maps were consulted to determine potential flooding issues related to the airport. Based on information provided from the FEMA Map Service Center, PWM land is covered by Community Panels Nos. 2300510012C, 2300510013B, 2300530004C, and 2300530005C. Based on these map panels, much of the airport property is designated Zone C – Areas of Minimal Flooding. Additionally, portions of the airport property along the Fore River east of the runway system may be encompassed by the Zone AE, 100-year floodplain. The location of the 100-year floodplain is depicted on **Exhibit 1U.**

HAZARDOUS MATERIALS AND WASTE

Four primary laws have been passed governing the handling and disposal of hazardous materials, chemicals, substances, and wastes. The two statutes of most importance to the FAA in proposing actions to construct and operate facilities and navigational aids are the *Resource Conservation Recovery Act* (RCRA) (as amended by the *Federal Facilities Compliance Act of 1992*) and the *Comprehensive Environmental Response, Compensation, Liability Act* (CERCLA), as amended (also known as Superfund). RCRA governs the generation, treatment, storage, and disposal of hazardous wastes. CERCLA provides for cleanup of any release of a hazardous substance (excluding petroleum) into the environment.

According to the EPA's EJView website, seven hazardous waste generators regulated under the RCRA are located on airport property. These sites are required to report to state environmental agencies because they generate, transport, treat, store, or dispose of hazardous waste. The EJView website does not indicate the presence of any Superfund or Brownfield sites at or within two miles of PWM.

HISTORICAL, ARCHITECTURAL, ARCHAEOLOGICAL AND CULTURAL RESOURCES

The *National Historic Preservation Act of 1966* (NHPA), as amended, and the *Archaeological and Historic Preservation Act of 1974* provide guidance for determination of a project's environmental impact to historic and cultural resources. Section 106 of the NHPA, as amended, requires federal agencies to take into account the effects of their undertakings on historic properties and determine if any properties in, or eligible for inclusion into, the National Register of Historic Places (NRHP) are present in the area. In addition, it affords the Advisory Council on Historic Preservation a reasonable opportunity to comment. The historic preservation review process mandated by Section 106 is outlined in regulations issued by the Council.

As previously discussed, four properties listed on the National Register of Historic Places are within two miles of the airport. These properties, located outside the airport property boundary, are depicted on **Exhibit 1U**. In conjunction with the November 2009 *Final Environmental Assessment for Proposed Airfield and Terminal Area Improvements at Portland International Jetport*, two archaeological surveys were conducted. In October 2007, a walkover survey was conducted in areas within the limits of disturbance for airport improvements that have since been completed. During the walkover survey, no potential Euroamerican archaeological sites were observed. The walkover survey, however, did identify a wharf, most likely associated with the State Reform School, located south of the approach end of Runway 36. The wharf site is now included in the Maine Historical Site Inventory as the Portland Jetport Wharf, ME 402-012.

Further investigation of two sites initially identified in a 2002 Phase I archaeological survey was conducted as part of a Phase II study in 2007. The survey area is south of Runway 18-36 in an area noted to have potential precontact archaeological resources. During the Phase II survey, precontact resources were recovered; however, they were diffusely scattered and maintained no stratigraphic integrity. The Maine Historic Preservation Commission concurred with the finding that no further archaeological investigation is necessary at these sites and stated that the two sites are not eligible for listing in the National Register.

NOISE AND COMPATIBLE LAND USE

An airport's compatibility with surrounding land uses is usually associated with the extent of the airport's noise impacts. Airport projects, such as those needed to accommodate fleet mix changes, an increase in operations at the airport, or air traffic changes, are examples of activities which can alter noise impacts and affect surrounding land uses. The FAA established noise thresholds for the evaluation of potential impacts associated with proposed development projects at airports. Additionally, FAA provides funding through the 14 CFR Part 150 Airport Noise Compatibility Planning program. PWM has participated in this program, most recently updating its Noise Compatibility Program in 2006. Through continued noise abatement efforts, PWM has established the airport's noise hotline and a system for receiving complaints. Additionally, the airport has established a Noise Advisory Committee by order of the Portland City Council. The Noise Advisory Committee, established in 1988, reviews feedback on noise abatement projects and provides overview for implementation of the airport's noise abatement programs. PWM also encourages airport operators to use voluntary flight procedures to reduce noise impacts within the vicinity of the airport.

WATER QUALITY

According to the EPA's online MyWATERs Mapper and State of Maine's 2012 Integrated Water Quality Monitoring and Assessment Report, the nearest *Clean Water Act* Section 303(d) impaired water is Stroudwater River, located north of the airport. The impairment results from elevated dissolved oxygen levels likely caused by post-development erosion and sedimentation.

The State of Maine requires facilities discharging storm water associated with industrial activity to obtain a Maine Pollutant Discharge Elimination System (MEPDES) permit. The airport is currently operating under Maine's *Multi-Sector General Permit for Stormwater Discharge Associated with Industrial Activity* (MSGP) Permit Number MER05B838. This general permit provides authorization for point source discharges of storm water associated with industrial activity to surface water in the state (including direct discharges to surface water in the state and discharges to municipal separate storm sewer systems). As a requirement of this permit, the airport has prepared a storm water pollution prevention plan (SWPPP), addressing sources of potential pollution and describing practices to minimize and control pollutants.

WETLANDS/WATERS OF THE UNITED STATES

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

The United States Army Corps of Engineers (USACE) regulates the discharge of dredged and/or fill material into waters of the United States, including adjacent wetlands, under Section 404 of the *Clean Water Act*.

As outlined within FAA Orders 1050.1E and 5050.4B, a significant impact to wetlands will occur when the Proposed Action causes any of the following:

- The action will adversely affect the function of a wetland to protect the quality or quantity of municipal water supplies, including sole source, potable water aquifers.

- The action will substantially alter the hydrology needed to sustain the functions and values of the affected wetland or any wetlands to which it is connected.

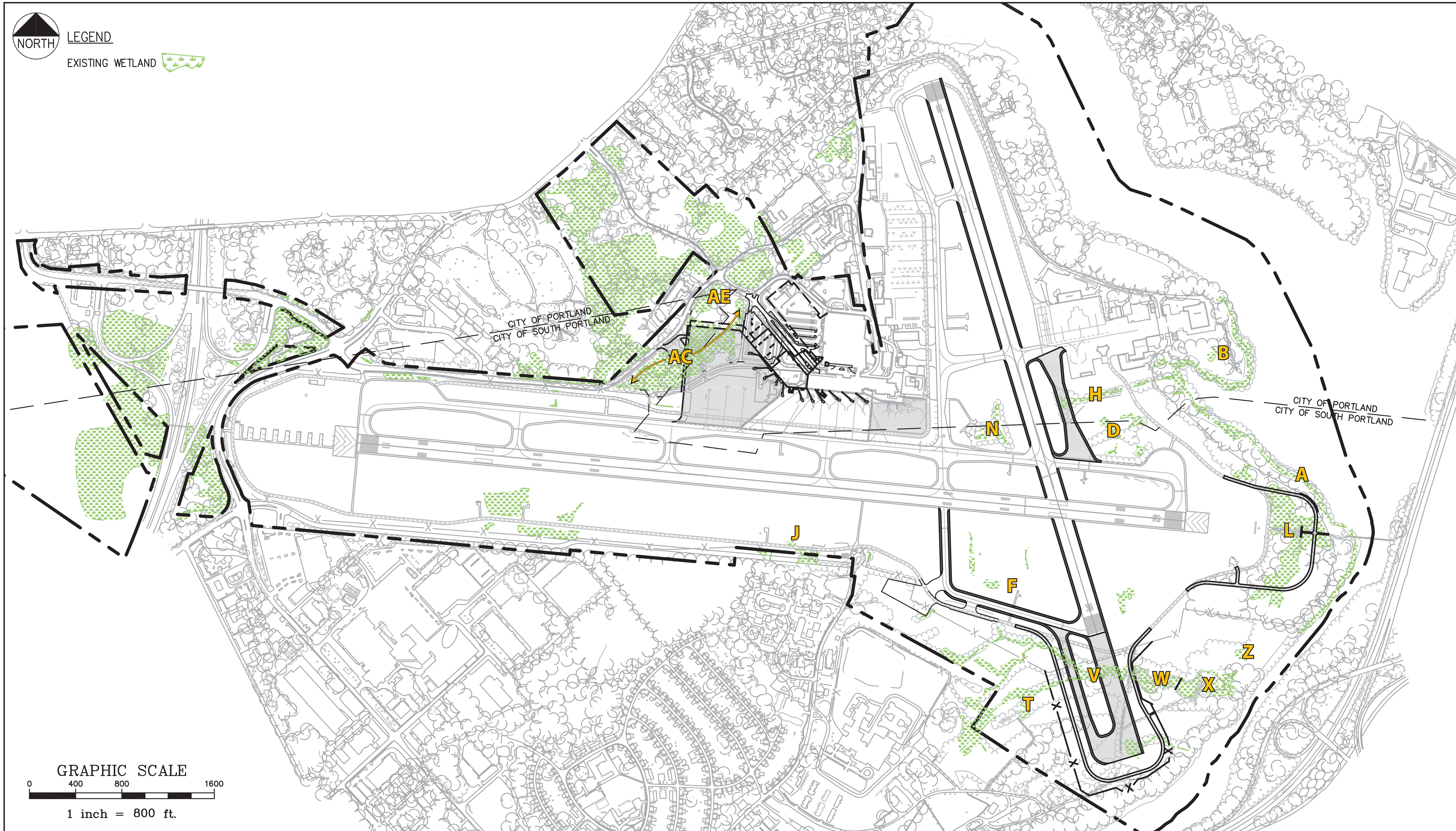
- The action will substantially reduce the ability of the affected wetland to retain floodwaters or storm-associated runoff, thereby threatening public health, safety, or welfare.

- The action will adversely affect the maintenance of natural systems that support wildlife and fish habitat or economically important timber, food, or fiber resources in the area or surrounding wetlands.

- The action will be inconsistent with applicable state wetland strategies.

Freshwater and tidal wetlands at PWM were field-delineated based on the 1987 *U.S. Army Corps of Engineers Wetlands Delineation Manual* during four separate periods between 1991 and 2007. The location of these wetlands, delineated for a 2008 *Natural Resource Protection Act* application, is depicted on **Exhibit 1V**. **Table 1K** summarizes the wetland type and wetland functional value. This information was prepared prior to implementation of improvements which were the subject of the *Final Environmental Assessment for Proposed Airfield and Terminal Area Improvements at Portland International Jetport*, November 2009. Based on wetland delineation described above, a total of 13.07 acres of wetlands were impacted by implementation of PWM's *Wildlife Hazard Management Plan*, Runway 18/36 extension,

PWM Portland International Jetport



DH DeLuca-Hoffman Associates, Inc.

DRAWN:	LECJ	DATE:	MAY 2008
DESIGNED:	DDA	SCALE:	1" - 800'
CHECKED:	DDA	JOB NO.	2743
FILE NAME:	2743-SP		

PORTLAND INTERNATIONAL JETPORT
ENVIRONMENTAL ASSESSMENT AND
REQUIRED ENVIRONMENTAL PERMITS

OVERALL WETLAND FIGURE

Exhibit 1V
EXISTING WETLANDS

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cargo facility improvements and terminal area improvements. These impacts occurred in wetlands AC, AE, H, L, S, W, and V.

TABLE 1K
Summary of Wetland Characteristics
Portland International Jetport

Wetland	Wetland Type [1]	Wetland Function/Value(s) [2]
A	E2EM1 (Fore River)	FFA, FSH, PE, SS, WLH, R, A
D	Mowed (airfield) PEM2	Surface water conveyance
E	Mowed (airfield) PEM2 (isolated)	ESH
F	Mowed (airfield) PEM2 (isolated)	ESH
H	Drainage ditch PEM1	Surface water conveyance
L	PEM1 (wildlife hazard) / PSS1	WLH, ESH (PSS portion)
N	PSS1	Surface water conveyance
S	Mowed PEM2	WLH
T (B)	PEM1	STPR, WLH
V (D)	PEM1	STPR, NRRT, WLH
W (E)	POWh	STPR, NRRT, WLH, A
X (F)	PEM1	STPR, NRRT, WLH, A
Y (G)	E2EM1 (Long Creek)	FFA, FSH, PE, SS, WLH, R, A
Z (H)	PSS1 (isolated)	WLH
AC	PEM1/PSS1	STPR, WLH
AE	PF01 (now isolated)	WLH

[1] Wetland types from USFWS *Classification of Wetlands and Deepwater Habitats* (Cowardin et al, 1979):

E2EM – Estuarine, inter-tidal, persistent emergent
POWh – Palustrine, open water, diked/impounded
PEM1 – Palustrine, persistent emergent
PEM2 – Palustrine, non-persistent (mown) emergent
PSS1 – Palustrine, broad-leaved deciduous scrub shrub
PFO1 – Palustrine, broad-leaved deciduous forested

[2] Based on the September 1999 supplement to the New England Division of the Corps Descriptive Approach to assessing wetland functions and values described in The Highway Methodology Workbook. Functions and values present in wetlands at PWM include: FFA – floodflow alteration; F/SH – fish/shellfish habitat; STPR – sediment, toxicant, pollutant retention; NRRT – nutrient removal/retention/transformation; PE – production export; SS – sediment/shoreline stabilization; WLH – wildlife habitat; R – recreation; A – visual quality/aesthetics; ESH – threatened/endangered species habitat. Wetland functions and values are described in greater detail in Attachment 12 of the NRPA application.

Source: Natural Resources Protection Act Application, October 2008, Updated March 12, 2009

WILD AND SCENIC RIVERS

The nearest Wild or Scenic Rivers, as designated by the *Wild and Scenic Rivers Act*, is the Lamprey River, located approximately 50 miles southwest of the airport in New Hampshire.

DOCUMENT SOURCES

A variety of sources were used during the inventory process. The following listing reflects a partial compilation of these sources. In addition, considerable information was provided directly to the consultant by Portland International Jetport.

Airport/Facility Directory Northeast U.S., U.S. Department of Transportation, Federal Aviation Administration, National Aeronautical Charting Office. Effective July 24, 2014 – September 18, 2014.

New York Aeronautical Chart, U.S. Department of Transportation, Federal Aviation Administration, National Aeronautical Charting Office. Effective May 1, 2014 – November 13, 2014.

U.S. Terminal Procedures, North Central U.S., U.S. Department of Transportation, Federal Aviation Administration, National Aeronautical Charting Office. Effective August 21, 2014 - September 18, 2104.

National Plan of Integrated Airport Systems (NPIAS), U.S. Department of Transportation, Federal Aviation Administration, 2013-2017.

Portland International Jetport Master Plan Update – Final Report, 2008. Prepared by Coffman Associates.

A number of internet websites were also used to collect information for the inventory chapter. These include the following:

Portland International Jetport:
http://www.portlandjetport.org/

MDOT- Aviation Division:
http://www.maine.gov/mdot/aviation/

Various FAA Websites:
Historical FAA Grants:
http://www.faa.gov/airports/aip/grant_histories/
Terminal Area Forecast:
http://aspm.faa.gov/main/taf.asp
TFMSC:
https://aspm.faa.gov/tfms/sys/main.asp
FAA 5010 Data:
http://www.airnav.com and http://www.gcr1.com/5010Web
New England Regional Aviation System Plan (RASP):
http://www.faa.gov/airports/new_england/planning_capacity/airport_system_plan/

U.S. Census Bureau:
http://www.census.gov

U.S. Bureau of Labor Statistics:
http://www.bls.gov

City of Portland:
http://www.portlandmaine.gov/

City of South Portland:
http://www.southportland.org/

Cumberland County:
http://www.cumberlandcounty.org/

EPA, Currently Designated Nonattainment Areas for All Criteria Pollutants:
http://www.epa.gov/oar/oaqps/greenbk/ancl3.html

City of Portland Zoning Ordinance:
http://portlandmaine.gov/DocumentCenter/View/3430

City of South Portland Code of Ordinance:
http://www.southportland.org/files/1614/0908/5561/CH_27___Zoning_08-26-14.pdf

U.S. Fish and Wildlife Service Information, Planning, and Conservation System:
http://ecos.fws.gov/ipac/

FEMA Map Service Center:
https://msc.fema.gov/portal/

EPA MyWaters Mapper:
http://watersgeo.epa.gov/

Maine Pollutant Discharge Elimination System:
http://www.maine.gov/dep/water/monitoring/305b/2012/report-final.pdf, accessed August 2014

Maine Multi-Sector General Permit for Stormwater Discharge Associated with Industrial Activity:
http://www.maine.gov/dep/land/stormwater/multisector/active2011nois.pdf
National Wild and Scenic Rivers System:
http://www.rivers.gov/

Portland International Jetport

CHAPTER TWO

AVIATION DEMAND FORECASTS

CHAPTER TWO

AVIATION DEMAND FORECASTS

The def nition of demand that may reasonably be expected to occur during the useful life of an airport's key components (e.g., runways, taxiways, terminal buildings, etc.) is an important factor in facility planning. In airport master planning, this involves projecting potential aviation activity for at least a 20-year timeframe. Aviation demand forecasting for Portland International Jetport (PWM) will consider commercial passenger service, air cargo, based aircraft, and aircraft operational activity forecasts.

The Federal Aviation Administration (FAA) has oversight responsibility to review and approve aviation forecasts developed in conjunction with airport planning studies. In addition, aviation activity forecasts may be an important input to future benef t-cost analyses associated with airport development, and FAA reviews these analyses when federal funding requests are submitted.

The FAA will review individual airport forecasts with the objective of comparing them to its *Terminal Area Forecasts* (TAF) and the *National Plan of Integrated Airport Systems* (NPIAS). Even though the TAF is updated annually, in the past there was almost always a disparity between the TAF and master planning forecasts. This was primarily because the TAF forecasts did not consider local conditions or recent trends. In recent years, however, the FAA has improved its forecast model to be a demand-driven forecast for aviation services based upon local and national economic conditions, as well as conditions within the aviation industry.



The TAF projections of passenger enplanements and commercial operations at large, medium, and small hubs (such as the Jetport) are based on a bottoms-up approach. The domestic enplanements are forecast by generating origin and destination (O&D) market demand forecasts using the Department of Transportation's (DOT) quarterly 10 percent sample data to model passenger flow on a quarterly basis.

The O&D passenger demand forecasts are based on regression analysis using fares, regional demographics, and regional economic factors as the independent variables. The O&D forecasts are then combined with DOT T-100 segment data to generate passenger forecasts by airport pair and segment pair. The segment pair passenger forecasts are assigned to aircraft equipment in order to produce segment pair operation forecasts. The quarterly segment pair forecasts are aggregated to produce annual airport forecasts.

FAA has improved its forecast model to be a demand-driven forecast for aviation services based upon local and national economic conditions, as well as conditions within the aviation industry.

Forecasts of itinerant general aviation operations and local civil operations at FAA facilities are based primarily on time series analysis. Because military operations forecasts have national security implications, the Department of Defense (DOD) provides only limited information on future aviation activity. Hence, the TAF projects military activity at its present level except when FAA has specific knowledge of a change. For instance, DOD may announce a base closing or may shift an Air Force wing from one base to another.

As stated in FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems* (NPIAS), forecasts should be:

- Realistic;
- Based on the latest available data;
- Reflective of current conditions at the airport (as a baseline);
- Supported by information in the study; and
- Able to provide adequate justification for airport planning and development.

Given the level of effort put into the *Terminal Area Forecasts*, it was decided during project scoping that the Master Plan would utilize the activity projections of the most current TAF if reasonable. In addition, an opinion of range around each forecast will be developed as a test of the need and viability for improvements. This range will further consider socioeconomic variables, as well as sensitivities to reasonable variances in the air transportation industry such that could have an effect at the Jetport.

This forecast effort was completed during the fourth quarter of 2014. Thus, the 2013 FAA *Terminal Area Forecasts* published in January 2014 were utilized. A summary of those forecasts are presented in **Table 2A**. The following sections of this chapter will discuss the reasonableness of each forecast, as well as establish the opinion of range that will be utilized in the remainder of the master plan process. This will begin with an overview of the trends in aviation at the national level.

TABLE 2A 2013 FAA Terminal Area Forecast Portland International Jetport	2013	2015	2020	2025	2035
Enplanements					
Air Carrier	356,024	379,510	415,442	445,867	514,689
Commuter	462,810	511,129	555,882	594,272	673,280
Total	***818,834***	***890,639***	***971,324***	***1,040,139***	***1,187,969***
ANNUAL OPERATIONS					
Itinerant					
Air Carrier	16,602	19,220	21,389	25,364	34,574
Air Taxi	14,941	13,406	15,166	15,669	16,169
General Aviation	16,467	16,507	17,417	18,373	20,449
Military	479	479	479	479	479
Total Itinerant	48,489	49,612	54,451	59,885	71,671
Local					
General Aviation	3,772	3,384	3,404	3,424	3,464
Military	88	88	88	88	88
Total Local	3,860	3,472	3,492	3,512	3,552
Total Operations	***52,349***	***53,084***	***57,943***	***63,397***	***75,223***
Based Aircraft	***38***	***41***	***45***	***51***	***61***
Source: FAA TAF; January 2014					

NATIONAL AVIATION TRENDS

Each year, the FAA updates and publishes a national aviation forecast. Included in this publication are forecasts for the large air carriers, regional/commuter air carriers, general aviation, and FAA workload measures. The forecasts are prepared to meet budget and planning needs of the constituent units of the FAA and to provide information that can be used by state and local authorities, the aviation industry, and the general public. The current edition when this chapter was prepared was FAA *Aerospace Forecasts – Fiscal Years 2014-2034*, published in March 2014. The FAA primarily uses the economic performance of the United States as an indicator of future aviation industry growth. Similar economic analyses are applied to the outlook for aviation growth in international markets. The following discussion is summarized from the FAA Aerospace Forecasts.

U.S. ECONOMIC OUTLOOK

Since the beginning of the century, the commercial air carrier industry has suffered several major shocks that have led to reduced demand for air travel. These shocks include the terror attacks of September 11, 2001, periods of rising fuel prices, and the most significant global economic recession since the Great Depression. To manage this period of extreme volatility, air carriers have fine-tuned their business models with the aim of minimizing financial losses by lowering operating costs, eliminating unprofitable routes and grounding older, less fuel efficient aircraft. To increase operating revenues, carriers have initiated new services that customers are willing to purchase, and unbundled other services that were typically included in the price of a ticket such as checked bags and on-board meals. The capacity discipline exhibited by carriers and their focus on additional revenue streams bolstered the industry to profitability in 2013 for the fourth consecutive year. Going into the next decade, there is cautious optimism that the industry has been transformed from that of a boom-to-bust cycle to one of sustainable profits.

According to the FAA Forecast report, as the economy recovers from the most serious economic downturn and slow recovery in recent history, aviation will continue to grow over the long run. Fundamentally, demand for aviation is driven by economic activity. As economic growth picks up, so will growth in aviation activity. The FAA Forecast calls for passenger growth over the next 20 years to average 2.2 percent annually. In the next five years, growth is anticipated to be somewhat muted, primarily due to uncertainty that surrounds the U.S. and global economies, with most growth in passengers taking place in years six through 20.

The FAA Forecast calls for passenger growth over the next 20 years to average 2.2 percent annually.

U.S. economic performance in 2013 continued to be mixed with modest growth in real GDP and real incomes, a slowly falling unemployment rate, and oil prices and consumer inflation remaining in check. The economy grew at an average annual rate of 1.6 percent in fiscal year (FY) 2013 after expanding 2.8 percent in FY 2012. Given the uncertainty that characterized 2013, it was not surprising that growth in 2013 was lower than the previous year. GDP growth accelerated throughout the year with the negative effects of Hurricane Sandy and the expiration of the temporary payroll tax cut impacting the first and second quarters. Despite the slow growth, there were some favorable signs as the housing market continued to improve, the stock market entered record territory, and the labor market saw steady but slow improvement.

One of the unique features about the economic recovery (now in its 5th year) has been the slow improvement in the nation's unemployment rate. Since 1960, there have been five economic expansions in the U.S. that have lasted longer than 48 months, including this latest expansion. On average, for the prior four expansions, the unemployment rate four years after the peak rate in the recession prior to the expansion has declined by about one-third. If the current recovery had been similar to the prior four recoveries, the unemployment rate would be 0.6 to 0.7 points lower than the 7.5 percent in the fourth quarter of FY 2013, and 7.6 percent for all of FY 2013. The persistently high unemployment rate is thought to be a contributing factor to the slow recovery in consumer spending and aviation demand that has been experienced since 2009.

In the medium term, (the four-year period between 2015 and 2019), U.S. economic growth is projected to average 3.0 percent per year with rates ranging between 2.9 and 3.2 percent. Income growth picks up during the same period averaging 3.2 percent per year. For the balance of the forecast period, both U.S. real GDP and real income growth slow to around 2.4 percent annually. The long-term stability of U.S. economic growth depends on sustained growth in the workforce and capital stock, along with improved productivity and competitiveness.

U.S. TRAVEL DEMAND

By year end of FY 2013, the U.S. commercial aviation industry consisted of 15 scheduled mainline air carriers that used large passenger jets (over 90 seats) and 63 regional carriers that used smaller piston, turboprop, and regional jet aircraft (up to 90 seats) to provide connecting passengers to the larger carriers. Mainline and regional carriers offer domestic and international passenger service between the U.S. and foreign destinations, although regional carrier international service is confined to the border markets in Canada, Mexico, and the Caribbean. Thirty all-cargo carriers were providing domestic and/or international air cargo service at the end of 2013.

Shaping today's commercial air carrier industry are three distinct trends: (1) continuing industry consolidation and restructuring; (2) continued capacity discipline in response to external shocks; and (3) the proliferation of ancillary revenues.

The restructuring and consolidation of the U.S. airline industry that began in the aftermath of the terror attacks of September 11, 2001 continued in 2013. During the year, Southwest continued to integrate the former AirTran network into its operations as did United with the former Continental Airlines network. In 2013, American and US Airways (the third and fifth largest U.S. airlines, respectively) announced a merger agreement that, if approved, would create the world's largest airline. Consequently, when compared to 2007, 7.0 percent fewer domestic available seat miles (ASMs) were flown and 5.2 percent fewer passengers were carried domestically in 2013.

One of the most striking outcomes of industry restructuring has been the unprecedented period of capacity discipline (achieving higher passenger loads through scheduled flight and fleet mix consolidation primarily), especially in domestic markets. Between 1978 and 2000, ASMs in domestic markets increased at an average annual rate of four percent per year, recording only two years of decline. Even though domestic ASMs shrank by 6.9 percent in FY 2002, following the events of September 11, 2001, growth resumed and by 2007, domestic ASMs were 3.6 percent above the FY 2000 level. However, since 2007, ASMs in the U.S. domestic market have decreased by 7.0 percent, as the industry responded first to the sharp rise in oil prices (up 155 percent between 2004 and 2008) and then the Global Recession that followed (2009 to the present).

The 7.0 percent reduction in domestic capacity since 2007 has not been shared equally between the mainline carriers and their regional counterparts. To better match demand to capacity, the mainline carriers contracted out "thin" routes to their regional counterparts because they could provide lift at a lower cost, or simply removed the capacity altogether. In 2013, the mainline carrier group provided 8.0 percent less capacity than it did in 2007 (and carried 6.6 percent fewer passengers). Capacity flown by the regional group has shrunk by 0.4 percent over the same five-year period (with passengers carried decreasing by 0.5 percent).

The most recent trend to take hold is that of ancillary revenues. Carriers generate ancillary revenues by selling products and services beyond that of an airplane ticket to customers. This includes the un-bundling of services previously included in the ticket price, such as checked bags and on-board meals, and by adding new services, such as boarding priority. As a result of capacity reduction and the introduction of ancillary revenue sources, U.S. passenger carriers posted net profits for the fourth consecutive year in 2013.

SOCIOECONOMIC TRENDS

Local and regional forecasts developed for key socioeconomic variables provide an indicator of the potential for creating growth in aviation activities at an airport. Three variables typically useful in evaluating potential for traffic growth are population, employment, and per capita personal income (PCPI). Most of this data is readily available on an annual historic basis at the county level. These were outlined earlier in **Chapter One** for the Portland-South Portland metropolitan statistical area (MSA) which is comprised of Cumberland County.

The socioeconomic trends discussed below examine not only the MSA, but also the three immediately adjacent counties, as well as the state of Maine as a whole. These counties are those that will most affect the Jetport's activity from a regional and local economic basis.

POPULATION

Table 2B presents the historic and forecast population for the immediate four-county Portland area counties of Cumberland, York to the south, Androscoggin to the north, Sagadahoc to the northeast, as well as the state of Maine. The population of the four-county area considered to be those generating the most demand for the Jetport totaled 621,800 in 2010. This was up 5.1 percent from the 2000 census population, compared to an 8.2 percent growth the previous decade. The state has also experienced population growth in each of the last three decades, although that growth has slowed over time. The strongest growth has been in the Portland area, which has grown from 43.1 percent to 46.8 percent of the state's population.

Woods & Poole Economics prepares an updated forecast of population and other socioeconomic indicators for each county in the United States each year. The forecasts prepared in January 2014 by Woods & Poole Economics are presented in **Table 2B** for 2020 and 2035. Woods and Poole projects the four-county population to grow by 10 percent by 2020 and by 27 percent by 2035. This represents an annual average growth rate of 0.96 percent over the 25-year period. The area is projected to grow at a faster rate than the state as a whole, while growing to comprise 49.8 percent of the population.

Table 2B Socioeconomic History and Forecasts Portland Area and Maine	ACTUAL				FORECAST	
	1980	1990	2000	2010	2020	2035
POPULATION						
Portland Four-County Area						
Cumberland	216,936	243,135	265,612	281,674	312,940	365,060
Androscoggin	99,531	105,259	103,793	107,702	113,829	123,289
Sagadahoc	28,926	33,535	35,214	35,293	39,269	46,310
York	140,431	164,587	186,742	197,131	219,358	255,358
Four County Area Total	**485,824**	**546,516**	**591,361**	**621,800**	**685,396**	**790,017**
State of Maine	**1,126,800**	**1,227,920**	**1,274,932**	**1,328,361**	**1,427,459**	**1,586,253**
4-County % or State	43.1%	44.5%	46.4%	46.8%	48.0%	49.8%
EMPLOYMENT						
Portland Four-County Area						
Cumberland	128,274	181,280	212,552	222,703	261,041	332,396
Androscoggin	47,774	53,183	60,497	62,888	68,066	77,790
Sagadahoc	15,312	22,441	20,826	21,377	23,607	29,247
York	61,253	81,320	90,176	96,391	109,107	131,603
Four County Area Total	**252,613**	**338,224**	**384,051**	**403,359**	**461,821**	**571,036**
State of Maine	**552,743**	**701,004**	**785,317**	**796,339**	**893,176**	**1,075,174**
4-County % or State	45.7%	48.2%	48.9%	50.7%	51.7%	53.1%
PER CAPITA PERSONAL INCOME ($2009)						
Portland Four-County Area						
Cumberland	$21,630	$31,557	$39,176	$43,884	$50,268	$64,188
Androscoggin	$19,027	$24,414	$30,134	$34,181	$38,334	$47,517
Sagadahoc	$19,303	$27,615	$32,090	$38,796	$42,848	$51,905
York	$19,632	$26,541	$34,097	$38,070	$42,157	$51,357
Four County Area	**$20,381**	**$28,429**	**$35,563**	**$40,071**	**$45,265**	**$56,719**
State of Maine	**$18,933**	**$25,521**	**$32,118**	**$36,033**	**$40,832**	**$51,474**

Sources: U.S. Census Bureau; Woods & Poole

EMPLOYMENT

Table 2B provides similar history and forecasts for total employment. As with population, the employment in the Portland area is growing faster than employment across the state. In 2010, the four-county area employment was at 621,800 or 46.8 percent of the state employment. However, after growing 8.2 percent in the 1990s, area employment grew by just 5.1 percent in the next decade.

The forecasts indicate that the four-county area will rebound to grow at 10.2 by 2020, and by 27.1 percent over by 2035. This represents an employment growth rate similar to that of population. The projections indicate that employment will continue to grow faster in the Portland area compared to the state through 2035, growing from 50.7 percent in 2010 to 53.1 percent by 2035.

PER CAPITA PERSONAL INCOME

Table 2B follows with the history of per capita personal income (PCPI), inflation-adjusted to 2009 dollars. Statewide, inflation-adjusted PCPI grew at an average annual rate of 2.2 percent between 1980 and 2010. Over the same period, the four-county area has maintained a slightly similar annual average of 2.3 percent. The last decade of the period had a slower growth of 1.6 percent.

The projected average PCPI growth through 2035 is slightly higher for the state (1.40 percent) than for four counties (1.40).

Cumberland County has maintained the highest per capita income in the service area since 1980. The Cumberland County inflation-adjusted PCPI grew at an annual average rate of 2.9 percent between 1980 and 2010. Its PCPI is projected to grow at a 1.53 percent annual rate.

SERVICE AREA

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

The closest of these commercial service airports to PWM is the Augusta State Airport (AUG), a 59-mile drive to the northeast. It is a non-primary commercial service airport with daily flights to Boston Airport (BOS), using 9-seat aircraft. In 2013, the airport enplaned 5,798 passengers.

Knox County Regional Airport (RKD) is 83 miles northeast from PWM. In the summer of 2014, this airport had five daily flights to Boston, using 9-seat aircraft. In 2013, the airport reported 15,724 enplaned passengers making it a non-hub primary commercial service airport.

The Bangor International Airport (BGR) is located 132 miles driving distance to the northeast. This airport is served by three domestic airlines using regional jets and MD-80's. The international terminal at the airport is used by international tour and holiday carriers to clear flights into the United States. In 2013, the airport enplaned 315,139 passengers and is a non-hub primary commercial service.

Hancock County-Bar Harbor Airport (BHB) is located 165 miles driving distance to the northeast. Service is available from two airlines with 8-seat and 19-seat aircraft. Enplanements in 2013 totaled 10,292 making it a non-hub primary commercial service airport.

Northern Maine Regional Airport (PQI) in Presque Isle is 246 miles driving distance from Portland. This airport has daily flights to Boston with 34-seat turboprops. In 2013, the airport enplaned 11,488 passengers, making it also a non-hub primary commercial service airport.


LEGEND
Primary Service Area
Secondary Service Area
Commercial Service Airports
NORTH
NOT TO SCALE
CANADA
MAINE
NEW HAMPSHIRE
AROOSTOOK
SOMERSET
PISCATAQUIS
PENOBSCOT
FRANKLIN
OXFORD
KENNEBEC
ANDROSCOGGIN
CUMBERLAND
SAGADAHOC
LINCOLN
KNOX
WALDO
HANCOCK
WASHINGTON
YORK
COOS
CARROLL
BELKNAP
STRAFFORD
ROCKINGHAM
Presque Isle
Bangor
Bar Harbor
Augusta
Rockland
PORTLAND
ATLANTIC OCEAN
Fort Kent
Madawaska
Van Buren
Limestone
Caribou
Houlton
Millinocket
East Millinocket
Greenville
Lincoln
Milo
Howland
Guilford
Dover-Foxcroft
Bingham
Dexter
Milford
Old Town
Orono
Hartland
Newport
Brewer
Madison
Skowhegan
Pittsfield
Farmington
Clinton
Bucksport
Ellsworth
Mexico
Rumford
Dixfield
Wilton
Chisholm
Oakland
Waterville
Winslow
Searsport
Belfast
Winthrop
Randolph
Gardiner
Norway
South Paris
Oxford
Bridgton
Auburn
Lewiston
Fryeburg
Richmond
Wiscasset
Thomaston
Lisbon Falls
Bath
Brunswick
Freeport
North Windham
Yarmouth
Boothbay Harbor
South Portland
Saco
Old Orchard Beach
Biddeford
Sanford
Kennebunk
North Berwick
Kennebunkport
Kittery
Woodland
Calais
Machias

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

Pease International Tradeport in Portsmouth, NH is located 50 miles south of Portland. The airport is served by Allegiant which offers flights to Orlando/Sanford and Ft. Myers/Punta Gordo, Florida. In 2013, the airport enplaned 22,540 passengers.

Manchester Airport (MHT) is the closest airport with more enplanements than the Jetport. Located 105 miles to the southwest of Portland, MHT is a small hub commercial service airport with enplaned 1,190,092 passengers in 2013. The airport saw a rapid rise in traffic after Southwest Airlines began serving it in 1998; however, traffic in 2013 was down nearly 33 percent from 10 years earlier.

Boston Logan International Airport (BOS) is located 110 miles to the south of Portland. BOS is a large hub airport that enplaned over 14.8 million passengers in 2013.

The primary commercial service area, as shown on **Exhibit 2A,** is the area where air travelers would most likely choose the Jetport for air service given equal service from the airports. The secondary service area is an expanded area where the Jetport is likely to draw additional passengers given that the Jetport has a higher level of service than other airports that may serve that area. The primary service area consists of Cumberland, York, Androscoggin, and Sagadahoc Counties. The secondary area includes the remainder of Maine, plus Coos and Carroll Counties in New Hampshire.

The primary service area consists of Cumberland, York, Androscoggin, and Sagadahoc Counties.

This does not mean that the Jetport would capture all air travelers from either service area. The fact is that other airports will draw some users from the same service area, especially those airports like Boston and Manchester that provide more flights and destinations. This is referred to as leakage.

The City of Portland retained Sixel Consulting Group to conduct True Market/Leakage Studies for Portland International Jetport utilizing data from the third quarter (July-September) of 2013. One study focused on a study area comprised of the counties of Cumberland, York, and Sagadahoc in the immediate Portland area. This study primarily examined the effect of the airports in Boston and Manchester on air travelers in the primary service area of the Jetport. The study determined that the Jetport captured 64.2 percent of the originating traffic from the primary service area. Boston Logan captured 28.1 percent, while Manchester International captured 7.8 percent.

The second study focused upon an extended study area that included the Jetport's secondary service area. This examined not only the effects of Boston and Manchester, but also smaller airports in Maine on the secondary service area of the Jetport. The study determined that with the secondary service area included, the Jetport's capture share was 52.6 percent, while Boston Logan captured 23.7 percent. Bangor International captured 15.1 percent, while Manchester International captured 7.6 percent. The other commercial service airports captured a combined 1.0 percent of air travelers.

COMMERCIAL PASSENGER SERVICE FORECASTS

To determine commercial service potential at Portland International Jetport and the facilities necessary to properly accommodate present and future airline activity, two basic elements must be forecast: annual enplaned passengers and annual airline operations. Annual enplaned passengers serve as the most basic indicator of demand for commercial passenger service activity. The combination of enplanements and deplanements would equal the total passengers using the airport. The annual number of enplanements is the figure utilized by the FAA to determine entitlement funding levels for the airport.

The term "enplanement" refers to a passenger boarding an airline flight. Enplaning passengers are then described in terms of either "originating" or "connecting/transferring." Originating passengers depart a specific airport for a destination or hub airport to connect/transfer to another flight. Connecting/transferring passengers are those who have departed from another location and are using the airport as an intermediate stop. These passengers may disembark their originating flight to wait in the terminal for their next flight or could simply remain on the aircraft at an intermediary stop as a "through" passenger. Portland International Jetport and airports similar to it tend to have mostly originating passengers, while larger hubs like those in Boston, New York, and Philadelphia could have a more significant percentage of passengers who are connecting/transferring.

As indicated earlier, an important resource utilized in aviation demand forecasting is the annual FAA aviation forecasts. The most recent available version is *Aerospace Forecasts – Fiscal Years 2014-2034*, published in March 2014. The FAA forecasts a variety of aviation demand indicators on an annual basis. In the most current edition, fiscal year 2012 is presented as the baseline, with 2013 shown as an estimate. Years 2014 through 2034 are projections. Many forecasting elements utilized in this analysis will consider the history and projections presented by the FAA in its annual forecast.

FAA COMMERCIAL AIR CARRIER FORECASTS

Although the recession has been officially over for several years, in 2013 carriers continued to deal with economic uncertainties as business travel budgets remained strained, unemployment persisted, and uncertainty surrounding federal fiscal policy (expiration of the payroll tax break in January, sequestration, and a partial shutdown of the federal government) remained. In such an uncertain economic environment, industry capacity growth was restrained (up 0.8 percent in 2013), after only a 0.1 percent increase in 2012. Given the minimal increase in seats available to the traveling public, carriers were still able to raise airfares despite the slow growth in demand. Higher airfares and ancillary revenue, coupled with flat to falling fuel prices, resulted in U.S. carriers being profitable in 2013.

The FAA provides several measures for commercial airline activity in its *Aerospace Forecasts – Fiscal Years 2014-2034*. After experiencing slight growth in 2013 (up 0.8 percent), domestic system capacity (as measured in available seat miles – ASMs) was projected to increase 1.0 percent in 2014. From 2013 through 2034, domestic ASMs are projected to grow 2.0 percent annually. Mainline carrier capacity is forecast grow 0.8 percent in 2014 and 2.0 percent through 2034. Regional carrier capacity grew by 2.2

percent and is forecast to grow 2.3 percent annually through 2034. Overall domestic capacity is projected to increase at an average annual rate of 2.1 percent through 2034, which is slightly slower economic growth.

The FAA forecasts indicate that enplanements are forecast to grow slightly (up 0.6 percent) in 2014, following a 0.1 percent increase in 2013. Over the forecast period, domestic enplanements are projected to grow at an average annual rate of 1.9 percent, with mainline carriers growing at the same rate (1.9 percent). **Exhibit 2B** presents the annual historical and forecast enplanement totals for both large air carriers and commuter airlines in the U.S. as forecast by the FAA.

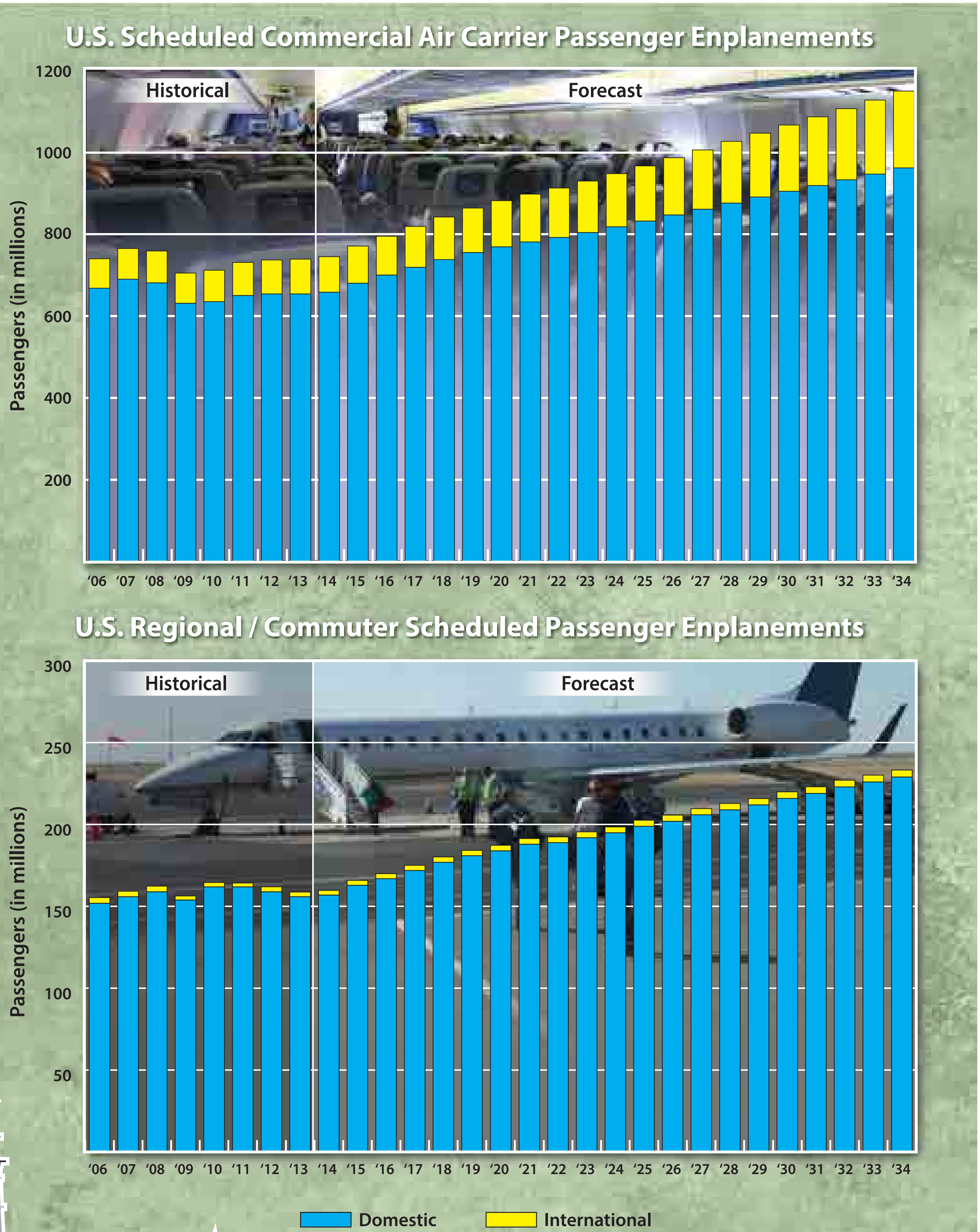
FAA COMMERCIAL AIRCRAFT FLEET FORECAST

The commercial passenger carrier fleet is undergoing transformation. The mainline carriers are retiring older, less fuel-efficient aircraft (e.g., 737-300/400/500, 757/767, and MD-80) and replacing them with more technologically advanced A319/320 and 737-700/800/900 aircraft. The regional carriers are growing their fleet of 70-90 seat regional jet aircraft and reducing their fleet of 50-seat jet aircraft. The total number of aircraft in the U.S. commercial fleet (including regional carriers) is estimated at 6,727 for 2013, a decrease of 184 aircraft from 2012. This includes 3,774 mainline air carrier passenger aircraft (over 90 seats), 740 mainline air cargo aircraft, and 2,213 regional carrier aircraft (jets, turboprops, and pistons).

The number of passenger jets in the mainline fleet is estimated to have increased by 41 in 2013. After 2013, the mainline aircraft fleet was projected to add approximately 65 aircraft annually, totaling 5,112 aircraft in 2034. The mainline narrow-body fleet (including the Embraer 190s) was projected to grow by 42 aircraft annually from 2013-2034. The wide-body fleet (including the Boeing 787 and Airbus A-350) was projected to grow by 23 aircraft annually over the same period. Mainline passenger jet aircraft are forecast to increase 1.5 percent annually through 2034.

The regional passenger aircraft fleet is estimated to have decreased by 127 aircraft in 2013, as decreases in 50-seat and smaller regional jets and turboprops outpace production of new larger regional jets. After 2013, the regional carrier fleet (turboprops and jets) is expected to decrease by 0.1 percent per year over the remaining years of the forecast period, totaling 2,141 aircraft in 2034. The number of regional jets (90 seats or fewer) is projected to grow from 1,642 in 2013 to 1,953 in 2034, an average annual increase of 0.8 percent. All of the growth in regional jets over the forecast period occurs in the larger, 70- to 90-seat aircraft category. During the forecast period, all regional jets of 50 or less seats are projected to be retired from the fleet.

Large cargo jet aircraft are forecast to grow from an estimate of 740 in 2013 to a total 1,182 aircraft in 2034. The narrow-body, cargo jet fleet is projected to increase by five aircraft per year over the 20-year forecast period as older 757s and 737s are converted to cargo service. The wide-body, cargo jet fleet is projected to increase by 18 aircraft.



Source: FAA Aerospace Forecasts, Fiscal Years 2014-2034

Exhibit 2B

JETPORT AIR SERVICE HISTORY

Table 2C provides a history of passenger enplanements at PWM since 1970. Over the past 45 years, the Jetport has seen its passenger activity grow from 104,708 in 1970, to an all-time high of 883,681 in 2008. The annual growth rate over that 38-year period averaged 5.8 percent, but the table shows how traffic has fluctuated on an annual basis.

Traffic has declined from the previous year 17 times since 1970, even though enplanements are up a net 806 percent over that period of time. A drop of 12.5 percent in 1981 was the largest single-year decline. The largest single-year increase of 52.0 percent occurred two years later in 1983.

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

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

From 1989 through 1995, passenger traffic at PWM declined in six of the seven years. Enplanements in 1995 were 561,761, or 9.3 percent below the 1988 peak. During this period, the nation experienced a recession, as well as the 1991 Gulf War. Both had an effect on the airline industry, as several airlines, many of which did not exist prior to deregulation,

The annual growth rate over that 38-year period averaged 5.8 percent

TABLE 2C
Historic Passenger Enplanements
Portland International Jetport

Year	Annual Enplaned	% Change
1970	104,708	NA
1971	115,137	10.0%
1972	133,571	16.0%
1973	144,792	8.4%
1974	149,920	3.5%
1975	171,715	14.5%
1976	189,817	10.5%
1977	205,498	8.3%
1978	240,340	17.0%
1979	286,977	19.4%
1980	278,427	-3.0%
1981	243,724	-12.5%
1982	238,525	-2.1%
1983	362,500	52.0%
1984	490,867	35.4%
1985	525,489	7.1%
1986	602,933	14.7%
1987	604,628	0.3%
1988	619,934	2.5%
1989	604,066	-2.6%
1990	565,180	-6.4%
1991	555,488	-1.7%
1992	607,157	9.3%
1993	595,642	-1.9%
1994	573,390	-3.7%
1995	561,761	-2.0%
1996	570,395	1.5%
1997	610,545	7.0%
1998	653,193	7.0%
1999	681,122	4.3%
2000	673,153	-1.2%
2001	627,344	-6.8%
2002	629,400	0.3%
2003	629,085	-0.1%
2004	689,174	9.6%
2005	732,504	6.3%
2006	710,671	-3.0%
2007	828,595	16.6%
2008	883,681	6.6%
2009	878,670	-0.6%
2010	855,198	-2.7%
2011	839,821	-1.8%
2012	816,054	-2.8%
2013	843,944	3.4%

went into bankruptcy. While some airlines did turn their fortunes around under bankruptcy protection, others did not. Some merged or were acquired by other airlines, while others ceased operations permanently.

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

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

Enplanement levels remained relatively flat through 2002 and 2003. In June 2004, traffic levels began to rise in relation to the previous year. This coincided with the initiation of service at PWM by regional discount carrier Independence Air. Traffic continued to grow the remainder of the year to finish 9.6 percent above the previous year and went on to set a new all-time high of 732,504 enplanements in 2005. While Independence Air did not survive for an extended period, Portland was one of its most successful markets, and other airlines. After a 3.0 percent decline in 2006, discount carriers JetBlue and AirTran both initiated service to the Jetport. Traffic responded with a 16.6 percent increase in 2007, followed by a 6.6 percent increase in 2008 in spite of the start of the country's greatest recession since the Great Depression.

As the recession continued, followed by a sluggish recovery, passenger traffic at the Jetport began to feel its effects, with four consecutive years of declining passengers to 816,054 enplanements in 2012. Southwest Airlines acquired AirTran during that time and, in late 2012, announced it would continue service as Southwest Airlines in 2013. Traffic in 2013 ended decline in traffic with a 3.4 percent increase to 843,944.

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

In 2004, there were three mainline carriers serving the airport, but they boarded just 40 percent of the 689,174 passengers. Delta and US Airways remained while Northwest began serving the market. In 1994, Northwest was represented by its commuter codeshare, Northwest Airlink. While United and Continental were no longer directly serving the market, they maintained a presence with service by codesharing regional airlines. In fact, Continental Express enplaned more passengers in 2004 (52,000) than Continental did in 1994 (46,294). Independence Air, a low-fare regional airline with no affiliation to a major airline, began service in June 2004 and boarded 35,565 passengers. With Independence Air's demise, AirTran and JetBlue entered the Portland market. Air Canada entered the market from 2009 until 2013.

With the mergers and commuter codesharing, all traffic at the Jetport over the past eight years can be attributed to six airlines as depicted on **Exhibit 2C.** Moving forward, the Jetport is served by the four largest airlines in the U.S., as well as discount carrier JetBlue.

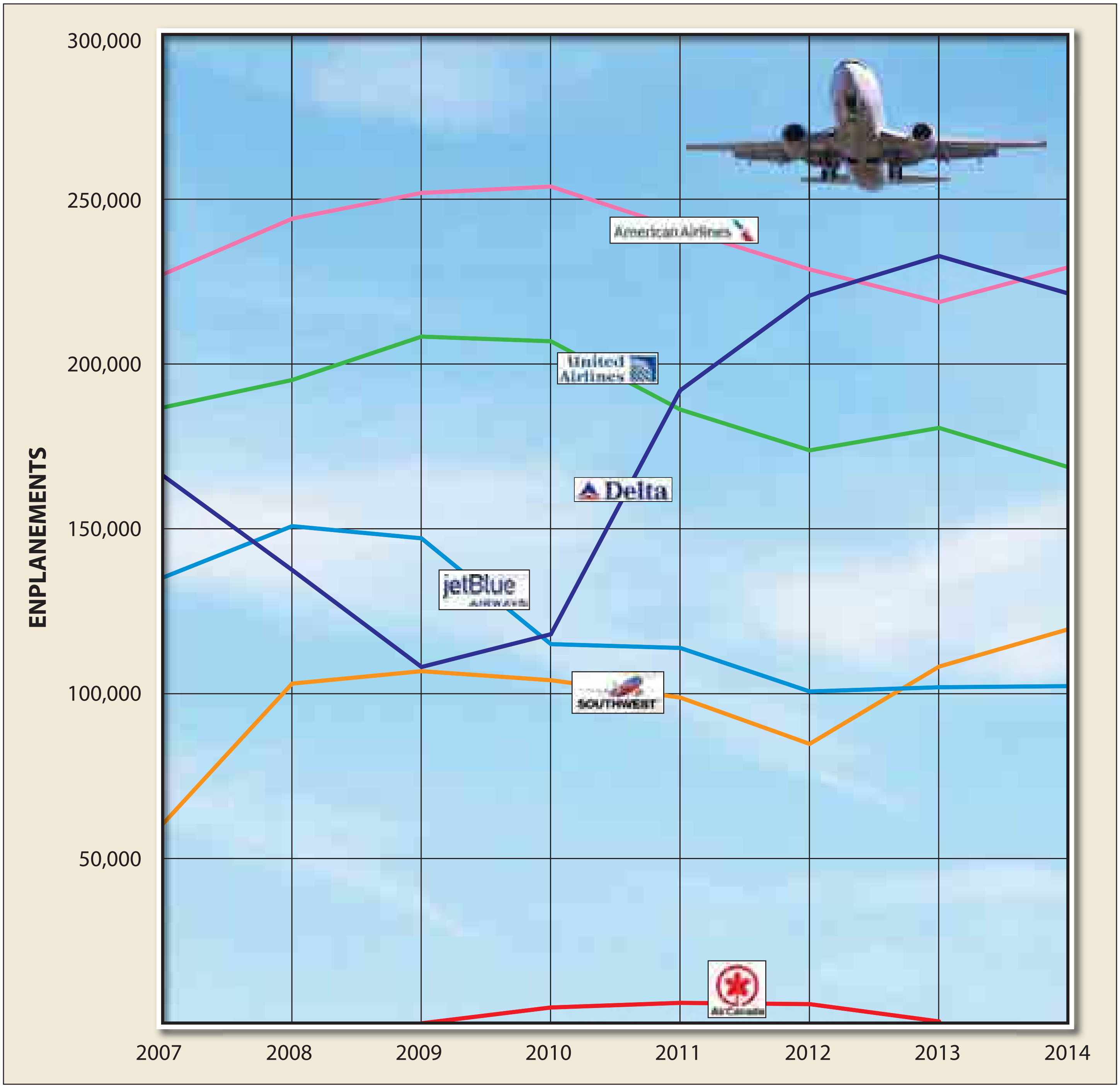
The origins and destinations of PWM air travelers have changed somewhat over the last 20 years. **Table 2D** examines the changes in the top 20 destinations between 1994, 2004, and 2013.

TABLE 2D
Top Twenty True Origin-Destination Markets
Portland Catchment Area

Market	1994	Market	2004	Market	2013
1. New York	83,720	1. Washington/Balt.	120,500	1. Washington/Balt.	146,085
2. Philadelphia	57,240	2. New York	100,070	2. New York	130,164
3. Chicago	49,940	3. Orlando	51,500	3. Orlando	75,011
4. Orlando	41,720	4. Chicago	50,440	4. Chicago	66,238
5. Washington/Balt.	40,220	5. Atlanta	50,380	5. South Florida	55,004
6. Tampa	28,210	6. Tampa	38,160	6. Atlanta	50,471
7. Atlanta	26,080	7. Philadelphia	36,390	7. Tampa	45,761
8. Boston	21,400	8. Fort Myers	29,030	8. Los Angeles Basin	45,114
9. Pittsburgh	21,390	9. Fort Lauderdale	23,390	9. San Francisco Bay	44,702
10. Fort Lauderdale	18,840	10. Detroit	23,030	10. Philadelphia	39,315
11. San Francisco Bay	18,330	11. Minneapolis	22,150	11. Denver	33,997
12. Baltimore	18,060	12. Cincinnati	21,340	12. Charlotte	32,806
13. Fort Myers	16,500	13. Pittsburgh	20,820	13. Southwest Florida	26,935
14. West Palm Beach	15,980	14. Denver	20,710	14. Phoenix	26,495
15. Denver	15,450	15. San Francisco Bay	20,680	15. Minneapolis	23,695
16. Los Angeles Basin	15,240	16. West Palm Beach	20,650	16. Houston	20,294
17. Miami	14,000	17. Los Angeles Basin	17,670	17. Dallas/Ft. Worth	20,066
18. Dallas/Ft. Worth	13,650	18. Las Vegas	16,560	18. Las Vegas	19,990
19. Detroit	12,350	19. Seattle/Tacoma	16,000	19. San Diego	19,271
20. Las Vegas	11,730	20. Albany	15,950	20. Albany	19,146
Top Twenty Total	**540,050**		**715,420**		**940,560**
Total True O-D Markets	**948,720**		**1,260,340**		**1,442,618**
Top Twenty %	**56.9%**		**56.7%**		**65.1%**

In 1994, New York was the largest destination market, followed by Philadelphia and Chicago. Washington/Baltimore jumped from fifth to the top in 2004 and remained there in 2013. New York has held onto second both years. Philadelphia fell to seventh in 2004, then tenth in 2013. Orlando switched places with Chicago to be third in 2004 and 2013. Tampa and Atlanta are the other two markets that have consistently remained in the top seven.

Several Florida markets have consistently been in the top 20 destinations for PWM. In addition to Orlando and Tampa, Fort Lauderdale, Fort Myers, and West Palm Beach have remained in the top 20 destinations. In 2013, the south Florida airports were combined into one market as were the airports in southwest Florida.



LEGEND

Air Canada	JetBlue	United[3]
Delta[1]	Southwest/AirTran[2]	American[4]

[1] Delta figures include Northwest Airlines and Northwest Regionals operating until acquired then discontinued in 2010

[2] Southwest acquired AirTran and figures include AirTran Airlines opertions through early 2013

[3] United merged with Continental and figures include Continental Express Airlines which operated through 2012

[4] U.S. Airways has merged with and will go forward as American Airlines

Exhibit 2C

Table 2E provides a comparison of the number of daily flights and their non-stop destinations from PWM between 1994, 2004, and 2014. Over the past two decades, the number of scheduled daily flights has decreased from 65 in 1994 to 44 in 2014. The primary difference was in the number of flights less than 200 miles. In 1994, there were 31 flights of less than 200 miles compared to just nine in 2004, and none in 2013. In 2013, 27 of these flights were to Boston. The number of flights between 200 and 500 miles has risen slightly from 29 to 32.

Table 2E
Non-Stop Service 1994, 2004 and 2014
Portland International Jetport

	Daily Flights		
	1994	2004	2014
Less Than 200 Miles			
Albany, NY	2	4	0
Augusta, ME	1	0	0
Boston, MA	27	5	0
Providence, RI	1	0	0
Subtotal	31	9	0
Between 200 and 500 miles			
New York/Newark	19	12	15
Philadelphia, PA	4	5	6
Presque Isle, ME	2	0	0
Washington/Baltimore	4	13	11
Subtotal	29	30	32
Between 500 and 800 miles			
Charlotte, NC	0	0	1
Cincinnati, OH	0	2	0
Detroit, MI	0	2	4
Pittsburgh, PA	1	2	0
Subtotal	1	6	5
Over 800 miles			
Atlanta, GA	0	2	3
Chicago, IL	4	5	4
Minneapolis, MN	0	2	0
Subtotal	4	9	7
Total Non-Stops	65	54	44

In 1994, there were just four flights with trip lengths greater than 500 miles. Chicago was the longest haul flight at 885 miles. In 2004, there were 15 flights longer than 500 miles with the longest hauls to Minneapolis (1,132 miles) and Atlanta (1,025 miles). In 2014, the number of flights greater than 500 miles has declined slightly to 12, with Atlanta the longest haul.

Destinations in 1994 that were no longer served in 2004 included Augusta, ME; Providence, RI; and Presque Isle, ME. Destinations in 2004 that are no longer served include Albany, NY; Cincinnati, OH; Pittsburgh, PA; and Minneapolis, MN. Charlotte, NC is a current destination that was not served in 1994 or 2004. Thus, service at PWM now has fewer short-haul flights than two decades ago, but more long-haul destinations are served non-stop.

The top two destinations in 2013, Washington/Baltimore and New York/Newark, also had the most non-stops at 15 and 11, respectively.

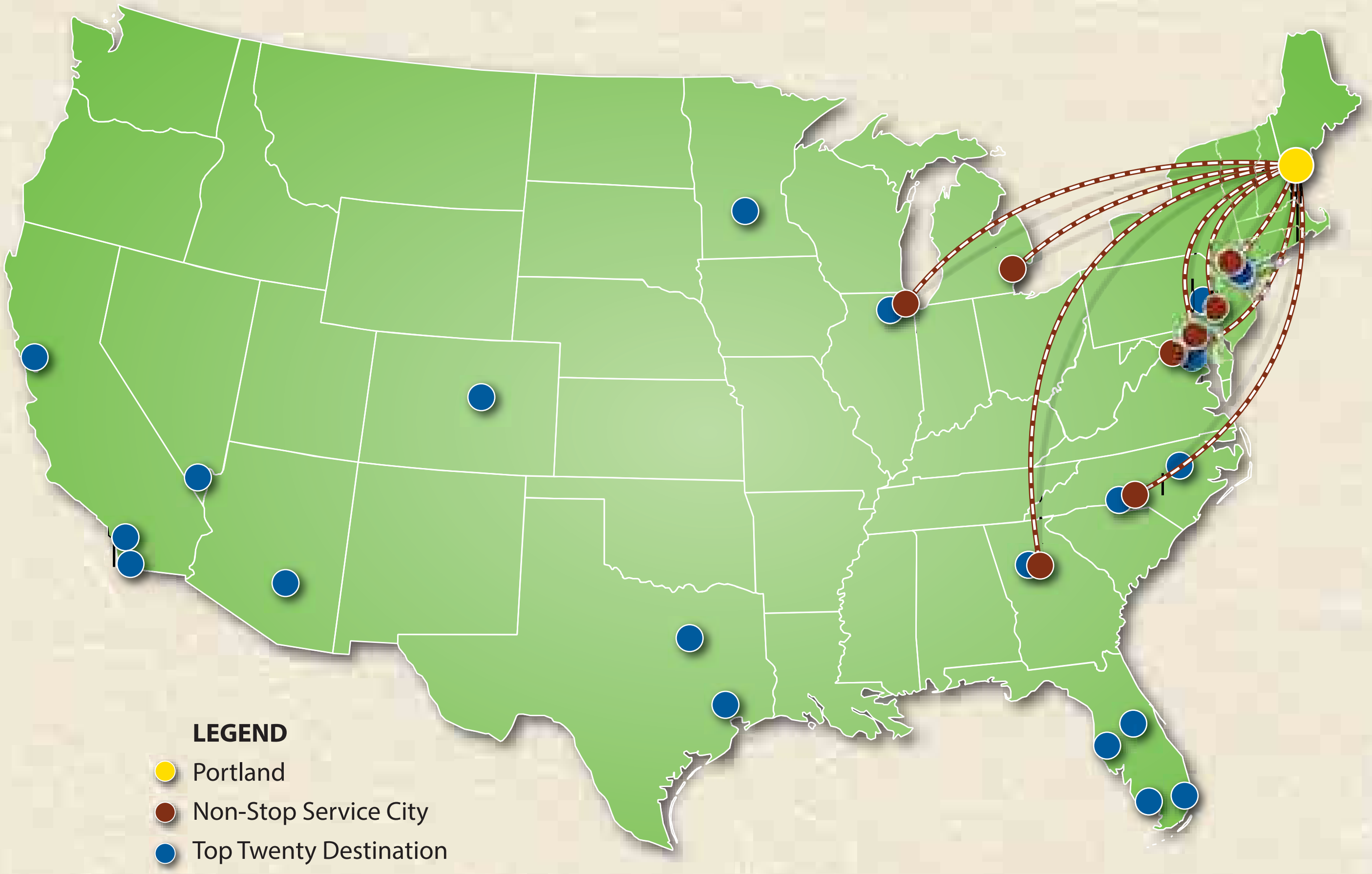
Exhibit 2D graphically compares the non-stop flight destinations from Portland International Jetport to its top 20 destinations. All of PWM's daily non-stops are to airports in its top 20 markets, including four of the top six. The top two destinations in 2013, Washington/Baltimore and New York/Newark, also had the most non-stops at 15 and 11, respectively.

ENPLANEMENT FORECAST

As discussed in this chapter's introduction, the FAA's 2013 *Terminal Area Forecasts* will be utilized in the master planning effort, if reasonable. Then an opinion of range will be established as a test of the need

PORTLAND (MSA) AREA

TOP TWENTY DESTINATIONS/NON-STOP SERVICE CITY PAIRS



Non-Stop Service Cities (2014)

- Atlanta, GA
- Charlotte, NC
- Chicago, IL
- Detroit, MI
- New York/Newark
- Philadelphia, PA
- Washington

Top Twenty Destinations (2013)

1. Washington/Baltimore
2. New York/Newark
3. Orlando/Sanford
4. Chicago
5. South Florida
6. Atlanta
7. Tampa/St. Petersburg
8. Los Angeles Basin
9. San Francisco Bay
10. Philadelphia
11. Denver
12. Charlotte
13. Southwest Florida
14. Phoenix/Mesa
15. Minneapolis
16. Houston
17. Dallas/Ft. Worth
18. Las Vegas
19. San Diego
20. Raleigh/Durham

Exhibit 2D

TOP TWENTY DESTINATIONS/
NON-STOP SERVICE CITY PAIRS

and viability of future improvements. Thus, this is the first step involved in reviewing the forecast in comparison to actual activity, as well as projections industry and socioeconomic activity to determine reasonableness. After that comes consideration of the effects of any potential new factors that could impact the forecasts, such as changes in the socioeconomic climate or the effects of changes in air carrier services.

Other than the TAF projections, the last forecast prepared for the Jetport was from the 2008 Master Plan, which utilized a base year of 2004. That forecast ran through 2025 and is presented both on **Table 2F** and **Exhibit 2E**. A second forecast depicted the potential to capture additional market share should a major discount carrier entered the market.

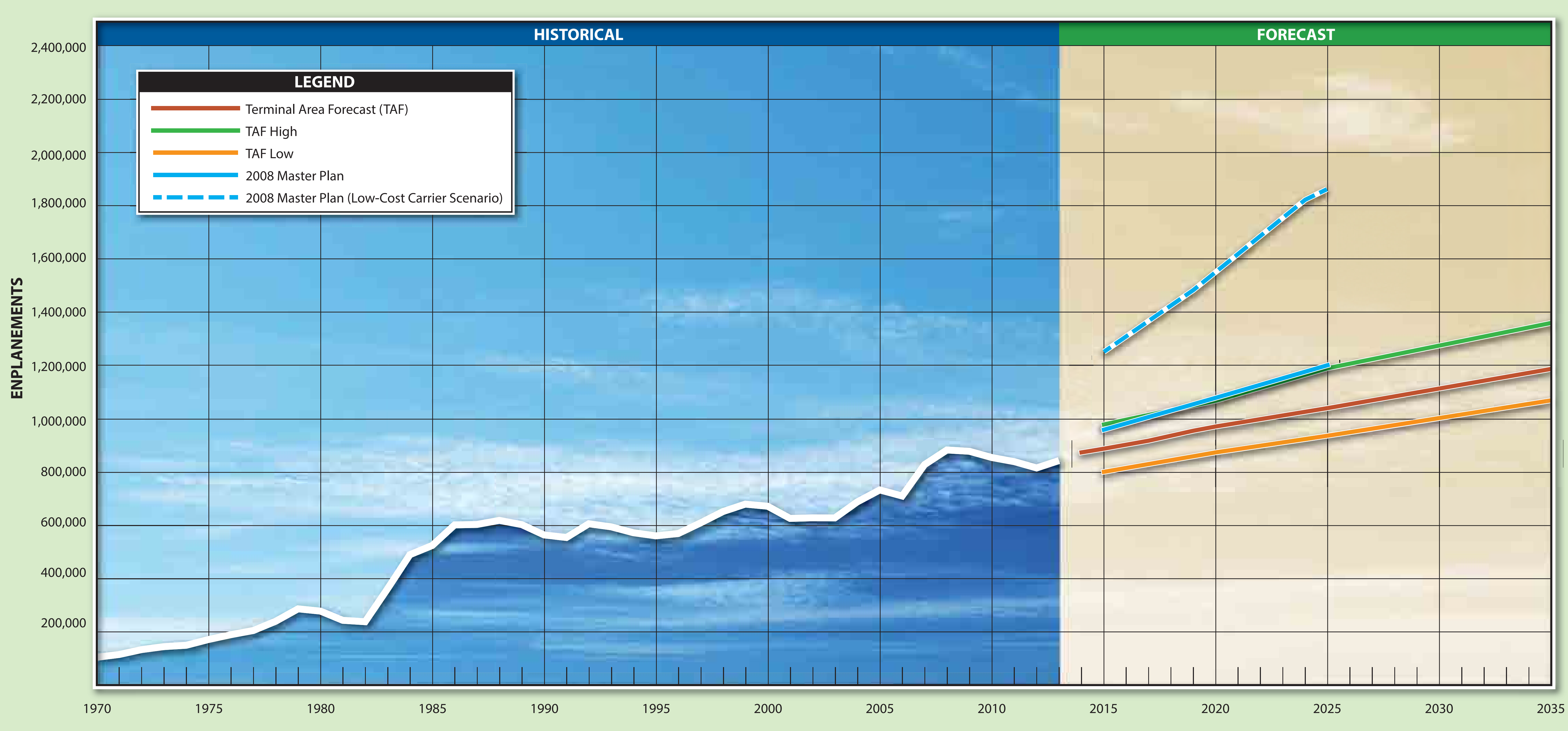
Table 2F
Enplanement Forecasts
Portland International Jetport

	2013	2015	2020	2025	2035
Actual	843,944				
2008 Master Plan		960,000	1,080,000	1,200,000	
FAA-TAF Jan. 2014		**890,639**	**971,324**	**1,040,139**	**1,187,969**
TAF Range					
High		979,703	1,068,456	1,196,160	1,366,164
Low		801,575	874,192	936,125	1,069,172

While the discount carrier forecast is well above current activity levels, the 2008 Master Plan appeared like it might be on the low side until passenger traffic began a four-year downturn in 2009 following the recession. In comparison to the TAF forecast, also depicted in the table and the exhibit, the previous master plan forecast is approximately eight percent higher than the TAF for 2015, and growing to 15 percent higher by 2035.

The table and exhibit also depict a high low ranges based upon a level of tolerance that FAA considers in evaluating and approving forecasts. A new forecast within this range will be readily approved. Outside of this range, the forecast is subject to more review and scrutiny of the rationale in approval consideration. That tolerance range is ten percent within the first five years and 15 percent through the remaining forecast period. As can be seen from the exhibit, the previous master plan forecast actually lies very close to the high range of the TAF.

A means to check the reasonableness of the TAF enplanement forecasts is to compare the Jetport's current market share of domestic enplanements in the U.S. to that of the forecasts. To check against the local factors, a travel propensity factor of enplanements per population was also examined. These are presented in **Table 2G**.


HISTORICAL
FORECAST
LEGEND
Terminal Area Forecast (TAF)
TAF High
TAF Low
2008 Master Plan
2008 Master Plan (Low-Cost Carrier Scenario)
ENPLANEMENTS
2,400,000
2,200,000
2,000,000
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
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2020
2025
2030
2035

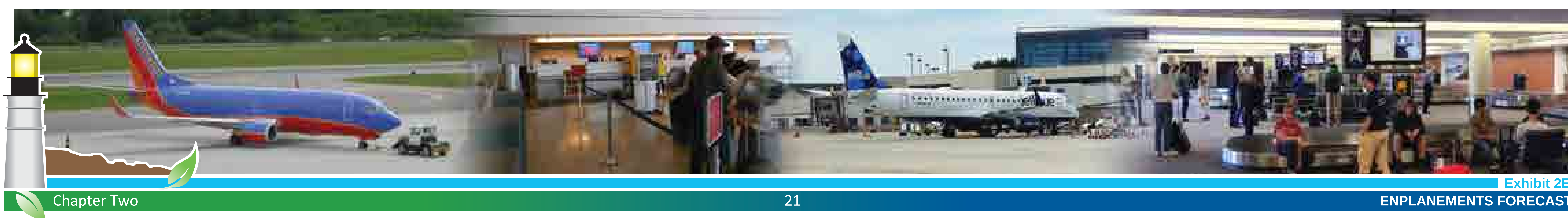

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Table 2G
Passenger Enplanement Forecast
Analysis of Reasonability
Portland International Jetport

Year	Annual Enplaned	U.S. Domestic Enplanements (millions)	PWM % Market Share	PWM Catchment Population	Enpl./Pop. Ratio
1970	104,708	146.7	0.071%	420,850	0.249
1975	171,715	186.6	0.092%	561,291	0.306
1980	278,427	287.9	0.097%	593,031	0.469
1985	525,489	369.9	0.142%	599,235	0.877
1990	565,180	456.6	0.124%	605,241	0.934
1995	561,761	531.1	0.106%	610,998	0.919
2000	673,153	641.2	0.105%	615,295	1.094
2001	627,344	626.8	0.100%	617,639	1.016
2002	629,400	574.5	0.110%	618,546	1.018
2003	629,085	587.9	0.107%	620,004	1.015
2004	689,174	627.2	0.110%	622,475	1.107
2005	732,504	669.5	0.109%	622,558	1.177
2006	710,671	668.4	0.106%	621,416	1.144
2007	828,595	690.1	0.120%	623,205	1.330
2008	883,681	680.7	0.130%	629,836	1.403
2009	878,670	630.8	0.139%	636,593	1.380
2010	855,198	635.2	0.135%	643,452	1.329
2011	839,821	650.1	0.129%	650,354	1.291
2012	816,054	653.8	0.125%	657,293	1.242
2013	843,944	654.3	0.129%	664,270	1.270
FAA-TAF					
2020	971,324	769.2	0.126%	685,396	1.417
2025	1,040,139	832.3	0.125%	720,772	1.443
2035	1,187,969	961.9	0.124%	790,017	1.504
High Range					
2020	1,068,456	769.2	0.139%	685,396	1.559
2025	1,196,160	832.3	0.144%	720,772	1.660
2035	1,366,164	961.9	0.142%	790,017	1.729
Low Range					
2020	874,192	769.2	0.114%	685,396	1.275
2025	936,125	832.3	0.112%	720,772	1.299
2035	1,069,172	961.9	0.111%	790,017	1.353

U.S. Domestic Enplanement History and Forecast: FAA Aeronautical Forecasts 2014-2034, Mar. 2005
2035 extrapolated by Coffman Associates.
Population Forecasts: Woods & Poole CEEDS 2014

The Jetport market share of domestic enplanements reached a high of 0.142 percent in 1985, but declined to 0.100 percent in 2001. By 2009, however, it had increased back to 0.139 percent. In 2013, it was at 0.129 percent.

In comparison, the TAF enplanement forecast would maintain a relatively constant market share around 0.125 percent. On the low range, the share would fall to as low as 0.111 percent. On the high range, the share would rise to 0.144 percent, similar to the highest share attained back in 1985.

Therefore, the TAF appears to be a reasonable forecast given that it maintains its domestic market share over the forecast period, while increasing the travel propensity factor at a reasonable rate.

The enplanement per departure ratio was checked against the four-county primary service area. The ratio grew regularly from 0.249 in 1970 to a high of 1.403 in 2008. By 2012, the ratio had declined to 1.242, but began to grow again in 2013.

The TAF enplanement forecast would see the ratio continue to grow to 1.417 in 2020 and 1.504 by 2035. The low range would grow far more slowly than in the past, never again reaching the peak ratio of 2008. The high range, however, would demonstrate more positive growth in the ratio to as high as 1.729 over the planning period.

Therefore, the TAF appears to be a reasonable forecast given that it maintains its domestic market share over the forecast period, while increasing the travel propensity factor at a reasonable rate. The high range allows for growth to a level that would recapture market share to a level experienced during the mid-1980s and with a stronger growth in the travel propensity factor. Whereas, the low range would have a slow growing travel propensity factor and a decline in the market share to around turn of the century levels.

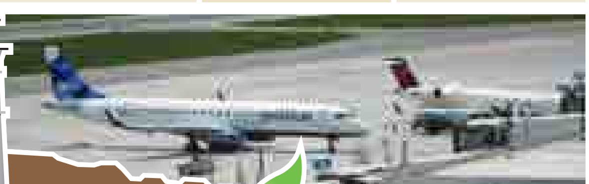
AIRLINE OPERATIONS FORECAST

The operations forecast for commercial service in the TAF follows the way that the FAA air traffic control counts aircraft. Large commercial aircraft flown by the major airlines are generally counted as air carrier operations, aircraft flown by commuter airlines are typically counted as air taxi, along with corporate-type aircraft that are flown for hire. The larger regional jet aircraft, however, are also included in the air carrier count. Air cargo operators are included in these counts as well.

The commercial service fleet mix is needed for the master plan, and can also serve as a check of the reasonableness of the TAF forecast of commercial service operations. A projection of the fleet mix for the Jetport has been developed by reviewing equipment used by the carriers serving the airport. **Exhibit 2F** depicts the aircraft fleet mix and seating capacities of the airlines serving the Jetport.

Changes in equipment, airframes, and engines have always had a significant impact on airlines and airport planning. There are many ongoing programs by the manufacturers to improve performance characteristics. These programs continue to focus on improvements in fuel efficiency. Regional jets also

AIRCRAFT TYPE	American Airlines	Delta	jetBlue Airways	Southwest	United Airlines	AVERAGE SEATING
B767-400					242	**242**
B767-300	218				181	**200**
A-321	184		190			**187**
B757-200	184	180			182	**182**
B737-900		180			167	**174**
MD-90		160				**160**
B737-800	150	160		175	152	**159**
MD-88		149				**149**
A320		150	150		138	**146**
B737-300				143		**143**
B737-700		124		143	118	**143**
MD-80	140					**140**
A-319	128	126			128	**127**
B737-500				122		**122**
B717-200		120			117	**117**
ERJ-190			100			**100**
CRJ-900		76				**76**
ERJ-175	76	76				**76**
ERJ-170		69			72	**71**
Q400					71	**71**
CRJ-700	65	65			66	**65**
ATR-72	64					**64**
CRJ-100/200	50	50			50	**50**
ERJ-145	50	50			50	**50**
Q300					50	**50**
ERJ-140	44					**44**
ERJ-135					37	**37**
Q200					37	**37**
SF-340					34	**34**
EMB-120		28			30	**29**
Beech 1900					19	**19**



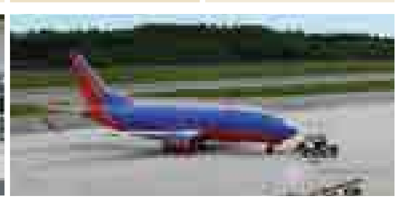


Exhibit 2F

AIRCRAFT SEATING FOR PWM CARRIERS

became a larger factor as the airlines looked for ways to reduce costs. Many airlines replaced larger commercial jets, as well as commuter turboprops on smaller emerging routes with regional jets.

Commuter airlines, such as the ones serving PWM, are transitioning to advanced turboprop aircraft and regional jets to fit their market needs. Many of these aircraft have greater seating capacity, lower operating costs, and are considerably more comfortable for the flying public. The regional jets made their initial impact in the 44- to 50-seat range. Regional jet aircraft eventually became available with as few as 37 seats and as many as 100 seats. This bridged a long-existing gap in seating capacity, making regional jets the aircraft of choice at non-hub and small-hub airports such as the Jetport.

As the price of fuel rose, however, the 50-seat and smaller regional jets have been found to be less cost-effective than their counterparts over 60 seats.

As the price of fuel rose, however, the 50-seat and smaller regional jets have been found to be less cost-effective than their counterparts over 60 seats. In fact, the higher seat capacity turboprops, such as the Q400, have been more cost-effective than the 50-seat jet carrying the same number of passengers. As a result, the 50-seat regional jets are no longer in production, and can eventually be expected to be eliminated from the fleet. This will occur over time, however, as some regional carriers will maintain them for some services, as well as in codesharing with major airlines that have restrictive scope clauses with pilot's unions that restrict codesharing on aircraft above a certain seating capacity.

In addition, the smaller seat turboprops that have been the workhorses for the small commuter markets, are also no longer in production. In fact, the only commuter turboprops still in production are ATR 42 in the 40- to 60-seat range and the Q-400 and ATR-72 above 60 seats. Unless there is a new aircraft manufactured in the range of 10 to 39 seats, smaller markets that can't support the larger turboprops could lose service from anything over nine-seats.

Table 2H compares the airline operational fleet mix by seat capacity for the last three years at PWM. The average seats per departure increased from 55.0 in 1993 to 61.0 in 2003, and to 75.7 in 2013. In 1993, over 69 percent of the airport's scheduled flights were by aircraft with 39 seats or less, and over 27 percent were by aircraft with at least 80 seats. In 2003, the flights with 80 seats or more declined to 21 percent, but the flights with 39 seats or less declined to just 34 percent. Aircraft with seating capacities between 40 and 79 grew from just three percent to 45 percent. By 2013, operations by aircraft with 39 seats or less declined to just 6 percent, including none below 20 seats. Capacities over 80 seats grew back to over 28 percent, while the 40-to 79-seat range jumped to nearly 66 percent.

This exemplifies the change to service by regional jet aircraft. By the end of 2004, Northwest and Delta (who have since merged as Delta) were the only airlines using the larger commercial jets on scheduled flights into PWM. While the larger jets have made a comeback with Southwest and American, United and JetBlue are utilizing regional jets at the Jetport almost exclusively.

Table 2H
Airline Fleet Mix and Operations Forecast
Portland International Jetport

Fleet Mix Seating Capacity	Actual			Forecast		
	1993	2003	2013	2020	2025	2035
>210	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
180-210	3.9%	0.0%	0.0%	0.0%	0.0%	0.0%
160-179	0.0%	0.0%	0.1%	0.5%	0.5%	1.0%
140-159	8.6%	9.2%	13.2%	14.0%	14.5%	15.0%
120-139	2.4%	9.3%	3.0%	3.0%	3.5%	5.0%
100-119	4.1%	2.5%	11.8%	13.0%	13.5%	15.0%
80-99	8.5%	0.0%	0.0%	0.0%	2.0%	5.0%
60-79	0.0%	4.1%	32.6%	39.0%	42.0%	46.0%
40-59	3.5%	40.5%	33.0%	25.0%	19.0%	10.0%
20-39	34.4%	24.6%	6.3%	5.5%	5.0%	3.0%
<20	34.7%	9.7%	0.0%	0.0%	0.0%	0.0%
Total	100.1%	99.9%	100.0%	100.0%	100.0%	100.0%
Average Seats per Departures	55.0	61.0	75.7	78.7	81.2	86.3
Boarding Load Factor	46.4%	64.7%	84.6%	86.0%	86.0%	86.0%
Enplanements per Departure	25.5	39.5	64.7	67.7	69.8	74.2
Annual Enplanements	595,648	629,085	843,944	971,324	1,040,139	1,187,969
Annual Departures	23,371	15,941	13,034	14,400	14,900	16,000
Annual Operations	46,742	31,882	26,068	28,800	29,800	32,000
High Range Projection						
Average Seats per Departures				80.0	84.0	90.0
Boarding Load Factor				86.6%	86.0%	86.0%
Enplanements per Departure				68.8	72.2	77.4
Annual Enplanements				1,068,456	1,196,160	1,366,164
Annual Departures				15,500	16,600	17,700
Annual Operations				31,000	33,200	35,400
Low Range Projection						
Average Seats per Departures				77.0	79.5	84.0
Boarding Load Factor				86.0%	86.0%	86.0%
Enplanements per Departure				66.7	68.4	72.2
Annual Enplanements				874,192	936,125	1,069,172
Annual Departures				13,400	13,900	14,800
Annual Operations				26,400	27,400	29,600

The boarding load factor (BLF) is defined as the ratio of passengers boarding aircraft compared to the seating capacity of the aircraft. The BLF at the Jetport has increased dramatically since 1993, growing from 46.4 percent to 64.7 percent in 2003, then jumping to 84.5 percent by 2013. This has occurred at airports across the country as airlines have worked to improve efficiency and reduce costs. In the future, boarding load factors can be expected to grow only slightly higher.

With an increase in both seating capacity and load factors, the number of passengers on each aircraft flight has also grown significantly over the past two decades. The average enplanements per departure were 25.5 in 1993. By 2003, the ratio had grown to 39.5. By 2013, the ratio had jumped to 64.0 enplanements per departure. The result has been a 44 percent reduction in commercial service flights, even while passengers have increased by over 40 percent since 1993.

Portland International Jetport can expect 60-seat and larger aircraft airlines to dominate service into the future. The 50-passenger regional jet aircraft will diminish, as RJs with higher seating capacities increase. The larger commercial jets will also see some growth in the fleet mix. Service by smaller commuter turboprops, however, is expected to continue to decline. **Table 2H** presents the fleet mix and operations forecast for Portland International Jetport under the TAF forecast.

The table also presents the operations forecast for the high and low range projections. Under these scenarios, it is anticipated that the boarding load factors will remain the same, with a slightly different mix resulting in slightly different seats per departure.

International Service Potential

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

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

The Sixel *True Market/Leakage Study* found that the Jetport's service area generates 115 international passengers a day. The Jetport's opportunities for international flights may come about due to the improved fuel efficiency, as well as the airport's proximity to East Coast international hub airports like Boston Logan. Improved fuel efficiency and performance characteristics available in the newer commercial jets allow the aircraft to travel farther from shorter runways. In addition, the limitations on available ramp space at Boston Logan and other international hubs can have some airlines looking to other airports in the region to overnight aircraft.

As a result, the Jetport does have some potential for future international service, although on a limited basis. Service would likely be by aircraft such as the Boeing 737-800, Boeing 757, or similar aircraft that would stop at Boston or another airport prior to flying overseas. The most likely destinations would be in the Caribbean or possibly Europe. Initially, service could be seasonal and/or once a week or less. With over 40,000 international passengers a year from the service area, a 30 percent capture rate could initially generate up to 12,000 annual passengers, and potentially increase to 25,000 to 30,000 in the long term as traffic grows and more market is captured. These figures will be utilized for the long range planning purposes of this master plan.

AIR CARGO

Air cargo is comprised of air freight and air mail. Air freight is handled by both passenger airlines and all-cargo airlines. Air mail is now primarily handled by an all-cargo carrier under contract with the United States Postal Service. Enplaned cargo is typically between 40 and 45 percent of the total cargo handled at PWM. **Exhibit 2G** presents the history of air cargo handled since 1995.

Until the mid-1980s, air cargo to and from the Portland area was carried almost exclusively by the passenger airlines as belly freight. That began to change with the introduction of the overnight package delivery carriers. In the mid-to-late 1980s, all-cargo carriers, such as Airborne (now DHL Worldwide), FedEx, and UPS began to serve PWM with priority overnight service. That service later expanded to include next-day, second-day, and third-day service. By 1995, the passenger airlines were handling just 13 percent of the air cargo at PWM. Since that time, belly freight tonnage has continued to decline. In 2004, belly freight comprised just 2.5 percent of the total air cargo handled at the Jetport. In 2013, it comprised less than one percent.

Exhibit 2G depicts the ups and downs of air cargo at the Jetport since 1995. Between 1995 and 2007, the air cargo handled more than doubled. Prior to 2007, the Jetport was served by several major cargo carriers. By 2009, only FedEx remained. Other carriers had elected to primarily truck cargo to and from the area to other airports. Coupled with the recession, cargo declined from its peak of 20,000 total tons to 11,000 tons in 2013.

Prior to 2007, the Jetport was served by several major cargo carriers. By 2009, only FedEx remained.

The exhibit also compares the cargo tonnage forecasts prepared for the previous master plan to the actual traffic that has occurred since. The previous forecast was in line until the all-cargo carriers were reduced to one, and the recession began to have an effect. The FAA does not include cargo handled in the TAF, so the forecast will be updated here.

The structural change in how cargo is handled in the Portland market by the cargo carriers make many of the typical forecasting methods invalid. Essentially, a smaller share of the Portland market is being handled from the Jetport.

Table 2J presents the market share of cargo tons at PWM to U.S. domestic cargo revenue ton-miles (RTMs). The market share as a percentage has declined 0.000132 percent in 2007 to just 0.000088 percent in 2010. In 2013, the market share was at 0.000099 percent. A projection of enplaned cargo based upon maintaining this percentage into the future is presented on the table and exhibit as well.

A constant market share would project the airport's cargo to grow at the industry rate for domestic air cargo. This results in a projection of 15,900 tons by 2035. A projection that recaptures the 2007 market share over the planning period would result in a high range forecast of 21,900 tons by 2035. A low range forecast would lose market share to below the 2010 percentage and result in slow growth to 13,600 tons by 2035.

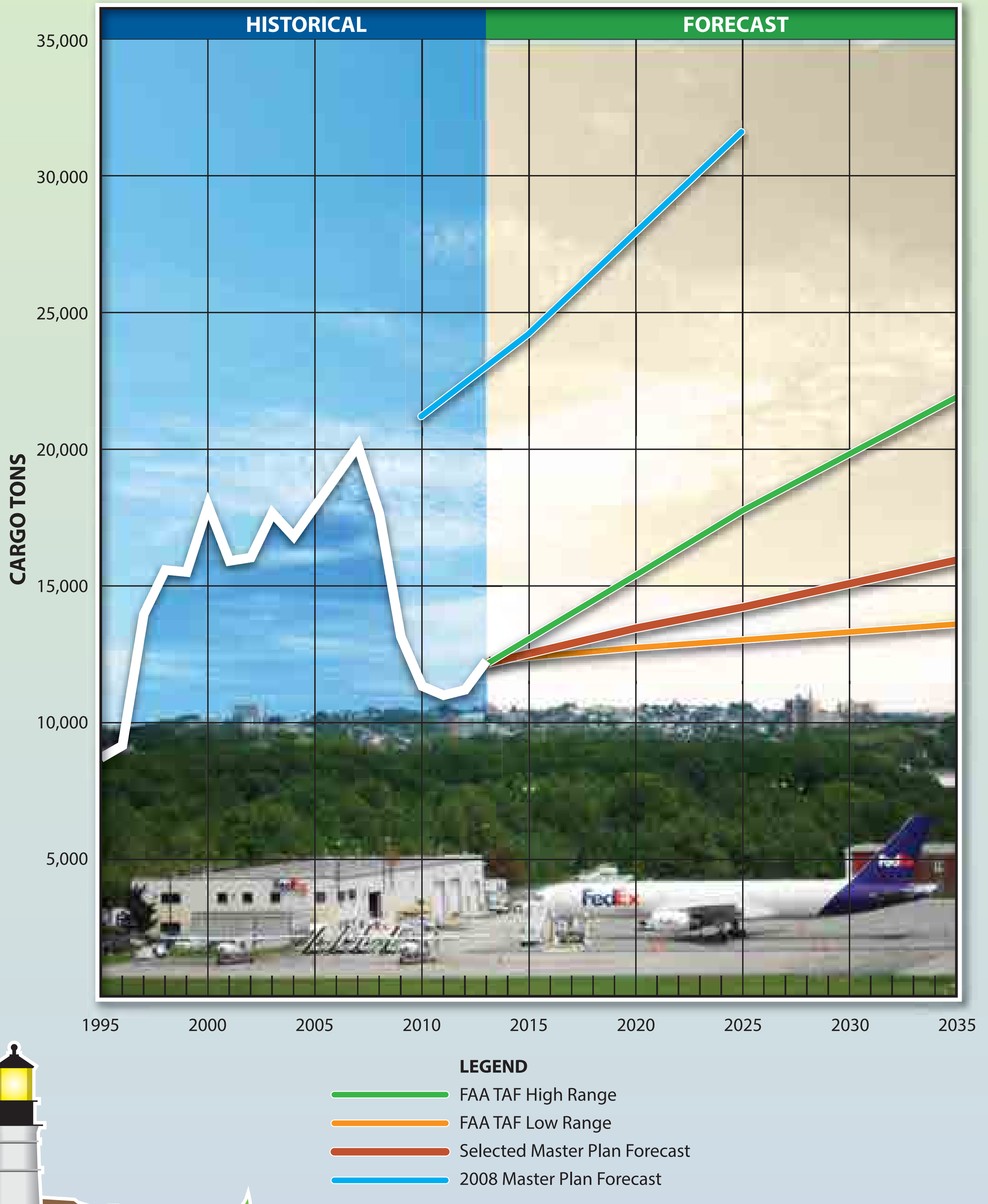

HISTORICAL
FORECAST
CARGO TONS
35,000
30,000
25,000
20,000
15,000
10,000
5,000
1995
2000
2005
2010
2015
2020
2025
2030
2035
LEGEND
FAA TAF High Range
FAA TAF Low Range
Selected Master Plan Forecast
2008 Master Plan Forecast

Exhibit 2G

Table 2J presents a full summary of the air cargo forecasts. Enplaned air cargo is forecast to remain at the past eight-year average of 42 percent of total air cargo. As can be seen from **Exhibit 2G,** the previous master plan forecast is well above the envelope of the updated range projections.

Table 2J
Air Cargo Forecasts
Portland International Jetport

Year	Enplaned Tons	Deplaned Tons	Total Cargo Tons	U.S. Domestic RTMs	Market Share %
2007	8,591	11,538	20,129	15,219.1	0.000132%
2008	7,246	10,401	17,648	14,407.6	0.000122%
2009	5,125	8,024	13,150	11,898.6	0.000111%
2010	4,838	6,498	11,337	12,823.1	0.000088%
2011	4,892	6,114	11,006	12,046.9	0.000091%
2012	4,893	6,310	11,203	12,294.8	0.000091%
2013	4,865	7,396	12,261	12,375.2	0.000099%
Master Plan Forecast					
2020	6,500	8,900	15,400	14,005.8	0.000110%
2025	7,500	10,300	17,800	14,804.6	0.000120%
2035	9,200	12,700	21,900	16,590.3	0.000132%
High Range					
2020	5,700	7,800	13,500	14,005.8	0.000096%
2025	6,000	8,200	14,200	14,804.6	0.000096%
2035	6,700	9,200	15,900	16,590.3	0.000096%
Low Range					
2020	5,300	7,400	12,700	14,005.8	0.000091%
2025	5,500	7,500	13,000	14,804.6	0.000088%
2035	5,700	7,900	13,600	16,590.3	0.000082%

ALL-CARGO OPERATIONS

As previously mentioned, Portland International Jetport is currently served by one all-cargo carrier, FedEx, and its contract carrier. FedEx utilizes commercial jet aircraft, such as the Boeing 757, the Airbus 310 and 300, while the commuter cargo carrier primarily utilizes the single-engine Cessna 208 Caravan turboprops. **Table 2K** examines the aircraft mix at the Jetport now and in the future.

As the table indicates**,** all-cargo operations totaled 3,162 in 2013. This is down from 4,168 all-cargo operations ten years ago. The load factors are currently around 22 percent for overnight cargo; carriers can readily handle 40 percent or higher before additional aircraft capacity is needed. Even as cargo volumes grow, there may be little need for additional flights unless another major cargo carrier returns to the market, or more commuter flights to smaller communities in Maine are added. One possible change could occur with the FedEx equipment over time. Most of the FedEx flights are currently utilizing the B757, which is no longer being produced. The equipment could be replaced by attrition over time.

The replacement could feasibly be with an aircraft with less cargo capacity, thereby increasing the load factors.

Table 2K also presents the operational forecasts for the all-cargo carriers, taking into account the aircraft size and load factors. As can be seen from the table, operations are anticipated to increase very slowly, and at a slower rate than the cargo tonnage. This will be primarily due to higher load factors. The high range takes into account the potential for another carrier re-establishing service at the Jetport.

Table 2K
All-Cargo Airline Operations
Portland International Jetport

Major All-Cargo Airlines Payload Capacity (lbs)	Actual 2013	Forecast 2020	Forecast 2025	Forecast 2035
>120,000 (B767)	0.0%	0.0%	0.0%	0.0%
100,000-120,000 (A300)	0.3%	0.5%	2.0%	3.0%
80,000-100,000 (B757)	18.7%	20.0%	15.0%	0.0%
60,000-80,000 (A310)	0.1%	0.0%	4.0%	18.0%
40,000-60,000 (B727)	1.2%	0.0%	0.0%	0.0%
20,000-40,000 (B737)	0.0%	0.0%	0.0%	0.0%
<20,000 (Commuter)	79.7%	79.5%	79.0%	79.0%
Total	100.0%	100.0%	100.0%	100.0%
Average Capacity (lbs.)	21,035	21,646	21,672	19,542
Load Factor	22.2%	25.0%	28.0%	35.0%
lbs./Operation	4,678	5,412	6,068	6,840
Deplaned Cargo Tons	7,396	8,900	10,300	12,700
Annual Operations	3,162	3,300	3,400	3,700
High Range Projection	3,162	3,800	3,900	4,300
Low Range Projection	3,162	3,200	3,300	3,400

GENERAL AVIATION FORECASTS

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

NATIONAL GENERAL AVIATION TRENDS

The FAA forecasts the fleet mix and hours flown for single engine piston aircraft, multi-engine piston aircraft, turboprops, business jets, piston and turbine helicopters, light sport, experimental, and others (gliders and balloons). The FAA forecasts "active aircraft," not total aircraft. An active aircraft is one that is flown at least one hour during the year. From 2011 through 2013, the FAA undertook an effort to have all aircraft owners re-register their aircraft. This effort resulted in a 6.4 percent decrease in the number of active general aviation aircraft, mostly in the piston category.

After growing rapidly for most of the decade, the demand for business jet aircraft slowed over the past few years, as the industry was hard hit by the 2008-2009 economic recession. Nonetheless, the FAA forecast calls for growth through the long-term, driven by higher corporate profits and continued concerns about safety, security, and flight delays. Overall, business aviation is projected to outpace personal/recreational use.

In 2013, the FAA estimated there were 141,325 piston-powered aircraft in the national fleet. The total number of piston-powered aircraft in the fleet is forecast to decline by 0.3 percent from 2013-2034, resulting in 131,625 by 2034. This includes -0.4 percent annually for single engine pistons and -0.5 percent for multi-engine pistons. Conversely, piston powered helicopters are forecast to grow 1.7 percent annually through 2034.

Total turbine aircraft are forecast to return to growth in 2014 and have an annual growth rate of 2.6 percent through 2034. The FAA estimates there were 29,110 turbine-powered aircraft in the national fleet in 2013, and there will be 49,565 by 2034. This includes annual growth rates of 1.6 percent for turboprops, 3.0 percent for business jets, and 3.0 percent for turbine helicopters.

While comprising a much smaller portion of the general aviation fleet, experimental aircraft, typically identified as home-built aircraft, are projected to grow annually by 1.5 percent through 2034. The FAA estimates there were 25,305 experimental aircraft in 2013, and these are projected to grow to 34,440 by 2034. Sport aircraft are forecast to grow 4.1 percent annually through the long term, growing from 2,110 in 2013 to 4,880 by 2034. **Exhibit 2H** presents the historical and forecast U.S. active general aviation aircraft.

The FAA also forecasts total operations based upon activity at control towers across the U.S. Operations are categorized as air carrier, air taxi/commuter, general aviation, and military.

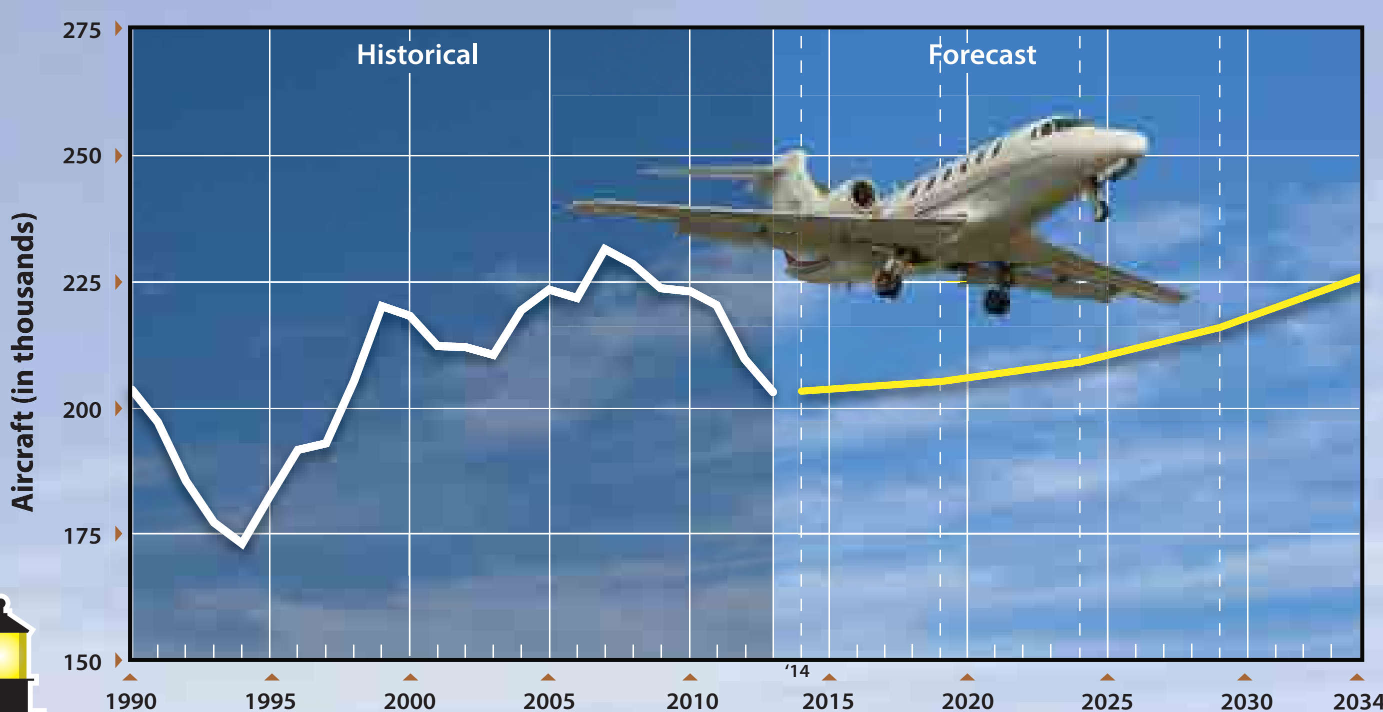
General aviation operations, both local and itinerant, declined significantly as a result of the 2008-2009 recession and subsequent slow recovery. Through 2034, total general aviation operations are forecast to grow 0.5 percent annually. Air taxi/commuter operations are forecast to grow by 0.6 percent through 2023, and then decline slightly through the remainder of the forecast period. Overall, air taxi/commuter operations are forecast to decline by 0.1 percent annually from 2013 through 2034.

General Aviation Aircraft Shipments and Revenue

As previously discussed, the 2008-2009 economic recession has had a negative impact on general aviation aircraft production, and the industry has been slow to recover. Aircraft manufacturing declined for three straight years from 2008 through 2010. According to the General Aviation Manufacturers Association (GAMA), there is optimism that aircraft manufacturing will stabilize and return to growth, which

U.S. Active General Aviation Aircraft

	2014	2019	2024	2029	2034
FIXED WING					
Piston					
Single Engine	122,755	118,700	115,660	113,895	113,975
Multi-Engine	14,180	13,890	13,500	13,155	12,890
Turbine					
Turboprop	10,160	10,355	11,000	12,375	14,370
Turbojet	12,055	13,600	15,800	18,665	22,050
ROTORCRAFT					
Piston	3,430	3,775	4,090	4,405	4,750
Turbine	7,280	8,690	10,150	11,600	13,145
EXPERIMENTAL					
	25,895	28,100	30,130	32,275	34,440
SPORT AIRCRAFT					
	2,240	2,955	3,595	4,315	4,880
OTHER					
	5,025	5,075	5,115	5,155	5,200
TOTAL	**203,020**	**205,140**	**209,040**	**215,840**	**225,700**



Source: FAA Aerospace Forecasts, Fiscal Years 2014-2034.

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

Exhibit 2H

has been evidenced since 2011. **Table 2L** presents historical data related to general aviation aircraft shipments.

TABLE 2L
Annual General Aviation Airplane Shipments
Manufactured Worldwide and Factory Net Billings

Year	Total	SEP	MEP	TP	J	Net Billings ($millions)
1994	1,132	544	77	233	278	3,749
1995	1,251	605	61	285	300	4,294
1996	1,437	731	70	320	316	4,936
1997	1,840	1043	80	279	438	7,170
1998	2,457	1508	98	336	515	8,604
1999	2,808	1689	112	340	667	11,560
2000	3,147	1,877	103	415	752	13,496
2001	2,998	1,645	147	422	784	13,868
2002	2,677	1,591	130	280	676	11,778
2003	2,686	1,825	71	272	518	9,998
2004	2,963	1,999	52	321	591	11,918
2005	3,590	2,326	139	375	750	15,156
2006	4,053	2,513	242	412	886	18,815
2007	4,276	2,417	258	465	1,136	21,837
2008	3,970	1,943	176	538	1,313	24,772
2009	2,279	893	70	446	870	19,474
2010	2,020	781	108	368	763	19,715
2011	2,120	761	137	526	696	19,097
2012	2,133	790	91	580	672	18,873
2013	2,345	900	122	645	678	23,450

SEP - Single Engine Piston; MEP - Multi-Engine Piston; TP - Turboprop; J - Turbofan/Turbojet

Source: General Aviation Manufacturers Association 2013 Statbook

Worldwide shipments of general aviation airplanes increased for the third year in a row in 2013. A total of 2,345 units were delivered around the globe, as compared to 2,133 units in 2012. Worldwide general aviation billings were also significantly higher than the previous year, similar to levels achieved prior to the 2008-2009 recession.

Business Jets: General aviation manufacturers delivered 768 business jets in 2013, as compared to 672 units in 2012. Similar to 2012, demand was stronger in 2013 for large-cabin business jets than it was for medium and light business jets.

Turboprops: In 2013, 645 turboprop airplanes were delivered to customers around the world, an increase of approximately 10 percent from the previous year's figure of 580 for equivalent reporting companies. Overall, the turboprop market has experienced significant gains since 2010.

Pistons: Piston deliveries increased from 881 units shipped from equivalent reporting companies in 2012, to 1,022 during 2013. The piston segment continued to fare best for unit deliveries among the three segments by which GAMA tracks the airplane manufacturing industry. This is due in part by deliveries to flight schools in emerging markets.

Most industry observers believe that the general aviation market, particularly the business aviation market, is in a position for sustained growth. Industry net orders are back to positive and most leading indicators continue to improve. The large jet category of the market is expected to expand faster than the other categories.

THE JETPORT'S GENERAL AVIATION SERVICE AREA

General aviation is the term used to describe a diverse range of aviation activities which includes all segments of the aviation industry, with the exception of commercial air carriers and military. General aviation is the largest component of the national aviation system and includes common activities such as pilot training, recreational flying, agricultural applications, medical support, and other business and corporate uses. General aviation aircraft can range from small glider and single engine aircraft to large turboprop and jet-powered aircraft. In fact, some larger commercial airline aircraft models such as the Boeing 737, known as the Boeing Business Jet (BBJ), have been converted to private general aviation uses. Many retired military aircraft are now in service with general aviation functions.

The service area for the general aviation component is heavily influenced by the proximity of an airport to an aircraft owner's home or business, as well as the level of service available at competing airports. A description of airports within an approximate 30-nautical mile radius of the Jetport was discussed in Chapter One. All airports within 30 miles are general aviation airports, including Biddeford Municipal Airport (13 miles SW), Brunswick Executive Airport (22 miles NE), Sanford Seacoast Regional Airport (23 miles SW), and Auburn/Lewiston Municipal Airport (24 miles N).

The Jetport's location serving the metropolitan areas of Portland, South Portland, and surrounding municipalities and townships make it an important facility serving the needs of general aviation users in Cumberland County. Existing Jetport facilities, including the 7,200-foot long primary runway, precision instrument approach capabilities (Categories I, II, and III), high quality aviation service providers, and hangar space, places the Jetport as a premier general aviation option for the region. No other airport in the immediate region can match the facilities and services provided at the Jetport, especially for business jet operators.

When discussing the general aviation service area, another primary demand segment that needs to be addressed is an airport's ability to attract based aircraft. As long as reasonably priced hangars and aviation services are offered, most aircraft owners and operators will choose to base at an airport near their home or business. As a result, the general aviation service area will tend to be more compact than a commercial service area. The corporate aviation component (typically turboprops and business jets) of the service area can extend a bit further depending on the capabilities of competing airports. Generally, a general aviation service area will extend outward between 20 and 30 miles, unless competing airports or factors such as geography limit the area.

Exhibit 2J presents the location of registered aircraft in the region for three points in time since the completion of forecasting in the previous master plan study: 2005, 2010, and 2014. The exhibit also depicts a ten-, twenty-, and thirty-mile diameter area around the Jetport with a report of number of registered aircraft located in each segmented areas.

As depicted on the exhibit, registered aircraft within 30 miles of the Jetport has decreased sharply since 2005, declining from 454 in 2010 to 291 in 2014. As also shown, the number of aircraft in each segmented area has experienced a decline. It should be noted that the FAA database had been significantly purged after 2010 to improve accuracy. Historical records were inflated due to aircraft records not being updated. As such, the registered aircraft decrease can in some part be explained by FAA record updating. Nationally, however, aircraft ownership trends have been in decline since the 2008 recession.

The majority of Cumberland County is located within the 30-mile ring surrounding the Jetport, as depicted on **Exhibit 2J**. Three other counties lie in the diameter as well, including Androscoggin, Sagadahoc, and York Counties. Each of these counties, however, is served by a closer airport. It is evident from the exhibit that these airports effectively limit the Jetport's general aviation service area to the northeast, north, and southwest. As such, the primary general aviation service area for the Jetport will be Cumberland County. The Jetport can and will attract aircraft from more distant locales and those will serve as a secondary service areas.

Service Area Aircraft Forecasts

The number of based aircraft at an airport is the most basic, and often telling, indicator of general aviation demand. A forecast of based aircraft is necessary so that other general aviation activities and demand can be projected. The process of developing forecasts of based aircraft for a specific airport typically begins with an analysis of aircraft ownership in the primary general aviation service area through a review of historical aircraft registrations.

Analysis presented earlier indicates that Cumberland County is the primary service area for general aviation demand. Aircraft ownership trends for the primary service area typically dictate the based aircraft trends for an airport. As such, an analysis of Cumberland County aircraft registrations was made. Historical trends can be utilized to develop future aircraft ownership projections for the County. This information can then be used as one method of determining a reasonable airport based aircraft forecast for the Jetport.

Table 2M presents the history of registered aircraft in Cumberland County from 1993 through 2014. These figures are derived from the FAA aircraft registration database that categorized registered aircraft by county based on the zip code of the registered aircraft. Although this information generally provides a correlation to based aircraft, it is not uncommon for some aircraft to be registered in the county, but based at an airport outside the county or vice versa.

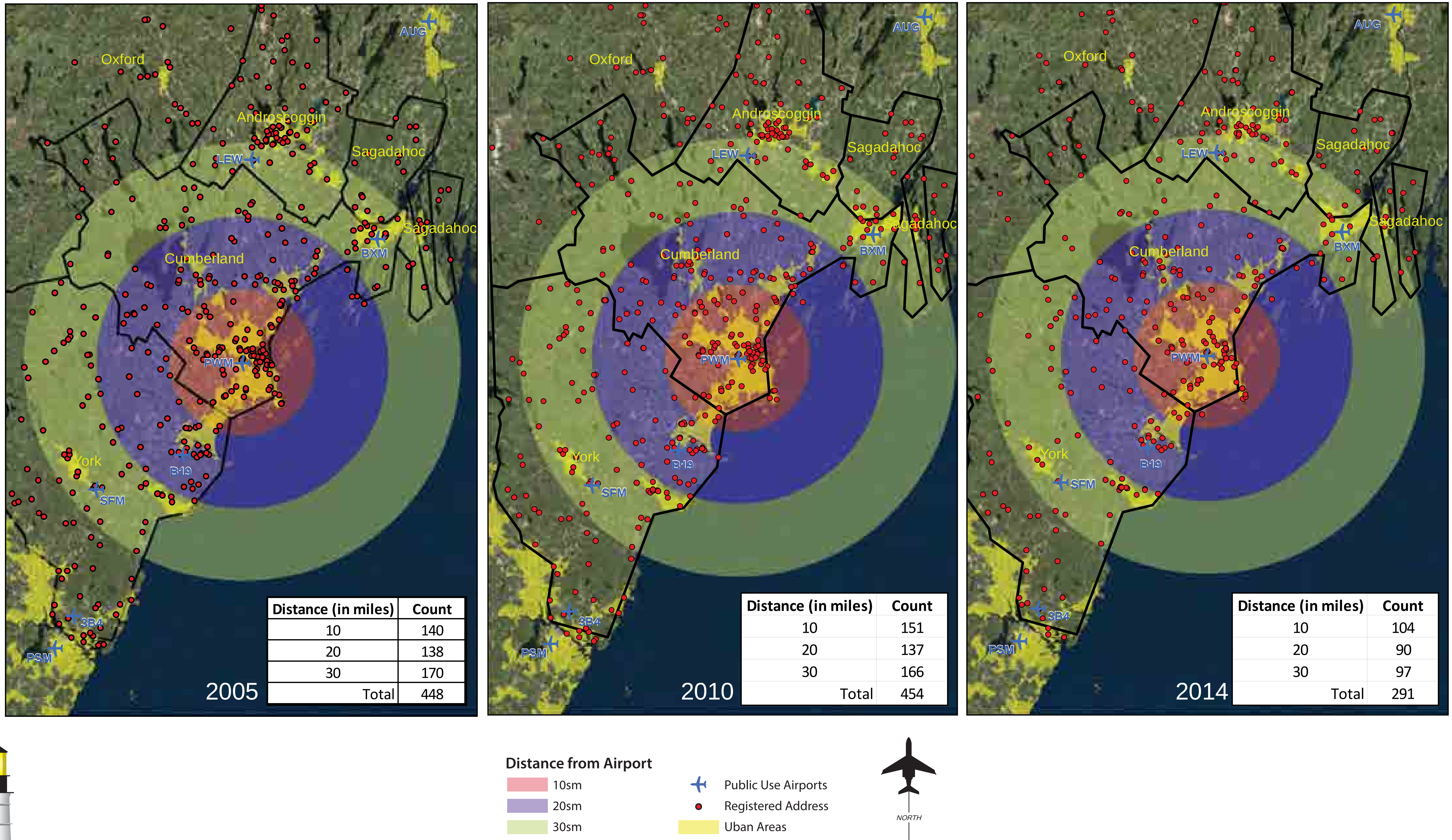
TABLE 2M
Historical Cumberland County Registered Aircraft Trends

	Cumberland County				
Year	Registered Aircraft	Population	Cumberland County Registered Aircraft Per 1,000 Resident Ratio	US Active Aircraft	Market Share Percent of U.S. Active Aircraft
1994	239	250,414	0.95	172,935	0.138%
1995	245	252,078	0.97	182,605	0.134%
1996	243	254,824	0.95	187,312	0.130%
1997	250	257,599	0.97	189,328	0.132%
1998	241	260,405	0.93	205,700	0.117%
1999	255	263,242	0.97	219,500	0.116%
2000	251	266,109	0.94	217,533	0.115%
2001	261	268,391	0.97	211,466	0.123%
2002	261	270,533	0.96	211,244	0.124%
2003	264	273,041	0.97	209,606	0.126%
2004	291	274,920	1.06	219,319	0.133%
2005	288	276,275	1.04	224,257	0.128%
2006	297	277,084	1.07	221,942	0.134%
2007	294	278,781	1.05	231,606	0.127%
2008	292	280,681	1.04	228,664	0.128%
2009	282	281,969	1.00	223,876	0.126%
2010	290	281,386	1.03	223,370	0.130%
2011	280	282,401	0.99	220,453	0.127%
2012	276	285,650	0.97	209,034	0.132%
2013	265	288,960	0.92	202,865	0.131%
2014	264	292,321	0.90	203,020	0.130%
AVERAGE ANNUAL GROWTH RATES					
5-year	-1.3%	0.7%	-2.0%	-1.9%	0.6%
10-year	-1.0%	0.6%	-1.6%	-0.8%	-0.2%
15-year	0.2%	0.7%	-0.5%	-0.5%	0.8%
20-year	0.5%	0.8%	-0.3%	0.8%	-0.3%

Source: Cumberland County registered aircraft from FAA records; U.S. active aircraft from FAA Aerospace Forecasts; Population from CEDDS, 2014

According to FAA record, there were 264 aircraft registered in Cumberland County in 2014. This level was the lowest tallied since 2003; however, the 20-year period low was 239 as recorded in 1994. The highest number of registered aircraft over the 20-year period was 297 in 2006. While registered aircraft in the county has been in decline since 2008, the 20-year AAGR has increased by 0.5 percent.

When compared to Cumberland County resident population, the ratio of registered aircraft per 1,000 county residents has declined from 0.95 in 1994 to 0.90 in 2014. Over the last 20 years, this ratio generally increased from 1994 until reaching a high of 1.07 in 2006. The ratio has been in general decline since. It should be noted that nationally, a declining ratio trend is common as population will generally outpace aircraft ownership, especially in areas with large urban centers. As presented, Cumberland County population has been increasing over the 20-year period, having a 20-year AAGR of 0.8 percent.



2005

Distance (in miles)	Count
10	140
20	138
30	170
Total	448

2010

Distance (in miles)	Count
10	151
20	137
30	166
Total	454

2014

Distance (in miles)	Count
10	104
20	90
30	97
Total	291

Exhibit 2J

REGISTERED AIRCRAFT WITHIN 30 MILES OF PORTLAND

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Cumberland County registered aircraft was also examined against U.S. active aircraft for the previous 20-year period. As presented in **Table 2M**, the 20-year relationship has been flat, decreasing slowly from the period high in 1994 of 0.138 percent and declining to 0.130 percent. The table also presents the negative AAGR for U.S. active aircraft over the last 5, 10, and 15 year periods. Since 1994, however, the overall 20-year AAGR has been 0.8 percent, slightly higher than the 0.5 percent AAGR experienced by Cumberland County registered aircraft.

Now that the Cumberland County registered aircraft trends have been identified, several projections of future registered aircraft have been made for the 20-year planning horizon of this planning process. Cumberland County registered aircraft projections are presented in **Table 2N** and are graphically depicted on **Exhibit 2K**. These projections evaluate the potential growth of aircraft demand (registered aircraft) in Cumberland County over the next 20 years.

TABLE 2N
Cumberland County Registered Aircraft Projections

Year	Registered Aircraft	Population	Registered Aircraft Per 1,000 Resident Ratio	US Active Aircraft	Market Share Percent of U.S. Active Aircraft
Constant Share of County Registered Per 1,000 Resident Projection (1.1% AAGR)					
2020	283	312,940	0.90	204,615	0.138%
2025	298	330,438	0.90	208,075	0.143%
2035	330	365,060	0.90	223,470	0.148%
20-Year Average Registered Aircraft Per 1,000 Residents Projection (1.5% AAGR)					
2020	307	312,940	0.98	204,615	0.150%
2025	324	330,438	0.98	208,075	0.156%
2035	358	365,060	0.98	223,470	0.160%
Constant Market Share of U.S. Active Aircraft Projection (0.5% AAGR)					
2020	267	312,940	0.85	204,615	0.131%
2025	272	330,438	0.82	208,075	0.131%
2035	292	365,060	0.80	223,470	0.131%
20-Year Average Market Share of U.S. Active Aircraft Projection (0.4% AAGR)					
2020	262	312,940	0.84	204,615	0.128%
2025	266	330,438	0.81	208,075	0.128%
2035	286	365,060	0.78	223,470	0.128%
Historical 20-year AAGR 0.52% Projection (SELECTED FORECAST)					
2020	272	312,940	0.87	204,615	0.133%
2025	279	330,438	0.84	208,075	0.134%
2035	293	365,060	0.80	223,470	0.131%

Sources: Registered Aircraft and U.S. Active Aircraft from FAA; Cumberland County Population Projections from Woods & Poole CEDDS 2014

Since 1994, the number of registered aircraft in Cumberland County increased until 2006, where the figures declined annually. Due to the generally increasing then decreasing ownership trend, statistical regression and trend line analyses fail to offer a reasonable or usable correlation for forecasting purposes. Therefore, several market share forecasts have been developed.

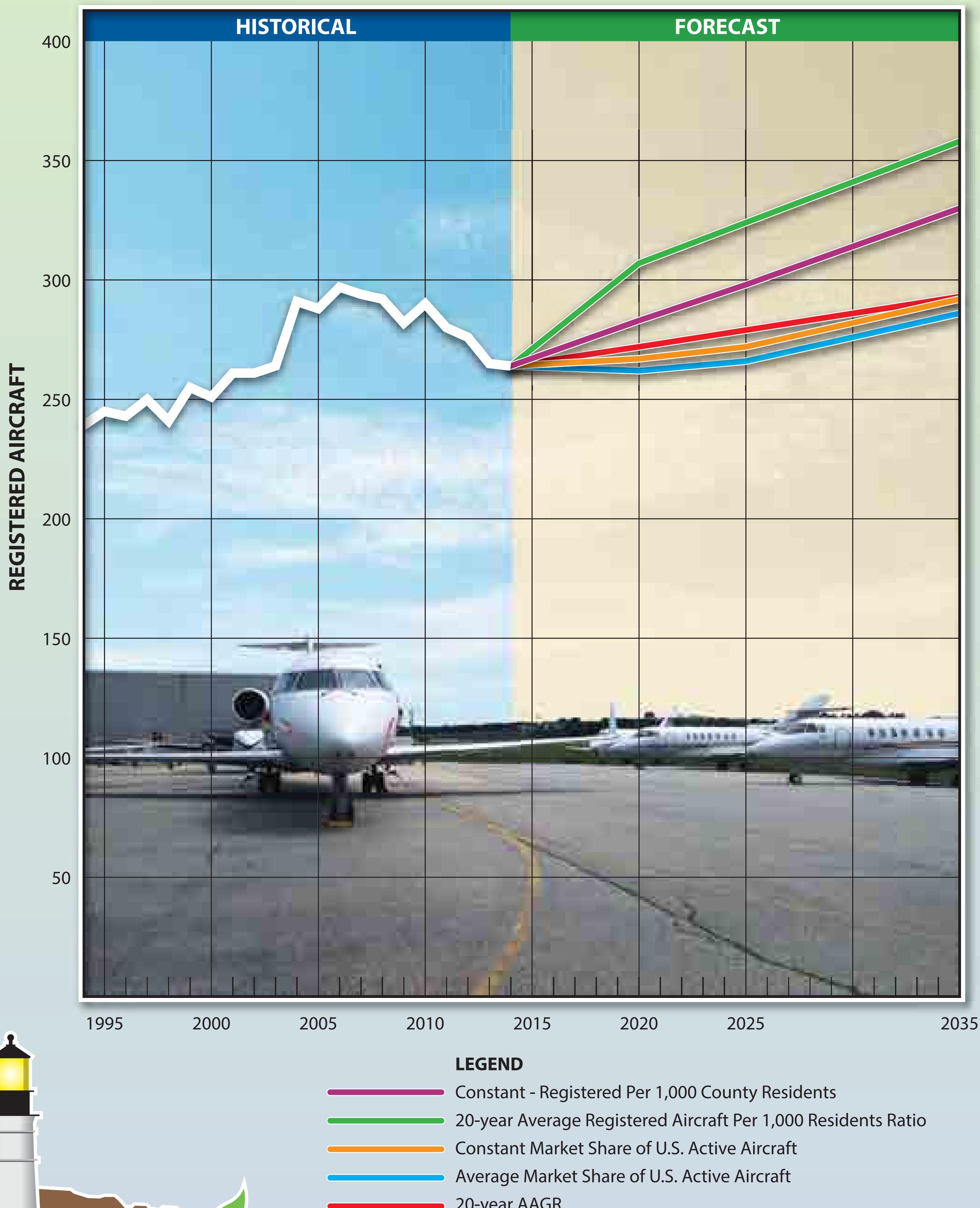


Exhibit 2K
CUMBERLAND COUNTY
REGISTERED AIRCRAFT FORECASTS

The first two projections consider the ratio of forecast population for the county to registered aircraft. The first of these projections considers the Jetport maintaining its 2014 ratio of 0.90 aircraft per 1,000 people in the county. This results in a 2035 projection of 330 registered aircraft and an annual growth rate of 1.1 percent. The second projection considers the 20-year average of 0.98 registered aircraft per 1,000 county residents, a projection with an AAGR of 1.5 percent which yields 358 registered aircraft by 2035.

The next two projections consider the county's market share of total active general aviation aircraft in the U.S. fleet as identified in the FAA's annual forecasts. The first projection considers the county maintaining its 2014 0.131 percent as a constant into the forecast years. This results in a long term projection of 292 registered aircraft and an annual growth rate of 0.50 percent. The second projection applies the 20-year average market share of registered aircraft as a ratio to the U.S. active aircraft fleet. This results in a constant market share of 0.128 percent and an annual average growth rate of 0.4 percent. By 2035, this projection results in 286 registered aircraft in the county.

A final projection considered simply extending the 20-year period AAGR of 0.52 percent into the future. This projection yielding a 2035 total of 293 registered aircraft has been selected as it represents a reasonable projection which closely mirrors the U.S. active aircraft market share projections. The selected registered aircraft projection is one data point to be used in the development of a based aircraft forecast for the Jetport. The following section will present several potential based aircraft forecasts as well as the selected based aircraft master plan forecast.

BASED AIRCRAFT FORECASTS

Determining the number of based aircraft at an airport can be a challenging task. Aircraft storage can be somewhat transient in nature, meaning aircraft owners can and do move their aircraft. Some aircraft owners may store their aircraft at an airport for only part of the year. For many years, the FAA did not require based aircraft records; therefore, historical records are often incomplete or non-existent. For this study, the Jetport provided leasing information for those hangars that the Jetport owns and obtained the number of aircraft housed in hangars owned by others. Based on airport records, there were 50 aircraft based at the Jetport.

The FAA TAF will be utilized as the baseline forecast source for based aircraft at the Jetport. The 2013 TAF estimated that there were 40 based aircraft in 2014, which was forecast to grow to 61 by 2035 for an annual growth rate of 2.03 percent. **Table 2P** shows the FAA TAF history and forecasts of based aircraft.

It is important to note that the actual number of based aircraft at the Jetport in 2014 is 50 based on airport tenant records including tail numbers and aircraft types. As such, the 2014 TAF model was developed utilizing a baseline assumption 20 percent (10 aircraft) below actual. As shown in the table, the TAF based aircraft projection does not even reach the actual current based aircraft level of 50 until 2025, as the forecast then increases to 61 by 2035. As such, the 2014 TAF projection essentially suggests that the Jetport's based aircraft level will decrease or at least remain flat until 2025. This projection appears

TABLE 2P FAA Terminal Area Forecast (TAF) – Based Aircraft	
Year	**Based Aircraft**
1994	52
1995	54
1996	54
1997	44
1998	44
1999	44
2000	44
2001	56
2002	56
2003	56
2004	43
2005	43
2006	43
2007	43
2008	55
2009	55
2010	55
2011	37
2012	37
2013	38
2014	40
PROJECTION (AAGR 2.03 percent	
2020	45
2025	50
2035	61

Source: 2013 FAA TAF

unreasonable as the general assumed base year figure utilized is 20 percent below actual and based aircraft increases should be expected over the next ten years.

The FAA TAF is intended to be the baseline forecast for based aircraft for this planning process; however, the current TAF projection is clearly undervalued. As such, an adjustment was made to the TAF projection. The adjusted TAF simply utilized 50 based aircraft as the baseline figure and was then extended out at the 2.03 percent AAGR per the 2014 FAA TAF model. The adjusted TAF will be utilized instead of the TAF which was developed with a 20 percent lower baseline assumption.

Table 2Q presents an analysis of Jetport based aircraft as a ratio of Cumberland County Aircraft as well as against the Cumberland County resident population. The relatively flat based aircraft growth registers a generally decreasing ratio trend when compared with county registered aircraft and aircraft per 1,000 county residents.

Table 2Q and **Exhibit 2L** present three TAF based aircraft projections for the Jetport considered in this analysis: the adjusted TAF, a low allowance adjusted TAF, and a high allowance adjusted TAF. As previously outlined, the high allowance projection is ten percent higher than the standard adjusted TAF for the first five years, then 15 percent higher for the remainder of the planning period. The low allowance TAF projection follows the same rationale, but less than the adjusted TAF projection. FAA criteria stipulates that master plan forecasts should be within 10 percent of the FAA TAF for the first five years and then within 15 percent for the remainder of the planning horizon. As such, the TAF allows for a planning envelope ten percent above and below the TAF projection for the first five years and 15 percent above and below the TAF for the remaining planning period, as depicted on **Exhibit 2L**. If the master plan forecasts differ from this planning envelope, specific justification needs be given and FAA would need to approve the deviation.

The three adjusted TAF projections represent the reasonable planning envelope. The high allowance projection is slightly below the previous master plan projection and extends out at a 2.71 percent AAGR. The low allowance projection follows a much slower 1.24 percent AAGR. The selected forecast is the adjusted TAF which simply extends from the 2014 baseline of 50 based aircraft by 2.03 percent annually through the planning period. This projection follows the same AAGR projected by the FAA. The selected forecast projects 56 based aircraft by 2020, 62 by 2025, and 76 by 2035.

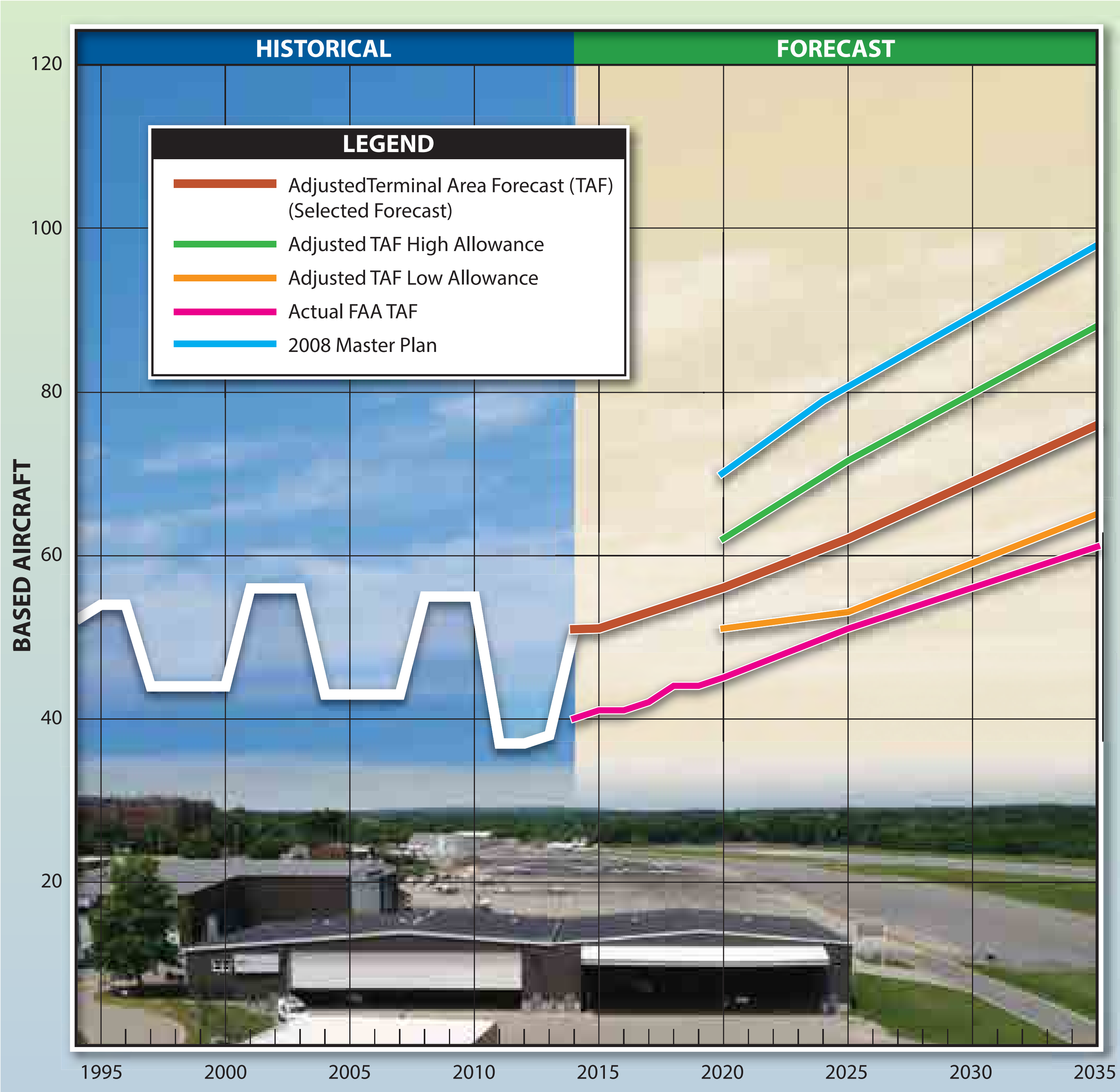


Exhibit 2L
BASED AIRCRAFT FORECAST

TABLE 2Q
Based Aircraft Projections
Portland International Jetport

Year	Based Aircraft	Cumberland County Registered Aircraft	Market Share of County Registered	Cumberland County Population	Based Aircraft Per 1,000 County Resident Ratio
1994	52	239	21.8%	250,414	0.21
1995	54	245	22.0%	252,078	0.21
1996	54	243	22.2%	254,824	0.21
1997	44	250	17.6%	257,599	0.17
1998	44	241	18.3%	260,405	0.17
1999	44	255	17.3%	263,242	0.17
2000	44	251	17.5%	266,109	0.17
2001	56	261	21.5%	268,391	0.21
2002	56	261	21.5%	270,533	0.21
2003	56	264	21.2%	273,041	0.21
2004	43	291	14.8%	274,920	0.16
2005	43	288	14.9%	276,275	0.16
2006	43	297	14.5%	277,084	0.16
2007	43	294	14.6%	278,781	0.15
2008	55	292	18.8%	280,681	0.20
2009	55	282	19.5%	281,969	0.20
2010	55	290	19.0%	281,386	0.20
2011	37	280	13.2%	282,401	0.13
2012	37	276	13.4%	285,650	0.13
2013	38	265	14.3%	288,960	0.13
2014	50	264	18.9%	292,321	0.17
ADJUSTED TAF - LOW ALLOWANCE PROJECTION - AAGR 1.24%					
2020	51	272	18.7%	312,940	0.16
2025	53	279	19.0%	330,438	0.16
2035	65	293	22.1%	365,060	0.18
ADJUSTED TAF - AAGR 2.03% (SELECTED FORECAST)					
2020	56	272	20.7%	312,940	0.18
2025	62	279	22.4%	330,438	0.19
2035	76	293	26.0%	365,060	0.21
ADJUSTED TAF - HIGH ALLOWANCE PROJECTION – AAGR 2.71%					
2020	62	272	22.8%	312,940	0.20
2025	72	279	25.7%	330,438	0.22
2035	88	293	29.9%	365,060	0.24

Source: Based aircraft and TAF from FAA 2014 Terminal Area Forecast - http://aspm.faa.gov/apowtaf/

BASED AIRCRAFT FLEET MIX

The fleet mix of based aircraft is oftentimes more important to airport planning and design than the total number of aircraft. For example, the presence of one or a few large business jets can impact design standards for the runway and taxiway system more so than a large number of smaller single engine piston-powered aircraft.

Knowing the aircraft fleet mix expected to utilize the Jetport is necessary to properly plan for facilities that will best serve the level of activity and the type of activities occurring at the air-port. The existing fleet mix of the 50 aircraft based at the Jetport is comprised of 27 single engine piston aircraft, nine multi-engine piston aircraft, four turboprops, eight jets, and two helicopters.

The based aircraft fleet mix, as presented on **Table 2R**, was compared to the existing and forecast U.S. general aviation fleet mix trends as presented in FAA Aerospace Forecasts – Fiscal Years 2014-2034 as well as to trends occurring at the Jetport. The national trend in general aviation continues to be toward a greater percentage of larger, more sophisticated aircraft as part of the national fleet. While single engine piston-powered aircraft will continue to account for the largest share of based aircraft at the Jetport, these aircraft are forecast to drop as a percentage of the fleet mix. Multi-engine piston-powered aircraft, although expected to decrease as a percentage of the fleet mix during the planning period of this planning effort, are forecast to increase by two. This is based upon demand the Jetport is currently experiencing for multi-engine aircraft storage space. Consistent with national aviation trends, the number and percentage of turboprops, jets, and helicopters are all expected to increase during the 20-year planning period. Jets are projected to experience the greatest percentage increase of any category of aircraft.

The based aircraft fleet mix forecast for the Jetport is presented in **Table 2R**. It has been developed based on local aircraft type usage and national trends as presented in FAA *Aerospace Forecasts - Fiscal Years 2014-2034*. The FAA expects business jets will continue to be the fastest growing general aviation aircraft type in the future. The Jetport is well positioned to accommodate business jets in the future; nevertheless, smaller piston-powered aircraft will continue to comprise the overall greatest number of based aircraft at the Jetport.

TABLE 2R
Based Aircraft Fleet Mix
Portland International Jetport

Aircraft Type	2014	%	2020	%	2025	%	2035	%
Single Engine Piston	27	54.0%	29	51.6%	32	51.3%	39	51.1%
Multi-Engine Piston	9	18.0%	9	16.4%	8	13.2%	8	10.5%
Turboprop	4	8.0%	5	8.9%	6	9.6%	9	11.8%
Jet	8	16.0%	10	17.7%	12	19.2%	15	19.7%
Helicopters	2	4.0%	3	5.4%	4	6.6%	5	6.9%
Total	**50**	**100.0%**	**56**	**100.0%**	**62**	**100.0%**	**76**	**100.0%**

Source: Airport Records; Coffman Associates analysis

GENERAL AVIATION OPERATIONS FORECASTS

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

While the Jetport is open 24-hours a day, year round, the tower is open from 5:45 am to 12:00 pm daily. Therefore, it is likely that the tower does not count all activity at the Jetport. To be consistent with FAA, the general aviation operations forecast to follow consider those operations that occur when the tower is open. Certain analysis to be conducted later in the Master Plan will incorporate an estimate of nighttime activity.

Itinerant Operations Forecasts

Table 2S depicts general aviation itinerant operations at the Jetport from 1990 through 2014. The figures presented in the table are based on actual ATCT counts for fiscal year (October through September). The fiscal year was utilized due to the proximity of the end of 2014 fiscal year when preparing these forecasts. The 2014 figure presented in **Table 2S** includes actual counts for the period of September 2013 through August 2014 as September 2014 was not available at the time of this writing.

General aviation itinerant operations at the Jetport have experienced two distinct growth trends since 1990. First, itinerant general aviation operations fluctuated during the 1990s but generally increased until 1999. Following 1999, however, general aviation itinerant operations have generally declined to the period's lowest total of 15,173 recorded in fiscal year 2014. The Jetport's generally declining general aviation itinerant operations has resulted in two key statistical relationship ratio declines as well. The Jetport's market share of U.S. ATCT recorded general aviation itinerant operations has declined from a high of 0.179 percent in 1993 to a low of 0.107 percent for 2014. General aviation itinerant operations per aircraft based at the Jetport have also been in general decline, falling from a high of 898 in 1993 to a low of 303 in 2014.

National general aviation itinerant operations have been declining since 2005, but have taken a steeper decline since the beginning of the recession and have yet to recover. However, the FAA forecasts a reversal for the planning. From 2014 through 2035, the FAA forecasts an annual growth rate of 0.48 percent for itinerant general aviation operations as presented in **Table 2T**.

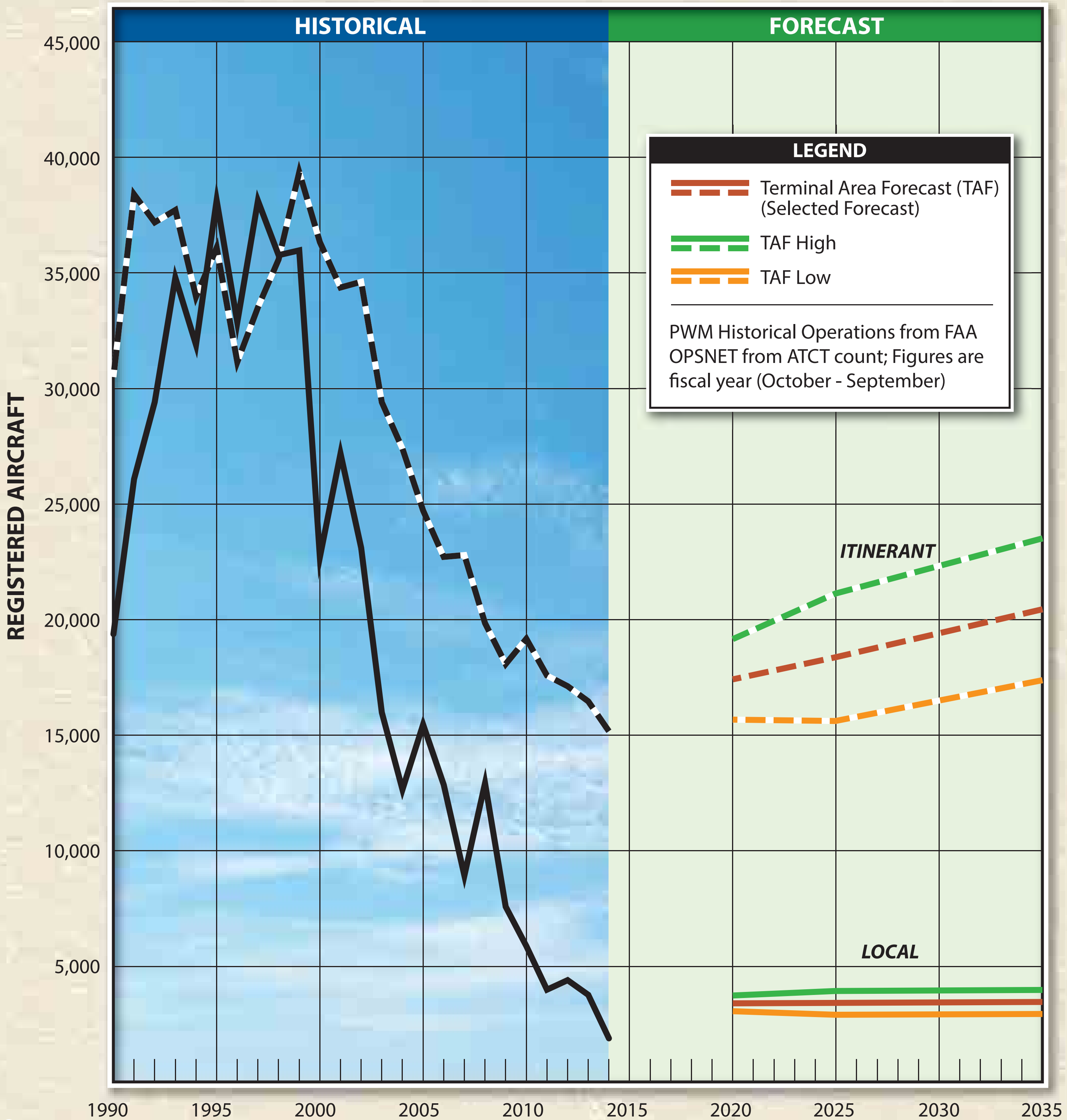
TABLE 2S
Itinerant General Aviation Operations
Portland International Jetport

Year	Itinerant Ops[1]	U.S. ATCT GA Itinerant Operations[2]	Market Share	Based Aircraft	Ops Per Based Ratio
1990	30,493	23,100,000	0.132%	83	367
1991	38,396	22,300,000	0.172%	83	463
1992	37,184	22,100,000	0.168%	42	885
1993	37,717	21,100,000	0.179%	42	898
1994	33,965	21,100,000	0.161%	52	653
1995	36,088	20,900,000	0.173%	54	668
1996	31,144	20,800,000	0.150%	54	577
1997	33,509	21,700,000	0.154%	44	762
1998	35,578	22,086,500	0.161%	44	809
1999	39,355	23,019,400	0.171%	44	894
2000	36,331	22,844,100	0.159%	44	826
2001	34,367	21,433,300	0.160%	56	614
2002	34,613	21,450,500	0.161%	56	618
2003	29,403	20,231,300	0.145%	56	525
2004	27,396	20,007,200	0.137%	43	637
2005	24,721	19,303,200	0.128%	43	575
2006	22,715	18,707,100	0.121%	43	528
2007	22,793	18,575,200	0.123%	43	530
2008	19,847	17,492,700	0.113%	55	361
2009	18,079	15,571,100	0.116%	55	329
2010	19,174	14,863,900	0.129%	55	349
2011	17,583	14,527,900	0.121%	37	475
2012	17,122	14,235,600	0.120%	37	463
2013	16,467	14,119,000	0.117%	38	433
2014	15,173	14,172,400	0.107%	50	303

[1] PWM Itinerant Operations from FAA OPSNET from ATCT count; Figures are fiscal year (October - September)
[2] *Source FAA Aerospace Forecasts; 2014 estimated*

Similar to the based aircraft projections presented earlier, three projections for general aviation itinerant operations have been considered utilizing the FAA TAF. **Table 2T** presents the three TAF projections including the actual TAF, a high allowance TAF, and a low allowance TAF. The high and low allowance TAF differ from the actual TAF, high or low, by ten percent in the first five years and 15 percent for the remainder of the planning period, as illustrated on **Exhibit 2M**.

The actual TAF projection for general aviation itinerant operations suggests that operations will reverse the negative growth curve by increasing to 20,450 by 2035. This projection yields a 1.43 percent AAGR and appears very reasonable given the 2035 figure was achieved as recently as 2007. If the economy continues to move ahead, even with slow to moderate growth, the selected forecast is quite reachable.


HISTORICAL
FORECAST
REGISTERED AIRCRAFT
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
1990
1995
2000
2005
2010
2015
2020
2025
2030
2035
LEGEND
Terminal Area Forecast (TAF) (Selected Forecast)
TAF High
TAF Low
PWM Historical Operations from FAA OPSNET from ATCT count; Figures are fiscal year (October - September)
ITINERANT
LOCAL

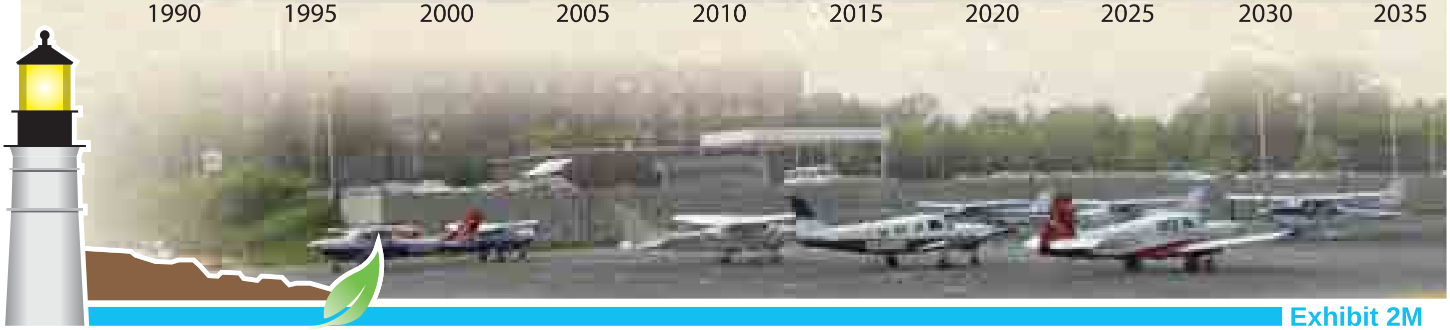


Exhibit 2M

TABLE 2T Itinerant General Aviation Operations Projections Portland International Jetport					
Year	Itinerant Ops[1]	U.S. ATCT GA Itinerant Operations[2]	Market Share	Based Aircraft	Ops Per Based Ratio
2014	15,173	14,172,400	0.107%	50	303
TAF - LOW ALLOWANCE PROJECTION - AAGR 0.65%					
2020	15,678	14,571,200	0.108%	56	278
2025	15,623	14,920,400	0.105%	62	250
2035	17,383	15,669,300	0.111%	76	228
TAF - ACTUAL PROJECTION – AAGR 1.43% (SELECTED FORECAST)					
2020	17,420	14,571,200	0.120%	56	309
2025	18,380	14,920,400	0.123%	62	295
2035	20,450	15,669,300	0.131%	76	268
TAF - HIGH ALLOWANCE PROJECTION – AAGR 2.11%					
2020	19,162	14,571,200	0.132%	56	340
2025	21,137	14,920,400	0.142%	62	339
2035	23,518	15,669,300	0.150%	76	308

Source: Based aircraft and TAF from FAA 2014 Terminal Area Forecast - http://aspm.faa.gov/apowtaf/

Local Operations

A similar methodology was utilized to forecast local general aviation operations. **Table 2U** and **Exhibit 2M** depict the history of local operations at the Jetport and examines its historic market share of GA local operations at towered airports in the United States. Similar to itinerant operations, historical local operations have generally declined since 1990. In fact, local operations have decreased more significantly, falling to a period low of 1,890 in 2014.

The Jetport's share of U.S. ATCT local general aviation operations has decreased from a high of 0.251 percent in 1997 to a low of 0.016% in 2014. The ratio of the Jetport's local general aviation operations per based aircraft has also decreased, falling from a high of 886 in 1997 to a low of 38 in 2014. As with national itinerant operations, local operations declined significantly beginning with the recession of 2008. The FAA forecasts that growth will return and continue at an annual rate of 0.44 percent through 2035 as presented in **Table 2V** and on **Exhibit 2M**.

Three TAF projections are presented in **Table 2V**: actual TAF, high allowance TAF, and low allowance TAF. The actual TAF offers a return to growth reaching 3,470 local general aviation operations by 2035. The high allowance projection yields 3,984 local operations by 2035, while the low allowance TAF projection yields only 2,944 local operations. The actual TAF projection having an AAGR of 2.94 percent has been the selected forecast. It should be made quite clear that this projection seems reasonable now as the Jetport is not supporting a busy flight training operation. If a flight school returns to operation, local operations could immediately exceed these forecasts. In fact, it would be very reasonable to assume that local operations could very simply jump back to 10,000 or more if a flight school were to return to the Jetport.

TABLE 2U
Local General Aviation Operations
Portland International Jetport

Year	Local Ops[1]	U.S. ATCT GA Local Operations[2]	Market Share	Based Aircraft	Ops Per Based Ratio
1990	19,376	17,100,000	0.113%	83	233
1991	26,079	16,600,000	0.157%	83	314
1992	29,409	16,300,000	0.180%	42	700
1993	34,792	15,500,000	0.224%	42	828
1994	31,889	15,200,000	0.210%	52	613
1995	38,134	15,100,000	0.253%	54	706
1996	32,861	14,500,000	0.227%	54	609
1997	38,119	15,200,000	0.251%	44	866
1998	35,766	15,960,000	0.224%	44	813
1999	35,973	16,980,200	0.212%	44	818
2000	22,703	17,034,400	0.133%	44	516
2001	27,184	16,193,700	0.168%	56	485
2002	23,107	16,172,800	0.143%	56	413
2003	15,988	15,292,700	0.105%	56	286
2004	12,652	14,960,400	0.085%	43	294
2005	15,463	14,843,600	0.104%	43	360
2006	12,857	14,365,400	0.089%	43	299
2007	8,931	14,556,800	0.061%	43	208
2008	12,926	14,081,200	0.092%	55	235
2009	7,586	12,448,000	0.061%	55	138
2010	5,883	11,716,300	0.050%	55	107
2011	3,995	11,437,000	0.035%	37	108
2012	4,406	11,608,300	0.038%	37	119
2013	3,772	11,690,000	0.032%	38	99
2014	1,890	12,001,500	0.016%	50	38

[1] PWM Local Operations from FAA OPSNET from ATCT count; Figures are fiscal year (October - September)
[2] Source FAA Aerospace Forecasts; 2014 estimated

TABLE 2V Local General Aviation Operations Projections Portland International Jetport					
Year	Local Ops	U.S. ATCT GA Local Operations	Market Share	Based Aircraft	Ops Per Based Ratio
2014	1,890	12,001,500	0.016%	50	38
TAF - LOW ALLOWANCE PROJECTION - 2.13% AAGR					
2020	3,064	12,312,700	0.025%	56	54
2025	2,910	12,585,200	0.023%	62	47
2035	2,944	13,173,900	0.022%	76	39
TAF - ACTUAL PROJECTION - 2.94% AAGR (SELECTED FORECAST)					
2020	3,410	12,312,700	0.028%	56	60
2025	3,430	12,585,200	0.027%	62	55
2035	3,470	13,173,900	0.026%	76	46
TAF - HIGH ALLOWANCE PROJECTION - 3.61 % AAGR					
2020	3,744	12,312,700	0.030%	56	66
2025	3,938	12,585,200	0.031%	62	63
2035	3,984	13,173,900	0.030%	76	52

Source: Based aircraft and TAF from FAA 2014 Terminal Area Forecast -http://aspm.faa.gov/apowtaf/

General Aviation Operational Fleet Mix Projection

Operational fleet mix information for an airport is an important factor when developing environmental and capacity modeling. As such, an effort was made to estimate current and project future general aviation operational activity by aircraft groupings. The groupings selected are the same as those utilized for projecting the based aircraft fleet mix: single engine piston, multi-engine piston, turboprop, jet, and rotorcraft. **Table 2W** presents the current and projected general aviation operational fleet mix.

TABLE 2W General Aviation Operational Fleet Mix Forecast Portland International Jetport								
Aircraft Type	2013	%	2020	%	2025	%	2035	%
SEP	9,726	47.5%	9,616	46.0%	9,630	44.0%	9,718	40.5%
MEP	5,516	26.9%	5,436	26.0%	5,362	24.5%	5,280	22.0%
TP	2,968	14.5%	3,240	15.5%	3,612	16.5%	4,320	18.0%
Jet	1,414	6.9%	1,674	8.0%	2,080	9.5%	3,120	13.0%
Rotor	846	4.1%	940	4.5%	1,204	5.5%	1,560	6.5%
Total GA Ops	20,470	100.0%	20,906	100.0%	21,888	100.0%	23,998	100.0%

Source: 2013 from FAA TFMSC, AirportIQ, and Coffman Analysis; 2013 and projections include 2.24% increase for operations when ATCT closed based on actual 2013 operations

The current, or base year, general aviation operational mix was obtained from information offered by two sources: FAA Traffic Flow Managements System Counts (TFMSC) and privately owned web service AirportIQ.com. Both of these resources utilize instrument flight rule (IFR) flight plans, but the TFMSC also utilizes captured radar data. The information is not absolutely complete, but offers a valuable resource to make informed estimates wherever necessary.

The current base year of 2013 includes both itinerant and local operations and is the most recent full calendar year data set and is the most current for forecasting purposes. It should be noted that the operational figure is slightly higher than that reported by the ATCT counts for 2013 as it includes traffic conducted when the ATCT was closed. Based on this information, approximately 2.24 percent more general aviation activity occurred when the ATCT was closed.

According to the table, the vast majority of general aviation operations for 2013 were conducted by single engine piston aircraft at 47.5 percent followed by multi-engine piston (26.9%), turboprop (14.5%), jet (6.9%), and rotorcraft (4.1%). Future general aviation operations will follow similar trends of based aircraft. As projected, turboprop and jet aircraft operations will experience a marked increase over the period, while single and multi-engine piston aircraft operations will fall as a percentage of total. Single engine piston operations will, however, continue to account for the largest share of general aviation operations at the Jetport through the planning period.

OTHER AIR TAXI

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

In 2013, there were a total of 5,299 other air taxi operations. Because the other air taxi operations are more closely related to corporate aircraft flying, they were projected to increase at the rate of general aviation turboprops and jets. The resulting forecast is also presented in **Table 2X**.

TABLE 2X
Other Air Taxi Operations
Portland International Jetport

Year	Other Air Taxi
Actual	
2013	5,299
Forecast	
2020	5,900
2025	6,900
2035	9,000

MILITARY ACTIVITY

Military pilots are free to utilize civilian airports across the country and, as such, the Jetport experiences some activity by the military. In 2014, there were 1,717 military operations. This total represents the highest level the Jetport has experienced since at least 2000. The Jetport has experienced an increasing

TABLE 2Y Military Operations Forecast			
Year	Itinerant	Local	Total
1990	892	577	1469
1991	1,115	987	2,102
1992	1,572	1,384	2,956
1993	1,307	1,484	2,791
1994	1,126	1,463	2,589
1995	1,361	1,729	3,090
1996	1,483	1,289	2,772
1997	1,971	2,191	4,162
1998	2,093	2,209	4,302
1999	2,068	1,509	3,577
2000	1,943	445	2,388
2001	1,586	357	1,943
2002	1,815	347	2,162
2003	1,445	168	1,613
2004	1,103	176	1,279
2005	1,307	182	1,489
2006	1,365	171	1,536
2007	1,200	184	1,384
2008	816	182	998
2009	817	304	1,121
2010	429	76	505
2011	505	28	533
2012	483	44	527
2013	479	88	567
2014	464	34	498
FORECASTS			
2020	500	100	600
2025	500	100	600
2035	500	100	600

level of military activity every year since 2009. This is a phenomenon being experienced at airports across the country and is attributable to the fact that the various overseas military commitments are drawing to a close, which brings military pilots home for continued training.

Developing a reliable forecast of military activity at civilian airports is inherently difficult primarily because the military mission can change rapidly. Generally, during peace time, civilian airports will experience higher levels of military operations. When there are overseas commitments, many of those pilots and equipment will be out of the country. The FAA recognizes these challenges to forecasting military activity and, therefore, provides only a flat forecast for both local and itinerant military activity. **Table 2Y** presents the history of military activity at the Jetport Since 1990.

As presented in the table, military operations were much more substantial in the 1990s through the mid-2000s. Itinerant and local operations exceeded 2,000 annually several times over the period. Since 2008, however, both groupings of military operations have been in decline.

In fact, local military operations are so low as to be negligible. Future military operations have been forecast at 500 annually for itinerant and 100 annually for local. These figures reasonably represent recent trends and are reasonable especially given that the FAA TAF is 489 annually itinerant and 88 annually for local. The military operational fleet mix has also been prepared and is presented in **Table 2Z**. It should be noted that approximately 39 percent more military activity occurred when the ATCT was closed in 2013, the base year for the operational fleet mix analysis. As such, the forecasted figures were inflated by 39 percent to account for nighttime operations.

TABLE 2X
Military Operational Fleet Mix Forecast
Portland International Jetport

Aircraft Type	2013	%	2020	%	2025	%	2035	%
SEP	142	18.4%	166	17.0%	146	15.0%	118	12.0%
MEP	8	1.0%	10	1.0%	10	1.0%	10	1.0%
TP	366	47.4%	472	48.0%	482	49.0%	492	50.0%
Jet	206	26.7%	266	27.0%	276	28.0%	294	30.0%
Rotor	50	6.5%	70	7.0%	70	7.0%	70	7.0%
Total Military Ops	772	100.0%	984	100.0%	984	100.0%	984	100.0%

Source: 2013 from FAA TFMSC and Coffman Analysis; 2013 and projections include 64% increase for operations when ATCT closed

SUMMARY

This chapter has outlined the various activity levels that might reasonably be anticipated over the planning period. **Exhibit 2N** is a summary of the aviation forecasts discussed in this chapter. The actual activity levels for 2015 have been added to the exhibit for the final report.

The 2013 FAA *Terminal Area Forecasts* form the basis for those presented. The only variations are those of the air carrier, air cargo, and other air taxi operations which constitute the air carrier and commuter plus air taxi forecasts in the TAF. The variation has to do with the Master Plan evaluation of the aircraft mix, boarding load factors, and those that can be expected in the future. This results in a lower operational forecast than the TAF.

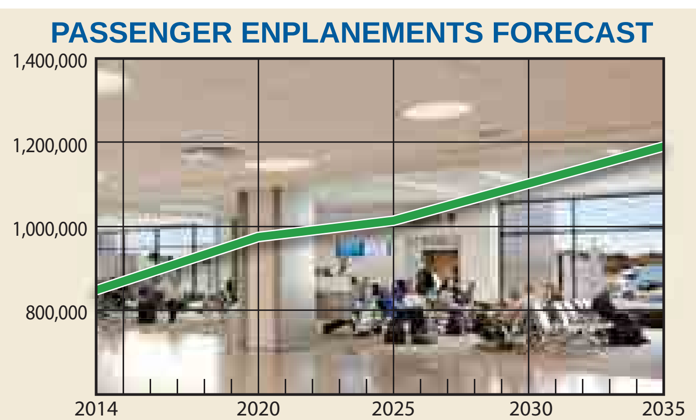
Airline passenger activity is anticipated to grow at an annual average rate of 1.5 percent. Small turboprops and 50-seat or less regional jets are no longer being produced so they can be expected to transition out of the commercial service fleet over the years. Thus, a larger average seat capacity will result in slower growth in operations.

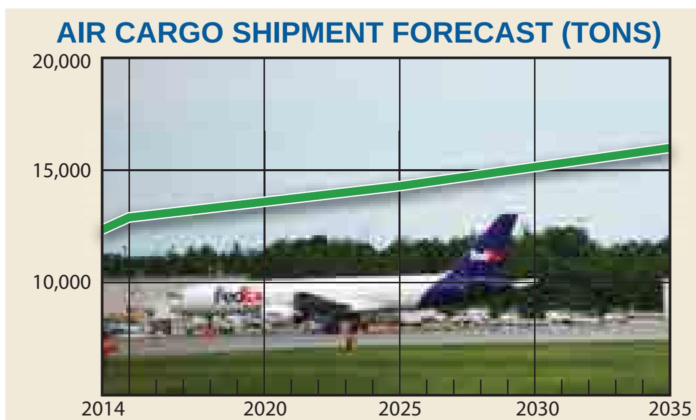
Air cargo activity can be expected to grow slowly in volume, possibly not even attaining previous highs when multiple cargo carriers operated at the airport. Other air taxi operations can be expected to continue to grow with increased use of fractional and for-hire aircraft. Military activity is expected to continue to be a small part of the mix at Portland International Jetport.

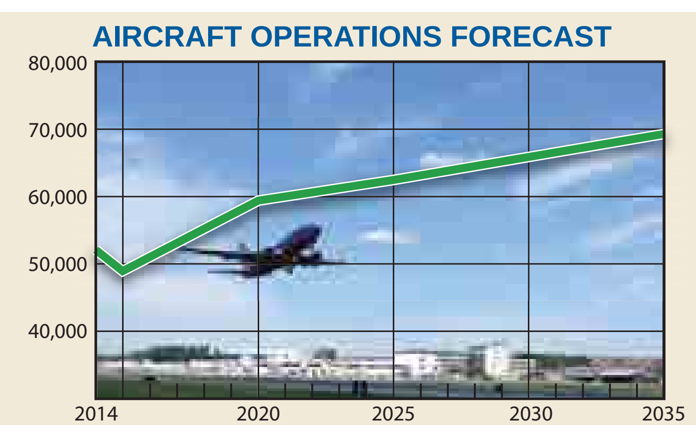
Based aircraft at PWM are expected to see some growth over the planning period. Business and corporate aircraft will spur most general aviation growth. The growth in smaller piston aircraft will be more limited.

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

	Baseline 2013	2015	2020	2025	2035
COMMERCIAL AIRLINE BOARDINGS					
PASSENGER ENPLANEMENTS	***843,944***	***869,710***	***971,324***	***1,010,139***	***1,187,969***
AIR CARGO SHIPMENTS					
Enplaned (Tons)	4,865	4,889	5,700	6,000	6,700
Deplaned (Tons)	7,396	8,021	7,800	8,200	9,200
TOTAL AIR CARGO SHIPPED	***12,261***	***12,910***	***13,500***	***14,200***	***15,900***
ANNUAL AIRCRAFT OPERATIONS					
ITINERANT OPERATIONS					
Air Carrier	26,068	24,848	28,800	29,800	32,000
Air Cargo	3,162	3,092	3,300	3,400	3,700
Other Air Taxi	5,299	2,475	5,900	6,900	9,000
General Aviation	15,173	15,233	17,400	18,400	20,500
Military	464	551	500	500	500
TOTAL ITINERANT OPERATIONS	*50,166*	*46,199*	*55,900*	*59,000*	*65,700*
LOCAL OPERATIONS					
General Aviation	1,890	2,683	3,400	3,400	3,500
Military	34	16	100	100	100
Total Local Operations	*1,924*	*2,699*	*3,500*	*3,500*	*3,600*
TOTAL OPERATIONS	***52,090***	***48,898***	***59,400***	***62,500***	***69,300***
BASED AIRCRAFT	***50***	***50***	***56***	***62***	***76***







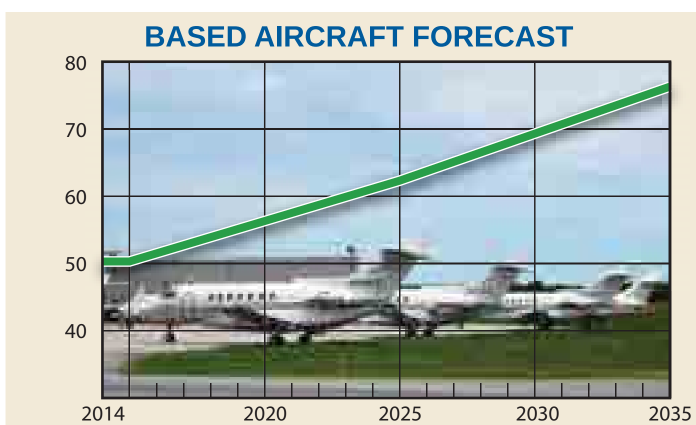


Exhibit 2N

FORECAST SUMMARY

Portland International Jetport

CHAPTER THREE

SUSTAINABILITY BASELINE ASSESSMENT

CHAPTER THREE

SUSTAINABILITY BASELINE ASSESSMENT

INTRODUCTION

The purpose of this Baseline Assessment is to provide an assessment of Portland Interna. onal Jetport's (PWM or the Jetport) current sustainability performance as determined by its related activities, policies, and procedures. This evaluation is an important f rst step in the development of the Jetport's long-term sustainability strategy that will enable the Jetport to focus its future sustainability work on areas that are of importance and interest to the Jetport, thereby ensuring the efficient use of limited resources. It will also enable the Jetport to measure, through existing and new metrics, its overall sustainability performance over time and the impact of individual initiatives.

Baseline Assessment Contents Overview

To determine the focus areas for this sustainability plan, the Project Team f rst worked with the Jetport and its stakeholders to develop priority categories for the Jetport SAMP. These priority categories are considered areas of primary importance to the Jetport and its stakeholders. This Baseline Assessment evaluates the Jetport's performance related to these categories, which include:

- Greenhouse Gas (GHG) Emissions;
- Energy;
- Waste Management and Recycling;
- Ground Access and Transportation;
- Social Responsibility; and
- Governance.

This Baseline Assessment also reviews the Jetport's performance relative to water quality and noise. These categories, however, are not given priority status, as the Jetport already dedicates substantial resources to ensure that it mitigates its impacts in these areas to the greatest extent practicable (for example, the Noise Advisory Committee [NAC] and the Jetport's award-winning aircraft deicing fluid re-cycling facility operated by Inland Technologies). Further, among all of the sustainability categories that the Jetport considered, water quality and noise are the most highly regulated by governmental bodies, as this Baseline Assessment discusses.

In addition to the sustainability categories, this Baseline Assessment also reports on the sustainability activities currently undertaken or planned for implementation by the Jetport's tenants. Tenant activities crosscut multiple sustainability categories and can substantially affect the Jetport's overall sustainability performance.

This chapter of the SAMP includes the following supporting documentation:

Appendices:
- Appendix C: GHG Emissions
- Appendix D: Energy
- Appendix E: Waste Management and Recycling

Supplemental Information:
- Part I: Sustainability Baseline Interview Notes
- Part II: Summary of Energy Usage Data
- Part III: Solar PV Old Terminal Overhang
- Part IV: Solar PV Terminal Building Roof
- Part V: Deicing Facility CHP Preliminary Payback Analysis
- Part VI: Waste Analysis Data and Supporting Documentation
- Part VII: Tenant Sustainability Survey Results

Baseline Assessment Methodology

This Baseline Assessment collected data from a variety of sources that include interviews with key Jet-port staff (see Supplemental Information, Part I), Jetport planning documents and reports, and web-based information. The assessment of each priority category includes the following:

- Introduction
  Provides an overview of the category and sustainability context.

- Regulatory Overview
  Reviews pertinent rules and regulations that define the parameters for reporting and initiative implementation.

- Relevance to Other Areas
  Discusses potential overlapping or secondary effects to other sustainability categories.

- Current Performance and Baseline Information
  Summarizes the Jetport's current performance and identifies current sustainability initiatives.

- Performance Improvement Opportunities
  Provides an initial list of opportunities, identified from the baseline information, that would improve the Jetport's performance in the category.

- Data Gaps
  Discusses information that is not currently available and recommends data types to collect in the future.

Identified opportunities for performance improvement presented herein are not intended to be comprehensive, yet are provided only as a means to convey potential directions that the Jetport's sustainability program may take.

SUMMARY OF FINDINGS

The following provides a high-level summary of the policies and programs that support sustainability at the Jetport, along with the opportunities available to improve its sustainability performance. These findings, as determined by this Baseline Assessment, are presented by sustainability category.

Greenhouse Gas (GHG) Emissions

GHGs include those gases, generated through human activities and natural processes, which absorb infrared radiation in the earth's atmosphere. Accumulation of GHGs (i.e., carbon dioxide [CO2], methane [CH4], nitrous oxide [N2O], Sulfur hexafluoride [SF6], Hydrofluorocarbons [HFC], and Perfluorocarbons [PFC]) increases the amount of energy held in the atmosphere, which has been linked to changes in the Earth's climate. The three scope categories include direct emissions (Scope 1), indirect emissions (Scope 2) and, indirect and optional emissions (Scope 3). Scope 3 sources account for the largest percentage of emissions at the Jetport (88 percent), followed by Scope 2 and Scope 1 emissions together accounting for twelve percent of all PWM's emissions. Overall, the greatest source of emissions results from operation of aircraft, which accounts for approximately 61 percent of overall GHG emissions at the Jetport. This is followed by tenant electricity purchase at 14 percent.

The Jetport's main sustainability successes in this category pertain to the installation of the geothermal system, which reduces GHG emissions associated within the operation of the terminal by 1,000 pounds per year, and the installation of 400-hertz electrical power units on each passenger boarding bridge except at Gate 1, which reduces fuel consumption and associated emissions from aircraft auxiliary and ground power units. Opportunities to reduce GHGs include the continued replacement of airfield quartz lighting throughout the terminal complex with technologies that are more effective and efficient, installation of a pre-conditioned air system to provide heated or cooled air at the boarding gates as an alternative to on-board systems which increase fuel consumption, and the purchase of alternative fueled vehicles and equipment for the Jetport's fleet.

Energy

Energy conservation and the use of renewable energy yield numerous economic and environmental benefits, including reducing GHG emissions, improving air quality, as well as reducing energy costs. Energy improvements at an airport often directly result in energy savings, due to the high cost of electricity and natural gas. The Jetport's utility costs accounted for seven percent of its operating expenses in FY 2013. This section focuses on energy performance within PWM facilities, which include the terminal buildings, hangars and other non-terminal buildings, loading bridges, and the deicing facility. The energy assessment reviewed energy sources and energy consuming systems throughout the Jetport and assessed the energy efficiency of the passenger terminal facility and other PWM facilities. The new terminal building systems appear to be well thought-out and practical from a life-cycle cost-benefit perspective. Highlights include LEED Gold certification for the terminal building and the Jetport's geothermal heating and cooling system, which was nearly cost neutral in the first year that related performance data was available and has opportunities for improved performance and energy savings in the future.

Waste Management and Recycling

Airports generate varying types and amounts of waste that primarily include municipal solid waste (MSW), construction and demolition debris, compostables, and deplaned waste. Passengers, airlines, tenants, vendors, and employees are the primary generators of waste at airports. In FY2014, the Jetport recycled 10.8 percent of the solid waste collected, which represented only a marginal increase from the 10.6 percent recycling rate in 2013. Increasing this recycling rate to meet the Maine Department of Environmental Protection's goal of recycling 50 percent of MSW represents an opportunity for improvement at PWM.

The Jetport has a strong record of accomplishment in diverting construction and demolition waste from local landfills; for example, during the construction of the new terminal addition, 89.6 percent of construction and demolition waste was diverted from the landfill. In addition, the Jetport's deicing fluid recycling program is an exemplary facility within the aviation industry, as it treats spent deicing fluid from PWM as well as other airports and facilities. The deicing fluid recycling facility on-site at the Jetport has the potential to enhance PWM's overall sustainability performance by processing spent deicing fluid into usable Type I aircraft deicing fluid to be reused at PWM. It is made possible by the deicing recycling contractor's US patent for this product.

Ground Access and Transportation

Although airports are typically associated only with air transportation, they also function as surface transportation nodes. Typically, modes of surface transportation at an airport include private passenger vehicles, rental vehicles, livery, public transit, and pedestrian or cycling access. In an effort to make its surface transportation framework more sustainable, the Jetport has implemented programs such as establishing priority parking for employees that drive high-efficiency/low-emissions vehicles and the development of the Consolidated Rental Car Atrium. Opportunities for continued improvement of the Jetport's surface transportation framework include implementing activities identified in the Jetport's 2009 *First Year Plan for Transportation Demand Management* (TDM Plan) such as the promotion of an employee rideshare program, as well as expanding public transit options to the Jetport and enhancing bicycle access.

Social Responsibility

The Jetport strives to act responsibly towards its passengers and employees, as well as the local communities in which it operates. To fulfill this responsibility, the Jetport has implemented a number of programs that focus on passenger experience, customer service, employee satisfaction and well-being, and community contribution. Efforts to enhance passenger experience and customer service include creating a sense of place through local cuisine and ambiance, terminal art displays, children's play areas, and a customer service program called "Above and Beyond." Efforts to ensure employee satisfaction include a safety incentive program and employee appreciation events. The Jetport's contributions to local communities include charitable giving, aviation-related educational programs, and economic contributions. PWM's suite of social responsibility programs is already comprehensive and conscientious; however, the Jetport could improve its social responsibility performance relative to its passengers, employees, and local communities through measures such as enhancing the existing public aircraft observation area, promoting on-site physical activity, increasing employee engagement activities, and updating the Jetport Service Quality (ASQ) survey.

Governance

Governance is comprised of the systems in place that enable an organization to make and implement decisions. The Jetport has demonstrated leadership in sustainability through its mission statement that incorporates all three responsibilities of sustainability (i.e., environmental, social, and economic), as well as the existence of Airport Performance Indicators (APIs), which will be integral in the completion of the Jetport's sustainability framework and related reporting. However, there exist strong opportunities to formalize sustainability as a core value for the organization by establishing policies and integrating sustainability into the Jetport's decision-making processes, such as its capital expenditure prioritization.

Water Quality

Airport operations can impact water quality through stormwater conveyance of contaminates. To lessen its water quality impacts, the Jetpoprt conducts careful planning and management that includes stormwater quality treatment measures, the collection and recycling of spent aircraft deicing fluid in a state-of-the-art deicing management facility, and adherence to the *City of Portland's Oil Spill Prevention Control and Countermeasure Plan and Stormwater Pollution Prevention Control Plan*. Continuation of these efforts will ensure that the Jetport maintains its exceptional performance in this category. Potential opportunities for improvement include installing additional on-site stormwater management options, particularly "green" infrastructure projects such as bioswales and rain gardens, and the collection of rainwater to reduce the Jetport's stormwater volume.

Noise

Noise can be defined as any unwanted sound, and is often a significant determinant of an airport's relationship with local communities. Aircraft are the primary generators of noise at airports. The Jetport excels at considering and mitigating noise impacts on its neighboring communities through a robust noise program that includes the NAC, a 14 CFR Part 150 study, and the voluntary Fly Quiet Program, among other initiatives. To maintain positive relations with neighboring communities, the Jetport should maintain these existing programs. Opportunities for performance improvement include working with local entities and property owners, as applicable, to increase/enhance landscaped areas around and adjacent to the Jetport; considering positioning extant and new noise-generating equipment away from residential areas, where feasible; and requiring all construction contractors to mitigate unwanted noise and vibration to the greatest extent practicable.

Tenant Sustainability

Tenant sustainability is a crosscutting issue that affects the Jetport's overall sustainability performance. Airport tenants generally include concessionaires, airlines, fixed-base operators, car rental companies, and government agencies, among others. Many of these entities provide travelers with products and services, while contributing to the revenue of the Jetport. Overall, few tenants at PWM are engaged in sustainability; ISS Facility Services, HMSHost, and Paradies are the most active in this regard. However, there is widespread interest in sustainability practices. The issues that appear most important to PWM tenants include recycling, environmentally preferable purchasing, and energy efficiency.

One significant advancement of tenant sustainability undertaken by the Jetport is instituting a requirement that all tenants participate in the Jetport's recycling program. Further opportunities to improve tenant sustainability include enhancing integration of sustainability in the Jetport's tenant lease agreements, developing design and construction standards that incorporate sustainable principles, and holding tenant awareness and training programs related to the Jetport's sustainability program and industry best practices.

GREENHOUSE GAS (GHG) EMISSIONS

GHGs include those gases, generated through human activities and natural processes, which absorb infrared radiation in the earth's atmosphere. Accumulation of GHGs increases the amount of energy held in the atmosphere, which has been linked to changes in the earth's climate. Consistent with Executive Order 13514 *Federal Leadership in Environmental, Energy, and Economic Performance*, GHGs for the purposes of this discussion include:

- Carbon dioxide (CO_2);
- Methane (CH_4);
- Nitrous oxide (N_2O);
- Sulfur hexafluoride (SF_6);
- Hydrofluorocarbons (HFC); and
- Perfluorocarbons (PFC).

Regarding airport activities, the primary source of GHGs is from the combustion of fuels, which primarily generates CO_2. Relatively small amounts of CH_4 and N_2O are also generated during combustion. These emissions result from the operation of aircraft, vehicles used for transporting passengers to and from airports, ground support equipment, airport maintenance and operations vehicles, and through use of utilities such as natural gas and electricity. Fluorinated compounds (SF_6, HFC, PFC) are typically generated through industrial activities and are considered less significant within the realm of aviation.

On both the global and national scale, the aviation sector is a relatively small contributor of GHGs. The International Civil Aviation Organization (ICAO) estimates that aviation accounts for two percent of total global CO_2 emissions.[1] In comparison, within the United States, the General Accounting Office reports that, based on available U.S. Environmental Protection Agency (EPA) data, domestic aviation contributes approximately three percent of total carbon dioxide emissions, and the remainder of the transportation sector contributes approximately 20 percent of carbon dioxide emissions.

As stated in the FAA's Interim Guidance for *Considering Greenhouse Gases and Climate Under the National Environmental Policy Act (NEPA)*, FAA seeks to clarify the role that commercial aviation plays in GHG emissions and climate by participating in multiple research initiatives. In conjunction with other participating federal agencies (e.g., NASA, NOAA, EPA, and DOE), the FAA has worked with the U.S. Global Change Research Program to develop the Aviation Climate Change Research Initiative (ACCRI) to advance scientific understanding of regional and global climate impacts of aircraft emissions. FAA also funds the Partnership for Air Transportation Noise & Emissions Reduction (PARTNER) Center of Excellence research initiative to quantify the effects of aircraft exhaust and contrails on global and U.S. climate and atmospheric composition. The International Civil Aviation Organization is examining similar research topics at the international level.

[1] International Civil Aviation Organization Environmental Report 2013, http://cfapp.icao.int/Environmental-Report-2013/files/assets/common/downloads/ICAO_2013_Environmental_Report.pdf

SUSTAINABILITY CONTEXT

Commercial service airports such as the Jetport connect to the local and national transportation systems and have many stakeholders (e.g., passengers, users, tenants, and staff) to consider when evaluating GHG emissions. To maintain a consistent evaluation of GHG emissions, the World Resources Institute and the EPA recommend consideration of the organizational and operational boundaries to establish the context for GHG inventories. The organizational structure is generally determined by ownership and, by extension, any associated legal agreements. For the purposes of this baseline report, the organizational boundary includes the City of Portland Department of Aviation and any tenants or leaseholders that have entered into a legal agreement with the Department of Aviation.

As outlined in the Airport Cooperative Research Program's *Guidebook on Preparing Airport Greenhouse Gas Emissions Inventories* (the Guidebook), emissions associated with operations are designated within three categories to establish the operational boundaries for the inventory. The three categories include direct emissions (Scope 1), indirect emissions (Scope 2), and indirect and optional emissions (Scope 3). Each of the Scopes is further defined in the Guidebook as follows:

- Scope 1: Direct emissions are from sources that are owned and controlled by the reporting entity (e.g., on-airport emissions from combustion in owned and controlled boilers, furnaces, vehicles, etc.). For an airport, the Scope 1 emissions would be those associated with fuel-powered vehicles owned and operated by the Jetport entity, as well as stationary sources owned and operated by that entity. For instance, an airport owns snow removal equipment and ground vehicles that burn fuel to service the Jetport, as well as the Jetport heating system or generators that may burn heating oil.

- Scope 2: Indirect emissions are those from the generation of purchased electricity consumed by the entity. This would represent the electricity acquired to power airport facilities. Tenant-purchased electricity would not be Scope 2, but Scope 3.

- Scope 3: Indirect and optional emissions are a consequence of the activities of the entity, but occur at sources owned and controlled by another party. Scope 3 would be the largest quantity of emissions at an airport, because they would include aircraft-related emissions, emissions from all tenant-related activities (including aircraft operations and the associated ground support activities), as well as the public's ground travel to and from the Jetport.

REGULATORY OVERVIEW

The EPA has the authority, under the *Clean Air Act,*[2] to regulate GHG emissions from all source types, including mobile sources, but has only established regulations for the largest stationary sources, which include power plants. Currently, there are no federal regulations that govern GHG emissions generated

[2] 42 U.S.C. Chapter 85

by aviation sources. At the state level, the State of Maine has not adopted GHG regulations for aviation-related emissions. Additionally, it is important to note that many of the GHG emissions associated with an airport come from sources outside of the direct control of the Jetport, such as aircraft and passenger vehicles. The federal *Clean Air Act* and federal aviation laws restrict the authority of airports to control these sources.

Additionally, the State of Maine issues Air Emissions Licenses for stationary equipment such as backup generators, boilers, and water heaters. The Jetport holds a state-issued permit that quantifies the total annual emissions from on-airport stationary sources and outlines best practical treatment for the maintenance and operation of this equipment. The license also requires annual reporting of emissions to the State of Maine.

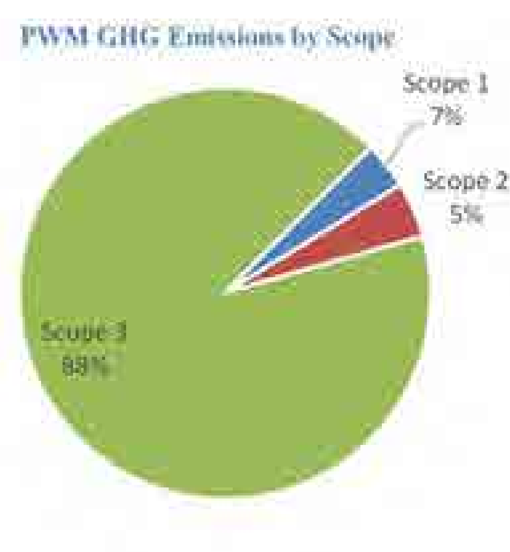
RELEVANCE TO OTHER AREAS

GHG emissions relate to areas beyond the primary function of the Jetport, which is to provide a safe and efficient environment for aircraft to operate. For example, airside and landside energy conservation measures can reduce GHG emissions by decreasing combustion of fuels. Additionally, materials management and composting programs at the Jetport can reduce the number of trips to the landfill, thereby reducing GHG emissions. Regarding passenger transportation to and from the Jetport, an expanded public transportation system would reduce vehicle trips to the Jetport, which would also decrease GHG emissions.

CURRENT PERFORMANCE/BASELINE INFORMATION

Baseline GHG Emissions Inventory by Scope and Source

Based on federal GHG protocols, GHG emissions are expressed as metric tons of carbon dioxide equivalent (MT CO_2e). As previously discussed, combustion is the primary GHG producing activity at airports and CO_2 is the GHG emitted in the largest portion from combustion. Therefore, protocol states that the remaining combustion-related GHG be converted to MT CO_2e, which is accomplished within ACERT. Based on the assumptions and methodology discussed in Appendix C, a baseline GHG emissions inventory for the Jetport was prepared.



Using the previously defined Scopes, the adjacent figure summarizes the distribution of direct (Scope 1), indirect (Scope 2), and indirect and optional (Scope 3) GHG emissions. As indicated in the figure, Scope 3 sources account for the largest percentage of emissions, followed by Scope 2 and Scope 1. As presented in **Table 3A**, the greatest source of emissions results from operation of aircraft, which accounts for approximately 61 percent of overall GHG emissions. This is followed by tenant electricity use at 14 percent. The next largest sources are airport utility consumption (gas, fuel oil, electricity) at 10 percent and tenant landside vehicles at 6 percent.

TABLE 3A
Greenhouse Gas (GHG) Baseline Inventory (2013)
Portland International Jetport

			GHGs (t)					
Entity	**Source**		**Scope**	**CO_2**	**CH_4**	**N_2O**	**CO_{2e}**	**CO_{2e} %**
Jetport Operator	Jetport	Airside Vehicles	1	442	0.0805	0.0245	451	1.78%
	Jetport	Buildings (gas/oil/coal)	1	1,267	0.0201	0.0052	1,269	5.01%
	Jetport	Fire Training	1	0	-	-	-	0.00%
	Jetport	Emergency Generator	1	33	0.0017	0.0050	35	0.14%
	Jetport	Glycol	1	0	-	-	-	0.00%
	Jetport	Electricity Purchase	2	1,289	-	-	1,289	5.09%
	Jetport	Heat Purchase	2	0	-	-	-	0.00%
Jetport Operator Subtotal							3,044	12.0%
Tenants (including airlines, government, shops etc.) and Employees	Tenant	Aircraft (LTO & taxi)	3	15,349	0.7383		15,365	60.66%
	Tenant	Aircraft APU	3	420	0.0132		420	1.66%
	Tenant	Aircraft Engine Run-ups	3	6	0.0002		6	0.02%
	Tenant	Aircraft Deicing	3	66			66	0.26%
	Tenant	Airside Vehicles	3	381	0.0347	0.0261	390	1.54%
	Tenant	Buildings (gas/oil/coal)	3	279	0.0050	0.0005	279	1.10%
	Tenant	Electricity Purchase	3	3,597			3,597	14.20%
	Tenant	Heat Purchase	3	-	-	-	-	0.00%
	Tenant	Fire Training	3	-	-	-	-	0.00%
	Tenant	Emergency Generator	3	-	-	-	-	0.00%
	Tenant	Landside Vehicles	3	1,543	0.2665	0.131	1,589	6.27%
	Tenant	Employee Vehicles	3	59	0.0111	0.0050	61	0.24%
Tenant Subtotal							21,773	86.0%
Public (including passengers)	Ground Access Vehicles	Cars, taxi	3	26	0.00	0.00	27	0.11%
		Bus, shuttles	3	468	0.21	0.04	485	1.91%
		Rail	3	-	-	-	-	0.00%
Public Subtotal							512	2.0%

SUSTAINABILITY SUCCESSES

The most notable reduction in GHGs at PWM is the installation of the geothermal system, which was constructed during the terminal expansion project completed in 2012. Using this system, CO_2 emissions associated with the operation of the terminal are reduced by 1,000 pounds per year. At the passenger boarding bridges, PWM has made available 400Hz ground power, which reduces the use of on-board auxiliary power units and diesel-powered portable ground units.

Additionally, using materials management techniques employed during construction of the terminal, which is certified to the LEED Gold Standard, reduced trips to the landfill, which also decreased GHG emissions.

POTENTIAL OPPORTUNITIES FOR PERFORMANCE IMPROVEMENT

As previously discussed, the Jetport has no authority to reduce aircraft emissions; however, opportunities exist to reduce emissions from vehicles, airside facilities, and buildings. Some of these opportunities include:

- Where possible, replace incandescent and quartz runway and taxiway fixtures with LED fixtures to reduce energy consumption;
- Building on the success of the terminal geothermal project, encourage the continued use of renewable energy techniques in future Jetport development projects;
- Consider installation of pre-conditioned air at each aircraft boarding gate. These systems heat or cool air, depending on the season, that is delivered directly to aircraft during boarding and deplaning. These systems can reduce fuel use, which in turn reduces emissions.
- As vehicles and equipment in the Jetport and tenant fleet are retired, promote purchase of replacement units powered with alternative fuels such as compressed natural gas (CNG); and
- Create an energy audit program for tenants to identify opportunities for energy use reductions.

DATA GAPS

The GHG emissions inventory relies on tenant responses to a questionnaire regarding common practices and energy use. For the purposes of this analysis, eight tenants plus the Jetport were contacted with the questionnaire. Five of the tenants and the Jetport provided responses to the questionnaire, while three tenants remained non-responsive after additional attempts to encourage participation.

ENERGY

Energy conservation and the use of renewable energy yield numerous economic and environmental benefits, including reducing GHG emissions, improving air quality, as well as reducing energy costs. Energy improvements at an airport often directly result in energy savings, due to the high cost of electricity, oil, and natural gas. PWM's utility costs accounted for seven percent of its operating expenses in FY 2013. This section focuses on energy performance within PWM facilities, which include the terminal buildings, hangars and other non-terminal buildings, loading bridges, and the deicing facility. PWM has already implemented a number of energy efficiency initiatives, and recently completed a 137,000 square-foot addition to its terminal building, which received LEED Gold certification. In addition, PWM's geothermal system has resulted in a significant decrease in the Jetport's fuel oil consumption and, as a result, source emissions.

REGULATORY OVERVIEW

When completing large projects such as PWM's terminal expansion, an airport is required to submit an Environmental Assessment (EA) to the FAA to obtain a Finding of No Significant Impact. The FAA reviews the document to ensure the project meets any applicable environmental requirements such as the Section 101(2) (c) of the *National Environmental Policy Act* (NEPA). Included in the November 2009 EA titled "Final Environmental Assessment for the Proposed Airfield and Terminal Area Improvements" is Chapter 4.2.6, "Energy Supplies, Natural Resources, and Sustainable Design." This chapter discusses the impact on natural resources resulting from fuel usage during construction for the Jetport improvements, and other indirect impacts that construction activities could temporarily affect. Also included in this chapter is an explanation of the proposed terminal additions' expected energy use once completed. According to the EA, "The terminal addition is expected to use less energy than the existing areas of the terminal due to the efficient cooling and heating systems and new construction materials that reduce energy consumption. Additionally, the new terminal may be designed to the Leadership in Energy and Environmental Design (LEED) Green Building Standard." In fact, the terminal building received a Gold LEED certification.

The FAA provides guidance on solar technology on airports in a November 2010 document titled "Technical Guidance for Evaluating Selected Solar Technologies on Airports." The document's purpose is to provide a readily usable reference for FAA technical staff who review proposed airport solar projects and for airports that may be considering a solar installation. According to the document, "Solar technology has matured and is now a reliable way to reduce airport operating costs. Environmentally, solar energy shows a commitment to environmental stewardship, especially when the panels are visible to the traveling public." This document is important to refer to if PWM decides to implement solar technology in the future.

Any future building projects, either energy driven, capital or deferred maintenance, should comply with the City of Portland's recently adopted Energy Ordinance and the 2009 IECC Maine Uniform Building and Energy Code "MUBEC," as there are many triggers that call for implementation of its prescriptive measures. The team also recommends that any building retrofits, alteration projects, or major "repairs" be simulated with a whole building energy modeling software such as DOE 2.2 (eQUEST® user interface) to readily comply with the energy codes non-prescriptively. In other words, modeling buildings in an airport type environment will facilitate modifications meeting the energy code more readily than prescriptive measures. Although this may present itself as a "loop hole" the recommendation serves itself well in that it is difficult to maintain a working knowledge of the ever changing energy code and supplements that may not fit the energy code's intent because it is largely based on commercial type structures/buildings. The implementation of this will ensure that a readily available means of meeting energy code through a comprehensive/custom approach is in place and will serve as a measurement and verification tool as it is updated.

RELEVANCE TO OTHER AREAS

The complex energy systems and energy usage at PWM are closely related to the following other sustainability categories:

- Governance;
- Waste Management and Recycling;
- Social Responsibility; and
- GHG Emissions.

Governance is comprised of the systems in place that enable an organization to make and implement decisions. PWM's leadership personnel are committed to efficient and sustainable energy systems and improvements. Examples of this are the success of the LEED accredited terminal building and VALE funded geothermal heating and cooling system. Key leadership personnel at PWM are also open to new ideas and have identified many opportunities for the Jetport to integrate sustainable practices. This includes ways to enhance the existing energy systems and future projects with well-integrated sustainability context.

Waste management and recycling is related to energy through the energy that can be extracted from waste-to-energy and recycled used cooking oil. PWM is dedicated to reducing and recycling waste, including spent aircraft deicing fluid, as a part of being sustainable. Currently, there is a single-sort recycling program implemented at the Jetport that includes the recycling of all paper products including newspaper and cardboard, glass and metal, and plastic. The recycling program at the Jetport is supported by ecomaine, a local non-profit waste management company located in Portland, Maine. The waste generated at the Jetport that is not recycled is also brought to ecomaine, where it is incinerated as part of a waste-to-energy process. PWM contributes approximately 400 tons of non-recyclable municipal solid waste a year to ecomaine. The ecomaine plant incinerates approximately 175,000 tons of trash per year, which produces enough steam to generate 100,000 - 110,000 megawatt-hours of electricity annually.

There are various restaurants at PWM, and all participate in the recycling of used cooking oil. Approximately 1,090 gallons of used cooking oil is recycled per year at the Jetport. The used cooking oil is brought to the Maine Standard Biofuels facility in Portland, Maine and recycled into high quality biodiesel as well as a powerful cleaning product.

PWM is socially responsible for minimizing depletion of natural resources caused by energy usage and the GHG emissions released through the energy processes. The primary source of GHG emissions at the Jetport is the combustion of fuels, which primarily generates CO_2. These emissions result from the operation of aircraft, vehicles used for transporting passengers to and from airports, ground support equipment, maintenance and operation vehicles, and the use of natural gas and electricity.

CURRENT PERFORMANCE/BASELINE INFORMATION

Overview of Energy Infrastructure

The following provides a review of energy sources and energy consuming systems throughout the Jetport as well as an energy efficiency assessment of the passenger terminal facility and other PWM facilities. A modified ASHRAE (formerly the American Society of Heating, Refrigerating and Air Conditioning Engineers) Level I energy audit was utilized to include a simple payback summary where deemed necessary and to provide recommendations for replacement, upgrade or addition of the energy consuming systems where appropriate. Input has been offered regarding various energy conservation opportunities that presented themselves through a terminal building walkthrough and review of other information provided. Utility bills for the base building meters and fuel usage data were reviewed for anomalies and have been reported on (see Supplemental Information, Part II). There are a number of check metered tenant spaces as PWM is not the sole occupant-proprietor. These tenant meters have been accounted for and reported on. However, it is important to note that assumptions were made relative to some of the end uses and consumptions relative to these meters. A detailed utility bill analysis was performed and is discussed later in this report. Project team personnel visited the site in June 2014 and toured the facility with airport staff to benefit this Baseline Assessment.

The team has also interviewed facility staff, and energy-related interviews are included in Supplemental Information, Part I. Based on interviews as well as on-site facility investigation and review of energy consumption data, the team has established a baseline Energy Use Index (EUI) that can be utilized to benchmark future performance.

The Jetport has installed a geothermal energy (heating and cooling) system to take advantage of a renewable energy source and save on heating and cooling expenses. This document evaluates the feasibility of installing other renewable energy sources, such as solar/photovoltaic, on airport property to determine what type of technology, if any, should be considered by PWM for future implementation.
Possible alternatives for PWM to purchase renewable energy from local sources off-airport are identified later in this energy section.

Based on feedback from PWM's staff and recent projects that have been completed, it is clear that energy consumption is closely monitored and understood by the city. ROI is understood to be the cost-benefit model PWM utilizes; as such, recommendations for energy conservation measures and occupant comfort measures are provided below.

General

Because of the number of buildings/facilities studied, we have organized this section by building envelope and grouping of building types. The groupings include the following:

- Building Envelope;
- Old Terminal Building;
- New Terminal Building (Addition/Expansion to Existing Terminal Building);
- Hangars and Other Non-Terminal Buildings (Maintenance);
- Loading Bridges; and
- De-Icing Facility.

Note 1: Because the buildings have been analyzed in accordance with the ASHRAE Level I audit guidelines, only the large and most significant energy consuming equipment has been studied/analyzed.

Note 2: System median useful life is an ASHRAE suggested value.

Building Envelope

The existing terminal complex was constructed in several phases, and consequently consists of various building envelope assemblies. Predictably, each newer addition appears better insulated than the last and reflects advances in best building practices. Existing documentation does not contain detailed R or U values and only shows materials' thickness that may not reflect as built conditions. Roof insulation thicknesses may not be accurate on the older drawings, as roofing replacement projects may have been implemented.

- 1967 Original Terminal: The primary solid wall assembly consists of precast concrete wall panels with only 1" thick rigid insulation on the interior side, under a layer of plaster. Since 1967, interior insulated partitions may have been built in some areas, but it is likely this poorly insulated condition exists in many older areas of the terminal. Some uninsulated single pane glazing also exists.

- 1980 Expansion: Solid wall assemblies consist of 1 ½" rigid wall insulation at concrete masonry units, and in some cases, uninsulated masonry exterior walls with interior partitions with 6" thick batt insulation. Recent research shows that batt insulation alone is a poor insulator, due to air gaps, bunching, and poor installation.

- 1994 Western Expansion: The primary solid wall assembly uses 2" thick rigid insulation and glazed assemblies with 1" insulated glass units. The roof plan indicates 1 ¾" thick roof insulation at the low points and 6" insulation at the high point. Modern common building practice is to provide a minimum of 4" roof insulation thickness at the low points.

- 2010 Expansion: The primary solid wall assembly uses 3" thick continuous wall insulation and a minimum of 4" thick roof insulation. Glazed assemblies use 1" insulated glass units, with different coatings and solar heat gain coefficients based on solar orientation. Automated interior shading tied to the building management system was a missed opportunity that was cut from the project budget, which might be investigated for a retrofit or future project.

Old Terminal Building

In general, the older portion of the terminal building is heated and cooled by four boilers and a chiller plant located in the penthouse spaces of the old terminal. The chiller plant consists of two chillers with the heat rejection device (open cooling tower) located on the roof. Sumps for the cooling tower are remotely mounted in the mechanical penthouse adjacent to the towers. All pumps in support of the hydronic heating and cooling system are located in the east penthouse over the baggage claim and the central penthouse. The mechanical room houses the chilled water generation equipment. In general, hot/chilled water is distributed to terminal units and air handling units serving the spaces. The fresh air for the remainder of the building is distributed from a roof mounted make-up air unit. Multiple roof-mounted centrifugal up-blast fans accommodate bathroom exhaust. Controls for the HVAC system consist of Direct Digital Controls (DDC). The controls systems are automated through a central BAS (Building Automation Controls System).

There are two mechanical penthouses in the "old" east section of the terminal with four boilers. The gas/oil fired cast iron boilers are HB Smith and are more than 25 years old with an expected useful life of 30 years if properly maintained. The boilers are in fair condition. The assumed combustion efficiency is approximately 80 to 82 percent AFUE (Annual Fuel Utilization Efficiency).

Hot Water Boiler/Burner System at the Old Terminal

Cooling Tower at the Old Terminal

The current control strategy for the boiler system is assumed to be controlled via an outside air temperature reset/enable, but this was not apparent at the time of the site visit. The burner that is associated with this system has limited turn down capability and is fitted with a 50 percent potentiometer, with a linked gas butterfly arrangement. The heating/hot water boiler system is arranged in a primary only pumping arrangement and serves various outlying building terminal equipment and air-handling units.

The cooling tower (heat rejection system) consists of two single cell induced draft-cooling towers with a remote common sump/basin located in the mechanical penthouse space. This strategy is commonly employed as a means to not have to include freeze protection in the winter months (Northern New England) in an outdoor basin. The east penthouse also houses two air handling units each with enthalpy wheels for energy recovery. The space beneath the east penthouse that is served by these units is currently vacant.

New Terminal Building

The “new terminal building” has many excellent energy conservation measures that were implemented at the time of construction. This document’s focus relative to the new terminal building lies in the mechanical systems that have been well regarded within the city and as well have received a significant amount of favorable press and awards.

The heating/cooling system currently consists of a geothermal well/heat pump system that utilizes modular water-cooled heat pumps and a “Trane” chiller. In addition, the heating is supplemented by a high efficiency gas fired condensing boiler system. Efficient/innovative design features of the new terminal building include radiant floor heating and floor air distribution.

The current geothermal system is operating with the heat pumps as the lead system for cooling and heating and the chiller and boiler system as the lag/backup. A study was performed prior to the new terminal building construction to determine the feasibility of using a ground source heat pump (geothermal) system to heat and cool the Jetport’s new terminal expansion. The study included drilling and thermal load testing a single, full depth, closed loop geothermal well. The results of this testing and the specific heating and cooling demands of the terminal expansion were used to evaluate the feasibility of geothermal systems. Based on these evaluations, it was determined that a “hybrid” geothermal system consisting of 120 closed loop wells along with undersized conventional heating/cooling equipment was the optimal system for the terminal simple expansion with a projected payback period of six years (including VALE funding) and 10 years (without VALE funding). Based on recent discussions with the Jetport, we understand that the system performance has resulted in a significant decrease in the Jetport’s fuel oil consumption.

The new geothermal plant produces both heating and cooling by way of the plant heat pump; the system is backed up for cooling by a fully redundant chiller.

Hangars and Associated Non-Terminal Buildings

The hangars and associated non-terminal buildings utilize stand-alone package and split system cooling and No. 2 fuel heating. As indicated in the interviews with facilities staff, the hangar door seals and frequency of opening cause a great deal of heat loss and

Hangar

energy consumption. The newer hangars are in better condition with more advanced door systems. The hangar/maintenance facility seen in the photo is an example of the type of construction and age of one of the buildings.

Loading Bridges (Jetways)

The pedestrian loading bridges were not originally a target of our benchmarking efforts; however, after examining the utility metering, some of these bridges are attributing to the kWh annual consumption. The bridge at Gate #1 is heated/cooled via a gas/electric heat pump on top of the bridge, as seen in the photograph. We are unaware of the quantity of insulation in the envelope, if any. A large contributing factor to the kWh consumption is the 400Hz ground power units for aircraft.

Loading Bridge at Gate #1

Deicing Facility

In 2010, PWM began a program to reclaim aircraft deicing fluid (propylene glycol). The glycol recycling facility is operated as a turnkey system by Inland Technologies. The system consists of concentrators, a distillation system, and a Reverse Osmosis (RO) system for polishing process water. The glycol is reclaimed and processed back to 99 percent pure. The system not only recycles the spent glycol utilized for deicing at PWM, but also other airports and sites. This recovery system with inclusion of treatment of fluid from other sites has resulted in lowered operations cost for the Jetport as well as lessened the environmental impact the glycol has on the surroundings, which includes the Fore River to the east of the Jetport. Each of the processes utilized in the glycol recovery process are very energy intensive and utilize both electric and natural gas fuels. The actual facility envelope and ancillary systems can be taken as negligible as the energy intensity of the process overwhelms any small portion of consumption utilized for lights and heat.

Inland Group De-Icing Facility

The photograph shows an overall view of the facility and apparatus. The distillation process and boiler stack can be seen in the center and to the left in the photograph. Although energy intensive, there are opportunities for energy cost avoidance at this facility that will be elaborated on later in the energy analysis/opportunity portion of this document.

Recommendations, Economics, and Energy Conservation Opportunities

General

The base case for all energy analysis is the existing system as described in the Overview of Energy Infrastructure portion of this report and in the interview documents found in Supplemental Information, Part I. Any construction cost estimates stated herein are preliminary engineering opinions of cost. All energy consumption analysis was developed utilizing computer modeling, if required, with eQUEST® building analysis software or past historical data via similar analysis. Utility rates utilized for this analysis were given by the end user/owner. Based on interviews and discussions with staff, energy conservation opportunities and proposed capital improvement projects are offered.

Utility Bill Analysis

A utility bill analysis can provide a good first look at the large picture of the building's energy use. Utility bills also provide an easy way to benchmark a building's utility use and track changes and upgrades to the building. The Jetport provided the team history of electricity, natural gas, and fuel oil billing data. The U.S. Energy Information Administration (EIA) publishes energy usage averages from the 2003 Commercial Buildings Energy Consumption Survey (CBECS). This published data is a great tool for benchmarking building performance by usage, size, location, year constructed, or several other categories. CBECS data can also be viewed in a variety of ways (i.e., by building size, use, construction year, region, etc.).

The Energy Usage Index (EUI) is a measure of total energy used per square foot of floor area per year. The calculated EUI for the Airport is approximately 120 kBtu/sq ft. The CBECS category utilized is "Assembly Buildings" which encompasses transportation terminals/airports. The national average for assembly type buildings in this category and square footage is 110 kBtu/sq ft. Although on the high side of the average, we believe that this is largely attributed to the older portion of the terminal building and addressing the Energy Conservation Measures (ECMs) suggested herein will aid in lowering the terminal buildings (new and old) EUI to well below the national average.

Although the Airport is currently utilizing the Quad Logic Systems, we recommend the Airport utilize the Energy Star Portfolio Manager to further benchmark and continuously track utility expenditures. Portfolio Manager is a free online tool provided by Energy Star. The tool can be utilized for each building to benchmark building energy consumption performance against the CBECS survey with a statistical algorithm. The tool is also capable of benchmarking any construction or energy conservation measures such as luminaire lamp replacement.

Utility bills were further analyzed to identify any unusual trending in the data. Typically, a heated and cooled building will experience seasonal peaks and valleys for both electricity and natural gas consumption. Electricity should typically peak during the summer season as the mechanical cooling equipment is in operation, while natural gas consumption should fall close to zero consumption during the cooling season to meet domestic hot water needs. Variations from this can indicate simultaneous heating and cooling, poor control strategies, or unique operation, which is not typical of this building type/usage per EIA, published CBECs. Upon initial examination, the energy consumption and demand trends very well, with the exception of the ground power units and baggage handling system.

The data analysis of the terminal building kWh profile is also backed by a consistent and steady demand (kW) which means that something is running for long periods without any off time or reduction in draw/consumption. One speculative reason for the high kWh consumption in winter months is the use of the 400Hz ground power units as well as the baggage handling systems, which utilize a large number of induction motors, most of which run idle in standby without baggage per FAA regulations.

In addition to trending consumption, we have also considered end-use consumption such as heating, lighting, and equipment/plug loads as there are a number of metering devices that do not necessarily lend themselves to end use analysis given their unique physical position and shared metering capability. Special attention is being paid to end uses such as baggage handling, which is a large demand and has potential for being reduced with operational modifications. Further discussion is explained in the ECMs herein relative to the potential end use consumption reduction.

The current electric utility rate/tariff is such that the majority of the dollar cost that can be generated through energy use is kW demand. The distribution and other charges that are associated with the utility rate are not as consequential as the demand charge. Demand (kW) is a result of simultaneous/peak use of equipment. In other words, the more motors, air handling units, lighting, fans, chillers, etc. that are running simultaneously, the more kW that is used instantaneously and ultimately paid for. The utility determines the kW demand by looking at the maximum 15-minute demand for the month. Off peak hour, kW demand is typically reduced by approximately 50 percent. However, the facilities' peak and off-peak demand appear to trend similarly. Review of the last 12 months of utility bills/energy consumption revealed a traditional bell curve. In other words, electric power consumption kWh peaks in the summer months, which is expected given the buildings are cooled via electric driven equipment. During winter months, the terminal building electric consumption is reduced. Although the building trends very well, there is room for improvement, which can be attained mostly through implementing energy conservation measures in the old terminal.

SUSTAINABILITY SUCCESSES

The current new terminal building systems appear to be very well thought-out and practical from a life cycle cost benefit perspective. Highlights include the 400Hz ground power units and the geothermal heating and cooling, which can be most beneficial in summer months run with the appropriate sequence of equipment installed. The geothermal project (largest geothermal in Maine) was funded through VALE and consists of 120 wells. The Jetport believes that much of future savings associated with the geothermal system will come from operations associated with cooling. Radiant heating utilizing high efficiency condensing boilers are also noted as being very successful in both energy consumption savings and occupant comfort. The LEED Gold-certified new terminal building is the most significant recent energy related sustainability success.

In addition to the major items discussed above, the Jetport has been proactive in energy related sustainability practices by:

- Replacing metal halide lights in the parking garage (with a ROI of less than three years);
- Installing new windows and insulation;
- Establishing temperature setpoints;
- Reminding employees to turn off lights;
- Establishing a Facility Department's policy to replace any light fixture/bulb that breaks with LED equipment;
- Converting five central burners to gas;
- Installing a new, high-efficiency boiler
- Establishing an unofficial, internal goal of going 100 percent LED by 2018;
- Converting light fixtures at the parking garage, reducing energy use and saving the Jetport $36,000 annually; and
- Completing airfield improvements with LED lights:
    - Replacing all airfield signs to be illuminated by LED lights instead of incandescent lights
    - The installation of LED lights along taxiways and the edge of Runway 18-36.

POTENTIAL OPPORTUNITIES FOR PERFORMANCE IMPROVEMENT

The energy audit conducted for this Baseline Assessment identified several opportunities to increase the Jetport's energy efficiency and reduce its reliance on fossil fuels. These opportunities are presented as ECMs, and include:

ECM #1 (Old Terminal Boiler, Chiller, Tower and Geothermal Well Field)

As mentioned and discussed earlier in this report, there is an aging heating/cooling system consisting of a cast iron hot water duel fuel boiler system as well as a water cooled chilled water distribution system. Due to the age and as it relates to both system infrastructures, it was apparent that a replacement system is or should be planned in the very near future. These systems are not only antiquated, but there are systems and apparatus that can replace these systems with better technology and higher energy efficiencies.

Given the success with the new terminal building's geothermal well system and its associated heating and cooling infrastructure, we believe after a preliminary analysis that there is adequate real estate and a real potential to retrofit the old terminal building systems and current distribution infrastructure with a like system in the old" terminal building. The use of a geothermal system for the old terminal building would integrate well with the existing radiant heat system. The old terminal building is currently heated by radiant heating in nearly 50 percent of its space.

We have located preliminarily the well field location that best suits the aforementioned application. The preferred location would be within the grassed infield to the east of Taxiway C just east of the control tower. We recommend that a test well in this location be studied for thermal yield ahead of any design/construction decisions to determine if an open well or closed well is appropriate. The well yield, number of wells, and cost should also be evaluated prior to any decision making. Our preliminary evaluation of the site location and application appears to be conducive to the technology, but requires further study.

ECM #2 (Vending Machines)

There are six vending machines throughout the facility. Plug loads, such as vending machines, computers, printers, fax machines, etc. are responsible for a fair amount of annual energy usage. A vending machine can utilize anywhere from $300-$500 annually in electricity. We recommend that each vending machine with the exception of any that house perishables be fitted with a "Watt Stopper" or "Vending Miser" to turn these machines off when not in use or the building is unoccupied for long periods.

Vending Miser by Watt Master™

ECM #3 (New Terminal Chiller/Boiler Operational Modifications)

We recommend changing the sequence of operations on the new geothermal system to have the chillers be the lead in cooling vs. the heat pumps. This will yield greater savings as the chiller can be retrofitted with a water regulating valve and the head pressure relief offered by the larger machine will be more beneficial. The exact time when the chiller should be utilized can be determined by the head pressure relief curves that the chiller manufacturer can provide alongside the already metered data. In other words, simply because the chiller is physically larger and is not as small and modular as the heat pumps, does not mean it is less efficient in cooling.

ECM #4 (Solar PV Opportunity)

We investigated the implementation of renewable energy at the Jetport. One source considered was photovoltaic cells as a source to provide electricity to the terminal buildings. Photovoltaic cells are arranged together into modules and wired into panels. The photovoltaic cells capture energy from the sunlight to create DC electricity. This DC electricity travels to an inverter, where it is changed to AC electricity to use for electric appliances. Most systems today are grid tied to avoid having to find a means of adding the electricity to the existing infrastructure. This also prevents having to have storage devices if power generated exceeds the need.

We investigated opportunities to utilize photovoltaic panels as an electric source. The first of the potential opportunities utilizes photovoltaic panels sized to utilize as much of the terminal building roof as possible. Ground mounts were not considered. The second of these opportunities were the building overhangs.

The first of the aforementioned yielded approximately a 248 kW DC system. The system generation production would be approximately 238,000 kWh/year with a cost avoidance of $26,200. At $4/Watt installed, the capital outlay would be approximately $992,000. The simple payback would be approximately 37 years. This exceeds the useful life of the panel system by greater than two times.

The second location mentioned previously yielded a 65 kW DC system. The system generation production would be approximately 62,700 kWh/year with a cost avoidance of $6,900. At $4/Watt installed, the capital outlay would be approximately $260,000. The simple payback would be approximately 37 years. Again, this exceeds the useful life of the panel system by greater than two times.

A summary of the calculations from the NREL PV Watts software are included in Supplemental Information, Parts III and IV.

Although there is a high first cost that is associated with this particular technology, there are third party funding options that can buy down or even eliminate the year one cost, such as PPAs (Power Purchase Agreements). A PPA option would give PWM the ability to take advantage of renewable energy and not own the actual equipment/infrastructure. Under a PPA structure, the Jetport would only be responsible for FAA compliance, leasing, and PPA purchasing; lessees would be responsible for managing the engineering, procurement, and construction; operations and maintenance; electrical interconnection; Jetport and/or third party power sales; and energy regulatory compliance. Funding opportunities available to lessees may include federal tax incentives such as the Investment Tax Credit and Modified Accelerated Cost-Recovery System (MACRS) as well as state incentives such as net metering, the Community Based Renewable Energy Production Incentive (pilot program), and PACE financing. Utility REC purchases/rebates may also be available. Savings associated with these incentive programs could be passed on to the Jetport in the form of reduced electricity costs.

ECM #5 (Combined Heat and Power CHP – Deicing Facility)

Another opportunity for reduced energy consumption and cost would be a CHP (combined heat and power) system. The opportunity for this lies in the glycol recovery process that is currently on-site. Because of the deicing facility's large year-round thermal demand, it presents the opportunity to utilize a bottoming cycle where paralleled gas fired micro-turbines can be used to generate power and use the waste heat (steam or hot water) in the glycol recovery process.

The utility bill analysis also showed an almost double in electrical consumption over the last two years due to an increase in production and use. This helps facilitate the use of CHP as the better opportunity lies in a simultaneous electric and thermal consumption.

This process is a good candidate for a CHP system as it is a more than 5,000-hour process annually with a heavy thermal demand. We estimate that a minimum of 200 kWe can be installed and potentially more depending on the final prime mover configuration and thermal need.

We took the opportunity to do a preliminary payback analysis based on a 200 kWe system with an annual thermal runtime of 5,000 hrs. The results of the analysis indicate a 7.5-year simple payback without external capital funding/year one buy down.

Results of the analysis can be found in Supplemental Information, Part V to this report.

ECM #6 (Additional Lighting Controls and Occupancy Sensors)

Per the Energy Analysis Interview, it has been reported that not all of the lighted areas are controlled through the lighting control system or occupancy sensors and some of the public common areas are lit 24/7. We understand through the interview process that all building incandescent lamps have been phased out, including the garage exterior lamps.

We recommend adding lighting control panels in areas that lack them currently and/or the existing lighting fixtures be integrated into the existing panels if space allows.

The addition of lighting controls ensures that the lights are turned on and off based on occupancy or other selectable environmental variable, such as photocell or even simple scheduling.

We also recommend lighting occupancy sensors be retrofitted throughout the facilities where currently not in place. The best guideline to utilize as a means of determining which type of spaces an occupancy sensor is best suited is ASHRAE 90.1 (latest edition) or the local building energy code IECC.

We recommend on the short term basis, at a minimum, signage and/or internal correspondence be utilized to educate the end user/occupants on turning lights off at the end of regular business hours.

As a relative measure, a building of this size with the appropriate occupancy sensors and daylighting controls vs. a building without would yield and annual energy consumption savings of approximately 179,000 kWh or $28,640.

ECM #7 (Re-Lamping/Fixture Replacement in Hangars and Maintenance Buildings)

Through the Energy Analysis Interview with Northeast Air, management reported that it is using Metal Halide (MH) lamps/fixtures in its hangars and indicated that they do plan to replace these fixtures. They have also explained the operating issues that are typically associated with MH lamps, which is their inability to start in a timely manner. When cold, MH lamps take approximately 3 to 5 minutes to start, and nearly 20 minutes when hot. As pointed out in the interview, we agree turning the lights off in many of these spaces with the inability of turning back on quickly can be considered a safety hazard for the employees.

We recommend that all MH lighting in the hangars and outlying maintenance type facilities be retrofitted with LED (Light Emitting Diode) fixtures that are suited for installation.

This ECM is highly recommended, as economics are second tier relative to public safety and well-being. Installing LEDs with occupancy sensors in low hazard spaces will yield significant energy savings over the long term and a betterment relative to occupant safety.

ECM #8 (Hangar Envelope Upgrades)

The current hangar and maintenance buildings are largely constructed of purlin type metal buildings. The age of the buildings is such that any existing insulation may not be adequate relative to current codes. Although not a code concern unless a significant portion of any of these buildings is upgraded, it does have a significant effect on energy consumption with respect to open spaces and heating, specifically.

The building has a very unique design with significant interior volumetric space or ceiling heights. At a minimum, a retrofit project is should be considered where roof insulation if not adequately provided. Although insulation projects tend to have a long-term simple payback from 25 to 30 years, it will provide an immediate reduction in emissions as many of these buildings are heated with fossil fuels.

Another significant envelope concern is the hangar and maintenance doors that are open many hours, contributing to high fossil fuel energy consumption. Although the hangar doors are very tall and have a significant area relative to the total envelope wall area, there are means of reducing the inherent infiltration that occurs with these types of door systems. Recommendations to remediate this infiltration/envelope loss are multi-faceted as follows:

- First, replace all doors with well insulated doors in compliance with current energy codes, which requires a 0.4 u-value or lower (effective weather stripping should be included in this solution, as Northeast Air mentioned in their interview that weather stripping on older roll-up and sliding hangar doors is an issue).

- Second, add custom air curtains where the heights are manageable relative to technology. This approach will need to be studied carefully relative to each circumstance to ensure that the conditions that the air curtains can provide for are conducive to the situation.

- Last is to provide a radiant heat solution utilizing gas fired infrared heating equipment. This equipment is designed to provide radiant heating in lieu of convective heating which is inherent to air type convective systems that include Make-Up Air Handling Units, Unit Heaters, H&V units etc.

This solution is advantageous as it heats only objects in its direct path, which is more efficient and suited to end user comfort conditions.

ECM #9 (Chemical Free Treatment System for Cooling Tower)

Consider a chemical free treatment system for the cooling tower. These systems utilize pulse technology base on Faraday's Law and eliminate the need for chemical additives in the cooling tower. They also keep solids in suspension, prolonging the life of the piping infrastructure and saving water. The typical payback period for these systems is usually less than three years; however, they come with a high upfront cost, with the equipment alone costing approximately $20,000.00. Vendor information can be provided upon request if there is an interest in exploring this. The vendor would first do a water quality test, free of charge, as well as a life cycle cost study to determine the Jetport's specific benefits. This measure would require additional study, but has been identified here as a means of introducing it.

ECM #10 (Old Terminal Building Envelope Opportunities)

Ahead of any building envelope project being implemented, an infrared camera survey should be performed to determine the condition and integrity of the envelope systems. This survey will reveal any thermal decay and infiltration. In addition to retro-commissioning through the use of infrared camera survey, commissioning of any future envelope projects upon completion is recommended. LEED v4 and ASHRAE provide good methodologies and standards for reference. Envelope recommendations are as follows to be performed when a renovation allows:

- Spray foam air barrier: It is becoming more common to provide a thin spray foam layer on the interior side of the exterior sheathing, to provide an additional air barrier to augment the "peel and stick" or liquid applied exterior air and water barrier.
- Glazing analysis: As part of the comprehensive energy analysis, future design teams should model thermal performance of glazing types and consider coatings, exterior shading, interior light shelves and triple glazing with appropriate coatings in the correct locations (inner, outer etc.)

We anticipate that future improvement projects will present additional energy savings opportunities, but may be too far in the future to be accurately reviewed at this time relative to operational impacts and benefits. One example of this is that incandescent lights remain on portions of the airfield. At the time of prior major airfield improvement projects associated with Runway 11-29, acceptable and FAA approved LED lights were not available for runway intersection guard lights, HIRLS along Runway 11-29, centerline lights for Runway 11-29, or TDZ lights. When future airfield improvement projects are performed in these areas or the existing lights are in need of replacement, the use of LED lights should be reevaluated to determine if advancements have been made for these airfield applications. To date, the airfield signs, taxiway edge lights, and MIRLS have been upgraded to LED lights.

Offsite Renewable Energy Options

In Maine, there are many renewable energy purchasing options. The most widespread, user-friendly and affordable renewable energy purchasing option in Maine is through a program called Maine Green Power managed by the Maine Public Utilities Commission. The program seeks to secure approximately 25 percent of its green power from Maine Class I renewable energy projects that have been placed into service or refurbished on or after September 1, 2005, or locally owned community based renewable energy projects. Green power projects eligible to supply renewable energy to Maine Green Power include the following:

- Solar photovoltaic systems;
- Hydroelectric projects that meet state and local fish passage requirements;
- Wind turbines;
- Biomass facilities that use wood, wood waste, landfill gas or agricultural biogas;
- Tidal power projects;
- Geothermal projects; and
- Fuel cells that use landfill gas or agricultural biogas.

The program works by customers purchasing certificates (often called “green tags,” “tradable renewable credits,” or “renewable energy credits.”) The certificates represent environmental attributed power generated from renewable electric plants. The certificates are offered separately from electricity service; however, the customer is not required to switch their electricity supplier in order to purchase the green power. The purchase of a certificate allows renewable energy generators to put more green electricity into the electrical grid. There is also the option of a customer changing energy supply to “green supply,” which would require a contract but would have the same environmental benefits.

Central Maine Power (CMP) allows customers to match electric use with green power produced in Maine. Through CMP, Maine Green Power costs 1.5 cents extra per kilowatt-hour, or $0.015. The program also sells the renewable energy in “blocks.” One block for 500 kWh can be purchased for $7.50 per month.

A local waste to energy plant called ecomaine (owned 20 percent by the City of Portland) sells the energy produced from burning non-recyclable trash. The plant produces a total of approximately 175,000 tons of trash a year, and enough steam to generated 100,000 - 110,000 megawatt-hours of electricity annually. The energy is sold to the New England Power Grid through a bidding process for power purchase agreements. Currently, ecomaine’s power is sold to Constellation, an Exelon Company. Constellation is a power, natural gas, and renewable energy supplier. PWM’s non-recyclable and recyclable waste is ultimately brought to ecomaine. PWM contributes approximately 400 tons of non-recyclable trash a year to ecomaine.

WASTE MANAGEMENT AND RECYCLING

Portland International Jetport (PWM) generates varying types and amounts of waste from the different activities the Jetport undertakes, both on the airside and the landside. Generally, waste and recycling at the Jetport consists of waste generated by passengers, airlines, tenants/vendors, and employees. The largest contributors to the waste volume are passengers who are passing through the Jetport for a short period. Waste generated by passengers is defined as Municipal Solid Waste (MSW), or everyday items. For collection purposes, MSW at the Jetport is broken down into general trash, single-sort recycling, and cardboard.

In order to assist with the high volumes of MSW created by passengers, the Jetport has a custodial services contract with ISS Facility Services (ISS). Although passengers are generally the highest volume daily waste generator, there are many other processes that can contribute significantly to the overall volume of airport waste, such as construction debris, airfield maintenance waste, and spent aircraft deicing fluid. This chapter summarizes waste management activities at PWM, whereas Appendix E contains a comprehensive assessment that is in accordance with FAA guidance issued in a September 30, 2014 memorandum titled “Guidance on Airport Recycling, Reuse, and Waste Reduction Plans.”

The FAA synthesis document titled “Recycling, Reuse, and Waste Reduction at Airports” dated April 24, 2013 identifies the following eight general types of waste generated at airports:

- Municipal Solid Waste (everyday items);
- Construction and Demolition Waste;
- Green Waste (yard waste);
- Food Waste;
- Deplaned Waste (bottles, cans, mixed paper, food waste, etc., from passenger aircraft);
- Lavatory Waste (sanitary waste from aircraft);
- Spill Cleanup and Remediation Waste; and
- Hazardous Waste;
    - Solvents
    - Caustic parts washes
    - Heavy metal paint waste and paint chips
    - Wastewater sludge from metal etching and electroplating
    - Unused epoxies and monomers
    - Waste fuels (including sump fuel or tank sludge) and other ignitables
    - Unusable water conditioning chemicals
    - Illegal dumping of containerized chemicals
    - Contaminated sludge in general aviation aircraft wash rack oil/water separators
    - Nickel cadmium (ni-cad) batteries
    - Waste pesticides

SUSTAINABILITY CONTEXT

Waste management and recycling play a significant role in a Sustainable Airport Master Plan because of the large amount of waste generated, potential impacts of waste on our land, air and water resources, and the many opportunities to reduce, reuse and recycle materials to lessen the environmental impact and demonstrate social responsibility.

REGULATORY OVERVIEW

The Maine DEP Waste Generation and Disposal Capacity Report for Calendar Year 2011 (Revised March 2013) establishes a hierarchy for the management of solid waste and notes efforts that are underway to divert waste from landfills. The State's approach to handling solid waste generated within the State and imported into the State is based on the following order of priority:

- Reduction of waste generated at the source, including both amount and toxicity of the waste;
- Reuse of waste;
- Recycling of waste;
- Composting of biodegradable waste;
- Waste processing that reduces the volume of waste needing land disposal, including incineration; and
- Land disposal of waste.

Maine DEP has an overall goal of 50 percent recycling of solid waste for the State. Commercial service airports have unique challenges in attaining high recycling rates. This is due in part to the relatively high amount of restroom-related/paper product waste generated by the large numbers of passengers, visitors, and employees at the terminal. Still, some airports are achieving 50 percent or greater recycling rates through aggressive composting efforts.

A memorandum dated September 30, 2014 was issued by the FAA in order to provide guidance on airport recycling, reuse, and waste reduction plans as an element of a master plan or a master plan update. According to the memorandum, the FAA Modernization and Reform Act of 2012 (FMRA), which amended Title 49, United States Code (U.S.C.), included a number of changes to the Airport Improvement Program (AIP). Two of these changes are related to recycling, reuse, and waste reduction at airports:

- Section 132 (b) of the FMRA expanded the definition of airport planning to include "developing a plan for recycling and minimizing the generation of airport solid waste, consistent with applicable State and local recycling laws, including the cost of waste audit."
- Section 133 of the FMRA added a provision requiring airports that have or plan to prepare a master plan, and that receive AIP funding for an eligible project, to ensure that the new or updated master plan addresses issues relating to solid waste recycling at the Jetport.

RELEVANCE TO OTHER AREAS

Through reduced materials use and materials disposal, waste management and recycling are relevant to other areas of the Sustainable Airport Master Plan, including:

- GHG Emissions;
- Energy;
- Social Responsibility; and
- Tenant Sustainability.

GHG emissions and energy are directly related to materials production and disposal; social responsibility entails demonstrating and promoting environmental awareness, in which waste management plays a major role; and tenant sustainability has a large focus on material purchasing, use and disposal.

CURRENT PERFORMANCE/BASELINE INFORMATION

This section describes the management of MSW, construction and demolition waste, organic waste, hazardous waste, and spent deicing fluid.

Municipal Solid Waste Management and Recycling

Scope of the Existing Recycling Program

Currently, PWM's waste management program for the Airport Terminal Building and Aircraft Ramp Area includes the use of separate containers for solid waste and for single-sort recycling. In the Jetport terminal, single containers are used for the recycling of all paper products including newspaper and cardboard, glass and metal, and plastic with numbers 1 through 7. The public trash and recycle bins located in the terminal building are provided by ecomaine, a non-profit waste management company located approximately 1.5 miles from the Jetport at 64 Blueberry Road in Portland, Maine. (See photos of the different types of ecomaine containers at PWM).

Under a contract directly with the City of Portland, Waste Management (WM) picks up the MSW once per week, and the recyclable materials about once a month. The recyclables are transported to ecomaine by WM haulers. It is assumed that the 2013 and 2014 recycling tonnage does not include returnable bottles and cans as the waste inventory inspection revealed these materials are removed from recycling bins prior to sending the recyclables to the compactors.

Many of the vendors and tenants located at the Jetport take care of their own waste and have contracts with waste management companies separate from the City's contract. See the *Tenant Sustainability* section of this chapter for additional information on tenant waste management practices.

Trash and recycling receptacles and recycling signage at PWM

Waste Inventory Inspection

A waste inventory inspection of the Airport Terminal Building and parking lots was completed on September 24, 2014. The inspection included collecting an inventory of all trash, recycle, and cardboard collection locations throughout the Jetport including the parking garage, municipal employee offices, and all public areas. Accessible tenant spaces such as Paradies, HMSHost, and the car rental garage and office were also included in the inventory (**See Exhibit 3A**).

The waste inspection revealed a 5:2 ratio of trash bins to recycling bins in the Airport Terminal Building. Typically, a 1:1 ratio is desired to reduce the temptation from the traveling public to discard recyclable materials in a trash bin because it is the closest bin. Indeed, a significant number of paper cups, newspapers and other paper items were observed in the trash bins even in instances when the trash bins were adjacent to the single-sort containers; however, a few recycling containers were not labeled or had been turned such that the labeling did not face travelers.

In the City of Portland employee offices, most offices had both a small recycle bin and a small trash bin; larger trash and recycle bins are in the common areas. No recycle bins were found in the Jetport's parking garage, the walkways from the garage to the terminal building, employee parking lot, or at the entrances of the Airport Terminal Building. Most of these locations contained trash bins.

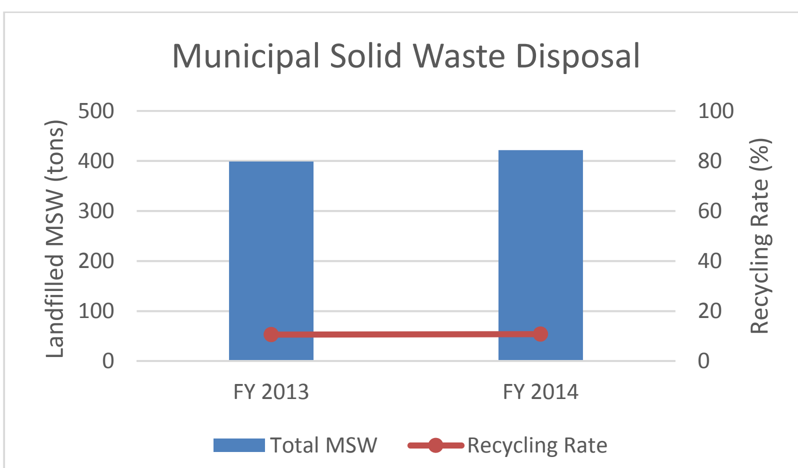
The waste inventory also addressed accessible tenant spaces (some airlines, HOST, Paradies, TSA and the rental car office.) In general, all HMSHost tenants and Paradies recycle cardboard and newspaper. Many of the HMSHost/Paradies spaces have trash bags for returnable bottles in back areas not accessible to public. Airline ticketing counters were observed to have both small and larger trash bins with no recycling bins. All restaurants stated they recycle waste oil. TSA shreds and recycles all used paper. At the rental car center, no recycle bins were observed in the parking area or at the check-in counters. Four trash bins were observed in the rental car parking area, with many recyclable materials mixed in.

An ISS employee confirmed that ISS goes through trash and recycling to separate returnable bottles and cans. No other on-site sorting beyond picking out returnable bottle and cans is implemented. Based on this information and observations of the collection of returnable bottles and cans, it is assumed that the majority of the returnable bottle and cans do not end up in the single-sort recycling stream. Almost all tenants confirmed that they collect and return the bottles and cans.

Rates of Recycling

The Jetport is billed by weight and a flat rate per haul (in addition to a monthly service fee, environmental fee, and taxes). Based on the Jetport's invoices, during fiscal year 2013, a total of 398.9 tons of MSW (including single sort recyclables) was collected in the compactors located at the Jetport, and 421.4 tons was collected in fiscal year 2014, representing a 5 percent increase of total waste (see chart below). The recycling rates for fiscal years 2013 and 2014 remained relatively constant (10.6 percent in 2013 and 10.8 in 2014).

It is assumed that the 2013 and 2014 recycling tonnage does not include returnable bottle and can tonnage based on the findings of the waste inventory inspection that these materials are removed from recycling bins prior to bringing the recyclables to the compactors.

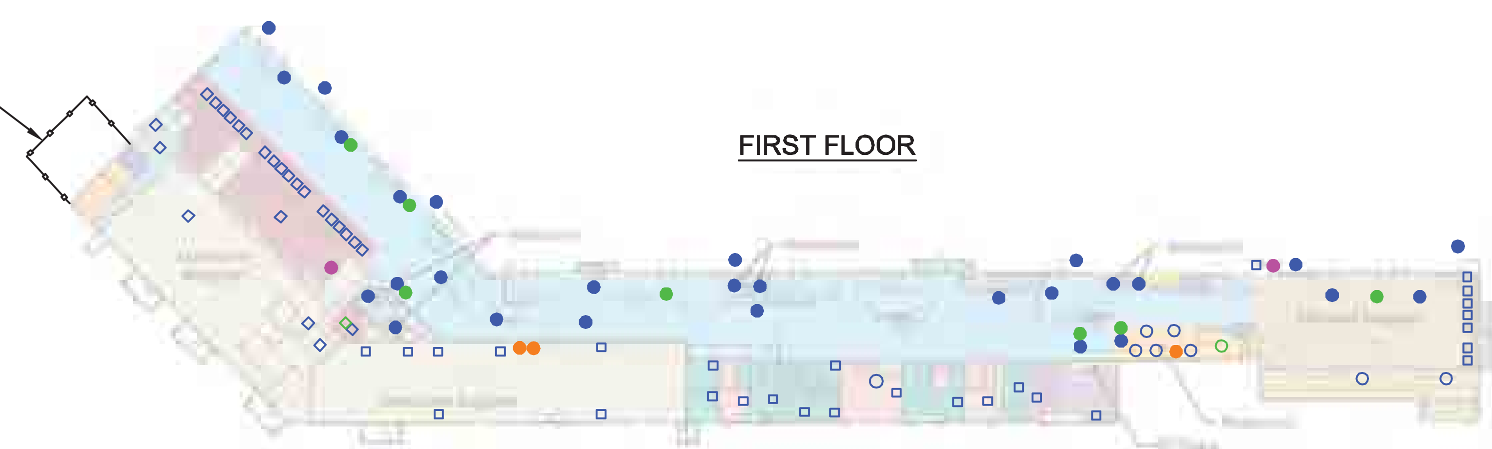


THIRD FLOOR

SECOND FLOOR

CHAIN LINK FENCE DUMPSTER ENCLOSURE WITH DUMPSTER # 1, 2 & 3 (WASTE MANAGEMENT) AND USED COOKING OIL CONTAINER (MAINE BIOFUELS)

FIRST FLOOR



LEGEND WITH PHOTOGRAPH EXAMPLES

● PUBLIC TRASH BIN (QTY. = 60)

□ SMALL OFFICE AND TENANT SPACE TRASH BIN (APPROXIMATE QTY. = 91)

○ LARGE OFFICE AND TENANT SPACE TRASH BIN (APPROXIMATE QTY. = 8)

● PUBLIC RECYCLE BIN (QTY. = 24)

□ OFFICE SPACE RECYCLE BIN (APPROXIMATE QTY. = 18)

● RETURNABLES COLLECTION (BOTTLES, CANS) (APPROXIMATE QTY. = 4)

● CARDBOARD COLLECTION (OFFICES AND TENANTS) (APPROXIMATE QTY. = 5)

NOTE:
INFORMATION BASED ON SITE VISITS TO THE AIRPORT ON 8/4/14 AND 9/24/14 AND INTERVIEWS OF AVAILABLE STAFF.
NOT ALL OFFICES WERE ENTERED. ASSUMED ONE TRASH BIN PER OFFICE.
NOT ALL BATHROOMS WERE ENTERED. ONE TRASH BIN PER RESTROOM ASSUMED.

Exhibit 3A

AIRPORT TERMINAL BUILDING RECYCLING AND TRASH BIN LOCATIONS

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Construction and Demolition Waste

The collection of construction and demolition debris (C&D) debris varies from project to project. Recently, PWM specifications for small construction contracts have required recycling of construction and demolition materials. The contractor selected for a project generally is responsible for disposal of the waste generated by the project. A major exception to this occurred with the Terminal Expansion Project. In 2012, PWM was successful in obtaining a Gold Rating with 39 points for LEED for New Construction of the Terminal Expansion Project. The project diverted 3,315.63 tons (89.6 percent) of construction waste from landfills while building materials had 39.4 percent recycled content. Clay soils excavated from the terminal building area were used to fill the Runway 29 safety area extension in 2010. As another example of recycling and reuse, when the Runway 18-36 Earthwork Preload project was constructed in 2010-11, 112,500 cubic yards of blasted rock was excavated and used as rock-fill and preload material to complete the project.

Metal from small renovation projects is delivered to an area by the maintenance building off Yellowbird Road and hauled off to be recycled once the stockpile has reached a weight where it is economical to transport. The steel is transported by City of Portland vehicles to Schnitzer Steel Industries, a metals recycling facility, located at 568 Riverside Street in Portland, Maine.

Organic Waste (Food and Green/ Yard Waste)

Organic waste, and specifically food waste, constitutes approximately 25 percent of the MSW waste stream at airports.[3] The Jetport has the potential and resources to compost organics. PWM can reduce waste generated by composting all food, landscaping and other organic material. Composting is economically feasible because of the low cost of collection, and the savings from weight reductions of landfilled waste. Currently, the Jetport's food waste is disposed of with general trash and ultimately is incinerated by ecomaine. Food concessionaires at the Jetport include a Burger King, Starbucks, Shipyard Brewpub restaurant, The Great American Bagel Bakery, and Linda Bean's Lobster Café. All locations have the potential to collect food scraps for composting.

Hazardous Waste

PWM recycles a number of hazardous materials. Fluorescent bulbs are recycled by Casella Waste. Used vehicle oil is collected in a tank and picked up when the tank is full. Car tires and batteries are recycled by the dealer.

[3] Based on waste audits conducted at other airports, such as Portland International Airport, Dane County Regional Airport, and San Francisco International Airport.

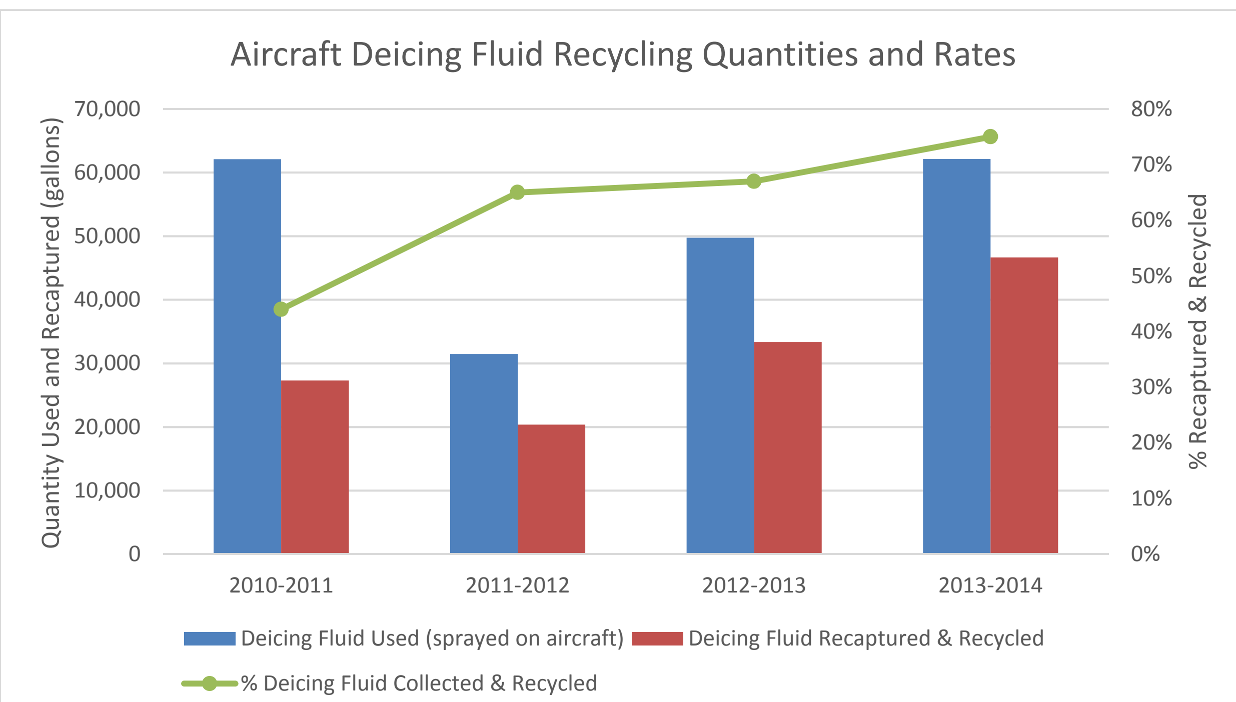
Spent Aircraft Deicing Fluid

In preparation for operation of the facility beginning in November 2010, the City of Portland established an aircraft deicing fluid recycling management contract to collect spent aircraft deicing fluid and removing propylene glycol from stormwater. The spent aircraft deicing fluid recycling program at the Jetport has the opportunity for annual cost reduction, has reduced environmental impacts to the Fore River, and is on the forefront of sustainable solutions for collecting and processing of spent aircraft deicing fluids at airports.

The overall percentage of propylene glycol collected varies by year due to dilution rates associated with various storm events, glycol being windblown beyond the limits of the aircraft deicing collection pad and the fact that Type IV deicing fluid tends to stay attached to the aircraft and shears off during takeoff and flight. According to Inland Technologies, the company that performs aircraft fluid recycling services for the city, the mix of stormwater and propylene glycol captured typically contains 6 percent glycol by volume.

The chart on the following page depicts the increasing rate of recapture and recycling of deicing fluid: in 2010, 44 percent of deicing fluid was recaptured and recycled, with this number increasing to 75 percent in 2013.

The aircraft deicing fluid recycling facility operated by Inland Technologies at the Jetport has been awarded the Pretreatment Excellence Award given by the Maine Water Environment Association (MeWEA). This award recognizes industrial facilities (indirect chargers) that have made exemplary efforts toward meeting the requirements of a State/National Pretreatment Program permit or State or local authority control mechanism.



SUSTAINABILITY SUCCESSES

The Jetport has a comprehensive, airport-wide recycling program with recycling bins located throughout the terminal, as well as engaged tenants who also have their own recycling programs. These existing programs provide the foundation for further recycling improvements.

In 2012, PWM was successful in obtaining a Gold Rating with 39 points for LEED for New Construction of the Terminal Expansion Project. The project diverted 3,315.63 tons (89.6 percent) of construction waste from landfills while building materials had a 39.40 percent recycled content. Clay soils excavated from the terminal building area were used to fill the Runway 29 safety area extension in 2010.

According to the ISS Facility Services proposal for custodial services at the Jetport, ISS lists experience in large public facilities with LEED Certification as part of their qualifications. ISS also highlights low environmental impact cleaning policy as part of their contract, including the use of sustainable cleaning systems sustainable cleaning products. LEED Certification requires a waste reduction and recycling program that addresses separation, collection, and storage of materials for recycling including (at a minimum) paper, glass, plastics, cardboard/OCC, metals, batteries, and florescent lamps and diversion from landfill disposal. ISS Facility Services states in their proposal that they will assist with this requirement.

The aircraft deicing fluid recycling facility is a successful program at the Jetport, with rates of recapture and recycling reaching 75 percent.

POTENTIAL OPPORTUNITIES FOR PERFORMANCE IMPROVEMENT

Based on the findings of this Baseline Assessment, the following represents a preliminary list of potential opportunities for performance improvement under Waste Management and Recycling.

- Include recycling requirements (similar to those of the Terminal Expansion Project) in contracts for construction projects above a certain size. Each construction project could be assessed individually for specific areas of recycling opportunity and funding impacts.
- Coordinate with airlines to encourage Aircraft Flight Crew to separate trash and recycling. Returnable bottles and cans are currently separated; however, cups, plastics, cardboard, newspapers, and other recyclable materials could also be collected separately or separated from trash.
- Increase number of recycling bins available in the terminal such that each trash bin has an adjacent recycling bin. This will require the addition of recycling bins throughout the Airport Terminal Building as well as outside public areas including the entrances and exits and parking garage and the rental car garage.
- Signage could be improved for the recycling bins throughout the Jetport Terminal Building. Currently, the signs for some of the recycle bins are located on the sides of the containers. Signage above waste containers at eye level would be more easily viewed.
- Educate janitorial staff about proper recycling procedures.

- Providing language in tenant lease agreements to require recycling, document recycling percentages and encourage materials reduction and reuse. As mentioned on pages 32 to 33 of the "Airline Signatory Operating Agreement and Lease at the Portland International Jetport," airlines are required to pay 60 percent of the cost for waste removal and recycling. The remaining 40 percent of waste removal costs are covered by the City of Portland and airport tenants. Waste reduction is an incentive to achieve cost savings for the tenants, airlines, and the City of Portland. Future modifications to agreements to incentivize recycling efforts may help to improve recycling rates.
- Change current Waste Management Contract between WM and the City of Portland to a Resource Management Contract that is based on performance in achieving waste reduction goals.
- Consider composting through Garbage to Gardens, a local Portland composting company, to reduce cost and reduce the amount of waste brought to landfills.
- Conduct regular waste audits to monitor recycling performance and identify opportunities to improve recycling management systems at the Jetport.

DATA GAPS

Obtaining the following data would help enable a more holistic understanding of PWM's waste management performance:

- Communication with additional airline managers;
- The research and steps required to implement a Resource Management Contract that is based on performance in achieving waste reduction goals; and
- Waste management practices for FedEx and FSDO (not likely to change these findings).

GROUND ACCESS AND TRANSPORTATION

Although airports are typically associated only with air transportation, they also function as surface transportation nodes. Surface transportation components at an airport serve as the facility's connection to the community. Typically, modes of surface transportation at an airport include private passenger vehicles, rental vehicles, livery, public transit, and pedestrian or cycling access. The combination of these modes of transportation requires an efficient transportation network and adequate parking infrastructure to accommodate all users. This section discusses the use of each mode of surface transportation at PWM, and the degree to which the Jetport supports it.

SUSTAINABILITY CONTEXT

Ground access and transportation are integral elements of the Jetport's sustainability planning efforts. Some considerations in assessing ground access and transportation include the level of connectivity, mode share, network efficiency, and competition among service providers. Further, parking revenues generated at airports are generally substantial. An airport must balance its reliance on such revenue with the environmental effects of motor vehicle traffic (e.g., air pollutants and GHG emissions).

REGULATORY OVERVIEW

All commercial ground transportation services and commercial ground transportation operators at the Jetport are subject to the PWM's *Commercial Ground Transportation Rules and Regulations*. Presently, however, there are no significant federal and state regulatory constraints specific to ground access and transportation at the Jetport facilities.

PWM's *Commercial Ground Transportation Rules and Regulations* govern commercial ground transportation at PWM and include the following objectives:

- Promote high quality and reasonably priced ground transportation services consistent with public health, safety, welfare, and convenience;
- Ensure the efficient movement of passengers to and from the Jetport;
- Foster competition among commercial ground transportation service providers; and
- Ensure customers the highest level of quality transportation and customer service.

An emerging area of legal and regulatory interest is ride-sharing services offered by such businesses as Uber, Lyft, and FlightCar. The specific regulatory concern is that ride sharing services offer airport transportation services without paying fees and charges to airports that are paid by traditional airport car rental companies, and without airport approvals required by other car rental companies. Most recently, the city and county of San Francisco, California have taken legal action against FlightCar by suing the company for operating as a car rental company without the required airport approvals.[4] FlightCar contends that their business is not a traditional car rental service, and therefore their operations should not be subject to the same types of regulatory approvals and airport fees. Uber already services PWM.

RELEVANCE TO OTHER AREAS

Ground transportation and access is relevant to other sustainability initiatives including air quality, energy consumption, and people. Vehicular emissions can significantly affect local and regional air quality, and are emitters of criteria pollutants and GHGs. Portions of coastal Maine are known to have air quality problems during the hottest days in the summer, which is created in part by vehicle emissions. As fuel users, passenger vehicles are also related to the Jetport's energy and fossil fuel consumption. Finally, the type and quality of ground transportation options directly effects people as part of their passenger experience, specifically with regard to curbside congestion, and the ease with which they are able to access their regional destinations.

[4] http://www.forbes.com/sites/tomiogeron/2013/07/29/airports-are-the-next-big-battleground-in-the-sharing-economy/

CURRENT PERFORMANCE/BASELINE INFORMATION

Transportation Demand

Transportation demand at the Jetport is driven by employee needs and customer needs. Existing transportation options to and from PWM include private passenger vehicles, the METRO bus system, taxis, shuttle buses, rental vehicles, the Downeaster passenger train (with use of connecting transportation), biking, and walking.

Based on vehicle traffic counts at surrounding road intersections completed in 2008, the afternoon peak hour (4:30 to 5:30 PM) represents maximum traffic generation levels. Thirty-three (33) percent more traffic is generated during the afternoon peak hour compared to the morning peak hour at the International Parkway/Jetport Boulevard intersection. Traffic to the Jetport was anticipated to increase by 180 vehicles per hour through 2016, and improvements to certain intersections around the Jetport have been recommended. Thus, the objective of transportation demand management at the Jetport is to reduce single occupancy vehicle trips to the Jetport.

As part of the expansion of the passenger terminal building, the Jetport developed the 2009 TDM Plan, which the Jetport adopted and the City of Portland accepted. This plan identified strategies to reduce single occupancy vehicle trips including:

- The appointment of a transportation coordinator;
- The implementation of employee and customer rideshare programs with preferential parking for participants;
- The establishment of incentives to use public transportation;
- The installation of covered bicycle parking areas and related facilities; and
- The implementation of an employee survey relative to transportation options to and from the Jetport that could be reviewed by Jetport management and used to provide recommendations for the city-based review process of Jetport facilities and operations.
- The Jetport should periodically review and update the TDM to ensure it is following and consistent with best practices.

Ground Access to the Jetport by Mode

The Jetport is readily accessed via the regional and local road network. With respect to the regional road network, Interstate 95/Maine Turnpike and the Skyway Drive interchange are located less than ¼-mile from Jetport Boulevard at the western end of the Jetport. Interstate 295 and U.S. Route 1 lie just south and east of the Jetport, within approximately ¼-mile of the eastern extent of the Jetport grounds. The Jetport is easily accessed from these regional roadways via the local road network.

The Jetport's two vehicular access points from the local road network include International Parkway off Congress Street to the north, and Jetport Boulevard off Johnson Road at the western end of the Jetport.

International Parkway serves as the primary access to the facility, while Jetport Boulevard provides secondary access. These entrances shift Jetport traffic away from the noise-sensitive Stroudwater residential area. The following sections describe PWM's accessibility via different transportation modes.

Public Transit

Public transit options for reaching the Jetport are somewhat limited, reflecting the relatively small population size of the greater Portland area. However, local bus service, shuttle/intercity bus service, and rail options are available, and the Jetport subsidizes employee transit passes. Local bus service connects PWM to a broader transit network that includes rail and regional bus service.

<u>Local Bus Service</u>

Local bus service to the Jetport is offered by the Greater Portland Transit District METRO bus, which serves Portland, the Maine Mall area of South Portland, Westbrook, and Falmouth. Access from PWM to downtown Portland is provided via METRO Route #5.

In addition to the METRO bus service, the City of South Portland offers a bus service. The South Portland bus service does not provide direct service to PWM, although it does transport passengers to locations where they may transfer to the METRO bus service, such as in downtown Portland and the Maine Mall vicinity. The Jetport coordinates flight schedules with METRO bus service to maximize the use of bus transportation. While the local bus services may be a viable transportation option for Jetport passengers, it is less viable for Jetport employees due to the early morning and late night shifts during which times bus service is not available.

<u>Regional Bus Service</u>

Shuttle and intercity bus services do exist in the Jetport vicinity, although they do not offer a direct connection to the Jetport. Passengers may reach the Jetport by connecting with the METRO Route #5 bus service, or by taxi from intercity bus stops in downtown Portland or the Maine Mall vicinity. The SH-ZOOM[5] Intercity/Portland bus service that runs from Biddeford to Portland will transport passengers to the Maine Mall vicinity and downtown Portland. Intercity bus service between Portland and other Maine cities and towns and out-of-state destinations is provided by Concord Coach and Greyhound.

<u>Rail Service</u>

Rail service near PWM includes the Amtrak Downeaster, which provides daily service from Brunswick, ME to Boston, MA with several stops along its route, including Portland. The Amtrak Downeaster train

[5] http://www.shuttlebus-zoom.com/portland.html

station in Portland is located off Congress Street less than one mile east of the Jetport. Taxi service between the Amtrak Downeaster terminal and the Jetport is readily available and requires an approximately five-minute taxicab ride along Congress Street.

Single Occupancy Vehicles

Single occupancy vehicle modes of transportation available at the Jetport include taxicabs, private shuttles, hotel-based courtesy van service, and rental vehicles. Taxicabs and livery services are subject to the City of Portland *Taxicab and Livery Business Rules & Regulations*. The Finance Department at the Jetport manages taxi licensing for the City of Portland. Taxis are available outside of the baggage claim areas, with rates of $1.90 for the first tenth of a mile and $0.30 for each additional tenth of a mile thereafter, subject to a $5.00 minimum fare charge. A $1.50 surcharge is required for all Jetport originated cab fares. Published flat rate fares are charged between PWM, various Maine cities and towns, Maine academic institutions, and out-of-state destinations. The Jetport provides information on its website regarding published taxi rates and flat rate fares.

In addition to taxicabs, 36 private limousines, luxury car, shuttle, and van and van service providers are reported by the PWM website to be available to pick up passengers outside baggage claim areas by reservation. Fifteen (15) report the availability of van shuttle services. Many local hotels also offer courtesy van service to and from the Jetport.

A fleet of more than 200 rental vehicles is located at the consolidated car rental atrium inside the Jetport parking garage. Rental car companies at PWM include:

- Alamo
- Avis
- Budget
- Enterprise
- Hertz
- National

Ridesharing

Ridesharing options for Jetport employees and passengers include carpooling/ridesharing, vanpools, and car sharing. Although the Jetport conducts occasional passenger parking surveys, data regarding the extent to which Jetport employees and passengers utilize shared modes of transportation to reach the Jetport is not available.

Carpooling and ridesharing information is available through the GO MAINE Rideboard (www.gomaine.org) web site. Rideboard users that register with GO MAINE are eligible for the Emergency Ride Home Benefit and other GO MAINE services and information. Other carpooling and ridesharing information in Maine is available on Ridester (www.Ridester.com), Craigslist (www.maine.craigslist.org), and other websites. The Jetport could encourage carpooling to the Jetport through incorporation of a carpool webpage to the Jetport's website, potentially in cooperation with GO MAINE.

Several vanpools operate in Maine, with certain vanpools run by private vanpool companies and others run by commuters. GO MAINE partners with vRide and Enterprise Rideshare offer an Emergency Ride Home Benefit to GO MAINE registered users that utilize vanpool services offered by these companies. None of Maine's vanpool services currently provide service to the Jetport.

With regard to car sharing, Maine currently has two car sharing options: ZipCar, which offers service in Biddeford and on the campuses of Bates, Bowdoin and Colby colleges; and U-Car, which operates in Portland. Establishing ZipCar or U-Car parking at the Jetport may encourage the use of car sharing to access and travel from the Jetport.

Pedestrian and Cycling Access

Pedestrian and bicycling access points to the Jetport include the main entrance at the intersection of Congress Street and International Parkway and the secondary entrance at the intersection of Johnson Road and Jetport Boulevard (see **Exhibit 3B**). International Parkway, Jetport Boulevard, and the connecting public roadways all provide paved sidewalks for pedestrian use. An additional pedestrian and bicycle access point is located along Westbrook Street to the northeast of the Jetport. Although none of the roads proximate to the Jetport have dedicated bike lanes, these roadways are useable by cyclists and certain of them presently have paved shoulders suitable for biking. Existing or proposed bicycle-friendly routes near PWM are summarized in **Table 3B** and displayed on the bike route map provided in this section of the baseline documentation report.

As part of the development of the new terminal building, PWM installed 40 covered bike racks on the east side of the parking garage. Shower and changing facilities are available for cyclists, but only to Jetport and tenant employees. The Jetport does not currently track usage of the bicycle rack or shower/changing facilities. Collecting data on the usage of the existing facilities would help to inform the type and extent of additional facilities that may be needed, and whether this mode of commuting could be further encouraged.

TABLE 3B
Bicycle-friendly Routes Near PWM
Portland International Jetport

Location	Type of Cycling Facility
Congress Street	Planned On-Road Bikeway
Westbrook Avenue	Planned Neighborhood Byway[1]
Western Avenue/ Johnson Road	Existing Paved Shoulder
Maine Mall Road	Existing Paved Shoulder
Stroudwater Trail	Dirt, Unpaved Trail

1 - A Neighborhood Byway is a local residential street prioritized for bicycling and walking, while still allowing motorized traffic.

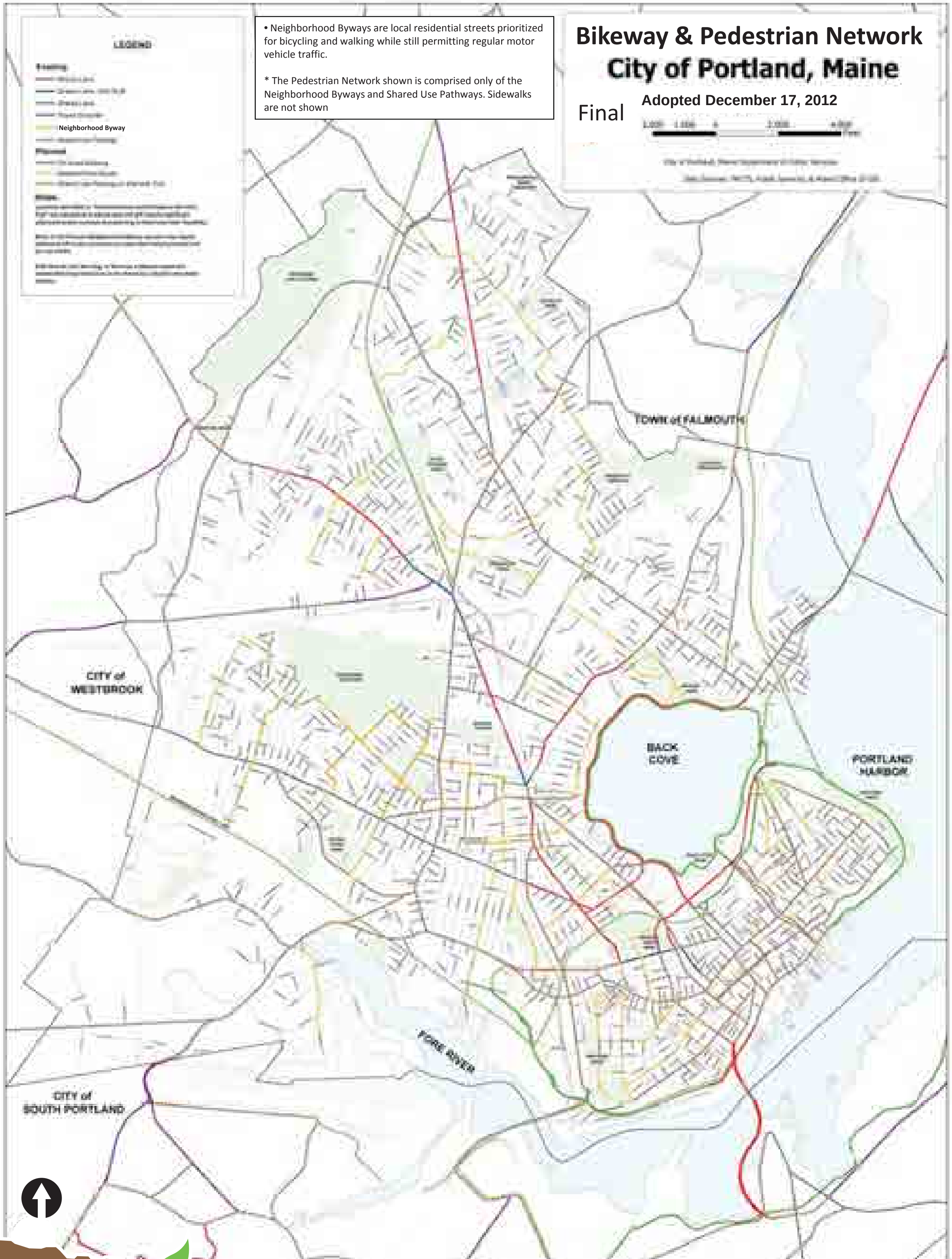

Bikeway & Pedestrian Network
City of Portland, Maine
Final
Adopted December 17, 2012
LEGEND
Neighborhood Byway
• Neighborhood Byways are local residential streets prioritized for bicycling and walking while still permitting regular motor vehicle traffic.
* The Pedestrian Network shown is comprised only of the Neighborhood Byways and Shared Use Pathways. Sidewalks are not shown
TOWN of FALMOUTH
CITY of WESTBROOK
BACK COVE
PORTLAND HARBOR
FORE RIVER
CITY of SOUTH PORTLAND

Exhibit 3B

The Jetport has established the goal of having one-percent of all employees commute by bicycle during compatible seasons. With 200 to 250 employees, this equates to approximately two employees commuting by bicycle. Maine has consistently ranked among the highest rated bicycle-friendly states in the country, and has a robust cycling community. As such, additional evaluation of the number of employees that live within reasonable and safe bicycle commuting distance may identify a higher potential for having more employees commute by bicycle.

Parking

Parking facilities at PWM include passenger and employee lots. Several parking options are available to passengers including short-term, long-term, a passenger pick-up lot, overflow and discount spaces, and a rental car lot. Public short-term/hourly parking spaces number 180, and are charged at a rate of $2 per hour with a $48 daily maximum. Public long-term parking spaces number 2,325, and are charged at a rate of $12 per day. A passenger pick up lot (cell phone lot) provides 30 spaces free of charge, and is located just outside of the baggage claim area. The Jetport has 96 overflow spaces and 459 discount spaces to use as needed. The rental car lot provides 238 spaces for rental vehicles.

The employee parking lot contains 473 spaces that cost $15 per month for Jetport employees and $30 per month for tenant employees. Preferred parking spaces are available within the employee parking lot for employees that drive low-emission and fuel efficient vehicles.

Regional Transportation Planning Context

Recent regional transportation planning studies include the *Portland Peninsula Transit Study*, and the METRO Bus Route Study. These studies are important, relevant, and linked to the Jetport's 2009 TDM Plan. Efforts related to transit within and around the Portland Peninsula, the METRO Bus Route, and transit to and from the Jetport should work cooperatively and be planned together.

The *Portland Peninsula Transit Study* aims to reduce single occupancy vehicle trips within the Portland Peninsula and encourage sustainable transportation practices, similar to the Jetport's 2009 TDM Plan. The *Portland Peninsula Transit Study* includes a recommendation for a consolidated Park and Ride Facility to serve the Peninsula, with a reroute of METRO Route 5 to the Park and Ride, which is the METRO route that currently serves the Jetport.

The METRO Bus Service is presently considering an expansion of service to Cumberland, Freeport, and Yarmouth, and is planning additional bus shelters along its routes. Regionalizing bus service through consolidation of the METRO, South Portland Bus Service, and SH-ZOOM service into a single regional transportation agency is also being evaluated. Also noteworthy is the development of Thompson's Point to the east of the Jetport is supported by TIF funding that potentially could help to develop a continuous bus link between City of Portland transportation centers including the Jetport, the Downeaster terminal, interstate bus terminals, and ferry terminals in Portland. Such a link is presently being planned by the

METRO bus system and may include the Jetport. The Jetport should coordinate with the region's public transit providers to enhance public transit options to and from the Jetport.

SUSTAINABILITY SUCCESSES

To date, the Jetport has achieved a number of sustainability successes as related to ground access and transportation. In 2009, the Jetport developed its TDM Plan, identifying a number of goals and objectives for reducing single occupancy vehicle trips to the Jetport. Specific achievements of the 2009 TDM Plan include the appointment of a transportation coordinator for the Jetport, installation of covered bicycle parking areas, and establishment of employee incentives/subsidies to use public transportation.

Independent of the 2009 TDM Plan, the Jetport has achieved the following ground access and transportation successes:

- Establishment of priority parking areas in the employee lot for employees that drive high efficiency/ low emissions vehicles;
- Development of the Consolidated Rental Car Atrium; and
- Relocation of the main Jetport entrance to International Parkway.

POTENTIAL OPPORTUNITIES FOR PERFORMANCE IMPROVEMENT

Opportunities exist to enhance the efficiency of access and travel at the Jetport. Some of these opportunities include:

- The 2009 TDM Plan should be reviewed and updated relative to current ground access and transportation conditions and needs. Following that, relevant plan action items that have not yet been implemented could be re-established as priorities, as warranted, with defined and achievable action items along with attainable schedules. An example of such an action includes the implementation of an employee rideshare program.
    - The use of ridesharing by passengers could be promoted and encouraged through the development of a web-based Jetport rideshare board for passengers in cooperation with GO MAINE. Employee carpools could be encouraged through electronic communication forums amongst Jetport employees that are interested in carpooling, such as email or an internet-based Jetport employee rideshare board. Establishing employee commuter vanpools through partnering with vRide and Enterprise Rideshare as GO MAINE has done for Maine commuters also presents a potential opportunity for reducing employee single occupancy vehicle trips to the Jetport.

- Improving public transit options to the Jetport could be explored by coordination with the Portland METRO, South Portland Bus System, and SH-ZOOM. Potential options to discuss include earlier service for Jetport employees, or the establishment of one or more Jetport shuttles that run at specific times of the day that could be used by employees and passengers.

- Bicycle access to the Jetport could be improved through working with the City of Portland to advance the development of proposed bikeways along Congress Street to the Jetport, and the implementation of the proposed Neighborhood Byway along Westbrook Avenue.

DATA GAPS

The following data gaps should be addressed to promote the improvement and sustainable growth of ground access and transportation at the Jetport:

- An updated employee transportation survey and an initial comprehensive passenger transportation survey to collect data relative to interest and participation in employee ridesharing, as well as employee and passenger group transit options and bicycle/pedestrian commuting; and
- Information related to expanded public transit options through consultation with public transit services and organizations.

SOCIAL RESPONSIBILITY

Airports have a responsibility to the local community, passengers, and its employees. The Jetport may implement specific programs that benefit one particular group, such as terminal upgrades for passenger comfort or wellness activities for employees; or broader programs with a variety benefits, such as educational programs for employees. PWM is focused on passenger experience, customer service, and employee satisfaction. The Jetport has implemented a number of programs that demonstrate this commitment, which are described in this section.

SUSTAINABILITY CONTEXT

Most social responsibility programs are focused on people as opposed to the environment. However, some social-environmental initiatives that airports may undertake include green space development and the establishment of recreational facilities, such as bike paths or golf courses.
Regulatory Framework

Laws and regulations influencing the Jetport's social responsibility concern employment, health and safety, and procurement. Some of these regulations include:

- Title VI of the Civil Rights Act of 1964, Civil Rights Act of 1987, and Section 520 of the Airport and Airway Improvement Act of 1982.
    - PWM cannot exclude persons from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity on the grounds of race, color, national origin, sex, or creed.
    - PWM requires Title VI assurances from each tenant, contractor, and concessionaire providing an activity, service, or facility at the Jetport under lease, contract, or franchise from the Jetport.
- Title 49 Code of Federal Regulations (CFR) part 26, Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs.
    - PWM established a Disadvantaged Business Enterprise (DBE) program because it is the recipient of federal airport funds. PWM is committed to ensuring that DBEs have an equal opportunity to participate in DOT-assisted contracts.
- Title 49 CFR part 23, Participation of Disadvantaged Business Enterprise in Airport Concessions.
    - PWM established an Airport Concession Disadvantaged Business Enterprise (ACDBE) program to ensure that ACDBEs have an equal opportunity to receive and participate in Jetport Concession contracts.
- There are no specific regulations or requirements pertaining to community well-being at PWM. However, environmental regulations (e.g., *National Environmental Policy Act, Executive Order 12898 [Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations],* and the *Clean Air Act*) are in place to ensure the health and wellness of the public.

RELEVANCE TO OTHER AREAS

The success of PWM's social responsibility effort requires buy-in and commitment from all of the Jetport's stakeholders, both internal (employees and tenants) and external (passengers and the local community). Initiatives implemented for social benefit may also offer benefits to other areas; for example, an indoor living wall is an aesthetic element that could enhance passenger experience while improving indoor air quality.

CURRENT PERFORMANCE/BASELINE INFORMATION

Social responsibility does not have many quantifiable metrics; therefore, this section focuses more heavily on the many existing initiatives and programs PWM has implemented.

Employee Well-Being, Engagement, and Satisfaction

PWM's employees are an invaluable asset to the Jetport. Currently, the Jetport employs approximately 50 full-time equivalent staff. From a focus on safety to annual barbeques, PWM strives to ensure that the Jetport is a safe and fun place to work. This section details the many existing initiatives PWM has implemented to improve employee health and wellness, engagement, and satisfaction.

Employee Health and Wellness

Employee health and wellness at PWM relates to the physical and emotional health of each employee, and has a critical impact on employee performance. A healthy workplace includes a work-life balance, incentives for healthy lifestyles, and access to affordable wellness care. Existing initiatives that promote health and wellness at PWM include:

- **Safety Incentive Program -** This program encourages employee health and safety within the workplace. The Jetport rewards its employees for demonstrated attention to safety, the provision of suggestions that could advance workplace safety, and the recognition of individual contribution to workplace safety. Rewards take the form of gift/cash cards. One of the activities associated with the Jetport's Safety Incentive Program is a daily 15-minute morning stretch.
- **Employee Health** - PWM considers employee, as well as passenger, well-being in the design of the new terminal building. As part of its effort to obtain LEED Gold certification (NC Version 2.2), the Jetport ensures a healthy work environment and earned the following Indoor Environmental Quality (IEQ) LEED credits:[6]

    - Minimum IAQ Performance;
    - Outdoor Air Delivery Monitoring;
    - Construction IAQ Management Plan: Before and During Construction;
    - Low-Emitting Materials (adhesives and sealants, paints and coatings, carpet systems, composite wood and agrifiber);
    - Indoor Chemical and Pollutant Source Control;
    - Controllability of Lighting Systems;
    - Thermal Comfort;
    - Daylighting and Views: Daylight 75 to 90 percent of spaces; and
    - Innovation in Design for implementing a green housekeeping program, which is intended to reduce the exposure of building occupants to potentially hazardous contaminants.

Employee Engagement

An engaged workforce can lead to increased pride and ownership of the Jetport's operation and success. Employee engagement can be accomplished through the solicitation of input and the recognition of employee successes. To date, PWM has implemented several activities to engage its employees, including:

[6] More information on these credits can be found at: http://www.usgbc.org/redirect.php?DocumentID=1095.

- **Appreciation Events** - The Jetport hosts an annual employee appreciation barbeque as well as chili contests with prizes.
- **Training** – Currently there are no formal training programs; however, each department is allocated a budget that includes funding for training. Employees can request training and department managers approve as applicable.

Employee Satisfaction

Employee satisfaction directly correlates to employee morale and retention. Steps taken to enhance employee satisfaction include:

- **Employee Compensation** - In 2011, the City of Portland conducted a compensation study that included the Jetport's employees. The results of this study were never released. The city has plans to conduct a similar study, and to be more transparent about the process and results.
- **Benefits** - PWM employees (union and non-union) receive the following benefits from the City of Portland:
  - Pension benefits (defined benefit program or defined contribution program)
  - Group term life insurance
  - Health insurance and prescription drug coverage
  - Fitness reimbursement
  - Dental insurance
  - Health and/or daycare flexible spending accounts
  - Domestic partner benefits
  - Income protection
  - Supplemental retirement savings plans
  - Employee assistance program
  - Tuition reduction program (special arrangements with the University of Southern Maine [USM] and Kaplan University)
  - Paid holidays and accrued vacation and sick leave
  - Miscellaneous employee discounts (e.g., BJ's membership discount, Verizon Wireless cell phone discount)
- **Professional Licenses** - The Jetport pays for professional licenses and continuing education credits.

Passenger Experience/Customer Service

PWM defines the "customer" as the passenger or traveling public (tenants and vendors are considered business partners). The Jetport's brand and reputation reflects its position as "convenient, affordable, [and] sustainable with an inherent sense of 'place.'"

Passenger satisfaction is one of PWM's primary focus areas. An estimated 16 percent of the Jetport's customers come from regional Portland, ME (the metropolitan statistical area is home to more than 500,000 people). PWM wants to be the Jetport of choice for Maine.[7] To help achieve this, PWM emphasizes customer service, which can give it a competitive advantage over other airports in the region.

The Jetport is currently served by five airlines: Delta Air Lines, JetBlue Airways, Southwest Airlines, United Airlines, and US Airways. Depending on the season, there are up to 90 daily non-stop flights to/from 12 airports in the U.S. (see **Table 3C**).

TABLE 3C
Airlines and Non-stop Destinations
Portland International Jetport

Airline	Destination
Delta Air Lines	Atlanta, Detroit, New York (LaGuardia)
JetBlue Airways	New York (JFK)
Southwest Airlines	Baltimore, Orlando (seasonal), Chicago Midway (seasonal)
United Airlines	Chicago-O'Hare, Newark, Washington, D.C. (Dulles)
US Airways	Charlotte, Philadelphia, Washington, D.C. (Reagan National)

PWM is pursuing the development of a Federal Inspection Service (FIS) facility, which would enable the Jetport to process international travelers. The addition of the FIS to process international airline service would likely result in service to new destinations and potentially new airlines, increasing the Jetport's value perceived by passengers. In general, passenger satisfaction increases when airlines offer new destinations/service. The lack of an FIS facility at PWM is an economic barrier that limits community access to the international traveler.[8]

According to a 2014 Airport Affordability Report, the Portland International Jetport is the 13th most affordable airport of the 100+ most popular airports in the country. PWM is three spots ahead of its northern New England competitor in Manchester, NH (MHT), and 63 spots ahead of Logan International Airport (BOS) in Boston. Average airfare at PWM is $308 compared to $430 at BOS, which equates to an average savings of 28 percent, which does not include additional gas and parking savings.[9]

To understand PWM's strengths and weaknesses relative to other airports, an Airport Service Quality (ASQ) survey was conducted between July and September 2014. This ASQ survey interviewed passengers at 43 different airports in North America. Based on this survey, PWM's successes include:

- Ranked first for overall satisfaction with the Jetport;
- Ranked first for waiting time check-in queue/line;
- Ranked first for courtesy, helpfulness of check-in staff;

[7] PWM Strategic Plan
[8] FIS Analysis and Study
[9] http://www.cheapflights.com/news/2014-airport-affordability-report/

- Ranked first for courtesy, helpfulness of Jetport staff;
- Ranked first for restaurant facilities value for money; and
- Ranked first for ambience of the Jetport.

Opportunities for improvement, based on the ASQ survey, include:

- Improve ground transportation to/from the Jetport (ranked 3; previously ranked 1 [ASQ 2009]);
- Enhance wayfinding to ease navigation within the Jetport (ranked 11; previously ranked 1 [ASQ 2009]); and
- Enhance business/executive lounges (ranked 23).

PWM has numerous programs and initiatives to improve the passenger experience, including:

- **Above and Beyond** – PWM rolled out the Above and Beyond program in July 2014. This program at the Jetport encourages exceptional customer service among Jetport staff and tenant employees through the provision of reward tokens, which recipients can redeem at Jetport concessionaires and have an approximate value of one cup of coffee.
- **Art Displays** - Local art at the Jetport includes works by Wendy Klemperer (animal sculptures) and Jesse Salisbury (granite from the Maine quarry). Other in-terminal showpieces include sculptures by Roy Patterson and wooden sculptures of birds/airplanes, including one from Portland's sister city, Shinagawa, Tokyo, Japan. All art displays are processed through the Portland Arts Committee.
- **Local Cuisine** - The Jetport has several restaurants that reflect the identity of Maine: Shipyard, a brewing company located in Portland, and Linda Bean's Maine Lobster.
- **Local Ambiance** - In addition to restaurants, other local reflections at the Jetport include handcrafted, antique duck decoys (replicating those that migrate through Maine) and a series of posters that highlight Maine attractions, including the Pemaquid Point Light. The Jetport has also placed white wooden rocking chairs next to the windows in the departure area, which reflect the feel of the New England seacoast.
- **Wi-Fi Access** - PWM has provided free Wi-Fi access throughout the terminal since May 2010.
- **Children's Play Area** - Playport is located by Gate 2. This play area was developed as a place for kids and their parents to play and learn while waiting for their flight.
- **Terminal Expansion** – The terminal expansion project included many components directly related to passenger comfort and convenience. One example includes the construction of an enclosed bridge connecting the central parking to the terminal building, which protects customers from weather elements.
- **Passenger Safety** - The safety of elderly passengers is an on-going concern. The Jetport continually identifies ways to minimize the risk of falls or injuries through such measures as skycap pick-up points and providing additional, strategically located elevators.
- **Airport Ambassadors** - Volunteers welcome and assist travelers as they arrive and depart PWM. For their efforts, Airport Ambassadors receive several benefits, including:
  - Free Jetport Parking;
  - Express Security Lane Access; and
  - Concessionaire discounts.

- **Thanks Again (Passenger Rewards Program)** - PWM participates in a free passenger rewards program. Participating passengers can earn 5 miles or 10 hotel points for every dollar they spend at the Jetport on parking, shopping, and dining (depending on vendor participation). Miles or points go toward the airline or hotel customer loyalty program of the passenger's choice. The Thanks Again rewards program is also available at other airports to maximize passenger rewards, including 11 of the 12 airports that have direct service to/from PWM.
- **Welcome Kit** - PWM supplies a "Welcome Kit" on their website, which is available to all passengers flying into the Jetport. This kit includes terminal maps and tips about navigating the Jetport, a passenger pick-up information sheet (which includes a map, parking tips, and space to write in flight information), and a map showing directions to the Jetport for passenger return.

Community Outreach, Support, and Transparency

It is important for PWM to be a good neighbor in the community. The Jetport supports many programs that enhance the quality of life for neighboring communities, including charitable contributions, educational programs, business support, and a strong economic impact.

Charitable Giving and Service

Volunteering time and donating money is an important component of community support. The Jetport supports a number of causes and charities. Some of the community support initiatives include:

- **Airplane Pull** - The Jetport hosts the Multiple Sclerosis Plane Pull, which is co-sponsored by PWM and FedEx.
- **Contests** - In the past, there have been contests, such as an employee chili cook-off. The proceeds from these contests go to a local soup kitchen.
- **Maine Suitcase Party** - PWM is a proud sponsor of the Maine Suitcase Party, a fundraising event held at Maine Aviation's hangar at PWM. The proceeds from this event benefit Camp Sunshine, which is a retreat for children with life-threatening illnesses and their families.
- **Honor Flights** - PWM supports Honor Flight Maine and Honor Flight New England, two organizations that honor local veterans for their military service and sacrifice. Honor Flights fly veterans from their home airport to Washington, D.C., to visit their war memorial.

Education

Educational programs are important to inspire youth and promote aviation-related careers. Prior to the events of September 11, 2001, PWM hosted the *Kids in Transportation Program*, which encompassed a variety of small programs and educated people of all ages about the aviation industry. The Jetport has not been able to dedicate the resources to reviving this extensive program, but has implemented other educational activities to educate and inspire the community:

- **ACE Camp** – PWM supports Maine's Aviation Career Education (ACE) Academy/Camp. ACE Camp is an educational, hands-on, nationwide program co-sponsored by the FAA with support from the U.S. Military, aviation businesses, and volunteers. The focus is on aviation career exploration with an emphasis on opportunities for women and minorities. Students experience instruction in aviation history, the physics of flight, fieldtrips to aviation sites, and hands-on activities. There are two camps held each summer in Maine: The Portland ACE Academy is a junior day camp for students ages 12 to 16. Weather permitting, students will get to fly in at least one general aviation airplane during the week.
- **Jetport Tours** - The Jetport hosts tours for student groups, as well as individual visits for those with special needs who are preparing for travel.
- **Education and Presentations** - The Jetport has provided presentations on its sustainability initiatives to classes at the University of Southern Maine and to E2TECH, the Environmental & Energy Technology Council of Maine. In addition, the Jetport offers seminars to seniors.
- **Educational Facilities** - The area between the old and new terminal buildings is occasionally used for educational purposes; however, the long-term plan is to build facilities for U.S. Customs and Border Protection to facilitate international passenger service and screening. Other facilities that could be used for educational purposes may be identified in the future.

Economic Contributions

Based on data provided in PWM's 2008 Master Plan, the Jetport provides a significant contribution to the local economy, including a total economic benefit of $868 million annually (on-airport spending accounts for $221 million, direct benefit of $196 million, and visitors spend $450 million). In total, 11,591 area jobs are supported by PWM.

Additionally, the City Council prefers that the city employ the best-qualified persons who are available at the salary levels being offered for City employment. Among equally qualified candidates, preference is given to residents of the city, then to those candidates willing to establish residency within the city limits. This initiative directly benefits the local community and economy.

Business Support

In serving the community, PWM also promotes area businesses and collaboration opportunities. These initiatives strengthen the bond with local businesses and help support the local economy:

- **Partnerships** - The Jetport relies heavily on tourism and collaborates with the local convention and visitors' bureau. There will be a travel show in October where all airlines exhibit. PWM also collaborates with local business trade shows.
- **Joint Advertising** - PWM works with Maine businesses to develop joint advertising. This has included a partnership with Maine & Company for in-airport advertisements, and promoting travel in all four seasons. PWM also allows organizations to promote large business conferences in the

terminal building and will occasionally collaborate with local organizations to welcome large groups with banners and other signage in the terminal building.

SUSTAINABILITY SUCCESSES

It is clear that PWM focuses on enhancing passenger experience, customer service, employee satisfaction and well-being, and community contribution. Some of the Jetport's major sustainability successes relative to its social responsibility include:

Passenger Experience

- Creating a sense of place through local cuisine and ambiance
- Terminal art displays
- Children's play areas

Customer Service

- The Above and Beyond program, which encourages exceptional customer service among Jetport staff and its business partners

Employee Satisfaction and Well-Being

- Safety Incentive Program, which encourages and rewards employees for safety in the workplace and includes employee wellness activities, such as a 15-minute stretch
- Employee appreciation events, such as annual barbeques and chili contests
- Support for employee training

Community Contribution

- Charitable giving and service through activities, such as the Multiple Sclerosis Plane Pull and the Maine Suitcase Party
- Aviation-related educational programs, such as ACE Camp and Jetport tours
- Economic contributions that include overall economic impact and a preference for local hiring
- Business support through terminal showcases, partnerships, and joint advertising

POTENTIAL OPPORTUNITIES FOR PERFORMANCE IMPROVEMENT

Conducting this Baseline Assessment has provided insight into some of the areas on which PWM may choose to focus future efforts. A preliminary list of these opportunities include:

- Target advertising to the business/corporate community;
- Enhance the public aircraft observation area or add a new one potentially located in an enclosed structure on the roof of the new terminal building;
- Promote physical activity/exercise at the Jetport;
- Continue the ASQ survey, and work to improve rankings as appropriate;

- Increase employee engagement opportunities, possibly through improved collaboration and more frequent employee appreciation events;
- Conduct employee satisfaction surveys; and
- Enhance the health and well-being of passengers and employees by requiring Health Product Declarations and Environmental Product Declarations (i.e., product ingredient listings) for all building products and materials installed at the Jetport, including tenant fit-outs, in an effort to avoid the EPA's six "chemicals of concern."

DATA GAPS

The quantitative metrics related to social responsibility are limited. However, maintaining the following information will provide a benchmark for the future:

- Employee retention statistics;
- Current customer service survey (see Opportunities for Performance Improvement);
- Charitable giving (dollars and volunteer hours);
- Number of Jetport tours and number of students participating; and
- Information regarding the educational program, which included a comprehensive signage program and a manual, guideline, or case study (see LEED scorecard).

GOVERNANCE

As defined by International Standards Organization (ISO) 26000 - Social responsibility, organizational governance is comprised of the systems in place that enable an organization to make and implement decisions. These systems may be formal (e.g., subject to laws and regulations) or informal (e.g., established by organizational culture), may emerge from an organization's mission and vision, and are profoundly influenced by an organization's leadership.[10] This Baseline Assessment evaluates PWM's existing decision-making processes and structures in order to identify opportunities where the Jetport can effectively integrate sustainability.

SUSTAINABILITY CONTEXT

Decision-making processes and structures within an organization are significant drivers of sustainability implementation and performance. In order for the sustainability of an organization to be long-lasting, it is necessary to integrate the principle into the very fabric of the organization. An organization in pursuit of a sustainable future may be unlikely to achieve much success if it lacks organization-wide acceptance of a sustainability-focused mission and vision. Under such circumstances, an organization may uninten-

[10] International Standards Organization (ISO). 2010. *ISO 26000, Guidance on Social Responsibility*. Geneva: International Standards Organization.

tionally trap sustainability initiatives within vertical hierarchies (i.e., silos), which would limit their organizational reach. However, a whole-system approach to governance that integrates sustainability into the existing hierarchal structure enables organizations to break down these silos. As a result, sustainability becomes a shared purpose, a principle that turns to practice through convergence and connection.

REGULATORY OVERVIEW

There are no regulatory requirements regarding organizational governance as it pertains to sustainability; however, there are reporting frameworks such as ISO 26000,[11] AccountAbility's AA1000 series,[12] and the Global Reporting Initiative (GRI) that provide guidance in this area. The first two examples offer general guidance and standards to help ensure proper governance and reporting. GRI's framework is the most recognized among reporting standards and is the most applicable to airports. GRI published the Jetport Operators Sector Supplement (AOSS), which is a version of its G3.1 *Sustainability Reporting Guidelines*.[13] Although many airports do not adopt GRI's framework in whole, many do adopt portions to lend its governance and reporting credibility and allows others to measure related performance.[14] Austin-Bergstrom International Airport and Dallas-Fort Worth International Airport are two airports within the United States that report using GRI's standards. GRI provides more information on its sector guidance at
https://www.globalreporting.org/resourcelibrary/GRI-G4-Airport-Operators-Sector-Disclosures.pdf.

RELEVANCE TO OTHER RESOURCE AREAS

Governance is applicable to all other sustainability categories, as commitment from the Jetport's leadership and whole-system integration of sustainability is necessary to make a marked improvement in the Jetport's sustainability performance. This is true regarding the reduction of GHG emissions, decreased energy use, efficient ground access and transportation, and enhanced social responsibility, as well as any other sustainability category not applicable or not yet covered by the Jetport SAMP.

CURRENT PERFORMANCE/BASELINE INFORMATION

Organizational Profile and Structure

The City of Portland owns and operates the Jetport. The Airport Director is the head of the Jetport's organization and reports to the City Manager. Approximately 50 employees, including five division managers, assist the Airport Director in the management and day-to-day operations of the Jetport. Divisions at the Jetport include Operations, Facilities and Engineering, Finance, Marketing, and Security.

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[11] http://www.iso.org/iso/home/standards/iso26000.htm
[12] http://www.accountability.org/standards/
[13] https://www.globalreporting.org/resourcelibrary/AOSS-Complete.pdf
[14] Goebel, Tiffany and Candice Derks-Woods. 2010. http://www.burnsmcd.com/Resource_/PressRelease/1308/FileUpload/article-AirportMagazine-CSR-Goebel-DerksWood.pdf. Airport Magazine. Accessed September 30, 2014.

The City of Portland has several directives related to the sustainability of the Jetport. These include an Environmental Performance Policy, which requires city operations to measure and report on building fuel use, electricity use, vehicle fuel use, solid waste generation, and office paper purchasing. In addition, this policy prohibits the purchasing of polystyrene food service products and the provision of single-serving beverage bottles and cans at city meetings.

The City also has construction and building sustainability directives. Under Chapter 6, Article 7 of the city's ordinances, the city requires that all new construction and renovation projects to be owned or occupied by the city of Portland that are over 2,000 square feet in floor area be certified to the LEED Silver standard (LEED v2009). Further, all new construction and renovation projects to be funded in part or in whole by the city that are over 10,000 square feet shall demonstrate a certain percentage improvement in the proposed energy performance of the building compared to the baseline performance rating per ASHRAE Standard 90.1. Related percentage improvements are defined as 30 percent for new construction, 25 percent for existing buildings, and 20 percent for historic buildings.[15] It is important to note that the US Green Building Council (USGBC) will close new registrations under LEED v2009 in October 2016. LEED v4, which places increased emphasis on using healthy building materials and encourages material transparency from manufacturers and vendors, will become USGBC's new standard rating system.

The Jetport is proactive, open to new ideas, and quick to respond when a promising idea is proposed. However, the Jetport should transition from a hybrid approach to governance that modifies the existing command control structure to support cross-departmental collaboration. This approach would establish a shared purpose, extend the reach of sustainability initiatives, and support the development of innovative new ideas. **Exhibit 1E** provides the organization chart of the Jetport.

Planning Processes

The Jetport utilizes two planning processes to manage its operations, assets, and resource allocation; strategic planning and capital improvement planning enable PWM to manage its array of services, funding, and assets in an efficient manner. The following sections describe organizational planning processes in place at the Jetport.

Strategic Planning

The integration of sustainability into all aspects of an organization is imperative to the success of any sustainability program. The Jetport has performed well in terms of integrating sustainability principles into its strategic plan; however, the Jetport should continue its work to establish sustainability as a core value. This effort requires robust employee engagement in order to achieve organization-wide acceptance.

[15] City of Portland, Maine. 2006. *Chapter 6, Buildings and Building Regulations*. http://www.portlandmaine.gov/DocumentCenter/View/1070. Retrieved December 30, 2014.

PWM's Strategic Plan outlines the Jetport's mission and vision. In general, an airport's mission statement identifies its ongoing objectives and priorities, while its vision summarizes its long-term goals. Further, they guide its management and employees, as well as the vendors and contractors with which it conducts business. An airport's mission and vision are also a means to inform its customers and larger community on its aspirations, and for these external stakeholders to hold the Jetport accountable to these aspirations. As stated in PWM's Strategic Plan, the mission of the Jetport is:

> *The Portland International Jetport commits to be a premier New England airport. We will provide a convenient, safe, and environmentally conscious gateway that exceeds our travelers' expectations while reflecting the essence of the Maine experience.*

The mission statement ties to a number of sustainability principles without calling them out directly. **Table 3D** identifies the connections between PWM's mission statement and the EONS principles of sustainability.

TABLE 3D
Sustainability Elements of PWM's Mission Statement
Portland International Jetport

EONS Category	EONS Applicability of PWM's Mission Statement
Economic Viability	PWM has committed to being a ***premier New England airport***, relying on not only its convenience, but also its commitment to excellent customer service for long-term economic success.
Operational Efficiency	PWM is committed to providing ***convenient*** and ***safe*** travel.
Natural Resource Conservation	PWM is dedicated to providing an ***environmentally conscious gateway*** by addressing local, regional, and global environmental concerns.
Social Responsibility	The Jetport strives to ***exceed*** its ***travelers' expectations*** through excellent customer service and a reflection of the local environment and culture.

To emphasize PWM's long-term goal of increasing its regional market share, the Jetport adopted the following shared vision statement:

Be the Jetport of Choice for Maine!

As demonstrated by its mission and vision, PWM's Strategic Plan emphasizes customer service. PWM underscores the importance of customer service in its organizational culture through the establishment of the following shared values: safety, service, trust, and teamwork. The current strategic planning process is in evaluating linking sustainability to a core value. This effort will require robust employee engagement in order to achieve organization-wide acceptance.

Capital Improvement Planning

The most recent 10-year Capital Improvement Plan (CIP) was created based on information from PWM's terminal master plan and the previous Airport Master Plan (2008). Applicable components of the 2008 Master Plan include its intermediate and long-range capital improvements. Division managers maintain their own five-year plan, which the Airport Director uses to augment and prioritize the CIP on an annual basis. The Airport Director applies three evaluating criteria when prioritizing funding. Presented in order of importance, these criteria include employee and passenger safety, passenger comfort, and financial savings. The Jetport also gives preference in the CIP to maintaining existing capital assets prior to initiating new programs or projects, unless these have an appropriate payback. All Jetport funding is authorized by the City Council, either through the city's annual budget or through standalone project appropriation.

Unofficially, the Jetport considers the sustainability merits of funding allocation; this is largely viewed through the lens of the project's return-on-investment (ROI). Unless the Jetport formalizes this process, it cannot ensure consideration of sustainability with every capital expenditure determination.

Business Processes

The Jetport is a major component of City operations and operates using standard business practices. The following describes how sustainability is incorporated into existing business practices at PWM, including procurement, contracts, and data management and reporting.

Procurement

The City of Portland owns and operates PWM and controls all its purchasing decisions. The City of Portland's procurement procedures require a formal competitive process for expenditures greater than $25,000, unless in the case of an emergency involving the safety of the public or city employees or the repair or replacement of essential equipment. Expenditures between $1,000 and $24,999 do not need to be formally bid, but do require a minimum of three quotes. Expenditures less than $1,000 require neither a formal competitive process nor written quotes.

Unlike the city, the Jetport is a business; it needs to move fast to resolve issues or it may be subject to customer discontent. Every purchase over $1,000 must go through the city's purchasing manager and/or through the bidding process, which can take up to six weeks. The Jetport finds that even purchasing emergency equipment and replacement parts can be difficult, as the City Manager must ultimately provide approval. As previously described, customer service is an important aspect of the Jetport's culture. In order to maintain levels of service and continually improve customer satisfaction, the Jetport needs to have purchasing autonomy to respond in a timely manner to issues that may negatively affect the passenger experience.

The City of Portland's procurement policies do not specifically address issues of sustainability. For instance, building equipment and fleet vehicles are only replaced when necessary, which leaves outdated and inefficient equipment in operation. In addition, the Jetport does not provide preference to local businesses in the purchasing of goods and services. Such a policy would not only provide positive economic impact to the Jetport's region, but would also generate goodwill between the Jetport and its surrounding communities. Although the city's procurement policies do not specifically address issues of sustainability, the city's Environmental Performance Policy does prohibit the purchasing of polystyrene food service products and the provision of single-serving beverage bottles and cans at city meetings.

Contracts and Requirements

PWM has a number of contracts and requirements that pertain to tenant and contractor operations. The Jetport's tenant lease agreements outline the rules and requirements that govern tenant operations and maintenance. The integration of sustainability principles in these documents, however, is limited. More information on the Jetport's tenant lease agreements is provided under *Tenant Sustainability*.

Contractor specifications that the Jetport has used in the past include *Construction Waste Management and Disposal* and *Selective Demolition*. The *Construction Waste Management and Disposal* specification was used during the terminal expansion, which was LEED driven. Although this specification incorporates many elements of sustainable construction practices, primarily concerning waste management, the Jetport has not adopted this specification for wider application. The *Selective Demolition* specification is the typical specification used on smaller jobs, and it only provides a brief reference to waste recycling and reuse.

The Jetport also publishes its *Rules and Regulations* and *Minimum Standards for Commercial Aeronautical Activities*. All Jetport tenants and users must comply with PWM's *Rules and Regulations*, which strive to protect the health and well-being of the public. The *Minimum Standards for Commercial Aeronautical Activities* pertains to General Aviation at the Jetport. Similar to the leases and contractor specifications discussed above, there are opportunities to incorporate sustainability principles into these documents. Modifying existing and future contracts, specifications, and standards to include a sustainability focus will help to guide the everyday behavior of the Jetport's employees, tenants, business partners, and users.

Data Collection and Management

The Jetport measures and tracks performance within all departments using Airport Performance Indicators (APIs) to establish "Best in Class" levels of operations and service. However, the Jetport could expand its list of APIs to include additional sustainability issues. For example, none of the Jetport's current APIs address recycling (e.g., recycling rate per passenger) or GHG emissions (e.g., GHG emissions per scope per passenger). **Table 3E** depicts all APIs within the Jetport's departments, except for the Security and Facilities Departments, as they were not available at the time of this writing.

TABLE 3E Airport Performance Indicators (APIs) Portland International Jetport	
Project(s) Description	
Operations and Maintenance	
• Annual discrepancies from FAA Letter of Correction • Annual at-fault vehicle or pedestrian deviations and runway incursions at the Jetport • Annual number of at-fault accidents, as determined by the Jetport Accident Review Committee, involving Jetport Maintenance Department vehicles • Annual damage (in dollars) that has occurred due to Jetport-related activities	
Finance	
• Total enplanements ('000) • Enplanement annual growth (%) • Utilization (x) • Debt outstanding ($) • Aggregate annual debt service ($) • Operating revenue ($) • Gross revenues and income ($)	• Debt per O&D enplanement ($) • Days cash on hand • Airline cost per enplanement ($) • Operating revenue per enplanement ($) • Operating ratio (%) • Debt service coverage (x)
Marketing	
• Passenger growth • Airline seat growth • New markets • Additional airlines	

Source: Portland International Jetport
Note: APIs for the Security and Facilities Departments were not available at the time of this writing

SUSTAINABILITY SUCCESSES

PWM has proven nimble enough to receive and respond to new ideas. This will prove valuable as the Jetport transitions to a new collaborative approach to governance and as employees develop new sustainability-focused initiatives through enhanced engagement. PWM incorporates sustainability principles into its mission statement. Further, it is in the process of incorporating sustainability into its core values. It also unofficially considers sustainability principles into the prioritization of capital expenditures. Through its development of APIs, the Jetport has developed the framework for robust sustainability reporting in the future, which will enhance transparency and provide for accountability.

Local and national entities across various industries have recognized PWM for its leadership in sustainability. The Jetport has won the following sustainability-related awards:

- **Maine Transportation Association Public Sector Achievement Award**
- **ACI-NA Environmental Achievement Award (2012)** – PWM won this honor in the Environmental Management Award Category for its geothermal system associated with the terminal expansion. This geothermal project is the first of its kind to receive FAA Voluntary Airport Low Emission Program (VALE) grant funds.

- **FAA New England Region, Airport Partnership Award**
- **Associated General Contractors (AGC) of Maine Build Maine Award** – Sargent Corporation, a contractor to PWM, won the 2011 Build Maine Award for the Jetport's apron expansion and deicing facility, which includes a 500,000-gallon storage tank and a deicing fluid recycling building.
- **Airports Going Green Award (2014)** – The Chicago Department of Aviation (CDA) recently honored PWM as one of seven recipients of the seventh annual Airports Going Green awards. PWM received the award in recognition of the recent Terminal Expansion, which received LEED Gold certification, and PWM's outstanding leadership in pursuit of sustainability within the aviation industry.
- **Air Service Quality Survey Recognition** – The ASQ Survey is the world's leading airport customer satisfaction benchmark program. The survey studies critical areas in more than 200 airports in more than 50 countries, surveying passengers every month of the year. During its busiest quarter (July to September 2014), PWM took top honors in 17 of 34 applicable categories, including overall satisfaction among all passengers and among business and leisure travelers specifically.
- **2012 Presidential Citation for Sustainable Design** – Awarded to Gensler by the American Institute of Architects, Washington D.C. Chapter for the environmentally responsible design of the Jetport's new terminal building.

POTENTIAL OPPORTUNITIES FOR PERFORMANCE IMPROVEMENT

Based on existing performance and initiatives at PWM, the Jetport has identified opportunities to improve the integration of sustainability into its operations. Some of these opportunities include:

- Increase awareness of the sustainability elements of the Jetport's mission statement.
- Continue existing efforts to incorporate sustainability into the Jetport's core values through robust employee engagement. Once incorporated, prominently display the Jetport's new set of core values throughout all employee areas.
- Formalize sustainability as the fourth criterion for the prioritization of capital expenditures. Include consideration of projects with an ROI of up to 10 years.
- Work with the City of Portland on establishing an environmentally preferable purchasing (EPP) program.
- Capitalize on the Jetport's buying power through negotiation and incentives.
- Integrate sustainability principles into existing and future contracts, specifications, and standards.
- Require all new projects be registered and certified under LEED v4 (instead of LEED v2009).

DATA GAPS

Data gaps include APIs for the security and facilities departments and the Jetport's process for data collection, management, and reporting.

WATER QUALITY

Stormwater from PWM discharges to the Fore River, one of three major rivers flowing into the Casco Bay. In the EPA's June 2007 *National Estuary Program Coastal Condition Report,* the watershed of the Casco Bay was identified as containing only three percent of the state's land mass but a quarter of the state's population, and the water quality was identified as generally good with low dissolved oxygen in a few areas. The Casco Bay supports a robust fishing industry, tourism, and recreational activities. The group Friends of Casco Bay has been monitoring waters of the Bay since 1993, and there is significant interest in protecting and improving the living resources and habitats of the Bay. PWM should continue to adhere to environmental laws and monitor changing regulations, utilize best available stormwater treatment technologies, and train staff in water quality benefiting practices.

SUSTAINABILITY CONTEXT

Water quality plays a significant role in a Sustainable Airport Master Plan because of the large expanse of impervious area at airports, the potential of equipment fluid leaks and spills, potential impacts of stormwater conveyed contaminates on water resources, and the many options to treat stormwater prior to release to lessen an airport's environmental impact and demonstrate environmental responsibility.

REGULATORY OVERVIEW

The Portland International Jetport is regulated by the Maine Department of Environmental Protection (Maine DEP) under the *Site Location of Development Act* (38 MRSA 481-490), and development projects at the Jetport require amendment to the facility's existing MaineDEP permit. Water quality protection is a major element reviewed as part of development projects at the Jetport, and each project must comply with the Maine DEP Chapter 500 Stormwater Regulations under general stormwater standards.

On October 11, 2005, the Maine DEP replaced the EPA as the regulatory agency for the Multi-Sector General Permitting of stormwater discharge associated with industrial activity in accordance with the Maine Pollutant Discharge Elimination System. As a result, federal regulation 40 CFR 122.26(b) (14) has been replaced by the Maine State Multi-Sector General Permit (Maine MSGP) as the controlling regulatory document for the Portland International Jetport.

US Environmental Protection Agency (EPA) effluent guidelines related to deicing fluid application apply to the Jetport and are regulated by the Maine DEP under the industrial activity program.

Development projects at the Jetport are also reviewed by either the City of Portland or City of South Portland (depending upon location) under their respective site plan approval guidelines, which include stormwater control requirements.

Additionally, Chapter 40 of the Code of Federal Regulations Part 112 (40 CFR 112) related to Oil Spill Prevention Control and Countermeasure must be complied with by the Jetport and other tenants with oil or fuel storage capacity exceeding certain levels. Oil Spill Prevention Control and Countermeasure Plans for the facility must be prepared in accordance with good engineering practices, including applicable industry standards, and in accordance with the requirements of Chapter 40 of the Code of Federal Regulations Part 112 (40 CFR 112); further, procedures must be established for required inspections and testing, and each plan must be adequate for the related facilities.

RELEVANCE TO OTHER AREAS

Water quality and waste are closely related. Prior to November 2010, all propylene glycol aircraft deicing fluid sprayed at PWM discharged to the Fore River or sheared off aircraft in flight. By recycling the previously wasted deicing fluid, the dissolved oxygen content in the Fore River at PWM's storm drain outfalls improves.

CURRENT PERFORMANCE/BASELINE INFORMATION

The following describes PWM activities to address water quality, including stormwater treatment measures, recycling of deicing fluid, spill prevention and countermeasures, and stormwater pollution prevention.

Stormwater Quality Treatment Measures

The nearest bodies of water to the Portland International Jetport are Long Creek to the south and the Fore River to the north and east. Stormwater at the site discharges to the Fore River and Long Creek via formal and extensive drainage systems, and ultimately discharges to Casco Bay. Personnel at the facility are made aware that non-stormwater spills leaving the site can impact the water quality of the Fore River and Long Creek. Personnel also inspect stormwater outfalls for non-stormwater contaminates on a regular basis as required by the Jetport's *Stormwater Pollution Prevention Control Plan*.

There are three major and several minor outfalls that are tributary to the Fore River. Additionally, three outfalls in the area east of the Runway 36 threshold are tributary to Long Creek just above its confluence with the Fore River.

To meet Maine DEP Chapter 500 Stormwater Requirements, five water quality units (WQU) were installed in the year 2001 within the airfield drainage system; in 2002, an additional WQU was added for the parking garage and associated roadways.

Over the past five years, several water quality improvement features have been designed, permitted and constructed, or enhanced to support the terminal expansion, associated aircraft apron, vehicular parking and access roads, and airfield improvements. These features include a two-acre water quality pond with a wire grid to deter birds at the southeast end of Runway 18-36, a water quality filter east of the north end of Runway 18-36, three water quality filters at the perimeter of the parking area to the northwest of the terminal building, and a large water quality filter west of the main deicing area. These water quality features were all designed to meet Maine DEP Chapter 500 Stormwater Rules.

Spent Deicing Fluid Recycling Operation

In October 2007, the Maine DEP requested a plan from the City of Portland to remove as much spent aircraft deicing fluid (propylene glycol) as practicable from the Jetport's stormwater discharge. At the same time, the EPA was developing effluent limit guidelines related to aircraft deicing operations. With future EPA effluent limit guidelines unknown, the City of Portland hired the project team to prepare a Deicing Study to review options for removal of propylene glycol from the Jetport's stormwater discharge.

Several options were considered, including disposal at Portland or South Portland's Publicly Owned Treatment Works (POTW), trucking to SAPPI's Waste Water Treatment Facility (WWTF) or to Clean Harbors Treatment Facility. Further general options included treating with an on-site lagoon or aerated gravel beds, treating on-site with an anaerobic system, treating with engineered wetlands, and recycling. After extensive review of solutions utilized at other airports, review of current FAA guidance and several meetings with city and MaineDEP staff, recycling with distillate discharge to the City of Portland's POTW was ultimately chosen as the solution for the Jetport. MaineDEP requested that the recycling facility be operational by November 1, 2010.

An aircraft deicing collection pad was designed and constructed in 2009 as part of an ARRA project for which construction was funded 100 percent by the FAA. The deicing fluid recycling building, associated 500,000-gallon underground storage tank, automatic valve control structure, additional snow storage shoulder, and expanded aircraft apron were built by Sargent Corporation in 2010, for which they received a Maine Build Award from the Associated General Contractors of Maine.

In preparation for operation of the facility beginning in November 2010, the City of Portland established an aircraft deicing fluid recycling management contract with Inland Technologies for collecting spent aircraft deicing fluid and removing propylene glycol from Jetport stormwater. Inland is required to ensure that un-permitted levels of glycol do not enter the sanitary sewer via the Jetport wastewater flow, or otherwise remain on-site at the Jetport. Regardless of the process used, there can be no discharge of stored fluid into the Jetport wastewater flow to the sanitary sewer having glycol levels that exceed a daily BOD loading of 170 pounds.

By installing the spent deicing fluid collection infrastructure and operating the recycling facility, the majority of the propylene glycol sprayed on aircraft at the Jetport is removed from the facility's stormwater. This helps to maintain dissolved oxygen levels in receiving waters otherwise reduced by degrading glycol.

Oil Spill Prevention Control and Countermeasure Plans

Both the City of Portland and Northeast Air maintain Oil Spill Prevention Control and Countermeasure Plans (SPCC) at the Jetport to prevent oil spills from occurring, and to perform safe, efficient, and timely responses in the event of a spill or leak. In accordance with the EPA oil pollution prevention regulations (40 CFR 112), owners must prepare and implement an SPCC Plan for facilities that could reasonably be expected to discharge oil into or upon navigable waters or adjoining shorelines, and meet one of the following conditions:

- Above-ground oil storage capacity exceeds 1,320 gallons; or
- Underground oil storage capacity exceeds 42,000 gallons, unless the underground tanks are subject to all of the technical requirements of 40 CFR 280 or a State program approved under 40 CFR 281. (Maine's approved program is Department of Environmental Protection, Chapter 691 – Rules for Underground Storage Facilities).

As defined by 40 CFR Part 112, oil includes all grades of motor oil, hydraulic oil, lube oil, fuel oil, gasoline and diesel, automatic transmission fluid (ATF), waste oil, and transformer mineral oil. The definition of oil also includes non-petroleum oils such as animal or vegetable oils and synthetic oils.
In addition to satisfying the regulatory requirement, the SPCC plans are working documents at the Jetport. The plans are used frequently in the following ways:

- As a reference for oil storage and containment system information;
- As a tool for informing new employees and refreshing existing employees on practices for preventing and responding to spills;
- As a guide to periodic training programs for employees;
- As a guide to facility inspections; and
- As a resource during an emergency response.

Stormwater Pollution Prevention Control Plan

1. The City of Portland maintains a Stormwater Pollution Prevention Control Plan to protect water quality and comply with the Maine State Multi-Sector General Permit for stormwater discharge associated with industrial activity.

SUSTAINABILITY SUCCESSES

PWM has a proactive water quality management program that includes stormwater quality treatment measures, the collection and recycling of spent aircraft deicing fluid, and adherence to the *City of Portland's Oil Spill Prevention Control and Countermeasure Plan and Stormwater Pollution Prevention Control*

Plan. The Jetport's exceptional performance in this category is indicated by PWM's proactive approach to meet its regulatory requirements.

POTENTIAL OPPORTUNITIES FOR PERFORMANCE IMPROVEMENT

Based on the findings of this Baseline Assessment, the following represents a preliminary list of potential opportunities for performance improvement under Water Quality. The Jetport will evaluate the applicability and feasibility of these opportunities moving forward.

- Additional staff training and education.
- Evaluate potential of at gate aircraft deicing pretreatment and overall discharge reduction benefits for extraordinary weather events.
- Implement most effective stormwater quality treatment measures to treat new imperious areas (not only measures that meet MeDEP Chapter 500 rules).
- Utilize GIS technology to inventory, monitor condition and schedule maintenance/replacement of stormwater conveyance and control infrastructure.
- Where appropriate, install additional on-site stormwater management options, particularly "green" infrastructure projects that naturally control and/or treat stormwater such as bioswales, rain gardens, and permeable pavements.
- Harvest rainwater to reduce the Jetport's stormwater volume. This would also reduce the Jetport's water consumption, if applied to non-potable uses such as landscaping (i.e., irrigation).

DATA GAPS

Sufficient information for this water quality assessment has been provided; no related data gaps exist.

NOISE

Noise can be defined as any unwanted sound. FAA has adopted standards to determine whether land uses surrounding an airport are compatible with airport noise. While an airport may not have incompatible land use within their noise contours, it may still generate unwanted sound that the neighboring community perceives as disruptive. Inadequately addressing noise concerns of residents can degrade local support for an airport.

PWM proactively mitigates aircraft noise impacts by participating in FAA's Part 150 noise compatibility program and responding to neighboring residents' concerns regarding aircraft noise deriving from its facilities.

SUSTAINABILITY CONTEXT

Consideration of impacts of noise within the surrounding community is an important aspect of sustainability because it often drives positive relations with the community. Aircraft noise is typically the largest concern the community has with an airport. Through working with the community, these concerns can be reduced and community well-being enhanced.

REGULATORY OVERVIEW

Title 14 CFR Part 150, *Airport Noise Compatibility Planning*, provides standards for airport operators to use in order to accurately calculate and document noise levels for a Noise Exposure Map. This regulation also provides guidance for the development of a Noise Compatibility Program, which should strive to reduce or eliminate noise-related incompatible land use. Advisory Circular (AC) 150/5020-1, *Noise Control and Compatibility Planning for Airports*, provides additional guidance for determining noise exposure levels and incompatible land use impacts.

RELEVANCE TO OTHER AREAS

Air emissions and noise are closely related. Many newer aircraft have improved performance characteristics, which decrease both air and noise emissions. Initiatives, such as utilizing Pre-Conditioned Air at airline gates, also provide both air and noise emission reductions. Conversely, intentionally reducing emissions of one type, through performance measures, could increase emissions of another. For example, if the Jetport's Fly Quiet noise procedures result in longer flight time, fuel usage and air emissions increase, even though noise decreases.

CURRENT PERFORMANCE/BASELINE INFORMATION

By working closely with the neighboring community, noise concerns can often be reduced. In 1998, the City of Portland established the NAC, an official City of Portland Advisory Committee on aircraft noise issues. The NAC provides an official forum for collaborative discussion of Jetport noise issues and other related matters. Local jurisdictions and the City of Portland appoint the 14-member committee to represent residential and business concerns.

In addition to this committee, the Jetport provides the means for members of the public to register complaints through the completion of an online noise complaints form, located at http://www.portlandjetport.org/about_the_portland_international_jetport/noise-complaint-form. Alternatively, members of the public can call a 24-hour hotline ([207]756-TELL [8355]). The Jetport's Noise Office logs each complaint into a database for recordkeeping and trend analysis purposes. Noise complaints and related analysis are presented to the NAC on a quarterly basis, who then reviews the information and advises corrective action, if necessary. Corrective action may take the form of changes to flight patterns, schedules, and/or runway usage.

In 2013, PWM received 100 noise complaints, which represents a slight decrease from 2012 when it received 104 complaints. However, the number of noise complaints received in 2013 represents a significant reduction (90.5 percent) from the number of noise complaints received in 2011. In 2013, the Jetport received noise complaints from an average of 3.6 persons per month. **Table 3F** presents the number of noise complaints received by the Jetport and the number of reporters by month between 2008 and 2013.

TABLE 3F
Noise Complaints and Reporters
Portland International Jetport

Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2008	Report	30	33	69	105	108	76	80	97	62	49	42	36	787
	Reporter	4	4	5	3	4	16	14	10	7	8	5	6	
2009	Report	20	41	18	49	61	63	100	132	72	43	38	43	680
	Reporter	4	7	5	9	12	14	16	13	12	6	4	5	
2010	Report	14	17	16	39	19	2	42	93	20	4	2	1	269
	Reporter	2	4	2	2	2	2	16	16	5	1	2	1	
2011	Report	0	0	2	24	165	160	289	299	89	18	6	1	1053
	Reporter	0	0	1	3	4	5	10	11	5	2	2	1	
2012	Report	3	0	0	6	1	13	22	52	1	3	2	1	104
	Reporter	0	0	0	2	1	7	8	10	1	3	2	1	
2013	Report	0	0	4	9	10	15	13	22	20	2	1	4	100
	Reporter	0	0	4	3	5	4	4	11	8	2	1	1	

Source: Portland International Jetport Noise Advisory Committee Meeting, February 27, 2014.

The Jetport completed a 14 CFR Part 150 Noise Compatibility Planning study (Part 150 Study) in 2005, in accordance with FAA Advisory Circular 150/5020-1. The Part 150 Study documents noise exposure in the Jetport environs and establishes programs to minimize noise-related land use incompatibilities. These programs include the following elements:

- Noise Abatement Measures
    - Noise barrier at approach end of Runway 18
    - Hush house on the east end of the Jetport property
    - Preferential use of Runway 29
    - Preferential arrival route
    - Runway 11 preferential departure routes
    - Use of FAA Advisory Circular (AC) 91-53 Noise Abatement Departure Profiles
- Monitoring and Review Measures
    - Monitor proposals for new scheduled operations between 11:30 PM and 6:15 AM
    - NAC review of implementation
    - Quantitative review of changes in noise exposure
    - Re-computation of contours with changes in Jetport layout or operation
    - Minimum interval between preparation of new contours

- Land Use Measures
    - Land acquisition and relocation
    - Soundproofing
    - Easement acquisition
    - Airport zoning overlay district
    - Real estate disclosure
    - Undeveloped land acquisition

PWM has also proactively instituted a voluntary Fly Quiet Program, which is designed to encourage aircraft operators to use "fly quiet" flight patterns and procedures that reduce noise in the communities surrounding Portland International Jetport. The Jetport's Noise Office is a timely resource for in-depth analysis and credible data about flight operations and noise monitoring reports. The Noise Office responds to residents' reports of specific noise events and investigates them to determine deviations from adopted Fly Quiet flight patterns and procedures.

The most recent noise exposure contours generated for the Jetport were prepared for the *2009 Environmental Assessment (EA) for Airfield and Terminal Improvements*. **Exhibit 3C** presents the noise contours from the EA for the plan year 2017. The contours were based upon forecast operations from the 2008 Master Plan. The 2008 Master Plan forecast of total aircraft operations was 82,421 for 2017, 48,906 of which were projected to be by air carrier and air taxi aircraft. It is important to point out that the actual aircraft operational count in 2015 was 48,898 for PWM, with only 27,920 air carrier/air taxi operations. Moreover, the SAMP 2035 long term operational projections do not reach the 2017 operational levels used to generate the noise contours depicted on **Exhibit 3C**. Thus, the contours depicted are an overestimation, with actual noise levels lower than shown.

The neighborhoods surrounding the Jetport have benefited significantly from Congressional and FAA mandates and policies, as well changes in the fleet used by the airlines. Perhaps the biggest impact was the requirement of all jet aircraft operating in the United States with a maximum takeoff weight over 75,000 pounds to meet Stage 3 noise emission requirements by December 31, 1999. More recently, the phase-out of the remaining older/louder/less fuel efficient Stage 2 jet aircraft, also ordered by Congress and implemented by the FAA, was completed on December 31, 2015.

Since the Part 150 Study, FedEx has retired its fleet of Boeing 727-200 aircraft that served the Jetport at the time. The air cargo company is currently operating the significantly quieter Boeing 757-200 into the Jetport. In addition, total air cargo jet operations have also declined from 1,579 in 2004 to 618 in 2015.

SUSTAINABILITY SUCCESSES

PWM recognizes that neighborhoods surrounding PWM are affected by noise from aircraft operations. The Jetport strives to improve education and understanding of noise associated with the Jetport through the following initiatives:

- **Part 150 Study** – The Jetport conducted a Part 150 Noise Study, which included a Noise Compatibility Program. This study, including noise contour maps, is available on PWM's website.[16]
- **Fly Quiet Program** - The Jetport developed a voluntary Fly Quiet Program, which was designed to encourage aircraft operators to use flight patterns and procedures that reduce noise in the communities surrounding PWM.
- **Noise Hotline** - The Jetport website provides information on noise complaint reporting. Noise complaints can be submitted online[17] at or to the 24-hour hotline at (207) 756-8355.
- **Noise Reporting** - The Jetport's Noise Office is a timely resource for in-depth analysis and credible data about flight operations and noise monitoring reports. The Noise Office responds to residents' reports of specific noise events and investigates the flight to determine if the aircraft deviated from the recommended Fly Quiet flight patterns and procedures.

POTENTIAL OPPORTUNITIES FOR PERFORMANCE IMPROVEMENT

Based on the findings of this Baseline Assessment, the following represents a preliminary list of potential opportunities for performance improvement under Noise. The Jetport will evaluate the applicability and feasibility of these opportunities moving forward. In addition to these opportunities, the Jetport should continue its already successful programs and initiatives such as support for the NAC and Fly Quiet Program.

- Update the Jetport's noise exposure maps, when appropriate.
- Work with local entities and property owners, as applicable, to increase landscaped areas around and adjacent to the Jetport to create a buffer between it and surrounding communities.
- Identify any noise-generating mechanical systems and relocate them away from residential areas, where feasible, and consider residential communities in the positioning of new on-site noise generating mechanical equipment.
- Require all construction contractors working on the Jetport to mitigate unwanted noise and vibration to the greatest extent practicable.

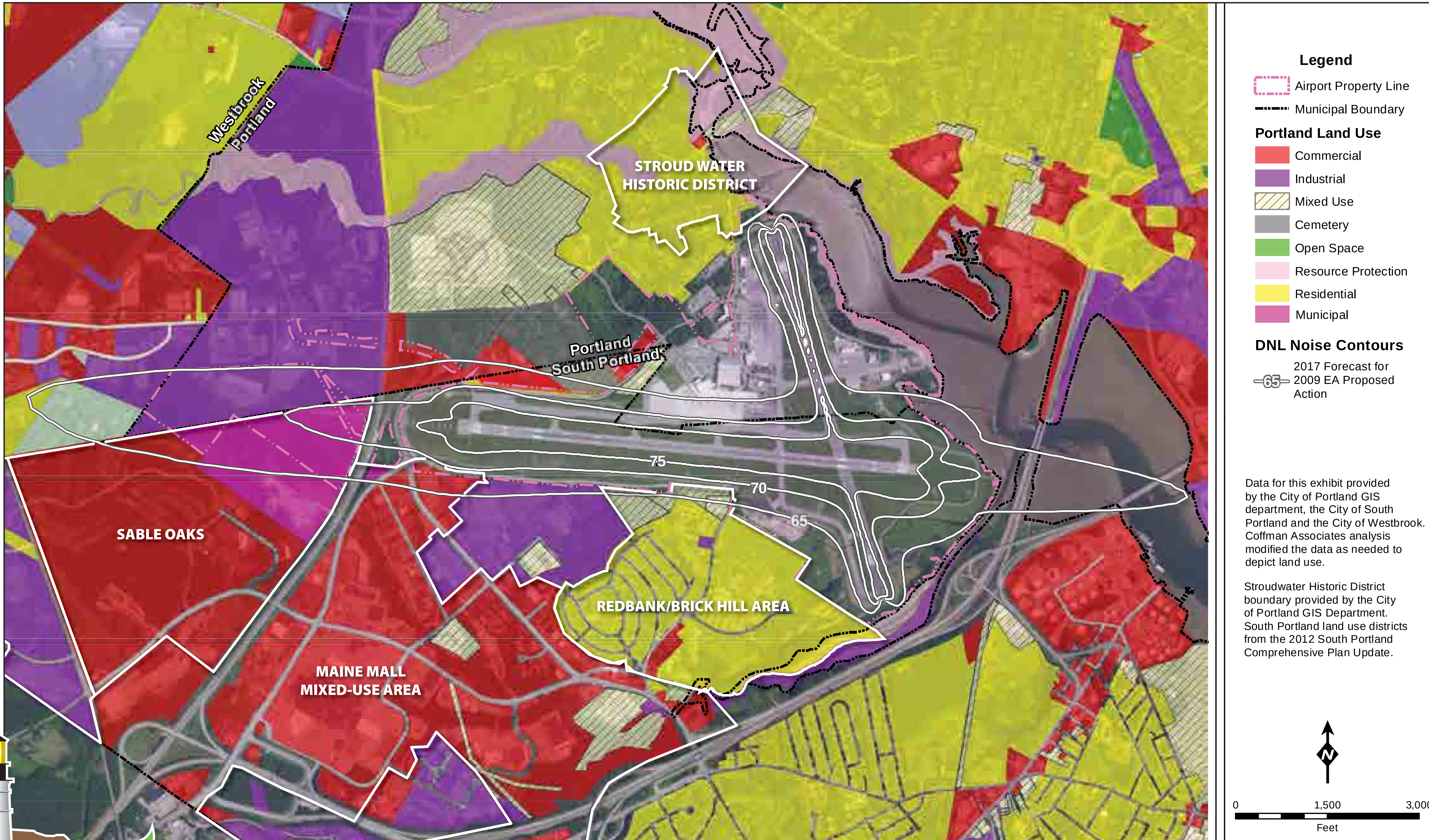
DATA GAPS

Sufficient information for this noise assessment has been provided; no related data gaps exist.

TENANT SUSTAINABILITY

This section provides context for tenant sustainability at airports and assesses PWM's current tenant sustainability performance through a review of the Jetport's tenant lease agreements and the results of

[16] PWM Part 150 Study. http://www.portlandjetport.org/about_the_portland_international_jetport/part_150_noise_study



Data for this exhibit provided by the City of Portland GIS department, the City of South Portland and the City of Westbrook. Coffman Associates analysis modified the data as needed to depict land use.

Stroudwater Historic District boundary provided by the City of Portland GIS Department. South Portland land use districts from the 2012 South Portland Comprehensive Plan Update.

Exhibit 3C

PWM ENVIRONMENTAL ASSESSMENT NOISE CONTOURS

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a Jetport-focused tenant sustainability survey. This assessment recognizes related sustainability successes at the Jetport and identifies opportunities to improve tenant sustainability performance. This section also details the limitations of this assessment through a description of existing data gaps.

SUSTAINABILITY CONTEXT

Airport tenants generally include concessionaires, airlines, fixed base operators, car rental companies, and government agencies, among others. Many of these entities provide travelers with products and services, while contributing to the revenues of the Jetport in which they operate. Airport tenants use airport infrastructure and services, and are an integral part of an airport's daily operations. As such, they are significant contributors to an airport's impact on the environment and society. In order to drive airport-wide sustainability performance improvement, an airport must integrate tenants within its sustainability framework and engage them in program implementation.

REGULATORY FRAMEWORK

There are no regulatory concerns specific to the sustainability of tenants at PWM. However, tenants at the Jetport are subject to their respective lease agreements, which outline the rules and requirements for tenant operation and maintenance. Further, contractors working on behalf of tenants are subject to specifications that prescribe procedures for new construction and alteration/improvement projects. PWM develops construction specifications on a project-by-project basis.

RELEVANCE TO OTHER AREAS

Tenant activities touch upon many aspects of an airport's daily operations; therefore, tenants can have a broad impact on an airport's sustainability performance. Tenants at PWM contribute or have the potential to contribute to all of the sustainability categories evaluated in this Baseline Assessment. **Table 3G** details tenant relationships with Baseline Assessment Categories.

TABLE 3G
PWM Sustainability and Related Tenant Activities
Portland International Jetport

Sustainability Category	Example Tenant Activities
Governance	Tenants are directed by Jetport lease agreements, and are among the Jetport's stakeholders
Greenhouse Gas (GHG) Emissions	Tenant fleets (i.e., vehicles and equipment) and aircraft produce GHG emissions
Energy	Tenants consume energy in their operations
Waste Management and Recycling	Tenants produce waste, and are required to participate in the Jetport's recycling program
Ground Access and Transportation	Tenant employees commute to the Jetport; rental car companies operate on-premises
Social Responsibility	Tenants may hire and source products/services locally
Noise	Aircraft are significant contributors to noise at the Jetport; tenant contractors may produce noise during construction periods

CURRENT PERFORMANCE/BASELINE INFORMATION

This section presents the Jetport's current tenant sustainability performance through a review of the Jetport's tenant lease agreements and the presentation of results from a Jetport-focused tenant sustainability survey.

Existing Tenant Contracts and Specifications

One method by which an airport can integrate sustainability into tenant activities is by formalizing sustainability requirements within tenant contracts and related documents, such as lease agreements and design and construction specifications. **Table 3H** identifies elements of these documents that airports have previously identified and addressed to improve their tenant sustainability performance.

TABLE 3H
Opportunities to Enhance Tenant Sustainability in Contracts and Guidelines
Portland International Jetport

Document	Tenant Activities
Airline Agreements	Use of preconditioned air, ground service equipment, waste hauling, ticket counter allocation, gate electrification, common use equipment, participation in working groups, general maintenance services
Concessionaire Agreements	Waste hauling; source reduction; programs to facilitate food quality, sourcing, recycling, and composting; resource efficiency (e.g., energy and water); packaging; sustainable design for tenant alternations; and alternate-fuel vehicles
Design and Construction Specifications	New construction, existing buildings, operations and maintenance, commercial interiors, core and shell

Source: "Airport Cooperative Research Program (ACRP) Synthesis Report 42: Integrating Environmental Sustainability into Airport Contracts," Transportation Research Board, 2013, http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_042.pdf

Existing Tenant Contracts and Specifications at PWM

Development of the PWM SAMP included a review of terminal lease agreements at the Jetport, including the Airline Signatory Agreement, Rental Car Concession Agreement, and the leases of HMSHost (March 2011) and Paradies (July 2011). PWM includes several environmental and social clauses in these documents that go beyond federal, state, and local laws and regulations. These clauses require tenants to:

- Install submeters, if not already extant, to determine unique utility usage and associated charges (HMSHost/Paradies/US Airways);
- Perform preventative maintenance (HMSHost/Paradies);
- Participate in the Jetport's recycling program (HMSHost/Paradies/US Airways);
- Adhere to the Jetport's policies regarding non-discrimination (HMSHost/Paradies/Hertz/US Airways);
- Comply with the Jetport Concession Disadvantaged Business Enterprise (ACDBE) (HMSHost/Paradies);

- Maintain good business ethics (Hertz);
- Work to meet the City of Portland's goals for DBE/WBE participation (Hertz); and
- Use a common and exclusive deicing facility (US Airways).

It is important to note that the non-discrimination clauses within the leases belonging to HMSHost and Paradies, as well as the Airline Signatory Agreement, do not address gender and sexual orientation.

As previously noted, PWM develops construction specifications for new construction and tenant alterations/improvements on a project-by-project basis. The Jetport has not developed any design and construction standards for these project types.

PWM Tenant Sustainability Survey

As part of the Baseline Assessment for the PWM SAMP, the Project Team solicited input from PWM's tenants, both terminal (e.g., concessionaires and airlines) and non-terminal (e.g., rental car companies and fixed base operators). The purpose of the tenant survey was threefold:

1. To identify existing and planned sustainability programs, policies, and practices;
2. To discover opportunities for the Jetport and its tenants to collaborate on improving the Jetport's overall sustainability performance; and
3. To engage tenants in the Jetport's sustainability program.

This section provides a summary of the responses to the tenant sustainability survey (see **Table 3J**). The complete survey responses are included in Supplemental Information, Part VII.

PWM distributed the tenant sustainability survey to 33 individuals representing 26 organizations at the Jetport. The survey yielded responses from 12 individuals, for a response rate of 36.4 percent. Survey participants represented the following PWM tenants:

- Concessionaires (HMSHost and The Paradies Shops);
- Airlines (Delta Air Lines and US Airways/American Airlines);
- Northeast Air, the Jetport's fixed base operator;
- Inland Technologies, the Jetport's deicing facility contractor;
- Aircraft sales and service (MAC Air Group/Main Aviation Corp and Maine Aviation Sales);
- ISS Facility Services, the Jetport's janitorial contractor; and
- Standard Parking.

Though not a Jetport tenant, the Greater Portland Convention + Visitors Bureau (GPCVB) also participated in the survey.

TABLE 3J
Highlights from the PWM Tenant Sustainability Survey
Portland International Jetport

Sustainability Topic	Related Tenant Activities
Sustainability Framework	At least three PWM tenants (ISS Facility Services, HMSHost, and Maine Aviation Sales) have formal sustainability programs or policies.
	The majority of PWM tenants that responded to the survey have implemented sustainability measures at the Jetport. These measures predominantly center on waste management (e.g., recycling), energy use and conservation, and environmentally preferable purchasing (EPP).
	PWM tenants have developed and offer sustainability-related training to their employees. Available trainings largely focus on waste management.
	PWM tenants plan to initiate or advance energy conservation and EPP practices.
Waste Management and Recycling	The majority of PWM tenants that responded to the survey recycle to some extent. Materials most often recycled include paper products, cardboard, bottles, waste oil, and e-waste.
	Tenants are promoting paperless activities such as paperless billing.
Greenhouse Gas Emissions	Many tenants encourage sustainable transportation through the promotion of public transportation, carpooling, and preferential parking for high efficiency/low emission vehicles.
	Airlines adhere to aircraft idling policies and hook up to ground power units and pre-conditioned air.
Community Well-Being	Tenants make an effort to hire and purchase locally to the greatest extent practicable.
	Some tenants conduct local charitable giving and encourage employee volunteerism. Examples include Camp Sunshine, Maine Muscular Dystrophy Association, and the Dempsey Challenge.
	In addition to offering products and services, some tenants provide passenger amenities, such as conference rooms, lounges, and Wi-Fi.
Green Building	None of the tenants that responded to the survey have incorporated green building standards in the design and construction of their spaces.

Source: "Airport Cooperative Research Program (ACRP) Synthesis Report 42: Integrating Environmental Sustainability into Airport Contracts," Transportation Research Board, 2013, http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_042.pdf

SUSTAINABILITY SUCCESSES

PWM has integrated certain elements of sustainability into its tenant lease agreements. Where the Jetport has been particularly successful in this approach is the tenant requirement to participate in the Jetport's recycling program, submetered utilities, and the universal agreement among airlines servicing PWM to use the Jetport's central deicing facility. With regard to tenant-led initiatives, the following are comparatively exceptional and positively contribute to the Jetport's overall sustainability performance:

- ISS Facility Services is a signatory of the United Nations Global Compact (UNGC), which commits the company to operating in accordance with UNGC's 10 principles concerning human rights, labor rights, environmental protection, and anti-corruption.[18]
- ISS Facility Services reduces their use of potentially harmful substances by procuring bio-based chemicals and cleaning equipment that use only water.

[18] ISS Facility Services. 2014. Code of Conduct. http://www.issworld.com/en/corporate-responsibility/approach-to-cr/code-of-conduct. Retrieved November 25, 2014.

- Inland Technologies provides its employees with training on the company's stormwater initiatives, as well as on the company's existing and planned energy conservation measures.
- MAC Air Group is considering the installation of solar panels to power some, if not all, of its operations.
- All HMSHost and The Paradies Shops tenants recycle cardboard and newspaper. Consistent with its corporate practices, HMSHost also donates excess food to local food pantries/banks.
- Inland Technologies developed route-planning initiatives to eliminate empty haul transporting. It also established designated locations for exchanging transporter vehicles for regular vehicles.
- The Paradies Shops collects and delivers toys locally through the Toys for Tots program. It also promotes its "Treat Our Troops" program, which encourages customers to purchase items for care packages that the United Service Organization sends to troops overseas.
- HMSHost, the only food and beverage tenant at PWM, plans to identify meal options on its menus that address nutritional wellness, as well as dietary and allergy concerns.
- The Greater Portland Convention + Visitors Bureau provides wayfinding and travel assistance to PWM customers.

POTENTIAL OPPORTUNITIES FOR PERFORMANCE IMPROVEMENT

The following opportunities exist to improve the integration of sustainability principles into PWM's tenant lease agreements.

- Ensure that non-discrimination clauses within all lease agreements address gender and sexual orientation;
- Require all tenants that serve food to participate in the Jetport's composting program;
- Require all tenants that serve food to use environmentally friendly food service ware; prohibit the use of Styrofoam™;
- Require all tenants to implement green cleaning practices and incorporate integrated pest management into their cleaning and janitorial practices;
- Require tenants to upgrade energy and water using equipment to higher efficiency models during tenant alterations/improvements;
- Require tenants to report on vehicle fleet information for the purposes of GHG emissions monitoring; and
- Incorporate incentives to encourage tenants to go beyond required sustainability initiatives.

In addition to modifying tenant lease agreements, PWM should also develop a set of design and construction standards that incorporate sustainable principles. The Jetport should require every tenant to adhere to these guidelines during any new construction or alteration/improvement project.

Through the tenant sustainability survey, tenants identified opportunities for PWM to support their respective organization's sustainability goals. These potential efforts include:

- Creating tenant awareness and training programs related to the Jetport's sustainability program and industry best practices;
- Linking lighting to motion sensors in spaces that are infrequently used; and
- Upgrading deicing facilities to support tenant-desired energy conservation measures.

DATA GAPS

Though PWM distributed the tenant sustainability survey to 33 tenants, it only gained input from 11 (not including the Greater Portland Convention + Visitors Bureau). It would be helpful to understand the existing and/or planned sustainability activities of the tenants that did not respond to the survey. These tenants may provide additional best practices, which the Jetport can share and other tenants can emulate. These tenants might also have insight into other opportunities of collaboration between the Jetport and its tenants.

PWM
Portland International Jetport

CHAPTER FOUR
AIRPORT FACILITY REQUIREMENTS

SUSTAINABLE AIRPORT MASTER PLAN

CHAPTER FOUR

AIRPORT FACILITY REQUIREMENTS

To properly plan for the future of Portland Interna. onal Jetport (PWM), it is necessary to translate forecast aviation demand into the specif c types and quantities of facilities that can adequately serve the identif ed demand. This chapter uses the results of the forecasts presented in **Chapter Two - Forecasts**, as well as established planning criteria, to determine the airside (i.e., runways, taxiways, navigational aids, marking and lighting) and landside (i.e., hangars, aircraft parking apron, and automobile parking) facility requirements.

The objective of this effort is to identify the adequacy of existing airport facilities and outline what new facilities may be needed, and when these may be needed to accommodate forecast demands. Having established these facility requirements, alternatives for providing these facilities will be evaluated in the next chapter. Analysis in **Chapter Five - Alternatives** will determine the most cost-effective and efficient means for implementing proposed facility development.

In addition, as part of its f rst sustainable master plan, the Jetport is taking the next step towards full sustainability integration. This will enable the Jetport to take a holistic approach in addressing the core sustainability principles outlined by Airports Council International-North America (ACI-NA), including **E**conomic vitality, **O**perational efficiency, **N**atural resource conservation, and **S**ocial responsibility (EONS). This approach has the potential to improve the Jetport's overall efficiency, reduce operating costs, and produce other measurable benef ts through the identif cation and implementation of innovative practices.



The Jetport's mission, vision, and shared values along with its sustainability priority categories, goals, objectives, metrics, targets, and actions comprise the Jetport's sustainability framework that will guide its sustainability program moving forward. **Chapter Three – Baseline Assessment** established the priority categories. This chapter will document the goals, objectives, and metrics established through the sustainable master plan process. Chapter Five identifies the sustainability actions for potential implementation and performance improvement, while Chapter Six establishes the sustainability targets.

PLANNING HORIZONS

An updated set of aviation demand forecasts for Portland International Jetport has been established with a summary of the primary forecasting elements presented on Exhibit 2N. These activity forecasts include commercial passenger enplanements, annual operations, based aircraft, fleet mix, and air cargo. With this information, specific components of the airfield and landside system can be evaluated to determine their capacity to accommodate future demand.

Cost-effective, efficient, and orderly development of an airport should rely more upon actual demand at an airport than on a time-based forecast figure. In order to develop a master plan that is demand-based rather than time-based, a series of planning horizon milestones have been established that take into consideration the reasonable range of aviation demand projections. The planning horizons presented in **Table 4A** are segmented as the Short Term (approximately years 1-5), the Intermediate Term (approximately years 6-10), and the Long Term (years 11-20 and possible beyond).

TABLE 4A
Planning Horizon Activity Levels
Portland International Jetport

	Baseline	PLANNING HORIZON		
	2013	Short Term	Intermediate Term	Long Term
Commercial Airline				
Enplaned Passengers	843,944	975,000	1,050,000	1,200,000
Total Air Cargo (tons)	12,261	13,500	14,200	15,900
Total Based Aircraft	50	56	62	76
Annual Operations by				
Air Carrier	26,068	28,800	29,800	32,000
Air Cargo	3,162	3,300	3,400	3,700
General Aviation	17,063	20,800	21,800	24,000
Air Taxi	5,299	5,900	6,900	9,000
Military	498	600	600	600
Total Annual Operations	52,090	59,400	62,500	69,300

The most important reason for utilizing milestones is it allows airport management the flexibility to make decisions and develop facilities according to need generated by actual demand levels. The demand-based schedule provides flexibility in development, as development schedules can be slowed or expedited according to demand at any given time over the planning period. The resultant plan provides airport officials with a financially responsible and needs-based program.

PEAKING CHARACTERISTICS

Many airport facility needs are related to the levels of activity during peak periods. The periods used in developing facility requirements for this study are as follows:

- **Peak Month** – The calendar month when peak activity occurs.
- **Design Day** – The average day in the peak month. This indicator is commonly derived by dividing the peak month activity by the number of days in a month.
- **Busy Day** – The busy day of a typical week in the peak month.
- **Design Hour** – The peak hour within the design day.

It should be noted that only the peak month is an absolute peak within a given year. All other peak periods will be exceeded at various times during the year. However, they do represent reasonable planning standards that can be applied without overbuilding or being too restrictive.

TABLE 4B
Peak Period Forecasts
Portland International Jetport

	Baseline (2013)	Short Term	Intermediate	Long Term
PASSENGER AIRLINE ENPLANEMENTS				
Annual	843,944	975,300	1,050,000	1,200,000
Peak Month	96,583	113,100	121,800	139,200
Design (Peak) Day	3,116	3,648	3,929	4,490
Design Hour	610	730	790	900
COMMERCIAL PASSENGER AIRLINE OPERATIONS				
Annual	26,068	28,800	30,000	32,400
Peak Month	2,656	3,024	3,129	3,360
Design Day	88	96	100	108
Design Hour	12	13	13	14
GENERAL AVIATION OPERATIONS				
Annual	17,063	20,800	21,800	24,000
Peak Month	2,210	2,662	2,790	3,072
Design Day	71	86	90	99
Busy Day	100	120	126	139
Design Hour	17	21	22	24
TOTAL ANNUAL OPERATIONS				
Annual	52,090	59,400	62,500	69,300
Peak Month	5,428	6,641	6,988	7,748
Design Day	175	214	225	250
Busy Day	516	631	664	736
Design Hour	35	43	45	50

AIRLINE PEAKING

In general, airport capacity and facility needs related to specific activity types will typically consider the levels of activity during a peak or design period. Determination of peaking characteristics related to airline activity is important for the planning and design of passenger terminal building as well as associated facilities and services. The analysis is commonly utilized as a basis for determining the appropriate size of the terminal building and the functional areas therein. Terminal building elements include hold rooms, security checkpoints, concessions, restrooms, baggage claim area, etc. The airline peaking characteristics also relate to aircraft gates, ramp apron space, and overnight parking.

Between 2009 and 2013, the peak month enplanement totals have occurred in the month of August and have averaged 11.6 percent of the annual enplaned passengers. This is anticipated to remain relatively constant in the future as it has been for the last decade.

The design day enplanement level for the peak month is essentially the average weekday enplanements of the peak month. Typically, this is derived by dividing the peak month enplanement level by the number of days in the month. The design day for operations is obtained by dividing by a factor of 31.

Between 2009 and 2013, the peak month enplanement totals have occurred in the month of August and have averaged 11.6 percent of the annual enplaned passengers.

The design hour enplanement estimate is based upon the airline schedule during the peak month was 44 (July and August) and the percentage of seats available during the peak hour. The hourly peak for seats was 19.5 percent of the daily departure seats. Future design hour enplanements are projected to remain relatively constant at approximately 20 percent of the design daily enplanements. **Table 4B** outlines the peak period airline enplanements and operations forecasts.

GENERAL AVIATION

The peak month of general aviation operations at the Jetport has averaged 12.76 percent of the yearly total between 2007 and 2014. The peak month for general aviation operations at the Airport typically occurs during the one of the summer months. Busy day operations were figured as 20 percent higher during the week, or by a multiplier of 1.4. The design hour was calculated as 17.5 percent of the design day operations.

TOTAL OPERATIONS

The total operations peak periods are utilized in examining the capacity of the airfield. The peak month of total operations has averaged 11.18 percent of annual operations since 2007, typically occurring during the summer months. **Table 4B** outlines the peak period forecasts for total airport operations.

AIRPORT DESIGN STANDARDS

The selection of appropriate FAA design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently using or expected to use the airport. In September 2012, the FAA published FAA Advisory Circular (AC) 150/5300-13A, *Airport Design*, which replaced the previous Airport Design AC which was in its 19th Change. Obviously, the new AC replaces that which was utilized in preparing the Jetport's previous Airport Master Plan. The new AC presented several substantial design changes, including the introduction of the Runway Design Code (RDC) and Taxiway Design Group (TDG), in addition to changes to revised standards for taxiway design and runway protection zones (RPZs). More recently, in February 2014, the FAA published AC 150/5300-13A, Change 1, *Airport Design*, which provided additional changes and clarifications to various airport design standards. The following sections provide details on the content in AC 150/5300-13A, Change 1, *Airport Design*.

FUNCTIONAL DESIGN CATEGORIES

The FAA has established several aircraft classification systems and categories that group aircraft types based on their performance (approach speed in landing configuration) and on design characteristics (wingspan and landing gear configuration). These classification systems are used to determine the appropriate airport design standards for specific airport elements, such as runways, taxiways, taxilanes, and aprons.

Aircraft Classification

The FAA design standards for the development and location of airport facilities are based primarily on the characteristics of the aircraft which are currently using or are expected to use an airport. The critical design aircraft defines the design parameters for an airport. The design aircraft may be a single aircraft type or, more commonly, is a composite aircraft representing a collection of aircraft classified by three parameters: Aircraft Approach Category (AAC), Airplane Design Group (ADG), and TDG. FAA AC 150/5300-13A, Change 1, *Airport Design*, describes the following airplane classification systems, the parameters of which are presented on **Exhibit 4A**.

Aircraft Approach Category (AAC) The AAC is a grouping of aircraft based on a reference landing speed (VREF), if specified, or if VREF is not specified, 1.3 times stall speed (VSO) at the maximum certificated landing weight. VREF, VSO, and the maximum certificated landing weight are those values as established for the aircraft by the certification authority of the country of registry.

The FAA design standards for the development and location of airport facilities are based primarily on the characteristics of the aircraft which are currently using or are expected to use an airport.

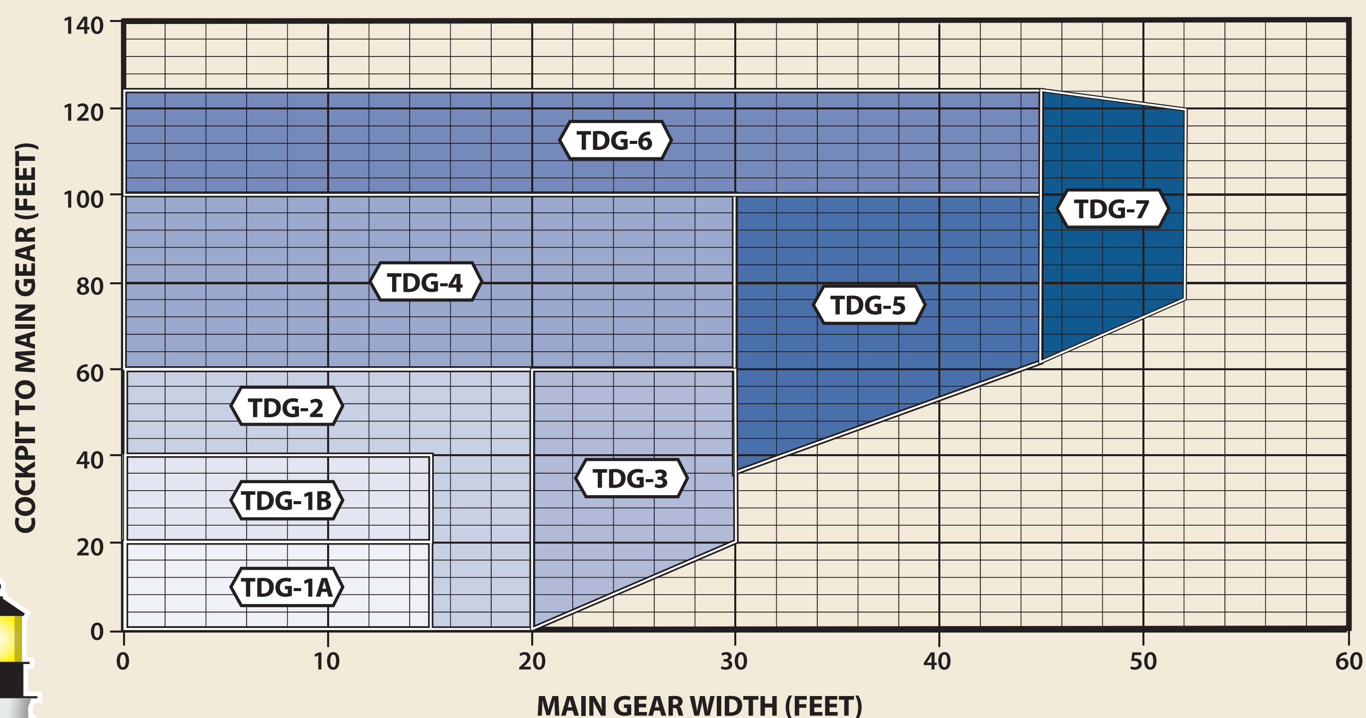
The AAC generally refers to the approach speed of an aircraft in landing configuration. The higher the approach speed, the more restrictive the applicable design standards. The AAC, depicted by a letter A through E, is the aircraft approach category as it relates to aircraft approach speed (operational characteristic). Aircraft in AAC A and B include pistons, turboprops, and small general aviation jets. Aircraft in

AIRCRAFT APPROACH CATEGORY (AAC)	
Category	**Approach Speed**
A	less than 91 knots
B	91 knots or more but less than 121 knots
C	121 knots or more but less than 141 knots
D	141 knots or more but less than 166 knots
E	166 knots or more

AIRPLANE DESIGN GROUP (ADG)		
Group #	**Tail Height (ft)**	**Wingspan (ft)**
I	<20	<49
II	20-<30	49-<79
III	30-<45	70-<118
IV	45-<60	118-<171
V	60-<66	171-<214
VI	66-<80	214-<262

VISIBILITY MINIMUMS	
RVR (ft)	**Flight Visibility Category (statute miles)**
VIS	3-mile or greater visibility minimums
5,000	Lower than 3 miles but not lower than 1-mile
4,000	Lower than 1-mile but not lower than ¾-mile (APV ≥ ¾ but < 1-mile)
2,400	Lower than ¾-mile but not lower than ½-mile (CAT-I PA)
1,600	Lower than ½-mile but not lower than ¼-mile (CAT-II PA)
1,200	Lower than ¼-mile (CAT-III PA)

TAXIWAY DESIGN GROUP (TDG)



KEY

APV: Approach Procedure with Vertical Guidance
PA: Precision Approach
RVR: Runway Visual Range
TDG: Taxiway Design Group

Exhibit 4A

Source: FAA AC 150/5300-13A, Change 1, Airport Design

AAC C, D, and E include medium-sized general aviation jets up to larger commercial jets. The AAC generally applies to runways and runway-related facilities, such as runway width, runway safety area (RSA), runway object free area (ROFA), RPZ, and separation standards.

Airplane Design Group (ADG): The ADG, depicted by a Roman numeral I through VI, is a classification of aircraft which relates to aircraft wingspan or tail height (physical characteristic). When the aircraft wingspan and tail height fall in different groups, the higher group is used. The ADG influences design standards for taxiway safety area (TSA), taxiway object free area (TOFA), apron wingtip clearance, and various separation distances.

Taxiway Design Group (TDG): The TDG is a classification of airplanes that is based on outer-to-outer main gear width (MGW) and cockpit to main gear (CMG) distances. The TDG relates to the under-carriage dimensions of the design aircraft, and the TDG standards are based on the MGW and CMG distances. The taxiway design elements determined by the application of the TDG include the taxiway width, taxiway edge safety margin, taxiway shoulder width, taxiway fillet dimensions, and, in some cases, the separation distance between parallel taxi-ways/taxilanes. Other taxiway elements, such as the TSA, TOFA, taxiway/taxilane separation to parallel taxiway/taxilanes or fixed or movable objects, and taxiway/taxilane wingtip clearances are determined solely based on the wingspan of the design aircraft utilizing those surfaces. It is appropriate for taxiways to be planned and built to different TDG standards based on expected use.

Airport and Runway Classification

These classifications, along with the aircraft classifications defined previously, are used to determine the appropriate FAA design standards to which the airfield facilities are to be designed and built.

The current ALP, which will be updated as part of this planning effort, identifies an existing and ultimate ARC of C-IV for the Jetport.

***Airport Reference Code (ARC)*:** The ARC is an airport designation that signifies the airport's highest Runway Design Code (RDC), minus the third (visibility) component of the RDC. The ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely on the airport. The current ALP, which will be updated as part of this planning effort, identifies an existing and ultimate ARC of C-IV for the Jetport. A generalized presentation of common aircraft within the ARC classification structure is presented on **Exhibit 4B**.

Runway Design Code (RDC): The RDC is a code signifying the design standards to which the runway is to be built. The RDC is based upon planned development and has no operational component.

The AAC, ADG, and Runway Visual Range (RVR) are combined to form the RDC of a particular runway. The RDC provides the information needed to determine certain design standards that apply. The first component, depicted by a letter, is the AAC and relates to aircraft approach speed (operational characteristics). The second component, depicted by a Roman numeral, is the ADG and relates to either the

A-I

- Beech Baron 55
- **Beech Bonanza**
- Cessna 150
- Cessna 172
- Cessna Citation Mustang
- Eclipse 500/550
- Piper Archer
- Piper Seneca

B-I

- Beech Baron 58
- Beech King Air 100
- Cessna 402
- **Cessna 421**
- Piper Navajo
- Piper Cheyenne
- Swearingen Metroliner
- Cessna Citation I (525)

B-II

- Super King Air 200
- Cessna 441
- DHC Twin Otter
- Super King Air 350
- Beech 1900
- Citation Excel (560), Sovereign (680)
- Falcon 50, 900, 2000
- **Citation Bravo (550)**
- Embraer 120

A-III, B-III

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

C-I, D-I

- Beech 400
- **Lear** 31, **35,** 45, 60
- Israeli Westwind

C-II, D-II

- **Cessna Citation X (750)**
- Gulfstream G100, G200, G300
- Challenger 300/600
- ERJ-135, 140, 145
- CRJ-200/700
- Embraer Regional Jet
- Lockheed JetStar
- Hawker 800

C-III, D-III

- ERJ-170
- CRJ 705, 900
- Falcon 7X
- **Gulfstream G500**, G550, G650
- Global Express, Global 5000
- Q-400

C-III, D-III

- ERJ-90
- Boeing Business Jet
- B-727
- **B-737**-300, **700,** 800
- MD-80, DC-9
- A319, A320

C-IV, D-IV

- **B-757**
- B-767
- C-130 Hercules
- DC-8-70
- MD-11

D-V

- **B-747-400**
- B-777
- B-787
- A-330, A-340

Exhibit 4B

TYPICAL AIRCRAFT REFERENCE CODES

aircraft wingspan or tail height (physical characteristics), whichever is most restrictive. The third component relates to the visibility minimums expressed by RVR values in feet of 1,200 (⅛-mile), 1,600 (¼-mile), 2,400 (½-mile), 4,000 (¾-mile), and 5,000 (1-mile). The RVR values approximate standard visibility minimums for instrument approaches to the runways. The third component should read "VIS" for runways designed for visual approach use only. Further evaluation presented later in this chapter will outline each runway's RDC based on analysis of critical aircraft operations.

Approach Reference Code (APRC): A code signifying the current operational capabilities of a runway and associated parallel taxiway with regard to landing operations. Like the RDC, the APRC is composed of the same three components: the AAC, ADG, and RVR. The APRC describes the current operational capabilities of a runway under particular meteorological conditions where no special operating procedures are necessary, as opposed to the RDC which is based upon planned development with no operational component. The APRC for a runway is established based upon the minimum runway-to-taxiway centerline separation.

Based on the approach minimums for the runway's existing instrument approaches, the APRC for Runway 18-36 is B/III/5000 and D/II/5000.

At the Jetport, parallel Taxiway A is situated on the north side of Runway 11-29 400 feet from the runway (centerline to centerline). Runway 11-29 is served by several precision approach procedures with minimums down to 1,200 feet RVR. As a result, the APRC for Runway 11-29 is D/IV/1600 and D/V/2400, which indicates a runway/taxiway separation of 400 feet for lower than ½-mile visibility minimums. Crosswind Runway 18-36 is served by parallel Taxiway C, which is only fully parallel to the runway at the northern and southern ends where it is situated 300 feet from the runway (centerline to centerline). Based on the approach minimums for the runway's existing instrument approaches, the APRC for Runway 18-36 is B/III/5000 and D/II/5000.

Departure Reference Code (DPRC): A code signifying the current operational capabilities of a runway and associated parallel taxiway with regard to takeoff operations. The DPRC represents those aircraft that can takeoff from a runway while any aircraft are present on adjacent taxiways, under particular meteorological conditions with no special operating conditions. The DPRC is similar to the APRC, but is composed of two components: ACC and ADG. A runway may have more than one DPRC depending on the parallel taxiway separation distance.

The DPRC for primary Runway 11-29 at the Jetport is D/V, which accounts for a runway to parallel taxiway separation of greater or equal to 400 feet. The DPRC for crosswind Runway 18-36 is B/III and D/II having a separation distance of equal to 300 feet.

CURRENT DESIGN AIRCRAFT

The critical design aircraft is defined as the most demanding category of aircraft which conduct 500 or more itinerant operations at the airport each year. In some cases, more than one specific make and model of aircraft comprises the airport's critical design aircraft. One category of aircraft may be the most critical in terms of approach speed, while another is most critical in terms of wingspan and/or tail height, which affects runway/taxiway width and separation design standards. The critical design aircraft for a non-primary commercial service airport may be a specific aircraft model or it can be a combination of several aircraft within the same design code that, when combined, exceed the 500 operations threshold.

A critical design aircraft will be determined for each runway. The largest design aircraft in terms of approach speed and airplane design group will determine the appropriate design standards for primary Runway 11-29, and the associated taxiways. Crosswind Runway 18-36 will be considered primarily for general aviation use, although air carrier aircraft can operate on the runway when high crosswinds dictate its use.

The Jetport is served by an airport traffic control tower (ATCT); however, the ATCT only logs aircraft operations by operational type, as air carrier, air taxi, general aviation, and military, but not by specific aircraft make and model. The FAA maintains the *Traffic Flow Management System Counts* (TFMSC) database. The TFMSC database documents aircraft operations at certain airports. Information is added to the TFMSC database when pilots file flight plans and/or when flights are detected in the National Airspace System, usually via radar. It includes documentation of commercial traffic (air carrier and air taxi), general aviation, and military aircraft. Due to factors such as incomplete flight plans and some limitations in radar coverage, TFMSC data cannot account for all aircraft activity at an airport. Therefore, it can be said that there are more operations at an airport than are captured by the TFMSC. Nonetheless, this information provides a reasonable representation of all airport activity.

Since air carrier and business jet aircraft are larger and faster, they will typically have a greater impact on airport design standards than smaller aircraft. Turbine aircraft, particularly jet aircraft will fall into "higher" runway design classifications as outlined earlier and presented **on Exhibit 4B**. The following analysis will focus on itinerant activity by jets at Portland International Jetport. The TFMSC database is the primary source of this analysis.

Exhibit 4C presents the TFMSC jet aircraft activity at Portland International Jetport from 2005 through October 2014. As can be seen, the airport has experienced a wide variety of jet operations from small very light jets (VLJ) to large commercial transport and military aircraft. From 2005 through 2014, the airport has experienced a high of 40,342 jet operations in 2005 and a low of 24,412 in the 10 months of 2014. The lowest full year total was 30,062 in 2013. It appears that jet aircraft operations have been generally trending downward at the airport over the last 10 years. Again, the data presented by the TFMSC is not an absolute count as some operations may not get logged. Some flight plans are not credited to the airport because they are opened or closed in the air or because radar coverage is lost. The TFMSC does, however, provide a good base from which to draw conclusions for critical design aircraft operations.

The exhibit also shows the breakout of jet aircraft by AAC and ADG. Over the sample period, an overwhelming majority at 90 percent of the jet activity was by aircraft in AAC C. Aircraft operations by ADG, however, varied with 61 percent of the activity by aircraft in AAC-II, 33 percent in AAC-III, four percent in AAC-I, and two percent in AAC-IV. There were operations by aircraft in AAC-V, but the values were very low, amounting to zero percent over the period.

JET OPERATIONS BY AIRPORT REFERENCE CODE

ARC	Aircraft	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014*
A-I	Eclipse 400/500	0	0	2	4	14	20	12	12	12	18
Total Operations By A-I		**0**	**0**	**2**	**4**	**14**	**20**	**12**	**12**	**12**	**18**
B-I	Cessna CJ1, CJ2, CJ3, CJ4	138	160	220	312	210	276	268	262	322	292
	Cessna Citation Mustang	0	0	0	0	26	42	26	38	24	16
	Cessna Citation I/SP	132	134	164	106	50	8	30	14	6	26
	Dassault Falcon/Mystère 10	36	128	54	58	32	34	32	46	72	52
	Embraer Phenom 100	0	0	0	0	8	72	84	58	38	38
	Beechjet 400	522	376	422	326	226	274	302	286	242	240
	Raytheon Premier I	4	12	20	8	30	28	26	10	18	14
	Rockwell Sabre 40/60	6	20	4	4	2	10	0	0	2	4
Total Operations By B-I		**838**	**830**	**884**	**814**	**584**	**744**	**768**	**714**	**724**	**682**
B-II	Aero Commander 680	0	0	0	14	10	4	0	0	0	0
	Cessna Citation Bravo/SP	366	442	226	168	102	96	112	112	146	134
	Cessna Citation Excel/XLS	532	730	782	804	786	1,032	1,042	692	714	630
	Cessna Citation Sovereign	10	60	106	128	162	170	218	242	234	214
	Cessna Citation V/Encore/Ultra	626	424	356	358	278	236	224	162	192	188
	Dassault Falcon 20/50	124	94	86	86	68	62	78	52	70	92
	Dassault Falcon 2000	142	114	144	256	174	230	228	250	194	198
	Dassault Falcon 900	108	112	92	88	56	106	82	60	60	52
	Embraer Phenom 300	0	0	0	0	0	0	14	12	42	100
Total Operations By B-II		**1,908**	**1,976**	**1,792**	**1,902**	**1,636**	**1,936**	**1,998**	**1,582**	**1,652**	**1,608**
C-I	BAE HS 125-1/2/3/125/400/600	58	44	46	34	12	6	12	10	2	0
	F-16 Falcon	4	4	2	2	2	6	0	2	2	2
	IAI 1124/1125 Westwind	280	224	256	166	244	204	180	112	46	10
	Learjet 20 Series	52	38	30	8	12	18	12	8	2	0
	Learjet 30 Series	292	232	218	222	102	124	80	66	50	32
	Learjet 55	90	94	78	58	30	46	52	28	16	14
	Rockwell Sabre 75	0	0	0	0	0	4	0	0	0	0
Total Operations By C-I		**776**	**636**	**630**	**490**	**402**	**408**	**336**	**226**	**118**	**58**
C-II	Bombardier CRJ 100/200/700	18,600	15,978	15,412	14,626	13,212	12,996	10,794	7,024	8,448	5,470
	Cessna Citation X	154	208	274	172	236	218	234	168	224	212
	Challenger 300/600	200	232	286	212	172	196	174	186	206	252
	Embraer ERJ 135/140/145/Legacy	8,168	7,564	6,496	4,970	1,884	848	2,318	6,338	3,602	2,974
	Fairchild A-10	2	4	0	0	2	2	4	0	0	0
	Gulfstream 200/300	82	98	58	50	28	38	40	34	42	16
	Hawker 800/1000/4000	1,092	1,386	1,650	1,238	1,010	1,298	1,300	978	1,072	960
	IAI 1126 Galaxy	86	152	176	178	126	128	146	92	138	190
	Lockheed L-1329	0	2	0	0	2	0	0	0	0	0
Total Operations By C-II		**28,384**	**25,624**	**24,352**	**21,446**	**16,672**	**15,724**	**15,010**	**14,820**	**13,732**	**10,074**
C-III	Airbus A319/320 Series	586	1,306	1,152	922	1,090	1,184	1,008	1,508	1,412	624
	CRJ-900	0	414	688	2,208	1,500	648	24	6	8	1,100
	Boeing 717/727/737 Series	1,564	962	2,226	3,396	2,990	2,452	2,570	2,266	2,040	1,818
	Bombardier Global 5000	8	20	20	16	22	14	16	18	42	30
	Cessna Citation III/VI/VII	324	344	370	330	308	278	256	216	168	98
	Dassault Falcon 7X	0	0	0	0	4	8	14	20	12	12
	Embraer 170/190 Series	1,942	2,698	4,856	5,872	7,276	6,572	6,802	7,386	7,714	5,816
	DC-9/MD-80 series	2,926	1,670	1,100	688	238	844	1,608	1,130	1,292	1,456
Total Operations By C-III		**7,350**	**7,414**	**10,412**	**13,432**	**13,428**	**12,000**	**12,298**	**12,550**	**12,688**	**10,954**
C-IV	Airbus A300/310 Series	432	316	228	48	112	0	10	8	12	2
	Boeing 757-200	24	6	4	4	2	404	410	408	590	512
	Boeing 767 Series	0	2	0	0	2	2	6	2	2	0
	KC-135 Stratotanker	14	10	14	10	4	4	4	8	0	0
Total Operations By C-IV		**470**	**334**	**246**	**62**	**120**	**410**	**430**	**426**	**604**	**514**

JET OPERATIONS BY AIRPORT REFERENCE CODE (continued)

ARC	Aircraft	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014*
C-VI	C-5 Galaxy	0	0	2	0	0	0	0	0	0	0
Total Operations By C-VI		**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
D-I	F/A-18 Hornet	6	6	4	4	0	8	4	10	0	4
	F-15 Eagle	4	4	0	0	6	6	0	0	2	2
	Learjet 40/45/60	358	330	314	280	200	202	216	182	202	240
	T-38 Talon	4	0	0	0	4	2	2	0	0	0
Total Operations By D-I		**372**	**340**	**318**	**284**	**210**	**218**	**222**	**192**	**204**	**246**
D-II	Gulfstream 150	0	0	10	30	24	36	48	68	124	46
	Gulfstream 400/500	242	244	224	204	196	284	252	292	198	210
Total Iperations By D-II		**242**	**244**	**234**	**234**	**220**	**320**	**300**	**360**	**322**	**256**
D-IV	Boeing 747 Series	2	0	2	0	0	0	2	0	4	0
Total Operations By D-IV		**2**	**0**	**2**	**0**	**0**	**0**	**2**	**0**	**4**	**0**
D-V	A340	0	0	0	2	0	0	0	0	2	0
	Boeing 777 Series	0	0	0	0	0	0	0	0	0	2
Total Operations By D-V		**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**2**	**2**
Total Jet Operations		**40,342**	**37,398**	**38,874**	**38,670**	**33,286**	**31,780**	**31,376**	**30,882**	**30,062**	**24,412**

AIRPORT REFERENCE CODE OPERATIONS SUMMARY

Jet Operations by Airport Reference Code

ARC	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014*
A-I	0	0	2	4	14	20	12	12	12	18
B-I	838	830	884	814	584	744	768	714	724	682
B-II	1,908	1,976	1,792	1,902	1,636	1,936	1,998	1,582	1,652	1,608
C-I	776	636	630	490	402	408	336	226	118	58
C-II	28,384	25,624	24,352	21,446	16,672	15,724	15,010	14,820	13,732	10,074
C-III	7,350	7,414	10,412	13,432	13,428	12,000	12,298	12,550	12,688	10,954
C-IV	470	334	246	62	120	410	430	426	604	514
C-VI	0	0	2	0	0	0	0	0	0	0
D-I	372	340	318	284	210	218	222	192	204	246
D-II	242	244	234	234	220	320	300	360	322	256
D-IV	2	0	2	0	0	0	2	0	4	0
D-V	0	0	0	2	0	0	0	0	2	2
Total	**40,342**	**37,398**	**38,874**	**38,670**	**33,286**	**31,780**	**31,376**	**30,882**	**30,062**	**24,412**

Jet Operations By Approach Category

AAC	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014*
A	0	0	2	4	14	20	12	12	12	18
B	2,746	2,806	2,676	2,716	2,220	2,680	2,766	2,296	2,376	2,290
C	36,980	34,008	35,642	35,430	30,622	28,542	28,074	28,022	27,142	21,600
D	616	584	554	520	430	538	524	552	532	504
Total	**40,342**	**37,398**	**38,874**	**38,670**	**33,286**	**31,780**	**31,376**	**30,882**	**30,062**	**24,412**

Jet Operations By Airplane Design Group

ADG	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014*
I	1,986	1,806	1,834	1,592	1,210	1,390	1,338	1,144	1,058	1,004
II	30,534	27,844	26,378	23,582	18,528	17,980	17,308	16,762	15,706	11,938
III	7,350	7,414	10,412	13,432	13,428	12,000	12,298	12,550	12,688	10,954
IV	472	334	248	62	120	410	432	426	608	514
V	0	0	0	2	0	0	0	0	2	2
VI	0	0	2	0	0	0	0	0	0	0
Total	**40,342**	**37,398**	**38,874**	**38,670**	**33,286**	**31,780**	**31,376**	**30,882**	**30,062**	**24,412**

* 2014 Data through October   Source: Traffic Flow Management System Counts

Exhibit 4C

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A review of military aircraft was also conducted; however, these operations do not count toward the FAA critical aircraft design. As such, military operations will not be utilized for determination of proper runway and airport design criteria.

Runway 11-29 Design Aircraft

Portland International Jetport experiences frequent daily use by narrow body commercial airline aircraft, narrow body cargo aircraft, and a full array of business jet aircraft. As such, the runway should be designed and planned to continue to accommodate these types of aircraft. Based on summary tables presented on **Exhibit 4C**, total jet operations by AAC B, C, and D exceed the critical design aircraft threshold of 500 annual operations. For ADG, historical operations by aircraft in ADG I through III have exceeded the threshold for the entire period. Since FedEx changed to the Boeing 757-200 model aircraft in 2010, ADG IV exceeded the 500 operations threshold in 2013.

Utilizing the TFMSC data, the minimum RDC for Runway 11-29 should be D-IV, which combines AAC D with ADG IV. The actual critical aircraft should be categorized as the Boeing 757-200 (C-IV) and D-I/D-II business jets in the Lear and Gulfstream families. It should be noted that the existing ALP denotes the current and ultimate ARC as C-IV. This determination was made without availability of the TFMSC data. The future critical aircraft has been forecast to remain in RDC D-IV as well.

The minimum RDC for Runway 11-29 should be D-IV.

Runway 18-36 Design Aircraft

A crosswind runway primarily functions to provide an alternate runway for periods when wind conditions do not favor the primary runway orientation. The FAA stipulates that the primary runway should be capable of providing 95 percent or more crosswind coverage for all aircraft types. If the primary runway does not provide 95 percent or greater coverage, a crosswind runway is recommended. Analysis to be presented later in this chapter indicates the primary Runway 11-29 does not fully conform to the FAA crosswind coverage standard. As such, the availability of at least one crosswind runway is justified.

Runway 18-36 is the airport's crosswind runway. It serves the needs of all airport operations when winds dictate or when the primary runway is closed due to maintenance, snow/ice, or other reasons. Moreover, the runway is also certified for commercial airline operations. As such, the runway should be capable of meeting the needs of the majority of aircraft operating at the airport if possible.

The current ALP for the Jetport defines Runway 18-36 as an ARC B-III facility. As presented earlier, the airport is utilized by a wide variety of aircraft. It would be ideal for crosswind Runway 18-36 to conform to RDC C/D-IV design standards like Runway 11-29 to ensure the airport is fully functional for commercial service operations; however, as will be detailed later, Runway 18-36 is significantly constrained from

The recommendation in this study will be to continue to plan Runway 18-36 according to RDC B-III standards.

meeting the higher design standards of AAC C and D due to natural barriers to the north and south. As will also be outlined later, the current design of Runway 18-36 was carefully crafted to ensure maximum allowance given the natural constraints. Thus, the recommendation in this study will be to continue to plan Runway 18-36 according to RDC B-III standards.

SUSTAINABILITY GOALS, OBJECTIVES, AND METRICS

As discussed in Chapter 3, *Sustainability Baseline Assessment*, Jetport staff along with representatives from the Jetport's tenants, contractors, local communities, and regional partners identified the Jetport's priority sustainability categories. These priority categories represent the areas of sustainability that are most relevant to the Jetport's operations and where the greatest opportunity for performance improvement exists. The Jetport's priority sustainability categories are the foundation of the rest of the organization's sustainability framework, and include:

- Greenhouse Gas Emissions;
- Energy;
- Waste Management and Recycling;
- Ground Access and Transportation;
- Social Responsibility; and
- Governance.

It must continue to be recognized that Noise and Water Quality are two additional categories that the Jetport already dedicates substantial resources to ensure that it mitigates its impacts in these areas to the greatest extent practicable. Still, they were considered in the baseline performance assessment. Further, the Jetport's sustainability program is being designed to be dynamic, allowing changes and additions as it matures and as the context of the Jetport's operating environment evolves. The Jetport can expand upon noise and water quality, as well as other sustainability categories, in its sustainability framework in the future, as needed.

The Jetport's sustainability goals, objectives, metrics, and targets included in this master plan reflect the unique conditions and culture of the Jetport. They have their basis in the findings of the Sustainability Baseline Assessment (see Chapter 3, *Sustainability Baseline Assessment*) and align with the environmental priorities of the City of Portland, State of Maine, and larger airport industry. Further, they incorporate feedback received from four main stakeholder groups: 1) Jetport management and employee representatives, 2) the Planning Advisory Committee (PAC), 3) Jetport tenants such as airlines, concessionaires, and fixed- base operators (FBOs), and 4) the public.

Sustainability Goals

The Jetport established sustainability goals that are broad and aspirational. The Jetport's sustainability framework includes one high-level goal for each sustainability category. **Table 4C** summarizes the Jetport's sustainability goals.

TABLE 4C The Jetport's Sustainability Goals Portland International Jetport	
Sustainability Category	**Sustainability Goal**
Greenhouse Gas Emissions	Become a national airport leader in climate change mitigation by supporting the reduction of greenhouse gas emissions generated from Jetport-controlled and influenced sources
Energy	Become a national airport leader in energy conservation, while considering opportunities for on-site renewable energy generation
Waste Management and Recycling	Augment the Jetport's existing waste management practices to reduce waste generation and land disposal, and continuously improve its exemplary deicing fluid recovery and recycling program
Ground Access and Transportation	Enhance the efficiency of regional and local access to and from the Jetport with an emphasis on high-occupancy modes of transportation and parking infrastructure that meets the needs of the Jetport's users
Social Responsibility	Promote the well-being of the Jetport's employees and customers, while reflecting and supporting the social, economic, and cultural assets of the local community and greater region
Governance	Integrate sustainability throughout the Jetport's organizational framework

Sustainability Objectives and Metrics

In contrast to the Jetport's sustainability goals, its objectives are narrow and measurable. Together with the Jetport's sustainability metrics, they define how the Jetport intends to achieve its sustainability goals and measure related performance. Each of the Jetport's sustainability goals is associated with no more than five objectives to ensure manageability of the Jetport's sustainability program, particularly during its early stages. The sustainability metrics take into consideration the evolving conditions at the Jetport and the facilitation of performance comparisons among other airports regardless of their size. The Jetport does not currently track all of these metrics; however, it plans to develop the capacities to do so as the sustainability program matures.

Table 4D lists the Jetport's sustainability goals, objectives, and metrics by priority sustainability category.

TABLE 4D The Jetport's Sustainability Objectives and Metrics Portland International Jetport	
Greenhouse Gas Emissions	
Goal: Become a national airport leader in climate change mitigation by supporting the reduction of greenhouse gas emissions generated from Jetport-controlled and influenced sources	
Objectives	**Metric(s)**
1. Reduce greenhouse gas emissions associated with Jetport-operated mobile and stationary sources on a per enplanement basis 2. Encourage greenhouse gas emission reduction strategies among the Jetport's employees, tenants, and customers	• Greenhouse gas emissions (CO_2equivalent) by scope • Greenhouse gas emissions (CO_2equivalent) per enplanement
Energy	
Goal: Become a national airport leader in energy conservation, while considering opportunities for on-site renewable energy generation	
Objectives	**Metric(s)**
1. Reduce the energy intensity of Jetport-owned facilities 2. Pursue on-site generation of renewable energy, where feasible	• Energy (kBtu) • Energy (kBtu) per square foot • Percent of electricity generated from renewable sources

TABLE 4D (Continued)
The Jetport's Sustainability Objectives and Metrics
Portland International Jetport

Objectives	Metric(s)
Waste Management and Recycling	
Goal: Augment the Jetport's existing waste management practices to reduce waste generation and land disposal, and continuously improve its exemplary deicing recovery and recycling program	
Objectives	**Metric(s)**
1. Reduce the amount of Jetport-generated municipal solid waste on a per enplanement basis 2. Increase the percentage of Jetport-generated municipal solid waste diverted from regional landfills 3. Continue to recycle and reuse construction and demolition waste to the greatest extent practicable 4. Prioritize the purchase and use of environmentally preferable products and materials in both Jetport and tenant operations 5. Provide the resources necessary to support continuous improvement of tenant waste management practices	• Landfill MSW (tons) • Landfill MSW (tons) per enplanement • Percent of MSW recycled • Construction and demolition diversion rate (%) • Tons of organic waste composted per enplanement • Deicing fluid recovery and recycling rate (%) • Ratio of onsite to offsite spent deicing fluid processed
Ground Access and Transportation	
Goal: Enhance the efficiency of regional and local access to and from the Jetport with an emphasis on high-occupancy modes of transportation and parking infrastructure that meets the needs of the Jetport's users	
Objectives	**Metrics**
1. Provide more choices to the Jetport's passengers by encouraging high-occupancy modes of transportation and the provision of adequate parking 2. Encourage the use of high-occupancy modes of transportation among employees commuting to and from the Jetport 3. Leverage regional partners to enhance and promote bicycle, pedestrian, and high-occupancy modes of transportation available to Jetport employees, customers, and visitors	• Percent of employees commuting by means other than single-occupancy modes of transportation • Percent of passengers commuting by means other than single-occupancy modes of transportation • Daily peak period parking spaces occupied (%)
Social Responsibility	
Goal: Promote the well-being of the Jetport's employees and customers, while reflecting and supporting the social, economic, and cultural assets of the local community and greater region	
Objectives	**Metrics**
1. Expand or enhance existing programs that support employee health and satisfaction 2. Continuously improve the Jetport's customer service experience 3. Foster a "sense of place" by incorporating regional representative elements into the Jetport's public-facing facilities 4. Increase opportunities for employee, customer, and community engagement 5. Continue the Jetport's support of the regional economy and promote its economic impact	• Percent of employees participating in Jetport-sponsored health and wellness programs • Jetport ASQ Survey rankings • Number of employee appreciation events per year • Number of in-terminal concessions, customer amenities, and attractions that reference the Jetport's social and natural environments • Regional economic impact ($) per year
Governance	
Goal: Integrate sustainability throughout the Jetport's organizational framework	
Objectives	**Metric(s)**
1. Integrate sustainability criteria into the Jetport's decision-making processes 2. Promote sustainability considerations in the daily activities of Jetport employees 3. Drive accountability throughout all levels of the organization 4. Enhance internal and external transparency of operations	• Percent of capital projects evaluated using sustainability criteria • Annual number of sustainability-based employee recognitions • Annual number and types of stakeholder feedback/information exchange events

AIRFIELD CAPACITY

Airfield capacity is measured in a variety of different ways. The hourly capacity measures the maximum number of aircraft operations that can take place in an hour. If capacity is reached during that time, operations are delayed and spread over a longer period. Very rarely will any runway reach its absolute capacity in any given day, so this measuring tool is not an effective way to determine airfield needs. The airfield annual service volume (ASV) is an annual level of service that is used to define airfield congestion and delay as a runway nears its hourly capacity. The airfield's calculated ASV is not the point at which gridlock occurs; rather, it is the point at which operational delays become exponential. Aircraft delay is the total delay incurred by aircraft using the airfield during a given timeframe. Delay has a cost in time to passengers and aircraft operators, but also in fuel spent. This, in turn, affects the sustainability categories of Energy and GHG Emissions.

FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*, provides a methodology for examining the operational capacity of an airfield for planning purposes. This analysis takes into account specific factors about the airfield. These various factors are depicted in **Exhibit 4D**.

A full ASV calculation was not conducted as a part of this study. The full analysis is not necessary to make proper airfield capacity judgments for the Jetport. A full analysis was completed in the previous Airport Master Plan which indicated that the current airfield configuration could support an ASV of 173,000 annual operations. This figure is similar to that offered by the generalized FAA analysis. The current annual operation level for Portland International Jetport of 52,090 represents 30 percent of the airfield's generalized ASV (173,000). By the end of the planning period, total annual operations are expected to represent 40 percent of the airfield's generalized ASV.

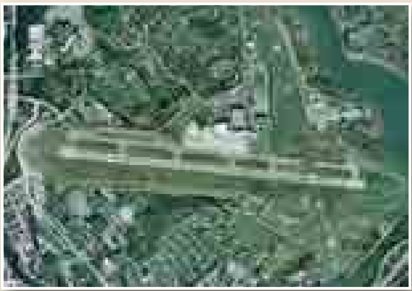
FAA Order 5090.3B, *Field Formulation of the National Plan of Integrated Airport Systems* (NPIAS), indicates that improvements for airfield capacity purposes should begin to be considered once operations reach 60 to 75 percent of the annual service volume. This is an approximate level to begin the detailed planning of capacity improvements. Once the 80 percent level is reached, the planned improvements should be under design or construction.

Based on current and projected operations developed for this study, improvements specifically designed to enhance capacity are not necessary.

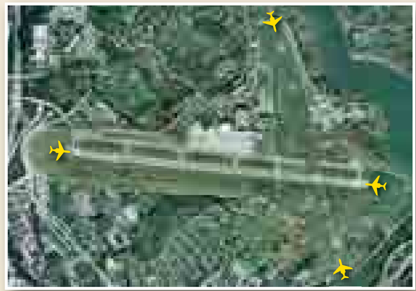
Based on current and projected operations developed for this study, improvements specifically designed to enhance capacity are not necessary during the 20-year scope of this master plan; however, proper planning should always consider airside safety and efficiency projects which could also serve to minimize aircraft delay for the reduction of energy use and GHG emissions.

AIRFIELD LAYOUT

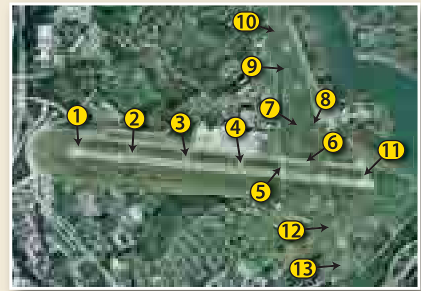
Runway Configuration



Runway Use

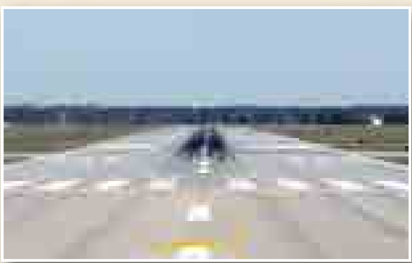


Number of Exits

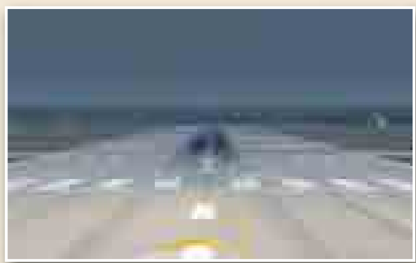


WEATHER CONDITIONS

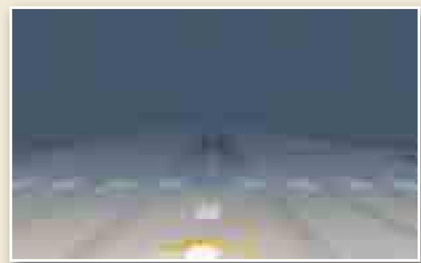
VMC
Visual Meteorological Conditions



IMC
Instrument Meteorological Conditions



PVC
Poor Visibility Conditions



AIRCRAFT MIX

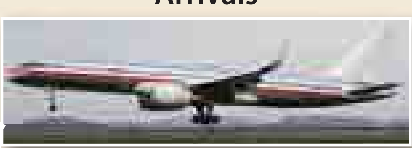
Category A & B Aircraft

Category C Aircraft

Category D Aircraft

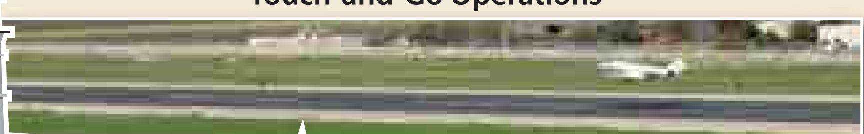
OPERATIONS

Arrivals



Departures

Touch-and-Go Operations



Total Annual Operations

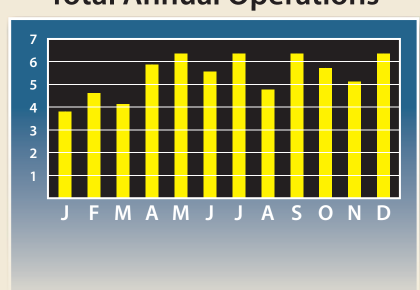


Exhibit 4D

AIRFIELD REQUIREMENTS

As indicated earlier, airport facilities include both airfield and landside components. Airfield facilities include those facilities that are related to the arrival, departure, and ground movement of aircraft. These components include:

- Runway Configuration
- Safety Area Design Standards
- Runways
- Taxiways
- Navigational Approach Aids
- Lighting, Marking, and Signage

RUNWAY CONFIGURATION

The Jetport's airfield system is supported by two runways situated in a crossing configuration. A cross-wind runway configuration is very common and is in place at the majority of airports across the country. A crosswind configuration is generally required to meet local wind conditions as detailed below.

Primary Runway 11-29 is generally oriented in an east to west fashion. Crosswind Runway 18-36 is oriented in a north to south manner. For the operational safety and efficiency of an airport, it is desirable for the primary runway to be oriented as close as possible to the direction of the prevailing wind. This reduces the impact of wind components perpendicular to the direction of travel of an aircraft that is landing or taking off.

FAA Advisory Circular 150/5300-13A, Change 1, *Airport Design,* recommends that a crosswind runway be made available when the primary runway orientation provides for less than 95 percent wind coverage for specific crosswind components. The 95 percent wind coverage is computed on the basis of not exceeding 10.5 knot (12 mph) component for RDC A-I and B-I, 13 knot (15 mph) component for RDC A-II and B-II, 16 knot (18 mph) component for RDC A-III, B-III, C-I through C-III, and D-I through D-III, and 21 knots for larger wingspans.

Weather data specific to the airport was obtained from the National Oceanic Atmospheric Administration (NOAA) National Climatic Data Center. This data was collected from the Jetport weather reporting station over a continuous 10-year period from 2004 to 2013. A total of 136,267 observations of wind direction and other data points were made as noted on **Exhibit 4E**.

In all-weather conditions, Runway 11-29 provides 91.70 percent wind coverage for 10.5 knot crosswinds, 95.38 percent coverage at 13 knots, and 98.84 percent at 16 knots. Crosswind Runway 18-36 provides for 93.97 percent wind coverage at 10.5 knots, 96.45 percent at 13 knots, and 98.87 percent at 16 knots. The combined runway system all-weather wind coverage is 98.84 percent for 10.5 knot crosswinds, 99.76 percent at 13 knots, and 99.96 percent at 16 knots. Under instrument flight rule (IFR) conditions, the crosswind component coverages for each runway and for the combined alignment decreases slightly. **Exhibit 4E** presents the all-weather and IFR wind roses for the airport which supports the need for both runway orientations at the Jetport since neither offers a full 95 percent coverage for all crosswind components.

RUNWAY DESIGN STANDARDS

The FAA has established several imaginary surfaces to protect aircraft operational areas and keep them free from obstructions that could affect their safe operation. These include the runway safety area (RSA), runway object free area (ROFA), runway obstacle free zone (ROFZ), and runway protection zone (RPZ).

The FAA has established several imaginary surfaces to protect aircraft operational areas and keep them free from obstructions that could affect their safe operation.

The entire RSA, ROFA, and ROFZ must be under the direct ownership of the airport sponsor to ensure these areas remain free of obstacles and can be readily accessed by maintenance and emergency personnel. The RPZ for each runway end should also be under airport ownership. An alternative to outright ownership of the RPZ is the purchase of avigation easements (acquiring control of designated airspace within the RPZ) or having sufficient land use control measures in place which ensure the RPZ remains free of incompatible development. The various airport safety areas are presented on **Exhibit 4F**. It should be noted that not all safety standards can be fully met due to various constraints around the airport. Improvements and other methods to be discussed later were utilized to meet a similar level of safety. The application of these improvements and alternative methods are depicted on **Exhibit 4G**.

Dimensional standards for the various safety areas associated with the runways are a function of the type of aircraft expected to use the runways as well as the instrument approach capability. **Table 4E** presents the FAA design standards as they apply to the runways at Portland International Jetport.

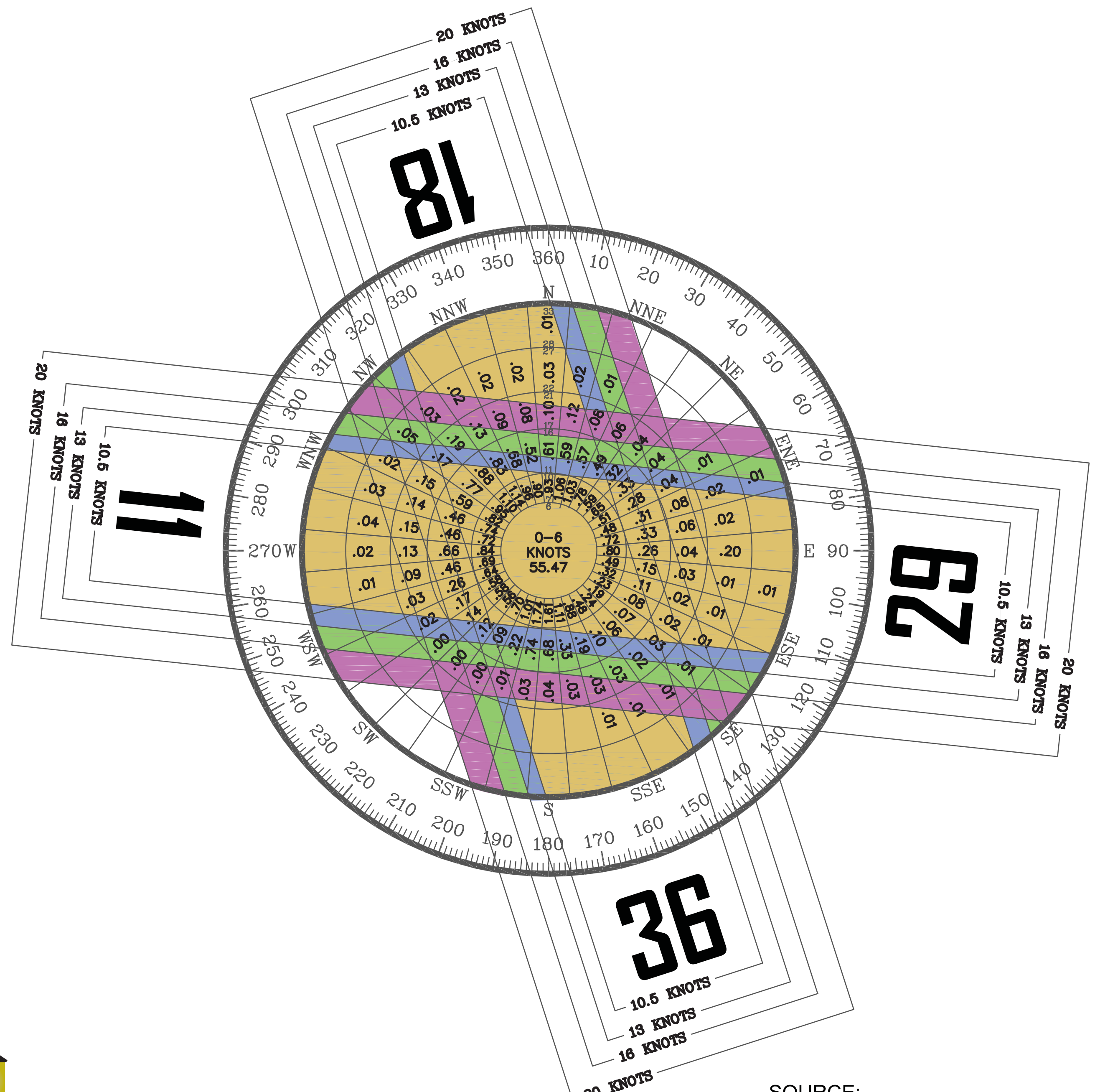
Runway Safety Area (RSA)

The RSA is defined in FAA Advisory Circular (AC) 150/5300-13A, *Airport Design,* as a "surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of undershoot, overshoot, or excursion from the runway." The RSA is centered on the runway and dimensioned in accordance to the approach speed of the critical design aircraft using the runway. The FAA requires the RSA to be cleared and graded, drained by grading or storm sewers, capable of accommodating the design aircraft and fire and rescue vehicles, and free of obstacles not fixed by navigational purpose such as runway edge lights or approach lights.

The FAA has placed a higher significance on maintaining adequate RSA at all airports. Under FAA Order 5200.8, effective October 1, 1999, the FAA established the *Runway Safety Area Program.* The Order states, "The objective of the Runway Safety Area Program is that all RSAs at federally-obligated airports…shall conform to the standards contained in Advisory Circular 150/5300-13A, Change 1, *Airport*

ALL WEATHER WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 18–36	93.97%	96.45%	98.87%	99.67%
Runway 11–29	91.7%	95.38%	98.84%	99.72%
All Runways	98.84%	99.76%	99.96%	100.0%

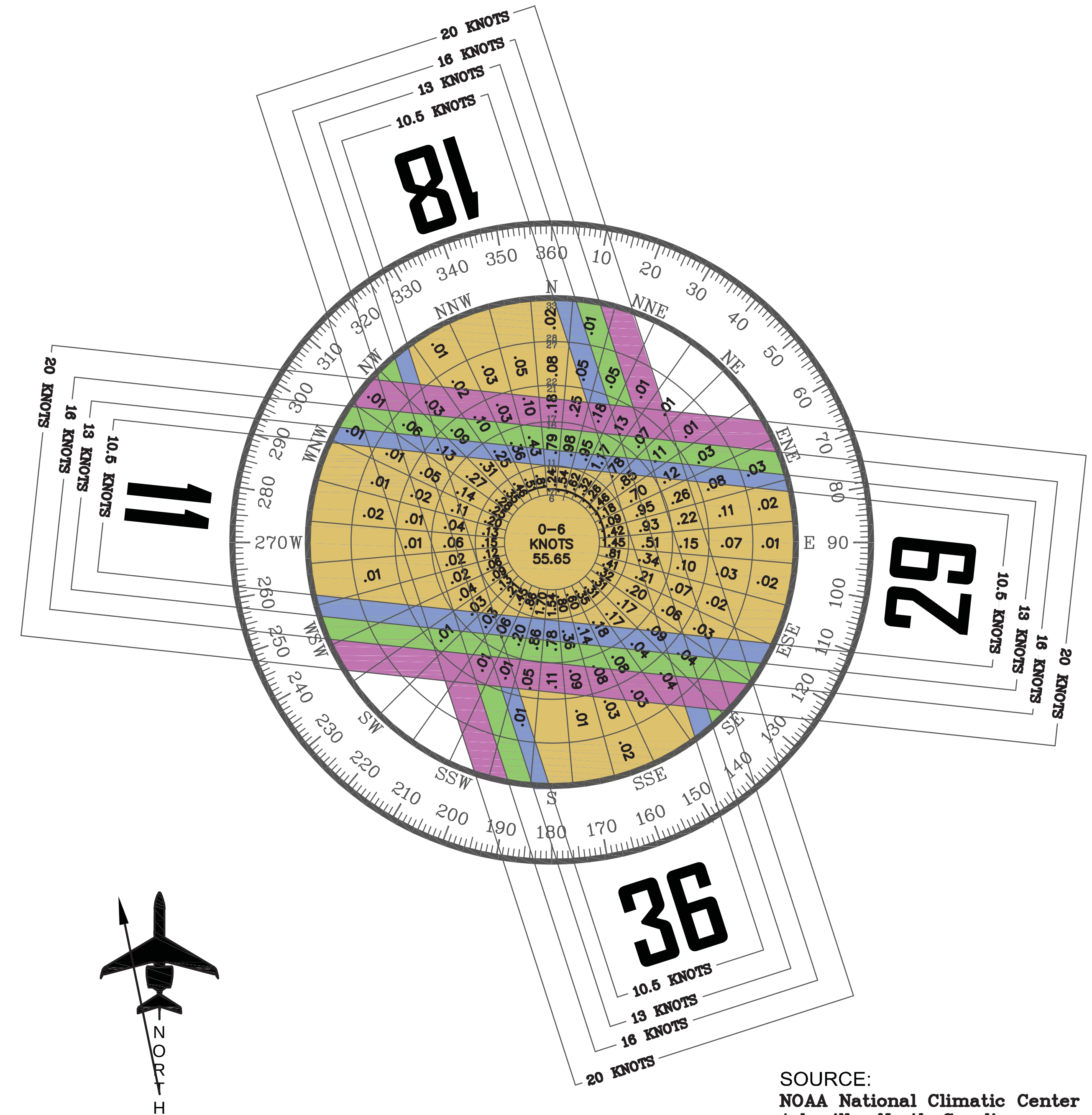


SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Portland Intl. Jetport
Portland, ME
OBSERVATIONS:
136,267 All Weather Observations
2004–2013

Magnetic Declination
15° 33' West (Dec. 2014)
Annual Rate of Change
00° 4.5' East (Dec 2014)

IFR WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 18–36	91.97%	95.35%	98.25%	99.33%
Runway 11–29	89.39%	93.64%	97.9%	99.35%
All Runways	97.69%	99.48%	99.92%	99.99%



SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Portland Intl. Jetport
Portland, ME
OBSERVATIONS:
31,213 IFR Observations
2004–2013

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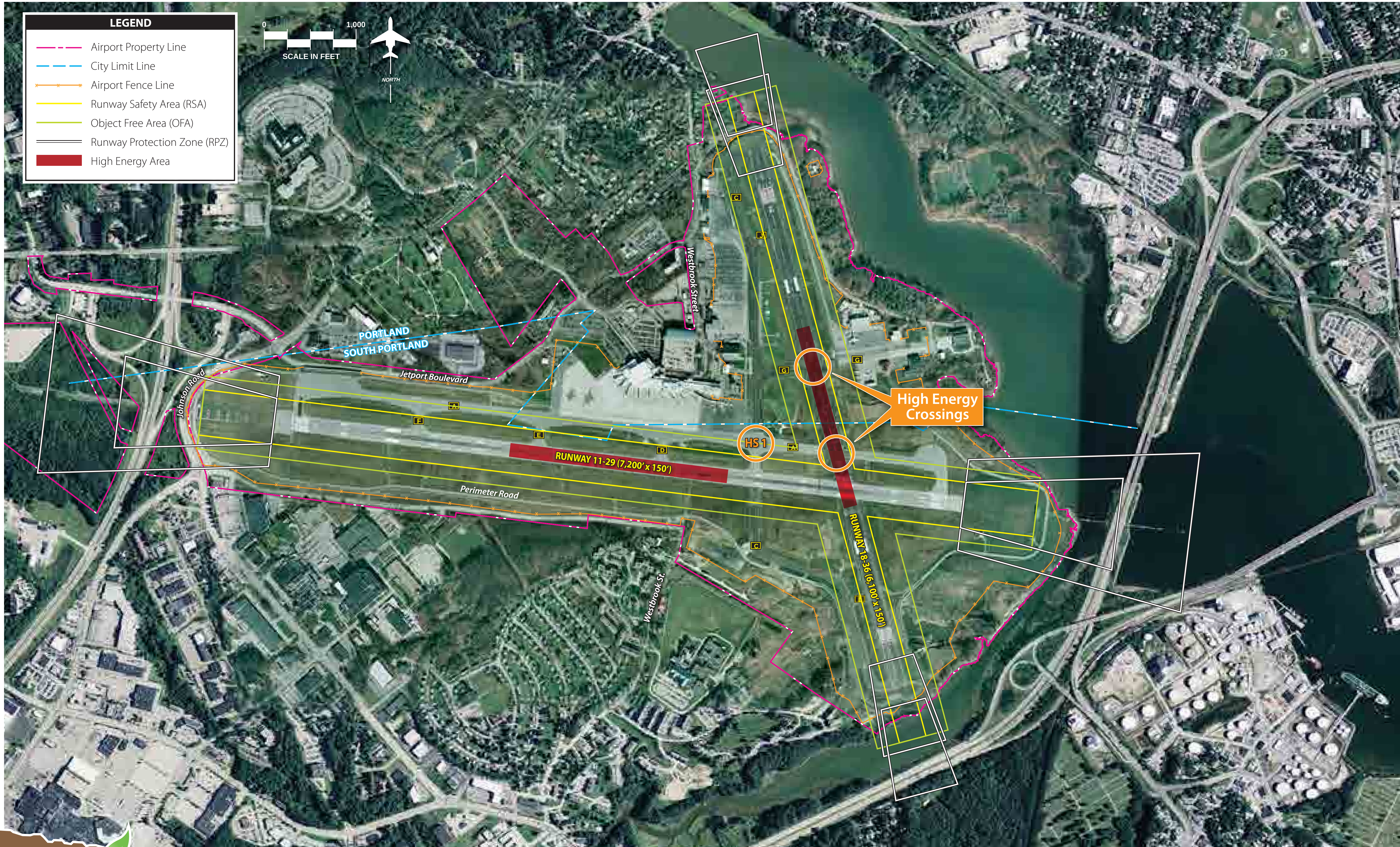

Exhibit 4F

FAA DESIGN STANDARDS

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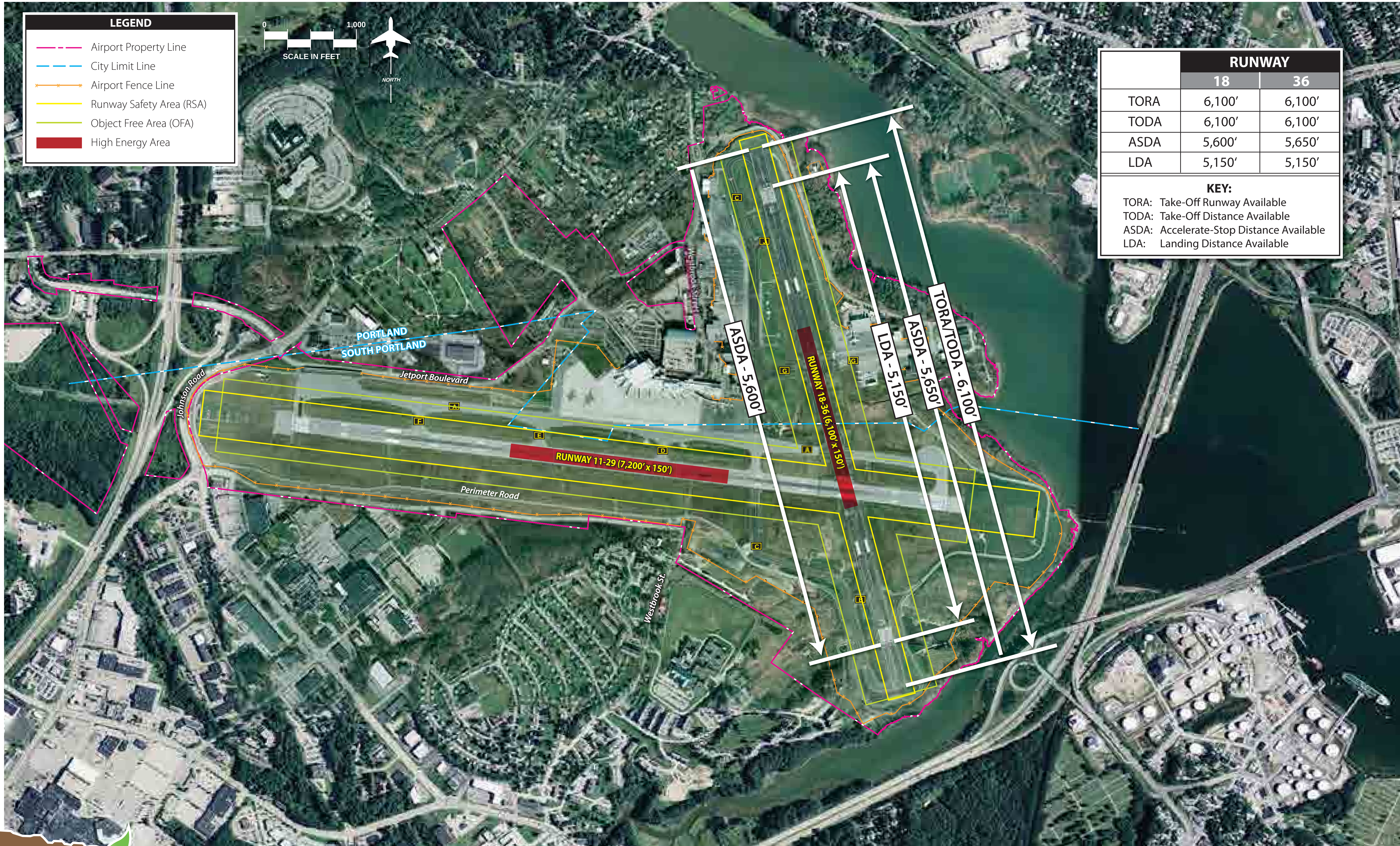

	RUNWAY 18	RUNWAY 36
TORA	6,100'	6,100'
TODA	6,100'	6,100'
ASDA	5,600'	5,650'
LDA	5,150'	5,150'

KEY:
TORA: Take-Off Runway Available
TODA: Take-Off Distance Available
ASDA: Accelerate-Stop Distance Available
LDA: Landing Distance Available

Exhibit 4G

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Design, to the extent practicable." Each Regional Airports Division of the FAA is obligated to collect and maintain data on the RSA for each runway at the airport and perform airport inspections.

TABLE 4E
Runway Design Standards
Portland International Jetport

	Runway 11-29	Runway 18-36
Runway Design Code (RDC)	C/D-IV	B-III
Visibility Minimums (in miles)	Lower than 3/4 Mile	Not Lower than 1 Mile
RUNWAY DESIGN		
Runway Width	150	100
Runway Shoulder Width	25	20
Blast Pad Length	200	N/A
Blast Pad Width	200	N/A
RUNWAY PROTECTION		
Runway Safety Area (RSA)		
Width	500	300
Length Beyond Departure End	1,000	600
Length Prior to Threshold	600	600
Runway Object Free Area (ROFA)		
Width	800	800
Length Beyond Departure End	1,000	600
Length Prior to Threshold	600	600
Runway Obstacle Free Zone (ROFZ)		
Width	400	400
Length Beyond End	200	200
Precision Obstacle Free Zone (POFZ)		
Width	800	NA
Length	200	NA
Approach Runway Protection Zone (RPZ)		
Length	2,500	1,000
Inner Width	1,000	500
Outer Width	1,750	700
Departure Runway Protection Zone (RPZ)		
Length	1,700	1,000
Inner Width	500	500
Outer Width	1,010	700
RUNWAY SEPARATION		
Runway Centerline to:		
Holding Position	250	200
Parallel Taxiway	400	300
Aircraft Parking Area	500	400

Note: All dimensions in feet unless otherwise noted
Source: FAA AC 150/5300-13A, Change 1 *Airport Design*

For Runway 11-29, the applicable RDC C/D-IV RSA standard is fully met. For Runway 18-36, however, the natural boundaries and on-airport facilities such as the perimeter road and navigational aids prohibit obtaining the full RDC B-III standard of 600 feet beyond each runway end. These constraints were known prior to the recent runway extension so the FAA allowed the runway design to utilize the application of declared distances to be utilized in order to meet RSA standards.

For Runway 11-29, the applicable RDC C/D-IV RSA standard is fully met.

Declared distances are the effective runway length that the airport operator declares available for take-off run, take-off distance, accelerate stop distance, and landing distance requirements. Pilots utilize these measurements in their runway length calculations. The use of declared distances is also a method to achieve runway safety area standards, as will be addressed later in the chapter. The four declared distances are defined as the following:

Take-off run available (TORA) - The length of the runway declared available and suitable to accelerate from brake release to lift-off, plus safety factors. The departure RPZ begins 200 feet beyond the far end of the TORA.

Take-off distance available (TODA) - The TORA plus the length of any remaining runway or clearway beyond the far end of the TORA available to accelerate from brake release past lift-off, to start of take-off climb, plus safety factors. The departure surface which should be cleared having a 40 to 1 slope begins at the far end of the TODA.

Accelerate-stop distance available (ASDA) - The length of the runway plus stopway declared available and suitable to accelerate from brake release to take-off decision speed, and then decelerate to a stop, plus safety factors.

Landing distance available (LDA) - The distance from the threshold to complete the approach, touch-down, and decelerate to a stop, plus safety factors.

The TORA and TODA are often equal to the actual runway length, which is currently the case for Runway 18-36, as detailed on **Exhibit 4G** where the TORA is equal to the runway length 6,100 feet in both directions. The ASDA and the LDA are the primary considerations in determining the runway length available for use by aircraft, as these calculations must consider providing full RSA.

As shown on **Exhibit 4G**, the constraints to the north and south allow for only 150 feet of RSA beyond the north end and 100 feet beyond the south end. The RSA standard for RDC B-III is 600 feet beyond the runway end. As such, the usable runway length for take-offs to the north is reduced by 450 feet to the north and 500 feet to the south. Thus, the ASDA for Runway 18 is 5,600 feet and for Runway 36 is 5,650 feet.

For landing operations, RSA must be provided prior to the landing threshold and beyond the far end of the runway. Since both ends are limited and cannot meet RSA standards, the landing distance available must account for the shortages at both ends. As such, the LDA for both Runways is 5,150 feet, which is calculated by reducing the runway length (6,100 feet) by the RSA shortages at each end, or 950 feet (450 feet and 500 feet).

The application of declared distances is the most practical method of meeting RSA on Runway 18-36. If declared distances were not used, the runway would need to be reduced or physical improvements to extend the RSA into the Fore River would be required. It is the recommendation of this planning effort to continue with declared distances on Runway 18-36 for the planning period.

Runway Object Free Area (ROFA)

The ROFA is "a two-dimensional ground area surrounding runways, taxiways, and taxilanes, which is clear of objects except for objects whose location is fixed by function (i.e., airfield lighting)." The ROFA does not have to be graded and level like the RSA; instead, the primary requirement for the ROFA is that no object in the ROFA penetrates the lateral elevation of the RSA. The ROFA is centered on the runway, extending out in accordance to the critical design aircraft utilizing the runway.

The ROFA on both runways are obstructed by on-airport features and facilities. Unlike the RSA, the FAA will allow for the ROFA to be modified. In fact, the FAA has already approved modification to FAA design standards for the ROFA at each runway end at the Jetport. Presently, only 225 feet of ROFA is available beyond the east end and 760 feet beyond the west end due to the location of the airport perimeter road. The FAA approved a modification to standard for this condition. For Runway 18-36, the ROFA at each end is also obstructed by the perimeter road, to which the FAA has also approved a modification to standard. No additional ROFA improvements are required or suggested for the planning period.

Runway Obstacle Free Zone (ROFZ)

The ROFZ is an imaginary volume of airspace which precludes object penetrations, including taxiing and parked aircraft. The only allowance for ROFZ obstructions is navigational aids mounted on frangible bases which are fixed in their location by function, such as airfield signs. The ROFZ is established to ensure the safety of aircraft operations. If the ROFZ is obstructed, the airport's approaches could be removed or approach minimums could be increased.

Runway 11-29 currently meets ROFZ standards which should be maintained through the planning period.

Runway 11-29 currently meets ROFZ standards which should be maintained through the planning period. The south end of Runway 18-36, however, does not meet ROFZ standards. Per FAA criteria detailed on **Table 4C**, the ROFZ is 400 feet wide and extends 200 feet beyond the runway ends. For Runway 36, the full ROFZ is available on the runway's west side, but is limited to only 176 feet to the east due to airport's perimeter road. The FAA has approved a modification to standard for this condition where any airport vehicles must contact airport traffic control prior to crossing into or through the ROFA/ROFZ.

A precision obstacle free zone (POFZ) is further defined for runway ends with a precision approach, such as the instrument landing system (ILS) approach to both ends of Runway 11-29. The POFZ is 800 feet wide, centered on the runway, and extends from the runway threshold to a distance of 200 feet. The POFZ is in effect when the following conditions are met:

a) The runway supports a vertically guided approach.
b) Reported ceiling is below 250 feet and/or visibility is less than ¾-mile.
c) An aircraft is on final approach within two miles of the runway threshold.

When the POFZ is in effect, a wing of an aircraft holding on a taxiway may penetrate the POFZ; however, neither the fuselage nor the tail may infringe on the POFZ. POFZ standards are met for Runway 11-29 at Portland International Jetport.

Runway Protection Zones (RPZ)

The RPZ is a trapezoidal area centered on the runway, typically beginning 200 feet beyond the runway end. The RPZ has been established by the FAA to provide an area clear of obstructions and incompatible land uses, in order to enhance the protection of people and property on the ground. The RPZ is comprised of the central portion of the RPZ and the controlled activity area. The central portion of the RPZ extends from the beginning to the end of the RPZ, is centered on the runway, and is the width of the ROFA. The controlled activity area is any remaining portions of the RPZ. The dimensions of the RPZ vary according to the visibility minimums serving the runway and the type of aircraft (design aircraft) operating on the runway.

While the RPZ is intended to be clear of incompatible objects or land uses, some uses are permitted with conditions and other land uses are prohibited. According to AC 150/5300-13A, Change 1, the following land uses are permissible within the RPZ:

- Farming that meets the minimum buffer requirements,
- Irrigation channels as long as they do not attract birds,
- Airport service roads, as long as they are not public roads and are directly controlled by the airport operator,
- Underground facilities, as long as they meet other design criteria, such as RSA requirements, as applicable, and
- Unstaffed navigational aids (NAVAIDs) and facilities, such as required for airport facilities that are fixed by function in regard to the RPZ.

Any other land uses considered within RPZ land owned by the airport sponsor must be evaluated and approved by the FAA Office of Airports. The FAA has published *Interim Guidance on Land Uses within a Runway Protection Zone* (9.27.2012), which identifies several potential land uses that must be evaluated and approved prior to implementation. The specific land uses requiring FAA evaluation and approval include:

- Buildings and structures (examples include, but are not limited to: residences, schools, churches, hospitals or other medical care facilities, commercial/industrial buildings, etc.)
- Recreational land use (examples include, but are not limited to: golf courses, sports fields, amusement parks, other places of public assembly, etc.)
- Transportation facilities. Examples include, but are not limited to:
- Rail facilities - light or heavy, passenger or freight
- Public roads/highways
- Vehicular parking facilities
- Fuel storage facilities (above and below ground)
- Hazardous material storage (above and below ground)
- Wastewater treatment facilities
- Above-ground utility infrastructure (i.e., electrical substations), including any type of solar panel installations.

The *Interim Guidance on Land within a Runway Protection Zone* states, "RPZ land use compatibility also is often complicated by ownership considerations. Airport owner control over the RPZ land is emphasized to achieve the desired protection of people and property on the ground. Although the FAA recognizes that in certain situations the airport sponsor may not fully control land within the RPZ, the FAA expects airport sponsors to take all possible measures to protect against and remove or mitigate incompatible land uses."

Currently, the RPZ review standards are applicable to any new or modified RPZ. The following actions or events could alter the size of an RPZ, potentially introducing an incompatibility:

- An airfield project (e.g., runway extension, runway shift),
- A change in the critical design aircraft that increases the RPZ dimensions,
- A new or revised instrument approach procedure that increases the size of the RPZ, and/or
- A local development proposal in the RPZ (either new or reconfigured).

Since the Interim guidance only addresses new or modified RPZ, existing incompatibilities are essentially grandfathered under certain circumstances. While it is still necessary for the airport sponsor to take all reasonable actions to meet the RPZ design standard, FAA funding priority for certain actions, such as relocating existing roads in the RPZ, will be determined on a case-by-case basis.

As depicted on **Exhibit 4F**, all existing RPZs at the Jetport extend, in part, beyond airport property. Most of the Runway 11 PRZ is contained on airport land with some extending beyond public roadways. For Runway 29, the RPZ extends into the Fore River and over public roadways to the east. Other than roads, no incompatible land uses exist in the existing RPZs for Runway 11-29.

Consideration should be given to acquiring the property in the approach and departure RPZs wherever feasible and/or practical.

The approach RPZ for Runway 36 is mostly on existing airport property; however, the southeastern and southwestern corners are outside of airport property over the Fore River. The approach RPZ for Runway 18 extends beyond airport property, with the northwestern corner located atop a residential area. The departure RPZs for both Runway 18 and 36 extend well beyond airport property, as depicted on **Exhibit 4F**. Consideration should be given to acquiring the property in the approach and departure RPZs wherever feasible and/or practical. At a minimum, avigation easements should be pursued.

Runway/Taxiway Separation

The design standards for the separation between runways and parallel taxiways are a function of the critical design aircraft and the instrument approach visibility minimum. The runway to taxiway separation standard for RDC C/D-IV runways served by published instrument approaches providing less than ½-mile visibility minimums is 400 feet (centerline to centerline). This standard applies to parallel Taxiway A, which is properly located 400 feet north serving Runway 11-29.

Taxiway C serves crosswind Runway 18-36, which has published instrument approaches offering not lower than one-mile visibility minimums. As noted earlier, Runway 18-36 should follow RDC B-III design which calls for a 300-foot runway/taxiway separation. Most of parallel Taxiway C exceeds this dimension, while the northern and southern parallel portions of Taxiway C are set at 300-foot separation. As such, Taxiway C is properly spaced from Runway 18-36

RUNWAYS

The adequacy of the existing runway system at Portland International Jetport has been analyzed from a number of perspectives, including runway orientation and adherence to safety area standards. From this information, requirements for runway improvements were determined for the airport. Runway elements, such as length, width, and strength, are now presented.

Runway Length

The determination of runway length requirements for the airport is based on five primary factors:

- Mean maximum temperature of the hottest month
- Airport elevation
- Runway gradient
- Critical aircraft type expected to use the runway
- Stage length of the longest nonstop destination (specific to larger aircraft)

The mean maximum daily temperature of the hottest month for Portland International Jetport is 79 degrees Fahrenheit (F), which occurs in July. The airport elevation is 75.65 feet above mean sea level (MSL). The runway end elevation difference is 33 feet for Runway 11-29 and less than one foot for Runway 18-36. The gradient of both runways conform to FAA design standards.

The factors listed above were analyzed in the last Airport Master Plan for specific aircraft currently and forecast to operate at the Jetport. The analysis considered the specific needs of both runways to serve varying purposes. Primary Runway 11-29 should be maintained to serve the needs of all commercial airline and business jet users. Crosswind Runway 18-36 should be properly sized to primarily serve aircraft in AAC A and B. Runway 18-36 should also be sized as a secondary option for commercial and business jet aircraft when winds dictate or during periods Runway 11-29 is closed.

TABLE 4F
Runway Length Capabilities
Portland International Jetport

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

Source: 2008 Airport Master Plan Analysis

Runway 11-29 is 7,200 feet long. It is bound to the west by Interstate 95 and to the east by the Fore River and I-95. For all practical purposes, any extension of Runway 11-29 would face monumental hurdles to implementation. Even with constraints, analysis should be conducted for a longer runway length if the need is presented by existing and/or projected aircraft operators. Based on the analysis in the previous Airport Master Plan, the current runway length can accommodate all commercial airline take-off length needs for the associated trip lengths currently scheduled as presented in **Table 4F**. In fact, the potential trip lengths associated with aircraft currently serving the airport far exceed those actually being conducted. Finally, the consultant interviewed all current airline operators and asked if the existing runway length poses any operational restrictions. All interviewed clearly identified the current length of Runway 11-29 as being adequate for their operations. Considering all factors, Runway 11-29 offers adequate length for the current needs and should be adequate for future operations as well. As such, the 7,200-foot runway should be maintained through the planning period.

Crosswind Runway 18-36 was only 5,001 feet long at the time of the previous Airport Master Plan. The analysis in that study outlined the need to extend the runway to at least 5,500 feet. Subsequently, Runway 18-36 was extended to measure 6,100 feet; however, the entire pavement length is not fully usable for all operations as outlined earlier in the declared distances discussion. The runway was lengthened so as to offer 5,650 of operational take-off length to the south, 5,600 feet of take-off length to the north, and 5,150 feet of landing length in both directions.

The current length of Runway 18-36 is more than adequate for all small general aviation aircraft as well as most business jet aircraft except on very hot days, which are relatively rare. Any additional runway

Considering all factors, Runway 11-29 offers adequate length for the current needs and should be adequate for future operations as well.

length would come at a substantial price as the runway is bound on both ends by the Fore River. Moreover, FAA's changed opinion of public roads inside of the RPZ would make approval of any further extension extremely challenging. While a longer runway may be desired by some, it is not the practical and/or prudent option. The value of any runway extension must be weighed against the potential costs. At present, aircraft operating at the airport utilizing Runway 18-36 have more than enough length. Moreover, future aircraft will not require a longer length as newer engines are being manufactured to be much more efficient. As such, the current runway length of Runway 18-36 is considered adequate and should be maintained through the planning period.

Runway Width

The width of the runway is a function of the airplane design group for each runway. Runway 11-29 is currently, and is forecast to remain, in ADG IV. The runway width design standard for RDC C/D-IV is 150 feet. The existing width of Runway 11-29 should be maintained throughout the planning period.

Crosswind Runway 18-36 is currently, and is forecast to remain, in RDC B-III. FAA standards call for a 100-foot runway width for RDC B-III runways. As such, Runway 18-36 exceeds FAA standards with its current width of 150 feet. While discussion could be had for narrowing the runway to 100 feet, the prudent and/or practical choice should be to maintain the current pavement width. Runway 18-36 does serve some commercial airline operations which require a 150-foot runway width as the recently extended pavement offers the ability to serve the aircraft during high crosswinds. Thus, the current runway width should be maintained in the future.

Runway Strength

An important feature of airfield pavement is its ability to withstand repeated use by aircraft. The FAA Airport/Facility Directory reports the pavement strength for Runway 11-29 at 75,000 pounds single wheel loading (S), 169,000 pounds dual wheel loading (D), and 300,000 pounds dual tandem wheel loading (DT). These strength ratings refer to the configuration of the aircraft landing gear. For example, S indicates an aircraft with a single wheel on each landing gear. The strength ratings of a runway do not preclude operations by aircraft that weigh more; however, frequent activity by heavier aircraft can shorten the useful life of that pavement.

The strength existing strength rating for Runway 11-29 is adequate to accommodate existing demand; however, it may need to be increased to meet future commercial airline operations. Two aircraft models in particular could enter the Jetport market having a higher loading than current design. The Airbus 321 has a maximum take-off weight of 205,000 pounds while the Boeing 737-800 and -900 models can have a maximum take-off weight of up to 195,000 pounds D. These aircraft models do not regularly operate at the Jetport today but could be utilized by airlines currently operating at the Jetport at some point in the future. As such, planning should consider future opportunities to increase the Runway 11-29 pavement strength up to 205,000 pounds D.

Runway 18-36 is strength rated at 75,000 pounds S, 165,000 pounds D, and 300,000 pounds DT. This runway is primarily designed for RDC B-III but can be utilized by larger commercial service aircraft on an infrequent basis. The current strength rating is adequate to handle all aircraft currently operating at the Jetport. Moreover, the current pavement strength is adequate to accommodate infrequent use by all aircraft types forecast to operate at the Jetport through the planning period, even the Airbus 321 and larger Boeing 737 models. While unlikely, if these aircraft were to regularly utilize Runway 18-36 (more than 500 operations annually), an increase pavement strength would be needed similar to that proposed for Runway 11-29.

TAXIWAYS

The design standards associated with taxiways are determined by the TDG or the ADG of the critical design aircraft. As determined previously, the applicable ADG for Runway 11-29 is ADG IV now and into the future. For crosswind Runway 18-36, the applicable design is ADG-III. **Table 4G** presents the various taxiway design standards related to ADGs III and IV.

TABLE 4G
Taxiway Dimensions and Standards
Portland International Jetport

STANDARDS BASED ON WINGSPAN	***ADG III***	***ADG IV***	
Taxiway Protection			
Taxiway Safety Area (TSA) width	118	171	
Taxiway Object Free Area (TOFA) width	186	259	
Taxilane Object Free Area width	162	225	
Taxiway Separation			
Taxiway Centerline to:			
Fixed or Movable Object	93	129.5	
Parallel Taxiway/Taxilane	152	215	
Taxilane Centerline to:			
Fixed or Movable Object	81	112.5	
Parallel Taxilane	140	198	
Wingtip Clearance			
Taxiway Wingtip Clearance	34	44	
Taxilane Wingtip Clearance	23	27	
STANDARDS BASED ON TDG	***TDG 2***	***TDG 3/4***	***TDG 5***
Taxiway Width Standard	35	50	75
Taxiway Edge Safety Margin	7.5	10	15
Taxiway Shoulder Width	10	20	30

ADG: Airplane Design Group
TDG: Taxiway Design Group
Source: FAA AC 150/5300-13A, Change 1 *Airport Design*

The table also shows those taxiway design standards related to TDG. The TDG standards are based on the Main Gear Width (MGW) and the Cockpit to Main Gear (CMG) distance of the critical design aircraft expected to use those taxiways. Different taxiway and taxilane pavements can and should be designed to the most appropriate TDG design standards based on usage. **Table 4H** presents the TDG for most commonly utilized commercial service and business jet aircraft at the Jetport.

TABLE 4H
Aircraft by Associated TDG

Aircraft	TDG	RDC
Airbus A300/310 Series	5	C-IV
Airbus A319/320 Series	3	C-III
Boeing 717	3	C-III
Boeing 727	5	C-III
Boeing 737	3	C-III
Boeing 757 Series	5	D-IV
Bombardier CRJ All Series	3	C-II/C-III
Bombardier Global 5000	3	C-III
Cessna Citation Bravo/SP	1	B-II
Cessna Citation Excel/XLS	2	B-II
Cessna Citation III/VI/VII	2	C-III
Cessna Citation Sovereign	3	B-II
Cessna Citation X	3	C-II
Cessna CJ1, CJ2, CJ3, CJ4	1	B-I
Dassault Falcon 20/50	2	B-II
Dassault Falcon 2000	2	B-II
DC-9	3	C-III
Embraer ERJ 135/140/145/Legacy	3	C-II
Fairchild A-10	2	C-II
Gulfstream G400/G500	3	D-II
IAI 1126 Galaxy	3	C-II
MD-80	5	C-III

Source: FAA Data and Aircraft Certification Manuals

The minimum taxiway design for Runway 11-29 should be TDG 5 to meet the needs of current commercial airline aircraft operating at the airport such as the Boeing 757 and MD 80 series. As such, the taxiways associated with Runway 11-29 and/or those commonly utilized by TDG 5 aircraft should be 75 feet wide. For Runway 18-36, the applicable taxiway design is TDG 3 to account for all general aviation aircraft, business jets, and some commercial airline aircraft including the regional jets, Boeing 737, and Airbus 319/320 series aircraft operating at the airport. Thus, the taxiways associated with Runway 18-36 should be at least 50 feet wide.

The current taxiway system is composed of varying taxiway widths with most being 75 feet wide. A portion of Taxiway C is 50 feet while Taxiway J is 60 feet. The current taxiway widths at the Jetport are sufficient to meet existing and planned aircraft TDG design criteria.

Taxiway Design Considerations

FAA AC 150/5300-13A, Change 1, *Airport Design*, provides guidance on recommended taxiway and taxilane layouts to enhance safety by avoiding runway incursions. A runway incursion is defined as "any occurrence at an airport involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft."

The taxiway system at Portland International Jetport generally provides for the efficient movement of aircraft; however, recently published AC 150/5300-13A, Change 1, *Airport Design*, provides recommendations for taxiway design. The following is a list of the taxiway design guidelines and the basic rationale behind each recommendation:

1. **Taxi Method**: Taxiways are designed for "cockpit over centerline" taxiing with pavement being sufficiently wide to allow a certain amount of wander. On turns, sufficient pavement should be provided to maintain the edge safety margin from the landing gear. When constructing new taxiways, upgrading existing intersections should be undertaken to eliminate "judgmental oversteering," which is where the pilot must intentionally steer the cockpit outside the marked centerline in order to assure the aircraft remains on the taxiway pavement.
2. **Steering Angle**: Taxiways should be designed such that the nose gear steering angle is no more than 50 degrees, the generally accepted value to prevent excessive tire scrubbing.
3. **Three-Node Concept**: To maintain pilot situational awareness, taxiway intersections should provide a pilot a maximum of three choices of travel. Ideally, these are right and left angle turns and a continuation straight ahead.
4. **Intersection Angles**: Design turns to be 90 degrees wherever possible. For acute angle intersections, standard angles of 30, 45, 60, 120, 135, and 150 degrees are preferred.
5. **Runway Incursions**: Design taxiways to reduce the probability of runway incursions.
   - *Increase Pilot Situational Awareness*: A pilot who knows where he/she is on the airport is less likely to enter a runway improperly. Complexity leads to confusion. Keep taxiways systems simple using the "three-node" concept.
   - *Avoid Wide Expanses of Pavement*: Wide pavements require placement of signs far from a pilot's eye. This is especially critical at runway entrance points. Where a wide expanse of pavement is necessary, avoid direct access to a runway.
   - *Limit Runway Crossings*: The taxiway layout can reduce the opportunity for human error. The benefits are twofold – through simple reduction in the number of occurrences, and through a reduction in air traffic controller workload.
   - *Avoid "high energy" Intersections*: These are intersections in the middle third of runways. By limiting runway crossings to the first and last thirds of the runway, the portion of the runway where a pilot can least maneuver to avoid a collision is kept clear.
   - *Increase Visibility*: Right angle intersections, both between taxiways and runways, provide the best visibility. Acute angle runway exits provide for greater efficiency in runway usage, but should not be used as runway entrance or crossing points. A right angle turn at the end of a parallel taxiway is a clear indication of approaching a runway.

- *Avoid "dual purpose" Pavements*: Runways used as taxiways and taxiways used as runways can lead to confusion. A runway should always be clearly identified as a runway and only a runway.
- *Indirect Access*: Do not design taxiways to lead directly from an apron to a runway. Such configurations can lead to confusion when a pilot typically expects to encounter a parallel taxiway.
- *Hot Spots*: Confusing intersections near runways are more likely to contribute to runway incursions. These intersections must be redesigned when the associated runway is subject to reconstruction or rehabilitation. Other hot spots should be corrected as soon as practicable.

6. **Runway/Taxiway Intersections**:
   - *Right Angle*: Right-angle intersections are the standard for all runway/taxiway intersections, except where there is a need for a high-speed exit. Right-angle taxiways provide the best visual perspective to a pilot approaching an intersection with the runway to observe aircraft in both the left and right directions. They also provide optimal orientation of the runway holding position signs so they are visible to pilots.
   - *Acute Angle*: Acute angles should not be larger than 45 degrees from the runway centerline. A 30-degree taxiway layout should be reserved for high speed exits. The use of multiple intersecting taxiways with acute angles creates pilot confusion and improper positioning of taxiway signage.
   - *Large Expanses of Pavement*: Taxiways must never coincide with the intersection of two runways. Taxiway configurations with multiple taxiway and runway intersections in a single area create large expanses of pavement, making it difficult to provide proper signage, marking, and lighting.
7. **Taxiway/Runway/Apron Incursion Prevention**: Apron locations that allow direct access into a runway should be avoided. Increase pilot situational awareness by designing taxiways in such a manner that forces pilots to consciously make turns. Taxiways originating from aprons and forming a straight line across runways at mid-span should be avoided.
8. **Wide Throat Taxiways**: Wide throat taxiway entrances should be avoided. Such large expanses of pavement may cause pilot confusion and makes lighting and marking more difficult.
9. **Direct Access from Apron to a Runway**: Avoid taxiway connectors that cross over a parallel taxiway and directly onto a runway. Consider a staggered taxiway layout that forces pilots to make a conscious decision to turn.
10. **Apron to Parallel Taxiway End**: Avoid direct connection from an apron to a parallel taxiway at the end of a runway.

FAA AC 150/5300-13A, Change 1 *Airport Design*, states that, "existing taxiway geometry should be improved whenever feasible, with emphasis on designated "hot spots." To the extent practicable, the removal of existing pavement may be necessary to correct confusing layouts.

There is one identified hot spot at Portland International Jetport. Hot Spot 1 (HS 1) is located at the intersection of Taxiways A and C. The airport has installed runway guard lighting (RGL), also known as "wig-wags," at the hot spot location so as to identify that the taxiways lead to runway surfaces. The

> ***Hot Spot 1 (HS 1) is located at the intersection of Taxiways A and C.***

Taxiway C pavement has also been painted with a Taxiway A direction sign to enhance pilot situational awareness. There have been no reported runway incursions at HS 1 and the current wig-wag, taxiway surface directional markings, and enhanced centerline markings should be sufficient to mitigate potential runway incursions in this location.

Exhibit 4F depicts the location of the high energy areas for both runways. As noted above, FAA airfield geometry standards indicate that there should be no taxiways crossing a runway in the high energy areas. At the Jetport, two taxiways cross through the Runway 18-36 high energy area: Taxiway A, the parallel taxiway serving Runway 11-29, and Taxiway G spanning between the north general aviation ramp and the FSDO ramp. Analysis in the next chapter will consider potential alternatives for this nonstandard condition.

All entrance/exit taxiways should interface the runway to allow aircraft to hold at a 90-degree orientation with the runway centerline. This allows the pilot full operational view of the runway in both directions. Runways 29, 18 and 36 do not currently conform to this geometrical standard. Alternative analysis will consider options for improving these taxiways' holding positions.

The final airfield geometry standard that does not conform to FAA standard is the allowance of direct runway to aircraft ramp access. FAA's Runway Safety Action Team (RSAT) study indicates that runway incursion risks increase when a pilot can traverse directly from a ramp to an active runway without having to make a turn. As such, the FAA suggests that all direct access linking a ramp with a runway be modified by relocating the taxiway or developing "no taxi islands" on the ramp to prohibit direct access. Currently four direct access points exist at the Jetport:

- Taxiway J to the north general aviation ramp;
- Taxiway G to the north general aviation ramp;
- Taxiway G to the FSDO ramp; and
- Taxiway D to the main terminal ramp

Analysis in the following chapter will outline methods to improve the nonstandard direct access taxiway alignments.

INSTRUMENT NAVIGATIONAL AIDS

The airport, specifically Runway 11-29, is served by highly sophisticated ILS precision instrument approaches offering Category I (CAT-I) and CAT II minimums. These approaches allow properly equipped aircraft and pilots the ability to operate with weather minimums as low as 108-foot cloud heights and 1,200 feet RVR. Moreover, Runway 11 offers CAT III minimums having zero cloud height and as low as 600 feet RVR visibility minimums.

A Global Positioning System (GPS) LP (Localizer Performance) instrument approach is also available to both ends of Runway 18-36. The GPS LP approaches utilize the constellation of GPS satellites to provide both near precision horizontal guidance for approaching aircraft without the need for extensive ground based equipment. The LP approach to Runway 18 provides for visibility minimums of one mile and cloud ceilings of 700 feet for AAC A/B aircraft. Runway 36 provides an LP approach with one-mile visibility minimums and 460-foot cloud ceiling minimums for AAC A/B aircraft. Both of the GPS LP approach minimums increase for AAC C/D aircraft.

The ILS and GPS approaches to both runways are excellent instrument approach procedures providing all-weather capability for the airport. These procedures should be maintained in the future. Consideration for lower visibility minimums on Runway 18-36 will be given in the next chapter; however, any minimums below one mile on the runway could be prohibitive due to revised RPZ standards.

VISUAL NAVIGATION AIDS

The airport beacon is located east of Runway 18-36 and north of Runway 29. The beacon provides for rapid identification of the airport with a rotating light that is green on one side and white on the opposite. The beacon should be maintained through the planning period.

All runway ends are equipped with four-box precision approach path indicators (PAPIs). The PAPI-4 systems are adequate to serve all aircraft operations at the airport and should be maintained in the future.

Runway end identification lights (REIL) are strobe lights set to either side of the runway. These lights provide rapid identification of the runway threshold. REILs should be installed at runway ends not currently providing an approach lighting system but supporting instrument operations. Currently, this would apply to runway ends 18 and 36, which are equipped with REILs and should be adequate unless replaced by a more sophisticated approach lighting system (ALS). An ALS would only be necessary on Runway 18-36 if the instrument approach procedure minimums were lower than ¾-mile, which is not likely to be approved by the FAA. As such, the REILs should be maintained throughout the planning period.

The FAA recommends an approach lighting system for instrument approaches not lower that ¾-mile and requires one for lower visibility minimums. Runway 11 is equipped with a dual mode system consisting of a high intensity ALS with sequenced flashers (ALSF-2). This system allows the runway to offer CAT III minimums and should be maintained in the future. Runway 29 has a medium intensity approach lighting system with runway alignment indicator lights (MALSR). This system is required as part of the ILS approach and allows for the visibility minimums to be CAT II. This system should be maintained throughout the planning period.

WEATHER AND COMMNUICATION AIDS

Portland International Jetport has four lighted windcones, with one each located at the approach ends of Runway 11-29 and Runway 18-36. Windcones provide information to pilots regarding wind conditions, including direction and speed. These windcones should be maintained. A segmented circle is also provided which should be maintained in the future.

The ATCT provides an automated terminal information service (ATIS). ATIS broadcasts contain essential information, such as weather information, active runways, available approaches, and any other information required by the pilots, such as important NOTAMs. These broadcasts are updated hourly during ATCT operational hours.

Portland International Jetport is equipped with an Automated Surface Observing System (ASOS). This is an important system that automatically records weather conditions such as wind speed, wind gust, wind direction, temperature, dew point, altimeter setting, visibility, fog/haze condition, precipitation, and cloud height. This information can be accessed by pilots and individuals via an automated voice recording on a published telephone number. This system should be maintained through the planning period. The airfield is also served with runway visual range equipment providing visibility measuring and reporting equipment along both runways. These systems should be maintained through the planning period.

A summary of the airside needs at Portland International Jetport is presented on Exhibit 4H.

A summary of the airside needs at Portland International Jetport is presented on **Exhibit 4H**.

LANDSIDE REQUIREMENTS

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

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

PASSENGER TERMINAL COMPLEX

Components of the passenger terminal complex include aircraft gate positions, departures processing, arrivals processing, concourse facilities, as well as public spaces. This section identifies the functional components of the terminal building and offers space requirements for projected passenger demand levels for each component.

CATEGORY	EXISTING		RECOMMENDED IMPROVEMENTS OVER PLANNING PERIOD	
RUNWAYS	Runway 11-29	Runway 18-36	Runway 11-29	Runway 18-36
RDC	RDC C/D-IV-1200	RDC B-III-5000	Same	Same
Length x Width (in feet)	7,200 x 150	6,100 x 150	Same	Same
Pavement Strength (in pounds)				
Single Wheel Loading (S)	75,000	75,000	Same	Same
Dual Wheel Loading (D)	169,000	165,000	Increase up to 205,000	Same
Dual Tandem Wheel Loading (DT)	300,000	300,000	Same	Same
Runway Protection Zones				
Owned/Airspace Control	Mostly	Mostly	Acquire if Feasible	
Incompatible Uses	Existing Public Roads	Residential/ Public Road	Non - if possible	
TAXIWAYS SERVING	Runway 11-29	Runway 18-36	Runway 11-29	Runway 18-36
TDG	5	3	Same	Same
Parallel Taxiway	Full Length	Full Length	Same	Same
Number of Entrance/Exits	Six	Four	Same	Same
Taxiway Widths (in feet)	75	50, 60, and 75	Same	Same
AIRFIELD GEOMETRY	Runway 11-29	Runway 18-36	Runway 11-29	Runway 18-36
Hot Spots Identified	Yes (Taxiway A & C Intersection)	Yes (Taxiway A & C Intersection)	Continue Runway Guard Lighting (RGL) and Enhanced Centerline Marking	
High Energy Runway Crossings	No	Yes (Taxiway A, G)	Consider Alternatives to Mitigate	
Direct Access Runway/Apron	Yes (Taxiway D)	Yes (Taxiway G)	Consider Alternatives to Mitigate	
NAVIGATION AND WEATHER AIDS				
	ASOS/ATIS, Four Lighted Wincones, Runway Visual Range (RVR) Equipment, Beacon		Same	
INSTRUMENT APPROACH PROCEDURES	Runway 11-29	Runway 18-36	Runway 11-29	Runway 18-36
ILS	CAT I, II, III (11); CAT I, II (29)	No	Same	Same
GPS LNAV	Yes	Yes	Same	Yes
GPS VNAV	Yes	No		
GPS LPV	Yes	LP only (No Vertical Component)	Same	Same
Other	None	None	Next Gen Approaches	Next Gen Approaches
LIGHTING AND MARKING	Runway 11-29	Runway 18-36	Runway 11-29	Runway 18-36
Runway Lighting	HIRL	MIRL	Same	Same
Centerline Lighting	Yes	No	Same	Same
Touchdown Zone Lights	Yes (11 Only)	No	Same	Same
Runway Marking	Precision	Non-precision	Same	Same
Taxiway Lighting	MITL	MITL	Same	Same
Approach Lighting System	ALSF-2 (11); MALSR (29)	REIL	Same	Same
Visual Approach Aids	PAPI-4R	PAPI-4L	Same	Same

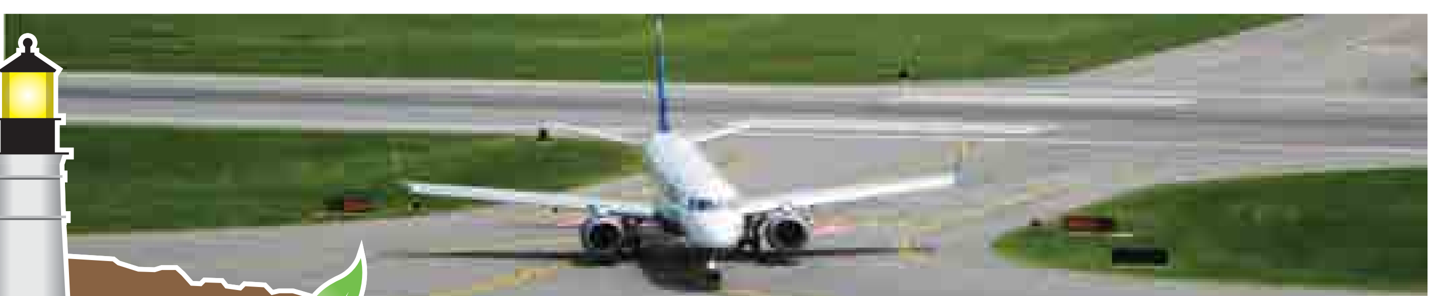


Exhibit 4H

As passenger demand increases, so does space needs. That in turn increases energy requirements as well as waste generation. As mentioned in the baseline assessment, the Jetport's geothermal energy system and the LEED Gold certification of the new portions of the passenger terminal has already significantly reduced its energy consumption as well as its carbon footprint. The terminal will be a key focal point for the Jetport meeting its sustainability goals and objectives, particularly under the Energy, GHG Emissions, and Waste Management and Recycling categories.

Many aspects of passenger terminal design are based upon peaking periods of commercial activity as determined by the flight schedules for the Jetport. The spring and summer flight schedules were used for this analysis. These months experience the greatest number of flights and passengers due to seasonal visitors to the Portland area. It is these same months that are and will continue to be the most taxing periods for the terminal complex functional components.

Aircraft Gate/Apron

An airport terminal gate designates an aircraft parking position adjacent to a terminal building for the loading and unloading of passengers and baggage. The size and type of aircraft served, the parking arrangement, and assignment procedures affect the required number of gates, size, and layout of the terminal gates.

Presently, the configuration of the ten terminal gates at the Jetport provides for 12 boarding and parking positions.

Presently, the configuration of the ten terminal gates at the Jetport provides for 12 boarding and parking positions. Three of the boarding positions associated with Gate 1 are specifically designed and sized to handle regional jet or large turboprop aircraft. The remaining nine gates can accommodate regional and mainline commercial aircraft. At present (2014), two airline gates (4 and 5) are not assigned to an airline and are utilized as common gates usable as needed for peaking periods.

The number of gates required can be estimated from the following formula:

N = V x T/U
N = the number of gates
V = design hour volume for arrivals or departures (aircraft per hour)
T = weighted mean stand occupancy time (hrs.)
U = utilization factor

The terminal building has a total of ten departure gates and 12 parking positions. The design hour volume (V) is seven, or 25 percent of the 32 daily departures (remaining overnight [RON] aircraft excluded). An analysis of stand or gate occupancy times (T), excluding RON, found an average of 31.8 minutes (0.53 hour) per aircraft. The current utilization factor is 0.42, making the current gate requirement 10. Based on projected demand, the gate requirement formula yields approximately 12 gates based upon the same variables over the long term.

Presently, the Jetport can host up to three RON aircraft in the RON designated spaces depicted on Exhibit 1Q. Each gate can also be utilized for RON if needed. With a total of 12 existing terminal parking positions, the Jetport can provide more than adequate RON spaces for the planning period.

Terminal apron requirements are determined by the number of gates, the size of the gates, the maneuvering area required for aircraft at gates, and the aircraft parking layout in the gate area. The existing commercial apron is designed for 12 aircraft positions, with alternative parking configurations able to accommodate three RON aircraft as well as a deicing pad. The existing apron is properly sized to accommodate existing demand.

Future apron requirements will be directly linked to the ultimate number of gates and associated parking positions offered. As noted earlier, the gate analysis indicates that up to 12 airline gates could be required to efficiently accommodate the long term projected passengers. Consideration was also given to the high range milestone of 1.35 million enplanements, which would require and additional gate.

Terminal Building Requirements

The requirements for the passenger terminal building begin with a demand capacity analysis of the existing facilities that determines the current capacity of key processing areas for comparison to the passenger demand at the Jetport. The purpose of the analysis is to quantify and qualify the ability of the existing terminal facilities to satisfy the current demand of the traveling public at the Airport.

The purpose of the analysis is to quantify and qualify the ability of the existing terminal facilities to satisfy the current demand of the traveling public at the Airport.

A spreadsheet model based on industry standards and calibrated for the Jetport based upon observations of passenger activities and terminal operations and design was used in this analysis. The model utilizes the standard queuing theory which can be defined as: passengers arriving minus passengers processed equals passengers in queue. The evaluation of individual processing elements is based on industry standards and formulas.

The model considers the level of service standards established by the International Air Transport Association (IATA). Level of service (LOS) defines the comfort and quality of the passenger experience. Some are related to crowding in queuing areas, while others define the amount of time a passenger must wait for processing. **Table 4J** outlines the basic level of service standards, while **Exhibit 4J** outlines space requirements for each functional element of the passenger terminal building.

In general, LOS C is a typical design goal for most airports. LOS B would be a preferred goal if the budget allows. LOS A is generally too expensive to achieve, and thus prohibitive to implement. For purposes of this analysis, an LOS C+ was used to represent a median between LOS B and C.

Functional Area	Unit	Available	Enplanement Milestones: Current 843,944	Short Term 975,000	Intermediate 1,050,000	Long Term 1,200,000	High 1,350,000
DEPARTURES PROCESSING							
Ticket Counters							
Utilization Factor	85%		566	643	723	940	
Agent Positions	#	36	22	26	28	32	36
Kiosk Positions	#	5	3	4	4	5	6
Frontage	LF	200	132	156	168	192	216
Area	SF	3,610	1,980	2,340	2,520	2,880	3,240
Ticket Lobby							
Queuing Area	SF	9,520	5,030	6,020	6,480	7,400	8,330
TSA Baggage Check	SF	19,432	12,240	12,340	12,340	12,340	16,340
Outbound Baggage	SF	19,074	12,600	13,900	14,800	16,700	19,100
Airline Ticket Office	SF	5,167	3,960	4,680	5,040	5,760	6,480
Ticket Lobby Circulation	SF	6,346	2,640	3,120	3,360	3,840	4,320
Public Area							
Circulation	SF	32,456	18,300	21,890	23,574	26,942	30,310
Security Stations							
Number	#	7	4	5	5	6	7
Queuing Area	SF	9,500	3,788	4,531	4,880	5,577	6,274
Station Area	SF	9,950	5,000	6,250	6,250	7,500	8,750
TSA Administration/Operations	SF	8,392	5,900	6,800	7,400	8,400	9,500
ARRIVALS PROCESSING							
Baggage Claim							
Passengers claiming bags	75%		336	409	440	503	566
Claim Display Frontage	LF	342	282	343	370	422	475
Inbound Baggage	SF	4,403	3,527	4,291	4,621	5,281	5,941
Baggage Service Office	SF	982	846	1,030	1,109	1,267	1,426
Claim Lobby							
Claim Floor Area	SF	7,045	6,146	7,478	8,053	9,203	10,354
Circulation Area	SF	6,164	4,803	5,843	6,293	7,192	8,091
CONCOURSE FACILITIES							
Passenger Holdrooms							
Gates		10	10	10	11	12	13
Holdroom Area	SF	24,602	15,000	15,000	17,600	21,600	24,700
Concourse Circulation							
Circulation Area	SF	35,202	22,000	26,300	28,300	32,300	36,400
PUBLIC SPACES							
Restrooms							
Area	SF	3,578	2,745	3,284	3,536	4,041	4,546
Concessions							
Food & Beverage	SF	16,336	12,659	14,570	15,152	17,820	20,250
Retail/Office	SF	4,274	5,064	5,828	6,061	7,128	8,100
Rental Car							
Counter Frontage	LF	75	60	70	75	86	97
Counter and Office Area	SF	2,000	1,500	1,800	1,900	2,200	2,400
Counter Queuing Area	SF	3,620	2,700	3,150	3,600	4,050	4,500
Airport Administration							
Administration/Operations	SF	8,514	7,745	8,284	8,536	9,041	9,546
Conference Center	SF	600	600	600	600	600	600
FUNCTIONAL AREA TOTAL							
Total Programmed Functional Area	SF	241,216	156,773	179,355	192,941	219,365	249,598
BUILDING SYSTEMS/SUPPORT							
Mechanical/HVAC	SF	15,386	12,542	14,348	15,435	17,549	19,968
General Circulation/Stairwells/Storage	SF	26,638	26,651	30,490	32,860	37,292	42,432
TOTAL TERMINAL							
Gross Building Area	SF	294,354	195,966	224,124	241,177	274,206	311,997

Exhibit 4J

TABLE 4J Level of Service Standards (IATA) Portland International Jetport								
AREA PER OCCUPANT								
Level of Service Standards	A	B	C+	C	C-	D	E	F
	Ft^2	Ft^2	Ft^2	Ft^2	Ft^2	Ft^2	Ft^2	Ft^2
Check-in Queue Area	19.4	17.2	16.1	15.1	14.0	12.9	10.8	-
Wait/Circulate	29.1	24.8	22.6	20.4	18.3	16.1	12.8	-
Hold Room	15.1	13.5	12.8	12.0	11.3	10.5	8.0	-
Bag Claim Area (excl. claim device)	21.5	19.4	18.3	17.2	16.1	15.1	12.9	-
Federal Inspection Services	15.1	12.9	11.8	10.8	9.7	8.6	6.5	-

A – Excellent levels of service; conditions of free flow; excellent level of comfort.
B – High level of service; condition of stable flow; very few delays; high level of comfort.
C – Good level of service; condition of stable flow; acceptable delay; good level of comfort.
D – Adequate level of service; condition of unstable flow; acceptable delays for short periods of time; adequate level of comfort.
E – Inadequate level of service; condition of unstable flow; unacceptable delays; inadequate levels of comfort.
F – Unacceptable levels of service; conditions of cross flows, system breakdown and unacceptable delays; unacceptable levels of comfort. Applies to areas below LOS E.

Departures Processing

The first destination for most enplaning passengers in the terminal building is the ticket counters. The ticketing area includes the counters, queuing area and lobby, the ticket offices, and bag screening and processing.

Ticket Counters - The percentage of the departing passenger peak hour demand that checks in at the ticket lobby is estimated at 85 percent. The remainder are assumed to check in prior to arriving at the Jetport and do not have checked baggage. The capacity at the ticket counters was calculated based on the passenger processing rate derived from observation and IATA averages.

Ticket Lobby - The adequacy of the ticket lobby floor area is also evaluated to determine whether demand levels result in an acceptable level of service. The ticket lobby demand included a percentage of well-wishers in addition to the passengers. Industry standards assume that some passengers enter the queue with their friends or family for assistance. The evaluation was based on a service goal of a 2.5-minute maximum wait in queue and an LOS C+ of 16.1 square feet per person in queue with baggage.

Public Area - The public area is typically the space between the ticketing lobby and the security screening area. This space is utilized both by departing and arriving passengers, meeters/greeters, and well-wishers. For the Jetport, the meters/greeters are typically found at the east end of the building as arriving passengers depart the secure area away from ticketing. Public area includes the area east of ticketing to the restaurant adjacent to the arriving passenger area.

Bag Screening and Processing – The Transportation Security Administration (TSA) must inspect every checked bag that is to be put on an aircraft. The current system at the Jetport involves an in-line system whereby the bags pass behind the ticket counter wall to a mechanical conveyor system which routes the bag through security screening devices. Once screening is complete, the bag is transferred to each airline's outbound baggage areas.

Passenger Security Screening - The required queuing area for the checkpoint was determined using an area of 16.1 square feet per person at a level of service LOS C+. Across the country, TSA is making efforts to help streamline the screening process. Efforts are being made to provide staff during peak periods, install new equipment, and open pre-check lanes. The current seven security lines with four security machines will likely be adequate for the intermediate term enplanements; however, additional security positions could be required by the long term during peak conditions.

Arrivals Processing

The passenger arrivals process consists primarily of those facilities and functions that provide means to reunite the arriving passenger with items that were checked at the origin of the flight.

Baggage Claim - It is estimated that 70 percent of arriving peak hour passengers claim checked baggage. The remaining 30 percent of the passengers bypass the baggage claim areas and go directly to the curb or to other ground transportation related facilities. An industry standard of 1.3 checked bags per passenger is utilized. The baggage claim capacity is based on the device frontage per person.

Claim Lobby - The lobby area adjacent to the baggage claim device includes space from the edge of the claim device to the wall next to the rental car counters. Passengers often view this as the outer boundary of the claim area. With the LOS C+ area of 18.3 square feet per person, the demand for baggage claim lobby currently exceeds capacity. If baggage claim circulation requirements at the Jetport are designed to lower standards (approximately 11 square feet per occupant), the baggage claim circulation area may be considered to operate below existing capacity, but only during arrival peaks.

Concourses

The concourses consist primarily of the public circulation spaces and secure passenger holdrooms. While holdrooms and circulation are calculated separately, it is common for actual usage to include both of these elements. For example, while passengers are waiting, they will typically disperse throughout the secure concourse. As it gets closer to boarding time, passengers tend to gather in the gate area. As a result, it is common to consider holdroom and concourse capacity in aggregate.

Holdrooms - The holdroom capacity is based upon available seats for the design aircraft for each gate and average load factor at the Airport. Podium space and queuing/exit space is also considered. Holdroom spaces are adequate for current gate numbers; however, additional holdrooms would be necessary if gates were to be added.

Circulation – The holdrooms are located at either end of the terminal, and concourse circulation is located between the two holdroom areas. The circulation requirement is based upon providing circulation at 22.6 square feet per occupant. The concourse circulation area demand exceeds available capacity currently.

Public Spaces

Public spaces include restrooms, concessions, and rental car facilities.

Restrooms - Restrooms in the terminal are located in four locations on the first floor, at two locations in the secured passenger area, and near the administrative offices. Restroom capacity is calculated based on square footage per peak hour passenger, as provided in FAA Advisory Circular 150/5360-13, *Planning and Design Guidelines for Airport Terminal Facilities*.

Concessions and Retail - While planning standards and demand are an important consideration in the adequacy of concessions in a terminal, there are marketing considerations that determine the capacity and economic viability of airport food/beverage services and retail concessions. Concessions are available on both the secure and non-secure sides of the terminal, and retail is available only on the secure side.

Rental Car - Rental car space planning is estimated based upon design hour passengers. The rental car counter operations, counter, and lobby area are all located on the lower level of the parking garage structure. The facility provides a stand-alone space separate from the main terminal building.

Administrative Spaces - Often airport administrative offices are located within an airport terminal building. At the Jetport, the administration occupies space on the second floor. By industry standards, the administrative offices are properly sized.

Net Terminal Building Requirements

The bottom of **Exhibit 4J** depicts the space requirements for the building systems and support and then sums the gross building area. This includes mechanical and heating and air conditioning (HVAC), as well as general circulation, stairwells, and miscellaneous storage areas. These were estimated at 25 percent of the total functional areas in the terminal.

The space requirements for the gross terminal building appear to be generally adequate through at least 1.2 million enplanements; however, as has been indicated earlier, there are functional components of the building

The space requirements for the gross terminal building appear to be generally adequate through at least 1.2 million enplanements; however, as has been indicated earlier, there are functional components of the building that could become undersized even though the overall area is provided.

that could become undersized even though the overall area is provided. For future planning consideration, the terminal needs for the 1.35 million enplanement milestone relating the high range enplanement forecasts are also presented.

VEHICLE PARKING

The Jetport's sustainability goal for the Ground Access and Transportation category is "Enhance the efficiency of regional and local access to and from the Jetport with an emphasis on high-occupancy modes of transportation and parking infrastructure that meets the needs of the Jetports users." It is important for the Jetport to provide adequate parking infrastructure for travelers and employees. The needs discussed here could be reduced through the objectives to encourage high-occupancy modes, as well as bicycle and pedestrian options.

Vehicle parking associated with the Jetport includes spaces utilized by passengers, visitors, employees, rental car companies, public transit, and taxis/shuttles. As noted in Chapter One, the existing public parking supply for the Jetport is provided by several lots: the parking structure, surface long term lot, north long term lot, discount lot, and employee lot. The number of spaces offered at each of the parking facilities was previously presented in the Inventory chapter (Table 1D). The short term lots are primarily used for hourly parking by same-day travelers and drop-off and pick-up convenience. The long term lots are primarily used for daily travelers. The existing and long term needed parking supply for the Jetport is shown in **Table 4K**.

TABLE 4K
Airline Terminal Automobile Requirements
Portland International Jetport

FUNCTIONAL ELEMENT	Existing	Current Need	Short Term	Intermediate Term	Long Term
Terminal Curb					
Enplane Curb (ft)	600	599	681	766	995
Deplane Curb (ft)	670	699	795	893	1,161
Total Curb (ft)	**1,270**	**1,299**	**1,476**	**1,659**	**2,157**
Auto Parking					
Short Term Public	180	375	426	437	505
Long Term Public	2,880	2,124	2,413	2,479	2,862
Total Public Parking	**3,060**	**2,498**	**2,839**	**2,916**	**3,367**
Employee	480	422	486	505	594
Rental Car	238	506	575	588	672
Taxi/Shuttle Stand	15	39	44	48	60
Total All Parking	**3,793**	**3,465**	**3,944**	**4,057**	**4,693**

TERMINAL CURB FRONTAGE

The terminal curb element is the direct interface between the terminal building and the ground transportation system. The length of the curb available for loading and unloading passengers and baggage is determined by the type and volume of ground vehicles anticipated during the peak period of the design day. Unloading of private and courtesy vehicles occurs adjacent to the ticketing area, while loading of private vehicles and taxis takes place on the curb adjacent to baggage claim. The total length of available turnout space allotted for curbside unloading/loading, queuing, or vehicle staging is approximately 1,270 feet. **Table 4K** presents the terminal curb capacity and requirements. Based upon projected enplanement levels and associated peaking conditions, the terminal curb could need to be expanded to meet demand. It should be noted, however, that the calculation may not adequately address the situation at the Jetport, where a high number of itinerant (seasonal) travelers utilize rental cars. These travelers will not require curb services and instead will utilize rental car facilities for arrival and departure.

AIR CARGO REQUIREMENTS

The primary cargo-related facilities requiring analysis include the cargo apron, sort building space, and landside staging area (delivery truck and vehicle parking). The current air cargo facilities at the Jetport are located east of Runway 18-36 on the northwest corner of the FSDO ramp. The facilities include a 16,500 square-foot sort/warehouse building, 16,900 square yards of total aircraft apron space, and 7,325 square yards of landside staging and parking space.

The cargo apron area requirements are based on the current and projected aircraft type to be utilized in air cargo service at the Jetport. As presented in the Forecasts chapter, no significant change from the current use of the Boeing 757-200 and Cessna Caravan type of aircraft is anticipated; however, the Boeing 757 could be replaced by a larger aircraft such as the Airbus A300 or A310, which currently occurs on occasion, or two smaller jet aircraft.

Estimates of the appropriate size of an air cargo sort facility are based upon national industry standards and range between 1.0 and 2.5 square feet per total tonnage shipped. As a rule, 1.0 square foot per ton typically indicates that the facility is more efficiently utilized, and 2.0 square feet per ton typically indicates that the facility has some capacity for near-term growth. Based on current building size and cargo shipped in 2013, the Jetport cargo building maintains a 1.35 building utilization rate, including warehousing and support spaces. Future space requirements were calculated by multiplying the projected tons shipped by a 1.5 utilization rate (1.25 warehouse rate + 0.25 support area rate). Based upon this space calculation, the building will need to be enlarged by 7,350 feet by the long term to meet industry utilization standards.

Cargo apron requirements are primarily based on the type and amount of aircraft utilizing the ramp. The apron should also provide for circulation of aircraft and ground support equipment (GSE). At the Jetport, FedEx is the only air cargo operator. FedEx currently utilizes a Boeing 757 (ADG IV) aircraft and four Cessna Caravan (ADG II) aircraft for its operations. The current apron design allows the Boeing 757 to turn nose in to the building directly off of Taxiway G. As a result, no circulation space factor is required for the large cargo parking where two spaces are currently available and only one used. The four turboprop spaces, however, require circulation. As indicated in **Table 4L**, the current apron space is sufficient to meet existing operations until the long term, which assumed the addition of another large aircraft in ADG III such as a Boeing 737/Airbus 320.

To accommodate the loading and unloading of aircraft, additional space on the landside is necessary for the movement of delivery trucks and equipment. This space is called the staging area and is estimated at three times the forecast building size. Approximately 625 square yards of staging area could be needed to meet the projected long term demand. **Table 4L** presents the requirements needed to fully accommodate air cargo activity at the Jetport.

TABLE 4L
Air Cargo Requirements
Portland International Jetport

Period	2014	Short Term	Intermediate Term	Long Term
Cargo Building Area Requirements (in square feet)				
Total Cargo (in tons)	12,261	13,500	14,200	15,900
Warehouse Area	13,434	16,875	17,750	19,875
Support Area	3,065	3,375	3,550	3,975
Total Building Required	*16,500*	*20,250*	*21,300*	*23,850*
Building Area Currently Available	16,500	16,500	16,500	16,500
Surplus/(Deficit)	*0*	*(3,750)*	*(4,800)*	*(7,350)*
Cargo Apron Requirements (in square yards)				
ADG II Aircraft	5,400	5,400	5,400	5,400
ADG III Aircraft	0	0	0	6,000
ADG IV Aircraft	5,100	5,100	5,100	5,100
Subtotal	10,500	10,500	10,500	16,500
Ground Support Equipment	1,050	1,050	1,050	1,650
Total Apron Space Required	*11,550*	*11,550*	*11,550*	*18,150*
Total Apron Currently Available	16,900	16,900	16,900	16,900
Surplus/(Deficit)	*5,350*	*5,350*	*5,350*	*(1,250)*
Landside Space (in square yards)				
Staging/Parking Required	*5,500*	*6,750*	*7,100*	*7,950*
Staging Area Currently Available	7,325	7,325	7,325	7,325
Surplus/(Deficit)	*1,825*	*575*	*225*	*(625)*

Source: Coffman Associates Analysis

GENERAL AVIATION FACILITIES

General aviation facilities are those necessary to accommodate airport activity by all aviation segments except commercial passenger service. This includes recreational flying, business aviation, charter, military, and some portions of air cargo and air ambulance activity. These airport users require a variety of services, such as fueling, terminal services, maintenance, and aircraft storage. The primary components considered for general aviation needs include:

- Aircraft Hangars
- Aircraft Parking Aprons
- General Aviation Terminal Building Services
- Auto Parking and Access

The future need for each of these components has been analyzed based on the aviation demand forecasts.

AIRCRAFT HANGARS

Utilization of hangar space varies as a function of local climate, security, and owner preferences. The trend in general aviation, whether single or multi-engine aircraft, is toward more sophisticated aircraft (and, consequently, more expensive aircraft); therefore, many aircraft owners prefer enclosed hangar space to outside tie-downs. This is especially true in the Portland region because of the corrosive nature of the frequent marine layers.

The demand for aircraft storage hangars is dependent upon the number and type of aircraft expected to be based at an airport in the future; however, hangar construction should be based upon actual demand trends and financial investment conditions. While a majority of aircraft owners prefer enclosed aircraft storage, a number of based aircraft owners may still tie-down outside (due to the lack of hangar availability, hangar rental rates, and/or operational needs). Therefore, enclosed hangar facilities do not necessarily need to be planned for each based aircraft. For planning purposes, 70 percent of based aircraft are considered to be stored in a hangar at current. Future planning considers a higher figure of 80 percent of based aircraft to be in a hangar by the end of the long term planning period.

> ***Hangar construction should be based upon actual demand trends and financial investment conditions.***

There are three general types of aircraft storage hangars: T-hangars, box hangars, and conventional hangars. T-hangars are similar in size and will typically house a single engine piston-powered aircraft. Some multi-engine aircraft owners may elect to utilize these facilities as well. There are typically many T-hangar units “nested” within a single structure. There are currently no T-hangars located on the Jetport.

Box hangars are open-space facilities with no interfering supporting structure. Box hangars can vary in size and can either be attached to others or be stand-alone hangars. Typically, box hangars will house larger multi-engine, turboprop, or jet aircraft. Conventional hangars are the familiar large hangars with open floor plans that can store several aircraft. All hangars at the Jetport are functional conventional box hangars which vary in size with the exception of the round hangar on the FSDO ramp. Several hangars also have attached office spaces.

Table 4M and **Exhibit 4K** present aircraft storage needs based on the demand forecasts. Assumptions have not been made of which type of hangars would be desired; rather, a general calculation of total projected hangar space has been made. The analysis utilizes a planning standard of 1,700 square feet per aircraft to be hangared as a means to account for the differential in sizes between small piston and larger turbine aircraft.

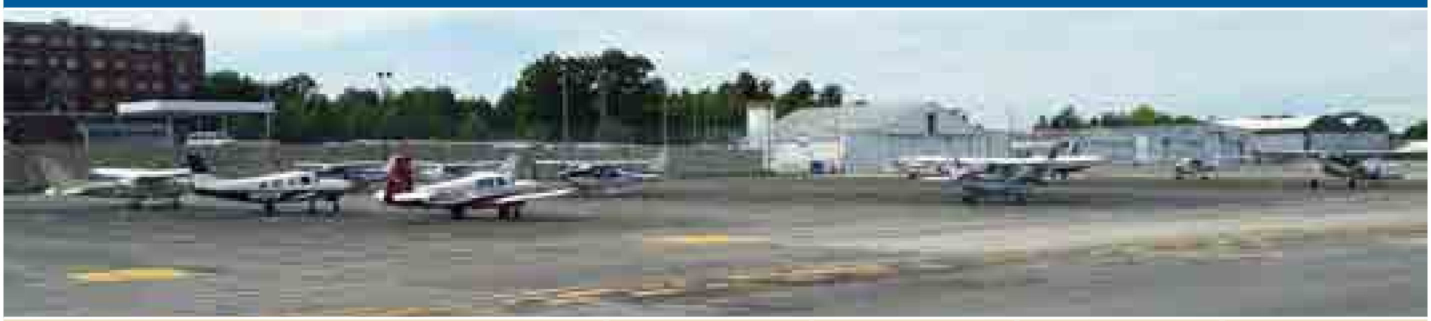
	Available	Short Term Need	Intermediate Term Need	Long Term Need
AIRCRAFT STORAGE				
				
Hangar Storage Area (s.f)	79,300	68,000	79,900	103,700
Maintenance Area (s.f.)	18,800	13,600	15,980	20,740
Total Hangar Area (s.f.)	**98,100**	**81,600**	**95,880**	**124,440**
AIRCRAFT APRON				
				
Single, Multi-engine Transient Aircraft Positions	20	12	13	16
Apron Area (s.y.)	16,000	9,600	10,400	12,800
Transient Business Jet Positions	10	17	19	24
Apron Area (s.y.)	16,000	27,200	30,400	38,400
Locally-Based Aircraft Positions	50	21	20	20
Apron Area (s.y.)	48,000	21,000	20,000	20,000
Total Positions	**80**	**50**	**52**	**60**
Total Apron Area (s.y.)	**80,000**	**57,800**	**60,800**	**71,200**
GA SERVICES				
				
GA Building Space (s.f.)	12,000	8,640	9,690	13,200
GA Itinerant Auto Parking Spaces	200	127	142	194
Local GA Auto Spaces		28	31	38
Total GA Auto Parking Spaces	**200**	**155**	**173**	**232**
Total Parking Area (s.f.)	**65,700**	**48,825**	**54,495**	**73,080**

Exhibit 4K

SUMMARY OF GENERAL AVIATION REQUIREMENTS

TABLE 4M
Hangar Storage Needs
Portland International Jetport

	Current Supply	Short Term	Intermediate Term	Long Term	Long Term Need
Based Aircraft	50	56	62	76	
Aircraft Hangar Spaces	35	40	47	61	26
Hangar Storage Area Needs (s.f.)	79,300	68,000	79,900	103,700	24,400
Maintenance Hangar Area (s.f.)	18,800	13,600	15,980	20,740	1,940
Total Storage Area (s.f.)	**98,100**	**81,600**	**95,880**	**124,440**	26,340

Source: Coffman Associates analysis.

It is estimated that there is a current total of 98,100 square feet of hangar storage space which includes 18,800 square feet of maintenance area. Hangar requirements are general in nature and are based on standard hangar size estimates and typical user preferences. If a private developer desires to construct or lease a large hangar to house one plane, any extra space in that hangar may not be available for other aircraft. The actual hangar area needs will be dependent on the usage within each hangar.

GENERAL AVIATION AIRCRAFT APRON

A general aviation aircraft apron is an expanse of paved area intended for aircraft parking and circulation. Typically, a main apron is centrally located near the airside entry point, such as the terminal building or FBO facility. Ideally, the main apron is large enough to accommodate transient airport users, as well as a portion of locally based aircraft. Often, smaller aprons are available adjacent to FBO hangars and at other locations around an airport. An aircraft parking apron should provide space for the number of locally based aircraft that are not stored in hangars, transient aircraft, and for maintenance activity. The apron layout at the Airport follows this typical pattern.

The Jetport offers two areas for general aviation aircraft apron space: the north general aviation ramp and the FSDO ramp. Both ramp areas are used for based aircraft and itinerant aircraft parking and tie-down. The north general aviation ramp offers approximately 66,000 square yards of total space and is marked with 62 tie-down positions. The FSDO ramp is not marked for tie-downs but offers a total of 14,000 square yards of apron space in four separate locations.

The Jetport offers two areas for general aviation aircraft apron space: the north general aviation ramp and the FSDO ramp.

FAA AC 150/5300-13A, *Airport Design*, suggests a methodology by which transient apron requirements can be determined from knowledge of busy-day operations. At the Jetport, the number of itinerant spaces required is estimated at 13 percent of the busy-day itinerant general aviation operations plus an average day of other air taxi operations. Of this total, approximately 60 percent are assumed for business jets and turboprop aircraft. The remaining 40 percent are for transient piston aircraft.

A planning criterion of 800 square yards per aircraft was applied to determine future transient apron area requirements for single and multi-engine piston aircraft. For turboprops and business jets (which can be much larger), a planning criterion of 1,600 square yards per aircraft was used. By the long term planning period, approximately 51,200 square yards of itinerant apron is estimated to be needed.

Local aircraft tie-down needs are derived from the estimated number of based aircraft which will tie-down, plus an additional ten spaces. The additional spaces allow for an unexpected influx of aircraft or, more typically, for the temporary movement of aircraft into and out of hangars. Approximately 50 local positions are available; thus, local tie-down positions are adequate through the long term.

While the Airport has adequate apron area to accommodate local and transient activity, new development may require additional apron area based on business needs. **Table 4N** and **Exhibit 4K** present the calculated aircraft apron needs for the Airport.

TABLE 4N
Aircraft Apron Requirements
Portland International Jetport

		FORECAST		
	Currently Available (Est)	**Short Term**	**Intermediate Term**	**Long Term**
Local Apron Positions	50	21	20	20
Local Apron Area (s.y.)	48,000	21,000	20,000	20,000
Transient Apron Positions				
Piston	20	12	13	16
Business Jet and Turboprop	10	17	19	24
Total Transient Positions	30	29	32	40
Transient Apron Area (s.y.)				
Piston	16,000	9,600	10,400	12,800
Business Jet	16,000	27,200	30,400	38,400
Total Transient Apron Area (s.y.)	32,000	36,800	40,800	51,200
Total Apron Area (s.y)	80,000	57,800	60,800	71,200

Source: Coffman Associates analysis

GENERAL AVIATION TERMINAL SERVICES

The general aviation facilities at the Jetport are often the first impression of the community that corporate officials and other visitors will encounter. General aviation terminal facilities at an airport provide space for passenger waiting, pilots' lounge, pilot flight planning, concessions, management, storage, and various other needs. This space is not necessarily limited to a single, separate terminal building, but can include space offered by fixed base operators (FBOs) and other specialty operators for these functions and services. This is the case at the Jetport, as general aviation terminal space is currently provided by both airport FBOs. The commercial passenger terminal building also provides additional elements, such as a restaurant and restrooms if the itinerant passengers so choose to shuttle over to the terminal for those services. It is estimated that there is approximately 13,000 square feet of general aviation terminal service space available at the Jetport.

The methodology used in estimating general aviation terminal facility needs was based upon the number of people expected to utilize general aviation facilities during the design hour. Space requirements for terminal facilities were based on providing 150 square feet per design hour itinerant passenger. **Table 4P** outlines the space requirements for general aviation terminal services at the Jetport. As shown in the table, up to 13,200 square feet of space could be needed by the long term for general aviation passengers. The combination of space provided by the FBOs and the commercial passenger building is slightly below the projected demand for general aviation terminal building space. Since general aviation terminal services are provided by the FBOs primarily, it will be their business decision to expand facilities as needed.

TABLE 4P
General Aviation Terminal Area Facilities
Portland International Jetport

	Existing	Short Term	Intermediate Term	Long Term
Design Hour Itinerant Operations	15	18	19	22
Multiplier	3	3.2	3.4	4
Total Design Hour Itinerant Passengers	45	57.6	64.6	88
Terminal Building Public Space (s.f.)	12,000[1]	8,640	9,690	13,200

[1]Estimate includes FBO/ SASO and certain services at the terminal building.
Source: Coffman Associates analysis

GENERAL AVIATION VEHICLE PARKING AND ACCESS

General aviation parking needs are attributable to transient airport users, locally based users, and aviation businesses. (General aviation parking needs do not include parking needs for those working in the terminal building, which were projected in Chapter Three.) Transient users include visitors and employees. Locally based users primarily include those attending to their based aircraft. Airport businesses need parking to accommodate employees and customers. (Airport business parking needs should be based on the needs of the individual business and are not specifically included in this analysis.)

A planning standard of 3.0 times the design hour itinerant passenger count provides the minimum number of vehicle spaces needed for transient users. The multiplier, which represents an average number of passengers on a general aviation aircraft, is expected to increase to 4.0 by the long term. Locally based parking spaces are calculated as one-half the number of based aircraft. A planning standard of 315 square feet per space is utilized to determine total vehicle parking area necessary, which includes area needed for circulation and handicap clearances. Parking requirements for general aviation activities at the Jetport are summarized in **Table 4Q**.

TABLE 4Q
General Aviation Terminal Area Facilities
Portland International Jetport

	Existing	Short Term	Intermediate Term	Long Term
Design Hour Itinerant Operations	15	18	19	22
Multiplier	3.0	3.2	3.4	4.0
Total Design Hour Itinerant Passengers	45.0	57.6	64.6	88.0
Local Based GA Auto Parking Spaces	200	28	31	38
Itinerant GA Auto Parking Spaces		127	142	194
Total GA Auto Parking Spaces		155	173	232
Total GA Parking Area (s.f.)	65,700[1]	48,825	54,495	73,080

[1]Estimate includes FBO/SASO and other parking areas adjacent to GA facilities.
Source: Coffman Associates analysis

AIRPORT SUPPORT REQUIREMENTS

Various facilities that do not logically fall within classifications of airside or landside facilities have also been identified. These other areas provide certain support functions related to the overall operation of the airport.

AIRCRAFT RESCUE AND FIREFIGHTING (ARFF) FACILITIES

Part 139 airports, including the Jetport, are required to provide aircraft rescue and firefighting (ARFF) services during commercial air carrier operations. A fleet of ARFF vehicles are maintained at the Jetport to respond to airport emergencies. Current equipment and firefighting agents meet ARFF Index B as required. The ARFF Index level is anticipated to possibly change to Index C at some point in the planning period which is the requirement to meet aircraft with five or more daily departures having a length of 126 feet but less than 159 feet. A representative aircraft could include the Boeing 737-800/900/MAX and Airbus 321 which could be used in future scheduled airline service. If the transition to ARFF Index C is required, another ARFF 1,500-gallon water/AFFF fire suppression system vehicle:

- without a complementary agent,
- with a complementary 450 or 500 pound (lb.) Dry Chemical only,
- with a complementary 460 (lb.) Halogenated Agent only,
- with a complementary 450 or 500 (lb.) Dry Chemical and 460 lb Halogenated Agent.

Also, as any rescue vehicles approach the end of their useful life, they should be replaced in a timely manner

SNOW REMOVAL EQUIPMENT

The Portland area commonly experiences snowfall during the winter months, with an average of 69.0 inches annually. Generally, snowfall can be expected from December through March. The heaviest snow typically falls in January. As a result, an evaluation of the snow removal equipment (SRE) and storage is in order.

The FAA Advisory Circular (AC) 5200-30A, *Airport Winter Safety and Operations*, provides general guidance for snow clearance for commercial service airports. According to the AC, "commercial service airports should have sufficient equipment to clear one inch of snow weighing up to 25 pounds per cubic foot from the primary instrument runway, one or two principal taxiways to the ramp area, emergency or firefighter access roads, and sufficient ramp area to accommodate anticipated aircraft operations." The time that one inch of snow should be cleared is based on the number of annual operations for the airport. The Jetport is in the highest category of over 40,000 annual operations, so the clearance time requirement is one-half hour.

The minimum snow clearance area required for the Jetport would include Runway 11-29, Taxiway A, the terminal ramp, and access to the ARFF facility. Adherence to the snow removal plan constitutes approximately 2.6 million square feet of pavement to be cleared. Assuming a density of 25 pounds per cubic foot, this translates to a requirement to clear nearly 7,900 tons per hour. The current Snow and Ice Control Plan included in the Jetport's Airport Certification Manual (ACM) prioritizes snow removal from paved surfaces as follows:

Level 1:
- Runway 11-29
- Taxiways A, F, and G
- Runway 18-36 between Runway 11-29 and Taxiway A
- Portions of the terminal ramp to allow for airline operations
- Taxiway C between the North GA ramp and Taxiway A
- ARFF access roads and gates
- NAVAID critical areas

Level 2:
- Taxiway C between Taxiway A and Runway 11-29
- Taxiways B, D, E, and J
- Taxiway C north of the North GA ramp and south of Runway 11-29
- Runway 18-36

Level 3:
- General clean up/remaining ramps and access roads

The plan indicates that SRE activities will begin prior to or at the accumulation of the first ½-inch of wet snow/slush or one inch of loose snow. Sand and/or chemical will be applied prior to anticipated icing conditions when possible or upon the onset of any icing condition as it occurs.

As shown previously in Table 1G, the airport currently owns four snow blowers with a combined capacity of 10,800 tons per hour. These snow blowers are supplemented with rotary brooms, liquid and dry spreaders, and plows. The current equipment is more than capable of clearing the required area in the timeframe set forth by the FAA. Snow removal equipment is stored in the airport's maintenance facility. This building is adequate for the parking and maintenance of the existing snow removal equipment.

AIRCRAFT DEICING RECYCLING FACILITY

The existing spent aircraft deicing fluid recycling facility is state-of-the-art. Now operating at capacity, it has numerous 20,000-gallon temporary storage tanks, and operates with outside distillation equipment. On-site recycling lessens the environmental impact that glycol has on the adjacent Fore River and its tributaries, contributing to both the Water Quality and Waste Management and Recycling sustainability categories. Efforts to bring in fluids to be recycled from other facilities and airports have been successful in reducing overall costs to the Jetport. A facility upgrade is needed to improve treatment capability, replace horizontal temporary storage tanks with smaller footprint vertical tanks of equal capacity, and get equipment inside and out of the elements. Inland Technologies currently operates the deicing fluid recycling facility at the Jetport and has determined an additional 5,000 square-foot building is required to meet these needs. A delivery truck turnaround is also recommended to eliminate the need for fluid transport trucks to back into the site from Jetport Boulevard.

Efforts to bring in fluids to be recycled from other facilities and airports have been successful in reducing overall costs to PWM.

AIRCRAFT DEICING PAD/AREA

Currently, there is a morning push back of approximately five aircraft at PWM, and a deicing pad capable of deicing two A320 aircraft simultaneously. This causes a waiting period for aircraft during more significant winter weather. As with airfield capacity, these delays increase aircraft fuel consumption, and thereby energy use and GHG emissions. There is a need for an additional aircraft deicing pad or area capacity. In later chapters of this SAMP, options for additional deicing positions will be evaluated. Included in the options will be the potential to deice at the gate or to construct a new deicing pad.

There is a need for an additional aircraft deicing pad or area capacity.

FUEL STORAGE

As discussed in Chapter One – Inventory, fuel sales and delivery to aircraft is managed by the FBOs on the Jetport. There is a total capacity of 62,000 gallons of storage capacity for Jet A fuel and 20,000 for 100 low-lead (avgas).

Additional fuel storage capacity should be planned when the Jetport is unable to maintain an adequate supply and reserve. While each FBO determines their own requirements, a 14-day reserve is common for avgas and a seven-day supply is common for Jet A. When additional capacity is needed, it should be planned in 10,000- to 12,000-gallon increments, which can accommodate common fuel tanker trucks that typically have an 8,000-gallon capacity. Fuel storage requirements can vary based upon individual supplier and distributor policies. For this reason, fuel storage requirements will be dependent upon the individual distributors.

At the time this analysis was prepared, Northeast Air (NEA) provided all aircraft fueling services on the airport. NEA indicated the current fuel storage facilities are adequate for more than the two-week supply for 100 avgas. Jet A fuel storage capacity, however, could accommodate only a three-day supply based on current operational needs. Fuel is provided to NEA by a supplier in South Portland whereas a 10,000gallon delivery can be provided in as little as a few hours. As such, NEA indicates current fuel storage is adequate to meet current demand.

It will be incumbent upon the City to provide alternative locations for new and/or consolidated fuel facilities if needed.

It will be incumbent upon the City to provide alternative locations for new and/or consolidated fuel facilities if needed. This is especially true if the airport were to be served by another FBO with a desire to retail fuel. As such, analysis in the next chapter will consider options for larger and/or consolidated fuel facilities.

AIRPORT MAINTENANCE FACILITIES

The airport maintenance facilities are located at the east end of Taxiway G near the Jetport's eastern border with the Fore River. Airport maintenance equipment storage and operations are conducted from a 33,000 square-foot building. An adjacent 5,600 square-foot building provides for the storage of sand/salt.

Future expansion of these facilities will be a function of airport management needs. The alternatives analysis will focus on retaining the airport maintenance facilities in this area to the extent possible as it is segregated from other airfield uses, is in a remote area of the airport that cannot be used for aviation-related activities, and provides an area to accommodate limited growth. Next to the passenger terminal, the maintenance building is the largest building that the Jetport directly controls. Practices to conserve energy consumption and reduce GHG emissions and waste should be considered with improvements and updates to the facility.

The light vault is located in a structure on the east side of the airport near the airport's maintenance facility. It is in good working order and should be maintained through the planning period.

PERIMETER FENCING

Perimeter fencing is used at airports primarily to secure the aircraft operational area. The physical barrier of perimeter fencing provides the following functions:

- Gives notice of the legal boundary of the outermost limits of a facility or security-sensitive area.
- Assists in controlling and screening authorized entries into a secured area by deterring entry elsewhere along the boundary.
- Supports surveillance, detection, assessment, and other security functions by providing a zone for installing intrusion-detection equipment and closed-circuit television (CCTV).
- Deters casual intruders from penetrating a secured area by presenting a barrier that requires an overt action to enter.
- Demonstrates the intent of an intruder by their overt action of gaining entry.
- Causes a delay to obtain access to a facility, thereby increasing the possibility of detection.
- Creates a psychological deterrent.
- Optimizes the use of security personnel while enhancing the capabilities for detection and apprehension of unauthorized individuals.
- Demonstrates a corporate concern for facility security.
- Limits inadvertent access to the aircraft operations area by wildlife.

The Jetport is served by perimeter fencing that meets standards for Part 139 airports. The fencing serves to provide both operational security as well as a deterrent to wildlife accessing the airfield movement areas. The fencing should be maintained through the planning period.

The Jetport is served by perimeter fencing that meets standards for Part 139 airports.

INTERIOR ACCESS

Service roads are typically used to segregate vehicles from aircraft operational areas and to provide access to the airfield for authorized users. At the Jetport, a paved perimeter road has been developed around nearly the entire airfield. The road extends west from the main terminal ramp around Runway 11 then east and southeast around Runways 36 and 29 and then turns north to the FSDO ramp. Another section of perimeter road extends from the FedEx air cargo feeder ramp area to the east side of Runway 18. Taxiway C and marked auto drive lanes on the north general aviation ramp are utilized for perimeter on-airport access between the main terminal ramp and the west side of Runway 18.

The segregation of vehicle and aircraft operational areas is supported by the FAA, and it is recommended that an airport operator limits vehicle operations on the movement areas of an airport to only those vehicles necessary to support the operational activity of an airport. Paved perimeter access roads and segregated and marked driving lanes on aircraft aprons should be maintained through the planning period.

SUMMARY

This chapter has outlined the facilities required to meet potential aviation demands projected for the Jetport for the next 20 years. It has also established the Goals and Objectives for the six sustainability focus categories. The next chapter, ***Chapter Five - Alternatives***, examines potential improvements to the airfield system and the landside area, as well as potential sustainability initiatives for the airport. Most of the discussion focuses on those capital improvements that would be eligible for federal grant funds. Other projects of local concern also are presented on a limited basis. Several facility layouts that meet the forecast demands over the next 20 years are presented in Chapter Five, and an overall ALP that presents a long term vision will ultimately be developed.

The next chapter, Chapter Five - Alternatives, examines potential improvements to the airfield system and the landside area.

CHAPTER FIVE

AIRPORT DEVELOPMENT ALTERNATIVES



SUSTAINABLE AIRPORT MASTER PLAN

CHAPTER FIVE

AIRPORT DEVELOPMENT ALTERNATIVES

In the previous chapter, airside and landside facilities required to satisfy the projected demand through the long-range planning period were identified. The next step in the planning process is to identify and discuss alternatives for meeting the needs of airport users as well as the strategic vision of the airport sponsor. There is a wide variety of potential development options, so this chapter provides an organized approach to identifying and discussing reasonable alternative development options. The alternatives should be considered unconstrained, meaning reasonable options are first presented and discussed. Factors such as cost and environmental constraints are not weighted heavily at this point as the goal of this chapter is to identify a viable set of alternatives. The alternatives will ultimately be evaluated using a variety of criteria (discussed below) to arrive at a recommended concept, which will be presented in the next chapter.

The key elements of this planning process are: (1) identification of alternative ways to address previously identified facility requirements; (2) evaluation of the alternatives, individually and collectively, so that planners gain a thorough understanding of the strengths, weaknesses, and other implications of each; and (3) selection of the recommended alternative. It is important to recognize that this chapter must necessarily focus on the facility requirements (including timing) and other considerations, such as the Airport's strategic development objectives, site or environmental considerations, and other factors.

Any development proposed for a Master Plan is evolved from an analysis of projected needs for a set period (i.e., the 20-year forecasts). Though the needs were determined by utilizing industry



accepted statistical methodologies, unforeseen future events could impact the timing of the needs identified. The master planning process attempts to develop a viable concept for meeting the needs resulting from projected demands for the next 20 years. However, no plan of action should be developed which may be inconsistent with the future goals and objectives of the City of Portland and those of airport administration. This chapter presents alternatives that could meet the airport's development needs for demand and FAA design standards, while remaining responsive to environmental, fiscal, and other objectives.

The development alternatives for Portland International Jetport can be categorized into two functional areas: the **airside** (runways, navigational aids, taxiways, etc.) and **landside** (hangars, apron, terminal area, support facilities, and vehicle access). Within each of these areas, specific capabilities and facilities are required or desired. Each functional area interrelates and affects the development potential of the others. Therefore, all areas are examined individually and then coordinated in whole to ensure that the final plan is functional, efficient, and cost-effective.

Not all airside or landside elements will require a detailed alternatives discussion, which is intended to present solutions to specific issues. In some instances, only the do nothing or a specific alternative remain as viable options. For those airside or landside elements where only one "build" solution is reasonable or where no alternative is necessary, an explanatory narrative is provided.

The information presented in the Alternatives chapter will be presented to the Planning Advisory Committee (PAC) and the general public for additional comments and suggestions. The project team will then evaluate the alternatives and incorporate any relevant information to develop a final airport concept to be presented in the next chapter.

AIRPORT DEVELOPMENT OBJECTIVES

It is the goal of this alternatives discussion to produce a balanced development plan to best serve forecast aviation demands. However, before defining and discussing specific alternatives, airport development objectives should be considered. As owner and operator, the City of Portland provides the overall guidance for the operation and development of the Airport. It is of primary concern that the Airport is marketed, developed, and operated for the betterment of the community and its users. With this in mind, the following development objectives have been defined for this planning effort:

It is the goal of this alternatives discussion to produce a balanced development plan to best serve forecast aviation demands.

- Identify sustainability initiatives and improvements;
- Incorporate the sustainability goals and objectives identified within this study process;
- To develop a facility with a focus on self-sufficiency in both operational and developmental cost recovery.

- To develop a safe, efficient, and attractive aviation facility in accordance with applicable federal, state, and local regulations, including best practices for safety and security.
- To conform to the intent of applicable FAA design standards and other appropriate planning guidelines.
- To plan for the highest and best use of airport land.
- To develop a balanced facility that is responsive to the current and long-term needs and forecast growth of all classes of airport users (commercial and general aviation).
- To be reflective and supportive of the long-term planning efforts currently applicable to the region, including appropriate local, regional, and state transportation plans and other applicable plans.
- To provide flexibility to adjust to unforeseen changes.
- To conform to the Jetport's strategic vision.
- To preserve and protect public and private investments in existing airport facilities and reflect the fiscal capabilities of the Jetport in the future.
- To ensure that future development is environmentally compatible and technically feasible.
- To develop a balanced facility that is socially and politically feasible.
- To incorporate a public involvement program and provide for an appropriate level of public involvement.

EVALUATION OF ALTERNATIVES

The alternatives presented in this chapter address possible solutions to specific issues for the Airport.

The alternatives presented in this chapter address possible solutions to specific issues for the Airport. It is the goal to present relatively unconstrained alternatives so that the most reasonable solutions can be discussed. In Chapter Six – Recommended Master Plan Concept, the criteria applied to identify the most reasonable solution will be presented. Evaluation criteria to be utilized to formulate the Recommended Master Plan Concept will be divided into five broad categories: operational performance, airport development objectives, including best planning tenets, sustainability initiatives, environmental factors, and fiscal factors.

(a) Operational Performance: How well the airport functions as a system can be evaluated from several perspectives, including capacity, capability, and efficiency.

Capacity: Test for the feasibility of accommodating future activity levels. Various capacity techniques can be applied to the airside, terminal and ground access elements. Consistent application of the technique to each alternative will allow the planners and public to compare them.

Capability: Test for the capability of meeting specific functional objectives, such as accommodating the design aircraft, providing the required number of aircraft parking positions or gates, etc.

Efficiency: Test how well the alternatives work as a system by examining combined alternative elements.

(b) Airport Development Objectives: The previously presented development objectives will be further considered in the overall evaluation of a recommended concept.

(c) Sustainability Initiatives: This planning effort is analyzing sustainability goals and objectives to formulate proper sustainability initiatives going forward. The initiatives will include operational and capital improvement options.

(d) Environmental Factors: The potential environmental effects of the alternatives are an important consideration. Early consideration of the environmental effects of the alternatives can help ensure that they remain responsive to the overall environmental objectives of the Jetport. The Environmental Inventory, which identifies a variety of environmental considerations, is presented in **Chapter One**.

(e) Fiscal Factors: Cost estimates of the recommended Master Plan concept will be presented in subsequent chapters.

REVIEW OF PREVIOUS PLAN

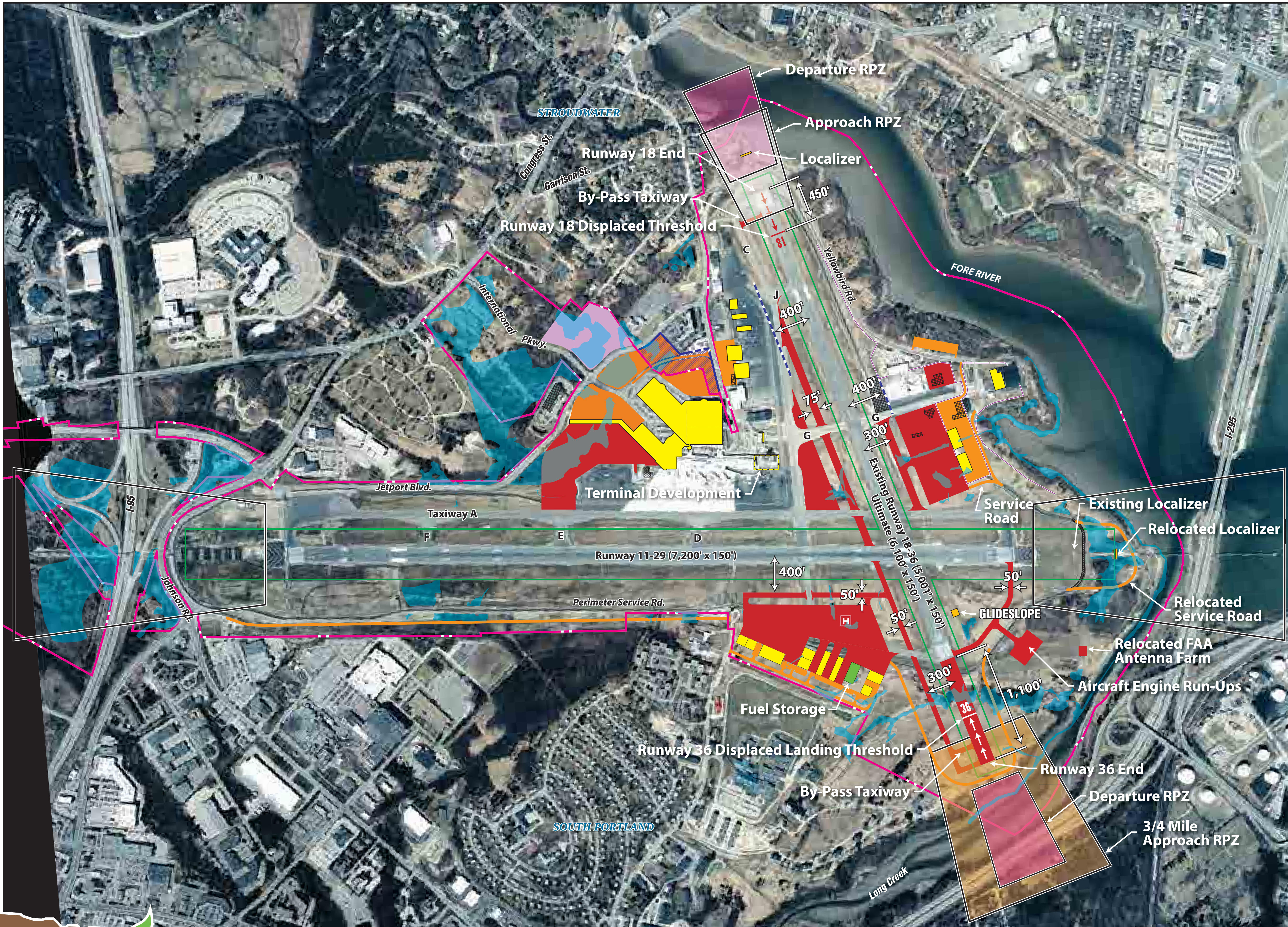
The previous Master Plan for the Airport was completed in 2008. Included as part of this Master Plan is an updated Airport Layout Plan (ALP), which is the technical document used by both the FAA and City of Portland to identify potential capital improvement projects. The ALP can be updated independent of a Master Plan. The ALP for the Jetport has been revised several times since 2008 to reflect airfield and terminal improvements, thus making the previous Master Plan outdated.

The ALP was most recently updated to include the runway safety area (RSA) and extension project on Runway 18-36. **Exhibit 5A** presents the recommended development plan proposed under the previous master plan. Many of the improvements have been made including:

- Northwesterly development of the commercial terminal building;
- Corresponding development of the commercial passenger terminal aircraft apron;
- Development of the commercial terminal automobile parking (surface lots and garage) as demand dictates;
- Southerly extension of Runway 18-36 and Taxiway C to provide for adequate runway safety areas (RSA) on Runway 18-36 without impacting runway length.

As depicted, the plan also includes several items that have not yet been implemented including:

- Straightened parallel Taxiway C;
- Enlarged passenger commercial aircraft apron to the east;
- Addition of hangars in north general aviation area;
- Development of a south general aviation area (some apron has been built and the area is under development lease);



LEGEND

- Existing Airport Property Line
- Ultimate Airport Property Line
- Property Acquisition
- Ultimate Fence
- Aircraft Parking Limit Line
- Wetlands
- Runway Safety Area (RSA)
- Runway Protection Zone (RPZ)
- Ultimate Airfield Pavement
- Building/Pavement to be Removed
- Ultimate Road/Parking
- Ultimate Building
- Airport Business

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

ASDA - Accelerate Stop Distance Available
LDA - Landing Distance Available

Exhibit 5A

PREVIOUS MASTER PLAN RECOMMENDATION

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- Taxiway connector linking Runways 29 and 36;
- Aircraft engine run-up pad; and
- Additional cargo facilities (apron, buildings, and roadway).

The primary objectives of the previous master plan have been completed. The improvements to the passenger terminal complex to provide more functional building space, corresponding aircraft ramp and automobile parking are in use. The most recent significant undertaking was the southerly extension of Runway 18-36 to improve the RSA. Those improvements not yet implemented will again be analyzed in this chapter to review their continued applicability going forward.

NO ACTION/RELOCATION ALTERNATIVES

The City of Portland is charged with managing the Jetport for the economic betterment of the community and region as a whole. In some cases, alternatives may include a No Action option; however, for Portland International Jetport, this would effectively reduce the quality of services being provided to the general public, affect the aviation facility's ability to meet Federal Aviation Administration (FAA) design standards, and potentially affect the region's ability to support commercial and general aviation needs.

The ramifications of a No Action alternative extend into negative impacts on the economic well-being of the region. An analysis of the economic benefits of the Jetport was conducted concurrently with this Master Plan and is included as Appendix H. If facilities are not adequately maintained and improved to meet demand and current standards, or if delays become unacceptable, then it could have an effect on the area's tourism industry as well as the area's ability to continue to develop and grow a diverse economy. The Jetport also serves as a vital link in the overall National Airport System, which is important for both economic development and national security. The No Action alternative is also inconsistent with the long-term goals of the FAA, which are to enhance local and interstate commerce. Therefore, an overall No Action alternative will not be considered further in this Master Plan. It should be noted, however, that a No Action approach can be analyzed with individual alternatives to determine each alternative's value and fitness. This is especially true if only limited options are available. In some cases, the No Action alternative can be more viable than a specific development option.

Likewise, this study will not consider the relocation of services to another airport or development of a new airport site. The development of a new commercial service airport is a very complex and expensive option. A new site will require greater land area, duplication of investment in airport facilities, installation of supporting infrastructure that is already available at the existing site, and greater potential for negative impacts to natural, biological, and cultural resources. Relocating airport services to another airport location, new or existing, would hinder an existing economic asset to the detriment of historical investments and future users. As such, neither option will be considered further.

In this Alternatives chapter, various airport elements will be considered for improvement. One option for each element may be to take no action. The No Action option is then compared to other alternatives. In some cases, the existing condition (No Action option) may be the best option available. While a No Action option for overall airport development is not a viable alternative, the No Action option can be considered against specific individual alternative options. Following review by the PAC, Jetport staff, and the public, a recommended concept will be developed; however, the final decision with regard to pursuing a development plan rests with the City of Portland and the FAA on an individual project basis. The reasons for the selection of the recommended alternative will be clearly documented in Chapter Six – Recommended Development Plan Concept.

PLANNING CONSIDERATIONS

Analysis conducted in the previous chapters indicated that various elements of the Jetport need consideration in this Alternatives chapter. The primary issues to be considered are summarized on **Exhibit 5B**. These issues are the result of the findings of the Aviation Demand Forecasts and Aviation Facility Requirements.

The primary airfield elements considered include:

- Holding position locations and layouts;
- High energy area crossing – Taxiway G;
- Direct apron to runway access – Taxiways D, J and G;
- Taxiway safety and efficiency issues; and
- Runway 29 glideslope antenna location and associated critical area holding position.

The primary commercial passenger terminal building considerations include:

- Development opportunities if needed to include additional gate area and baggage claim;
- Automobile parking development; and
- Federal Inspection Services (FIS) – U.S. Customs services for international passenger traffic.

Other important elements to be considered in the alternatives discussion include:

- Additional deicing pad options;
- Cargo facility growth opportunities; and
- General aviation growth opportunities.

AIRSIDE ISSUES

AIRFIELD GEOMETRY
- Holding Position Location/Layouts
- High Energy Runway Crossing – Taxiway G
- Aircraft Holding Apron/Perimeter Road

TAXIWAY EFFICIENCY
- Parallel Taxiway C
- Parallel Taxiway Options – East Side Runway 18-36

LANDSIDE ISSUES

TERMINAL BUILDING IMPROVEMENT OPTIONS
- Secured Building Space Development Options
- Additional Baggage Claim Options
- Public Parking Options
- FIS Development Options

COMMERCIAL AIRCRAFT APRON
- RON Parking Options
- De-icing Pad Options

GENERAL AVIATION OPTIONS
- North GA Area
- South GA Area

CARGO
- Cargo Facilities Additions
- Road Alignment Options

Exhibit 5B

AIRFIELD DEVELOPMENT CONSIDERATIONS

The purpose of this section is to identify and discuss various airside development considerations at Portland International Jetport to meet program requirements set forth in the preceding chapters. Airfield facilities are, by nature, the focal point of an airport complex. Because of their primary role and the fact that they physically dominate airport land use, airfield facility needs are often the most critical factor in the determination of viable airport development alternatives. In particular, the runway/taxiway system requires the greatest commitment of land area and defines minimum building set-back distances from the runways and object clearance standards. These criteria, depending upon the areas around the airport, must be defined first in order to ensure that the fundamental needs of the airport are met. Therefore, airside requirements will be considered prior to detailing land use development alternatives.

Exhibit 5C presents the primary geometry issues that need to be considered in this study.

The previous chapter outlined several new and updated FAA airfield design standards, some of which are not currently satisfied at the Jetport. **Exhibit 5C** presents the primary geometry issues that need to be considered in this study.

RUNWAY HIGH ENERGY AREA CONSIDERATIONS

The high energy area is a new safety design standard implemented by the FAA in the 2012 AC 150/5300-13A *Airport Design* update. Previous planning efforts were not required to address this as a standard, but alternative analysis for development options to mitigate high energy crossings is necessary in this study. As presented on the exhibit, each runway should provide a high energy area free of crossing taxiways. The high energy area for Runway 11-29 is completely free of crossing taxiways, while two taxiways cross the Runway 18-36 high energy area.

Taxiway A is a parallel taxiway serving primary Runway 11-29 and serves a vital functional role in moving most of the airport's commercial airline aircraft. Even though it does cross through the Runway 18-36 high energy area, relocating Taxiway A outside of the high energy area is not a viable option. The taxiway would need to be shifted remotely north or south, so much so as to no longer be capable of providing its functional role. Moreover, Runway 11-29 serves at the airport's primary runway; thus, it is utilized to a greater extent than the crosswind runway. Its modification would increase delay and decrease operational efficiency. Most operations will also be under the direction of airport ground control, and it has

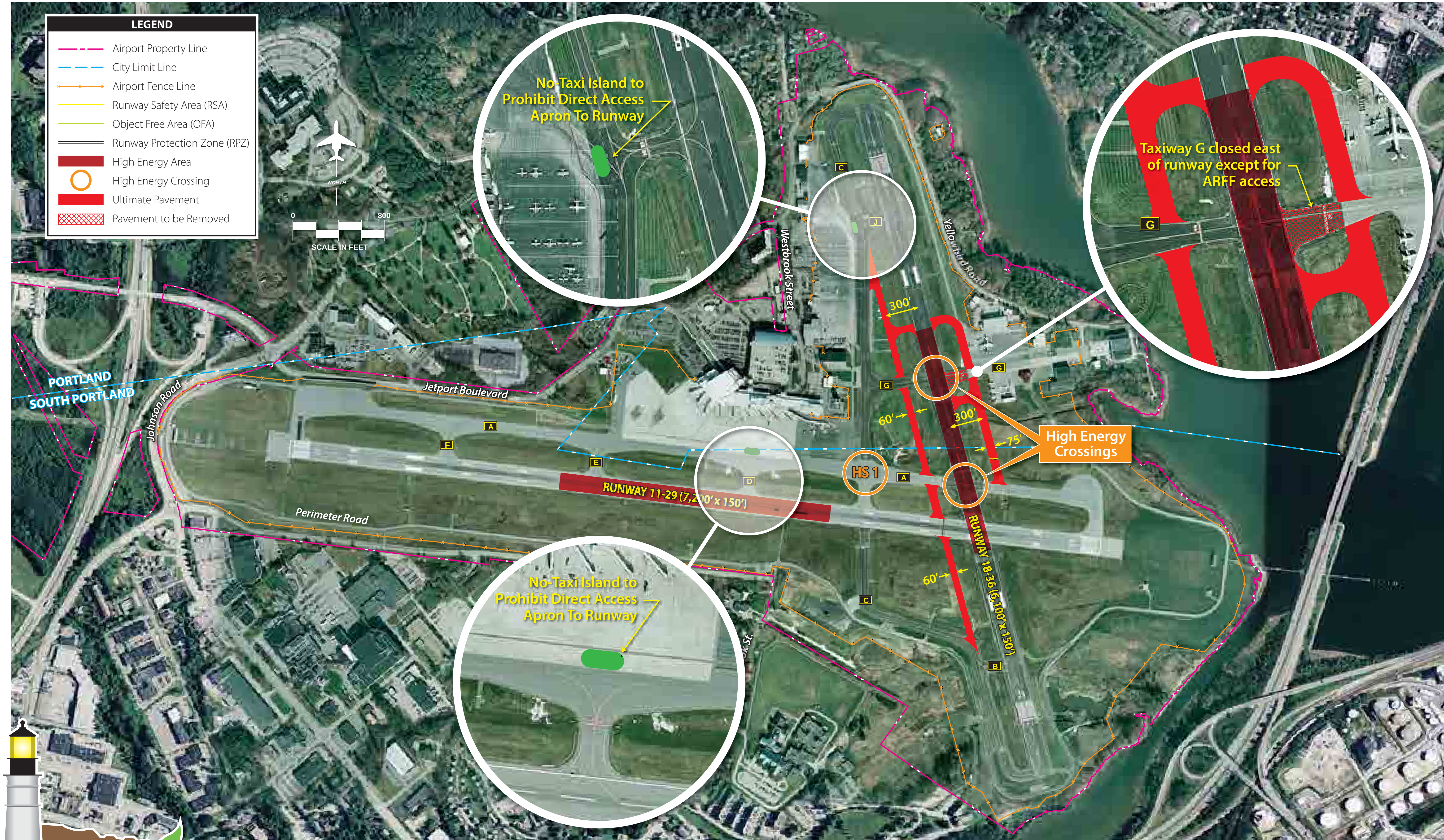
LEGEND
Airport Property Line
City Limit Line
Airport Fence Line
Runway Safety Area (RSA)
Object Free Area (OFA)
Runway Protection Zone (RPZ)
High Energy Area
High Energy Crossing
Ultimate Pavement
Pavement to be Removed
NORTH
0
800
SCALE IN FEET
No-Taxi Island to Prohibit Direct Access Apron To Runway
Taxiway G closed east of runway except for ARFF access
G
C
J
Westbrook Street
Yellowbird Road
300'
60'
75'
High Energy Crossings
HS 1
A
D
E
F
B
PORTLAND
SOUTH PORTLAND
Johnson Road
Jetport Boulevard
Perimeter Road
RUNWAY 11-29 (7,200' x 150')
RUNWAY 18-36 (6,100' x 150')
No-Taxi Island to Prohibit Direct Access Apron To Runway

Exhibit 5C

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not been considered as a hot spot for concern by the runway safety action team (RSAT). As a result, Taxiway A is considered fixed by function and will need to remain in the high energy area.

Exit Taxiway G provides runway ingress/egress as well as a route for aircraft to cross between west side facilities and the FSDO ramp to the east. It is located in the northern portion of the Runway 18-36 high energy area. While it serves an important functional role, its location is not fixed as is Taxiway A. Alternative options for relocation of the access taxiway were evaluated.

Exhibit 5C presents two solutions for mitigating the Taxiway G high energy crossing. The simplest option would be to shift Taxiway G to the north, as illustrated on the exhibit. The relocated taxiway would require a partial parallel taxiway north from Taxiway G along the current small cargo aircraft apron. Relocating the taxiway would not negatively impact general aviation operations as the crossing between the North GA Ramp and FSDO Ramp would remain intact, although more circuitous. The proposed alternative proposes leaving the existing western Taxiway G taxiway connection open while closing the eastern connection to the FSDO Ramp but maintaining a portion of the closed pavement to serve as an airport rescue and firefighting access road to the east side facilities. Closing the eastern section of Taxiway G also serves to eliminate direct apron to runway access that no longer meets standards under the revised FAA design criteria.

Relocating Taxiway G north is less efficient for the large cargo aircraft, currently a Boeing 757, which require the crossing for access to and from Runway 11-29. For this reason, consideration should also be given to construction of extending a partial parallel taxiway south from the cargo ramp to Taxiway A. As depicted on **Exhibit 5C**, the parallel taxiway option will also aid in holding cargo aircraft instead of having to be on Taxiway A between the Runway 18-36 holding position and the instrument landing system (ILS) critical area holding position (to be discussed later).

PARALLEL TAXIWAY C ISSUES

The current alignment of parallel Taxiway C does not fully conform to FAA standard.

The current alignment of parallel Taxiway C does not fully conform to FAA standard. The northernmost and southernmost portions of the taxiway are parallel to Runway 18-36, but the remainder is not. Taxiway C is aligned in a north/south manner along the North GA ramp then through

Runway 11-29 and then turns to the east to the parallel southernmost section. While not uncommon, the non-parallel alignment of Taxiway C is less efficient and constricts development options on the west side of Runway 18-36. Reconfiguring Taxiway C, as depicted on **Exhibit 5C**, will better conform to FAA design standards and provide additional development flexibility. A primary benefit would be more flexibility along the east end of the commercial aircraft apron that could also assist deicing operations (to be discussed later in this chapter).

DIRECT RUNWAY TO APRON ACCESS CONSIDERATIONS

FAA standards now prohibit the allowance of a direct route linking a runway with an aircraft parking apron. This standard change was made to minimize the opportunities for runway incursions by forcing aircraft to make at least one turn when transitioning between the runway and apron.

The Jetport currently has two access routes allowing for direct access between the apron and runway. As depicted on **Exhibit 5C**, Taxiway D links the Air Carrier Ramp and Runway 11-29 while Taxiway J offers a direct link between the North GA Ramp and Runway 18-36. The FAA offers two solutions to mitigate the direct access link: move/close the exit taxiway or install a no-taxi island. The no-taxi island can be installed via pavement removal or pavement markings. **Exhibit 5C** illustrates the alternative of installing no-taxi islands on the Air Carrier Ramp at Taxiway D and North GA Ramp at Taxiway J.

As previously mentioned, the eastern portion of Taxiway G directly links the FSDO ramp and Runway 18-36. The option to close the eastern section of Taxiway G proposed on **Exhibit 5C** would effectively mitigate the non-standard condition.

HOLDING POSITION OPTIONS

Table 5A presents a summary of the existing non-standard holding position conditions on the airfield. The non-standard holding positions markings are depicted on **Exhibit 5D**. For reference, the IDs listed in **Table 5A** reference the corresponding holding as positions depicted on **Exhibit 5C**.

As presented in the table and on the exhibit, there are three primary issues with existing holding positions. The first issue identified by references A and E on **Exhibit 5D** are for nonstandard holding positions on Taxiway C at the north and south ends of Runway 18-36. The second issue for nonstandard holding position marking alignment on Taxiway B and at Runway 29 is identified on the exhibit as B and D. The final issue is the close spacing of two holding positions on parallel Taxiway A, identified on the exhibit as C.

LEGEND
Airport Property Line
City Limit Line
Airport Fence Line
NORTH
0
800
SCALE IN FEET
A
200'
B
C
140'
D
Reposition Hold Line to be Parallel to Runway Centerline
E
200'
PORTLAND
SOUTH PORTLAND
Jetport Boulevard
Westbrook Street
Yellowbird Road
RUNWAY 18-36 (6,100' x 150')
RUNWAY 11-29 (7,200' x 150')
Perimeter Road
Johnson Road

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TABLE 5A
Existing Non-Standard Holding Position Conditions
Portland International Jetport

ID	Non-Standard Condition	Applicable Design Standard	Potential Alternative Solutions
A and E	Holding position locations on Taxiway C located perpendicular to Runway 18-36 centerline and not at runway ends	Positions should be situated parallel 200 feet from runway centerline on entrance taxiway	Consider moving holding positions to proper location
B and D	Holding position markings not fully parallel Runway 11-29 centerline	Positions should be situated parallel 250 feet from runway centerline on entrance taxiway	Consider remarking positions to be parallel to runway centerline if possible
C	Runway 18-36 holding position and Runway 29 glideslope critical area holding position on Taxiway A only 140 feet apart, which is too closely spaced to hold a large commercial airline aircraft between the two positions	The closely spaced holding positions could create operational flow issues including the potential for operational delays for large aircraft movements	Consider relocation of glideslope antenna and/or construction of partial east-side parallel taxiway to Runway 18-36

Nonstandard Holding Positions

The first holding position consideration is to evaluate options for improving the Taxiway C holding position locations. The holding positions are currently located on Taxiway C perpendicular to the runway centerline and not at the end of runway. As such, the holding positions do not allow for pilots to view the runway in both directions. The holding position standard for Runway 18-36 is depicted on **Exhibit 5D**. As depicted, the holding positions should be located parallel to the runway centerline a minimum of 200 feet from centerline to accommodate aircraft reference code (ARC) and runway design code (RDC) B-III aircraft for runways with not lower than ¾-mile visibility minimums. There are two options: leave the holding positions as existing or relocate as shown on the exhibit.

The next holding position issue to consider is the non-standard holding position alignments on Taxiway C and the east end of Runway 11-29. Neither of the positions is fully parallel with Runway 11-29. **Exhibit 5D** illustrates realigning the Runway 11-29 holding position to be parallel to the runway centerline. This option could also require modifying the taxiway route marking so aircraft could pull to the holding position fully perpendicular to the runway. The Taxiway C holding position could be modified only if the taxiway alignment is changed; however, Taxiway C is aligned by functional role and cannot be set at fully 90 degrees with Runway 11-29. Thus, the No Action option is viable. Earlier analysis indicated a potential for realigning Taxiway C to be fully parallel to Runway 18-36, as depicted on **Exhibit 5C**. This realignment option will also present a holding position that is not fully 90 degrees to the runway.

Runway 29 Holding Position

The final holding position issue regards the closely spaced positions at the eastern end of parallel Taxiway A. Currently, a holding position is situated 200 feet east of Runway 18-36 for holding westerly bound aircraft from crossing Runway 18-36 until approved by ground control. The second position is an ILS glideslope antenna critical area holdline located approximately 140 feet east of the Runway 18-36 holding position. The ILS holding position is designed to keep eastbound aircraft movements from impacting the glideslope signal during instrument approach landings. The space between the two holding positions is adequate to fit the length of most aircraft operating at the airport. For longer aircraft such as the Boeing 737-800, Airbus 321, and Boeing 757, the spacing is not adequate.

In addition, the longer distance from the hold line to the Runway 29 threshold upon release for take-off requires increased taxi time and contributes to longer delays for aircraft waiting in queue. This results in increased fuel consumption, reducing the Jetport's sustainability by increasing energy use and GHG emissions.

The current location of the Runway 29 glideslope antenna between the runway and taxiway also presents a significant operational issue during snow removal operations. The FAA requires the removal of snow in the critical area in front of the antenna. This snow must be moved north across Taxiway A and beyond. Thus, alternative solutions should be considered for the holding positions.

An option which could improve the situation would be to construct the east-side partial parallel taxiway for Runway 18-36 as presented earlier on **Exhibit 5C**. The partial parallel taxiway could allow for the large cargo aircraft, currently a Boeing 757, to hold on the partial parallel taxiway instead of between the two closely spaced holding positions. This solution, however, would not serve commercial passenger aircraft transitioning between the passenger terminal and Runway 29.

Relocating the antenna would alleviate the difficulty associated with snow removal operations and delays created by such operations. A second alternative for improving the closely spaced holding positions on Taxiway A would relocate the Runway 29 glideslope antenna to the south side of Runway 11-29. Relocation of the antenna would be challenging. Per siting criteria, the ideal location for a glideslope antenna is between 800 feet and 1,200 feet from the landing threshold. The antenna also needs to be located outside the runway safety area of both runways. The proximity of Runway 18-36 does not leave sufficient distance from the Runway 29 threshold to meet the glide slope siting criteria. This alternative would not be feasible without further study by the FAA to determine if the glide slope could be relocated at less than the standard distance from the threshold.

Barring FAA's allowance for a nonstandard glideslope antenna location, another option for relocating the glideslope antenna to the south side of Runway 11-29 would be shifting the Runway 29 threshold. **Exhibit 5E** presents an alternative that would extend Runway 29 east 400 feet. That is the maximum allowable to still provide adequate RSA for approaches to Runway 29. Shifting the threshold east would also require shifting the medium intensity approach lighting system with runway alignment lights (MALSR) 400 feet further into the Fore River. It should also be noted that the relocated threshold will place aircraft approximately 21 feet lower than the current approach path, assuming a three (3) degree approach slope.

This alternative would require the imposition of declared distances for landing and takeoffs on Runway 11. The extended runway pavement would still need to be treated as safety area beyond the departure end of Runway 11 to meet RSA requirements. The FAA requires 1,000 feet of RSA beyond the end of a runway for both take-off and landing operations, which is the current allotment. Even with the extension, Runway 11 would continue to have an effective runway length of 7,200 feet. The easterly extension would, however, provide Runway 29 with 7,600 feet for both takeoff and landing. Taxiway A may not be feasibly extended to the runway end without significant fill into wetlands and coastal areas. To utilize the full 7,600 feet for take-offs, aircraft would either need to back taxi on the runway or a partial parallel taxiway could be developed on the south side of the runway as depicted on **Exhibit 5E**. Aircraft desiring to use the additional length would need to cross over the runway to reach the end for takeoff. This would still create delays during the runway crossing, which would continue until the crossing aircraft exits the glide slope critical area. Aircraft that do not desire the additional length could make an intersection takeoff from the current runway threshold.

A fourth alternative also depicted on **Exhibit 5E** would realign the eastern portion of Taxiway A to position it farther north of the glide slope antenna. This would provide sufficient room for the glide slope critical area and allow aircraft to taxi to the end of the taxiway to hold, as well as space to clear snow out of the critical area. This would reduce the length of time between aircraft release, thus decreasing delay, conserving energy, and reducing GHG emissions. This alternative would not only be less costly to develop than the previous alternative, but also have less impact on operations during construction.

AIRCRAFT HOLDING APRON ISSUES

Aircraft holding aprons are primarily designed so that departing aircraft can hold near the runway while awaiting clearance for take-off. Both ends of Runway 11-29 are served by holding aprons of varying sizes. The Runway 29 holding apron is the smaller of the two and allows for one aircraft to pull aside, allowing for other aircraft to pull onto Runway 29. It is properly designed to serve this limited function. The Runway 11 hold apron, however, follows a design which is no longer recommended according to FAA AC 5300-13A, Change 1. The current design of the Runway 11 holding apron creates a "large expanse of pavement" which the FAA considers potentially confusing to pilots. As

Aircraft holding aprons are primarily designed so that departing aircraft can hold near the runway while awaiting clearance for take-off.

such, the FAA has put forth a changed design for aprons having the need to serve multiple aircraft holding/bypass operations.

Exhibit 5F presents the FAA-recommended holding/bypass apron design for Airplane Design Group (ADG) III. As illustrated, the recommended design layout would allow for three aircraft holding positions and a taxilane to each position. The positions are situated so that the aircraft is parked perpendicular to the runway. While ideal, the recommended layout is not feasible unless Jetport Boulevard and incompatible land uses to the north are removed and/or relocated. The expense for removing and/or relocating the road and business would likely be prohibitive as the cost will outweigh the potential benefits achieved. As a result, this alternative is neither practical nor feasible. The No Action solution may be viable for the Runway 11 holding apron.

The No Action solution may be viable for the Runway 11 holding apron.

PERIMETER SERVICE ROAD OPTIONS

Vehicle service roads have significant importance on 14 CFR Part 139 commercial service airports, including Portland International Jetport. Such roads provide access to critical operational areas for airport staff, security, and aircraft rescue and firefighting teams. Vehicle service roads also provide a means for unimpeded access to potential accident areas on the airfield, while reducing the possibility of a runway incursion. Jetport staff is required to perform inspections of the airport daily, and service roads provide the necessary access to accomplish this task.

Currently, the perimeter service road transitions a variety of runway and taxiway protection surfaces, which require tower clearance. Under an ideal layout, a perimeter service road would remain outside of these protected surfaces. There are several FAA documents providing guidelines defining the function and location of perimeter service roads.

FAA AC 150/5210-20, *Ground Vehicle Operations on Airports*, defines vehicle service roads as "a designated roadway for vehicles in a non-movement area." Paragraph 7 of the AC states: "Airport operators should keep vehicular and pedestrian activity on the airside of the airport to a minimum…Vehicles should use service roads or public roads in lieu of crossing movement areas whenever possible."

FAA AC 150/5300-13A, *Airport Design*, states in Paragraph 318(a), "It is recommended that the entire RSA and RPZ be accessible to rescue and firefighting vehicles such that no part of the RSA or RPZ is more than 330 feet (100 m) from either an all-weather road or a paved operational surface."

OPTION 1: RELOCATE RUNWAY 29 GLIDE SLOPE

	RUNWAY 11	RUNWAY 29
TORA	7,200'	7,600'
TODA	7,200'	7,600'
ASDA	7,200'	7,600'
LDA	7,200'	7,600'

KEY:
TORA: Take-Off Runway Available
TODA: Take-Off Distance Available
ASDA: Accelerate-Stop Distance Available
LDA: Landing Distance Available

OPTION 2: REALIGN TAXIWAY A

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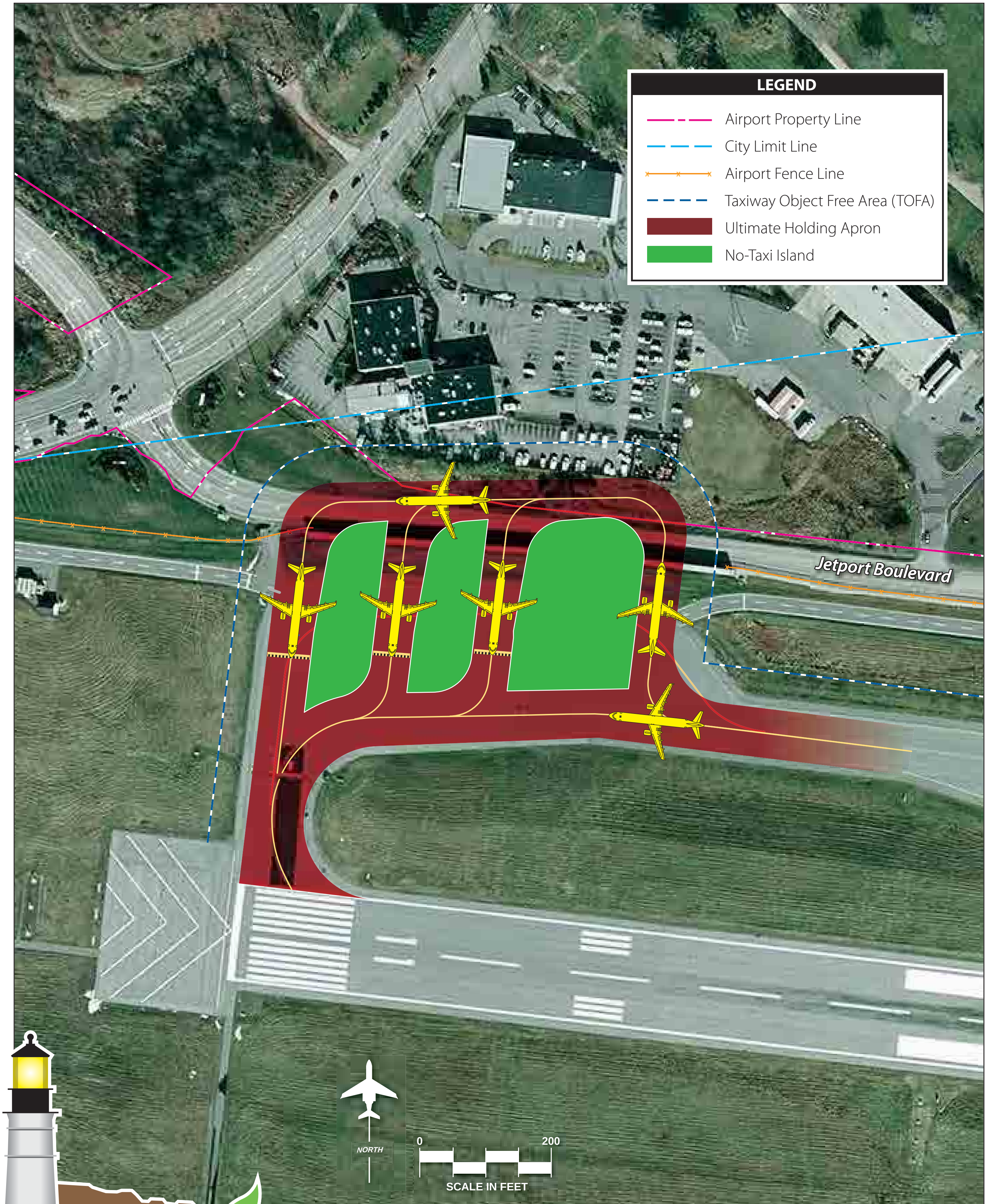


Exhibit 5F

FAA HOLD APRON STANDARD DESIGN

FAA Order 5190.6B, *FAA Airport Compliance Manual*, states in Appendix R, Paragraph VII (I) (1) that an airport should "Look for opportunities to enhance safety, such as reducing runway crossings (ex., adding perimeter service roads, etc.)."

FAA Order 5280.5C, *Airport Certification Program Handbook*, Paragraph 421, Section 139.329(a)(1) states that a Part 139 certificate holder is responsible for "Limiting access to movement areas and safety areas to only those pedestrian and ground vehicles necessary for airport operations. Unless required to support a specific operational requirement on the airport, vehicles and equipment should use perimeter access [service] roads whenever possible" (FAA 2006).

FAA Order 5100.38D, *Airport Improvement Handbook* provides several functions for airport service roads, including (FAA 2014):

- ARFF access to a runway or runway safety area;
- Airport operations and maintenance;
- Separation of ground vehicles and aircraft;
- Airport security;
- Incidental access to FAA-owned facilities; and
- Temporary construction access.

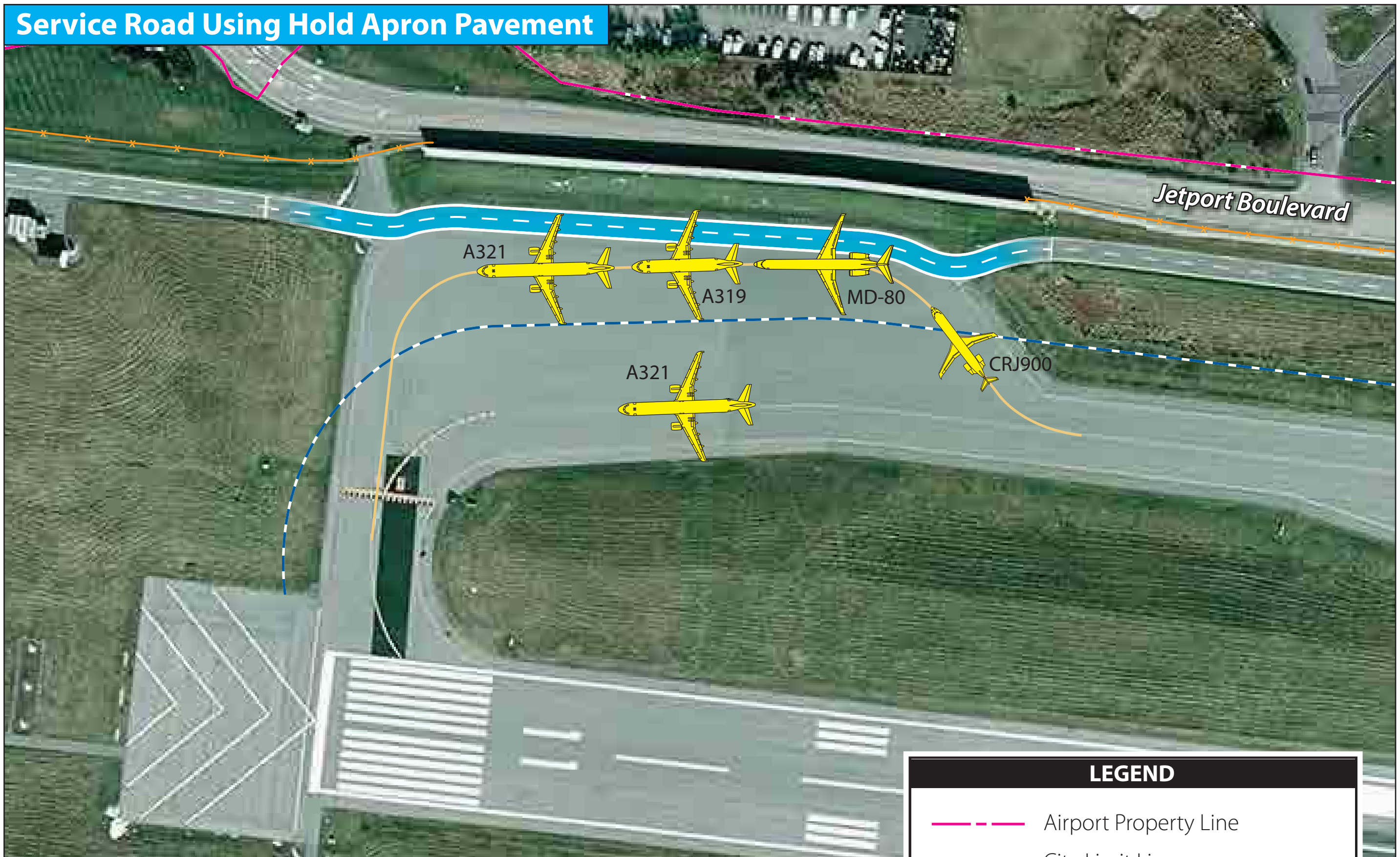
The Jetport is served by an on-airport perimeter service road that circumvents most of the airfield. Due to property and terrestrial constraints, however, a full perimeter access road is not practical or feasible. The perimeter service route utilizes portions of "movement area" surfaces such as taxiways and even Runway 18 to allow full perimeter access. The use of movement area pavements is allowed; however, the ground operations on movement area pavements require prior authorization from airport traffic control. Prior authorization is appropriate and acceptable to airport operation personnel.

Due to property and terrestrial constraints, however, a full perimeter access road is not practical or feasible.

As it comes on-line, the new fixed base operation in the south side general aviation area will require refueling vehicle access to the north side terminal apron. To enhance safety, it is desirable for the refueling vehicles to be able to avoid airfield movement areas. Due to insurance reasons, airport refueling vehicles are not allowed on public roadways and must stay within the airport perimeter. The most practical route is the existing perimeter road around the west end of Runway 11. Currently, this would require the fuel trucks to cross the back portion of the Runway 11 holding apron, which is currently an aircraft movement area.

There is not enough space along the back edge of the holding apron to provide adequate clearance from aircraft for a dedicated service road. Vehicles must hold and await ATCT clearance to cross the holding apron. Two alternatives that remove the perimeter road from the movement area of the Runway 11 holding apron were considered, as shown on **Exhibit 5G**. The top half of the exhibit illustrates the option to construct a new section of service road between the current apron and the noise barrier wall. As depicted, the southern lane of the perimeter road would remain within the wingspan of ADG III aircraft;

Service Road Using Hold Apron Pavement



Service Road Realignment

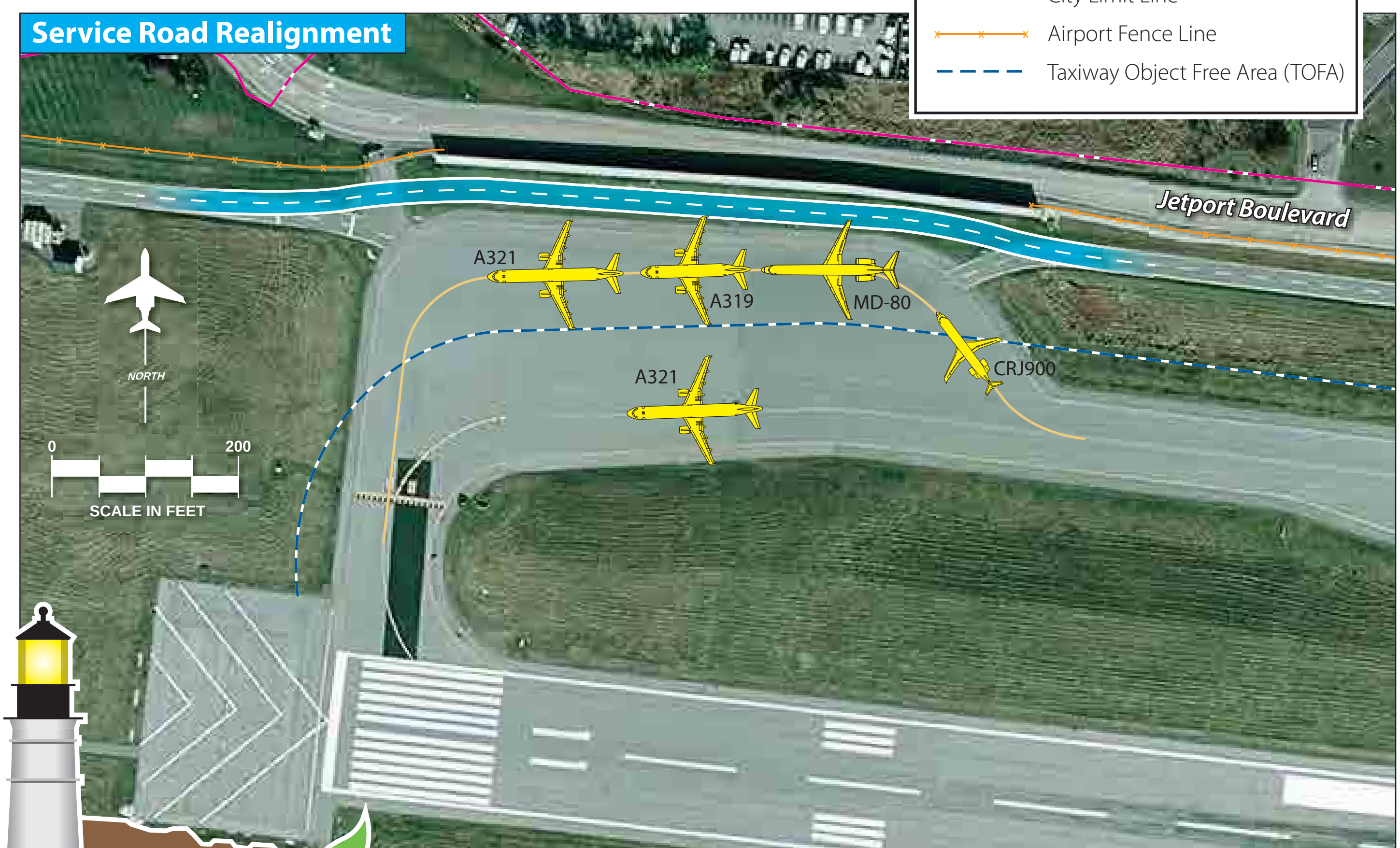


Exhibit 5G

PERIMETER SERVICE ROAD ALTERNTIVES

however, it appears that the northern portion of the road could remain clear of ADG III wingtips. Further survey and design work would be required to assure the clearance, but if possible, the one lane road could possibly offer a viable non-movement area road for refueling operators.

The second alternative presented on the bottom half of **Exhibit 5G** would construct a bypass taxiway just east of the Taxiway A terminus at Runway 11. This would permit aircraft to bypass an aircraft holding at the end of the runway. The holding apron would be abandoned and the back side of it converted to the perimeter service road connection. The abandonment of the holding apron would also correct its non-standard condition.

AIRFIELD ALTERNATIVE SUMMARY

The preceding sections outlined various options for improving airfield geometry and other non-standard issues. In some cases, the No Action alternative appears to be the viable choice, as with the holding position location/marking at Taxiway C and Runway 11-29. While it is not standard, it is fixed by function and the alignment of Taxiway C.

Several issues can be remedied including the Taxiway A IFR holding position issues, Taxiway C alignment, and the Runway 11 holding apron/perimeter service road issues. Realignment of Taxiway A will resolve what has long been an issue during instrument weather. Realignment of Taxiway C will provide better circulation and space along the north general aviation area and the east end of the terminal apron. Constructing a bypass taxiway at the Runway 11 end will resolve the non-standard holding apron as well as provide for an unimpeded perimeter service road at that end of the airfield.

The partial parallel taxiway east of Runway 18-36 alternative would aid in improving two airfield issues.

The partial parallel taxiway east of Runway 18-36 alternative would aid in improving two airfield issues. First, it would be necessary to mitigate the high energy area crossing at Taxiway G. It would also serve to improve taxiing operations for cargo aircraft, especially for taxi operations between Runway 29 and the cargo apron. Those operations are required to cross Runway 18-36 twice to complete the route; however, a partial parallel taxiway would serve to create a more efficient route with only one crossing of Runway 18-36 for operations to/from cargo apron to western portions of the airport.

Several options from the last master plan were completed, such as the extension of Runway 18-36 and associated RSA improvements. The previous plan did also propose the construction of a connecting taxiway between the southern portion of Runway 18-36 and the Runway 29 threshold. This improvement should continue to be included on the recommended plan to improve taxiing efficiency, especially for the new south GA development area.

PASSENGER TERMINAL COMPLEX CONSIDERATIONS

The alternatives discussion for the passenger terminal complex at Portland International Jetport includes the terminal building, aircraft aprons, vehicle parking, and adjacent support facilities. Strategies will be considered for both current and long-term development needs. These include the optimization of existing terminal facilities and identifying potential incremental expansion to meet demand.

Exhibit 4J, previously presented in the **Facility Requirements** chapter, indicates that the gross square footage of the existing terminal building, at approximately 295,000 square feet (s.f.), meets current demand levels and should be generally sufficient to accommodate long term enplanement levels (1,200,000). Based on the analysis, overall size may be sufficient through the long term, but individual components of the facility may be undersized. Components which will likely need to be modified include the baggage claim facilities, concessions, restrooms, and rental car facilities. The airport has been studied and recommendations made for concession improvements. Other modifications to the building could include relocation of airport administration offices and the addition of Federal Inspection Services (FIS) via U.S. Border and Customs.

Exhibit 5H presents a generalized exhibit showing the footprint for terminal building expansion opportunities. As noted above, the terminal building total footprint area exceeds the overall footprint necessary to accommodate enplanements through the long term; however, individual functions may become undersized. The analysis considered here will include the following options:

- Additional departure gates and lounges;
- Expansion of the baggage claim facilities;
- Expansion of automobile parking facilities;
- Relocation of administration and Transportation Security Agency (TSA) spaces;
- Development of FIS Customs facilities for international travel; and
- Construction of additional deicing and aircraft remain overnight (RON) parking.

DEPARTURE GATE EXPANSION

The relatively newly remodeled and expanded commercial passenger terminal building is more than sufficient to meet existing passenger demands. The building was sized to meet the long-term enplanement levels when constructed less than 10 years ago. Moreover, at present, the current gate configuration and usage includes two gates that are not dedicated to specific users, only used for peak period common use gate.

For planning sake, consideration was given to future gate expansion options. Two options are readily available. First, the most recent improvements provided for future development of the terminal to the northwest, as depicted on **Exhibit 5H**. As shown,

The relatively newly remodeled and expanded commercial passenger terminal building is more than sufficient to meet existing passenger demands.

three additional gates and holding rooms could be built with little impact to the employee parking. If ever needed, the building could be extended even farther northwest for three to five more gates, but would remove most surface lot parking for employees. The northwesterly expansion is the current plan and would most likely be implemented as the first course of action.

Another terminal gate improvement consideration could be remodeling Gate 1. This gate currently utilizes the second floor secure hold room, but is serviced by an extended loading bridge serving three commuter airline parking spaces. Reconfiguring parallel Taxiway C fully parallel to Runway 18-36, as proposed earlier, could provide additional ramp at Gate 1. This would permit a second floor extension of the secure concourse to replace the extended loading bridge, thus allowing for larger aircraft boarding at Gate 1. Reconfiguring Gate 1 would not offer significant gate capacity improvement, but could provide more flexibility to options for gate usage by allowing a variety of larger aircraft to board from the second level as well as accommodate deicing operations which will be discussed later in this chapter. Considering that aircraft with 60 seats or less are no longer being manufactured and will continue to attrition from the fleet over the planning period, this would make Gate 1 more serviceable in the future.

An immediate issue to consider is the current aircraft gate parking space allotments. At present, only 14 feet of wingtip clearance is provided by the existing gate and jet bridge configurations. The standard wingtip clearance is 25 feet. With the airline fleet mix shifting to include more aircraft such as the Boeing 737-700/800 and Airbus 319/320/321 models, alternative alignments should be considered. Until the terminal building is expanded to meet larger passenger demands, only one viable option is available: relocate a gate to the northwest corner of the terminal. Airport staff has previously evaluated and selected the option to relocate Gate 4 to the northwestern corner (Gate 11). Shifting/relocating the Gate 4 gate/jet bridge will allow the parking spaces for Gates 5 through 10 to be shifted east and Gates 2 and 3 to the west to allow at least 25 feet of parking wingtip clearances. This will be sufficient until passenger demands generate a need to extend the terminal building.

An immediate issue to consider is the current aircraft gate parking space allotments.

BAGGAGE CLAIM OPTIONS

The baggage claim is located at the far eastern end of building's first floor. Analysis presented in the previous chapter indicated that additional baggage claim will become a need before other components of the terminal. Given its location and due to physical constraints to the east, adding baggage claim facilities to the east are not considered practical or feasible. The airport traffic control tower (ATCT) is

Exhibit 5H
TERMINAL EXPANSION OPTIONS

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immediately east of the building and cannot be readily moved for expansion of baggage claim area. Adding baggage claim to the east also extends its distance from the arrivals exit from the concourse.

The only viable and reasonable alternative for additional baggage claim is presented on **Exhibit 5J**. As depicted, the baggage claim space could be added by converting space to the west. This would require relocation of a restaurant concessionaire and modification of an escalator and stairway. The escalator and stairway are needed to transition arriving passengers from the second floor concourse to the first floor baggage claim and arrivals curbfront. As proposed, the escalator and stairway would be shifted west to provide a more logistic departure point for passengers. This would allow arriving passengers without checked bags to recognize an earlier vestibule and proceed directly out of the building to the curb, parking garage, or the rental car facilities. Relocation of the restaurant would allow for additional baggage claim area immediately east of existing facilities.

AUTOMOBILE PARKING OPTIONS

Automobile parking alternatives are straightforward, following the plan set in place a decade ago. The plan includes expansion of the parking garage to the west/northwest where the long-term surface lot parking current exists. The proposed plan would also allow for additional rental car spaces and will be designed to offer improved access between the rental car return area and the terminal building. The proposed parking expansion will more than accommodate the proposed increased need in automobile parking through the planning period.

The parking garage will encumber existing surface lot spaces but will offer an increased number of overall spaces. Its construction should provide adequate parking allowances for the future; however, remote surface lots could be developed to the north along International Parkway if the need presents.

ADMINISTRATIVE AND TSA SPACE OPTIONS

Airport administration is currently housed on the second level of the terminal building, approximately in the middle of the building footprint. The space is sufficient to accommodate airport administrative roles, but could better serve TSA needs due to its proximity to most of the TSA functions. When feasible, consideration should be given to relocating the airport administration to the undeveloped space at the eastern end of the second floor, which is best suited for office-related uses. This location was considered for TSA offices; however, it is somewhat remote from TSA's primary duty areas.

It should be noted that some of the existing TSA office space is located in an area which could be better utilized for concessions. If the existing airport administration space is reallocated for TSA use, the existing TSA office space could then be reallocated for concession spaces. Thus, relocating TSA would effectively provide additional concessions space which has been identified as a need by the long term. It would also be a higher and better use of the space for revenue generation.

Relocating TSA would effectively provide additional concessions space which has been identified as a need by the long term.

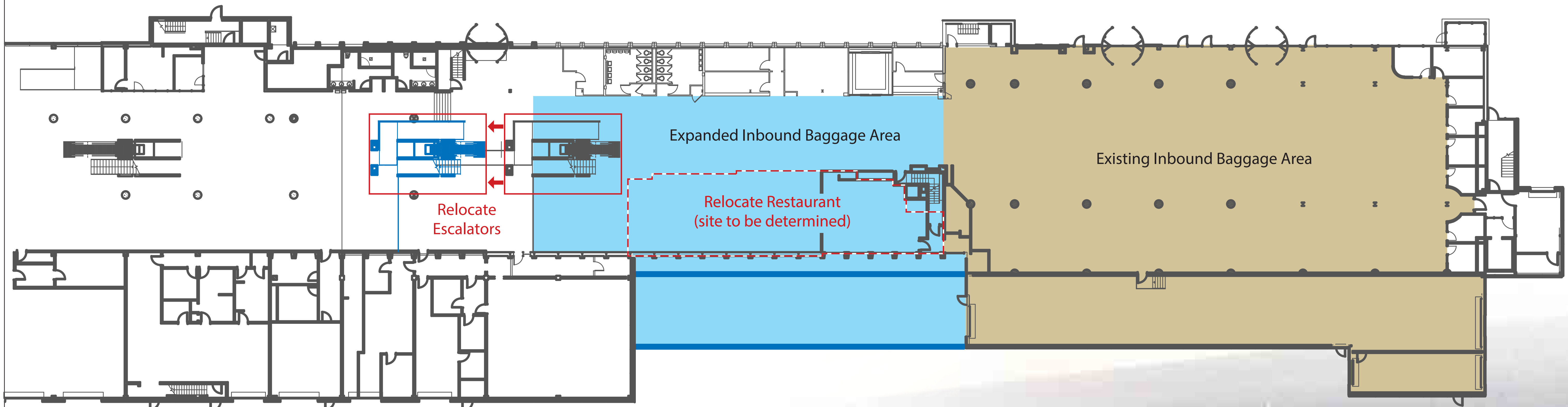
FIS FACILITY DEVELOPMENT OPTIONS

The Jetport has studied the opportunity for obtaining Customs Border Protection (CBP) services with a new FIS facility in the terminal. It is believed that the Jetport would fare well in obtaining CBP services due to its designation as an official Port of Entry. As a Port of Entry, CBP officers are available for use to clear scheduled airline passengers at the Jetport. In fact, the Jetport has already used officers in this way for passenger charter flights, international general aviation flights, and international non-scheduled cargo flights.

The primary detractor in obtaining CBP services is the lack of a dedicated Federal Inspection Facility (FIS) for customs and immigration at the airport. Without the FIS facility, the Jetport will continue to remain unable to obtain regularly scheduled international airline service (unless those services are offered at the origin). The lack of an FIS facility is an economic barrier limiting the community access to the international traveler who would typically fly on scheduled international passenger flights. Additionally, the lack of an FIS facility limits the Jetport's ability to generate additional aeronautical revenue including additional fuel sales, landing fees, terminal rent, concession revenue, and parking charges.

The airport engaged Sixel Consulting Group to prepare an FIS study to determine the economic feasibility of developing FIS at the Jetport. According to the study, "A large proportion of commercially-served airports in the United States already have CBP services. Of the roughly 350 commercial service airports in the contiguous 48 Continental states (the number changes frequently as services are ended and as new service begins), 185 have a CBP office on the field. This does not necessarily mean those airports have a FIS facility, however. Many airports have ''on demand' CBP service, with officers that come from other jurisdictions to clear specific general aviation flights."

The study goes on to include, "…for future international flights, serving scheduled airline service of more than nine seats at a time, it must have an approved FIS facility in which to process passengers. Before an airport can embark upon the process of building an FIS facility, it must meet certain requirements set by CBP. Among those requirements, an airport must:



LEGEND

- Existing Inbound Baggage
- Expanded Inbound Baggage
- New Wall to be Constructed

Exhibit 5J

BAGGAGE EXPANSION ALTERNATIVE

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- Secure status as either a Port of Entry or user fee airport;
- Have a carrier's demonstrated interest in beginning service which could include:
  - Letter of support for regular charter service, or
  - Letter of support for scheduled carrier service;
- Illustrate that a private, general aviation facility will not be adequate, or
- Demonstrate demand for the airport to be used as a primary diversion point for international flights on a regular basis.

Once those requirements have been met, an airport must plan the FIS facility under the strict guidelines published by CBP itself. CBP, in conjunction with the Department of Homeland Security, has outlined all aspects of FIS design in their 292-page handbook entitled, 'Airport Technical Design Standards Passenger Processing Facilities'".

Exhibit 5K presents the proposed result of the FIS facility study. The conclusion was that a currently unused portion of the terminal building could be rededicated for FIS. The portion of the building is adjacent and below Gates 4 and 5, as depicted earlier on **Exhibit 5J**. The exhibit depicts the proposed FIS facility options for both the first and second floors of the building. As proposed, the layout would allow for Gates 5 and/or possibly Gate 4 to be usable for international operations. Arriving passengers would deplane at the gate and would remain in a segregated and secured corridor which routes the passengers from the second floor to first floor CBP operation area. The first floor is where the arriving international passengers would be processed by Customs personnel and then ultimately allowed to retrieve baggage. Once the processing is complete and baggage is claimed, the passenger would exit out of the FIS facility to the lobby area of the first floor, then out of the building.

At the present time, airport administration has elected to not pursue the FIS improvements, but consider the opportunity reasonable to continue planning for the future.

The proposed FIS development plan followed a detailed study. The study carefully outlines the realistic opportunities for regularly scheduled international flights to the Caribbean, Mexico, and Canadian locales. FIS facilities would be a requirement to achieve such a goal; however, as proposed, the FIS facility would be costly, at an estimated \$6.5 to \$7.5 million without the aid of federal grant-in-aid programs. For this analysis, one of two options remain: continue to plan for FIS facilities or to select a No Action option. The Jetport administration has elected to not pursue the FIS improvements at the present time, but consider the opportunity reasonable to continue planning for the future. Planning for the facilities would position the airport favorably to respond to a shift in international demands and opportunities to serve said demand. The most practical and basic issue is how the development will be funded.

DEICING AND RON APRON OPTIONS

The current deicing facilities and RON are located on the western portions of the terminal ramp. Deicing operations occur in a designated area where the spent deicing materials can be reclaimed and recycled. The current deicing pad provides for two aircraft deicing positions. During non-peak periods, two deicing positions are adequate; however, during the peak early morning peak departure periods, additional deicing positions could reduce delays. Consideration should be given to providing additional deicing positions.

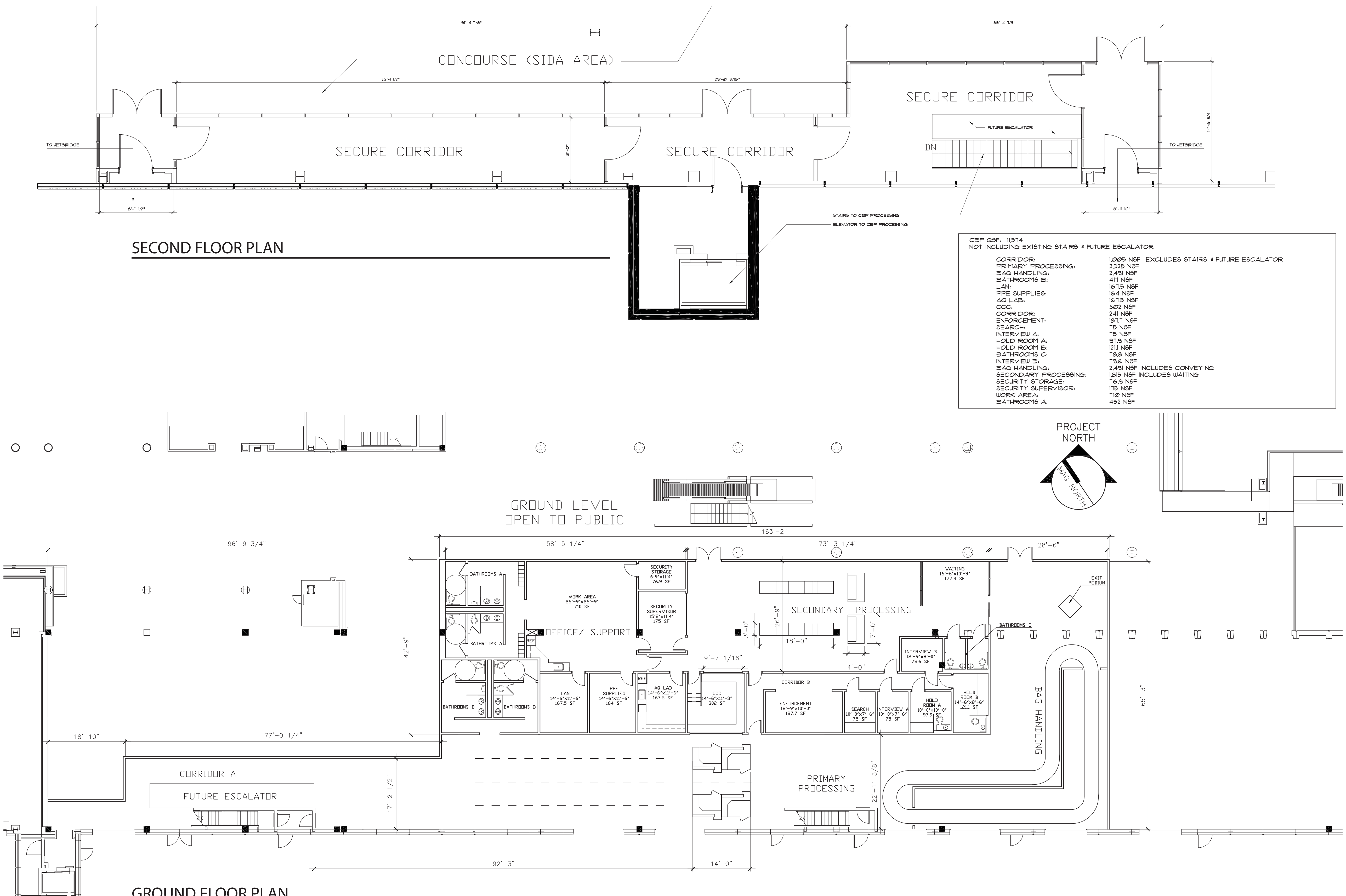
Increasing deicing capacity could include operational or capital improvement alternatives. An operational alternative would be to moderate morning departure times. This option is not practicable as commercial airlines set their schedules to meet their system needs. As such, this option will not be considered further. Another alternative would be to allow for deicing operations to occur at the gate. If this option were selected, some improvements would be needed to recapture the deicing fluids at the gate apron area. This option is less efficient for glycol fluid reclamation unless the apron is fitted with proper fluid reclamation facilities requiring capital improvements as well.

The alternatives analysis also considers three specific capital improvements which would increase deicing operation capacity. The first option would be to extend the terminal ramp to the west as depicted on **Exhibit 5L**, Option 1. As depicted, Option 1 could provide at least two additional deicing positions, bringing the total number to four positions. The option would allow for aircraft to transition from the Air Carrier Ramp, then back to Taxiway A and beyond. As presented, Option 1 would be an ideal alignment for enhanced and improved deicing operations.

Increasing deicing capacity could include operational or capital improvement alternatives.

Option 2 proposes expanding the Air Carrier Ramp to the northwest as would be needed for future terminal expansion presented earlier. This option would serve both terminal building gate expansion and deicing operations, making it an advantageous option to compete for grant-in-aid funding. This option's primary drawback is the apron's location and alignment would make it less efficient for ground movements. Moreover, if the terminal is extended to the northwest, the ramp would be used primarily for aircraft parking (gates). It would then allow for at-gate deicing operations, but that would limit its effectiveness to the few gates located adjacent to the ramp, as opposed to Option 1 which could serve all aircraft operations.

Option 3 considers a similar alternative as presented above whereas the apron adjacent to Gate 1 would be reconditioned to include deicing fluid reclamation facilities. Moreover, this alternative would benefit from the reconfigured parallel Taxiway C in that the terminal apron could be extended to the east as depicted on **Exhibit 5L**. Thus, Option 3 would allow for at-gate deicing and extended apron deicing operations farther east. This option would be more expensive but could be phased over time as the pavement adjacent to Gate 1 requires reconstruction.


CONCOURSE (SIDA AREA)
SECURE CORRIDOR
SECURE CORRIDOR
SECURE CORRIDOR
FUTURE ESCALATOR
DN
TO JETBRIDGE
TO JETBRIDGE
STAIRS TO CBP PROCESSING
ELEVATOR TO CBP PROCESSING
SECOND FLOOR PLAN
CBP GSF: 11,574
NOT INCLUDING EXISTING STAIRS & FUTURE ESCALATOR
CORRIDOR: 1,005 NSF EXCLUDES STAIRS & FUTURE ESCALATOR
PRIMARY PROCESSING: 2,325 NSF
BAG HANDLING: 2,491 NSF
BATHROOMS B: 417 NSF
LAN: 167.5 NSF
PPE SUPPLIES: 164 NSF
AQ LAB: 167.5 NSF
CCC: 302 NSF
CORRIDOR: 241 NSF
ENFORCEMENT: 187.7 NSF
SEARCH: 75 NSF
INTERVIEW A: 75 NSF
HOLD ROOM A: 97.9 NSF
HOLD ROOM B: 121.1 NSF
BATHROOMS C: 78.8 NSF
INTERVIEW B: 79.6 NSF
BAG HANDLING: 2,491 NSF INCLUDES CONVEYING
SECONDARY PROCESSING: 1,815 NSF INCLUDES WAITING
SECURITY STORAGE: 76.9 NSF
SECURITY SUPERVISOR: 175 NSF
WORK AREA: 710 NSF
BATHROOMS A: 452 NSF
PROJECT NORTH
MAG NORTH
GROUND LEVEL
OPEN TO PUBLIC
96'-9 3/4"
58'-5 1/4"
73'-3 1/4"
28'-6"
163'-2"
OFFICE/ SUPPORT
SECONDARY PROCESSING
BAG HANDLING
PRIMARY PROCESSING
CORRIDOR A
FUTURE ESCALATOR
CORRIDOR B
18'-10"
77'-0 1/4"
42'-9"
17'-2 1/2"
22'-11 3/8"
65'-3"
92'-3"
14'-0"
GROUND FLOOR PLAN

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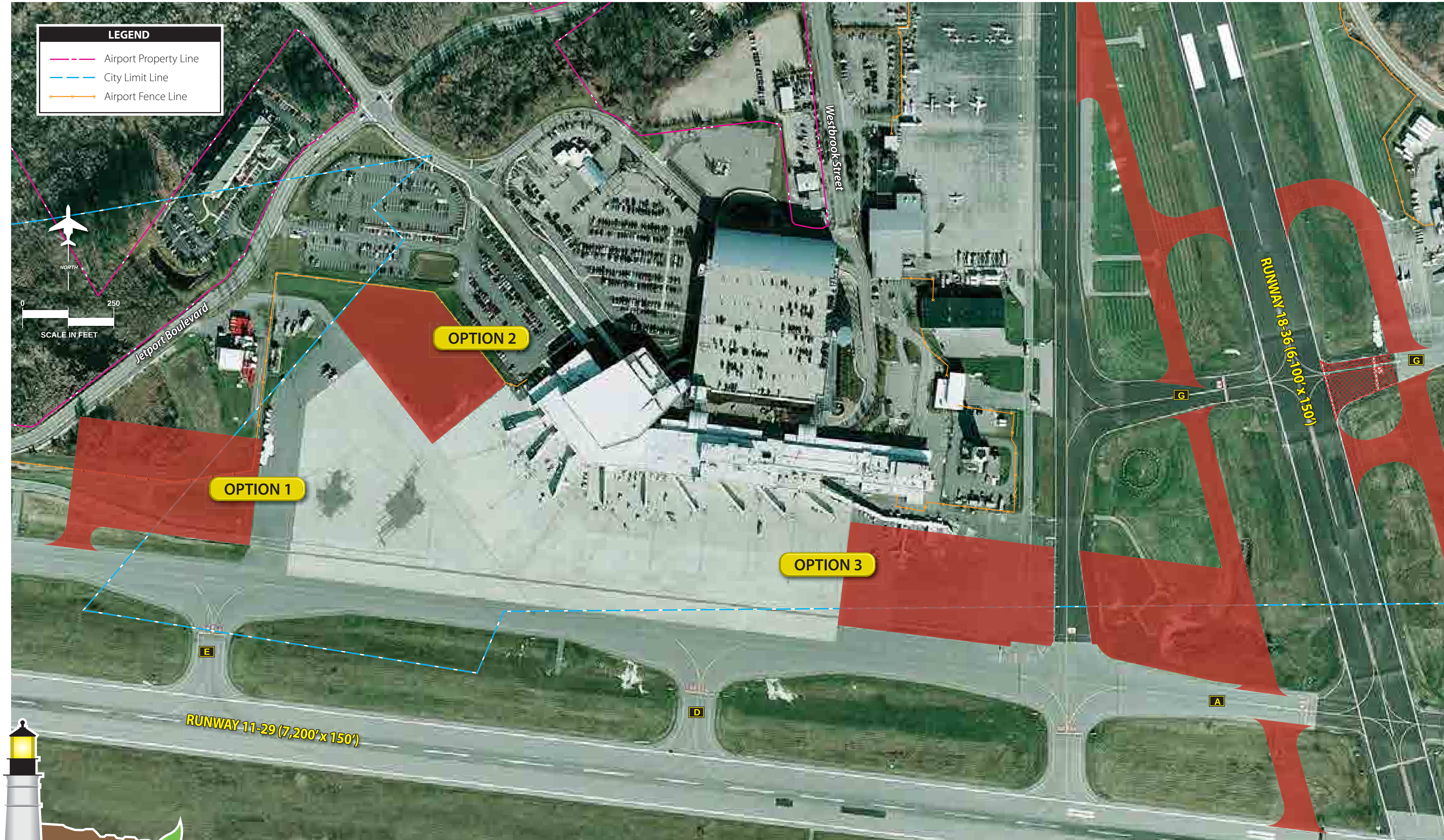
LEGEND
Airport Property Line
City Limit Line
Airport Fence Line
NORTH
0
250
SCALE IN FEET
Jetport Boulevard
Westbrook Street
OPTION 1
OPTION 2
OPTION 3
RUNWAY 18-36 (6,100' x 150')
RUNWAY 11-29 (7,200' x 150')
G
G
E
D
A

Exhibit 5L

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AIR CARRIER CARGO (BELLY FREIGHT)

Air cargo is a broad term which many times suggest freight carried by dedicated air cargo handlers such as FedEx, UPS, or others. For many airports, however, air cargo is also carried inside the freight holds (belly) of the commercial passenger aircraft. In the past, the Jetport did not have much belly freight as the primary commercial passenger aircraft utilized were smaller regional aircraft. Presently, however, the airport is served by larger narrow body commercial aircraft, such as the MD80, Airbus 319, and Boeing 737. The commercial aircraft fleet mix is projected to include more similarly sized aircraft in the future. As such, the needs of belly freight handling operations should be considered.

The alternatives analysis considered several options for belly freight facility development. The primary need is for the transfer of cargo between non-aviation and aviation sides of the terminal building. In other words, the freight needs to transition between the cargo vehicle and the aircraft via dedicated facilities at the airport. The cargo is handled by the airline operator which will carry the freight. For planning purposes, the analysis must offer a plan for facility development which would allow for truck loading/unloading on the unsecured side of the terminal and space for the freight to be sorted and readied for flight or from flight to the truck. The Jetport does not currently and is not ultimately expected to process significant amounts of belly freight; therefore, a simple and basic facility is needed.

The best location for the belly freight facility would be near airline operations so that the freight would fit in with other baggage makeup and sorting operations.

The best location for the belly freight facility would be near airline operations so that the freight would fit in with other baggage makeup and sorting operations. Thus, a facility distant from the terminal building would not be desirable. A facility nearer the ticketing area would be ideal for outgoing freight, while a facility near baggage claim would be more ideal for incoming freight. Consideration has been given to both locations. Unfortunately, a facility near baggage claim would not be ideal due to limited space availabilities and due to ground movements which would require the cargo vehicle to transition through arriving passenger traffic to access the facility. It is quite clear that a facility located at the existing north loading dock of the terminal building would be the best choice as it would be ideal for outgoing freight and would be the best option for ground movements/operations on the non-secured side of the terminal complex.

PASSENGER TERMINAL ALTERNATIVE SUMMARY

The commercial airline passenger terminal complex is vital to the lifeblood of the Jetport. While the airport serves all civilian aviation functions, the Jetport's primary role is to meet the needs of commercial airline operations and associated needs of the community's travelers. The importance of a highly functional complex cannot be understated. The building, as well as the facilities on both sides of the building, should fully meet current and future demand as presented. As such, proper planning offering a logical and reasonable plan for meeting demand must be undertaken and followed.

The terminal building's most recent expansion has established a suitable level of service for most functional elements through the long-term enplanement levels. Some functional elements will become constrained and undersized as outlined earlier. The most critical elements will include baggage, automobile parking, and security.

Analysis presented earlier outlines a solution to offer additional baggage, parking, and security space needs. Other alternatives, including the addition of FIS facilities and additional deicing ramp area, were also provided. All these options will be weighed by the Planning Advisory Committee, airport administration, and the public. Based on input from these entities, a selected development option will be made and will be presented in the following chapter.

GENERAL AVIATION AND AIR CARGO OPTIONS

The final considerations in the landside alternatives analysis are to evaluate options for general aviation and air cargo expansion. Forecasts presented in Chapter Two did not suggest substantial growth for either segment; however, aviation trends do include larger general aviation aircraft usage and numbers, as well as strong air cargo operations. Forecasts presented in this study suggest strong but relatively moderate growth curves for general aviation and air cargo. As projected, the airport could expect up to 26 additional based aircraft by the long term of the planning period. Air cargo operations growth could also include an additional air carrier, thereby doubling the required spaces needed to accommodate the operations. As such, alternatives to meet the potential growth needs of both segments should be evaluated.

All of the existing general aviation and air cargo facilities are located on the north side of Runway 11-29. The bulk of general aviation facilities are located west of Runway 18-36 with some facilities on the runway's east side (FSDO Ramp). All the air cargo facilities are located on the east side of Runway 18-36.

Exhibit 5M presents alternatives for expanded general aviation and air cargo facilities in areas north of Runway 11-29 and east and west of Runway 18-36. As depicted, the northern general aviation area could support four additional hangars, two large conventional hangars and two executive hangars. The conventional hangars could be developed to support fixed base operator (FBO) operations, while the executive hangars could house aircraft storage. The executive hangars depicted offer two solutions. First, the northernmost hangar would be a simple box hangar which would allow for multiple aircraft storage. The linear box hangar could support several attached hangar units with east facing doors. The corporate hangars would support hangar storage for all aircraft types except for large business jets.

The eastern general aviation facilities currently on the FSDO ramp are limited with little expansion opportunities. As such, the airport has allowed for private general aviation facility development to the southeast of the intersection of Runway 11-29 and Runway 18-36. **Exhibit**

The eastern general aviation facilities currently on the FSDO ramp are limited with little expansion opportunities.

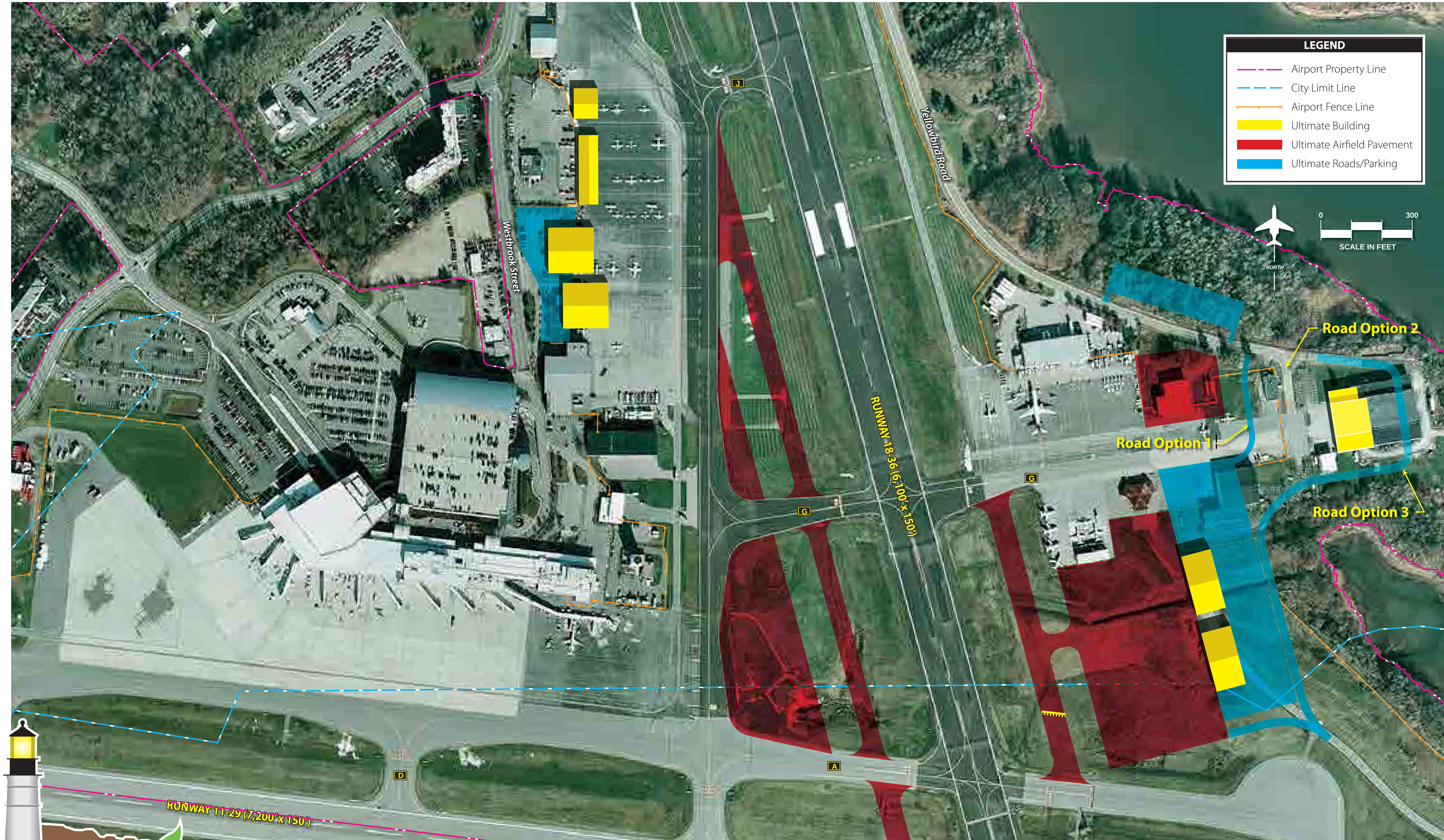
LEGEND
Airport Property Line
City Limit Line
Airport Fence Line
Ultimate Building
Ultimate Airfield Pavement
Ultimate Roads/Parking
0
300
SCALE IN FEET
NORTH
Road Option 1
Road Option 2
Road Option 3
RUNWAY 18-36 (6,100' x 150')
RUNWAY 11-29 (7,200' x 150')
Westbrook Street
Yellowbird Road
J
G
G
G
A
D

Exhibit 5M

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5N illustrates the proposed South General Aviation Development Plan for the area based on the outcome of the previous master planning effort. The southern general aviation development area will be privately developed so any plan here would be a potential. The final approved concept will likely be achieved through agreement between the private developer and the airport as demand dictates. The plan included on **Exhibit 5N** does indicate that the area could support seven additional hangars and a fuel storage area. The proposed hangar development could include a mix of large conventional hangars, smaller executive hangars, and T-hangars. As mentioned, however, this plan will only serve as a guide with the final development plan worked through agreement as demand dictates.

Air cargo development alternatives are straightforward. The existing air cargo facilities can support another aircraft position but no more without additional facility construction. Moreover, the proposed development of an east side parallel taxiway would require relocating the four Caravan aircraft parking positions. As such, the analysis should consider the potential for providing additional cargo spaces.

Exhibit 5M presents the air cargo expansion plan put forth in the previous planning effort. As shown, the area immediately south of the eastern hangar area could support a large cargo facility development, including two sort buildings and a sizeable apron. The primary challenge with the plan would be routing vehicular and truck traffic to the facilities. Yellowbird Road would have to be extended south to the facilities via one of the three options shown on the exhibit. Options 1 and 2 would route the road in a manner to segregate the airport maintenance facility from the secured side of the airport. Option 3 would require the demolition of a portion of the existing maintenance facility so that the road could be routed around an improved or newly constructed maintenance building. Option 3 would be most ideal for airport maintenance operations as the facility would be within the secured side, whereas Options 1 and 2 would segregate the facility completely.

GENERAL AVIATION AND AIR CARGO SUMMARY

General aviation and air cargo are very important aviation demand elements at the Jetport. While neither will likely follow a dynamic or explosive growth curve over the planning period, both are currently constrained from meeting projected long-term demand levels. Moreover, airside geometry improvements involving relocating Taxiway G and the development of an east side partial parallel taxiway will further tax existing eastern landside facilities. As such, proper planning should continue to put forth expansion options for both operation groupings.

The general aviation options included on **Exhibits 5M and 5N** will more than satisfy projected demand levels. The primary issue with implementing the facility development will be funding. Hangar construction can be costly, generating a relatively higher-than-historical cost to the user. As such, demand will typically define the type of hangar to be constructed. Historically, T-hangars have been a popular solution for small aircraft storage. More recently, however, the T-hangar option has presented a higher cost per storage unit than the market will bear. Thus, T-hangar construction has become rarer, whereas larger executive box and conventional hangars have filled the storage gap.

Air cargo facility development can be difficult as the logistics of the industry has changed significantly over the last 30 years. Most air cargo handlers have found that ground movements are much more cost-effective and have elected to limit air freight operations. This has occurred at the Jetport as only one dedicated carrier remains. If only one carrier continues going forward, the existing air cargo facilities could likely meet the long-term demand. If, however, an additional carrier were to locate at the Jetport or if the existing carrier significantly increased its shipments from the airport, additional facilities could be required as proposed on **Exhibit 5M**.

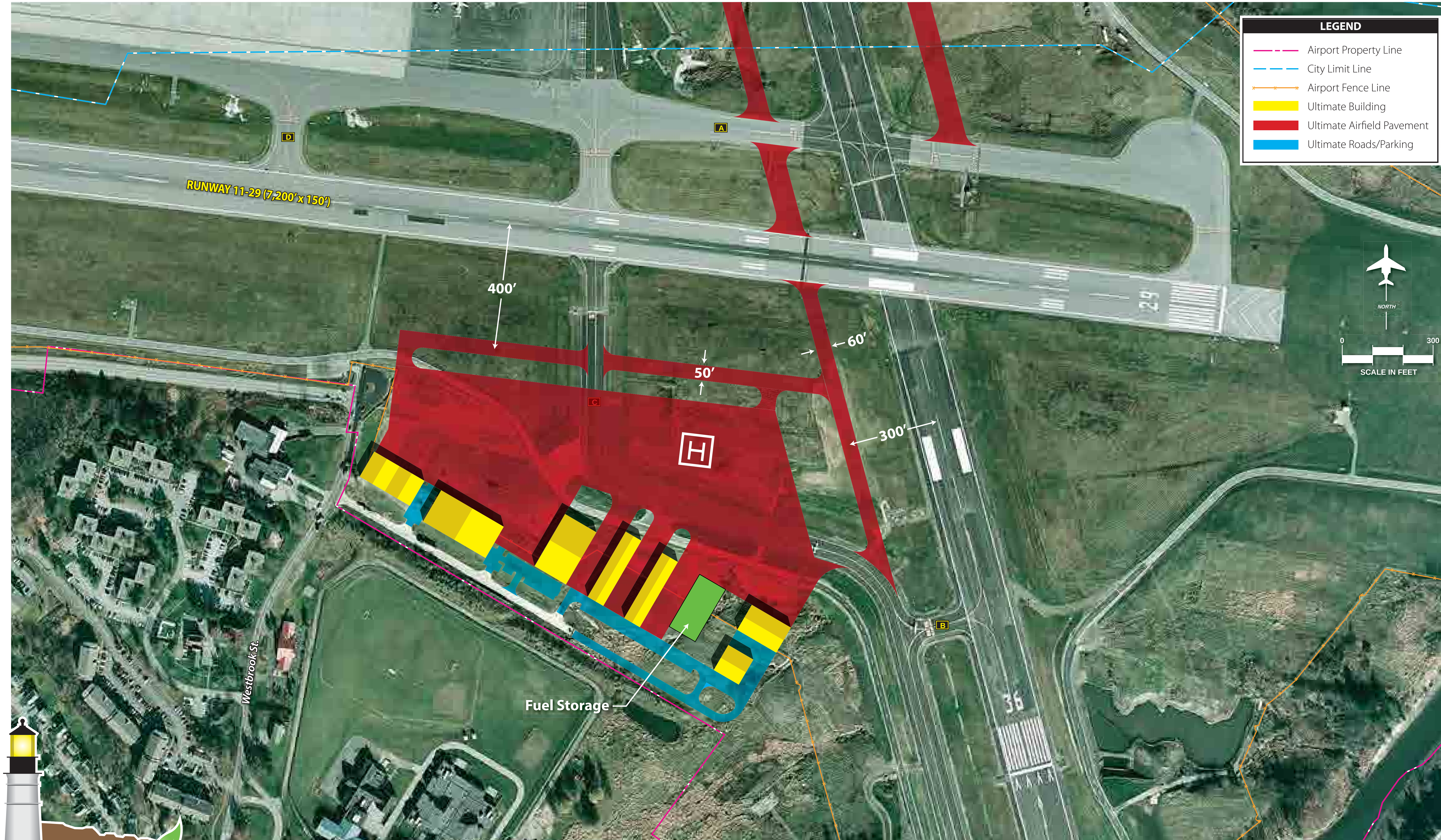
SUSTAINABILITY INITIATIVES

The planning process associated with this master plan generated a wide range of sustainability ideas for potential implementation at the Jetport. Idea generation drew from the Sustainability Baseline Assessment (see Chapter 3, *Sustainability Baseline Assessment*), interviews with Jetport staff, roundtable discussions with the PAC, the solicitation of feedback from the public, industry sources such as the Sustainable Aviation Guidance Alliance,[1] and examples from other airports.

This process also drew from the Airports Council International – North America's (ACI-NA) environmental goals and targets.[2] In 2009, the ACI-NA Environmental Affairs Committee adopted a set of ambitious, yet achievable, environmental goals and targets for its airport membership. Those most relevant to the Jetport and its burgeoning sustainability program are under the categories of Air Quality, Climate, and Energy and Waste Management. For example, under Air Quality, Climate, and Energy, ACI-NA anticipates that all of its "member airports will strive to have at least 25 percent of their loading bridges equipped with pre-conditioned air and 400 Hz electrification by 2019" and "will strive to conduct greenhouse gas emissions inventories by 2015."[3]

An evaluation process enabled an estimate of the extent to which these candidate initiatives might improve sustainability performance in a cost-effective manner. This process involved an Excel-based pro-

[1] Sustainable Aviation Guidance Alliance. (2016). *Sustainable Principles and Practices*. Retrieved January 11, 2016, from http://www.airportsustainability.org/
[2] ACI-NA. (2009). *ACI-NA Environmental Goals*. Retrieved January 13, 2016, from http://www.aci-na.org/static/entransit/board_enviro_goals_feb6.pdf
[3] Ibid.



LEGEND
Airport Property Line
City Limit Line
Airport Fence Line
Ultimate Building
Ultimate Airfield Pavement
Ultimate Roads/Parking
RUNWAY 11-29 (7,200' x 150')
400'
50'
60'
300'
H
Fuel Storage
Westbrook St.
A
B
C
D
29
36
NORTH
0
300
SCALE IN FEET

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gram, the Sustainability Action Evaluation Tool, which is included in the custom-built suite of Sustainability Planning Optimization Tools (SPOT) (see **Figure 5-1**). This tool incorporated a series of evaluation criteria under five broad categories:

- Feasibility;
- Goal Applicability;
- Asset Management;
- Estimated Costs; and
- Estimated Effects.

Feasibility: Feasibility criteria were internal, as influenced by the Jetport's organizational capacities and governance, and external, as influenced by regulating authorities (e.g., FAA, Maine Department of Transportation, and Maine Department of Environmental Protection). If the Jetport determined an action to be infeasible, then it did not consider it for implementation.

Goal Applicability: The applicability of candidate sustainability actions to the Jetport's sustainability goals was determined. If an initiative did not address any goals, then it was not considered for implementation.

Asset Management: In its CIP, the Jetport gives preference to projects that maintain or enhance existing capital assets. Accordingly, each candidate sustainability action was evaluated to see if it would make use of existing assets such as buildings and equipment or if it would require the acquisition or construction of new capital assets. Preference was given to candidate sustainability actions that maintained or enhanced its existing capital assets.

Estimated Costs: Candidate sustainability initiatives were examined against their financial requirements, including capital expenses, operations and maintenance (O&M) expenses, and staffing requirements. It also reviewed each action's anticipated return on investment (ROI).

Estimated Effects: The possible extent of impacts from the candidate sustainability actions as they relate to several environmental and social concerns was also considered. Some of these concerns pertain to the Jetport's sustainability goals, while others address a broader spectrum of sustainability topics. These concerns included:

- Greenhouse Gas Emissions Reduction;
- Energy Consumption and Generation;
- Air Quality and Human Health;
- Water Conservation;
- Waste Management and Recycling;
- Sustainable Materials;
- Regional Economic Benefit;
- Natural Resources;
- Climate Adaptation;
- Safety;
- Customer Satisfaction; and
- Employee Satisfaction.

Figure 5-1

To determine the extent of a candidate sustainability action's potential impact on the Jetport's sustainability performance, the Sustainability Action Evaluation Tool was used to produce impact scores for each action by criteria category and by total sum. This tool derives total impact scores by assigning a range of scores to each individual criteria and then evaluates each candidate action against those criteria. The tool sums and balances scores across categories by normalizing each category impact score by the number of criteria within each category. To emphasize specific evaluation criteria that are of greater value to the Jetport, some evaluation criteria was assigned a higher weight value, including Return on Investment within *Estimated Costs* and Energy Consumption and Generation and Greenhouse Gas Emissions Reduction within *Estimated Benefits*. These criteria, therefore, had a greater impact on the total impact scores.

Once the Sustainability Action Evaluation Tool assigned each candidate sustainability action a total impact score, the Jetport ranked the actions by these scores and by sustainability category. In consultation with its employees, the Jetport then adjusted the prioritization of these actions based on the Jetport's specific operating environment.

The candidate sustainability initiatives that were evaluated using the Sustainability Action Evaluation Tool follow along with brief descriptions of these actions. Their order reflects priority status based on their evaluation scores and input received from the Jetport's internal stakeholders. These actions represent opportunities to improve the Jetport's overall sustainability performance. The Jetport will consider their implementation as resources become available and as they remain applicable.

GREENHOUSE GAS EMISSIONS INITIATIVES

Post "No Idling" signs around the Jetport property, particularly targeted toward taxis and livery cars - The Jetport should install "no idling" signs around Jetport property to remind visitors, particularly taxis and livery cars, to turn off their vehicles while not in motion. This would reduce associated greenhouse gas emissions and the generation of other air pollutants. It could also improve the visitor experience by minimizing associated noise. These signs could serve as an educational tool that would raise visitor awareness of the environmental impact of vehicle idling to discourage against idling at other locations in and outside the Jetport.

Note: The City of Portland has an anti-idling ordinance (Chapter 28, Section 28-195); however, this only applies to private passenger vehicles.

Prepare an annual Jetport-wide greenhouse gas emissions inventory, and voluntarily report the Jetport's carbon performance - Annual greenhouse gas emissions reporting would enhance the Jetport's accountability, improve communication with internal and external stakeholders, and serve as a tool to encourage and measure future greenhouse gas emissions reductions. Such reporting may also strengthen funding pursuits for projects that would reduce the Jetport's greenhouse gas emissions. The Carbon Disclosure Project (https://www.cdp.net) is one potential reporting mechanism.

Encourage tenants to procure alternative fuel and/or fuel-efficient ground support equipment - The Jetport could offer incentives to encourage tenants to replace petroleum-based ground support equipment with low emission and/or fuel-efficient alternatives and thereby reduce the Jetport's overall negative impact on air quality by reducing associated greenhouse gas emissions and criteria pollutants. Incentives may include preferred facility locations and/or other financial discounts.

Use warm-mix asphalt instead of hot mix asphalt, where applicable - The Jetport should determine the feasibility of replacing hot-mix asphalt with warm-mix asphalt on a project-by-project basis. This would decrease the amount of process energy by lowering the temperature at which the asphalt mixture is produced and applied. This would also decrease the amount of generated greenhouse gas emissions and other air pollutants. Additionally, warm-mix asphalt could reduce project timeframes because of lower viscosity and better workability. Areas like parking lots, taxiways, and aprons are examples of where warm-mix asphalt can be applied.

Encourage the procurement of hybrid/alternative-fuel vehicles among rental car companies - Rental car companies at the Jetport generate a significant amount of vehicle miles traveled at the Jetport and in the surrounding areas. By encouraging rental car companies to procure and promote hybrid or alternative fuel vehicles, the Jetport could indirectly reduce the emission of greenhouse gases and other air pollutants. Such encouragement could take the form of financial incentives or priority accommodations. The Jetport could encourage rental car customers to rent these vehicles through targeted marketing.

Provide pre-conditioned air (PCA) at all commercial service aircraft gates - The Jetport could outfit its jet bridges with PCA supply modules that would connect to parked aircraft. PCA would provide clean air for aircraft, eliminating the need for aircraft tenants to operate standalone gas-powered air compressors. Using PCA instead of standalone modules would increase the Jetport's energy consumption but reduce overall greenhouse gas emissions and improve local air quality.

Install public charging stations in the garage to accommodate electric vehicles - Installing public electric vehicle charging stations would facilitate the use of electric vehicles for Jetport users traveling to and from the Jetport; electric and plug-in hybrid vehicles produce less local and regional air emissions.

Expand the use of CNG among the Jetport's fleet vehicles - As the necessary fueling infrastructure becomes more available at the local level, the Jetport could consider converting its petroleum oil-based fleet vehicles to compressed natural gas (CNG). This would reduce the Jetport's overall negative impact on air quality by reducing the associated emission of criteria pollutants and greenhouse gases and could potentially provide long-term financial benefits through reduced fuel costs. The Jetport's fleet vehicles include ground support equipment, including tugs and tows, and other operational vehicles.

ENERGY INITIATIVES

Implement a Jetport-wide IT energy conservation program - A Jetport-wide IT energy conservation program would help reduce the plug load from personal computers and other electronic equipment, thereby reducing the overall electricity use at the Jetport.

Continue to install occupancy sensors for lighting systems throughout the Jetport's occupied spaces, including tenant spaces - Installing lighting occupancy sensors within the Jetport's occupied facilities would automatically shut off lighting in unoccupied spaces, likely reducing overall energy use.

Outfit existing vending machines with "Watt Stoppers" - Installing "Watt Stoppers" for vending machines would reduce Jetport energy usage by automatically shutting off power during extended periods of inactivity.

Upgrade the building envelope of the Old Terminal - Enhancing the doorway and window seals, building insulation, and flooring and roofing materials would reduce the heating and cooling requirements of Jetport facilities, leading to reductions in energy and fuel consumption.

Install a pilot-controlled airfield lighting system - A pilot-controlled airfield lighting system would reduce Jetport energy consumption by extinguishing airfield lighting when not needed.

Evaluate the potential for combined heat and power systems at Jetport facilities, where applicable - Combined heat and power (CHP) systems capitalize on the heat produced by facility systems and provide opportunities for improved energy efficiency.

Continue to upgrade lighting within the parking garage to LEDs - The Jetport could continue to upgrade the lighting within its parking garage with LEDs. LED lighting provide significant benefits over traditional lighting, including reduced electricity consumption and related costs as well as reduced maintenance requirements. They may also provide enhanced lighting quality, thereby improving safety conditions.

Determine the feasibility of replacing outdated HVAC equipment in the Old Terminal with more efficient alternatives - Replacing outdated HVAC equipment with more efficient alternatives would lead to improved energy and fuel consumption efficiency at the Jetport.

Retro-commission the building systems at the Old Terminal - Retro-commissioning of the building systems provides a procedural approach to verifying the operability and efficiency of the building systems to identify and correct inefficiencies or damaged components.

Develop and implement an energy audit program - An energy audit program with regularly scheduled energy audits and standard record keeping processes would enable the Jetport to gather and retain accurate records of Jetport energy usage and identify trends and opportunities for improvement.

Consider ways to improve the energy efficiency of the Jetport's baggage handling system - Baggage handling systems at airports have large energy loads. By upgrading system components, the Jetport can create significant energy savings. This may include the conversion of a friction-based belt system to one that has teeth; variable frequency drives (VFDs) to provide speed controls when the baggage handling system does not require full-speed operation; and the creation of an energy management zone, which would enable the Jetport to shut the baggage handling system down when not in use.

Support the development of an on-site solar power purchase agreement to increase the Jetport's consumption of renewable energy - Supporting a solar power purchase agreement (PPA) would enable the Jetport to increase the percentage of renewable power consumed. Solar PPAs also typically offer reduced electricity rates compared to traditional power sources.

Note: The City of Portland recently put out a Request for Proposals for a Solar PPA at municipal properties, including the Jetport. It did not receive responses for the Jetport due to glare concerns and the associated installation costs. The Jetport considers this a long-term opportunity, as conditions and costs may change.

WASTE MANAGEMENT INITIATIVES

Convert or replace the existing waste management contract with one that is performance-based - Converting or replacing the existing waste management contract with a performance-based contract provides built-in incentives for the waste management contractor to keep accurate records of waste disposal and continually identify opportunities for recycling, composting, or other reuse.

Design and implement a recycling awareness campaign for employees and passengers - A recycling awareness campaign at the Jetport would seek to improve internal and external awareness of recycling practices in an effort to improve overall diversion rate and reduce unwanted mingling of recyclables with trash.

Make permanent the existing composting pilot program and expand it beyond the Jetport's back-of-house food preparation to include the passenger/public organic waste stream - By increasing the scope and organization of the existing composting program, the Jetport could further reduce waste generated and improve the volume of compostable materials. Expanding the program to passengers and public spaces also increases program visibility.

Encourage restaurants to coordinate and use compostable/recyclable disposable cups, plates, and cutlery - Through financial, policy, or contractual incentives, the Jetport may encourage food-dispensing tenants to use compostable or recyclable dishes and flatware in order improve the Jetport's overall diversion rate.

Increase the number of recycling bins and strategically co-locate them with standard trash receptacles throughout the Jetport's facilities and exterior spaces to maximize use - The Jetport may be able to improve the overall diversion rate by providing more bins for recycling and more convenient and intuitive locations for recycling bins.

Conduct regular waste audits - A waste audit program at the Jetport would enable the Jetport to systematically track waste generation, diversion rates, and other metrics associated with waste and record this information in standard formats. Armed with this information, the Jetport may identify trends and opportunities to improve waste disposal practices.

Explore the potential to process spent deicing fluid into usable Type I aircraft deicing fluid to be reused at the Jetport - The Jetport's deicing recycling contractor, Inland Technologies, has a patent on processing spent deicing fluid into usable Type I aircraft deicing fluid. The Jetport could take advantage of this capability, with FAA approval, to close the loop on the on-site use of manufactured glycol for aircraft applications. This would reduce associated chemical sourcing and costs. Pending market conditions, the Jetport could use this technology to generate revenue by selling excess re-manufactured glycol to other airports and off-site entities.

GROUND ACCESS AND TRANSPORTATION INITIATIVES

Encourage employees and passengers to use the existing bike and walking paths connected to the Jetport, while advocating for their enhancement - The Jetport could promote the use of existing bike and walking paths among employees and passengers. This could reduce related greenhouse gas emissions and demand for on-site parking. Promotion could be conducted through the creation and publication of related maps, improving on-site infrastructure, and incentives – potentially linked to the Jetport's employee Safety Incentive Program.

Continue to work with regional entities to enhance/expand public transportation service to the Jetport and establish connections to local points of interest - The Jetport could work with regional entities to provide greater access to PWM through an expansion of public transportation services. This would greatly decrease the environmental impact of visitors traveling to and from the Jetport by reducing the generation of related greenhouse gas emissions and other air pollutants. A focus of this strategy should be establishing earlier runtimes to accommodate the Jetport's first-shift employees. This strategy should also consider connections to local points of interest such as the Casco Bay Ferry Terminal and Thompson's Point.

Work with regional transportation and institutional entities to develop a bike-sharing program with connections to the Jetport - The Jetport could work with regional entities to develop a local bike-sharing program that would offer employees and visitors an additional option to travel to and from the Jetport. This could be done in association with the City of Portland, who has already expressed an interest in establishing such a system; a Request for Information was sent to vendors in 2014. A bike-sharing program would reduce greenhouse gas emissions and other air pollutants, decrease on-site demand for parking, and promote health and wellness through physical activity.

Promote ridesharing for employee commutes - The Jetport could promote ridesharing opportunities to reduce employee vehicle miles traveled, which would decrease related greenhouse gas emissions and the generation of other air pollutants to better regional air quality. It would also decrease on-site demand for employee parking. Promotion could take the form of preferred parking and/or online boards such as Zimride by Enterprise (https://www.zimride.com/).

Install displays in the baggage claim area that provide information on local transportation options as well as promote the use of related websites and mobile apps - To assist passengers in navigating the Portland area, the Jetport could install displays in the baggage claim area that provide information on local transportation options. Given that this information would not be available once a passenger leaves the Jetport, local websites and mobile applications that provide similar information should be promoted. This strategy would assist passengers in efficiently coordinating their travel plans, helping to make their trips less stressful.

Update the employee transportation survey - To better understand employee commuting behavior, the Jetport could administer an update to its employee transportation survey. The findings of this survey could help to identify related challenges and opportunities. Such baseline information could be leveraged to make employee commuting more efficient and enjoyable.

Group hotels by their proximity to one another and consolidate shuttle buses by hotel group - The Jetport could coordinate with local hotels to establish hotel groupings based on geography and establish consolidated shuttle services for each grouping. This would reduce vehicle miles traveled by hotel guests traveling to and from the Jetport, which would limit the generation of greenhouse gas emissions and other air pollutants.

Obtain up-to-date traffic counts for Jetport roadways, including curbside counts, when appropriate - Based on need, determined on a project-by-project basis, the Jetport could gather traffic counts for on-airport roadways and curbside areas to establish baseline conditions from which future transportation planning could be conducted. Such data could also be utilized in a Jetport-wide greenhouse gas emissions inventory.

SOCIAL RESPONSIBILITY INITIATIVES

Increase local collaborations by participating in local and regional partnerships and working groups - The Jetport could increase its visibility in the community through increased partnerships and collaborations. These relationships would assist all organizations involved in improving their sustainability performance by leveraging combined resources, where appropriate, and sharing best practices.

Develop an external communications plan focused on the Jetport's sustainability program - The Jetport could share information on its sustainability program with its external stakeholders to enhance the transparency of its operations and keep it accountable for its sustainability performance. Further, it could create a conversation around sustainability that would bring attention to the issue and lead to stakeholder collaborations. For this effort, the Jetport could utilize communication platforms such as its website, in-person presentations and webinars, conference participation, and social media.

Develop an internal sustainability awareness program to communicate the Jetport's sustainability guidelines and related practices to its employees and tenants - The Jetport could develop internal sustainability awareness by communicating elements of its sustainability program, including its goals, objectives, and targets as well as past, current, and future actions, to its staff and tenants. Building internal awareness invites participation and creates a shared sense of ownership to improve its sustainability performance. Such a strategy would also assist the Jetport in fostering an inclusive organizational culture. Communicating elements of the Jetport's sustainability program can be accomplished by posting the sustainability guidelines in all employee spaces and including sustainability updates in frequently read employee communications, among other methods.

Delineate and promote the use of a wellness/walking path within the terminals - The Jetport could designate walking paths within the passenger terminal to offer employees and passengers the opportunity to get physical exercise during their downtime. The walking paths could be marked with signage to promote their utilization and track distance. This signage could be augmented with educational displays related to living a healthier lifestyle or other sustainability principles.

Work with regional entities such as Portland Trails to seek the establishment of a public trail along the Fore River - The Jetport could reach out to local groups that have the aim to enhance regional bicycle and pedestrian infrastructure such as Portland Trails (http://trails.org/) and seek to develop trails adjacent to the Jetport within two to five years – particularly along the Fore River in the resource protection zone adjacent to Yellow Bird Road. This would be with the understanding that no through access of the airport's east perimeter would be provided, and this would be an in-and-out trail. Public trails can enhance the quality of life for local residents, contribute to a sense of place, and conserve and/or create green space.

Conduct regular employee satisfaction surveys - The Jetport could administer a regular employee satisfaction survey to offer its employees an opportunity to provide feedback on the challenges they face in their workplace as well as opportunities for improvement. Resulting actions could improve employee satisfaction. Regular surveys would allow the Jetport to determine changes in employee satisfaction over time.

Create indoor landscaped areas that celebrate and display flora of Maine - The Jetport could expand indoor landscaping to enhance the aesthetics of the its occupied spaces and to foster a sense of place. These indoor plantings could be context sensitive by including flora that is native to Maine. Further, indoor plantings would improve indoor air quality.

Create a curbside rental car drop-off - Create a more accessible rental car drop-off, perhaps at curbside or in the lower level of the parking garage with elevator access, to improve the connection between the rental car return area and the terminal building. Reducing the walking distance between these areas would enhance the Jetport's convenience, thereby improving passenger satisfaction.

Conduct a walkability assessment of the terminal building - A walkability assessment of the terminal building would evaluate the structure based on a series of characteristics such as pedestrian room/space to maneuver, presence of bottlenecks or bottlenecking equipment, ease of wayfinding, or perceived safety. From the results of the walkability assessments, the Jetport may decide to pursue improvements that address identified deficiencies, particularly as they pertain to improving conditions for the elderly, persons with disabilities, and other travelers with special needs. The results of the walkability assessments may also be used to direct the planning and design of future facilities.

Enhance the existing and/or create a new public airfield observation area - By enhancing and/or constructing a new public airfield observation area, the Jetport would provide a community benefit in the form of a passive recreational opportunity. The airfield observation area would allow the public to view aircraft take-offs and landings. The space could be leveraged to provide a history of aviation in the local community and to highlight the Jetport's sustainability activities.

GOVERNANCE INITIATIVES

Include a requirement on all capital improvement applications to identify a proposed project's sustainability elements and any known alternatives that serve the same purpose with greater efficiency and/or environmental/social performance - As part of its CIP process, the Jetport could request that all capital improvement applications identify a project's sustainability elements. With such a request, the Jetport would be asking the applicant to consider sustainability during the early stages of project planning. This could lead to the discovery of potential alternatives or enhancements that would make the project more sustainable. Further, documentation of the sustainable elements of a project could be used in future reporting.

Establish the Jetport's focus on sustainability as one of its core values and communicate these values to the its stakeholders - By establishing sustainability as one of its core values, the Jetport would demonstrate its commitment to integrating sustainability principles into its day-to-day decision-making and organizational culture. These values could be prominently displayed in all employee spaces to raise awareness. They could also be communicated to its other stakeholders to guide engagement activities.

Incorporate the Jetport's sustainability guidelines into future tenant and service contracts, and provide training on these guidelines, as needed - The Jetport could incorporate its sustainability guidelines into its leases and contracts as well as provide appropriate trainings to ensure that its sustainability aspirations are properly integrated into the work performed by its tenants and service providers. Incorporating sustainability metrics into these documents would assist the Jetport in the tracking and reporting related performance as well as to identify opportunities for improvement.

Publish an annual “scorecard” to report on the Jetport's ongoing sustainability performance - The Jetport can use an annual sustainability scorecard as a mechanism to report its sustainability performance relative to its goals and targets. This would enhance the Jetport’s transparency of operations as well as keep it accountable for continuous performance improvement. Through this channel of communication, the Jetport can take a leadership position in sustainability – within its industry and community – to set an example for others to follow. The Jetport can leverage this leadership position to foster dialogues that can address shared responsibilities. The Jetport can publish its annual sustainability scorecard to its website among other digital means of distribution.

WATER QUALITY INITIATIVES

Utilize GIS technology to inventory, monitor condition, and schedule maintenance/replacement of stormwater conveyance and control infrastructure - A task of this master plan included creating a detailed geospatially referenced inventory of stormwater conveyance and control infrastructure. Also included were photos, dates of last inspection, installation dates, elevations, size and a statement of conditions. Utilizing GIS technology to maintain this inventory and schedule maintenance and replacement of stormwater systems will help provide a cost-effective functional stormwater system.

Install additional “green” on-site stormwater management infrastructure, where appropriate - “Green” stormwater management infrastructure such as bioswales, rain gardens, and permeable pavements naturally control and/or treat stormwater. Such projects can minimize stormwater runoff at the Jetport; however, their design must avoid attracting unwanted wildlife to ensure safety of aircraft operations.

Harvest rainwater to reduce the volume of the Jetport’s stormwater runoff - The practice of harvesting rainwater on-site would also allow the Jetport to minimize its stormwater runoff. Using the harvested rainwater in non-potable applications such as landscaping (i.e., irrigation), this practice could reduce the Jetport’s water consumption and related costs.

NOISE INITIATIVES

Identify any existing and planned noise-generating mechanical systems and relocate them away from residential areas, where applicable and feasible – Relocating existing noise generating mechanical equipment away from residential areas, where applicable and feasible, would lessen the impact of such noise on sensitive sites, potentially improving community relations. The Jetport should continue to consider potential noise impacts in the planning and design of new facilities.

Require construction contractors working on the Jetport to mitigate unwanted noise and vibration to the greatest extent practicable – When appropriate, the Jetport could stipulate noise and vibration mitigation measures in its contractor specifications to lessen related impacts from the construction of future on-site facilities. To the extent practicable, the Jetport should ensure compliance through regular monitoring.

With NAC input, and within two to five years, review the Jetport's voluntary preferential use of Runway 11-29 – The voluntary preferential use of Runway 11-29 is one of the FAA-approved measures from the 2005 Part 150 Study. Since its implementation, neighbors have raised concerns on how well it is followed. The Jetport can review the preferential use program with the NAC and look for means to further encourage voluntary compliance. The review is needed to ensure the Jetport's outreach to pilots is following best practice and is providing the most effective compliance possible.

Continue to monitor operations and noise complaints with the NAC to recommend an update to the 14 CFR Part 150 study at the appropriate time – Current operational levels suggest that an update in the short term would be premature. The Jetport along with the NAC can continue to monitor changes in operational levels, aircraft fleet mix, compliance with the current noise abatement program, as well as noise complaints for when an update to the Part 150 study would be appropriate.

CONCLUSION

The purpose of the alternatives discussion is to present a variety of solutions to specific issues that have emerged during the Master Planning process. The master plan alternatives along with sustainability initiatives were considered by the Planning Advisory Committee (PAC), Jetport staff, the City of Portland, airport operators, and the public at-large. Based on the feedback received and the expertise of the consultants, a recommended master plan concept was developed.

The purpose of the alternatives discussion is to present a variety of solutions to specific issues that have emerged during the Master Planning process.

The major elements considered in the alternatives discussion were:

- Hold Lines: Several holding position markings can be modified to meet FAA design standards, while some may need to remain (Taxiway C/Taxiway A intersection). The ILS holding position is problematic as it is closely spaced with the Runway 18-36 holding position and also creates a snow removal issue. Realigning Taxiway A further from the glideslope will place the taxiway outside the glideslope critical area, allowing the holdline at the Taxiway A terminus with Runway 29 to be used in all weather conditions.

- Commercial Airline Terminal Building and Parking Apron: The primary questions to answer include development options for additional departure gates, increased aircraft parking wingtip clearance, baggage claim, FIS development, belly freight facility, and deicing apron capacity and efficiency.
- General Aviation: The analysis provides options for north and south GA development options.
- Air Cargo: Air cargo growth could require additional facility development in the future. Limited air cargo development options are available, with those presented on **Exhibit 5M** being the most realistic to provide for all-air cargo operations.

The remaining chapters will be dedicated to refining these basic alternatives and sustainability initiatives into a final development concept and sustainability plan with recommendations to ensure proper implementation and timing for a demand-based capital development program that meets FAA design standards to the greatest degree feasible.

Portland International Jetport

CHAPTER SIX

RECOMMENDED MASTER PLAN CONCEPT

Portland International Jetport

CHAPTER SIX

RECOMMENDED MASTER PLAN CONCEPT

The sustainable airport master plan for Portland Interna. onal Jetport (PWM) has progressed through a systematic and logical process with a goal of formulating a recommended 20-year development plan. The process began with an evaluation of existing and future operational demand which aided in creating an assessment of future facility needs. Those needs were then used to develop alternative facility plans to meet projected needs. Each of those steps in the planning process has included the development of draft working papers which were presented and discussed at previous Planning Advisory Committee (PAC) meetings.

The PAC is comprised of several constituencies with an investment or interest in Portland International Jetport. Included in the PAC were representatives from the Federal Aviation Administration (FAA), the Portland International Jetport administrative staff, City of Portland, adjacent community representatives, Maine Department of Transportation, passenger airlines, air cargo, airport businesses, and local and national aviation associations. This diverse group has provided extremely valuable input into the recommended plan.

In the previous chapter, several development alternatives were analyzed to explore options for the future growth and development of Portland International Jetport. The development alternatives have been ref ned into a single recommended concept for the master plan. This chapter describes, in narrative and graphic form, the recommended direction for the future use and development of Portland International Jetport.



The recommended concept provides the ability to meet the disparate needs of the array of airport operators, including commercial airlines, general aviation, and the military. The goal of this plan is to ensure that the airport can continue to serve, and even improve, in the primary role of serving as the State of Maine and the Greater Portland Region's commercial passenger service platform. The role also includes serving all other aviation segments, such as commercial air cargo and general aviation users. The plan has also been specifically tailored to support existing and future growth of all forms of potential aviation activity as the demand materializes.

The recommended master plan concept, as shown on **Exhibit 6A**, presents a long-term configuration for the airport which preserves and enhances the role of the airport while meeting FAA design standards. The phased implementation of the recommended development concept will be presented in Chapter Six - Capital Improvement Program. The following subsections describe the key details of the recommended master plan concept.

The Jetport is classified by the FAA as a small hub, primary commercial service airport, as designated in the *National Plan of Integrated Airport Systems* (NPIAS). NPIAS airports are considered important to the national aviation infrastructure and, as such, are eligible for development grant funding from the FAA. The 2006 Maine Aviation Systems Plan (MASP) classifies the Jetport as a Level I Airport which should be designed to accommodate national and regional air carrier commercial service airlines, as well as the full range of general aviation activity. The recommended plan developed in this study process supports the national and state classifications, as well as the associated goals and objectives of each.

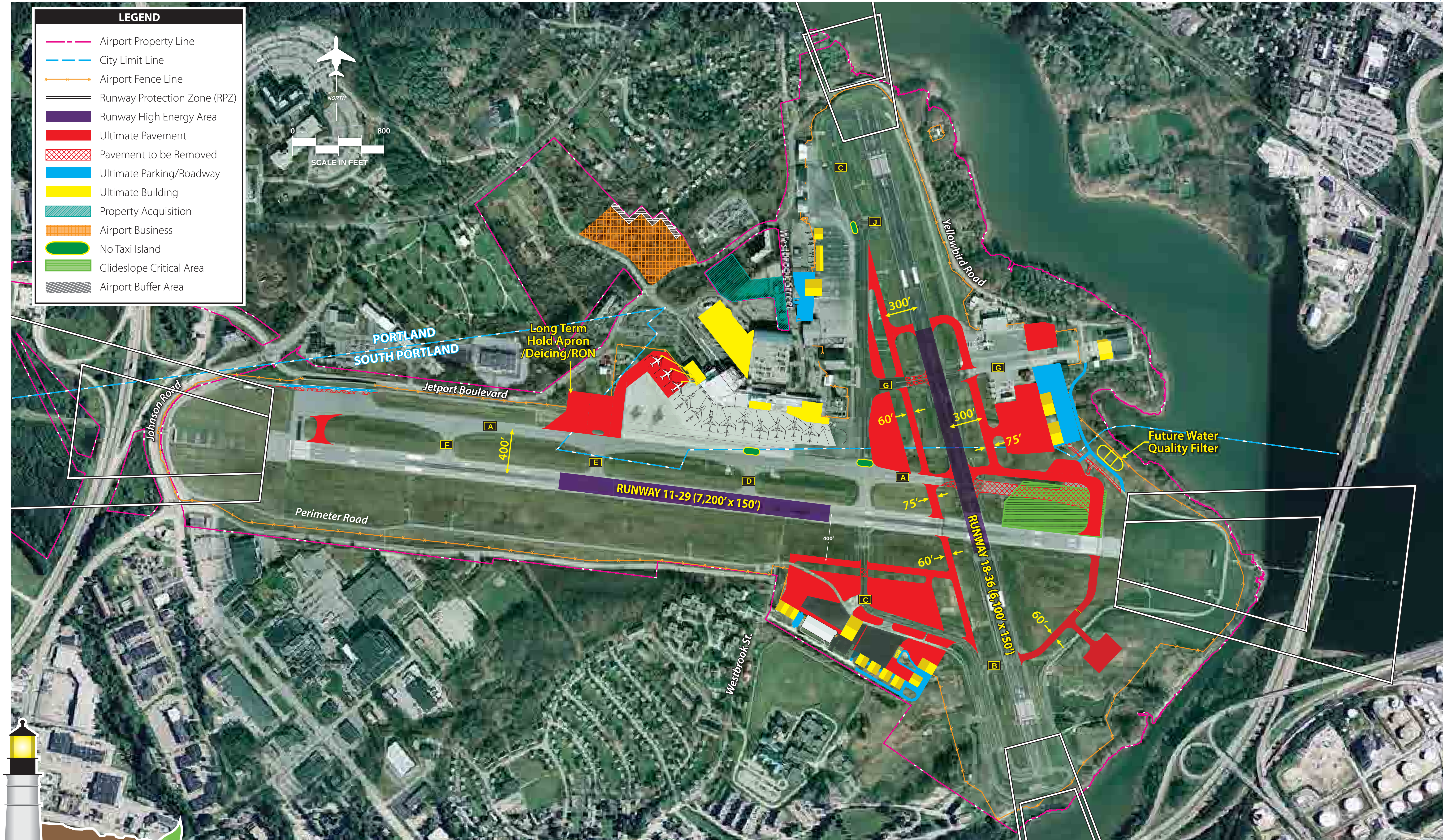
AIRSIDE CONCEPT

The airside plan generally considers those improvements related to the runway and taxiway system. The Jetport is currently served by a crosswind runway configuration. These two pavement surfaces position the airport to attract and support a wide array of aviation operations. The airport's primary function is to serve the civilian aviation fleet in which the airport functions ideally. The airport also serves to support military functions on occasion.

DESIGN STANDARDS

The FAA has established design criteria to define the physical dimensions of runways and taxiways, as well as the imaginary surfaces surrounding them, to enhance the safe operation of aircraft at the airport. These design standards also define the separation criteria for the placement of landside facilities.

As discussed previously, the design criteria primarily center on the airport's critical design aircraft. The critical aircraft is the most demanding aircraft, or family of aircraft, which currently, or are projected to, conduct 500 or more operations (take-offs and landings) per year at the airport. Factors included in airport design are an aircraft's wingspan, approach speed, tail height and, in some cases, the instrument approach visibility minimums for each runway. The FAA has established the Runway Design Code (RDC)


LEGEND
Airport Property Line
City Limit Line
Airport Fence Line
Runway Protection Zone (RPZ)
Runway High Energy Area
Ultimate Pavement
Pavement to be Removed
Ultimate Parking/Roadway
Ultimate Building
Property Acquisition
Airport Business
No Taxi Island
Glideslope Critical Area
Airport Buffer Area
NORTH
0
800
SCALE IN FEET
PORTLAND
SOUTH PORTLAND
Long Term Hold Apron /Deicing/RON
Jetport Boulevard
Johnson Road
Perimeter Road
Westbrook Street
Westbrook St.
Yellowbird Road
RUNWAY 11-29 (7,200' x 150')
RUNWAY 18-36 (6,100' x 150')
Future Water Quality Filter
400'
300'
300'
60'
75'
75'
60'
60'

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to relate these design aircraft factors to airfield design standards. The most restrictive RDC is also considered the overall Airport Reference Code (ARC).

While airfield elements, such as safety areas, must meet design standards associated with the applicable RDC, landside elements can be designed to accommodate specific categories of aircraft. For example, an airside taxiway must meet taxiway object free area (TOFA) for all aircraft types using the taxiway, while the taxilane into a T-hangar area only needs to meet width standard for smaller single and multi-engine piston aircraft expected to utilize the taxilane.

DESIGN AIRCRAFT

As discussed at length in Chapter Four – Airport Facility Requirements, the design aircraft is defined by that category of aircraft which accounts for 500 or more operations annually and can differ for each runway at an airport. The overarching airfield design criteria is designated by the Airport Reference Code (ARC), which is defined by the airport's critical aircraft. Each runway at an airport is categorized in a similar fashion, but that singular runway design criterion is called the Runway Design Code (RDC). The airfield ARC is the most taxing RDC for the airfield and is typically applied to the primary runway. The design aircraft is identified by several components, including its Aircraft Approach Category (AAC), Airplane Design Group (ADG), Approach Reference Code (APRC), Departure Reference Code (DPRC), and Taxiway Design Group (TDG). The APRC is represented in minimum runway visual range (RVR) feet.

For Primary Runway 11-29, the current RDC is defined by aircraft that fall in AAC C/D, ADG-IV, APRC-1600, and TDG-4, denoted as C/D-IV-1600-4.

For Primary Runway 11-29, the current RDC is defined by aircraft that fall in AAC C/D, ADG-IV, APRC-1600, and TDG-4, denoted as C/D-IV-1600-4. The one aircraft most representative of this category is the Boeing 757 utilized by FedEx, which is a C-IV with wheel base dimensions placing it in ADG 4. The APRC and DPRC is D-IV, as offered by the existing 400-foot runway to Taxiway A separation. Approach minimums for the runway are down to 600 feet RVR for specially equipped aircraft; however, the APRC is D/IV/1600, as noted in the Airport Design A/C for the existing runway to taxiway separation.

The ultimate design for Runway 11-29 should follow D-IV-1600-5 standards.

The current Runway 11-29 design of C/D-IV-1600-4 will be adequate to accommodate all existing and most planned aircraft, including the potential fleet transitions of commercial passenger aircraft. For Runway 11-29 ultimate design, however, a FedEx fleet change to an Airbus 300, Airbus 310, and/or Boeing 767 should be anticipated. These are D-IV aircraft which fall in TDG 5. Thus, the ultimate design for Runway 11-29 should follow D-IV-1600-5 standards.

The RDC for Runway 18-36 is currently, and projected to remain, B-III-5000-3. This indicates the runway is designed for those aircraft in B-III and is served by an instrument approach with not lower than 1-mile visibility minimums. The B-III category includes most general aviation aircraft except for some business jet models. This design will not conform to the full requirements of the commercial airline aircraft currently or forecast to use the airport; however, the current and ultimate design will allow the runway to accommodate use by larger transport aircraft on an infrequent basis as needed when the primary runway is closed for an emergency, snow removal, maintenance or when strong crosswinds dictate its use.

Runway Safety Areas

The Facility Requirements chapter discussed the requirements for the runway safety area (RSA), object free area (OFA), and obstacle free zone (OFZ). The greatest emphasis is the RSA, which must meet FAA design standard to the greatest extent practicable. Modifications to this standard are not permitted. The RSA is an area surrounding the runway that must be cleared of all penetrating obstructions, graded, drained, and capable of supporting an aircraft veer-off or emergency vehicles.

The existing and ultimate RSA for Runway 11-29 is 500 feet wide, extending 1,000 feet beyond each runway end. Only those navigational aids with frangible bases, such as runway edge lights and approach lights necessary for the safe operation of aircraft, are allowable within the RSA. The OFA must also be clear of penetrating obstructions, but it does not have to be capable of supporting an aircraft or emergency vehicle, like the RSA. The existing and ultimate OFA for these runways is 800 feet wide, extending 1,000 feet beyond the runway ends. Ownership of the RSA by the airport is required, while ownership of the OFA is not required but highly recommended. If the OFA is not owned and contained on airport property, some control measures need to be in place. The RSA and OFA for both runways currently meet design standard.

For Runway 18-36, the existing and ultimate RSA is 300 feet wide, extending 600 feet beyond the runway ends. The existing and ultimate OFA is 800 feet wide, also extending 600 feet beyond the runway ends. Runway 18-36 currently conforms to RSA and OFA standards.

The OFZ for both runways at the Jetport is 400 feet wide and extends 200 feet beyond all runway ends. Generally, the OFZ falls within the RSA. Like the RSA, the OFZ precludes penetrating obstructions except for frangible navigational aids necessary for safe operation of aircraft at the airport. The OFZ design standards are currently met at the airport, which is a condition that should be maintained in the future.

Runway Protection Zones

The RPZ is a trapezoidal area beginning 200 feet beyond the runway ends. The function of the RPZ is to protect people and property on the ground. Typically, this is achieved through airport ownership of the RPZs, although proper land use control measures, such as easements, are acceptable. The RPZs should be cleared of any incompatible objects or activities. Prohibited land uses include residences and places of public assembly, such as churches, schools, hospitals, office buildings, and shopping centers.

The FAA recommends that the airport sponsor own the RPZ property in fee simple. When fee simple ownership is not currently feasible, positive land use measures should be implemented to protect the airport from encroachment by incompatible land uses or obstructions.

Airport sponsors should follow existing guidance for meeting RPZ design standards for existing incompatibilities.

In September 2012, the FAA published *Interim Guidance on Land Uses within a Runway Protection Zone*. The guidance addresses actions necessary for new or modified RPZs. Any action that would introduce new land use incompatibilities into the RPZ will have to be specifically reviewed and approved by the FAA. Airport sponsors should follow existing guidance for meeting RPZ design standards for existing incompatibilities.

The existing RPZs for all runways at the Jetport extend beyond airport property. The only uses not considered compatible currently are roads located in the RPZs for Runways 11, 29, and 36. These roads are considered grandfathered as they currently exist in the RPZs. The ultimate Runway 29 RPZ would shift 400 feet to the east to accommodate the shifted landing threshold. This will place more of the RPZ over the interstate, thereby requiring FAA approval.

RUNWAY LENGTH

Runway 11-29 is currently 7,200 feet long by 150 feet wide. The current length and width are sufficient to accommodate the needs of aircraft operators most of the time. During very hot days, the length may require some aircraft operators to impose weight restrictions. Thus, the existing length of Runway 11-29 is considered adequate for existing and ultimate operations.

Runway 18-36 is currently 6,100 feet long by 150 feet wide. In the application of declared distances, both landing thresholds have been displaced: Runway 18 by 450 feet and Runway 36 by 500 feet. The threshold displacements are set to demark the end of usable runway length in the opposite direction so the remaining length plus available area beyond the pavement ends can serve as RSA. The four declared distances are defined as the following:

Runway 18 offers 5,600 feet ASDA, while Runway 36 provides 5,650 feet of ASDA. Both runway ends offer 5,150 feet of LDA.

Take-off run available (TORA) - The length of the runway declared available and suitable to accelerate from brake release to lift-off, plus safety factors.

Take-off distance available (TODA) - The TORA plus the length of any remaining runway or clearway beyond the far end of the TORA available to accelerate from brake release past lift-off, to start of take-off climb, plus safety factors.

Accelerate-stop distance available (ASDA) - The length of the runway plus stopway declared available and suitable to accelerate from brake release to take-off decision speed, and then decelerate to a stop, plus safety factors.

Landing distance available (LDA) - The distance from the threshold to complete the approach, touchdown, and decelerate to a stop, plus safety factors

The ASDA and the LDA are the primary considerations in determining the runway length available for use by aircraft, as these calculations must consider providing the full RSA standard. Thus, each runway offers usable lengths less than 6,100 feet with declared distances reduced to meet RSA requirements. Runway 18 offers 5,600 feet ASDA, while Runway 36 provides 5,650 feet of ASDA. Both runway ends offer 5,150 feet of LDA. The current operational lengths of the runway are practicably set by the Fore River and cannot be increased without substantial impact and investment. Thus, the plan does not propose any change to Runway 18-36.

RUNWAY STRENGTH

The FAA reports the pavement strength for Runway 11-29 at 75,000 pounds single wheel loading (S), 169,000 pounds dual wheel loading (D), and 300,000 pounds dual tandem wheel loading (DT). The strength ratings of a runway do not preclude operations by aircraft that weigh more; however, frequent activity by heavier aircraft can shorten the useful life of that pavement. The existing strength rating for Runway 11-29 is adequate to accommodate existing demand; however, it may need to be increased to meet future commercial airline operations.

Three aircraft models have a potential to enter the Jetport market with loading than current design. The Airbus 321 has a maximum take-off weight of 205,000 pounds, while the Boeing 737-800 and -900 models can have a maximum take-off weight of up to 195,000 pounds D. These aircraft would be operated for passenger airline service. FedEx could potentially shift to a Boeing 767-200 which has a DT rating of 361,000 pounds, while the Airbus 300 and 310 model options have 364,000 and 375,000 DT ratings. Obviously, the existing pavement strength should be upgraded to meet potential passenger or cargo airline operator needs when demand dictates. Planning should account for future opportunities to increase the Runway 11-29 pavement strength up to 205,000 pounds D and/or 375,000 pounds DT.

Planning should account for future opportunities to increase the Runway 11-29 pavement strength up to 205,000 pounds D and/or 375,000 pounds DT.

Runway 18-36 is strength-rated at 75,000 pounds S, 165,000 pounds D, and 300,000 pounds DT. This runway is primarily designed for RDC B-III but may be utilized by larger commercial service aircraft on an infrequent basis when the primary runway is not available. The current strength rating is adequate to handle all aircraft currently operating at the Jetport. Moreover, the current pavement strength is adequate to accommodate infrequent use by all aircraft types forecast to operate at the Jetport through the planning period, even the Airbus 321 and larger Boeing 737 models. While unlikely, if these aircraft were to regularly utilize Runway 18-36 (more than 500 operations annually), an increase in pavement strength would be needed similar to that proposed for Runway 11-29.

INSTRUMENT APPROACHES

The recommended concept includes maintaining existing approach minimums at current levels. Runway 11-29 is served by exceptional minimums down to CAT III on Runway 29. Runway 18-36 minimums at not-lower-than-one-mile are currently adequate for that runway's purpose. This runway could also support an LPV (localizer performance with vertical guidance) approach at these same minimums. Ultimately, a ¾-mile approach would be possible, but would require a wider RPZ and subsequent residential acquisition.

RUNWAY/TAXIWAY SEPARATION

There are two factors that primarily influence the FAA standards for runway/taxiway separation. The first is the type and frequency of aircraft operations as described by the applicable RDC, and the second is the capability of the instrument approaches available at the airport. The current RDC is C/D-IV for Runway 11-29 and B-III for Runway 18-36. Runway 11-29 has CAT-I, II and III (Runway 11 only) ILS precision instrument approach RVR visibility minimums down to 600 feet (Runway 11 only). Runway 18-36 is served by global positioning system (GPS) approaches with not-lower-than-one-mile visibility minimums.

Figure 6-1

Taxiway A is the airport's only current standard full length parallel taxiway. Serving the north side of Runway 11-29, Taxiway A is situated no closer than 400 feet to the runway as shown on **Figure 6-1**. The current location of Taxiway A meets all design parameters and will adequately serve Jetport operations through the planning period.


Figure 6-2

While the standard separation is met, the glideslope for the instrument landing system (ILS) serving Runway 29 is located between Taxiway A and the Runway. At the standard runway-taxiway separation, however, Taxiway A encroaches upon the glide slope's critical area. During instrument weather conditions, this requires aircraft to hold behind the taxiway until cleared to the runway. The additional taxi distance upon clearance increases delay for aircraft in both the arrival and departure queues, resulting in not only time delays but also increased fuel burn and subsequent energy consumption and GHG emissions. **Figure 6-2** depicts the recommended plan to realign Taxiway A to outside the glide slope critical area. This will permit aircraft to taxi into the normal holding position 250 feet from the runway end, thereby reducing delays. This will also reduce aircraft delays during snow removal from the critical area, as there will be sufficient space to move the snow between the critical area/runway object free area and the taxiway object free area.

Figure 6-3

Taxiway C is a quasi-parallel taxiway serving the west side of Runway 18-36 as depicted on **Figure 6-3**. At the northern and southern ends of Runway 18-36, Taxiway C is fully parallel to the runway at a separation of 300 feet. This separation is adequate to serve the runway with not-lower-than-one-mile visibility approach minimums.

Figure 6-4

TAXIWAYS

The recommended plan considers several modifications to the taxiway system at the Jetport, including the construction of two additional taxiways. First, the plan proposes reconfiguring quasi-parallel Taxiway C so it will be fully parallel to the west side of Runway 18-36. Second, the plan includes the construction of a partial-parallel taxiway to serve the east side of Runway 18-36 as shown on **Figure 6-4**.

As discussed in previous chapters, the primary purpose for reconfiguring Taxiway C is to provide a more standardized layout to minimize the potential for ground movement incidents. Reconfiguring the taxiway will provide a benefit for airline terminal apron and building space flexibility. As shown on **Figure 6-4**, reconfiguring the taxiway to parallel Runway 18-36 would allow for larger aircraft to utilize Gate 1 and ultimately extend the full upper level terminal building concourse to the east.

As noted, the plan also includes the construction of a partial parallel taxiway on the east side of Runway 18-36. This taxiway would extend between the FSDO ramp and Taxiway A. The partial parallel taxiway is proposed to improve four operational inefficiencies and/or FAA design criteria deficiencies:

1. Provides a more direct route to Runway 29 for all aircraft on the FSDO ramp to include FedEx's Boeing 757, thereby eliminating the current need to cross Runway 18-36 twice to reach Runway 29;

2. Aid in the long-term goal of eliminating direct access from the FSDO apron taxiway to Runway 18-36 (if Taxiway G is ultimately reconfigured); and,

3. Allows for the elimination of a runway crossing from the high energy area (Taxiway G on Runway 18-36).

An extensive discussion of the taxiway design standards was presented in previous chapters. Several taxiway elements, as they exist today, do not conform to the latest design standards. Each of these has been addressed in the master plan concept and is briefly described below.

High Energy Runway Crossings

Updated FAA standards contained in A/C 150/5300-13A instruct that a taxiway which routes aircraft across a runway should not be within the middle third of such runway. The middle third of a runway is classified as the high energy area. The high energy area is an area on the runway where aircraft, either landing or departing, are commonly operating at high speeds. Aircraft in this area have little or no ability to readily avoid any aircraft entering the runway from an associated taxiway. Runway 11-29 does not have a crossing taxiway in its high energy area.

Exit Taxiway G crosses Runway 18-36 in the runway's high energy area. Currently, the only taxiway access to the east side air cargo and FSDO facilities, Taxiway G, is used regularly by both general aviation and air cargo aircraft. The east side also hosts U.S. Border Protection and Customs services.

The recommended remedy is to develop a partial parallel taxiway on the east side of the runway extending north to just beyond the high energy area of Runway 18-36. Taxiway G would essentially be relocated to that point. Enough pavement for an emergency service road would remain in the current Taxiway G location to maintain the current access times for airport rescue and firefighting equipment to reach the east side of the airport.

Direct Access Runway/Apron

New FAA standards also stipulate that there should not be direct access between a runway and aircraft parking apron. Currently, direct access between Runway 11-29 and the commercial ramp is offered via Taxiway D. Taxiway J and Taxiway G offer direct access to the north GA apron and FSDO ramp, respectively.

The FAA suggests that an impediment be created which requires the pilot to make at least one turn while traversing from an apron to a runway. The impediment is deemed a "no-taxi island." As presented on **Exhibit 6A** and **Figure 6-5**, three no-taxi islands are proposed which are aimed at preventing direct taxi routes between the apron and runway surfaces. The islands can be developed simply with paint markings or by removing existing pavement surfaces and lighting. The plan proposes the marking-only method.

As discussed earlier, Taxiway G currently provides direct access between the FSDO ramp and Runway 18-36. Several alternatives were considered to remove the less desirable direct access from the ramp. The preferred alternative is to extend the parallel taxiway north to a point beyond the high energy area and relocated Taxiway G to that point, leaving only an emergency response vehicle crossing. Until the parallel taxiway is developed, however, Taxiway G must remain in place

Figure 6-5

Holding Positions

As discussed in **Chapter Four – Alternatives**, all airfield holding positions should conform to FAA design standards, some of which have changed since completion of the last Master Plan for the Jetport. **Figure 6-6** illustrates the proposed changes for holding position markings on Taxiway C at each end of Runway 18-36 as well as for Runway 29. These three holding position markings do not currently conform to FAA criteria.

One significant holding position issue was outlined earlier. The ILS glideslope antenna serving Runway 29 is located such that its "critical area" holding position is only 140 feet east of the Runway 18-36 holding position on Taxiway A. The close spacing of the hold lines does not readily allow larger aircraft, such as the Airbus 321 and Boeing 757, to fully position between the lines. The realignment of Taxiway A further north at this end of the runway will relocate the taxiway out of the critical area and permit aircraft to taxi to the normal holding position at the end of taxiway to await clearance for takeoff.

VISUAL NAVIGATION AIDS

The visual navigational aids serving Runways 11-29 and 18-36 are adequate and should be maintained for their useful life.

AIRSIDE CONCLUSION

Design standards for Portland International Jetport are determined by the frequency of activity by the critical aircraft group and the sophistication of the instrument approaches. A design aircraft is determined for each runway with the most restrictive RDC also serving as the overall ARC. The current critical aircraft for Runway 11-29 falls in RDC C/D-IV-1600 with a TDG of 4 transitioning to 5 by the long-term planning horizon. For Runway 18-36, the current and future planned RDC is B-III-5000 with a TDG 3.

Runway 11-29 falls in RDC C/D-IV-1600 with a TDG of 4 transitioning to 5 by the long-term planning horizon.

Taxiway efficiency and safety is promoted through several projects. The most significant projects are the realignment of the east end of Taxiway A and the construction of a partial parallel taxiway on the east side of Runway 18-36. Both allow for greater safety and efficiency as well as reduced delay and taxi times. The resulting fuel savings serve to reduce both energy consumption and GHG emissions from aircraft using the Jetport.

Three other taxiway projects are also planned. First, Taxiway C is planned to be reconfigured to be fully parallel to Runway 18-36. Second, holding positions on Runway 18-36 and Runway 29 will be repositioned. This modification will allow pilots a greater field of view while awaiting departure clearance. Third, the plan includes the creation of two no-taxi islands adjacent to Taxiways D and J. These islands will be marked using yellow paint outlines and green paint to designate the islands.

LANDSIDE CONCEPT

The primary goal of landside facility planning is to provide adequate space to meet reasonably anticipated passenger, cargo, and general aviation needs, while also optimizing operational efficiency and land use. Achieving these goals yields a development scheme which segregates functional uses while maximizing the airport's revenue potential. **Exhibit 6A** presents a large-scale view of the planned landside development for the airport.

Several potential layouts were presented in the previous chapter; however, limited land availability is a significant constraint to landside facility growth. The future layout depicted is a compilation of the alternatives presented, but mostly reflective of previous planning efforts.

COMMERCIAL PASSENGER TERMINAL BUILDING

As previously noted, the Jetport primarily serves to meet the needs of commercial airline passengers for the greater Portland region, as well as much of the State of Maine. As such, careful planning of future commercial terminal facilities should be undertaken. The analysis presented in the previous chapters outlined the adequacy of most functional areas inside and outside of the building.

The proposed plan considers several development options for the building. The most recent expansion was undertaken to readily allow for the building's northwesterly expansion into the existing employee parking lot. The recommended plan shown on **Figure 6-6** illustrates that ability to add three gates to the northwest. The plan also would support an easterly extension of the second level concourse to replace the Gate 1 boarding bridge structure. The easterly expansion would be practical if Taxiway C is reconfigured as proposed, thereby allowing for larger aircraft parking at Gate 1. These improvements would be driven by demand and only pursued if passenger enplanements reach and exceed the projected long-term levels.

Figure 6-6

Three terminal building modifications are also proposed. First, existing baggage claim functional areas are limited and undersized. The plan proposes additional baggage claim to the west into the current restaurant location as shown on **Figure 6-7**. The second level exit from the secure departure area and the escalator down to baggage claim would also be shifted to the west to align better with an exit from the building. Overall, this shift will improve passenger throughput efficiency and capacity.

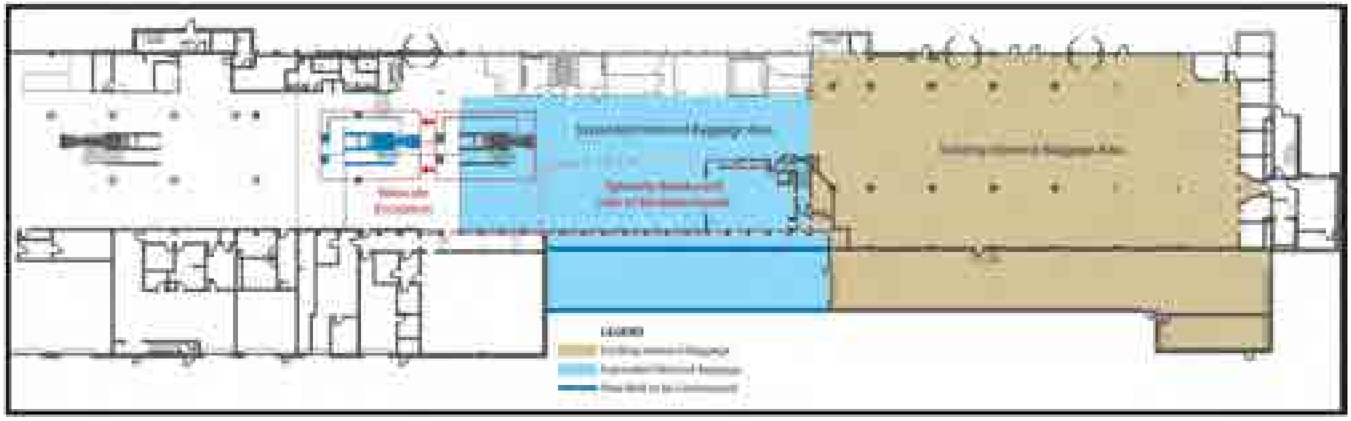

Figure 6-7

The second terminal building modification proposed is a modification to the current gate configuration. The existing gate alignments will not adequately accommodate the wingspans of the newer, quieter, and more fuel-efficient aircraft in the fleet, such as the increasing use of winglets in aircraft design. The plan relocates Gate 5 to the northwestern corner of the building to allow Gates 6-10 to be shifted slightly east and Gates 2-4 to be shifted slightly west. This change will only involve moving the loading bridges and applying new markings for aircraft parking positions. No internal building changes would be required.

The plan considers relocating Gate 5 to the northwestern corner of the building.

The last modification proposed is secure U.S. Customs and Border Protection (CBP) facilities in the terminal building. The previous chapter outlined the use of underutilized terminal space for Customs. The plan would accept international arrivals at gates 4 and/or 5. Arriving international passengers would have a secured passageway directly to the CBP facility on the main floor beneath the gates. Estimated previously at $7.5 million, the proposed plan would be needed for non-stop arriving international flights that are not precleared.

The larger apron would be sufficient for Gate 1 to serve the full range of passenger aircraft.

COMMERCIAL APRON

As noted above, the commercial apron is planned to be reconfigured to accommodate increasing wingspans at all gates. The plan also includes use of additional apron space adjacent to Gate 1 that would become usable with the realignment of Taxiway C. This would permit Gate 1 a broader range of the passenger aircraft operating both now and in the future at the Jetport. The plan also allows for a northwesterly extension of the commercial ramp to serve future needs. The northwesterly growth would only occur in response to demand generating a need for the gates and space.

DEICING APRON

The commercial terminal apron is currently supported by two deicing positions. These positions are generally adequate but do not meet demand during peak morning departures. Several options for providing additional deicing capacity were examined in the previous chapter. The proposed plan utilizes all options for long term development.

The ultimate option will be for the length of the commercial apron to be equipped for "at-gate" deicing and fluid recapture. Due to costs and efficiency, this will be phased over time with apron reconstruction. The Gate 1 apron is planned for reconstruction in the short term, so a deicing recapture system will be installed at that time. Over time, deicing recapture would be extended to all gates.

Over time, deicing would be an option for aircraft at all gates.

In the interim, the apron planned west of the existing deicing positions would be designed to allow for deicing. As proposed, the apron could provide for two additional deicing positions and serve as a holding apron and as remain overnight (RON) aircraft parking.

RUNWAY 11 HOLDING APRON

The existing configuration of the Runway 11 holding apron no longer conforms to FAA design standards. It is a large expanse of pavement. Moreover, the apron and adjacent jet blast fence do not readily allow for the creation of a non-movement perimeter roadway. When aircraft are present, the current alignment requires airside vehicles to contact air traffic control for clearance to enter the movement area when transitioning between the perimeter road along Jetport Boulevard and areas west of the Runway 11 end. The fuel trucks stationed at the new south general aviation area will need to access the main terminal ramp for airline refueling. The trucks are not allowed to cross active runways or utilize public streets. Thus, the trucks must be routed around the airport perimeter road and should remain clear of movement areas where practicable. If the truck must use a movement area, it must be escorted. To alleviate this, the plan considered options for providing the non-movement surface.

The recommended plan relocates the blast wall 50 feet closer to the runway. The perimeter road would be installed between the relocated blast wall and the perimeter security fence. To mitigate the loss of the holding apron, a by-pass taxiway would be installed. The by-pass taxiway would provide a separate entrance taxiway linking Runway 11 with Taxiway A, allowing for aircraft to by-pass a holding aircraft. If additional holding space is needed for aircraft sequencing, the apron planned for deicing and RON parking immediately west of the commercial terminal apron could be utilized.

COMMERCIAL AIR CARGO

The recommended concept for future air cargo is similar to that of the previous master plan. **Figure 6-8** highlights the plan, which would include additional apron fronted by buildings and vehicle parking to the east. Under this concept, the existing air cargo building currently utilized by FedEx could be repurposed for airport maintenance. If additional or updated air cargo needs do not materialize over the long term, there is flexibility to utilize the area for general aviation hangar storage.

Figure 6-8

GENERAL AVIATION

The bulk of the Jetport's general aviation facilities are currently located on the north general aviation ramp, with some facilities on the FSDO ramp. Recently, the airport approved a leasehold development for general aviation facility development to the south of Runway 11-29 as shown on **Figure 6-9**. Some additional general aviation needs can also be accommodated on the north ramp as shown on **Exhibit 6A**. These areas should be more than adequate to accommodate projected general aviation aircraft and associated facility needs.

Figure 6-9

OFF-AIRPORT LAND USE COMPATIBILITY

Land use compatibility is the responsibility of the airport sponsor and must be pursued to comply with FAA grant assurances. In effect since 1964, Grant Assurance 21, *Compatible Land Use*, implementing Title 49 United States Code (U.S.C.) § 47107 (a) (10), requires, in part, that the sponsor:

"…take appropriate action, to the extent reasonable, including the adoption of zoning laws, to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations, including landing and takeoff of aircraft."

In all cases, the FAA expects a sponsor to take appropriate actions to the extent reasonably possible to minimize incompatible land uses. FAA Order 5190.6B, *Airport Compliance Manual*, provides guidance on land use compatibility and other airport compliance issues.

The City of Portland, in conjunction with the City of South Portland, Cumberland County, and other nearby municipalities/townships should continue to work together to develop and maintain compatibility standards to prohibit residential and public assembly uses within the runway protection zones and to limit certain uses within noise impact boundaries (typically the 65 DNL – See Appendix G for more detail). For example, new residential land uses should be kept as far away from the airport as is practicable.

In all cases, the FAA expects a sponsor to take appropriate actions to the extent reasonably possible to minimize incompatible land uses.

As has been mentioned in earlier chapters, the Jetport is located immediately adjacent to the Stroudwater residential neighborhood to the north and the Red Bank Neighborhood to the south. A portion of Stoudwater is a Historic District listed in the National Register of Historic Places. Both neighborhoods also include buildings that are listed in the National Register

During the preparation of this Sustainable Airport Master Plan, the City of Portland's Planning and Urban Development Department prepared a white paper entitled "Outer Congress Street Land Use". The Outer Congress Street area includes both the Jetport and Stroudwater as well as several other land uses. A copy of the white paper is attached as Appendix J.

The white paper is intended to inform ongoing discussion by describing the existing land use climate and presenting a basic outline for land use policy in the area. The outlined approach is founded on recent land use planning work on the part of the city, the Jetport's master planning process, previous land use discussions for the area, national best practices, and public input received through the course of the 1945 Congress Street deliberations. Key recommendations for establishing a policy direction to guide future land use decisions along Outer Congress Street include:

1. Protect the residential area of Stroudwater and emphasize pedestrian, bicycle, and transit improvements on Congress Street in this area, particularly east of the airport entrance road and the Congress Street neckdown.

2. Focus commercial development and/or higher density residential development where the road network can support it and low-density residential development is unlikely.

3. Preserve a greenscape along Congress Street in the vicinity of the airport entrance road to soften the transition between commercial areas to the south and west and the residential areas to the east.

4. Reinforce small-scale nodal commercial and mixed-use development within the existing B-1 zone in Stroudwater proper.

5. Continue to mitigate the airport's impacts on the surrounding neighborhood by preserving a vegetated buffer around the airport itself.

6. Emphasize transit, bicycle, and pedestrian connections; context-sensitive site planning; and high quality design to minimize development impacts.

Grant Assurance 20, *Hazard Removal and Mitigation*, states that the airport sponsor "will take appropriate action to assure that such terminal airspace as is required to protect instrument and visual operations to the airport (including established minimum flight altitudes) will be adequately cleared and protected by removing, lowering, relocating, marking, lighting, or otherwise mitigating existing airport hazards and by preventing the establishment or creation of future airport hazards."

The FAA provides further guidance in Advisory Circular (AC) 150/5200-33, *Hazardous Wildlife Attractants on or Near Airport*s. The distance between the airport movement areas and wildlife attractants should be at least 10,000 feet for airports serving turbine-powered aircraft (such as Portland International Jetport) and should include approach and departure airspace to a distance of five miles. Examples of wildlife attractants (particularly for birds) include landfills, waste water treatment facilities, lakes, and wetlands.

HEIGHT AND HAZARD LAND USE ZONING

It is important that an airport be supported through height and hazard zoning which serves to protect from incompatible uses, primarily those that could be a hazard to flight operations. The primary resource guidance utilized to establish the zoning is provided by the FAA in the Code of Federal Regulations (CFR) Part 77, *Objects affecting Navigable Airspace* to develop the height and hazard zoning. The Airport Airspace Drawing, which is included as part of the Airport Layout Plan drawing set, should be the basis for an updated height and hazard zoning ordinance, should that be needed. Any existing local ordinances should be examined as the recommended plan differs from previous plans for Runway 11-29 due to the 400-foot easterly extension.

WATER QUALITY TREATMENT

Water quality treatment features will need to be designed, permitted and constructed or enhanced to support the infrastructure improvements associated with this Master Plan. Impervious and developed areas associated with vehicular parking and access roads, buildings and airfield improvements require stormwater treatment to protect adjacent water resources. Several of these water quality features of different sizes will be needed and one large water quality filter intended to treat the area of the parallel taxiway is planned to the east of Runway 18-36 as shown on **Exhibit 6A**. All water quality features will need to be constructed to meet Maine DEP (Department of Environmental Protection) Chapter 500 *Stormwater Rules*.

SUSTAINABILITY TARGETS

Establishing sustainability targets will assist the Jetport in understanding the level of success it is achieving through the implementation of its sustainability program. This implementation includes the cumulative impact of its sustainability actions along with the integration of sustainability into the fabric of its organization. Progress made toward achieving these targets will provide the basis for the Jetport's annual reporting and will promote transparency of operations and organizational accountability.

In developing these sustainability targets, current sustainability performance was also considered. **Chapter 3 - *Sustainability Baseline Assessment*** identified and described the current performance levels. Goals and targets established by the City of Portland and the State of Maine were also considered. Specifically, these goals and targets include:

City of Portland

- Greenhouse Gas Emissions: The City of Portland's Municipal Climate Action Plan set the target to reduce CO_2 emissions related to its operations to 10 percent below 1990 levels by 2020.[1] The city established this target in association with the Cities for Climate Protection (CCP) campaign.
- Energy Conservation: The City established an energy efficiency target for private buildings receiving more than $200,000 in municipal assistance. This calls for the exceedance of the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) 90.1 standard by 30 percent for new construction, 25 percent for existing buildings, and 20 percent for historic buildings.[2] For new construction or major renovations associated with municipal buildings over a certain size, these projects must achieve LEED Silver certification through the United States Green Building Council's rating system.[3]
- Waste Management/Recycling: In accordance with the State of Maine's statutory goal, the city's Solid Waste Task Force recommended the target of achieving a recycling/composting rate of 50 percent by 2020. The City of Portland's recycling rate is approximately 33 percent (2010).[4]

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1 City of Portland. (2008). *Municipal Climate Action Plan*. Retrieved 23 December 2015, from http://www.portlandmaine.gov/DocumentCenter/View/6274
2 City of Portland. (2015). *Sustainability in the Community.* Retrieved 23 December 2015, from http://www.portlandmaine.gov/1306/Sustainability-Ordinances
3 City of Portland. (2015). *City of Portland Code of Ordinances, Chapter 6 Buildings and Building Regulations*. Retrieved January 13, 2016, from http://www.portlandmaine.gov/DocumentCenter/View/1070
4 City of Portland. (2011). *Solid Waste Task Force, Report to the Portland City Council*. Retrieved 23 December 2015, from http://www.portlandmaine.gov/DocumentCenter/Home/View/4976

State of Maine

- Greenhouse Gas Emissions: According to Maine Law 38 MRSA §576, the state aims to reduce statewide greenhouse gas emissions to 10 percent below 1990 levels by 2020. In the long-term, the state aims to reduce greenhouse gas emissions to between 75 percent and 80 percent below 2003 levels.[5]
- Energy Conservation: In 2005, the State of Maine joined the Federal "Energy Star Challenge," which encourages building owners and operators to improve energy efficiency by 10 percent or more. Further, Efficiency Maine developed its Triennial Plan for Fiscal Years 2014-2016, which calls for the reduction of peak-load electric energy consumption by 100 megawatts by 2020 and the state's consumption of liquid fossil fuels by at least 30 percent by 2030, in addition to achieving electricity and natural gas savings of at least 30 percent by 2020.[6]
- Renewable Energy Generation: In June 2006, the state enacted legislation (L.D. 2041) that created a renewable portfolio goal to increase new renewable-energy capacity by 10 percent by 2017.[7]
- Waste Management/Recycling: The State of Maine adopted a statutory goal of achieving a statewide recycling rate of 50 percent by 2020.[8] Residents, municipalities, and businesses statewide currently recycle over 41 percent of municipal solid waste.[9]

The determination of targets for the Jetport's priority sustainability categories included factors such as:

1. The Jetport's existing sustainability performance, as discussed in Chapter 3, Sustainability Baseline Assessment of the SAMP;
2. Ambition levels, as identified by the Planning Advisory Committee (PAC);
3. Sustainability actions for potential implementation at the Jetport, as vetted through stakeholder engagement and evaluated through the Sustainability Action Evaluation Tool, a custom-built Excel workbook;
4. The implementation schedule of, and sustainability enhancements considered for, the Jetport's Capital Improvement Program; and
5. Relevant goals and targets established by the City of Portland, the State of Maine, and Airports Council International – North America (ACI-NA).

Some of the targets associated with the categories of Greenhouse Gas Emissions and Energy are intensity-based. This involves the use of a normalizing factor (i.e., per square foot) that will reflect performance improvement independent of the Jetport's organic growth, as described in this plan. This approach has

5 State of Maine. (2013). *Reducing Impacts*. Retrieved 23 December 2015, from http://www.maine.gov/dep/sustainability/climate/reducing-impacts.html
6 Efficiency Maine. (2012). *Triennial Plan for Fiscal Years 2014-2016*. Retrieved 23 December 2015, from http://www.efficiencymaine.com/docs/TriPlan2-11-26-2012.pdf
7 State of Maine. (2012). *Energy Efficiency and Renewable Energy*. Retrieved 23 December 2015, from http://www.maine.gov/energy/initiatives/efficiency_renewable.html
8 State of Maine. (2015). *Maine Revised Statutes: Waste Reduction and Recycling Heading.* Retrieved 23 December 2015, from http://www.mainelegislature.org/legis/statutes/38/title38sec2132.html
9 State of Maine. (2013). *Environmental Trends Dashboard*. Retrieved 23 December 2015, from http://www.maine.gov/dep/commissioners-office/environmental_trends.html

the added benefit of allowing direct comparisons to other airports, regardless of their size. **Table 6A** lists the Jetport's sustainability targets.

TABLE 6A
Sustainability Targets
Portland International Jetport

Sustainability Category	Sustainability Targets
Greenhouse Gas (GHG) Emissions	• Install pre-conditioned air at 100 percent of all loading bridges by 2018 • Reduce Jetport-owned and controlled GHG emissions • Work with tenants to develop a baseline of the Jetport's scope 3 GHG emissions by 2018.
Energy	• Begin to measure percent of energy generated from renewable sources by 2018 • Reduce the Jetport's energy use intensity below 2013 levels five percent by 2025 and 15 percent by 2035.
Waste Management and Recycling	• Begin to measure the Jetport's composting rate by 2017 • Increase the Jetport's municipal solid waste recycling rate to 30 percent by 2020 • Continuously divert at least 90 percent of construction and demolition waste from landfills • Recapture and recycle at least 70 percent of deicing fluid • Reduce deicing fluid recycling operations cost
Ground Access and Transportation	• Appoint a transportation coordinator by 2017 • Identify the mode distribution of Jetport employees by 2018 • Identify the mode distribution of Jetport passengers by 2020
Social Responsibility	• Increase the number of Jetport employees participating in Jetport-sponsored health and wellness programs to 80 percent by 2020 • Hold three employee appreciation events per year beginning in 2016 • Continuously improve Airport Service Quality rankings, as applicable and where possible
Governance	• Present two sustainability-based employee recognition awards per year beginning in 2016 • Establish an internal Sustainability Working Group by 2017 • Ensure that 100 percent of capital projects are evaluated using sustainability criteria by 2017 • Engage three local organizations per year on the Jetport's sustainability program beginning 2017 • Participate in or establish a regional task force focused on sustainability by 2018

SUMMARY

The recommended master plan concept and the sustainability targets have been developed with significant input from the PAC. The PAC included a broad-based representation of local/regional/national governmental agencies, neighborhood representatives, commercial airlines, military users, airport businesses, and other airport users. This plan provides the necessary development to accommodate and satisfy the anticipated growth over the next 20 years and beyond, as well as goals and targets to continue to improve the Jetport's sustainability.

The Jetport meets all applicable safety design standards for current and proposed critical aircraft (that grouping of aircraft that perform 500 or more annual operations) in ARC C/D-IV. Overall, the airport has been superbly managed and expertly developed. The recommended development plan simply enhances historical development, incorporates recently adopted changes to FAA design standards, and further promotes airport sustainability.

The next chapter of this master plan will consider strategies for funding the recommended improvements and will provide a reasonable schedule for undertaking the projects based upon demand over the course of the next 20 years. It will also provide direction for implementing and managing the Jetport's Sustainability Program into the future.

Portland International Jetport

CHAPTER SEVEN

CAPITAL IMPLEMENTATION PLAN

CHAPTER SEVEN

CAPITAL IMPLEMENTATION PLAN

The analyses completed in previous chapters evaluated development needs and sustainability goals, objectives, metrics, initiatives, and targets at the Portland International Jetport (the Jetport) over the next 20 years and potentially beyond. These are based on forecast activity, operational safety and efficiency, as well as sustainability practices. The next step is the preparation of a capital improvement plan (CIP) for those projects that are expected to be implemented over the near-term. A more general discussion of the funding of the medium and long-term projects is provided because of the possible demand changes that would shift the need and priority of those projects.

This chapter presents the description of the capital improvement program (CIP) and the resulting financial projections for the Jetport. The capital improvement plan is developed under the assumption that various demand-based indicators, such as annual operations, annual passenger enplanements, and based aircraft grow in-line with the aviation activity forecasts presented at the end of Chapter Two, (Exhibit 2N). The base forecast for enplanements included in that exhibit reflects the 2013 FAA *Terminal Area Forecast* (TAF).

The Jetport's and the City of Portland's Fiscal Year (FY) ends June 30. Financial projections were developed for three planning horizons: Short Term (years 1-6, or FY 2017 through FY 2022), Intermediate Term (years 7-11, or FY 2023 through FY 2027), and Long Term (years 12-20, or FY 2028 through FY 2036). The FY 2015 numbers included in this chapter are presented in the City of Portland, Maine Comprehensive Annual Financial Report (2015 CAFR), and the FY 2016 amounts are presented in the City of Portland, Maine Municipal Budget (2016 Budget), approved on June 24, 2015.

SUSTAINABILITY ENHANCEMENTS FOR THE CAPITAL IMPROVEMENT PLAN

As part of the preparation of this sustainable airport master plan, the Recommended Master Plan Concept from Chapter 6 was reviewed from a sustainability perspective. This involved the identification of potential sustainability enhancements for each project that the Jetport may consider incorporating into its capital improvement plan (CIP). As these projects move forward, the Jetport will consider the identified sustainability enhancements for potential inclusion into project specifications to improve the social, environmental, and/or economic performance of each project and ultimately the Jetport's overall sustainability performance. **Table 7A** outlines these enhancements along with a description of their benefits and applicability to identified master plan concept projects. Appendix F provides detailed descriptions of these enhancements along with case studies and guidance documents, where available.

TABLE 7A
Sustainability Enhancements in the Jetport's Capital Improvement Plan
Portland International Jetport

Sustainability Enhancement	Example Applications to the Recommended Master Plan Concept
Install Pervious and Permeable Pavements	In the construction of surface parking lots, incorporate permeable pavements to improve stormwater quality. Such projects should maintain or reduce existing operations and maintenance costs.
Plant native, non-wildlife-attracting flora when removing pavement and landscaping projects	Native plantings, perhaps included as part of any property acquisition, would provide aesthetic enhancements that would support employee and passenger well-being as well as the creation of a sense of place.
For non-building construction, apply the Envision® sustainable infrastructure rating system	The Envision® rating system would provide projects like the ramp expansion with a framework for evaluating and rating sustainability performance over the course of project life cycles.[1]
Incorporate resiliency measures in the maintenance and design of the Jetport's existing and future critical assets	Consider incorporating resiliency measures, tailored to the unique conditions of southern Maine, into the planning and design of any terminal building expansion or other building projects. This would help protect the Jetport's significant investments in its critical assets as well as minimize future operational disruptions due to the potential impacts of climate change.
In accordance with applicable regulations, accommodate water reclamation and reuse systems	New buildings such as the expanded maintenance building could include water reclamation systems such as rainwater harvesting equipment. The Jetport could use the reclaimed water for non-potable applications, which would reduce the Jetport's overall water consumption and related costs.
Use highly reflective roofing and pavement materials	When acquiring or renovating existing buildings (e.g., expanding the Maintenance Building), consider retrofitting them with highly reflective roofing materials to mitigate the urban heat island effect. Dark, non-reflective surfaces can create microclimates by increasing temperatures within built areas relative to their surroundings.

[1] Institute for Sustainable Infrastructure. (2016). *Envision® Sustainable Infrastructure Rating System*. Retrieved January 11, 2016, from https://www.sustainableinfrastructure.org/rating/

TABLE 7A (Continued)
Sustainability Enhancements in the Jetport's Capital Improvement Plan
Portland International Jetport

Sustainability Enhancement	Example Applications to the Recommended Master Plan Concept
Integrate green stormwater infrastructure such as vegetated water quality filters and rain gardens	For all projects that increase the impervious surfaces at the Jetport, such as the construction of a by-pass taxiway or surface parking lot, consider installing green stormwater infrastructure such as vegetated water quality filters and rain gardens on Jetport property to collect and/or treat stormwater on-site, thereby controlling pollutant run-off. The Jetport should ensure that the design of such infrastructure does not attract wildlife that may be hazardous to aircraft operations.
Incorporate recycled materials, including recycled pavements	Minimize the use of virgin materials when expanding or reconfiguring pavements at the Jetport such as parking areas, terminal aprons, and the perimeter service road by using discarded asphalt or fly-ash concrete where allowed by current FAA construction guidelines. This would have the added benefit of reducing greenhouse gas emissions associated with the extraction, manufacturing, and distribution of raw materials.
Design for Deconstruction	For new construction such as the development of the FIS customs facilities, consider designing for deconstruction. This would provide for flexibility in future interior fit-outs, minimize waste during renovations, and allowing for disassembly at the time the facility becomes obsolete.

In addition to the project enhancements above, the Jetport will perform a life cycle cost analysis for all CIP projects where a sustainable alternative is available and associated decision-making would benefit from such an analysis. Life cycle cost analyses will enhance the decision-making process by providing short- and long-term costs, including initial costs, operation and maintenance costs, replacement costs, resale/disposal costs, and finance charges. For example, when expanding baggage claim facilities, the Jetport may compare conventional baggage handling systems to more sustainable alternatives such as the BLUEVEYOR system, which is more energy efficient and has greater reliability.[2]

CAPITAL IMPROVEMENT PLAN AND COST SUMMARIES

From the specific needs and improvements that have been established for the Jetport, a realistic schedule and the associated costs for implementing the plan can be determined. The implementation plan considers the interrelationships among the projects in the recommended alternative in order to determine a logistics sequence to minimize conflicts and establish a master schedule.

This section will examine the overall cost of each item in the recommended development alternative and present a development schedule. The implementation plan covers the same years as the forecasts in the planning effort. A CIP, programmed by years, has been developed to cover the first six years of the plan. The remaining projects will be grouped into intermediate (years 7-11) and long (years 12-20)

[2] Vanderlande. (2016). *Next Generation Belt Conveyor*. Retrieved January 13, 2016, from http://www.blueveyor.com/the-product

term planning horizons. More detailed information is provided for the five-year horizon, with less detail for the longer planning periods. By utilizing planning horizons instead of specific years for intermediate and long term development, the Jetport will have greater flexibility to adjust capital needs as demand dictates. Table 4A in Chapter Four summarizes the key milestones for each of the three planning horizons.

A key aspect of this planning document is the use of demand-based planning milestones. The short term planning horizon contains items of highest need and/or priority. These items should be considered for development based on actual demand levels within the next five years. As short term horizon activity levels are reached, it will then be time to program for the intermediate term based upon the next activity milestones. Similarly, when the intermediate term milestones are reached, it will be time to program for the long term activity milestones.

Several development items included in the recommended alternative will need to follow demand indicators which essentially establish triggers for key improvements. For example, the recommended concept includes construction of new hangar aprons and taxilanes. Based aircraft will be an indicator for additional hangar needs. If based aircraft growth occurs as projected, additional hangars will likely need to be constructed to meet the demand. If growth slows or does not occur as projected, hangar pavement projects could be delayed. As a result, capital expenditures will be undertaken as needed, which leads to a responsible use of capital assets. Some development items do not depend on demand, such as pavement maintenance. These types of projects typically are associated with day-to-day operations and should be monitored and identified by Jetport management.

All airports receiving federal Airport Improvement Program (AIP) funding are required to maintain a current CIP with the FAA, which identifies projects to be undertaken at an airport over a specified period of time. The Jetport's CIP includes the projects recommended as part of this Sustainable Airport Master Plan (SAMP) from FY 2017 through FY 2036. **Table 7B** presents the recommended CIP and its corresponding cost estimates, which are based on a planning level of detail. While accurate for master planning purposes, actual project costs will likely vary from these planning estimates once project design and engineering estimates are developed. The cost estimates presented in the table are in 2016 dollars, inflated at 2.7 percent annually and also include contingencies, design costs and construction management costs. As shown in the table, the CIP is estimated at approximately $193.3 million in 2016 dollars and approximately $271.8 million in inflated dollars.

TABLE 7B
CIP Project Costs and Funding Sources
Portland International Jetport
(in $000's)

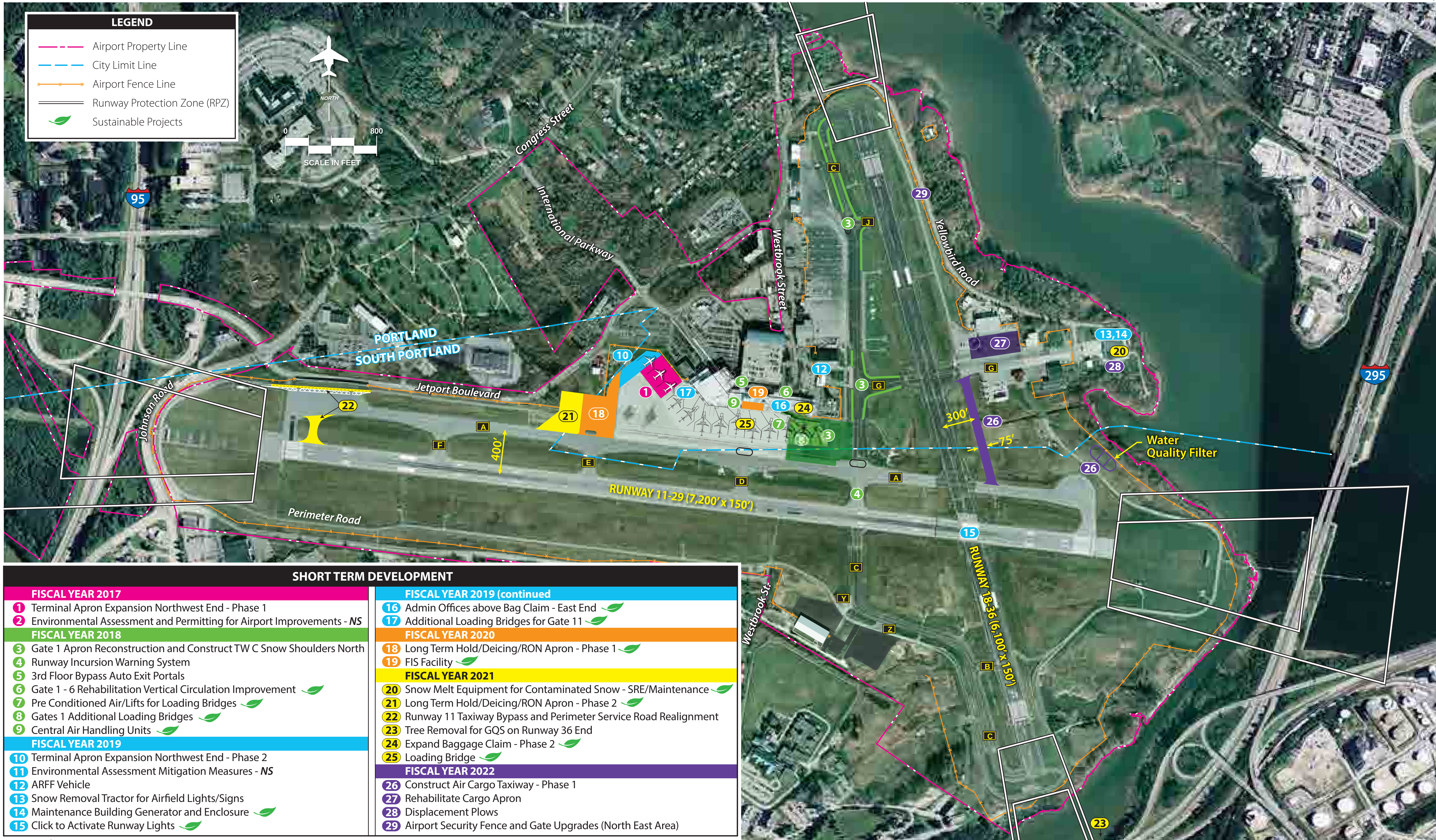
Proj. No.	Description	Project Costs		Funding Sources			
		2016 $	Inflated	AIP Grants	State	Local	
						PFCs	Jetport
FISCAL YEAR 2017							
1	Terminal Apron Expansion Northwest End - Phase 1	$3,290	$3,379	$3,041	$169	$0	$169
2	Environmental Assessment and Permitting for Airport Improvements	750	770	693	39	0	39
Subtotal 2017		***$4,040***	***$4,149***	***$3,734***	***$207***	***$0***	***$207***
FISCAL YEAR 2018							
3	Gate 1 Apron Reconstruction and Construct TW C Snow Shoulders North	$4,089	$4,320	$3,888	$216	$0	$216
4	Runway Incursion Warning System	125	132	119	7	0	7
5	3rd Floor Bypass Auto Exit Portals	450	475	0	0	475	0
6	Gate 1 - 6 Rehabilitation & Vertical Circulation Improvement	2,000	2,110	0	0	0	2,110
7	Pre Conditioned Air/Lifts for Loading Bridges	900	949	854	0	0	95
8	Gate 1 Additional Loading Bridges	650	686	0	0	686	0
9	Central Air Handling Units	220	232	0	0	232	0
Subtotal 2018		***$8,434***	***$8,903***	***$4,861***	***$223***	***$1,392***	***$2,427***
FISCAL YEAR 2019							
10	Terminal Apron Expansion Northwest End - Phase 2	$2,085	$2,225	$2,003	$111	$0	$111
11	Environmental Assessment Mitigation Measures	1,000	1,083	975	54	0	54
12	ARFF Vehicle	1,000	1,083	975	54	0	54
13	Snow Removal Tractor for Airfield Lights/Signs	350	379	341	19	0	19
14	Maintenance Building Generator and Enclosure	250	271	244	14	0	14
15	Click to Activate Runway Lights	50	54	49	3	0	3
16	Admin Offices above Bag Claim - East End	1,500	1,625	0	0	244	1,381
17	Additional Loading Bridges for Gate 11	650	704	0	0	704	0
Subtotal 2019		***$6,885***	***$7,424***	***$4,586***	***$255***	***$948***	***$1,636***
FISCAL YEAR 2020							
18	Long Term Hold/Deicing/RON Apron - Phase 1	$3,918	$4,220	$3,798	$211	$0	$211
19	FIS Facility	7,000	7,787	0	0	7,398	389
Subtotal 2020		***$10,918***	***$12,007***	***$3,798***	***$211***	***$7,398***	***$600***
FISCAL YEAR 2021							
20	Snow Melt Equipment for Contaminated Snow	$300	$343	$308	$17	$0	$17
21	Long Term Hold/Deicing/RON Apron - Phase 2	2,400	2,600	2,340	130	0	130
22	Runway 11 Taxiway Bypass and Perimeter Service Road Realignment	1,028	1,100	990	55	0	55
23	Tree Removal for GQS on Runway 36 End	50	57	51	3	0	3
24	Expand Baggage Claim - Phase 2	10,000	11,425	0	0	10,854	571
25	Loading Bridge	515	588	0	0	588	0
Subtotal 2021		***$14,293***	***$16,113***	***$3,690***	***$205***	***$11,442***	***$776***
FISCAL YEAR 2022							
26	Construct Air Cargo Taxiway - Phase 1 TW G to TW A	$3,660	$4,200	$3,780	$210	$0	$210
27	Rehabilitate Cargo Apron	2,440	2,863	2,577	143	0	143
28	Displacement Plows	750	880	792	44	0	44
29	Airport Security Fence and Gate Upgrades (North East Area)	245	288	259	14	0	14
Subtotal 2022		***$7,095***	***$8,230***	***$7,407***	***$412***	***$0***	***$412***
TOTAL SHORT TERM		***$51,665***	***$56,827***	***$28,076***	***$1,512***	***$21,180***	***$6,058***

TABLE 7A (Continued)							
INTERMEDIATE TERM							
1	Construct Taxiway C Realignment - Phase 1	$6,080	$7,524	$6,772	$376	$0	$376
2	Loading Bridge	538	666	0	0	666	0
3	Land Acquisition	1,948	2,476	2,228	124	0	124
4	Construct Air Cargo Taxiway - Phase 2	2,400	3,050	2,745	153	0	153
5	Loading Bridges	2,186	2,778	0	0	2,778	0
6	Replace Regional Boarding Ramps at Gate 1B and C	350	445	0	0	445	0
7	Relocate Taxiway A East of Runway 18-36	5,200	6,788	6,109	339	0	339
8	Construct Taxiway C Realignment - Phase 2	3,000	4,022	3,619	201	0	201
9	Relocate Service Access Road East of Cargo	600	804	724	40	0	40
10	Parking Garage Expansion Phase 3	15,000	20,108	0	0	0	20,108
TOTAL INTERMEDIATE TERM		***$37,302***	***$48,661***	***$22,197***	***$1,233***	***$3,889***	***$21,341***
LONG TERM							
1	Construct Air Cargo Apron Phase II (North)	$4,300	$5,920	$5,328	$296	$0	$296
2	Construct Air Cargo Apron Phase I (South)	3,000	4,130	3,717	207	0	207
3	ARFF Vehicle	1,500	2,065	1,859	103	0	103
4	Construct Taxiway B Runway 36 to 29	2,800	3,959	3,563	198	0	198
5	Extend Cargo Apron East Interport Location	1,900	2,686	2,418	134	0	134
6	Rotary Snowplow 5000 TPH	550	778	700	39	0	39
7	Expand Maintenance Building	3,750	5,445	4,901	272	0	272
8	Construct Aircraft Engine run-Up Pad	1,600	2,323	2,091	116	0	116
9	SRE 18' FRT MTD Broom	950	1,379	1,241	69	0	69
10	Strengthen/Rehab Runway 11-29	8,200	12,228	11,006	611	0	611
11	Displacement Plows/Spreaders	650	969	872	48	0	48
12	Strengthen/Rehab Taxiways A, D, E, & F	5,900	9,036	8,132	452	0	452
13	2000 Gallon Liquid Spreader	250	383	345	19	0	19
14	ARFF Vehicle	125	191	172	10	0	10
15	Construct South Apron Taxiway	2,830	4,451	4,006	223	0	223
16	Construct South General Aviation Apron - Phase 1	2,300	3,618	3,256	181	0	181
17	Construct South General Aviation Apron - Phase 2	2,300	3,715	3,344	186	0	186
18	Terminal Westerly Expansion	16,000	25,846	0	0	24,553	1,292
19	Rehabilitate Runway 18-36, Taxiway B and J	3,600	5,972	5,375	299	0	299
20	Construct South General Aviation Apron - Phase 3	3,000	4,977	4,479	249	0	249
21	Ramp Expansion East of Air Traffic Control Tower	7,200	12,267	11,040	613	0	613
22	Snow Plows	650	1,107	997	55	0	55
23	Parking Garage Expansion Phase 4	20,000	34,075	0	0	0	34,075
24	Terminal Easterly Expansion/Renovation	11,000	18,741	0	0	17,804	937
TOTAL LONG TERM		***$104,355***	***$166,264***	***$78,842***	***$4,380***	***$42,358***	***$40,685***
TOTAL CIP		***$193,322***	***$271,752***	***$129,116***	***$7,126***	***$67,426***	***$68,084***
PLUS: CAPITAL OUTLAY		***$30,738***	***$40,498***	***$0***	***$0***	***$0***	***$40,498***
TOTAL CIP AND CAPITAL OUTLAY		***$224,059***	***$312,250***	***$129,116***	***$7,126***	***$67,426***	***$108,582***

Exhibits 7A, 7B, and 7C graphically present the master plan projects on an aerial photograph of the Jetport. The projects are color-coded by year in the short term on **Exhibit 7A** and by singular colors on each of the intermediate (**Exhibit 7B**) and long term (**Exhibit 7C**) planning horizons. A brief discussion of key projects in each period follows.

SHORT TERM IMPROVEMENTS

The short term projects are those anticipated to be implemented in calendar years 2017 through 2022. The list of projects is divided into yearly timeframes and are prioritized based on the needs of the Jetport. Where a project may require multiple steps, such as environmental documentation, design, and engineering prior to construction, those elements have been identified separately. Short term projects can be generally categorized into three groups: airfield, landside, and equipment.



SHORT TERM DEVELOPMENT

FISCAL YEAR 2017

1. Terminal Apron Expansion Northwest End - Phase 1
2. Environmental Assessment and Permitting for Airport Improvements - *NS*

FISCAL YEAR 2018

3. Gate 1 Apron Reconstruction and Construct TW C Snow Shoulders North
4. Runway Incursion Warning System
5. 3rd Floor Bypass Auto Exit Portals
6. Gate 1 - 6 Rehabilitation Vertical Circulation Improvement
7. Pre Conditioned Air/Lifts for Loading Bridges
8. Gates 1 Additional Loading Bridges
9. Central Air Handling Units

FISCAL YEAR 2019

10. Terminal Apron Expansion Northwest End - Phase 2
11. Environmental Assessment Mitigation Measures - *NS*
12. ARFF Vehicle
13. Snow Removal Tractor for Airfield Lights/Signs
14. Maintenance Building Generator and Enclosure
15. Click to Activate Runway Lights

FISCAL YEAR 2019 (continued)

16. Admin Offices above Bag Claim - East End
17. Additional Loading Bridges for Gate 11

FISCAL YEAR 2020

18. Long Term Hold/Deicing/RON Apron - Phase 1
19. FIS Facility

FISCAL YEAR 2021

20. Snow Melt Equipment for Contaminated Snow - SRE/Maintenance
21. Long Term Hold/Deicing/RON Apron - Phase 2
22. Runway 11 Taxiway Bypass and Perimeter Service Road Realignment
23. Tree Removal for GQS on Runway 36 End
24. Expand Baggage Claim - Phase 2
25. Loading Bridge

FISCAL YEAR 2022

26. Construct Air Cargo Taxiway - Phase 1
27. Rehabilitate Cargo Apron
28. Displacement Plows
29. Airport Security Fence and Gate Upgrades (North East Area)

NS - Not Shown

Exhibit 7A

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PWM Portland International Jetport

Exhibit 7B

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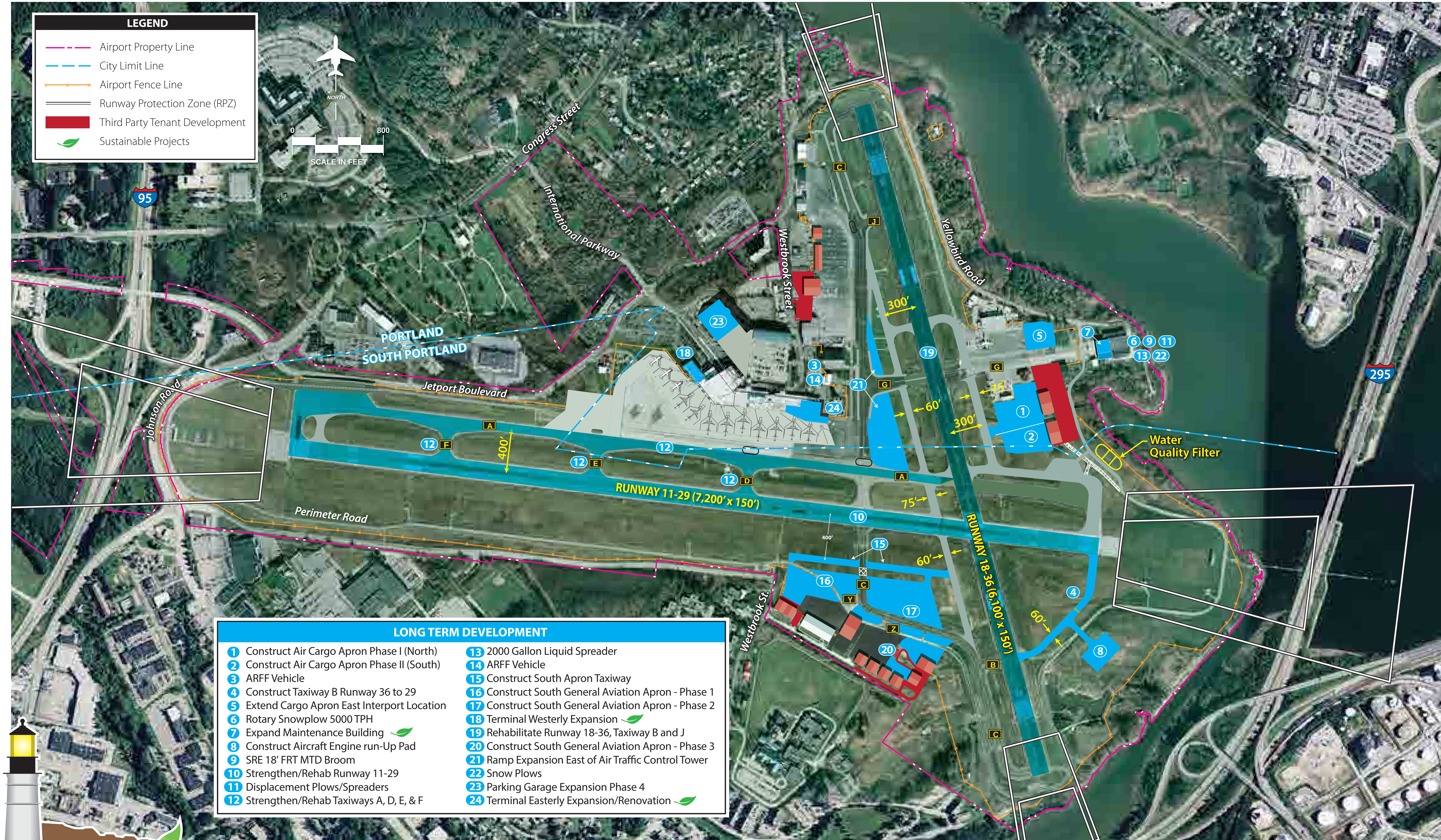
LEGEND
Airport Property Line
City Limit Line
Airport Fence Line
Runway Protection Zone (RPZ)
Third Party Tenant Development
Sustainable Projects
NORTH
0
800
SCALE IN FEET
95
295
Congress Street
International Parkway
Westbrook Street
Yellowbird Road
PORTLAND
SOUTH PORTLAND
Jetport Boulevard
Johnson Road
Perimeter Road
Westbrook St.
RUNWAY 11-29 (7,200' x 150')
RUNWAY 18-36 (6,100' x 150')
Water Quality Filter
300'
75'
60'
400'
LONG TERM DEVELOPMENT
1 Construct Air Cargo Apron Phase I (North)
2 Construct Air Cargo Apron Phase II (South)
3 ARFF Vehicle
4 Construct Taxiway B Runway 36 to 29
5 Extend Cargo Apron East Interport Location
6 Rotary Snowplow 5000 TPH
7 Expand Maintenance Building
8 Construct Aircraft Engine run-Up Pad
9 SRE 18' FRT MTD Broom
10 Strengthen/Rehab Runway 11-29
11 Displacement Plows/Spreaders
12 Strengthen/Rehab Taxiways A, D, E, & F
13 2000 Gallon Liquid Spreader
14 ARFF Vehicle
15 Construct South Apron Taxiway
16 Construct South General Aviation Apron - Phase 1
17 Construct South General Aviation Apron - Phase 2
18 Terminal Westerly Expansion
19 Rehabilitate Runway 18-36, Taxiway B and J
20 Construct South General Aviation Apron - Phase 3
21 Ramp Expansion East of Air Traffic Control Tower
22 Snow Plows
23 Parking Garage Expansion Phase 4
24 Terminal Easterly Expansion/Renovation

Exhibit 7C

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The following sections briefly describe short term projects in each specific grouping. It should be noted that two projects, numbers 2 (2017) and 11 (2019), are related to environmental study and specific mitigation measures to be determined through the *National Environmental Policy Act* (NEPA) process. While planned, these projects are not depicted on **Exhibit 7A**.

Airside Projects

Airside improvements are those specifically related to the runway and/or taxiway surfaces. Recent pavement improvements have maintained the airfield pavement in good condition. No airfield improvements are planned in the first year of the short term. The first airfield project, programmed for 2018, is the construction of snow shoulders along Taxiway C north of Taxiway J. A runway incursion warning system is also planned for installation that same year, followed with a pilot-activated runway lighting enhancement in 2019.

The next airfield project, programmed for 2021, is the construction of a bypass taxiway on the Runway 11 end to allow for the ground vehicle non-movement road to be routed on the northernmost portion of the existing Runway 11 holding apron. The bypass taxiway will serve to allow for efficient traffic flow in lieu of the holding apron, which will be decommissioned. As planned, the bypass taxiway will work in conjunction with the proposed deicing apron (projects 18 and 21) to be discussed later to serve all aircraft holding needs.

Construction of a new partial parallel taxiway is planned east of Runway 18-36. The Phase 1 portion of the partial parallel taxiway will span between Taxiways G and A in 2021, allowing cargo and general aviation aircraft using the FSDO ramp to transition to the airfield without crossing Runway 18-36. The final airfield project proposed in the short term is tree removal from the cemetery located south of the Fore River and I-295. This would include trees that extend into the glideslope qualification surface (GQS) of Runway 36. The GQS should be fully cleared to meet FAA criteria for precision instrument approach capabilities.

Landside Projects

Landside projects included in the short term are primarily associated with the commercial terminal complex, but also include apron construction/rehabilitation. The following projects are proposed for the terminal building:

- Rehabilitate/replace the third floor bypass automatic portals (2018);
- Rehabilitate and improve the vertical circulation for Gates 1 through 6 (2018);
- Addition of preconditioned air/lifts for loading bridges (2018);
- Rehabilitate/replace central air handling units (2018);
- Replace loading bridge(s) (various years);
- Construct new administrative offices in eastern end of second floor terminal (2019);

- Construction of federal inspection services (FIS) facility (2020); and
- Expand baggage claim area to the west (2021)

Other landside improvements are also included involving apron spaces and fencing. The plan proposes the reconstruction and/or rehabilitation of the Gate 1 apron and the cargo apron. Planning for the Gate 1 reconstruction/rehabilitation may include the evaluation and development of a geothermal wellfield as a measure to accomplish sustainability goals and objectives. Extension of the commercial apron to the northwest is planned for two phases, with the first in 2017 and the second in 2019. The expansion will provide for Gate 1 aircraft operations while the Gate 1 apron reconstruction is undertaken. The second phase will better provide space for proper realignment of gates to meet wider aircraft wingspans. The short term also includes construction of a new deicing apron immediately west of the existing commercial apron. The deicing apron is planned to be a two-phase project as well, and will be multifunctional, serving deicing operations in the winter, remain overnight (RON) operations during peak periods, and as a holding position to replace the decommissioned Runway 11 holding apron (as discussed above). The final landside projects include construction of a maintenance building generator enclosure and airport security fence/gate upgrades in the northeast portion of the airport.

Equipment Acquisition

Various pieces of equipment are programmed throughout the 20-year CIP. The equipment is required to support airport operations, specifically aircraft rescue and firefighting (ARFF), snow removal equipment (SRE), and general maintenance. Most of the planned equipment acquisitions are to replace aging units.

INTERMEDIATE TERM IMPROVEMENTS

The intermediate term projects are those that are anticipated to be necessary in years 7-11 of the Master Plan. These projects are not tied to specific years for implementation; instead, they have been prioritized so that Jetport management has the flexibility to determine when they need to be pursued based on the current conditions at the time of implementation. It is not unusual for certain projects to be delayed or advanced based on changing conditions, such as funding availability or changes in the aviation industry.

Ten projects have been identified for completion during the intermediate term. Four of these projects are tied to airfield improvements. Taxiway C has been identified as non-standard and is planned for realignment in two phases, as depicted on **Exhibit 7B**. The realigned taxiway will offer a true parallel taxiway alignment with Runway 18-36 and will allow for greater development opportunity in the commercial terminal complex. The next airfield project will be the realignment/relocation of Taxiway A east of Runway 18-36. This project is necessary to allow for ground movements around the instrument landing system (ILS) glideslope antenna critical area during inclement weather conditions and during snow removal operations. The second phase extensions of Taxiway C south of Runway 11-29 and east partial parallel taxiway north of Taxiway G to Runway 18-36 are also planned for this time period.

Two commercial terminal building projects are proposed for the intermediate term: replacement of jet bridges and replacement of regional boarding ramps at Gates 1B and 1C. The acquisition of the privately owned parcel immediately north of the parking garage is included, as is the expansion of the parking garage and relocation of the service access road east of the cargo area.

LONG TERM IMPROVEMENTS

Long term projects are those considered for years 12-20 of the Master Plan. A total of 24 projects are included in the long term horizon, understanding that some of these may be moved ahead if needed or not implemented at all if demand for the improvement does not materialize.

The first two projects in the long term involve the phased construction of a new cargo apron on the airport's east side, as depicted on **Exhibit 7C**. The apron would offer the ability to add or shift cargo facilities to a dedicated area and allow for other uses of the existing cargo spaces, including the expansion of ramp as proposed in Project 5 of the long term (apron expansion). Other projects planned for the airport's east side include maintenance building expansion/remodeling and maintenance equipment upgrades.

The long term plan includes several commercial passenger terminal complex improvements. As proposed, the terminal building would be expanded to the east and west and the parking garage would be expanded to include multiple floor additions. The relocation of Taxiway C in the intermediate term would allow for the proposed easterly development of the terminal apron and terminal building. The northwesterly development would be readily available due to earlier apron and loading bridge improvements.

Significant apron construction in the recently opened south general aviation area is also included in the long term. As proposed, the apron would be further developed in three phases, as demand dictates, if at all. Several equipment acquisitions for ARFF, SRE, and maintenance are planned as outlined on **Table 7A** and **Exhibit 7C**.

CAPITAL IMPROVEMENT FUNDING SOURCES

Table 7C presents the CIP's estimated funding sources for the planning period. The following sections describe the amount of funding available from these sources.

TABLE 7C
CIP Funding Sources by Fiscal Year
Portland International Jetport
(in $000's)

	Short						Intermediate	Long	
	2017	2018	2019	2020	2021	2022	2023 - 2027	2028 - 2036	Total
Project Costs									
Inflated	$4,149	$8,903	$7,424	$12,007	$16,113	$8,230	$48,661	$166,264	$271,752
Funding Sources									
AIP Grants	$3,734	$4,861	$4,586	$3,798	$3,690	$7,407	$22,197	$78,842	$129,116
State	207	223	255	211	205	412	1,233	4,380	7,126
Local									
PFCs									
Pay-go	0	1,392	948	0	588	0	3,889	0	6,817
Bond Funds	0	0	0	7,398	10,854	0	0	42,358	60,609
Jetport									
Pay-go	207	2,427	1,636	600	205	412	1,233	4,380	11,100
Bond Funds-CFCs	0	0	0	0	0	0	4,022	6,815	10,837
Bonds Funds- Jetport	0	0	0	0	571	0	16,086	29,490	46,147
	$4,149	$8,903	$7,424	$12,007	$16,113	$8,230	$48,661	$166,264	$271,752
Net	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***

AIP GRANTS

Grants administered by the FAA through the AIP are a critical capital funding source to implement the projects recommended in this SAMP. Although the future status of the AIP is currently uncertain, for the purpose of this SAMP, it is assumed that the AIP will continue to be authorized and appropriated at levels consistent with H.R. 658, the *FAA Modernization and Reform Act of 2012*.

The U.S. DOT classifies the Jetport as a small hub primary airport. Therefore, the AIP formula stipulates that the Jetport is entitled to receive 90 percent in federal funding for AIP-eligible projects. AIP funds can be used for most improvement needs, but not operating costs. However, AIP funds are typically not available for revenue-generating projects, so it may be difficult for the Jetport to use these funds for projects designated to generate revenue.

As shown on **Table 7C**, federal grants are estimated to be approximately $129.1 million from FY 2017 through FY 2036. Of this amount, approximately $84.9 million is assumed to be funded with entitlement grants, approximately $854,000 with Voluntary Airport Low Emissions (VALE) grants, and approximately $43.4 million with discretionary grants, all of which are described in detail below.

Entitlement Grants

Entitlement funds are distributed through grants by a formula based on the number of enplanements at individual airports. In cases where entitlement funds are not used during the current federal fiscal year, these funds are redistributed to other airport sponsors as discretionary funds and become what is known as protected entitlement funding in the next federal fiscal year. **Table 7D** presents the Jetport's AIP entitlement calculation. This calculation is based on the enplanement forecast presented in Chapter Two. As shown in the table, it is estimated that the Jetport will receive approximately $84.9 million in entitlement AIP grants from FY 2017 through FY 2036.

TABLE 7D
AIP Entitlement Calculation
Portland International Jetport
(in $000's)

	Short							Intermediate	Long
	2016	2017	2018	2019	2020	2021	2022	2023 - 2027	2028 - 2036
Enplanements for Entitlements	870	922	938	955	971	984	996	5,201	10,290
FAA Formula									
$7.80 for 1st 50,000 Enplanements	$390	$390	$390	$390	$390	$390	$390	$1,950	$3,510
$5.20 for next 50,000 Enplanements	260	260	260	260	260	260	260	1,300	2,340
$2.60 for next 400,000 Enplanements	1,040	1,040	1,040	1,040	1,040	1,040	1,040	5,200	9,360
$0.65 for next 500,000 Enplanements	241	274	285	296	306	315	323	1,625	2,925
$0.50 for the remaining Enplanements	0	0	0	0	0	0	0	100	645
Total Calculated Entitlements	$1,931	$1,964	$1,975	$1,986	$1,996	$2,005	$2,013	$10,175	$18,780
Total Calculated Entitlements x 2	$3,861	$3,929	$3,949	$3,972	$3,993	$4,010	$4,025	$20,351	$37,560
2 Year Lag in Receipt of Grants	***$3,827***	***$3,827***	***$3,861***	***$3,929***	***$3,949***	***$3,972***	***$3,993***	***$20,201***	***$37,297***
Cumulative AIP Entitlement Grants		***$7,654***	***$11,515***	***$15,444***	***$19,393***	***$23,365***	***$27,357***	***$47,559***	***$84,856***

VALE Grants

The VALE Grant Program was created by Congress in 2004 to encourage airport sponsors to meet their state-related air quality responsibilities under the *Clean Air Act* and is funded through the AIP grant program and passenger facility charges (PFCs). The Jetport received a VALE grant to aid in the cost of the geothermal heating and cooling system in the terminal addition. This analysis assumes that VALE grants will be used to fund approximately $854,000 in FY 2018 for preconditioned/air baggage lifts for the loading bridges.

Discretionary Grants

At the beginning of each federal fiscal year, the FAA sets aside the amount of discretionary funds to cover the Letter of Intent (LOI) payment schedules. The total discretionary funds in all LOIs subject to future obligation are limited to approximately 50 percent of the forecast discretionary funds available for that purpose. The authorizing statute directs the FAA to allocate certain discretionary funding to specific airport types and set aside categories such as noise, reliever airports, military airport program and projects relating to capacity, safety, security and noise. However, the FAA has some discretion in funding specific projects within these discretionary funding set-aside categories. The FAA approves discretionary funds for use on specific projects, after consideration of project priority and other selection criteria. The Jetport does not have any outstanding LOIs; however, it is assumed they will submit future LOIs to the FAA to fund certain eligible CIP projects.

Table 7E presents the AIP grants assumed to fund the eligible portions of the CIP. As shown in the table, AIP entitlement funds and the VALE grant are sufficient to fund the eligible portions of the short term projects; however, discretionary grant funding in the amount of approximately $43.4 million will be needed in combination with entitlement dollars to fund eligible projects in the intermediate and long term periods. Over the past 10 years, the Jetport has received approximately $18 million in discretionary funding. As such, it is possible that the Jetport will not receive the amount required in discretionary funding for the eligible projects during the projection period. If the Jetport does not receive this discretionary funding, it will need to identify alternative funding sources, delay the project until funding sources become available, or cancel the project.

TABLE 7E
Application of AIP Grants
Portland International Jetport
(in $000's)

	Short							Intermediate	Long	
	2016	2017	2018	2019	2020	2021	2022	2023 - 2027	2028 - 2036	Total
Available Federal Grants										
Entitlement	$3,827	$3,827	$3,861	$3,929	$3,949	$3,972	$3,993	$20,201	$37,297	$84,856
VALE	0	0	854	0	0	0	0	0	0	854
Discretionary	0	0	0	0	0	0	0	1,861	41,545	43,406
Total Available Federal Grants	**$3,827**	**$3,827**	**$4,715**	**$3,929**	**$3,949**	**$3,972**	**$3,993**	**$22,062**	**$78,842**	**$129,116**
Federally Eligible Portion of CIP	***$0***	***($3,734)***	***($4,861)***	***($4,586)***	***($3,798)***	***($3,690)***	***($7,407)***	***($22,197)***	***($78,842)***	***($129,116)***
Difference	***$3,827***	***$92***	***($146)***	***($657)***	***$151***	***$282***	***($3,415)***	***($135)***	***$0***	***$0***
Cumulative	***$3,827***	***$3,920***	***$3,774***	***$3,117***	***$3,268***	***$3,550***	***$135***	***$0***	***$0***	

STATE GRANTS

The AIP legislation stipulates that states fund half the local share percentage for eligible projects in an airport's capital program. Since the Jetport is a small-hub airport, the formula for grants is 90 percent federal and 10 percent local. As a result, it is assumed that the State of Maine will fund 5 percent of the eligible projects in the CIP, which equates to approximately $7.1 million through FY 2036.

LOCAL FUNDS

Approximately $67.4 million in PFC revenue and $68.1 million in the Jetport revenue is required to fund the remaining costs of the CIP. These funding sources are described in greater detail in the following sub-sections.

Passenger Facility Charges

PFCs are authorized by Title 14 of the Code of Federal Regulations, Part 158 and are administered by the FAA. PFCs collected from qualified enplaned passengers are used to fund eligible projects. An airport operator can impose a PFC of $1, $2, $3, $4 or $4.50 per eligible, enplaned passenger. Once a PFC is imposed, it is included as part of the ticket price paid by passengers enplaning at the airport, collected by the airlines and remitted to the airport operator, less an allowance for airline processing expenses. The PFC legislation stipulates that if a medium to large hub airport institutes a PFC of $1, $2, or $3, they must forego 50 percent of their AIP entitlement funds. This increases to 75 percent if they charge a $4 or $4.50 PFC. As a small hub airport, the Jetport does not have to forego any of its annual AIP entitlement funds.

Projects that are eligible for PFC funding include those that preserve or enhance the capacity, safety or security of the air transportation system; reduce noise or mitigate noise effects; or furnish opportunities for enhanced competition between or among air carriers. PFCs cannot be used for revenue-generating facilities at airports, such as restaurants and other concession space, rental car facilities, public parking facilities or construction of exclusively-leased space or facilities.

Since 1993, the Jetport has submitted five PFC applications to the FAA; currently, PFC Application #5 is the only active application. PFC Application #5 was approved in April 2010 to collect a $4.50 per enplaned passenger fee to pay for the eligible portions of the debt service associated with the Series 2010 Bonds. This application was approved to collect $132.6 million in PFC revenues, of which $16.3 million has been collected as of September 30, 2015. PFC Application #5 is currently due to expire in April 2040. As a result, PFC revenues collected at the $4.50 rate are committed through the projection period of this analysis and are not available to fund the CIP.

The airport industry is currently lobbying the FAA to increase the PFC charge to $8.50 per passenger along with annual indexing for inflation. This analysis assumes the FAA will increase the PFC level to $8.50 and that the Jetport would receive approval to begin collecting the increased amount in FY 2018. Since $4.50 of this amount is already committed under PFC Application #5, only the collections from the $4.00 difference are assumed to be applied toward to future eligible CIP projects. **Table 7B** details the projects that are assumed to be funded with this amount. If the PFC collection amount is not increased, the Jetport will need to identify alternative funding sources, delay the projects until funding sources become available, or cancel the projects.

Some of the project costs anticipated to be funded with these additional PFC revenues, such as the federal inspection services (FIS) facility, baggage claim expansion, and the west terminal expansion, are too large to be funded on a pay-go basis. As a result, this analysis assumes the Jetport will issue PFC-backed bonds in 2020, 2021, and 2034 for a total of $47 million. While this analysis does not make any recommendations on the type of debt structure the Jetport needs to undertake, it does assume the issuance of a 30-year debt instrument at an interest rate of 5 percent, which is the revenue bond index as of January 2016, increased for future interest risk. The east terminal expansion is not scheduled to be complete until after the forecast period and, therefore, is not reflected in this analysis.

Table 7F presents the PFC calculation for the Jetport based on the enplanement projections presented in Chapter Two, as well as the annual funding plan for these revenues. As previously mentioned, the base enplanement forecast reflects the TAF. Typically, in a PFC revenue analysis, enplanement forecasts are decreased by the non-revenue passengers since they do not pay the PFC collection fee; however, the

TAF forecast excludes non-revenue passengers. As a result, 100 percent of the enplanements included in the table are used to calculate PFC revenues.

TABLE 7F
Application of PFCs
Portland International Jetport
(in $000's)

	Short						Intermediate	Long	
	2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2023 - 2027**	**2028 - 2036**	**Total**
Enplanements	922	938	955	971	984	996	5,201	10,290	
$4.50 per Enplanement	$4.39	$4.39	$4.39	$4.39	$4.39	$4.39	$4.39	$4.39	
Annual PFCs	$4,047	$4,118	$4,193	$4,264	$4,322	$4,374	$22,832	$45,174	
Total PFC Revenue	**$4,047**	**$4,118**	**$4,193**	**$4,264**	**$4,322**	**$4,374**	**$22,832**	**$45,174**	**$93,324**
Plus: FY 2016 PFC Balance	***$1,320***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$1,320***
Less: PFC Applied to Series 2010 Bonds	***($3,260)***	***($4,250)***	***($4,491)***	***($4,514)***	***($4,542)***	***($4,564)***	***($23,219)***	***($43,612)***	***($92,452)***
Annual Difference	***$2,107***	***($132)***	***($297)***	***($250)***	***($220)***	***($190)***	***($387)***	***$1,562***	***$2,192***
Cumulative Difference		***$1,975***	***$1,677***	***$1,427***	***$1,207***	***$1,017***	***$630***	***$2,192***	
Potential Increase in PFC Level	$0.00	$4.00	$4.00	$4.00	$4.00	$4.00	$4.00	$4.00	
Annual PFCs	$0	$3,752	$3,821	$3,885	$3,938	$3,986	$20,804	$41,161	
Total PFC Revenue	**$0**	**$3,752**	**$3,821**	**$3,885**	**$3,938**	**$3,986**	**$20,804**	**$41,161**	**$81,346**
Less: PFC "Pay Go" Portion of CIP	***$0***	***($1,392)***	***($948)***	***$0***	***($588)***	***$0***	***($3,889)***	***$0***	***($6,817)***
Less: PFC Bond Funded Portion of CIP	***$0***	***$0***	***$0***	***$0***	***($500)***	***($1,300)***	***($6,500)***	***($15,100)***	***($23,400)***
Annual Difference	***$0***	***$2,360***	***$2,873***	***$3,885***	***$2,849***	***$2,686***	***$10,415***	***$26,061***	***$51,128***
Cumulative Difference		***$2,360***	***$5,232***	***$9,118***	***$11,967***	***$14,653***	***$25,068***	***$51,128***	

As shown in the table, the Jetport is estimated to collect approximately $81.3 million in PFCs for the anticipated $4.00 increase in the collection rate from FY 2018 through FY 2036, which is sufficient to fund the PFC-eligible portions of certain CIP projects and the debt service associated with future PFC-backed bond issuances.

Jetport Funds

The Jetport generates revenue through airline revenues, terminal concessions, ground and facility leases, cargo landing fees, ramp fees and parking revenue. Typically, such revenues are used to cover maintenance and operating expenses (M&O Expenses) along with debt service obligations. However, any surplus revenues can be applied directly to the CIP. As shown on **Table 7C**, approximately $11.1 million in Jetport revenue is required to fund the CIP on a pay-go basis. Of this amount, approximately $2.1 million for the rehabilitation of Gates 1 through 6 (project 6 on **Table 7B**) will be funded out of the Jetport's unrestricted fund balance, which was approximately $17.6 million as of June 30, 2015. Additional Jetport revenues will be required to pay for the debt service associated with certain CIP projects, which is discussed in greater detail in the Financial Feasibility section.

CAPITAL OUTLAY PROJECTS

Table 7B also includes the costs for the Jetport's capital outlay projects during the projection period. Capital outlay projects include projects that are related to the daily maintenance of airport facilities and are fully funded from Jetport revenues. They include projects related to land and building improvements, computer and miscellaneous equipment, and vehicles. As shown in the table, the capital outlay projects are estimated at approximately $30.7 million in 2016 dollars and approximately $40.5 million in inflated dollars and are entirely funded with Jetport revenue.

JETPORT'S FINANCIAL STRUCTURE

This section discusses City of Portland (City) accounting practices, including the cost center structure utilized for airline rate-setting purposes and the requirements and provisions of the General Certificate, dated July 1, 2003, as well as any supplemental certificates (the Certificate) and the proposed airline agreements.

JETPORT ACCOUNTING

The Jetport is owned by and is a department of the City and is operated as a financially self-sufficient enterprise fund of the City. The City's elected officials include the Mayor and the City Council, which consists of five members that are elected by voters in five separate districts of the City, three members elected at-large, and the Mayor. The Jetport's operating budget is approved by the City Council. In addition, the City has a City Manager, who is the administrative head of the City and is responsible to the City Council for the administration of all departments, including the Jetport.

The accounting and financial reporting policies of the City conform to accounting principles for local government units as set forth by the Governmental Accounting Standards Board. Ten divisions are included in the City's financial structure for the Jetport, of which five are direct cost centers (Jetport field, general aviation, terminal, parking, and airfield deicing facility), and five are indirect cost centers (Jetport administration, fringe and indirect costs, security, Jetport surplus, and marketing).

CERTIFICATE

The Certificate authorizes the issuance of General Airport Revenue Bonds by the City. Certain provisions of the Certificate were utilized to develop the financial analysis contained in this section. Sections of the Certificate as they pertain to this report are summarized in the following paragraphs.

- The Certificate defines Revenues as all receipts, revenues, fees, rentals, investment earnings, income, and other monies received by or on behalf of the City from or in connection with the ownership or operation of all or any part of the Jetport, including without limitation all tolls and charges, landing fees, terminal rentals, real property rentals, concession fees, parking receipts, interest income, proceeds of business interruption insurance and condemnation awards from temporary takings, but not including proceeds of insurance (except business interruption insurance, if any) and of condemnation awards (except awards for temporary takings); proceeds of the sale of any Indebtedness; Grant Receipts; PFC Revenues; proceeds of any permitted sale of any portion of the Jetport; monies derived from facilities financed with the proceeds of certain Indebtedness; interest income or other investment earnings on the Project Fund; any Swap Termination Payments paid to the City; or any other amounts which are not deemed to be Revenues in accordance with generally accepted accounting principles or that are restricted as to their use.

- Under the Certificate, Net Revenues means with respect to a period of time, an amount equal to Revenues minus M&O Expenses both accrued and payable during such period in accordance with generally accepted accounting principles.

- Under the Certificate, M&O Expenses shall mean the City's expenses, whether or not annually recurring, of maintaining, repairing and operating the Jetport including, without limiting the generality of the foregoing, amounts for administrative expenses including costs of salaries and benefits and amounts required to finance pension benefits earned by employees; cost of insurance; payments for engineering, financial, accounting, legal and other services; any lawfully imposed taxes or other assessments on the Jetport or income from or operations at the Jetport and reserves for such taxes or assessments, any payments in lieu of taxes for the Jetport or income from or operations at the Jetport and reserves for such in lieu of taxes; any administration or service fees; costs of issuance not financed in the Costs of a Project paid by the City; and payments of interest on (but not the principal of) revenue anticipation notes and other current expenses; but not including any allowance for amortization or depreciation; any other expense for which (or to the extent to which) the City is or will be paid or reimbursed from or through any source that is not included or includable as Revenues; any extraordinary items arising from the early extinguishment of debt; depreciation, recognition upon disposal or other retirement of a capital asset, reserves for unusual and extraordinary maintenance or repair, Debt Service payable from any Fund or Account established under the General Certificate, and expenses described in Section 709(c)(i) of the General Certificate.

- In Section 705 of the General Certificate, the City covenants that for each Fiscal Year, it will fix and adjust rates and charges with respect to the Jetport for the services and facilities furnished by the Jetport so that Net Revenues in each Fiscal Year will equal at least 125 percent of the Required Debt Service Fund Deposits. The City also covenants to comply with the required fund deposits specified in the General Certificate.

AIRLINE AGREEMENTS

In 2010, the City entered into airline agreements with some of the airlines (signatory airlines) serving the Jetport. Signatory airlines as of December 31, 2015 include American Airlines, Delta Air Lines, FedEx, JetBlue Airways, Southwest Airlines, and United Airlines. Under the terms of the airline agreements, rates for rentals, charges, and fees are calculated on an annual basis using a compensatory rate-making methodology. The landing fee recovers 50 percent of the requirements of the Jetport field divided by total airport landed weight. The terminal building rental rate for each terminal sub-center (Common

Use, Exclusive Use, and Public/Concessions) is based on requirements of the terminal divided by the square footage of those respective areas. Rentals, charges, and fees for the current rate setting period are adjusted for the variance of budget to actual maintenance and operating expenses from the prior rate setting period.

The Jetport's airline agreements expired on December 31, 2015. In anticipation of their expiration, City Council unanimously approved a one-year extension to the agreements on July 6, 2015. It is the Jetport's intention to have new airline agreements in place by Summer 2016, containing terms similar in nature to the existing agreements. Since the existing airline agreements expire during the projection period of the financial analysis, the current rate-making methodologies were assumed to remain in place throughout the projection period.

FINANCIAL FEASIBILITY

This section of the financial analysis presents the existing debt service, projected M&O Expenses, and projected revenues resulting from the daily operation of the Jetport. In addition, the funding of the CIP is layered into projections to determine if it is feasible for the Jetport to undertake the program in the FY 2017 through FY 2036 planning period.

CAPITAL OUTLAYS AND LONG-TERM DEBT

As shown in **Table 7B**, approximately $108.6 million in Jetport revenues will be needed to fund the CIP and capital outlay projects. While the capital outlay projects are assumed to be funded from annual surplus revenue, the larger projects such as the parking garage expansion in FY 2027 and the non-PFC funded portion of the baggage claim and west terminal expansion in FY 2021 and FY 2034, respectively, are assumed to be bond funded, requiring additional Jetport revenues to fund the financing costs. The fourth parking garage expansion and the east terminal expansion are not scheduled to be complete until after the forecast period and, therefore, are not reflected in this analysis.

While this analysis does not make any recommendations on the type of debt structure the Jetport needs to undertake, it does assume the issuance of a 30-year debt instrument to fund approximately $25 million at an interest rate of 5 percent, which is the revenue bond index as of January 2016 increased for future interest risk.

Table 7G presents the capital outlay projects that are expensed directly from Jetport revenue and **Table 7H** presents the debt service requirements for the future bonds, as well as the debt service on the outstanding bonds.

TABLE 7G
Capital Outlay Projects
Portland International Jetport
(in $000's)

	Short						Intermediate	Long	
	2017	2018	2019	2020	2021	2022	2023 - 2027	2028 - 2036	Total
SUMMARY BY CATEGORY									
Land Improvements	$351	$180	$52	$239	$24	$42	$2,441	$3,545	$6,875
Building Improvements	883	1,980	1,054	581	472	1,471	5,021	10,074	21,536
Computer Equipment	118	26	0	456	160	413	1,163	1,251	3,587
Other Equipment	119	0	54	189	27	1,343	751	2,174	4,657
Vehicles	317	132	54	292	268	129	978	1,673	3,843
Total Capital Outlay	*$1,788*	*$2,319*	*$1,214*	*$1,757*	*$952*	*$3,399*	*$10,354*	*$18,716*	*$40,498*
SUMMARY BY COST CENTER									
Jetport Administration	$94	$0	$0	$45	$0	$0	$0	$108	$247
Jetport Field	544	53	0	217	63	53	757	1,196	2,883
General Aviation	0	1,055	0	0	0	0	482	220	1,757
Security	33	26	0	102	0	61	75	297	595
Terminal	430	486	638	801	187	2,171	3,629	7,700	16,043
Marketing	0	0	0	0	0	0	0	0	0
Parking	687	646	576	570	701	1,114	5,377	8,943	18,614
Airfield Deicing Facility	0	53	0	22	0	0	34	251	360
Total Capital Outlay	*$1,788*	*$2,319*	*$1,214*	*$1,757*	*$952*	*$3,399*	*$10,354*	*$18,716*	*$40,498*

TABLE 7H
Long-Term Debt Service
Portland International Jetport
(in $000's)

	Outstanding Debt Service						Future Debt Service		
Year	S2008 Bonds	S2010 Bonds	S2013 Refunding Bonds	Total	Less: PFC	Net Debt Service	Future Debt	Less: PFC	Net Debt Service
2015	$1,729	$3,772	$2,034	$7,535	($3,260)	$4,275	$0	$0	$0
2016	$1,731	$3,770	$2,031	$7,532	($3,260)	$4,272	$0	$0	$0
2017	$1,732	$3,768	$2,028	$7,528	($3,260)	$4,268	$0	$0	$0
2018	$1,731	$4,761	$2,034	$8,526	($4,250)	$4,276	$0	$0	$0
2019	$1,733	$5,004	$2,029	$8,766	($4,491)	$4,275	$0	$0	$0
2020	$1,734	$5,026	$2,023	$8,783	($4,514)	$4,269	$0	$0	$0
2021	$1,733	$5,055	$2,025	$8,813	($4,542)	$4,271	$500	($500)	$0
2022	$1,737	$5,073	$2,019	$8,829	($4,564)	$4,265	$1,340	($1,300)	$40
2023 - 2027	$8,694	$25,772	$10,083	$44,549	($23,219)	$21,330	$6,700	($6,500)	$200
2028 - 2036	$15,730	$48,212	$12,023	$75,965	($43,612)	$32,353	$28,240	($15,100)	$13,140

M&O EXPENSES

M&O Expenses at the Jetport are assigned to the divisions described in the section entitled "Jetport's Financial Structure." Within each division, there are line items to which the M&O Expenses are assigned, including payroll, benefits, administrative services, contractual services, maintenance and repairs, rentals, insurance, supplies, minor capital items, utilities, and contributions.

The FY 2015 operating expenses reflect the actual expenses presented in the 2015 CAFR and the FY 2016 operating expenses reflect the amounts presented in the 2016 budget. **Table 7J** presents operating expenses by line item for FY 2015 through FY 2036.

TABLE 7J
M&O Expenses
Portland International Jetport
(in $000's)

	Actual	Budget	Short						Intermediate	Long
	2015	2016	2017	2018	2019	2020	2021	2022	2023 - 2027	2028 - 2036
SUMMARY BY LINE ITEM										
Payroll	$2,657	$2,826	$2,893	$2,962	$3,033	$3,105	$3,180	$3,255	$17,482	$37,161
Benefits	1,610	1,701	1,802	1,905	2,010	2,119	2,229	2,342	12,574	26,711
Administrative Services	473	670	686	701	718	735	753	772	4,146	8,818
Contractual Services	4,067	4,103	4,201	4,302	4,406	4,513	4,621	4,732	25,426	54,100
Maintenance & Repairs	1,043	1,012	1,037	1,062	1,087	1,113	1,139	1,165	6,252	13,250
Rentals	40	15	15	15	15	15	15	15	75	135
Insurance	167	139	142	145	148	152	156	160	860	1,828
Supplies	697	755	773	792	811	830	850	870	4,663	9,868
Minor Capital Items	9	8	8	8	8	8	8	8	40	72
Utilities	1,485	1,250	1,280	1,309	1,340	1,371	1,403	1,436	7,693	16,312
Contributions	1,633	1,832	1,876	1,921	1,967	2,015	2,063	2,112	11,346	24,137
Total M&O Expenses	***$13,881***	***$14,312***	***$14,713***	***$15,122***	***$15,543***	***$15,976***	***$16,417***	***$16,867***	***$90,557***	***$192,392***
SUMMARY BY COST CENTER										
Jetport Administration	$1,856	$2,131	$2,218	$2,306	$2,396	$2,489	$2,584	$2,681	$14,388	$30,521
Jetport Field	2,744	2,847	2,915	2,984	3,057	3,130	3,205	3,281	17,612	37,445
General Aviation	23	27	27	28	29	30	31	32	175	378
Security	1,904	1,951	2,007	2,064	2,121	2,182	2,243	2,304	12,374	26,299
Terminal	4,395	4,329	4,431	4,537	4,646	4,757	4,872	4,989	26,797	56,983
Marketing	369	545	559	572	585	599	613	628	3,383	7,212
Parking	184	187	192	196	200	204	208	212	1,120	2,290
Airfield Deicing Facility	759	683	698	714	731	748	765	783	4,198	8,909
ARFF	1,647	1,612	1,666	1,721	1,778	1,837	1,896	1,957	10,510	22,355
Total M&O Expenses	***$13,881***	***$14,312***	***$14,713***	***$15,122***	***$15,543***	***$15,976***	***$16,417***	***$16,867***	***$90,557***	***$192,392***
Percent Increase		3.1%	2.8%	2.8%	2.8%	2.8%	2.8%	2.7%		
CAGR FY 2016 - FY 2022								2.8%		

As shown in the table, operating expenses were approximately $13.9 million in FY 2015 and are budgeted to increase 3.1 percent to approximately $14.3 million in FY 2016. M&O Expenses are forecast to be approximately $16.9 million in FY 2022, reflecting a compound annual growth rate of 2.8 percent from FY 2016 through FY 2022. M&O Expenses are projected based on a review of historical trends, increases in the pension costs for security and ARFF, and the anticipated effects of inflation assumed at 2.4 percent annually, reflecting a 10-year average of the Consumer Price Index (CPI). Since the west and east terminal expansions are not programmed to occur in the short term period, their impact on M&O expense projections is uncertain; and therefore, is not reflected.

OPERATING REVENUES

Major sources of operating revenue at the Jetport are derived from non-airline and airline sources. Non-airline revenues accounted for approximately 69 percent of the Jetport's revenues in FY 2015 and include the operation of parking facilities; terminal concession revenues generated from fees paid by concessionaires such as rental car, restaurant, news/gift shop, and advertising; cargo landing fees, ground rentals; and cargo and hangar rentals. A summary of major non-airline tenant leases at the Jetport is presented in **Table 7K**.

TABLE 7K
Non-Airline Tenants
Portland International Jetport
(in $000's)

Lessee	Expiration	Area (sq. ft.)	Annual Rental Rate
TERMINAL			
Rental Car Counter			
Avis Budget Car Rental, LLC	6/30/19	796 sq. ft.	$44.83 per sq. ft.
Enterprise	6/30/19	607 sq. ft.	$44.83 per sq. ft.
Hertz & Dollar	6/30/19	732 sq. ft.	$44.83 per sq. ft.
National Car Rental & Alamo Rent A Car	6/30/19	614 sq. ft.	$44.83 per sq. ft.
Rental Car Service Center			
Avis Budget Car Rental, LLC, Enterprise, Hertz & Dollar, and National Car Rental & Alamo Rent A Car	6/30/19		10% of gross revenues with a yearly MAG, plus a $1.00 CFC per day for up to 5 days
General Services Administration	9/30/16	8,215 sq. ft.	$3.23 per sq. ft.
ISS Facility Solutions	Month-to-Month	106 sq. ft.	$29.28 per sq. ft.
Mobile Lobster Bake, dba Old Port Foreign Exchange	Month-to-Month	100 sq. ft.	$28.00 per sq. ft.
Standard Parking Plus	Month-to-Month		Gross revenues - operating costs - management fee
Host International	9/30/26		15% gross revenue of alcoholic beverages and 10% gross revenue of all other sales with a yearly MAG
The Paradies Shops, LLC	12/31/26		18% of gross revenue up to $3,000,000 and 20% of gross revenue in excess of $3,000,000 with a yearly MAG
Interspace Airport Advertising	Month-to-Month		30% of gross revenue from the sale of static advertising up to $400,000 and 35% thereafter. 23% of gross revenue from the sale of high-technology advertising up to $400,000 and 28% thereafter.
Cardtronics USA, Inc.	9/4/25		The greater of 45% of gross revenues or the yearly MAG
Smarte Carte, Inc.	Year-to-Year		10% of gross proceeds from baggage carts & massage chairs, and 7% of gross proceeds from digitally downloaded entertainment
GROUND LEASES			
164 Realty	10/9/33	31,927 sq. ft.	$.03 per sq. ft.
Cellco Partnership, dba Verizon	1/19/31		
Hangar Associates	12/4/34	37,886 sq. ft.	
Maine Aviation Sales, Inc. / Hangar Group	2/28/56		
General Aviation fixed base operations		138,036 sq. ft.	$0.25 per sq. ft. and 2% of gross
Aircraft tiedowns			$10.09 per tiedown
Jetport Properties, LLC	8/23/65	50,530 sq. ft.	
Northeast Air	6/30/16	188,286 sq. ft.	Commission on gross sales
Northeast Air / LCL Associates / HLJ Associates	1/20/48	68,553 sq. ft.	$.25 per sq. ft.
Northeast Air / Maine Aviation Corp.	8/12/36	44,500 sq. ft.	
PWM Properties, LLC	11/30/46	36,384 sq. ft.	
Aero Portland ME, LLC	1/31/45	125,888 sq. ft.	$.26 per sq. ft.
Hertz car service facility	Month-to-Month		
LCL Associates	6/30/36		
Federal Express	11/30/24		
Ramp		92,250 sq. ft.	
GSE Area		31,282 sq. ft.	

Source: Jetport records

Airline revenues accounted for approximately 31 percent of the Jetport's revenues in FY 2015 and include revenues generated from passenger airline landing fees and terminal rentals. As previously discussed, the existing airline agreements expire during the projection period. The methodologies outlined in the current airline agreements are assumed to be in place throughout the projection period. **Table 7L** presents a summary of the airline rates and charges at the Jetport for FY 2016 through FY 2022 and for FY 2027 and FY 2036.

TABLE 7L
Summary of Airline Rates and Charges
Portland International Jetport
(in $000's)

	Budget	Short						Intermediate	Long
	2016	2017	2018	2019	2020	2021	2022	2027	2036
Landing Fee	$2.83	$2.82	$2.85	$2.86	$2.90	$2.97	$3.05	$3.34	$3.61
Terminal Rental Rates									
Airline Exclusive Use	$29.17	$29.19	$30.00	$31.34	$32.56	$33.43	$35.19	$39.91	$48.91
Common Use	$29.25	$29.19	$30.00	$31.34	$32.56	$33.43	$35.19	$39.91	$48.91
Outbound Baggage	$38.88	$38.25	$39.37	$41.02	$42.56	$43.76	$45.87	$52.56	$66.24
Public/City	$29.12	$29.19	$30.00	$31.34	$32.56	$33.42	$35.19	$39.91	$48.91
Airline Cost per Enplanement	***$8.06***	***$7.72***	***$7.76***	***$7.87***	***$8.01***	***$8.13***	***$8.33***	***$8.84***	***$9.77***

The airline cost per enplanement is shown in **Table 7L**. As shown in the table, the airline cost per enplanement is budgeted to be $8.06 in FY 2016 and is then projected to increase to $8.33 in FY 2022.

Table 7M presents revenues for FY 2015 through FY 2036. As shown, revenues were approximately $20.9 million in FY 2015 and $20.7 million in FY 2016, increasing to approximately $25.4 million in FY 2022, reflecting a compound annual growth rate of 3.5 percent during that time period.

FY 2016 operating revenues are budgeted to decrease 1.0 percent from FY 2015 actuals, primarily as a result of a conservative budget for terminal concession revenues reflecting only the minimum annual guarantee included in the tenant leases. However, the first six months of FY 2016 enplanements are approximately 5.6 percent higher than FY 2015 enplanements for the same time period, indicating that actual FY 2016 terminal concession revenues will be greater than the minimum annual guarantee. As a result, total FY 2017 revenues are forecast to increase 3.3 percent over the FY 2016 budget. FY 2017 through FY 2036 operating revenues are projected based on the following:

- Historical trends, lease provisions, and inflation.

- Revenues from parking, terminal concessions, and rental cars are projected to increase with prospective enplanement growth. FY 2018 and FY 2020 includes additional increases in parking revenues resulting from an anticipated parking rate increase by the Jetport. It is likely that additional parking rate increases would occur during the projection period. However, to be conservative, these are the only parking rate increases assumed during the projection period.

- A customer facility charge (CFC) of a $1.00 per day, for up to five days, was instituted at the Jetport in 2010 to fund the car rental portion of the Series 2013 Refunding Bonds related to the parking garage. This analysis assumes that the CFC will remain in place to fund the car rental portion of the parking garage expansion in FY 2027.

- It was assumed that the Jetport would renegotiate concession leases that expire during the planning period with terms and conditions that would implement changes in rate structures and business practices, as necessary, to maintain positive financial performance.

- Since the west and east terminal expansions are not programmed to occur in the short term period, their impact on revenue projections are uncertain; and therefore, are not reflected in this analysis.

TABLE 7M
Revenues
Portland International Jetport
(in $000's)

	Actual	Budget	Short						Intermediate	Long
	2015	2016	2017	2018	2019	2020	2021	2022	2023 - 2027	2028 - 2036
AIRLINE REVENUES										
Terminal Areas	$3,773	$3,994	$4,069	$4,148	$4,314	$4,486	$4,620	$4,829	$26,234	$55,914
Landing Fees	2,675	3,016	3,046	3,126	3,202	3,294	3,384	3,474	18,735	39,999
Total Airline Revenues	***$6,448***	***$7,010***	***$7,115***	***$7,274***	***$7,516***	***$7,780***	***$8,004***	***$8,303***	***$44,969***	***$95,913***
NONAIRLINE REVENUES										
Cargo Revenues										
Landing Fees	$210	$171	$160	$165	$169	$173	$178	$183	$986	$2,105
Ramp Rent	72	70	72	73	75	76	78	79	420	869
Ground Rent	43	45	46	47	48	49	50	51	277	588
	$326	$286	$278	$284	$291	$299	$306	$313	$1,683	$3,563
Concession Revenue										
Parking	$6,476	$6,392	$6,767	$7,556	$7,694	$8,589	$8,706	$8,814	$46,027	$91,153
Rental Car	4,030	3,753	3,970	4,037	4,109	4,176	4,231	4,364	22,752	44,906
Concessions										
Restaurant	583	568	601	611	622	633	642	650	3,395	6,716
News/Gift Shop	670	632	670	682	695	707	717	726	3,790	7,495
Advertising	95	90	95	97	99	101	102	103	536	1,060
Other Concessions	15	13	14	14	14	14	14	14	70	126
	$1,364	$1,302	$1,380	$1,404	$1,430	$1,455	$1,475	$1,493	$7,791	$15,397
Other										
De-Icing Facility Reimb	715	795	810	826	843	860	877	895	4,751	9,833
Ground Rent	435	417	427	437	447	458	469	480	2,581	5,493
TSA	396	354	240	246	257	267	275	289	1,558	3,294
Miscellaneous	577	352	361	370	378	387	395	404	2,154	4,465
Total Nonairline Revenues	***$14,318***	***$13,649***	***$14,233***	***$15,160***	***$15,449***	***$16,490***	***$16,734***	***$17,053***	***$89,297***	***$178,104***
Total Operating Revenues	***$20,766***	***$20,659***	***$21,348***	***$22,434***	***$22,965***	***$24,271***	***$24,738***	***$25,355***	***$134,266***	***$274,017***
Investment Earnings	$130	$20	$20	$20	$20	$20	$20	$20	$100	$180
Total Revenue	***$20,896***	***$20,679***	***$21,368***	***$22,454***	***$22,985***	***$24,291***	***$24,758***	***$25,375***	***$134,366***	***$274,197***
Percent Increase		-1.0%	3.3%	5.1%	2.4%	5.7%	1.9%	2.5%		
CAGR FY 2016 - FY 2022								3.5%		

PRO FORMA CASH FLOW

Table 7N presents the pro forma cash flow of the Jetport for the planning period, based on the projection of operating revenues, M&O Expenses, and long-term debt discussed above. According to the analysis reviewed here, net income remains positive during the planning period.

TABLE 7N
Pro Forma Cash Flow
Portland International Jetport
(in $000's)

	Actual	Budget	Short						Intermediate	Long
	2015	2016	2017	2018	2019	2020	2021	2022	2023 - 2027	2028 - 2036
Net Revenues										
Revenues	$20,896	$20,679	$21,368	$22,454	$22,985	$24,291	$24,758	$25,375	$134,366	$274,197
LESS: M&O Expenses	(13,881)	(14,312)	(14,713)	(15,122)	(15,543)	(15,976)	(16,417)	(16,867)	(90,557)	(192,392)
LESS: Adjust for Encumbrances	(84)	0	0	0	0	0	0	0	0	0
Net Revenues	***$6,931***	***$6,367***	***$6,655***	***$7,332***	***$7,442***	***$8,315***	***$8,341***	***$8,508***	***$43,809***	***$81,805***
Required Debt Service Fund Deposits										
Outstanding Bonds	$4,275	$4,272	$4,268	$4,276	$4,275	$4,269	$4,271	$4,265	$21,330	$32,353
Future Bonds	0	0	0	0	0	0	0	40	$200	$13,140
Required Debt Service Fund Deposits	***$4,275***	***$4,272***	***$4,268***	***$4,276***	***$4,275***	***$4,269***	***$4,271***	***$4,305***	***$21,530***	***$45,493***
Debt Service Coverage Ratio	***1.62***	***1.49***	***1.56***	***1.71***	***1.74***	***1.95***	***1.95***	***1.98***	***N/A***	***N/A***
Required Fund Deposits										
Revenues	$20,896	$20,679	$21,368	$22,454	$22,985	$24,291	$24,758	$25,375	$134,366	$274,197
Required Operating Fund Deposits	(13,881)	(14,312)	(14,713)	(15,122)	(15,543)	(15,976)	(16,417)	(16,867)	(90,557)	(192,392)
Required Debt Service Fund Deposits	(4,275)	(4,272)	(4,268)	(4,276)	(4,275)	(4,269)	(4,271)	(4,305)	(21,530)	(45,493)
Required M&O Reserve Fund Deposits	(166)	(108)	(100)	(102)	(105)	(108)	(110)	(113)	(526)	(1,118)
Jetport Share of Capital Outlay	(630)	(1,640)	(1,788)	(2,319)	(1,214)	(1,757)	(952)	(3,399)	(10,354)	(18,716)
Jetport Share of CIP	0	0	(207)	(2,427)	(1,636)	(211)	(205)	(412)	(1,233)	(4,380)
Jetport Unrestricted Cash to Fund Gates 1-6 Rehab	0	0	0	2,110	0	0	0	0	0	0
Net Surplus/(Deficit)	$1,944	$347	$291	$318	$211	$1,581	$2,803	$280	$10,166	$12,099

According to **Table 7B**, the Jetport is responsible for funding approximately $108.6 million in project costs. With the combination of a healthy operating fund balance and a positive net cash flow, the Jetport has cash on hand to fund its portion of the CIP through FY 2036. However, the construction of the FIS and the expansion of the parking garage and terminal strains the financial health of the Jetport. As previously discussed, this analysis assumes the Jetport would issue bonds to fund those projects, the debt service of which would be funded primarily with PFCs and airport revenues.

Table 7N also presents the Jetport's estimated debt service coverage. As shown, estimated debt service coverage exceeds the 1.25 times rate covenant required in the Certificate during the projection period ranging from a minimum of 1.56 times in FY 2017 to a maximum of 1.98 times in FY 2022.

IMPLEMENTING THE JETPORT'S SUSTAINABILITY PROGRAM

To translate its sustainability framework into action, the Jetport will establish a sustainability management system. This includes identifying roles and responsibilities within the organization to oversee the process of planning, implementing, monitoring, and adjusting its sustainability program, as necessary.

SUSTAINABILITY ROLES AND RESPONSIBILITIES

The Sustainable Airport Master Plan becomes the catalyst for the Jetport to formalize its sustainability program. This will require support to ensure proper integration into existing organizational processes and continuous improvement. Accordingly, the Jetport should identify roles and responsibilities within its organization to manage its sustainability program. Such roles and responsibilities include:

- **Sustainability Champion:** The ideal candidate should have an inherent passion for sustainability and be able to translate this passion into action on the part of others. Although he or she can hold any position within the organization, it is preferable that they hold a non-executive management position so that they are more likely to be influential and not perceived as obligatory. This would support a bottom-up approach to sustainability integration, which promotes ownership of the sustainability program among the Jetport's employees.

- **Sustainability Working Group (SWG):** This group will guide the direction of the Jetport's sustainability program by reviewing and providing feedback on the program's ongoing activities and performance. It should have representation from various levels of the Jetport's workforce as well as its tenant companies.

  This master plan recommends that the SWG meet on a regular basis, ideally monthly. At these meetings, members will identify and evaluate new sustainability ideas for potential implementation at the Jetport; review the implementation status of existing sustainability actions; assess the Jetport's overall progress toward meeting its established sustainability goals, objectives, and targets; and work with Jetport management to make and implement recommendations to adjust and improve the sustainability program, as needed.

- **Sustainability Action Leaders:** These leaders will be responsible for overseeing the implementation of sustainability actions, as evaluated and prioritized by the SWG. In addition, it will be important for leaders to collect relevant data and identify implementation challenges and opportunities for improvement.

- **Sustainability Ambassadors:** All of the Jetport's employees should be advocates and promoters of its sustainability program; however, it is essential to appoint key staff members to represent this program in front of external stakeholder groups. Sustainability Ambassadors could directly solicit, and respond to, feedback from local community groups on the Jetport's sustainability activities and performance, represent the Jetport in regional and national sustainability forums, and present to local academic institutions to educate students on sustainability. The Jetport can coordinate this effort with its existing Airport Ambassador Program and expand opportunities to communicate the Jetport's sustainability activities and performance to its customers.

SUSTAINABILITY MANAGEMENT SYSTEM

To support the ongoing planning, implementation, review, and improvement of the Jetport's sustainability program, this sustainable airport master plan establishes a sustainability management system for the organization. This management system, which adapts the basic plan, do, check, act (PDCA) framework, intends to make sustainability a forethought of decision-making at every level of the organization. The PDCA framework, as described in the international standard ISO 14001 (environmental management), involves:

- Plan: Establish the objectives and process to meet desired organizational results;
- Do: Implement the process and programs established to meet those objectives;
- Check: Monitor, measure, and report on progress toward objectives based on the environmental policy, regulations, and other requirements; and
- Act: Take actions to continually improve performance.

This framework involves processes that the Jetport performed as part of the development of this sustainable airport master plan, will continue to perform, or will perform in the future as its sustainability program matures. It assumes that the Jetport has assigned roles and responsibilities, as the *Sustainability Roles and Responsibilities* identifies.

Plan

The planning stage involves identifying and evaluating opportunities for sustainability performance improvement at the Jetport. This includes determining the aspects of the organization's operations with the greatest environmental and social impacts, while conceiving of opportunities that may avoid or minimize those impacts. One way the Jetport can identify these aspects and opportunities is by soliciting feedback from its internal and external stakeholders through direct engagement activities and virtual means (e.g., comment form on its website). In particular, the Jetport should empower its employees to consider and communicate sustainability enhancements related to their day-to-day responsibilities. For example, an employee tasked with hazardous waste management might conceive of ways to avoid the use of hazardous materials in the first place or propose alternative practices that would reduce the amount of hazardous waste required. In addition to stakeholder feedback, the Jetport should solicit and obtain sustainability ideas from future studies it commissions, best practices at other airports, industry publications, and academic research.

The Sustainability Action Evaluation Tool, part of the SPOT suite of tools, supports this planning stage. When the Jetport receives a sustainability idea, it should input the idea into the Sustainability Action Evaluation Tool. As *Sustainability Actions* discusses, the Sustainability Action Evaluation Tool enables the

Jetport to consistently catalogue and evaluate sustainability ideas against sustainability criteria, which include feasibility, goal applicability, asset management, estimated costs, and estimated benefits. Through robust discussion, the SWG should evaluate each idea using these criteria, entering the results into the tool as it achieves consensus. The final evaluation step should be for the SWG to prioritize the idea for implementation based on its relative total impact score by sustainability category in consideration of the Jetport's needs and available resources.

The Sustainability Action Evaluation Tool also enables the Jetport to record who provided the sustainability idea along with that person's contact information. The Jetport can formally acknowledge receipt of a sustainability idea through direct communication with the source of the idea, and once the SWG completes its evaluation, the Jetport should follow-up with that source to relay the results of the evaluation, as applicable and feasible. This will support accountability and transparency of operations, as well as provide the Jetport's stakeholders with a sense of responsibility and accomplishment by knowingly contributing to the Jetport's sustainability program and potential sustainability performance improvement.

Do

This stage is when the Jetport initiates and tracks the implementation of sustainability actions that the SWG prioritized for implementation during the planning stage. The Sustainability Action Implementation Tool, also part of the SPOT suite of tools, will support the Jetport in this process (see **Figure 1**). The Sustainability Action Implementation Tool includes the Sustainability Action Implementation Plan template (see **Figure 2**), which establishes implementation tasks as well as identifies the information needed to track the progress and specific conditions of implementation. The Sustainability Action Implementation Plans also provide relevant supporting information such as case studies and guidance documents. For each sustainability action, the SWG will identify and coordinate with a Sustainability Action Leader on the development of a Sustainability Action Implementation Plan.

The SWG should use the Sustainability Action Implementation Tool to track implementation status, as the Sustainability Action Leaders should be required to provide an update to the Implementation Plan on a regular basis, perhaps quarterly. To the extent practicable, these updates should include overall status (i.e., not started, in progress, completed, and flagged), status of implementation tasks, costs to-date (i.e., capital and operations and maintenance), and staff hours spent to-date. The SWG should input these updates into the Sustainability Action Implementation Tool to document implementation progress.

At the time of a sustainability action's completion, the Sustainability Action Leader should provide the SWG with a final version of the Sustainability Action Implementation Plan along with all requested data. In addition, the Sustainability Action Leaders should be sure to summarize all lessons learned during the implementation process as well as the realized benefits of the action, as the Jetport can use this information to inform the identification, evaluation, and implementation of future actions.

Portland International Jetport Sustainability Action Implementation Tool

Action ID	Action	Action Description	Implementation Status	Last Status Update	Start Date	Expected Completion Date	Completion Date
[illegible]	[illegible]	[illegible]	[illegible]				
[illegible]	[illegible]	[illegible]	[illegible]				

Figure 1

Check

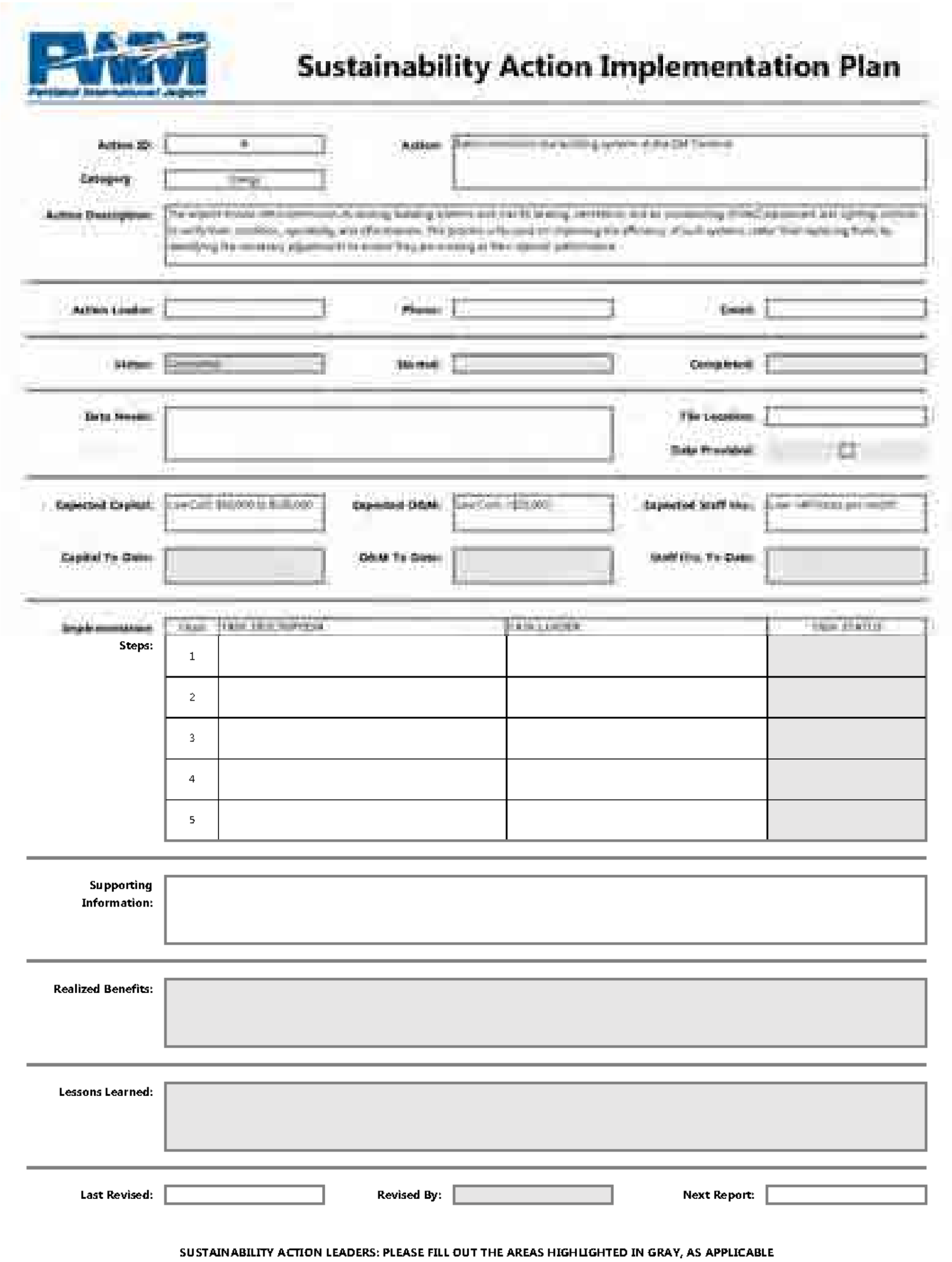
The check stage involves the monitoring and measurement of the Jetport’s sustainability program. This includes the review of the status of sustainability actions along with their contributions to the Jetport’s overall sustainability performance. It also includes a review of data associated with the Jetport’s sustainability metrics (see *Sustainability Objectives and Metrics*) and progress made toward achieving its sustainability targets (see *Sustainability Targets*). The SWG should conduct this review on a quarterly basis, and report to Jetport management on a bi-annual basis.

The Jetport, through the SWG, should establish procedures for data collection and recordkeeping. This involves the identification of data holders and the establishment of a centralized repository for data collection as well as storing all Sustainability Action Implementation Plans. Depending on the maturity of the Jetport’s sustainability program, this centralized source can be an Excel-based workbook or an enterprise-wide, web-based platform.

Act

This stage of the Jetport’s sustainability management system focuses on the continuous improvement of its sustainability program. Accordingly, it involves the Jetport’s management conducting a holistic review of the program to identify any challenges or opportunities and working with the SWG to adjust the program based on those findings. This review should include, but is not limited to, progress made (or not made) toward stated sustainability goals, objectives, and targets; relevant input from stakeholders; and changes to conditions relating to the Jetport’s internal and external influences such as new or revised regulations, evolving organizational priorities, community hot topics, and shifting demographics.

This process should occur on an annual basis to ensure the consistent evaluation of the Jetport’s sustainability program, which will promote organizational accountability. The regularity of this process will also ensure that the Jetport's sustainability program is adaptable to ever-changing operational and environmental conditions.



Sustainability Action Implementation Plan

Action ID:
Action:
Category:
Action Description:

Action Leader: Phone: Email:

Status: Started: Completed:

Data Needs: File Location: Data Provided:

Expected Capital: Expected O&M: Expected Staff Hrs.:

Capital To Date: O&M To Date: Staff Hrs. To Date:

Implementation Steps:

STEP	TASK DESCRIPTION	TASK LEADER	TASK STATUS
1			
2			
3			
4			
5			

Supporting Information:

Realized Benefits:

Lessons Learned:

Last Revised: Revised By: Next Report:

SUSTAINABILITY ACTION LEADERS: PLEASE FILL OUT THE AREAS HIGHLIGHTED IN GRAY, AS APPLICABLE

Figure 2

SUPPORTING THE JETPORT'S SUSTAINABILITY PROGRAM

Beyond involving its stakeholders in the formulation of its sustainability framework and the establishment of its management system, the Jetport will need to implement innovative stakeholder engagement practices to build continued momentum around sustainability, including the development of Sustainability Guiding Principles and seeking additional opportunities for collaboration. Further, it will need to identify funding mechanisms to support the continued implementation of sustainability actions.

SUSTAINABILITY GUIDING PRINCIPLES

To promote sustainability as an organizational focus within the Jetport's culture, the Jetport is embracing the development of Sustainability Guiding Principles. These principles will provide key criteria to guide decision-making processes across the organization as well as align the activities of those representing or working on behalf of the Jetport, namely its tenants and contractors/vendors, with the Jetport's sustainability ambitions.

As the formality of the Jetport's sustainability program is in its beginning stages, this master plan recommends that the Jetport craft its Sustainability Guiding Principles through vigorous employee feedback led by the SWG. The principles should have a positive and energetic tone and reflect the sustainability framework of the Jetport's sustainability program, including its priority categories as well as the goals and objectives it seeks to accomplish. They should also be broad enough to permit the Jetport's sustainability program to grow over time based on the Jetport's continuously changing internal and external operating conditions.

Once completed, the Jetport should ensure that its Sustainability Guiding Principles permeate throughout the organization by prominently displaying them in key employee spaces. Increased awareness of these principles among employees will improve the likelihood that they will uphold them in their day-to-day responsibilities. Further, the Jetport should include its Sustainability Guiding Principles in all contract-related documentation such as tenant leases and requests for proposals/qualifications to ensure that its partners are contributing toward the Jetport's sustainability performance improvement. This could have exponential benefits, as it has the potential to change not only the way these organizations conduct business at the Jetport, but elsewhere as well.

In addition, to influencing its employees and business partners, the Jetport's Sustainability Guiding Principles can convey the organization's sustainability commitment and leadership to its other stakeholders. Accordingly, the Jetport plans to highlight its Sustainability Guiding Principles on its website, incorporate them into its reporting, and display them throughout the terminal buildings.

STAKEHOLDER PARTNERSHIPS

The Jetport should continue to strive to validate itself as a recognized leader in sustainability by establishing new, or strengthening existing, partnerships. The Jetport can develop these partnerships on a one-to-one basis focused on singular, mutually beneficial initiatives; form a multi-organizational collaborative that addresses regional sustainability issues; or a combination thereof. The one-to-one partnerships may involve individual groups such as art organizations. As an example, the Jetport may collaborate with a group such as Oak Street Studios, a local art instruction institute for children, to develop an educational initiative that communicates issues of sustainability, particularly those associated with the Jetport's operations, through creative expression.

The multi-organizational collaborative could take the form of roundtable discussions, hosted by the Jetport, with local organizations and topical experts that exchange best practices and lessons learned. This collaborative may also involve the creation of a permanent consortium, facilitated by the Jetport, focused on regional sustainability issues such as climate mitigation and adaptation.

FUNDING THE JETPORT'S SUSTAINABILITY PROGRAM

As the Jetport moves forward with implementing the sustainability elements of this master plan and its larger sustainability program, it will be essential to identify funding resources. Federal, state, local, private, and non-profit sources typically provide funding for airport-related sustainability activities. The Jetport should continually research new funding opportunities or potential partnerships that can achieve shared sustainability goals. Through community-based or internal tenant partnerships, the Jetport may be able to benefit from tax credits or opportunities that may not otherwise be available to municipally operated airports.

The majority of current funding opportunities apply to projects related to the Jetport's sustainability categories of energy efficiency and greenhouse gas emissions. For example, the Maine Public Utilities Commission administers the Efficiency Maine program, which offers funding and support for energy conservation measures (e.g., variable frequency drives, HVAC equipment, lighting fixtures and controls, etc.). Under the related Large Customer Program, the Jetport may be eligible to receive funds for large electrical energy efficiency and distributed energy projects. Further, Efficiency Maine offers free Scoping Audits, which may assist the Jetport with its specific energy needs by identifying related energy efficiency projects. It also offers the opportunity to secure funding for Technical Assistance Studies for projects the Jetport has already identified.

Federal agencies such as the FAA have several applicable programs including the FAA Energy Efficiency of Airport Power Sources Program, FAA Voluntary Airport Low Emissions Program (VALE), and the FAA Zero Emissions Airport Vehicle and Infrastructure Pilot Program. These programs aim to cost-effectively implement infrastructure changes or energy conservation projects that reduce greenhouse gas emissions and improve regional air quality. The Environmental Protection Agency (EPA) and U.S. Department of Energy (DOE) offer additional federal grants such as the EPA Diesel Emissions Reduction Grant and the DOE Loan Guarantee Program. These types of nationally competitive grants are best pursued in partnership with the larger community to demonstrate environmental stewardship though innovative technologies that result in large-scale emission reductions.

Outside of grant opportunities, the Jetport can pursue innovative funding strategies such as establishing a revolving sustainability fund or expanding non-aviation facilities or services. For example, as the Jetport implements energy conservation measures, it can funnel all or a portion of associated cost savings to the implementation of new energy conservation measures. The Airport Cooperative Research Program's Report 121 outlines additional innovative revenue strategies that airport directors are spearheading that capitalize on real estate development related to transportation, commercial cargo, and recreational activities. In addition, improvements to the planning, design, and management of passenger concessions, public parking, or other in-terminal services at the Jetport could potentially result in revenue gains.

Appendix F provides more information on funding the Jetport's sustainability program.

REPORTING ON THE JETPORT'S SUSTAINABILITY PROGRAM

The Jetport is committed to reporting on its sustainability program on an annual basis, including its progress toward achieving the program's goals, objectives, and targets as well as the actions associated with its sustainability performance. Through annual reporting, the Jetport can enhance transparency, promote accountability, build stakeholder trust, and convey its leadership in sustainability within airport industry.

To assist the Jetport in preparing its annual progress reports, this master plan includes a Sustainability Progress Report Template (see **Figure 3**). This template provides space for an introductory cover letter from the Jetport Director and a narrative that summarizes the Jetport's sustainability program as well as reinforces its commitment to sustainability. Additionally, it provides space for the following by priority sustainability category (as well as the categories of Water Quality and Noise, as relevant), which the Jetport should complete as applicable and as data is available:

- Goals and objectives;
- Progress made toward achieving targets;
- The implementation status of actions; and
- Notable activities and accomplishments.

Governance

GOAL: Integrate sustainability throughout the Jetport's organizational framework.

Governance is comprised of the systems in place that enable an organization to make and implement decisions. The Jetport has demonstrated leadership in sustainability through its mission statement and continually aims to balance opportunities for economic prosperity, social wellbeing, and environmental integrity across it organizational framework.

OBJECTIVES

1. Integrate sustainability criteria into the Jetport's decision-making processes
2. Promote sustainability considerations in the daily activities of Jetport employees
3. Drive accountability throughout all levels of the organization
4. Enhance internal and external transparency of operations

TARGETS	PROGRESS TO DATE
Present two sustainability-based employee recognition awards per year beginning in 2016	
Establish an internal Sustainability Working Group by 2017	
Ensure that 100 percent of capital projects are evaluated using sustainability criteria by 2017	
Engage three local organizations on the Jetport's sustainability program per year beginning in 2017	
Participate or establish a regional task force focused on sustainability by 2018	

Activities & Accomplishments

Sustainability Airport Master Plan

The release of the Jetport's first sustainable airport master plan, in 2016 builds on the City of Portland and State of Maine's commitments to sustainability and provides the foundation for integrating sustainability as a core value over the next 20 years and beyond. Past sustainability efforts and opportunities for continued improvement in the future are captured in the SAMP to guide the Jetport through a transformational change that fully integrates the principles of sustainability.

ACTIONS	STATUS	PROGRESS TO DATE
Include a requirement on all capital improvement applications to identify a proposed project's sustainability elements and any known alternatives that serve the same purpose with greater efficiency and/or environmental/social performance	Not Started	No activity to date
Establish the Jetport's focus on sustainability as one of its core values, and communicate these values to the its stakeholders	Not Started	No activity to date
Incorporate the Jetport's sustainability guidelines into future tenant and service contracts, and provide training on these guidelines, as needed	Not Started	No activity to date
Publish an annual "scorecard" to report on the Jetport's ongoing sustainability performance	In Progress	Developed a progress report template for future use

Figure 3

SUMMARY

The financial feasibility of future projects will be determined by existing and future leases, funding levels and participation rates of federal grant programs, the availability of PFC revenues and other funding sources, bonding capacity and the ability to generate internal cash flow from operations at the Jetport.

The financial projections were prepared on the basis of available information and assumptions set forth in this chapter. It is believed that such information and assumptions provide a reasonable basis for the projections to the level of detail appropriate for an airport master plan. Some of the assumptions used to develop the projections may not be realized, and unanticipated events or circumstances may occur. Therefore, the actual results will vary from those projected, and such variations could be material.

Based on these assumptions, the CIP – as it is presented – can be funded through 2036 by the Jetport with the assistance of additional grants, PFCs, and bond funding. As the Jetport has done in the past, it should continue to monitor its financial situation to determine which projects should be undertaken and when. In addition, the Jetport should review and evaluate current leases and service incentives to enhance revenues and provide financial solvency, while improving the facilities.

The best means to begin implementation of the recommendations in the Master Plan is to first recognize that planning is a continuous process that does not end with completion and approval of this document. Rather, the ability to continuously monitor the existing and forecast status of airport activity must be provided and maintained. The issues upon which the Master Plan is based will remain valid for a number of years. The primary goal is for the Jetport to best serve the air transportation needs of the region, while continuing to be economically self-sufficient.

The actual need for facilities is most appropriately established by airport activity levels rather than a specified date. For example, projections have been made as to when additional hangars may be needed at the Jetport. In reality, however, the timeframe in which the development is needed may be substantially different. Actual demand may be slower to develop than expected. On the other hand, high levels of demand may establish the need to accelerate the development. Although every effort has been made in this master planning process to conservatively estimate when facility development may be needed, aviation demand will dictate when facility improvements need to be delayed or accelerated.

In summary, the sustainable airport master planning process requires the Jetport management to consistently monitor the progress of the Jetport in terms of aircraft operations and based aircraft. Analysis of aircraft demand is critical to the timing and need for certain airport facilities. The information obtained from continually monitoring airport activity will provide the data necessary to determine if the development schedule should be accelerated or decelerated.

Similarly, implementing the Jetport's sustainability program will require establishment of a management system with roles and responsibilities to Plan, Do, Check and Act. The Jetport will need to craft Sustainability Guiding Principles and collaborate with tenants and other stakeholders as well as continue to take advantage of federal funding programs for sustainability. Finally, reporting on its sustainability progress will enhance transparency, promote accountability, build stakeholder trust, as well as convey its leadership in sustainability within the airport industry.

The Jetport welcomes its stakeholders to follow its sustainability journey and to provide comments on its sustainability program, including the submission of ideas to improve its sustainability performance.

Followers should submit all comments to the Jetport through its website, http://www.portlandjetport.org/contact, by calling (207) 874 -8877, or by writing to Portland International Jetport, 1001 Westbrook Street, Portland, Maine, 04102.

APPENDIX A

GLOSSARY OF TERMS

SUSTAINABLE AIRPORT MASTER PLAN

A

ABOVE GROUND LEVEL: The elevation of a point or surface above the ground.

ACCELERATE-STOP DISTANCE AVAILABLE (ASDA): See declared distances.

ADVISORY CIRCULAR: External publications issued by the FAA consisting of nonregulatory material providing for the recommendations relative to a policy, guidance and information relative to a specif c aviation subject.

AIR CARRIER: An operator which: (1) performs at least f ve round trips per week between two or more points and publishes f ight schedules which specify the times, days of the week, and places between which such f ights are performed; or (2) transports mail by air pursuant to a current contract with the U.S. Postal Service. Certif ed in accordance with Federal Aviation Regulation (FAR) Parts 121 and 127.

AIRCRAFT: A transportation vehicle that is used or intended for use for f ight.

AIRCRAFT APPROACH CATEGORY: A grouping of aircraft based on 1.3 times the stall speed in their landing conf guration at their maximum certif cated landing weight. The categories are as follows:

- Category A: Speed less than 91 knots.
- Category B: Speed 91 knots or more, but less than 121 knots.
- Category C: Speed 121 knots or more, but less than 141 knots.
- Category D: Speed 141 knots or more, but less than 166 knots.
- Category E: Speed greater than 166 knots.

AIRCRAFT OPERATION: The landing, takeoff, or touch-and-go procedure by an aircraft on a runway at an airport.

AIRCRAFT OPERATIONS AREA (AOA): A restricted and secure area on the airport property designed to protect all aspects related to aircraft operations.

AIRCRAFT OWNERS AND PILOTS ASSOCIATION: A private organization serving the interests and needs of general aviation pilots and aircraft owners.

AIRCRAFT RESCUE AND FIRE FIGHTING: A facility located at an airport that provides emergency vehicles, extinguishing agents, and personnel responsible for minimizing the impacts of an aircraft accident or incident.

AIRFIELD: The portion of an airport which contains the facilities necessary for the operation of aircraft.

AIRLINE HUB: An airport at which an airline concentrates a significant portion of its activity and which often has a significant amount of connecting traffic.

AIRPLANE DESIGN GROUP (ADG): A grouping of aircraft based upon wingspan. The groups are as follows:

- Group I: Up to but not including 49 feet.
- Group II: 49 feet up to but not including 79 feet.
- Group III: 79 feet up to but not including 118 feet.
- Group IV: 118 feet up to but not including 171 feet.
- Group V: 171 feet up to but not including 214 feet.
- Group VI: 214 feet or greater.

AIRPORT AUTHORITY: A quasi-governmental public organization responsible for setting the policies governing the management and operation of an airport or system of airports under its jurisdiction.

AIRPORT BEACON: A navigational aid located at an airport which displays a rotating light beam to identify whether an airport is lighted.

AIRPORT CAPITAL IMPROVEMENT PLAN: The planning program used by the Federal Aviation Administration to identify, prioritize, and distribute funds for airport development and the needs of the National Airspace System to meet specif ed national goals and objectives.

AIRPORT ELEVATION: The highest point on the runway system at an airport expressed in feet above mean sea level (MSL).

AIRPORT IMPROVEMENT PROGRAM: A program authorized by the Airport and Airway Improvement Act of 1982 that provides funding for airport planning and development.

AIRPORT LAYOUT DRAWING (ALD): The drawing of the airport showing the layout of exis. ng and proposed airport facilities.

AIRPORT LAYOUT PLAN (ALP): A scaled drawing of the existing and planned land and facilities necessary for the operation and development of the airport.

AIRPORT LAYOUT PLAN DRAWING SET: A set of technical drawings depicting the current and future airport conditions. The individual sheets comprising the set can vary with the complexities of the airport, but the FAA-required drawings include the Airport Layout Plan (sometimes referred to as the Airport Layout Drawing (ALD), the Airport Airspace Drawing, and the Inner Portion of the Approach Surface Drawing, On-Airport Land Use Drawing, and Property Map.

AIRPORT MASTER PLAN: The planner's concept of the long-term development of an airport.

AIRPORT MOVEMENT AREA SAFETY SYSTEM: A system that provides automated alerts and warnings of potential runway incursions or other hazardous aircraft movement events.

AIRPORT OBSTRUCTION CHART: A scaled drawing depicting the Federal Aviation Regulation (FAR) Part 77 surfaces, a representation of objects that penetrate these surfaces, runway, taxiway, and ramp areas, navigational aids, buildings, roads and other detail in the vicinity of an airport.

AIRPORT REFERENCE CODE (ARC): A coding system used to relate airport design criteria to the operational (Aircraft Approach Category) to the physical characteristics (Airplane Design Group) of the airplanes intended to operate at the airport.

AIRPORT REFERENCE POINT (ARP): The latitude and longitude of the approximate center of the airport.

AIRPORT SPONSOR: The entity that is legally responsible for the management and operation of an airport, including the fulf llment of the requirements of laws and regulations related thereto.

AIRPORT SURFACE DETECTION EQUIPMENT: A radar system that provides air traffic controllers with a visual representation of the movement of aircraft and other vehicles on the ground on the airf eld at an airport.

AIRPORT SURVEILLANCE RADAR: The primary radar located at an airport or in an air traffic control terminal area that receives a signal at an antenna and transmits the signal to air traffic control display equipment def ning the location of aircraft in the air. The signal provides only the azimuth and range of aircraft from the location of the antenna.

AIRPORT TRAFFIC CONTROL TOWER (ATCT): A central operations facility in the terminal air traffic control system, consisting of a tower, including an associated instrument f ight rule (IFR) room if radar equipped, using air/ground communications and/or radar, visual signaling and other devices to provide safe and expeditious movement of terminal air traffic.

AIR ROUTE TRAFFIC CONTROL CENTER: A facility which provides en route air traffic control service to aircraft operating on an IFR f ight plan within controlled airspace over a large, multi-state region.

AIRSIDE: The portion of an airport that contains the facilities necessary for the operation of aircraft.

AIRSPACE: The volume of space above the surface of the ground that is provided for the operation of aircraft.

AIR TAXI: An air carrier certif cated in accordance with FAR Part 121 and FAR Part 135 and authorized to provide, on demand, public transportation of persons and property by aircraft. Generally operates small aircraft "for hire" for specif c trips.

AIR TRAFFIC CONTROL: A service operated by an appropriate organization for the purpose of providing for the safe, orderly, and expeditious f ow of air traffic.

AIR ROUTE TRAFFIC CONTROL CENTER (ARTCC): A facility established to provide air traffic control service to aircraft operating on an IFR f ight plan within controlled airspace and principally during the en route phase of f ight.

AIR TRAFFIC CONTROL SYSTEM COMMAND CENTER: A facility operated by the FAA which is responsible for the central f ow control, the central altitude reservation system, the airport reservation position system, and the air traffic service contingency command for the air traffic control system.

AIR TRAFFIC HUB: A categoriza. on of commercial service airports or group of commercial service airports in a metropolitan or urban area based upon the proportion of annual national enplanements existing at the airport or airports. The categories are large hub, medium hub, small hub, or non-hub. It forms the basis for the apportionment of entitlement funds.

AIR TRANSPORT ASSOCIATION OF AMERICA: An organization consisting of the principal U.S. airlines that represents the interests of the airline industry on major aviation issues before federal, state, and local government bodies. It promotes air transportation safety by coordinating industry and governmental safety programs and it serves as a focal point for industry efforts to standardize practices and enhance the efficiency of the air transportation system.

ALERT AREA: See special-use airspace.

ALTITUDE: The vertical distance measured in feet above mean sea level.

ANNUAL INSTRUMENT APPROACH (AIA): An approach to an airport with the intent to land by an aircraft in accordance with an IFR f ight plan when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude.

APPROACH LIGHTING SYSTEM (ALS): An airport lighting facility which provides visual guidance to landing aircraft by radiating light beams by which the pilot aligns the aircraft with the extended centerline of the runway on his f nal approach and landing.

APPROACH MINIMUMS: The altitude below which an aircraft may not descend while on an IFR approach unless the pilot has the runway in sight.

APPROACH SURFACE: An imaginary obstruction limiting surface def ned in FAR Part 77 which is longitudinally centered on an extended runway centerline and extends outward and upward from the primary surface at each end of a runway at a designated slope and distance based upon the type of available or planned approach by aircraft to a runway.

APRON: A specif ed portion of the airf eld used for passenger, cargo or freight loading and unloading, aircraft parking, and the refueling, maintenance and servicing of aircraft.

AREA NAVIGATION: The air navigation procedure that provides the capability to establish and maintain a f ight path on an arbitrary course that remains within the coverage area of navigational sources being used.

AUTOMATED TERMINAL INFORMATION SERVICE (ATIS): The continuous broadcast of recorded non-control information at towered airports. Information typically includes wind speed, direction, and runway in use.

AUTOMATED SURFACE OBSERVATION SYSTEM (ASOS): A reporting system that provides frequent airport ground surface weather observation data through digitized voice broadcasts and printed reports.

AUTOMATIC WEATHER OBSERVATION STATION (AWOS): Equipment used to automatically record weather conditions (i.e. cloud height, visibility, wind speed and direction, temperature, dew point, etc.)

AUTOMATIC DIRECTION FINDER (ADF): An aircraft radio navigation system which senses and indicates the direction to a non-directional radio beacon (NDB) ground transmitter.

AVIGATION EASEMENT: A contractual right or a property interest in land over which a right of unobstructed f ight in the airspace is established.

AZIMUTH: Horizontal direction expressed as the angular distance between true north and the direction of a f xed point (as the observer's heading).

B

BASE LEG: A f ight path at right angles to the landing runway off its approach end. The base leg normally extends from the downwind leg to the intersection of the extended runway centerline. See "traffic pattern."

BASED AIRCRAFT: The general aviation aircraft that use a specif c airport as a home base.

BEARING: The horizontal direction to or from any point, usually measured clockwise from true north or magnetic north.

BLAST FENCE: A barrier used to divert or dissipate jet blast or propeller wash.

BLAST PAD: A prepared surface adjacent to the end of a runway for the purpose of elimina. ng the erosion of the ground surface by the wind forces produced by airplanes at the initiation of takeoff operations.

BUILDING RESTRICTION LINE (BRL): A line which identif es suitable building area locations on the airport.

C

CAPITAL IMPROVEMENT PLAN: The planning program used by the Federal Aviation Administration to identify, prioritize, and distribute Airport Improvement Program funds for airport development and the needs of the National Airspace System to meet specif ed national goals and objectives.

CARGO SERVICE AIRPORT: An airport served by aircraft providing air transportation of property only, including mail, with an annual aggregate landed weight of at least 100,000,000 pounds.

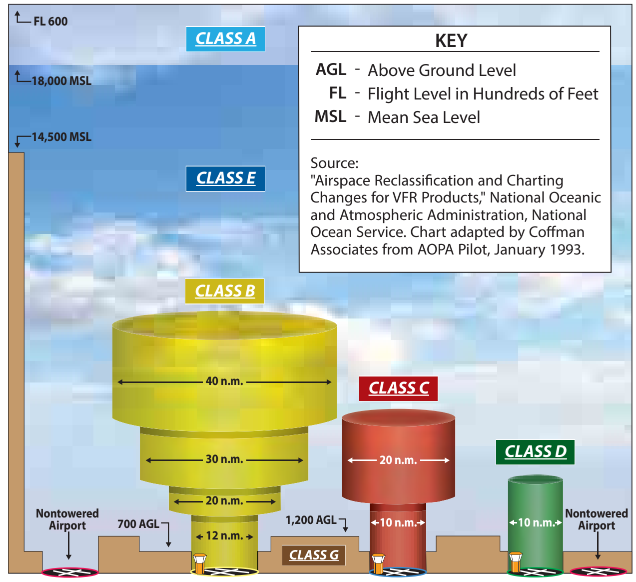
CATEGORY I: An Instrument Landing System (ILS) that provides acceptable guidance information to an aircraft from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a decision height of 200 feet above the horizontal plane containing the runway threshold.

CATEGORY II: An ILS that provides acceptable guidance information to an aircraft from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a decision height of 100 feet above the horizontal plane containing the runway threshold.

CATEGORY III: An ILS that provides acceptable guidance information to a pilot from the coverage limits of the ILS with no decision height specif ed above the horizontal plane containing the runway threshold.

CEILING: The height above the ground surface to the location of the lowest layer of clouds which is reported as either broken or overcast.

CIRCLING APPROACH: A maneuver initiated by the pilot to align the aircraft with the runway for landing when f ying a predetermined circling instrument approach under IFR.



CLASS A AIRSPACE: See Controlled Airspace.

CLASS B AIRSPACE: See Controlled Airspace.

CLASS C AIRSPACE: See Controlled Airspace.

CLASS D AIRSPACE: See Controlled Airspace.

CLASS E AIRSPACE: See Controlled Airspace.

CLASS G AIRSPACE: See Controlled Airspace.

CLEAR ZONE: See Runway Protection Zone.

COMMERCIAL SERVICE AIRPORT: A public airport providing scheduled passenger service that enplanes at least 2,500 annual passengers.

COMMON TRAFFIC ADVISORY FREQUENCY: A radio frequency identif ed in the appropriate aeronautical chart which is designated for the purpose of transmitting airport advisory information and procedures while operating to or from an uncontrolled airport.

COMPASS LOCATOR (LOM): A low power, low/medium frequency radio-beacon installed in conjunction with the instrument landing system at one or two of the marker sites.

CONICAL SURFACE: An imaginary obstruction-limiting surface def ned in FAR Part 77 that extends from the edge of the horizontal surface outward and upward at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

CONTROLLED AIRPORT: An airport that has an opera. ng airport traffic control tower.

CONTROLLED AIRSPACE: Airspace of def ned dimensions within which air traffic control services are provided to instrument f ight rules (IFR) and visual f ight rules (VFR) f ights in accordance with the airspace classif cation. Controlled airspace in the United States is designated as follows:

- **CLASS A**: Generally, the airspace from 18,000 feet mean sea level (MSL) up to but not including f ight level FL600. All persons must operate their aircraft under IFR.

- **CLASS B**: Generally, the airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports. The conf guration of Class B airspace is unique to each airport, but typically consists of two or more layers of air space and is designed to contain all published instrument approach procedures to the airport. An air traff c control clearance is required for all aircraft to operate in the area.

- **CLASS C**: Generally, the airspace from the surface to 4,000 feet above the airport elevation (charted as MSL) surrounding those airports that have an operational control tower and radar approach control and are served by a qualifying number of IFR operations or passenger enplanements. Although individually tailored for each airport, Class C airspace typically consists of a surface area with a f ve nautical mile (nm) radius and an outer area with a 10 nautical mile radius that extends from 1,200 feet to 4,000 feet above the airport elevation. Two-way radio communication is required for all aircraft.

- **CLASS D**: Generally, that airspace from the surface to 2,500 feet above the air port elevation (charted as MSL) surrounding those airports that have an operational control tower. Class D airspace is individually tailored and conf gured to encompass published instrument approach procedure. Unless otherwise authorized, all persons must establish two-way radio communication.

- **CLASS E**: Generally, controlled airspace that is not classif ed as Class A, B, C, or D. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. When designated as a surface area, the airspace will be conf gured to contain all instrument procedures. Class E airspace encompasses all Victor Airways. Only aircraft following instrument f ight rules are required to establish two-way radio communication with air traffic control.

- **CLASS G**: Generally, that airspace not classif ed as Class A, B, C, D, or E. Class G airspace is uncontrolled for all aircraft. Class G airspace extends from the surface to the overlying Class E airspace.

CONTROLLED FIRING AREA: See special-use airspace.

CROSSWIND: A wind that is not parallel to a runway centerline or to the intended f ight path of an aircraft.

CROSSWIND COMPONENT: The component of wind that is at a right angle to the runway centerline or the intended f ight path of an aircraft.

CROSSWIND LEG: A f ight path at right angles to the landing runway off its upwind end. See "traffic pattern."

D

DECIBEL: A unit of noise representing a level relative to a reference of a sound pressure 20 micro newtons per square meter.

DECISION HEIGHT/DECISION ALTITUDE: The height above the end of the runway surface at which a decision must be made by a pilot during the ILS or Precision Approach Radar approach to either continue the approach or to execute a missed approach.

DECLARED DISTANCES: The distances declared available for the airplane's takeoff runway, takeoff distance, accelerate-stop distance, and landing distance requirements. The distances are:

- **TAKEOFF RUNWAY AVAILABLE (TORA):** The runway length declared available and suitable for the ground run of an airplane taking off.

- **TAKEOFF DISTANCE AVAILABLE (TODA):** The TORA plus the length of any remaining runway and/or clear way beyond the far end of the TORA.

- **ACCELERATE-STOP DISTANCE AVAILABLE (ASDA):** The runway plus stopway length declared available for the accelera. on and deceleration of an aircraft aborting a takeoff.

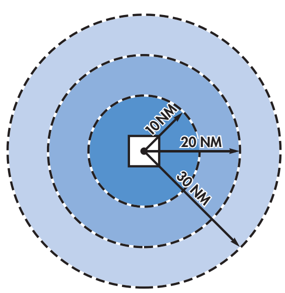
- **LANDING DISTANCE AVAILABLE (LDA):** The runway length declared available and suitable for landing.

DEPARTMENT OF TRANSPORTATION: The cabinet level federal government organization consisting of modal operating agencies, such as the Federal Aviation Administration, which was established to promote the coordination of federal transportation programs and to act as a focal point for research and development efforts in transportation.

DISCRETIONARY FUNDS: Federal grant funds that may be appropriated to an airport based upon designation by the Secretary of Transportation or Congress to meet a specif ed national priority such as enhancing capacity, safety, and security, or mitigating noise.

DISPLACED THRESHOLD: A threshold that is located at a point on the runway other than the designated beginning of the runway.

DISTANCE MEASURING EQUIPMENT (DME): Equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid.



DNL: The 24-hour average sound level, in Aweighted decibels, obtained after the addition of ten decibels to sound levels for the periods between 10 p.m. and 7 a.m. as averaged over a span of one year. It is the FAA standard metric for determining the cumulative exposure of individuals to noise.

DOWNWIND LEG: A f ight path parallel to the landing runway in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg. Also see "traffic pattern."

E

EASEMENT: The legal right of one party to use a portion of the total rights in real estate owned by another party. This may include the right of passage over, on, or below the property; certain air rights above the property, including view rights; and the rights to any specif ed form of development or activity, as well as any other legal rights in the property that may be specif ed in the easement document.

ELEVATION: The vertical distance measured in feet above mean sea level.

ENPLANED PASSENGERS: The total number of revenue passengers boarding aircraft, including originating, stop-over, and transfer passengers, in scheduled and nonscheduled services.

ENPLANEMENT: The boarding of a passenger, cargo, freight, or mail on an aircraft at an airport.

ENTITLEMENT: Federal funds for which a commercial service airport may be eligible based upon its annual passenger enplanements.

ENVIRONMENTAL ASSESSMENT (EA): An environmental analysis performed pursuant to the National Environmental Policy Act to determine whether an action would signif cantly affect the environment and thus require a more detailed environmental impact statement.

ENVIRONMENTAL AUDIT: An assessment of the current status of a party's compliance with applicable environmental requirements of a party's environmental compliance policies, practices, and controls.

ENVIRONMENTAL IMPACT STATEMENT (EIS): A document required of federal agencies by the National Environmental Policy Act for major projects are legislative proposals affecting the environment. It is a tool for decision-making describing the positive and negative effects of a proposed action and citing alternative actions.

ESSENTIAL AIR SERVICE: A federal program which guarantees air carrier service to selected small cities by providing subsidies as needed to prevent these cities from such service.

F

FEDERAL AVIATION REGULATIONS: The general and permanent rules established by the execu. ve departments and agencies of the Federal Government for aviation, which are published in the Federal Register. These are the aviation subset of the Code of Federal Regulations.

FEDERAL INSPECTION SERVICES: The provision of customs and immigration services including passport inspection, inspection of baggage, the collection of duties on certain imported items, and the inspections for agricultural products, illegal drugs, or other restricted items.

FINAL APPROACH: A f ight path in the direction of landing along the extended runway centerline. The f nal approach normally extends from the base leg to the runway. See "traffic pattern."

FINAL APPROACH AND TAKEOFF AREA (FATO). A def ned area over which the f nal phase of the helicopter approach to a hover, or a landing is completed and from which the takeoff is initiated.

FINAL APPROACH FIX: The designated point at which the f nal approach segment for an aircraft landing on a runway begins for a non-precision approach.

FINDING OF NO SIGNIFICANT IMPACT (FONSI): A public document prepared by a Federal agency that presents the rationale why a proposed action will not have a signif cant effect on the environment and for which an environmental impact statement will not be prepared.

FIXED BASE OPERATOR (FBO): A provider of services to users of an airport. Such services include, but are not limited to, hangaring, fueling, f ight training, repair, and maintenance.

FLIGHT LEVEL: A measure of altitude used by aircraft f ying above 18,000 feet. Flight levels are indicated by three digits representing the pressure altitude in hundreds of feet. An airplane f ying at f ight level 360 is f ying at a pressure altitude of 36,000 feet. This is expressed as FL 360.

FLIGHT SERVICE STATION: An operations facility in the national f ight advisory system which utilizes data interchange facilities for the collection and dissemination of Notices to Airmen, weather, and administrative data and which provides pre-f ight and in-f ight advisory services to pilots through air and ground based communication facilities.

FRANGIBLE NAVAID: A navigational aid which retains its structural integrity and stiffness up to a designated maximum load, but on impact from a greater load, breaks, distorts, or yields in such a manner as to present the minimum hazard to aircraft.

G

GENERAL AVIATION: That portion of civil aviation which encompasses all facets of aviation except air carriers holding a certif cate of convenience and necessity, and large aircraft commercial operators.

GENERAL AVIATION AIRPORT: An airport that provides air service to only general aviation.

GLIDESLOPE (GS): Provides vertical guidance for aircraft during approach and landing. The glideslope consists of the following:

1. Electronic components emitting signals which provide vertical guidance by reference to airborne instruments during instrument approaches such as ILS; or

2. Visual ground aids, such as VASI, which provide vertical guidance for VFR approach or for the visual portion of an instrument approach and landing.

GLOBAL POSITIONING SYSTEM (GPS): A system of 48 satellites used as reference points to enable navigators equipped with GPS receivers to determine their latitude, longitude, and altitude.

GROUND ACCESS: The transportation system on and around the airport that provides access to and from the airport by ground transportation vehicles for passengers, employees, cargo, freight, and airport services.

H

HELIPAD: A designated area for the takeoff, landing, and parking of helicopters.

HIGH INTENSITY RUNWAY LIGHTS: The highest classif cation in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

HIGH-SPEED EXIT TAXIWAY: A long radius taxiway designed to expedite aircra. turning off the runway after landing (at speeds to 60 knots), thus reducing runway occupancy time.

HORIZONTAL SURFACE: An imaginary obstruction-limiting surface def ned in FAR Part 77 that is specif ed as a portion of a horizontal plane surrounding a runway located 150 feet above the established airport elevation. The specif c horizontal dimensions of this surface are a function of the types of approaches existing or planned for the runway.

I

INITIAL APPROACH FIX: The designated point at which the initial approach segment begins for an instrument approach to a runway.

INSTRUMENT APPROACH PROCEDURE: A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument f ight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

INSTRUMENT FLIGHT RULES (IFR): Procedures for the conduct of f ight in weather conditions below Visual Flight Rules weather minimums. The term IFR is often also used to def ne weather conditions and the type of f ight plan under which an aircraft is operating.

INSTRUMENT LANDING SYSTEM (ILS): A precision instrument approach system which normally consists of the following electronic components and visual aids:

1. Localizer.
2. Glide Slope.
3. Outer Marker.
4. Middle Marker.
5. Approach Lights.

INSTRUMENT METEOROLOGICAL CONDITIONS: Meteorological conditions expressed in terms of specif c visibility and ceiling conditions that are less than the minimums specif ed for visual meteorological conditions.

ITINERANT OPERATIONS: Operations by aircraft that are not based at a specif ed airport.

K

KNOTS: A unit of speed length used in navigation that is equivalent to the number of nautical miles traveled in one hour.

L

LANDSIDE: The portion of an airport that provides the facilities necessary for the processing of passengers, cargo, freight, and ground transportation vehicles.

LANDING DISTANCE AVAILABLE (LDA): See declared distances.

LARGE AIRPLANE: An airplane that has a maximum certif ed takeoff weight in excess of 12,500 pounds.

LOCAL AREA AUGMENTATION SYSTEM: A differential GPS system that provides localized measurement correction signals to the basic GPS signals to improve navigational accuracy integrity, continuity, and availability.

LOCAL OPERATIONS: Aircraft operations performed by aircraft that are based at the airport and that operate in the local traffic pattern or within sight of the airport, that are known to be departing for or arriving from f ights in local practice areas within a prescribed distance from the airport, or that execute simulated instrument approaches at the airport.

LOCAL TRAFFIC: Aircraft operating in the traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from the local practice areas, or aircraft executing practice instrument approach procedures. Typically, this includes touch and-go training operations.

LOCALIZER: The component of an ILS which provides course guidance to the runway.

LOCALIZER TYPE DIRECTIONAL AID (LDA): A facility of comparable utility and accuracy to a localizer, but is not part of a complete ILS and is not aligned with the runway.

LONG RANGE NAVIGATION SYSTEM (LORAN): Long range navigation is an electronic navigational aid which determines aircraft position and speed by measuring the difference in the time of reception of synchronized pulse signals from two f xed transmitters. Loran is used for en route navigation.

LOW INTENSITY RUNWAY LIGHTS: The lowest classif ca. on in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

M

MEDIUM INTENSITY RUNWAY LIGHTS: The middle classif cation in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

MICROWAVE LANDING SYSTEM (MLS): An instrument approach and landing system that provides precision guidance in azimuth, elevation, and distance measurement.

MILITARY OPERATIONS: Aircraft operations that are performed in military aircraft.

MILITARY OPERATIONS AREA (MOA): See special-use airspace

MILITARY TRAINING ROUTE: An air route depicted on aeronautical charts for the conduct of military f ight training at speeds above 250 knots.

MISSED APPROACH COURSE (MAC): The f ight route to be followed if, after an instrument approach, a landing is not affected, and occurring normally:

1. When the aircraft has descended to the decision height and has not established visual contact; or
2. When directed by air traffic control to pull up or to go around again.

MOVEMENT AREA: The runways, taxiways, and other areas of an airport which are utilized for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports with a tower, air traffic control clearance is required for entry onto the movement area.

N

NATIONAL AIRSPACE SYSTEM: The network of air traffic control facilities, air traffic control areas, and navigational facilities through the U.S.

NATIONAL PLAN OF INTEGRATED AIRPORT SYSTEMS: The national airport system plan developed by the Secretary of Transportation on a biannual basis for the development of public use airports to meet national air transportation needs.

NATIONAL TRANSPORTATION SAFETY BOARD: A federal government organization established to investigate and determine the probable cause of transportation accidents, to recommend equipment and procedures to enhance transportation safety, and to review on appeal the suspension or revocation of any certif cates or licenses issued by the Secretary of Transportation.

NAUTICAL MILE: A unit of length used in navigation which is equivalent to the distance spanned by one minute of arc in latitude, that is, 1,852 meters or 6,076 feet. It is equivalent to approximately 1.15 statute mile.

NAVAID: A term used to describe any electrical or visual air navigational aids, lights, signs, and associated supporting equipment (i.e. PAPI, VASI, ILS, etc.)

NAVIGATIONAL AID: A facility used as, available for use as, or designed for use as an aid to air navigation.

NOISE CONTOUR: A continuous line on a map of the airport vicinity connecting all points of the same noise exposure level.

NON-DIRECTIONAL BEACON (NDB): A beacon transmitting nondirectional signals whereby the pilot of an aircraft equipped with direction f nding equipment can determine his or her bearing to and from the radio beacon and home on, or track to, the station. When the radio beacon is installed in conjunction with the Instrument Landing System marker, it is normally called a Compass Locator.

NON-PRECISION APPROACH PROCEDURE: A standard instrument approach procedure in which no electronic glide slope is provided, such as VOR, TACAN, NDB, or LOC.

NOTICE TO AIRMEN: A notice containing information concerning the establishment, condition, or change in any component of or hazard in the National Airspace System, the timely knowledge of which is considered essential to personnel concerned with f ight operations.

O

OBJECT FREE AREA (OFA): An area on the ground centered on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircra. operations by having the area free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.

OBSTACLE FREE ZONE (OFZ): The airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be kept clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function, in order to provide clearance for aircraft landing or taking off from the runway, and for missed approaches.

ONE-ENGINE INOPERABLE SURFACE: A surface emanating from the runway end at a slope ratio of 62.5:1. Air carrier airports are required to maintain a technical drawing of this surface depicting any object penetrations by January 1, 2010.

OPERATION: The take-off, landing, or touch-and-go procedure by an aircraft on a runway at an airport.

OUTER MARKER (OM): An ILS navigation facility in the terminal area navigation system located four to seven miles from the runway edge on the extended centerline, indicating to the pilot that he/she is passing over the facility and can begin f nal approach.

P

PILOT CONTROLLED LIGHTING: Runway lighting systems at an airport that are controlled by activating the microphone of a pilot on a specif ed radio frequency.

PRECISION APPROACH: A standard instrument approach procedure which provides runway alignment and glide slope (descent) information. It is categorized as follows:

- **CATEGORY I (CAT I)**: A precision approach which provides for approaches with a decision height of not less than 200 feet and visibility not less than 1/2 mile or Runway Visual Range (RVR) 2400 (RVR 1800) with operative touchdown zone and runway centerline lights.

- **CATEGORY II (CAT II)**: A precision approach which provides for approaches with a decision height of not less than 100 feet and visibility not less than 1200 feet RVR.

- **CATEGORY III (CAT III)**: A precision approach which provides for approaches with minima less than Category II.

PRECISION APPROACH PATH INDICATOR (PAPI): A lighting system providing visual approach slope guidance to aircraft during a landing approach. It is similar to a VASI but provides a sharper transition between the colored indicator lights.

PRECISION APPROACH RADAR: A radar facility in the terminal air traffic control system used to detect and display with a high degree of accuracy the direction, range, and elevation of an aircraft on the f nal approach to a runway.

PRECISION OBJECT FREE AREA (POFA): An area centered on the extended runway centerline, beginning at the runway threshold and extending behind the runway threshold that is 200 feet long by 800 feet wide. The POFA is a clearing standard which requires the POFA to be kept clear of above ground objects protruding above the runway safety area edge elevation (except for frangible NAVAIDS). The POFA applies to all new authorized instrument approach procedures with less than 3/4 mile visibility.

PRIMARY AIRPORT: A commercial service airport that enplanes at least 10,000 annual passengers.

PRIMARY SURFACE: An imaginary obstruction limiting surface def ned in FAR Part 77 that is specif ed as a rectangular surface longitudinally centered about a runway. The specif c dimensions of this surface are a function of the types of approaches existing or planned for the runway.

PROHIBITED AREA: See special-use airspace.

PVC: Poor visibility and ceiling. Used in determining Annual Service Volume. PVC conditions exist when the cloud ceiling is less than 500 feet and visibility is less than one mile.

R

RADIAL: A navigational signal generated by a Very High Frequency Omni-directional Range or VORTAC station that is measured as an azimuth from the station.

REGRESSION ANALYSIS: A statistical technique that seeks to identify and quantify the relationships between factors associated with a forecast.

REMOTE COMMUNICATIONS OUTLET (RCO): An unstaffed transmitter receiver/facility remotely controlled by air traffic personnel. RCOs serve f ight service stations (FSSs). RCOs were established to provide ground-to-ground communications between air traffic control specialists and pilots at satellite airports for delivering en route clearances, issuing departure authorizations, and acknowledging instrument f ight rules cancellations or departure/ landing times.

REMOTE TRANSMITTER/RECEIVER (RTR): See remote communications outlet. RTRs serve ARTCCs.

RELIEVER AIRPORT: An airport to serve general aviation aircraft which might otherwise use a congested air-carrier served airport.

RESTRICTED AREA: See special-use airspace.

RNAV: Area navigation - airborne equipment which permits f ights over determined tracks within prescribed accuracy tolerances without the need to overf y ground-based navigation facilities. Used en route and for approaches to an airport.

RUNWAY: A def ned rectangular area on an airport prepared for aircraft landing and takeoff. Runways are normally numbered in relation to their magnetic direction, rounded off to the nearest 10 degrees. For example, a runway with a magnetic heading of 180 would be designated Runway 18. The runway heading on the opposite end of the runway is 180 degrees from that runway end. For example, the opposite runway heading for Runway 18 would be Runway 36 (magnetic heading of 360). Aircraft can takeoff or land from either end of a runway, depending upon wind direction.

RUNWAY ALIGNMENT INDICATOR LIGHT: A series of high intensity sequentially f ashing lights installed on the extended centerline of the runway usually in conjunc. on with an approach lighting system.

RUNWAY DESIGN CODE: A code signif ying the design standards to which the runway is to be built.

RUNWAY END IDENTIFICATION LIGHTING (REIL): Two synchronized f ashing lights, one on each side of the runway threshold, which provide rapid and positive identif cation of the approach end of a particular runway.

RUNWAY GRADIENT: The average slope, measured in percent, between the two ends of a runway.

RUNWAY PROTECTION ZONE (RPZ): An area off the runway end to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape. Its dimensions are determined by the aircraft approach speed and runway approach type and minima.

RUNWAY REFERENCE CODE: A code signifying the current operational capabilities of a runway and associated taxiway.

RUNWAY SAFETY AREA (RSA): A def ned surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.

RUNWAY VISIBILITY ZONE (RVZ): An area on the airport to be kept clear of permanent objects so that there is an unobstructed line of- site from any point f ve feet above the runway centerline to any point f ve feet above an intersecting runway centerline.

RUNWAY VISUAL RANGE (RVR): An instrumentally derived value, in feet, representing the horizontal distance a pilot can see down the runway from the runway end.

S

SCOPE: The document that identif es and def nes the tasks, emphasis, and level of effort associated with a project or study.

SEGMENTED CIRCLE: A system of visual indicators designed to provide traffic pattern information at airports without operating control towers.

SHOULDER: An area adjacent to the edge of paved runways, taxiways, or aprons providing a transi. on between the pavement and the adjacent surface; support for aircraft running off the pavement; enhanced drainage; and blast protection. The shoulder does not necessarily need to be paved.

SLANT-RANGE DISTANCE: The straight line distance between an aircraft and a point on the ground.

SMALL AIRCRAFT: An aircraft that has a maximum certif ed takeoff weight of up to 12,500 pounds.

SPECIAL-USE AIRSPACE: Airspace of def ned dimensions identif ed by a surface area wherein activities must be conf ned because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. Special-use airspace classif cations include:

- **ALERT AREA**: Airspace which may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft.

- **CONTROLLED FIRING AREA**: Airspace wherein activities are conducted under conditions so controlled as to eliminate hazards to nonparticipating aircraft and to ensure the safety of persons or property on the ground.

- **MILITARY OPERATIONS AREA (MOA)**: Designated airspace with def ned vertical and lateral dimensions established outside Class A airspace to separate/segregate certain military activities from instrument f ight rule (IFR) traffic and to identify for visual f ight rule (VFR) traffic where these activities are conducted.

- **PROHIBITED AREA**: Designated airspace within which the f ight of aircraft is prohibited.

- **RESTRICTED AREA**: Airspace designated under Federal Aviation Regulation (FAR) 73, within which the f ight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated joint use. When not in use by the using agency, IFR/VFR operations can be authorized by the controlling air traffic control facility.

- **WARNING AREA:** Airspace which may contain hazards to nonparticipating aircraft.

STANDARD INSTRUMENT DEPARTURE (SID): A preplanned coded air traffic control IFR departure routing, preprinted for pilot use in graphic and textual form only.

STANDARD INSTRUMENT DEPARTURE PROCEDURES: A published standard f ight procedure to be utilized following takeoff to provide a transition between the airport and the terminal area or en route airspace.

STANDARD TERMINAL ARRIVAL ROUTE (STAR): A preplanned coded air traffic control IFR arrival routing, preprinted for pilot use in graphic and textual or textual form only.

STOP-AND-GO: A procedure wherein an aircraft will land, make a complete stop on the runway, and then commence a takeoff from that point. A stop-and-go is recorded as two operations: one operation for the landing and one operation for the takeoff.

STOPWAY: An area beyond the end of a takeoff runway that is designed to support an aircraft during an aborted takeoff without causing structural damage to the aircraft. It is not to be used for takeoff, landing, or taxiing by aircraft.

STRAIGHT-IN LANDING/APPROACH: A landing made on a runway aligned within 30 degrees of the f nal approach course following completion of an instrument approach.

T

TACTICAL AIR NAVIGATION (TACAN): An ultrahigh frequency electronic air navigation system which provides suitably-equipped aircraft a continuous indication of bearing and distance to the TACAN station.

TAKEOFF RUNWAY AVAILABLE (TORA): See declared distances.

TAKEOFF DISTANCE AVAILABLE (TODA): See declared distances.

TAXILANE: The portion of the aircraft parking area used for access between taxiways and aircraft parking positions.

TAXIWAY: A def ned path established for the taxiing of aircraft from one part of an airport to another.

TAXIWAY DESIGN GROUP: A classif cation of airplanes based on outer to outer Main Gear Width (MGW) and Cockpit to Main Gear (CMG) distance.

TAXIWAY SAFETY AREA (TSA): A def ned surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway.

TERMINAL INSTRUMENT PROCEDURES: Published f ight procedures for conducting instrument approaches to runways under instrument meteorological conditions.

TERMINAL RADAR APPROACH CONTROL: An element of the air traffic control system responsible for monitoring the en-route and terminal segment of air traffic in the airspace surrounding airports with moderate to high levels of air traffic.

TETRAHEDRON: A device used as a landing direction indicator. The small end of the tetrahedron points in the direction of landing.

THRESHOLD: The beginning of that portion of the runway available for landing. In some instances the landing threshold may be displaced.

TOUCH-AND-GO: An operation by an aircraft that lands and departs on a runway without stopping or exiting the runway. A touch-and go is recorded as two operations: one operation for the landing and one operation for the takeoff.

TOUCHDOWN: The point at which a landing aircraft makes contact with the runway surface.

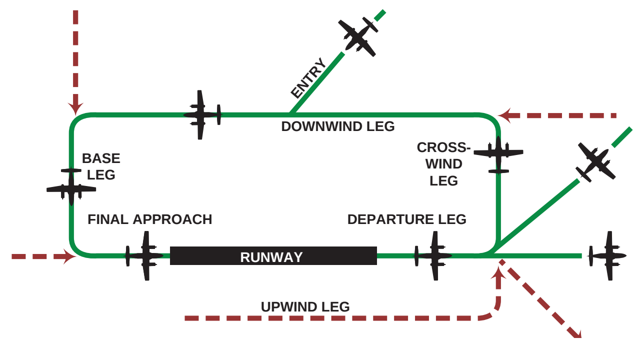
TOUCHDOWN AND LIFT-OFF AREA (TLOF): A load bearing, generally paved area, normally centered in the FATO, on which the helicopter lands or takes off.

TOUCHDOWN ZONE (TDZ): The f rst 3,000 feet of the runway beginning at the threshold.

TOUCHDOWN ZONE ELEVATION (TDZE): The highest elevation in the touchdown zone.

TOUCHDOWN ZONE (TDZ) LIGHTING: Two rows of transverse light bars located symmetrically about the runway centerline normally at 100- foot intervals. The basic system extends 3,000 feet along the runway.

TRAFFIC PATTERN: The traffic f ow that is prescribed for aircra. landing at or taking off from an airport. The components of a typical traffic pattern are the upwind leg, crosswind leg, downwind leg, base leg, and f nal approach.



U

UNCONTROLLED AIRPORT: An airport without an air traffic control tower at which the control of Visual Flight Rules traffic is not exercised.

UNCONTROLLED AIRSPACE: Airspace within which aircraft are not subject to air traffic control.

UNIVERSAL COMMUNICATION (UNICOM): A nongovernment communication facility which may provide airport information at certain airports. Locations and frequencies of UNICOM's are shown on aeronautical charts and publications.

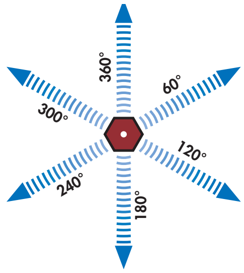
UPWIND LEG: A f ight path parallel to the landing runway in the direction of landing. See "traffic pattern."

V

VECTOR: A heading issued to an aircraft to provide navigational guidance by radar.

VERY HIGH FREQUENCY/ OMNIDIRECTIONAL RANGE (VOR): A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north. Used as the basis for navigation in the national airspace system. The VOR periodically identif es itself by Morse Code and may have an additional voice identif cation feature.

VERY HIGH FREQUENCY OMNI-DIRECTIONAL RANGE/ TACTICAL AIR NAVIGATION (VORTAC): A naviga. on aid providing VOR azimuth, TACAN azimuth, and TACAN distance-measuring equipment (DME) at one site.



VICTOR AIRWAY: A control area or portion thereof established in the form of a corridor, the centerline of which is def ned by radio navigational aids.

VISUAL APPROACH: An approach wherein an aircraft on an IFR f ight plan, operating in VFR conditions under the control of an air traffic control facility and having an air traffic control authorization, may proceed to the airport of destination in VFR conditions.

VISUAL APPROACH SLOPE INDICATOR (VASI): An airport lighting facility providing vertical visual approach slope guidance to aircraft during approach to landing by radiating a directional pattern of high intensity red and white focused light beams which indicate to the pilot that he is on path if he sees red/white, above path if white/white, and below path if red/red. Some airports serving large aircraft have three-bar VASI's which provide two visual guide paths to the same runway.

VISUAL FLIGHT RULES (VFR): Rules that govern the procedures for conducting f ight under visual conditions. The term VFR is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of f ight plan.

VISUAL METEOROLOGICAL CONDITIONS: Meteorological conditions expressed in terms of specif c visibility and ceiling conditions which are equal to or greater than the threshold values for instrument meteorological conditions.

VOR: See "Very High Frequency Omnidirectional Range Station."

VORTAC: See "Very High Frequency Omnidirectional Range Station/Tactical Air Navigation."

W

WARNING AREA: See special-use airspace.

WIDE AREA AUGMENTATION SYSTEM: An enhancement of the Global Positioning System that includes integrity broadcasts, differential corrections, and additional ranging signals for the purpose of providing the accuracy, integrity, availability, and continuity required to support all phases of f ight.

Abbreviations

AC: advisory circular

ADF: automatic direction f nder

ADG: airplane design group

AFSS: automated f ight service station

AGL: above ground level

AIA: annual instrument approach

AIP: Airport Improvement Program

AIR-21: Wendell H. Ford Aviation Investment and Reform Act for the 21st Century

ALS: approach lighting system

ALSF-1: standard 2,400-foot high intensity approach lighting system with sequenced f ashers (CAT I conf guration)

ALSF-2: standard 2,400-foot high intensity approach lighting system with sequenced f ashers (CAT II conf guration)

AOA: Aircraft Operation Area

APV: instrument approach procedure with vertical guidance

ARC: airport reference code

ARFF: aircra. rescue and f re f ghting

ARP: airport reference point

ARTCC: air route traffic control center

ASDA: accelerate-stop distance available

ASR: airport surveillance radar

ASOS: automated surface observation station

ATCT: airport traffic control tower

ATIS: automated terminal information service

AVGAS: aviation gasoline - typically 100 low lead (100LL)

AWOS: automatic weather observation station

BRL: building restriction line

CFR: Code of Federal Regulation

CIP: capital improvement program

DME: distance measuring equipment

DNL: day-night noise level

DWL: runway weight bearing capacity of aircraft with dual-wheel type landing gear

DTWL: runway weight bearing capacity of aircraft with dual-tandem type landing gear

FAA: Federal Aviation Administration

FAR: Federal Aviation Regulation

FBO: f xed base operator

FY: f scal year

GPS: global positioning system

GS: glide slope

HIRL: high intensity runway edge lighting

IFR: instrument f ight rules (FAR Part 91)

ILS: instrument landing system

IM: inner marker

LDA: localizer type directional aid

LDA: landing distance available

LIRL: low intensity runway edge lighting

LMM: compass locator at middle marker

LOM: compass locator at outer marker

LORAN: long range navigation

MALS: medium intensity approach lighting system with indicator lights

MIRL: medium intensity runway edge lighting

MITL: medium intensity taxiway edge lighting

MLS: microwave landing system

MM: middle marker

MOA: military operations area

MSL: mean sea level

NAVAID: navigational aid

NDB: nondirectional radio beacon

NM: nautical mile (6,076.1 feet)

NPES: National Pollutant Discharge Elimination System

NPIAS: National Plan of Integrated Airport Systems

NPRM: notice of proposed rule making

ODALS: omnidirectional approach lighting system

OFA: object free area

OFZ: obstacle free zone

OM: outer marker

PAC: planning advisory commi. ee

PAPI: precision approach path indicator

PFC: porous friction course

PFC: passenger facility charge

PCL: pilot-controlled lighting

PIW public information workshop

PLASI: pulsating visual approach slope indicator

POFA: precision object free area

PVASI: pulsating/steady visual approach slope indicator

PVC: poor visibility and ceiling

RCO: remote communications outlet

RRC: Runway Reference Code

RDC: Runway Design Code

REIL: runway end identif cation lighting

RNAV: area navigation

RPZ: runway protection zone

RSA: runway safety area

RTR: remote transmitter/receiver

RVR: runway visibility range

RVZ: runway visibility zone

SALS: short approach lighting system

SASP: state aviation system plan

SEL: sound exposure level

SID: standard instrument departure

SM: statute mile (5,280 feet)

SRE: snow removal equipment

SSALF: simplif ed short approach lighting system with runway alignment indicator lights

STAR: standard terminal arrival route

SWL: runway weight bearing capacity for aircraft with single-wheel tandem type landing gear

TACAN: tactical air navigational aid

TAF: Federal Aviation Administration (FAA) Terminal Area Forecast

TDG: Taxiway Design Group

TLOF: Touchdown and lift-off

TDZ: touchdown zone

TDZE: touchdown zone elevation

TODA: takeoff distance available

TORA: takeoff runway available

TRACON: terminal radar approach control

VASI: visual approach slope indicator

VFR: visual f ight rules (FAR Part 91)

VHF: very high frequency

VOR: very high frequency omni-directional range

VORTAC: VOR and TACAN collocated

Portland International Jetport

APPENDIX B
LANDSIDE BUILDING REFERENCES

SUSTAINABLE AIRPORT MASTER PLAN

Appendix B
LANDSIDE BUILDING REFERENCES

Bldg. No.	Building Name
1	Terminal Building
2	Air Traffic Control Tower
3	Aircraft Rescue and Fire Fighting
4	Parking Garage
5	Glycol Recovery
6	Equipment Shack
7	GA Hangar
8	Fuel Farm
9	GA Hangar
10	Rental Car Facilities
11	GA Terminal/FAA Office
12	Rental Car Facilities
13	Fuel Farm
14	GA Hangar

Bldg. No.	Building Name
15	GA Hangar
16	GA Hangar
17	GA Hangar
18	FedEx Hangar
19	Customs
20	Lighting Vault
21	Airport Maintenance Building
22	Conventional Hangar/Offices
23	Hexagon Hangar
24	Sand/Salt Storage
25	Maintenance/Equipment Storage
26	Rental Car Facilities
27	Rental Car Facilities

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1 - Passenger Terminal Building


2 - Air Traffic Control Tower


3 - ARRF Building


4 - Parking Garage

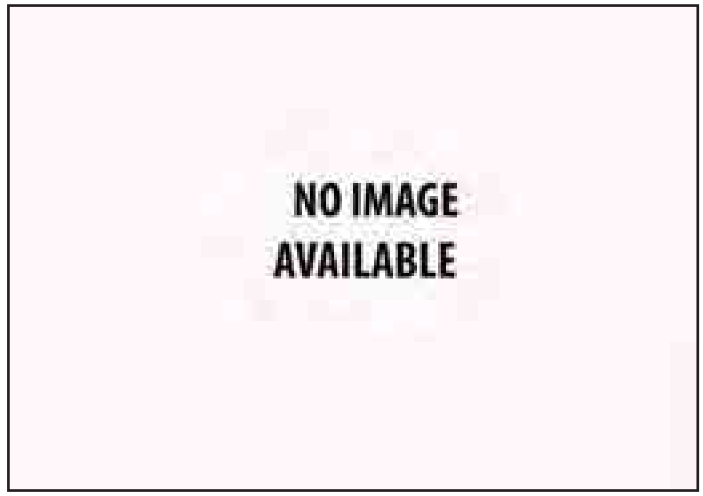

5- Glycol Recovery Plant


6 - Equipment Shack


7 - General Aviation Hangar


8 - Fuel Farm


9 - General Aviation Hangar



10 - Rental Car Facility


11 - General Aviation Treminal / FAA Offices


12 - Rental Car Facility

13 - Fuel Farm

16 - General Aviation Hangar

14 - General Aviation Hangar

17 - General Aviation Hangar

15 - General Aviation Hangar

18 - Fed Ex Hangar

19 - Customs / Main Aviation

20 - Unknown

21 - Airport Maintenance Building

NO IMAGE AVAILABLE

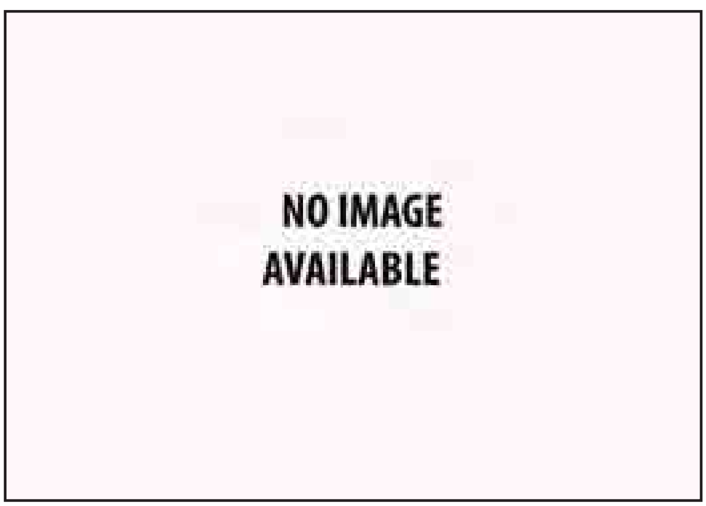
22 - Conventional Hangar / Offices

23 - Hexagon Hangar

24 - Sand / Salt Storage

25 - Air Cargo DHL

26 - Rental Car Facility



27- Rental Car Facility

PWM
Portland International Jetport

APPENDIX C
GREENHOUSE GAS (GHG) INVENTORY METHODOLOGY



SUSTAINABLE AIRPORT MASTER PLAN

Appendix C: Greenhouse Gas (GHG) Inventory Methodology

GHG Emissions Inventory

The purpose of a Greenhouse Gas (GHG) emissions inventory is to quantify GHG emissions emitted into the atmosphere from the sources within the organizational and operational boundaries described above. This information can be used to achieve several tasks:

- Identify the sources and activities within the Airport's jurisdiction responsible for GHG emissions;
- Establish a basis for developing a GHG reduction plan; and
- Establish a basis to track GHG emissions.

Methodology

The GHG emissions inventory uses the Airport Carbon and Emissions Reporting Tool Version 2.0 (ACERT) developed by the Airports Council International (ACI). ACERT inputs include the following information and relevant emissions factors to quantify GHGs:

- Total aircraft, passenger, and cargo operations;
- Fuel use by airport and tenant vehicles, buildings, emergency generators and fire training;
- Electricity (and heat) purchased by the Airport operator and tenants;
- Aircraft taxi and APU usage times and engine run-ups;
- Glycol (deicing fluid) use; and
- Landside traffic estimates of passenger and staff ground access.

Based on the inputs above, ACERT outputs GHG emissions totals categorized by the previously discussed GHG protocol Scopes (direct, indirect, indirect and optional). For the purposes of this analysis, input totals for calendar year 2013 were used, as discussed below. Information was collected through interviews with airport staff and tenants.

Aircraft Operations

Table C-1 on the following page summarizes the annualized fleet mix for PWM. These totals are based on the consolidated flight schedule for commercial operations and a review of FAA's Air Traffic Activity System (ATADS) for general aviation operations. ACERT includes emissions factors that include all phases of operation (run up, taxi, takeoff and landing) for 136 types of fixed wing and helicopter aircraft. Of the available aircraft, 127 are current aircraft in the U.S. fleet such as the Boeing 737, Learjet 45, and Cessna 182. For cases when an aircraft is not available in ACERT, ACI recommends selecting a comparable aircraft. Additionally, nine generic aircraft, examples include one engine helicopter or two-engine piston, are available to the user. The number of operations (one takeoff or one landing) is multiplied by the corresponding emission factor to calculate the GHG emissions associated with aircraft operations.

Non-Aviation Fuel Use

Non-aviation fuel use includes fuels available at PWM for vehicles that are primarily used on the Jetport, such as those used for airport maintenance and airline service. This fuel is not available for commercial sale and does not include fuel purchased for vehicle trips to or from the Jetport. Based on responses from airport staff and tenants, three types of fuel are available at PWM: gasoline, diesel, and propane. Non-aviation fuel also includes natural gas and fuel oil used for heating buildings.

It should be noted that the Jetport holds an Air Emission License issued by the Maine Bureau of Air Quality. The License covers stationary equipment such as backup generators, boilers, and water heaters and quantifies the total annual emissions for this equipment. The license also outlines best practical treatment for the maintenance and operation of this equipment and requires annual reporting of emissions to the State of Maine.

Table C-2 on the following page summarizes the non-aviation fuel use assumptions for calendar year 2013. For fuel types where calendar year 2013 usage was not available (airport gasoline and diesel), budgeted 2015 amounts were used.

TABLE C-1
Baseline Operational Fleet Mix
Portland International Jetport

Aircraft	Number of Operations	Aircraft (con't)	Number of Operations (con't)
Airbus 300	8	Eclipse 500	178
Airbus 310	4	EMB 120	2
Airbus 319	776	EMB 135/145	3,644
Airbus 320	624	EMB 170	5,112
Airbus 321	8	EMB 190	2,608
ATR-42-300	18	Falcon 2000	180
Beech 1900D	788	Falcon 50	204
Beech 300	8	Falcon 900EX	64
Beech Super King 200B	254	GLEX	32
Beech Super King 350	546	Global 5000	8
Beech T-6A Texan	8	Gulfstream G200	332
Bell 206B	440	Gulfstream V	216
Bell 407/MDD 600N	406	Hawker 800	1,068
Boeing 717	506	Hawker Horizon	166
Boeing 737 (300-500)	554	Learjet 45	158
Boeing 737 (600-900)	988	Learjet 60	98
Boeing 757	590	MD83 (80-87)	1,288
Boeing 767-300	2	MD95	4
Cessna 172	24	Piaggio P180	14
Cessna 182	120	Pilatus PC-12	92
Cessna 208B	1,990	Piper PA31 Cheyenne	12
Cessna 402	16	Piper PA32 Saratoga	2
Cessna 525	324	Piper PA34 Seneca	2
Cessna 560XL	920	Piper PA46 Malibu	126
Cessna 680	396	Shorts 360	2
Cessna 750	228	TBM 700	48
Cessna Citation	146	Generic Aircraft	
CL300	112	1-engine helicopter	50
CL604	70	2-engine helicopter	12
CRJ200	5,054	1-eng piston aircraft	9,828
CRJ700	3,408	2-eng piston aircraft	5,634
CRJ900	8	2-engine business jet	36
Dash 8-400	1,644	2 turboprop aircraft	618
Subtotal	20,988	Subtotal	31,838
Grand Total: 52,826			

Source: Consolidated flight schedule; FAA Air Traffic Activity System (Calendar Year 2013); Coffman Associates analysis

TABLE C-2
Non-Aviation Fuel Source
Portland International Jetport

	Airport	Tenant	Total
Gasoline (liters)	55,456	37,864	93,320
Diesel (liters)	78,737	106,760	185,497
Propane (liters)	69553	6,719	76,272
Natural Gas (m_3)	567,481	149,422	716,903
Fuel oil (liters)	111,726	9,433	121,159

Source: PWM records and tenant questionnaire responses

Electricity

Electrical use is reported at PWM in three segments: electricity purchased by the Jetport for airport use, purchased by the Jetport for tenant use, and electricity purchased directly by tenants. Electricity purchased by the Jetport for airport use includes the administrative and common portions of the terminal, airside and landside lighting, and maintenance areas. Electricity purchased by the Jetport for tenant use primarily includes in-terminal tenants, such as retailers and terminal gate areas. Finally, airport tenants located outside of the terminal, such as the fixed base operator and cargo operations based at the Jetport, purchase electricity directly from the electric company. **Table C-3** summarizes electrical use from each of these segments.

TABLE C-3
2013 Electricity use (KWh)
Portland International Jetport

Airport	Airport Resold to Tenant	Tenant	Total
2,766,632	3,045,876	3,677,503	9,490,011

Source: PWM records and tenant questionnaire responses

Deicing Fluid Use

Propylene glycol, commonly referred to as glycol or deicing fluid, is a liquid that is combined with water and applied during winter months at airports to remove ice or snow from aircraft or airport pavement surfaces to enhance operational safety. Due to the potential for environmental contamination associated with the use of deicing fluids, the FAA has developed several guidance documents for developing fluid containment systems at airports. In 2010, PWM established a glycol recycling program to minimize potential environmental impacts associated with deicing fluids.

ACERT includes an emissions factor for GHG emitted through the deicing process. This is calculated in accordance with the quantity of glycol dispensed at the Jetport during a year. Based on information collected from airport tenants, a total of 153,056 liters were dispensed during 2013. It is also noted that PWM uses potassium acetate fluid for deicing runway surfaces; however, ACERT does not include this as part of the GHG calculation.

Landside Traffic Estimates

Within ACERT, landside traffic estimates are based on the number of airport and tenant employees and the estimated number of deliveries per day to each tenant. Based on the Jetport's organizational chart, the number of airport employees used for this analysis is 50. The total number of tenants (airside and landside) is 23. Based on PWM security badge records, there are 1,054 badges issued to persons not employed by the City of Portland at the airport; this includes commercial and cargo airlines, airfield based companies, tenants, and federal and state employees. Additionally, based on a 24-hour sample retrieved from the Jetport's parking system, a total of 282 airport visits occurred. ACERT accepts input expressed as visits per tenant per day. Based on the information provided, an average of 13 visits per tenant per day was assumed.

Summary

The results of the GHG inventory are summarized Table 3-5 of Chapter Three – Sustainability Baseline Assessment.

Portland International Jetport

APPENDIX D
ENERGY BASELINE



SUSTAINABLE AIRPORT MASTER PLAN

Appendix D: Energy Baseline

The following provides a review of energy sources and energy consuming systems throughout the Jetport as well as an energy efficiency assessment of the passenger terminal facility and other PWM facilities. A modified ASHRAE (formerly the American Society of Heating, Refrigerating and Air Conditioning Engineers) Level I energy audit was utilized to include a simple payback summary where deemed necessary and to provide recommendations for replacement, upgrade or addition of the energy consuming systems where appropriate. Input has been offered regarding various energy conservation opportunities that presented themselves through a terminal building walkthrough and review of other information provided. Utility bills for the base building meters and fuel usage were reviewed for anomalies and have been reported on (see Supplemental Information, Part II). There are a number of check metered tenant spaces as PWM is not the sole occupant-proprietor. These tenant meters have been accounted for and reported on. However, it is important to note that assumptions were made relative to some of the end uses and consumptions relative to these meters. A detailed utility bill analysis was performed and is discussed later in this report. Project team personnel visited the site in June 2014 and toured the facility with airport staff to benefit this baseline assessment.

The team has also interviewed facility staff, and energy-related interviews are included in Supplemental Information, Part I. Based on interviews as well as on-site facility investigation and review of energy consumption data, the team has established a baseline Energy Use Index (EUI) that can be utilized to benchmark future performance.

The Jetport has installed a geothermal energy (heating and cooling) system to take advantage of a renewable energy source and save on heating and cooling expenses. This document evaluates the feasibility of installing other renewable energy sources, such as solar/photovoltaic, on airport property to determine what type of technology, if any, should be considered by PWM for future implementation.

Possible alternatives for PWM to purchase renewable energy from local sources off-airport are identified later in this energy section.

Based on feedback from PWM's staff and recent projects that have been completed, it is clear that energy consumption is closely monitored and understood by the city. Return on Investment (ROI) is understood to be the cost-benefit model PWM utilizes; as such, recommendations for energy conservation measures and occupant comfort measures are provided below.

GENERAL

Because of the number of buildings/facilities studied, we have organized this section by building envelope and grouping of building types. The groupings include the following:

- Building Envelope
- Old Terminal Building;
- New Terminal Building (Addition/Expansion to Existing Terminal Building);
- Hangars and Other Non-Terminal Buildings (Maintenance);
- Loading Bridges; and
- De-Icing Facility.

Note 1: *Because the buildings have been analyzed in accordance with the ASHRAE Level I audit guidelines, only the large and most significant energy consuming equipment has been studied/analyzed.*

Note 2: *System median useful life is an ASHRAE suggested value.*

Building Envelope

The existing terminal complex was constructed in several phases, and consequently consists of various building envelope assemblies. Predictably, each newer addition appears better insulated than the last and reflects advances in best building practices. Existing documentation does not contain detailed R or U values and only shows materials' thickness that may not reflect as built conditions. Roof insulation thicknesses may not be accurate on the older drawings, as roofing replacement projects may have been implemented.

- 1967 Original Terminal: The primary solid wall assembly consists of precast concrete wall panels with only 1" thick rigid insulation on the interior side, under a layer of plaster. Since 1967, interior insulated partitions may have been built in some areas, but it is likely this poorly insulated condition exists in many older areas of the terminal. Some uninsulated single pane glazing also exists.

- 1980 Expansion: Solid wall assemblies consist of 1 ½” rigid wall insulation at concrete masonry units, and in some cases, uninsulated masonry exterior walls with interior partitions with 6” thick batt insulation. Recent research shows that batt insulation alone is a poor insulator, due to air gaps, bunching, and poor installation.

- 1994 Western Expansion: The primary solid wall assembly uses 2” thick rigid insulation and glazed assemblies with 1” insulated glass units. The roof plan indicates 1 ¾” thick roof insulation at the low points and 6” insulation at the high point. Modern common building practice is to provide a minimum of 4” roof insulation thickness at the low points.

- 2010 Expansion: The primary solid wall assembly uses 3” thick continuous wall insulation and a minimum of 4” thick roof insulation. Glazed assemblies use 1” insulated glass units, with different coatings and solar heat gain coefficients based on solar orientation. Automated interior shading tied to the building management system was a missed opportunity that was cut from the project budget, which might be investigated for a retrofit or future project.

Old Terminal Building

In general, the older portion of the terminal building is heated and cooled by four boilers and a chiller plant located in the penthouse spaces of the old terminal. The chiller plant consists of two chillers with the heat rejection device (open cooling tower) located on the roof. Sumps for the cooling tower are remotely mounted in the mechanical penthouse adjacent to the towers. All pumps in support of the hydronic heating and cooling system are located in the east penthouse over the baggage claim and the central penthouse. The mechanical room houses the chilled water generation equipment. In general, hot/chilled water is distributed to terminal units and air handling units serving the spaces. The fresh air for the remainder of the building is distributed from a roof mounted make-up air unit. Multiple roof-mounted centrifugal up-blast fans accommodate bathroom exhaust. Controls for the HVAC system consist of Direct Digital Controls (DDC). The controls systems are automated through a central BAS (Building Automation Controls System).

There are two mechanical penthouses in the “old” east section of the terminal with four boilers. The gas/oil fired cast iron boilers are HB Smith and are more than 25 years old with an expected useful life of 30 years if properly maintained. The boilers are in fair condition. The assumed combustion efficiency is approximately 80 to 82 percent AFUE (Annual Fuel Utilization Efficiency).

The current control strategy for the boiler system is assumed to be controlled via an outside air temperature reset/enable, but this was not apparent at the time of the site visit. The burner that is associated with this system has limited turn down capability and is fitted with a 50 percent potentiometer, with a linked gas butterfly arrangement.

Hot Water Boiler/Burner System at the Old Terminal

Cooling Tower at the Old Terminal

The heating/hot water boiler system is arranged in a primary only pumping arrangement and serves various outlying building terminal equipment and air-handling units. “Danfoss” variable frequency drives were installed on the pump motors. There are currently two sets of pumps that serve the hot water distribution system. Each set of pumps is piped in parallel in a run/standby arrangement giving 100 percent redundancy in each instance. The pumps were in poor to fair condition and there appeared to be evidence of a seal leak on one of the pumps. There was also evidence of bearing coupler wear on both pumps.

The cooling tower (heat rejection system) consists of two single cell induced draft-cooling towers with a remote common sump/basin located in the mechanical penthouse space. This strategy is commonly employed as a means to not have to include freeze protection in the winter months (Northern New England) in an outdoor basin. The east penthouse also houses two air handling units each with enthalpy wheels for energy recovery. The space beneath the east penthouse that is served by these units is currently vacant.

New Terminal Building

The “new terminal building” has many excellent energy conservation measures that were implemented at the time of construction. This document’s focus relative to the new terminal building lies in the mechanical systems that have been well regarded within the city and as well have received a significant amount of favorable press and awards.

The heating/cooling system currently consists of a geothermal well/heat pump system that utilizes modular water-cooled heat pumps and a “Trane” chiller. In addition, the heating is supplemented by a high efficiency gas fired condensing boiler system. Efficient/innovative design features of the new terminal building include radiant floor heating and floor air distribution.

The current geothermal system is operating with the heat pumps as the lead system for cooling and heating and the chiller and boiler system as the lag/backup.

A study was performed prior to the new terminal building construction to determine the feasibility of using a ground source heat pump (geothermal) system to heat and cool the Jetport's new terminal expansion. The study included drilling and thermal load testing a single, full depth, closed loop geothermal well. The results of this testing and the specific heating and cooling demands of the terminal expansion were used to evaluate the feasibility of geothermal systems. Based on these evaluations, it was determined that a "hybrid" geothermal system consisting of 120 closed loop wells along with undersized conventional heating/cooling equipment was the optimal system for the terminal simple expansion with a projected payback period of six years (including VALE funding) and 10 years (without VALE funding). Based on recent discussions with the Jetport, we understand that the system performance has resulted in a significant decrease in the Jetport's fuel oil consumption.

With the emission of NOx (Oxides of Nitrogen) and VOCs (Volatile Organic Compounds) reduced by reduction of No. 2 fuel oil usage for heating purposes as a result of this project, the regional air quality benefits. This project reduces emissions by producing heating from a geothermal plant with centralized heat pumps, supplemented by dual fuel hot water boilers. The new geothermal plant produces both heating and cooling by way of the plant heat pump; the system is backed up for cooling by a fully redundant chiller.

Hangars and Associated Non-Terminal Buildings

The hangars and associated non-terminal buildings utilize stand-alone package and split system cooling and No. 2 fuel heating. As indicated in the interviews with facilities staff, the hangar door seals and frequency of opening cause a great deal of heat loss and energy consumption. The newer hangars are in better condition with more advanced door systems.

The hangar/maintenance facility seen in the photo is an example of the type of construction and age of one of the buildings.


Hangar

Loading Bridges (Jetways)

The pedestrian loading bridges were not originally a target of our benchmarking efforts; however; after examining the utility metering, some of these bridges are attributing to the kWh annual consumption. The bridge at Gate #1 is heated/cooled via a gas/electric heat pump on top of the bridge, as seen in the photograph. We are unaware of the quantity of insulation in the envelope, if any. A large contributing factor to the kWh consumption is the 400Hz ground power units for aircraft.


Loading Bridge at Gate #1

Deicing Facility

In 2010, PWM began a program to reclaim aircraft deicing fluid (propylene glycol). The glycol recycling facility is operated as a turnkey system by Inland Technologies. The system consists of concentrators, a distillation system, and a Reverse Osmosis (RO) system for polishing process water. The glycol is reclaimed and processed back to 99 percent pure. The system not only recycles the spent glycol utilized for deicing at PWM, but also other airports and sites. This recovery system with inclusion of treatment of fluid from other sites has resulted in lowered operations cost for the Jetport as well as lessened the environmental impact the glycol has on the surroundings, which includes the Fore River to the east of the Jetport. Each of the processes utilized in the glycol recovery process are very energy intensive and utilize both electric and natural gas fuels. The actual facility envelope and ancillary systems can be taken as negligible as the energy intensity of the process overwhelms any small portion of consumption utilized for lights and heat.


Inland Group De-Icing Facility

The photograph shows an overall view of the facility and apparatus. The distillation process and boiler stack can be seen in the center and to the left in the photograph. Although energy intensive, there are opportunities for energy cost avoidance at this facility that will be elaborated on later in the energy analysis/opportunity portion of this document.

RECOMMENDATIONS, ECONOMICS AND ENERGY CONSERVATION OPPORTUNITIES

General

The base case for all energy analysis is the existing system as described in the Overview of Energy Infrastructure portion of this report and in the interview documents found in Supplemental Information, Part I. Any construction cost estimates stated herein are preliminary engineering opinions of cost. All energy consumption analysis was developed utilizing computer modeling, if required, with eQUEST® building analysis software or past historical data via similar analysis. Utility rates utilized for this analysis were given by the end user/owner. Based on interviews and discussions with staff, energy conservation opportunities and proposed capital improvement projects are offered.

Utility Bill Analysis

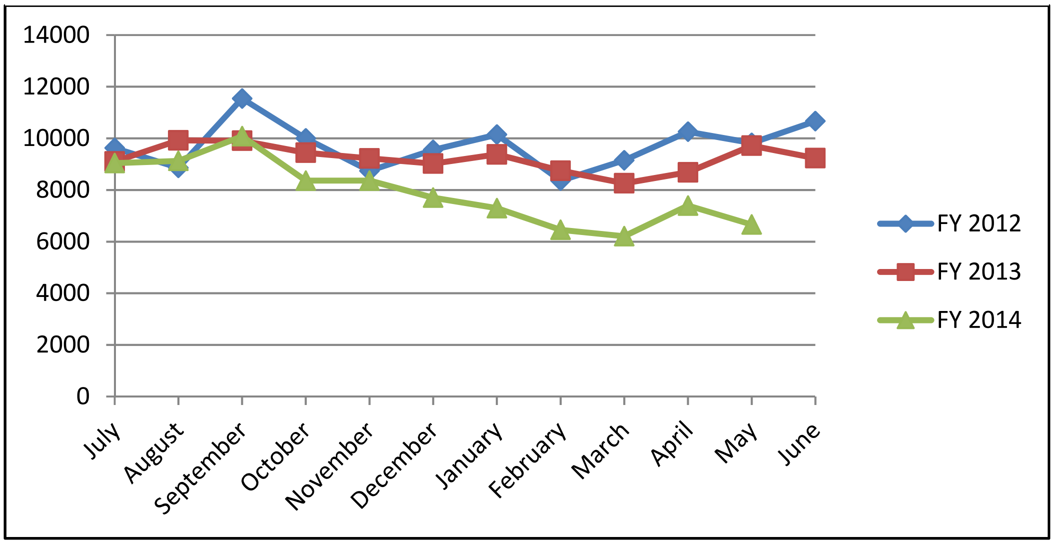
A utility bill analysis can provide a good, first look at the large picture of the building's energy use. Utility bills also provide an easy way to benchmark a building's utility use and track changes and upgrades to the building. The Jetport provided the team history of electricity, natural gas, and fuel oil billing data. The U.S. Energy Information Administration (EIA) publishes energy usage averages from the 2003 Commercial Buildings Energy Consumption Survey (CBECS). This published data is a great tool for benchmarking building performance by usage, size, location, year constructed, or several other categories. CBECS data can also be viewed in a variety of ways (i.e. by building size, use, construction year, region, etc.).

The Energy Usage Index (EUI) is a measure of total energy used per square foot of floor area per year. The calculated EUI for the Airport is approximately 120 kBtu/sq ft. The CBECS category utilized is "Assembly Buildings" which encompasses transportation terminals/airports. The national average for assembly type buildings in this category and square footage is 110 kBtu/sq ft. Although on the high side of the average, we believe that this is largely attributed to the older portion of the terminal building and addressing the Energy Conservation Measures (ECMs) suggested herein will aid in lowering the terminal buildings (new and old) EUI to well below the national average.

Although the Airport is currently utilizing the Quad Logic Systems, we recommend the Airport utilize the Energy Star Portfolio Manager to further benchmark and continuously track utility expenditures. Portfolio Manager is a free online tool provided by Energy Star. The tool can be utilized for each building to benchmark building energy consumption performance against the CBECS survey with a statistical algorithm. The tool is also capable of benchmarking any construction or energy conservation measures such as luminaire lamp replacement.

Utility bills were further analyzed to identify any unusual trending in the data. Typically, a heated and cooled building will experience seasonal peaks and valleys for both electricity and natural gas consumption. Electricity should typically peak during the summer season as the mechanical cooling equipment is in operation, while natural gas consumption should fall close to zero consumption during the cooling season to meet domestic hot water needs. Variations from this can indicate simultaneous heating and cooling, poor control strategies, or unique operation, which is not typical of this building type/usage per EIA, published CBECs. Upon initial examination, the energy consumption and demand trends very well with the exception of the ground power units and baggage handling system (please see Terminal Building kWh profile below).

Terminal Building kWh Profile



The data analysis of this use profile is also backed by a consistent and steady demand (kW) which means that something is running for long periods without any off time or reduction in draw/ consumption. One speculative reason for the high kWh consumption in winter months is the use of the 400Hz ground power units as well as the baggage handling systems, which utilize a large number of induction motors, most of which run idle in standby without baggage per FAA regulations.

In addition to trending consumption, we have also considered end-use consumption such as heating, lighting, and equipment/plug loads as there are a number of metering devices that do not necessarily lend themselves to end use analysis given their unique physical position and shared metering capability. Special attention is being paid to end uses such as baggage handling, which is a large demand and has potential for being reduced with operational modifications. Further discussion is explained in the ECMs herein relative to the potential end use consumption reduction.

The current electric utility rate/tariff is such that the majority of the dollar cost that can be generated through energy use is kW demand. The distribution and other charges that are associated with the utility rate are not as consequential as the demand charge. Demand (kW) is a result of simultaneous/peak use of equipment. In other words, the more motors, air handling units, lighting, fans, chillers, etc. that are running simultaneously, the more kW that is used instantaneously and ultimately paid for. The utility determines the kW demand by looking at the maximum 15-minute demand for the month. Off peak hour, kW demand is typically reduced by approximately 50 percent. However, the facilities' peak and off peak demand appear to trend similarly. Review of the last 12 months of utility bills/energy consumption revealed a traditional bell curve. In other words, electric power consumption kWh peaks in the summer months, which is expected given the buildings are cooled via electric driven equipment. During winter months, the terminal building electric consumption is reduced. Although the building trends very well, there is room for improvement, which can be attained mostly through implementing energy conservation measures in the old terminal.

Monetary utility incentives do exist for many of the energy conservation opportunities described herein. All incentives described or identified herein are not guaranteed and must be reviewed by the utility company for acceptance.

Opportunities for Energy Performance Improvement

The following are ECMs that have the most potential to move forward either as low/no cost solutions or as part of capital improvement projects:

ECM #1 (Old Terminal Boiler, Chiller, Tower and Geothermal Well Field)

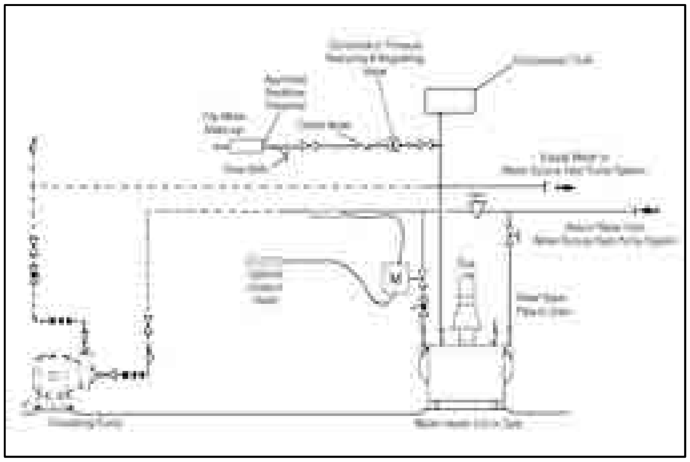
As mentioned and discussed earlier in this report, there is an aging heating/cooling system consisting of a cast iron hot water duel fuel boiler system as well as a water cooled chilled water distribution system. Due to the age and as it relates to both system infrastructures, it was apparent that a replacement system is or should be planned in the very near future. These systems are not only antiquated, but there are systems and apparatus that can replace these systems with better technology and higher energy efficiencies.

Given the success with the new terminal building's geothermal well system and its associated heating and cooling infrastructure, we believe after a preliminary analysis that there is adequate real estate and a real potential to retrofit the old terminal building systems and current distribution infrastructure with a like system in the "old" terminal building. The use of a geothermal system for the old terminal building would integrate well with the existing radiant heat system. The old terminal building is currently heated by radiant heating in nearly 50% of its space. Proprietary software and algorithms would be utilized to determine the best sequence of operations as it relates to well temperatures and equipment to run based on well yield and *Swedish G-functions* that are developed through documented well test data. At this point in the technology's life-span, this is the most accurate means to determine the true life cycle cost-benefit, which includes energy consumption.

We have located preliminarily the well field location that best suits the aforementioned application. The preferred location would be within the grassed infield to the east of Taxiway C just east of the control tower. We recommend that a test well in this location be studied for thermal yield ahead of any design/construction decisions to determine if an open well or closed well is appropriate. The well yield, number of wells, and cost should also be evaluated prior to any decision making. Our preliminary evaluation of the site location and application appears to be conducive to the technology, but requires further study.

The level of analysis performed on the existing well system prior to design and construction was not evaluated as part of this review; however, the infrastructure in place can be easily adjusted to be optimized for what it currently serves. To date, we believe the outcome has been beneficial and can be largely attributed to building envelope technologies, as well as controls and end use delivery systems such as radiant heating and CO_2/demand controlled ventilation systems.

With the information provided, we recommend as a capital project the heating and cooling infrastructure in the old terminal building be retrofitted with more state-of-the-art and efficient systems, which would consist of a geothermal hybrid-tower system with a high efficiency gas fired condensing boiler system. Our experience is that utilizing the tower to compl-ement the well system performance has the longest term or life cycle cost-benefit in cooling. In other words, when the ground is not able to provide the lowest temperature, operations switch over to the cooling tower until the ground has recovered/replenished. Conversely, when the ground or source side of the system is not able to provide the most advantageous temperature, in the winter months the condenser boiler coupled with a cooling tower (closed loop propylene glycol filled) with a simple heat exchanger can increase the COP of a heat pump module by almost 3 to 4 times what is expected. We accomplish this by distributing the hot water independent of the chilled water, adding the energy to the source side of the heat pump system, which increases linearly the efficiency of the heat pumps' ability to add heat to the system at a lower fuel cost. By utilizing a gas fired condensing boiler to increase the source side temperature, we would be taking advantage of the lower fuel cost (natural gas) at the highest combustion efficiency the boiler technology has to offer and increase the COP/electric fuel efficiency. In addition to this strategy, we would also recommend adding a Hartman Control LOOP™ to the system. This control product contains proprietary algorithms to maximize chiller/heat pump efficiency by tracking all building variables as well as outdoor environmental variables to determine the best sequence of operations (e.g., how much tower fan vs. pump, how much delta T [refrigeration] is most beneficial, etc. – see illustration above).



Side Car Condensing Boiler on Heat Pump Source Loop

ECM #2 (Vending Machines)

There are six vending machines throughout the facility. Plug loads, such as vending machines, computers, printers, fax machines, etc. are responsible for a fair amount of annual energy usage. A vending machine can utilize anywhere from \$300-\$500 annually in electricity. We recommend that each vending machine with the exception of any that house perishables be fitted with a "Watt Stopper" or "Vending Miser" to turn these machines off when not in use or the building is unoccupied for long periods. These devices can yield up to \$150.00 savings annually per machine. The cost of a single

Vending Miser by Watt Master™

Vending Miser is approximately $180.00 and can be installed by the facility's staff with very little effort. This would yield a simple payback of 1.2 years. We have categorized this as a low cost-no cost resolution, as there is a small first cost associated with implementing. The photograph above depicts one example of the apparatus that "Watt Master" provides relative to vending machine energy consumption reduction.

ECM #3 (New Terminal Chiller/Boiler Operational Modifications)

We recommend changing the sequence of operations on the new geothermal system to have the chillers be the lead in cooling vs. the heat pumps. This will yield greater savings as the chiller can be retrofitted with a water regulating valve and the head pressure relief offered by the larger machine will be more beneficial. The exact time when the chiller should be utilized can be determined by the head pressure relief curves that the chiller manufacturer can provide alongside the already metered data. In other words, simply because the chiller is physically larger and is not as small and modular as the heat pumps, does not mean it is less efficient in cooling.

ECM #4 (Solar PV Opportunity)

We investigated the implementation of renewable energy at the Jetport. One source considered was photovoltaic cells as a source to provide electricity to the terminal buildings. Photovoltaic cells are arranged together into modules and wired into panels. The photovoltaic cells capture energy from the sunlight to create DC electricity. This DC electricity travels to an inverter, where it is changed to AC electricity to use for electric appliances. Most systems today are grid tied to avoid having to find a means of adding the electricity to the existing infrastructure. This also prevents having to have storage devices if power generated exceeds the need.

We investigated opportunities to utilize photovoltaic panels as an electric source. The first of the potential opportunities utilizes photovoltaic panels sized to utilize as much of the terminal building roof as possible. Ground mounts were not considered. The second of these opportunities were the building overhangs.

The first of the aforementioned yielded approximately a 248 kW DC system. The system generation production would be approximately 238,000 kWh/year with a cost avoidance of $26,200. At $4/Watt installed, the capital outlay would be approximately $992,000. The simple payback would be approximately 37 years. This exceeds the useful life of the panel system by greater than two times.

The second location mentioned previously yielded a 65 kW DC system. The system generation production would be approximately 62,700 kWh/year with a cost avoidance of $6,900. At $4/Watt installed, the capital outlay would be approximately $260,000. The simple payback would be approximately 37 years. Again, this exceeds the useful life of the panel system by greater than two times.

A summary of the calculations from the NREL PV Watts software are included in Supplemental Information, Parts III and IV.

Although there is a high first cost that is associated with this particular technology, there are third party funding options that can buy down or even eliminate the year one cost such as PPAs (Power Purchase Agreements). A PPA option would give PWM the ability to take advantage of renewable energy and not own the actual equipment/infrastructure. Under a PPA structure, the Jetport would only be responsible for FAA compliance, leasing, and PPA purchasing; lessees would be responsible for managing the engineering, procurement, and construction; operations and maintenance; electrical interconnection; Jetport and/or third party power sales; and energy regulatory compliance. Funding opportunities available to lessees may include federal tax incentives such as the Investment Tax Credit and Modified Accelerated Cost-Recovery System (MACRS) as well as state incentives such as net metering, the Community Based Renewable Energy Production Incentive (pilot program), and PACE financing. Utility REC purchases/rebates may also be available. Savings associated with these incentive programs could be passed on to the Jetport in the form of reduced electricity costs.

ECM #5 (Combined Heat and Power CHP – Deicing Facility)

Another opportunity for reduced energy consumption and cost would be a CHP (combined heat and power) system. The opportunity for this lies in the glycol recovery process that is currently on-site. Because of the deicing facility's large year round thermal demand, it presents the opportunity to utilize a bottoming cycle where paralleled gas fired micro-turbines can be used to generate power and use the waste heat (steam or hot water) in the glycol recovery process.

The utility bill analysis also showed an almost double in electrical consumption over the last two years due to an increase in production and use. This helps facilitate the use of CHP as the better opportunity lies in a simultaneous electric and thermal consumption.

This process is a good candidate for a CHP system as it is a more than 5,000-hour process annually with a heavy thermal demand. We estimate that a minimum of 200 kWe can be installed and potentially more depending on the final prime mover configuration and thermal need.

We took the opportunity to do a preliminary payback analysis based on a 200 kWe system with an annual thermal runtime of 5,000 hrs. The results of the analysis indicate a 7.5-year simple payback without external capital funding/year one buy down.

Results of the analysis can be found in Supplemental Information, Part V of this report.

ECM #6 (Additional Lighting Controls and Occupancy Sensors)

Per the Energy Analysis Interview, it has been reported that not all of the lighted areas are controlled through the lighting control system or occupancy sensors and some of the public common areas are lit 24/7. We understand through the interview process that all building incandescent lamps have been phased out, including the garage exterior lamps.

We recommend adding lighting control panels in areas that lack them currently and/or the existing lighting fixtures be integrated into the existing panels if space allows.

The addition of lighting controls ensures that the lights are turned on and off based on occupancy or other selectable environmental variable, such as photocell or even simple scheduling.

We also recommend lighting occupancy sensors be retrofitted throughout the facilities where currently not in place. The best guideline to utilize as a means of determining which type of spaces an occupancy sensor is best suited is ASHRAE 90.1 (latest edition) or the local building energy code IECC.

We recommend on the short term basis, at a minimum, signage and/or internal correspondence be utilized to educate the end user/occupants on turning lights off at the end of regular business hours.

As a relative measure, a building of this size with the appropriate occupancy sensors and daylighting controls vs. a building without would yield and annual energy consumption savings of approximately 179,000 kWh or $28,640.

ECM #7 (Re-Lamping/Fixture Replacement in Hangars and Maintenance Buildings)

Through the Energy Analysis Interview with Northeast Air, management reported that it is using Metal Halide (MH) lamps/fixtures in its hangars and indicated that they do plan to replace these fixtures. They have also explained the operating issues that are typically associated with MH lamps, which is their inability to start in a timely manner. When cold MH lamps take approximately 3 to 5 minutes to start, and nearly 20 minutes when hot. As pointed out in the interview, we agree turning the lights off in many of these spaces with the inability of turning back on quickly can be considered a safety hazard for the employees.

We recommend that all MH lighting in the hangars and outlying maintenance type facilities be retrofitted with LED (Light Emitting Diode) fixtures that are suited for installation.

This ECM is highly recommended, as economics are second tier relative to public safety and well-being. Installing LEDs with occupancy sensors in low hazard spaces will yield significant energy savings over the long term and a betterment relative to occupant safety.

ECM #8 (Hangar Envelope Upgrades)

The current hangar and maintenance buildings are largely constructed of purlin type metal buildings. The age of the buildings is such that any existing insulation may not be adequate relative to current codes. Although not a code concern unless a significant portion of any of these buildings is upgraded it does have a significant effect on energy consumption with respect to open spaces and heating specifically.

The building has a very unique design with significant interior volumetric space or ceiling heights. At a minimum, a retrofit project is should be considered where roof insulation if not adequately provided. Although insulation projects tend to have a long-term simple payback from 25 to 30 years it will provide an immediate reduction in emissions as many of these buildings are heated with fossil fuels.

Another significant envelope concern is the hangar and maintenance doors that are open many hours, contributing to high fossil fuel energy consumption. Although the hangar doors are very tall and have a significant area relative to the total envelope wall area, there are means of reducing the inherent infiltration that occurs with these types of door systems. Recommendations to remediate this infiltration envelope loss are multi-faceted as follows:

- First, replace all doors with well insulated doors in compliance with current energy codes, which requires a 0.4 u-value or lower (effective weather stripping should be included in this solution, as Northeast Air mentioned in their interview that weather stripping on older roll-up and sliding hangar doors is an issue).
- Second, add custom air curtains where the heights are manageable relative to technology. This approach will need to be studied carefully relative to each circumstance to ensure that the conditions that the air curtains can provide for are conducive to the situation.
- Last is to provide a radiant heat solution utilizing gas fired infrared heating equipment. This equipment is designed to provide radiant heating in lieu of convective heating which is inherent to air type convective systems that include Make-Up Air Handling Units, Unit Heaters, H&V units etc. This solution is advantageous as it heats only objects in its direct path, which is more efficient and suited to end user comfort conditions.

ECM #9 (Chemical Free Treatment System for Cooling Tower)

Consider a chemical free treatment system for the cooling tower. These systems utilize pulse technology base on Faraday's Law and eliminate the need for chemical additives in the cooling tower. They also keep solids in suspension, prolonging the life of the piping infrastructure and saving water. The typical payback period for these systems is usually less than three years; however; they come with a high upfront cost, with the equipment alone costing approximately $20,000.00. Vendor information can be provided upon request if there is an interest in exploring this. The vendor would first do a water quality test, free of charge, as well as a life cycle cost study to determine the Jetport’s specific benefits. This measure would require additional study but has been identified here as a means of introducing it.

ECM #10 (Old Terminal Building Envelope Opportunities)

Ahead of any building envelope project being implemented, an infrared camera survey should be performed to determine the condition and integrity of the envelope systems. This survey will reveal any thermal decay and infiltration. In addition to retro-commissioning through the use of infrared camera survey, commissioning of any future envelope projects upon completion is recommended. LEED v4 and ASHRAE provide good methodologies and standards for reference. Envelope recommendations are as follows to be performed when a renovation allows:

- Spray foam air barrier: It is becoming more common to provide a thin spray foam layer on the interior side of the exterior sheathing, to provide an additional air barrier to augment the “peel and stick” or liquid applied exterior air and water barrier.
- Glazing analysis: As part of the comprehensive energy analysis, future design teams should model thermal performance of glazing types and consider coatings, exterior shading, interior light shelves and triple glazing with appropriate coatings in the correct locations (inner, outer etc.)

We anticipate that future improvement projects will present additional energy savings opportunities, but may be too far in the future to be accurately reviewed at this time relative to operational impacts and benefits. One example of this is that incandescent lights remain on portions of the airfield. At the time of prior major airfield improvement projects associated with Runway 11-29, acceptable and FAA approved LED lights were not available for runway intersection guard lights, HIRLS along Runway 11-29, centerline lights for Runway 11-29, or TDZ lights. When future airfield improvement projects are performed in these areas or the existing lights are in need of replacement, the use of LED lights should be reevaluated to determine if advancements have been made for these airfield applications. To date, the airfield signs, taxiway edge lights, and MIRLs have been upgraded to LED lights.

Offsite Renewable Energy Options

In Maine, there are many renewable energy purchasing options. The most widespread, user-friendly and affordable renewable energy purchasing option in Maine is through a program called Maine Green Power managed by the Maine Public Utilities Commission. The program seeks to secure approximately 25 percent of its green power from Maine Class I renewable energy projects that have been placed into service or refurbished on or after September 1, 2005, or locally owned community based renewable energy projects. Green power projects eligible to supply renewable energy to Maine Green Power include the following:

- Solar photovoltaic systems;
- Hydroelectric projects that meet state and local fish passage requirements;
- Wind turbines;
- Biomass facilities that use wood, wood waste, landfill gas or agricultural biogas;
- Tidal power projects;
- Geothermal projects; and
- Fuel cells that use landfill gas or agricultural biogas.

The program works by customers purchasing certificates often called “green tags,” “tradable renewable credits,” or “renewable energy credits.” The certificates represent environmental attributed power generated from renewable electric plants. The certificates are offered separately from electricity service; however, the customer is not required to switch their electricity supplier in order to purchase the green power. The purchase of a certificate allows renewable energy generators to put more green electricity into the electrical grid. There is also the option of a customer changing energy supply to "green supply," which would require a contract but would have the same environmental benefits.

Central Maine Power (CMP) allows customers to match electric use with green power produced in Maine. Through CMP, Maine Green Power costs 1.5 cents extra per kilowatt-hour, or $0.015. The program also sells the renewable energy in "blocks." One block for 500 kWh can be purchased for $7.50 per month.

A local waste to energy plant called ecomaine (owned 20% by the City of Portland) sells the energy produced from burning non-recyclable trash. The plant produces a total of approximately 175,000 tons of trash a year, and enough steam to generated 100,000 - 110,000 megawatt-hours of electricity annually. The energy is sold to the New England Power Grid through a bidding process for power purchase agreements. Currently, ecomaine's power is sold to Constellation, an Exelon Company. Constellation is a power, natural gas, and renewable energy supplier. PWM's non-recyclable and recyclable waste is ultimately brought to ecomaine. PWM contributes approximately 400 tons of non-recyclable trash a year to ecomaine.

Portland International Jetport

APPENDIX E

WASTE MANAGEMENT BASELINE

SUSTAINABLE AIRPORT MASTER PLAN

Appendix E: Waste Management Baseline

This Appendix provides more detailed information on the existing waste management activities at PWM and follows with the format outlined in the FAA guidance issued in a September 30, 2014 memorandum titled, "Guidance on Airport Recycling, Reuse, and Waste Reduction Plans." This baseline inventory can be used to identify recycling, reuse, and waste reduction opportunities and priorities, and gauge program effectiveness over time. This baseline inventory can also be used moving forward to assess the effectiveness of future additional recycling efforts.

The FAA synthesis document titled, "*Recycling, Reuse, and Waste Reduction at Airports"* (April 24, 2013) that identifies the following eight general types of waste generated at airports:

- Municipal Solid Waste (everyday items);
- Construction and Demolition Waste;
- Green Waste (yard waste);
- Food Waste;
- Deplaned Waste (bottles, cans, mixed paper, food waste, etc., from passenger aircraft);
- Lavatory Waste (sanitary waste from aircraft);
- Spill Cleanup and Remediation Waste; and
- Hazardous Waste;
    - Solvents
    - Caustic parts washes
    - Heavy metal paint waste and paint chips
    - Wastewater sludge from metal etching and electroplating

- Unused epoxies and monomers
- Waste fuels (including sump fuel or tank sludge) and other ignitables
- Unusable water conditioning chemicals
- Illegal dumping of containerized chemicals
- Contaminated sludge in General Aviation aircraft wash rack oil/water separators
- Nickel cadmium (ni-cad) batteries
- Waste pesticides

Per the FAA Memorandum, "*Guidance on Airport Recycling, Reuse, and Waste Reduction Plans,"* and to meet Section 133 of the *FAA Modernization and Reform Act of 2012* (FMRA), the following elements are included as part of the Sustainable Master Plan's Waste Management and Recycling Section in the subsections as follows:

A Facility Description and Background;
B Waste Audit;
C Review of Recycling Feasibility;
D Operation and Maintenance Requirements;
E Review of Waste Management Contracts;
F Potential for Cost Savings or Revenue Generation; and
G Plan to Minimize Solid Waste Generation.

Spent aircraft deicing fluid is discussed as a supplemental Subsection H.

A. Facility Description and Background

1. Scope of the Existing Recycling Program

Currently, PWM's waste management program for the Airport Terminal Building and Aircraft Ramp Area includes the use of separate containers for solid waste and for single-sort recycling. In the Jetport terminal, single containers are used for the recycling of all paper products, including newspaper and cardboard, glass and metal, and plastic with numbers 1 through 7. The public trash and recycle bins located in the terminal building are provided by ecomaine, a non-profit waste management company located approximately 1.5 miles from the Jetport at 64 Blueberry Road in Portland, Maine. (See photos below of the different types of ecomaine containers at PWM taken during a walk-through of the terminal with Arthur Laferriere of the City of Portland on August 4, 2014).

Trash and recyclables collected in the compactors are transported by Waste Management (WM), a waste collection and management company.

For the purpose of the Waste Management and Recycling Section, the airport is broken into the following categories:

- Facilities over which the Jetport has direct control – This includes the City of Portland offices, general public areas of the Jetport terminal, including bathrooms, general public outdoor areas, the airfield and maintenance area.
- Areas over which the Jetport has control via contract or lease agreement – This area includes the majority of the tenant facilities including the airline offices, deplaned waste, all HOST/Paradies tenants, Standard Parking, Northeast Air, etc.
- Areas over which the Jetport has no direct control and limited influence – This area includes TSA and FAA offices. TSA does recycle shredded paper and returnable bottles and cans, but recycling is limited beyond that due to security and regulations.

2. Waste Inventory Inspection

A waste inventory inspection of the Airport Terminal Building and parking areas was completed on September 24, 2014. The inspection included collecting an inventory of all trash bins, recycling bins, and cardboard collection locations throughout the Jetport, including the parking garage, municipal employee offices, and all public areas. Accessible tenant spaces such as Paradies, HOST, and the car rental garage and office were also included in the inventory.

Throughout the Airport Terminal Building public areas, 60 trash bins and 24 recycle bins (mainly ecomaine) were observed to be located on the first, second, and third floors. A significant number of paper cups, newspapers and other paper items were observed in the general waste containers even in instances when the waste containers were adjacent to the single-sort containers; however, a few recycling containers were not labeled or had been turned so labeling did not face travelers.

In the City of Portland employee offices, most offices had a small recycle bin, a small trash bin, and larger trash and recycling bins in the common areas. The recycle bins were used for mainly paper and were generally observed to be used properly.

During the waste inventory inspection, accessible tenant spaces were entered and included in the inventory. This included accessible spaces of some airlines, HOST, Paradies, TSA and the rental car office. Airline ticketing counters were observed to have both small and larger trash bins with no recycling. On aircraft, flight attendants collect municipal solid waste (MSW) from passengers before the passengers exit the aircraft. In the outbound baggage area, many trash bins were observed and no recycle bins were observed; however, there were numerous bags full of returnable bottles and cans. In general, all HOST and Paradies tenants recycle cardboard and newspaper. The cardboard is collected loosely in a designated location and it is picked up by ISS Facilities Services. Many of the HOST/Paradies spaces have trash bags for returnable bottles in back areas not accessible to public. All restaurants stated that they keep used cooking oil in a container; ISS collects the oil in a roll-away container. ISS then transports the oil to the container located in the dumpster enclosure area at the west end of the terminal building. A TSA employee was interviewed as part of the inspection. TSA shreds all used paper and the shredded paper is recycled. No other recycling efforts were discussed during the interview with TSA. Four trash bins and no recycle bins were located in the rental car parking area. There were many recyclable materials found mixed in the trash bins. Approximately one trash bin per counter was observed at the rental car check-in counters, and no recycle bins were observed.

Seventeen trash bins were observed in the Jetport's parking garage located near the elevator/stair entrances at the southwestern corner of the garage and the eastern side of the garage on all five floors, with an additional six trash bins located along the walkways to the terminal building on the first floor. No trash or recycle bins were observed in the cell phone parking lot. One trash bin was found near the entrance of the employee parking lot, and one trash bin was located at the exit of the long term and short term parking pay lanes. Seven trash bins were observed outside of the first floor of the Airport Terminal Building adjacent to all of the entrances. No recycle bins were observed outside of the Airport Terminal Building or in the parking garage.

During the inspection, an ISS employee in the process of picking up trash from public trash receptacles was interviewed. According to the employee, ISS has a formal way of separating recyclables from trash. Trash bins are emptied into clear trash bags and recycling bins are emptied into black bags. This creates less error in the process of the waste transport to the dumpsters. The ISS employee also confirmed that ISS goes through recycling to separate returnable bottles and cans. No other on-site sorting beyond picking out returnable bottle and cans is implemented. Based on the interview and observations of the collection of returnable bottles and cans, it is assumed that the majority of the returnable bottle and cans do not end up in the single-sort recycling stream. Almost all tenants interviewed confirmed that they collect and return the bottles and cans.

3. Tenant Facilities and Deplaned Waste

Many of the vendors and tenants located at the Jetport manage their waste and have contracts with waste management companies separate from the City of Portland's contract. Some examples of these companies include rental car companies, Inland Technologies, and Maine Aviation. One of the larger waste producers at the Jetport is Northeast Air, a full service fixed based operator. Northeast Air maintains two ten-cubic yard dumpsters on-site to handle waste and recycling for their ground services/aircraft maintenance operations at PWM. One dumpster is for cardboard and one is for trash. Pine Tree Waste removes the waste once a month. Northeast Air also disposes of international waste, waste for secure shredding (burn), waste for unsecure shredding, and hazardous waste. See "Hazardous Materials Management" for more information on the hazardous waste disposal. Invoices for Northeast Air's disposal of waste for fiscal years 2013 and 2014 are summarized in Supplemental Information, Part VI.

The following information was obtained from phone interviews with managers of other vendors and tenants:

- Inland Technologies has a six-yard trash bin and a two-yard recycle bin that are emptied approximately once a month by Waste Management.

- Maine Aviation Corporation has two trash bins that are emptied bi-weekly by Pine Tree Waste and Triano. The paper generated by the administration is placed in recycle bins and is picked up quarterly by Without a Trace.
- Standard Parking has a contract with the City of Portland to utilize PWM's compactors. ISS janitorial staff transports the waste to the compactors on an as-needed basis.
- Delta Airlines has a contract with the City of Portland to utilize PWM's compactors. According to the Ramp Manager, Delta Airlines flight attendants collect solid waste from passengers in a trash bag. Delta's ground crew then collects and transports the waste from aircraft in a roll-away cart and has direct access to the dumpster enclosure. Based on the conversation with the Ramp Manager, the trash and recycling are intermingled in one bag.

The weight of trash generated by Inland Technologies and Maine Aviation Corporation has not been quantified or included in the calculated baseline quantities and it is not expected that the quantities would result in a change to the outcome of this memo. Generally, the pickup of waste from smaller dumpsters is not weighed and the user is charged a tipping fee only. Future weighing and reporting would allow this waste and recycling data to be added to the overall summary for the Jetport.

4. Hazardous Materials Management

Northeast Air has implemented recycling efforts for hazardous materials including regular and diesel gasoline, aviation gasoline, and jet fuel. Northeast Air provided invoices reporting the frequency and cost of the wastes. The wastes are disposed of by Enpro on an as-needed basis. The hazardous wastes are largely oils – oil from the oil/water separator, hydraulic oil, synthetic oil, Speedi Dry, containerized oily liquids, and various other oils. Other examples of hazardous waste disposed of are gasoline contaminated soils, antifreeze, and flammable paint from aerosol cans. Hazardous waste disposal information collected from Northeast Air invoices is reported in Supplemental Information, Part VI.

Northeast Air pumps aviation gasoline (Avgas) and jet fuel storage sumps on a daily basis. Fuel removed from the tank sumps is put through visual testing for water or condensation and contamination. After testing, the fuel is filtered twice and put back into the storage tanks for reuse. Any jet fuel not reclaimed is used as a secondary heating source in the winter. As Avgas is too volatile to be used as a heating source, it is disposed of. Clean Harbors handles this disposal. There is also a recycling program for universal wastes such as batteries, fluorescent bulbs, and tires. Universal wastes are hazardous wastes that are less heavily regulated than other hazardous wastes.

PWM also implements recycling efforts for hazardous materials. Fluorescent bulbs are recycled by Casella Waste. Used vehicle oil is collected in a tank and picked up when the tank is full. Car tires and batteries are recycled by the dealer.

5. Local Municipality's Waste Management Program (ordinances, requirements, permits, etc.)

Both the City of Portland and the City of South Portland's Code of Ordinances were reviewed for relevant restrictions or applicable information. As shown on **Exhibit 1F**, the areas discussed in this section of the Sustainable Master Plan are located within the City of Portland with the exception of the deicing facility and a portion of the airfield, which are located in South Portland. Chapter 12 of the City of Portland Code of Ordinances "Garbage, Wastes and Junk" revised 4/16/14 discusses garbage and solid waste removal/recycling, and Chapter 9 of the City of South Portland Code of Ordinances discusses "Garbage and Refuse." The chapters were reviewed, and there are no requirements that would affect the Jetport's current procedures. The City of Portland also has a "Trash & Recycling" Solid Waste Program and Service and is 20 percent owner of ecomaine. The City of South Portland is also a partial owner of ecomaine at 11.7 percent. Recycling is encouraged in both cities, but it is not required.

6. Reasons for Implementing/Maintaining a Recycling Program

There are a wide variety of driving factors for implementing and maintaining a recycling program at the Jetport, including the available resources, long term cost effectiveness, and PWM's goal of sustainability.

ecomaine played a huge role in the implementation of the Jetport's recycling program. According to Lissa Bitterman of ecomaine, the Jetport was part of ecomaine's Public Places Program. When the Public Places Program was introduced, ecomaine met with the City of Portland staff at the Jetport to provide education on how to improve and better regulate recycling efforts. The meetings for the employees were held from February 2013 through May 2013 with the facilities and engineering department members. According to Ms. Bitterman, ecomaine would be willing to hold future educational meetings with the City of Portland employees and ISS employees to help improve recycling efforts at the Jetport. WM, the Jetport's waste management company, holds a contract with ecomaine for the Jetport's waste along with many other similar facilities. The transport from the compactors at the Jetport by WM to ecomaine is part of a routine pick-up schedule.

Recycling can also be more cost-effective. See Subsection F "Potential for Cost Savings or Revenue Generation" for more details.

7. Description and Inventory of Infrastructure in Place that Supports Airport Recycling

As shown in **Exhibit 3A**, there are three WM compactors located at the west end of the terminal building for cardboard, single-sort recyclables, and solid waste. Based on labeling of the compactors, there is one compactor for cardboard identified as Compactor #1, one compactor for trash identified as Compactor #2, and one compactor for single-sort recycling identified as Compactor #3. There is also a Maine Standard Biofuels container for used cooking oil. A description of the recycling and trash bins within the Jetport is included in the Waste Inventory Inspection completed by FST.

The compactors are accessible from the inside and outside of the building. MSW from within the Jetport is taken to the compactors by ISS through the building. Deplaned MSW is taken to the compactors in roll-away carts by ground crews who access the fence enclosure from the airfield. Under a contract directly with the City of Portland, WM picks up the solid waste once per week, and the single-sort recyclable materials about once a month. The solid waste and recyclables are transported to ecomaine, under a contract between WM and ecomaine (See Subsection E "Review of Waste Management Contracts").

According to ecomaine, all of the Jetport's waste (both recyclables and non-recyclables) is brought to the ecomaine plant approximately 1.5 miles from the Jetport at 64 Blueberry Road in Portland, Maine. Because both the City of Portland and South Portland are partial owners of ecomaine, all waste is brought to ecomaine. The recyclables and trash are both hauled to the ecomaine plant by WM haulers and weighed at the plant. All single sort recyclable materials with the exception of glass brought to ecomaine are baled by type at the plant. The various bales are then sold at current market value and picked up by the buyer in tractor-trailer trucks. The general waste (non-recyclables) is incinerated at ecomaine to produce electricity at their waste-to-energy plant. Metals are pulled out of the ash after burning. The ash generated from combustion is trucked two miles away from the plant to ecomaine's landfill/ashfill facility. The landfill/ashfill facility located at Scott Drive contains 240 contiguous acres of landfill located within Westbrook, Scarborough, and South Portland.

Used cooking oil is collected at each HOST restaurant location. The HOST employees dispose of their used cooking oil by emptying individual containers in the Maine Standard Biofuels container in the compactor area. The Maine Standard Biofuels containers are emptied by Maine Standard Biofuels on an as-needed basis. The used cooking oil is brought to the Maine Standard Biofuels facility located at 51 Ingersoll Drive in Portland, Maine, approximately 5 miles from the Jetport. The used cooking oil is recycled into high quality biodiesel as well as a powerful cleaning product. The refining process separates the grease into different chemical components, including glycerin. The glycerin is purified and marketed as Wicked Strong Soap, utilized as a degreaser for composting buckets and grease bins.

8. Description of Airport's Current Solid Waste Recycling, Reuse, and Waste Reduction Efforts and Program Performance

A detailed description of the baseline data collected from the Jetport is included in Subsection B "Waste Audit." This includes data for fiscal years 2013 and 2014. For information about the Jetport's current recycling efforts and specific instances of recycling efforts, refer to the waste inventory inspection completed by FST. A summary of the findings of the Waste Audit is listed below:

- Approximately 10.8 percent of all MSW collected from passengers, City of Portland employees, HOST/Paradies tenant spaces, and certain tenants choosing to pay the Jetport for waste management was recycled in fiscal year 2014. This recycling rate is similar to the recycling rate of 10.6 percent in fiscal year 2013.

- Based on current baseline information including weight of solid waste collected and passenger counts, it is estimated that approximately 1 pound of MSW per passenger is produced.
- Approximately 1,090 gallons of used cooking oil is recycled per year at the Jetport.

There are no current local goals set for recycling in the City of Portland or specifically at the Jetport. On a statewide level, the Maine Department of Environmental Protection (MaineDEP) has an overall goal of 50 percent recycling of solid waste. Although airports have unique challenges in reaching high recycling rates because of the relatively high amount of bathroom/soiled waste and from the large amount of people passing through the facility, some airports are achieving 50 percent or greater recycling rates with aggressive composting efforts. An example of this is at San Francisco International Airport (SFO). SFO progressively increased the rate of recycling waste to 75 percent at the end of FY 2011. In 2011, 9,309 tons of solid waste was generated at SFO, of which 6,961 tons (75 percent) was recycled. The recycled solid waste was composed primarily of food/compostable materials (39 percent), cardboard (14 percent), and paper (14 percent). The tonnages did not include the recycling of construction and demolition waste, which exceeded 90 percent on major airport construction projects.

Perhaps the most challenging part of recycling efforts at airports is the fact that the environment is not entirely a controlled environment. For example, at an office building, the same employees are present each day and generate similar waste each day. A controlled environment makes education on recycling more effective. An airport's environment is like no other. Not only are the waste generators often changing, the people are from many different parts of the state, country, and world and value recycling differently.

Based on the current challenges faced for recycling at an airport, the 10.8 percent recycling rate can be used as a baseline when implementing new recycling efforts, as explained in Subsection B "Waste Audit." According to ecomaine, the recycling program at the Jetport was implemented in two phases. The Jetport implemented the first phase in November 2007 and the second phase in December 2011. Based on this, the recycling rates in fiscal years 2013 and 2014, which were similar, represent data collected under similar circumstances. Any notable increase in this recycling rate in the future would most likely be a result of additional recycling efforts. Refer to Subsection G "Plan to Minimize Solid Waste Generation" for details on additional recycling efforts and waste reduction ideas for the future.

B. Waste Audit

A waste audit is conducted to identify and document the source, composition, and baseline quantity of MSW streams generated at an airport. At the start of the inventory process of this Sustainable Master Plan, the ecomaine recycling program among other recycling efforts had already been implemented. A waste audit was not completed before the recycling program was started. However, as explained below, a baseline recycling rate including a general composition of the waste has been documented as part of this inventory. The baseline information can be used to identify recycling, reuse, and waste reduction opportunities and priorities, as well as gauge program effectiveness over time. This baseline can also be used moving forward to assess effectiveness of future additional recycling efforts.

1. Annual Quantity and Composition of MSW and Rates of Recycling

The City of Portland provided FST with Waste Management invoices which included tonnage and costs broken down by compactor for fiscal years 2013 and 2014. This included all waste created by passengers, City of Portland employees, HOST/Paradies tenant spaces, Standard Parking, and other tenants choosing to pay the Jetport for waste management. All of this waste is handled and brought to the compactors by ISS. During fiscal year 2013, a total of 398.9 tons of MSW (including single sort recyclables) was collected in the compactors located at the Jetport, and 421.4 tons was collected in fiscal year 2014, representing a 5 percent increase of total waste.

During fiscal year 2014, 10.8 percent of the solid waste collected was recycled, which was similar to the recycling rate in 2013 of 10.6 percent. Based on current baseline information including weight and passenger counts, it is estimated that approximately 1 pound of MSW per passenger is produced including trash and recyclables.

Table E-1 presents a breakdown of solid waste and recycling tonnage and costs for fiscal years 2013 and 2014. See Supplemental Information, Part VI for a complete breakdown of solid waste and recycling tonnage and fees for each compactor. As indicated earlier, the City of Portland, Waste Management of Portland, Maine picks up the MSW once per week, and the recyclable materials about once a month. The recyclables are transported to ecomaine by WM haulers. It is assumed that the 2013 and 2014 recycling tonnage does not include returnable bottle and can tonnage based on the findings of the waste inventory inspection that these materials are removed from recycling bins prior to bringing the recyclables to the compactors.

TABLE E-1
Solid Waste and Recycling Tonnage/Costs
Portland International Jetport

Fiscal Year 2013	**Tonnage**	**Cost***	**$ per ton**
Municipal Solid Waste (Compactor # 2)	356.58	$53,077.69	$148.85
Cardboard/Single Sort Recycling (Compactor #1 & 3)	42.36	$5,145.45	$121.47
Total	398.94	$58,223	$145.94
Rate of Recycling	**10.6%**		
Fiscal Year 2014	**Tonnage**	**Cost***	**$ per ton**
Municipal Solid Waste (Compactor # 2)	375.71	$59,556.15	$158.52
Cardboard/Single Sort Recycling (Compactor #1 & 3)	45.66	$7,950.88	$174.13
Total	421.37	$67,507.03	$160.21
Rate of Recycling	**10.8%**		

*This cost includes disposal per ton, flat rate per haul, monthly service fee, environmental fees, and taxes. There is not a "disposal per ton" cost for disposal of cardboard and single sort recycling.

During permitting efforts for the terminal building in 2010, it was anticipated that 604 tons of general office waste per year would be generated.

PWM's waste management program also includes a 275-gallon container for collecting used cooking oil. This container is emptied on an as-needed basis by Maine Standard Biofuels. From January to September 2014, approximately 743 gallons of used cooking oil was recycled (see **Table E-2**). Based on this rate of generation, approximately 1,090 gallons of used cooking oil are recycled per year.

TABLE E-2
Cooking Oil Collection (2014)
Portland International Jetport

Date	Gallons	Fee at $1.25/Gallon
21-Jan	75	$93.75
17-Mar	157.5	$196.88
9-May	150	$187.50
9-Jun	120	$150.00
11-Jul	135	$168.75
2-Sep	105	$131.25
Total	**742.5**	**$928.13**

In summarizing the rates of recycling information for MSW and cooking oil, the following baseline information was calculated:

- Approximately 10.8 percent of all solid waste collected from passengers, City of Portland employees, HOST/Paradies tenant spaces, and certain tenants choosing to pay the Jetport for waste management were recycled in fiscal year 2014. This recycling rate is similar to the recycling rate of 10.6 percent in fiscal year 2013. These percentages do not include returnable bottles and cans that are removed from the recyclable material prior to depositing this material in compactors.
- Based on current baseline information including weight of solid waste collected and passenger counts, it is estimated that approximately 1 pound of MSW per passenger is produced.
- Approximately 1,090 gallons of used cooking oil is recycled per year at the Jetport.

Bio-fuel Tank at PWM

C. Review of Recycling Feasibility

Included in Section 133 of the FMRA is a list of factors that influence the scope and nature of airport recycling programs:

- Local markets for recyclable commodities;
- Cost for transport and processing recyclables;
- Local recycling infrastructure;
- Willingness of an airport and its tenants to implement recycling programs;
- The nature of an airport's waste stream;
- Competition between recycling and landfilling firms; and
- Airport layout and logistics.

1. Technical and Economic Factors that Currently Affect Airport's Ability to Recycle

There are currently no technical or economic factors that affect the Jetport's ability to recycle. There is currently a local market for recycling commodities through ecomaine, and ecomaine has aided the Jetport in recycling efforts by providing trash and recycling bins. There is currently adequate space in the compactor enclosure as well as space for haulers to access. ISS currently has a routine system of collecting recyclables, used cooking oil, and MSW and has adequate staffing to support the Jetport's needs. There are no contractual issues that would affect the Jetport's ability to recycle; the current ISS janitorial and WM waste management contracts support recycling efforts.

2. Federal, State, or Local Guidelines that Aid or Hinder Recycling Efforts and Waste Management

Federally, the Jetport follows FAA and the Environmental Protection Agency (EPA) regulations. The guidelines set by the FAA and EPA aid waste management efforts by providing guidance on how to manage materials such as hazardous wastes. The EPA implemented the Resource and Conservation and Recovery Act of 1976 (RCRA), which provides general guidelines for the waste management program envisioned by Congress. Under RCRA Subtitle C, the EPA has established a system for controlling hazardous waste from the time it is generated until its ultimate disposal. This federal law aids the Jetport in the process of handling and disposing of hazardous waste. ISS also follows the EPA's Environmentally Preferred Products (EPP) program and Green Seal products that are certified by the EPA.

Along with the rules and regulations the EPA has put forth, there are also guidance documents for recycling efforts. A document published by the EPA called "Developing and Implementing an Airport Recycling Program" has helpful guidance on how to implement recycling at an airport. Included in this document is a set of worksheets and instructions for identifying and measuring waste.

The FAA provides guidance on preparing airport recycling, reuse, and waste reduction plans. An example of this guidance is the memorandum issued by the FAA on September 30, 2014, titled "Guidance on Airport Recycling, Reuse, and Waste Reduction Plans." The memorandum aids recycling efforts by providing the Jetport with guidance on how to form a plan for the Jetport's recycling program. It is meant to aid airports and their engineering consultants in the following ways:

- The feasibility of solid waste recycling at the Jetport;
- Minimizing the generation of solid waste at the Jetport;
- Operation and maintenance requirements;
- Review of waste management contracts; and
- The potential for cost savings or the generation of revenue.

Chapter 852 "Land Disposal Restrictions" is authorized and adopted under MaineDEP 38 M.R.S.A Sections 1319-O and 1319-R (1) and was developed to be consistent with EPA's RCRA. The rule encourages waste management consistent with the hierarchy of preferred waste management as shown below. The rule also restricts land disposal of hazardous waste without prior treatment in order to reduce toxicity and mobility of hazardous constituents in the waste. The MaineDEP *Waste Generation and Disposal Capacity Report for Calendar Year 2011* (Revised March 2013) establishes a hierarchy for the management of solid waste and notes efforts that are underway to divert waste from landfills. The State's approach to handling solid waste generated and imported into the State is based on the following order of priority:

- Reduction of waste generated at the source, including both amount and toxicity of the waste;
- Reuse of waste;
- Recycling of waste;
- Composting of biodegradable waste;
- Waste processing that reduces the volume of waste needing land disposal, including incineration; and
- Land disposal of waste.

Based on FST's review of the City of Portland and South Portland's Code of Ordinances, there were no guidelines found that would hinder or aid recycling efforts. However, because both South Portland and Portland have a voting interest in ecomaine, they are required to bring MSW to the ecomaine waste and recycling processing plant. This aids the Jetport in recycling efforts because ecomaine supports single-sort recycling. Single-sort recycling has been proven the most effective recycling for public places because of its simplicity. The ecomaine facility is also located 1.5 miles from the Jetport, making it cost-efficient for trucking.

3. Incentives for Implementing/Maintaining a Recycling Program

The incentives for implementing and maintaining the recycling program are discussed under "Reasons for Implementing/Maintaining a recycling program" in Subsection A.6 of this document.

4. Logistical Constraints

The layout of the Airport Terminal Building does not hinder recycling or trash collection. All of the public bins emptied by ISS are easily accessible. There are also many elevators located throughout the Jetport that make it convenient to transport collected MSW and recyclables from the upper levels to the compactors. ISS employees have the authority to enter areas such as the hold areas in front of the gateways. The security of the Jetport also does not hinder ISS from recycling or trash collection.

D. Operation and Maintenance (O&M) Requirements

1. Waste Handling and the Parties Responsible for Each Area and Waste Stream

For information on waste handling and the parties responsible for each area and waste stream, refer to the waste inventory inspection completed by FST in Subsection A of this document.

2. Recycling and Municipal Solid Waste to Landfills

The generators of MSW to landfills include all passenger waste, City of Portland employees that contribute to operations within the terminal and airfield, HOST/Paradies tenants, airlines, Standard Parking, Northeast Air, TSA, FAA, Maine Aviation, Avis/Budget, Alamo/National/Enterprise, Hertz, FedEx, FSS, Inland Technologies, and ISS Facility Services. The majority of the MSW is the waste collected from the bins located throughout the public areas of the Jetport, including the bathrooms. The MSW to landfills also currently includes organic materials. The organic materials are composed of food waste generated by the operations at the restaurants and consist of excess food that passengers in the terminal and on aircraft do not consume. The City of Portland employees also generate both organic material waste and MSW from office operations. The collection of MSW is completed by ISS, a janitorial services company that is under contract with the Jetport. The MSW is collected in roll-away containers and is brought to the “trash” compactor located within a fenced area. As discussed in *Description and Inventory of Infrastructure in Place that Supports Airport Recycling* in Subsection A, the MSW from the trash compactor is brought to ecomaine and incinerated as part of a waste-to-energy process. The ash is transported to the ecomaine landfill/ashfill on 240 contiguous acres located within Westbrook, Scarborough, and South Portland. MSW generated by the Jetport is tracked by both WM and ecomaine. WM provides the Jetport with invoices each month that include the tonnage of the waste collected. ecomaine also has on-site scales and tracks the tonnage of MSW brought to the plant by WM haulers.

WM is responsible for the maintenance of the trash and recycling compactors. Shawn Graney of Waste Management of Maine is responsible for the contract between the City of Portland and WM. WM is responsible for the collection, reporting, and tracking of all tonnage and pick-up information for the compactors. The information is collected and presented on the invoice for each month. Other tenants at PWM, including Inland Technologies, have separate contracts with WM and the tracking and operations are generally the same.

Other tenants at PWM have contracts with other waste management companies. For example, Maine Aviation Corporation has a contract with both Pine Tree Waste and Triano. The specific information of the contracts was not available for review.

3. Recyclables

The generators of recyclables are the same as the generators of MSW to landfills. As discussed in *Description and Inventory of Infrastructure in Place that Supports Airport Recycling* in Subsection A, the recyclables are brought to ecomaine and baled by type at the plant, and the various bales are then sold at current market value. The majority of the trash and recycle bins located throughout the Airport Terminal Building are provided by ecomaine, but are maintained by the City of Portland. There are also several smaller and larger typical trash bins located throughout the terminal and offices that are owned by the City of Portland. The roll-away containers used to transport the waste from the various collection bins to the compactors are owned and maintained by ISS. The compactors and used oil containers are owned and provided by WM and Maine Standard Biofuels, respectively; the City of Portland leases all the containers. The WM compactors and Maine Standard Biofuels used oil containers are maintained by the owners of the compactors/container. The contracts with the City of Portland are managed by various City of Portland employees including Rick Marston, who is part of the Jetport's accounting department.

4. Construction & Demolition Debris

The collection of construction and demolition debris (C&D) debris varies from project to project. Recently, PWM specifications for small construction contracts have required recycling of construction and demolition materials. The contractor selected for a project generally is responsible for disposal of the waste generated by the project. A major exception to this occurred with the Terminal Expansion Project. In 2012, PWM was successful in obtaining a Gold Rating with 39 points for LEED for New Construction of the Terminal Expansion Project. The project diverted 3,315.63 tons (89.6 percent) of construction waste from landfills, while building materials had 39.4 percent recycled content. Clay soils excavated from the terminal building area were used to fill the Runway 29 safety area extension in 2010. As another example of recycling and reuse, when the Runway 18-36 Earthwork Preload project was constructed in 2010 – 2011, 112,500 cubic yards of blasted rock was excavated and used as rock-fill and preload material to complete the project.

Metal from small renovation projects is delivered to an area by the maintenance building off Yellowbird Road and hauled off to be recycled once the stockpile has reached a weight where it is economical to transport. The steel is transported by City of Portland vehicles to Schnitzer Steel Industries, a metals recycling facility, located at 568 Riverside Street in Portland, Maine.

E. Review of Waste Management Contracts

1. Waste Management (WM) and City of Portland Contract

The contract between the City of Portland and Waste Management of Maine, Inc. (WM) was executed on October 21, 2003. The contract states that WM will collect and recycle all (A) white, computer, and office paper, magazines, newspapers, telephone books, junk mail, and all other paper, and (B) old corrugated cardboard (OCC), and that WM will collect all (C) general waste. The contract specifically states that the collection and recycling of aluminum cans and plastic bottles and any other recyclables is not included. According to the Jetport, this contract is the most current contract. This contract was likely executed before the involvement of ecomaine; as such, it is due to be updated. WM collects single-sort recycling in one compactor, which includes newspaper and cardboard, glass and metal, and plastic with numbers 1 through 7. OCC is also collected in an additional compactor and hauled off by WM. The pricing and location of compactors listed in the contract is not up to date. The procedures for pickup and hauling from the Jetport are typical of the standard with other commercial facilities throughout the area.

The Jetport's current waste management contract, which is based on payments for weights of waste disposed, could be changed to a Resource Management Contract, which is based on performance in achieving waste reduction goals. This type of contract provides a monetary incentive to manage resources more efficiently. There is also a possibility of adding in language into the contracts between PWM and its vendors/tenants stating the need to collect information on recycling rates in order to meet a certain goal of recycling rates for the Jetport as a whole. In order to implement this type of contract, it is important to understand the relationship between the City of Portland and the waste management company, as well as the relationship between the City of Portland and its tenants/vendors. In order to facilitate collecting and reporting recycling data, Supplemental Information, Part VI contains an example of a generic spreadsheet to distribute to tenants and vendors for FY 2015 to assist in collecting recycling rate information.

2. Waste Management (WM) and ecomaine Contract

Waste Management and ecomaine have a three-year contract dated February 1, 2011, and which expired on February 1, 2014; however, it is the most recent contract on file according to ecomaine. The contract is not specific to the Jetport, but covers the services offered to the Jetport. The contract states that WM agrees to deliver a minimum of 1,100 tons of Single Stream Recyclable Materials (SSRM) and that ecomaine shall be exclusively entitled to any benefits derived from Single Stream Recyclable Materials. It also states that upon acceptance of SSRM by ecomaine, all responsibility belongs to ecomaine provided that no hazardous waste is inadvertently accepted by ecomaine.

The contract payment between WM and ecomaine is based upon "Blended Average Revenue" and is calculated and issued by ecomaine within thirty days of the end of each month. Ecomaine shall pay WM, or WM shall pay ecomaine per ton of SSRM based on revenue received by ecomaine.

3. ISS Contract

The custodial services contract is awarded through a Request for Proposals (RFP) system. The City of Portland's RFP for Custodial Services at the Portland International Jetport dated November 16, 2010 was reviewed. The RFP specified that Green Seal or EcoLogo certified products were to be used when possible. The ISS Facility Services Proposal was also reviewed. According to the proposal, ISS lists experience in large public facilities with LEED Certification as part of their qualifications. ISS also highlights low environmental impact cleaning policy as part of their contract, including the use of sustainable cleaning systems, and the use of sustainable cleaning products. LEED Certification requires a waste reduction and recycling program that addresses separation, collection and storage of materials for recycling, including (at a minimum) paper, glass, plastics, cardboard/OCC, metals, batteries and fluorescent lamps and diversion from landfill disposal. ISS Facility Services states in their proposal that they will assist with this requirement. As required by the City of Portland RFP, ISS uses Green Seal certified products. The Green Seal standard for tissue paper contains characteristics such as recycled content, post-consumer waste recycled content, post-industrial and pre-consumer waste recycled content; generated packaging waste and controlled-use dispensing efficiency data are also considered. ISS facilitated the purchasing of toilet tissue dispensers that promote the use of all tissue so that remainders of stub rolls are not discarded and hand towel dispensers that regulate the amount dispensed with each pull. Plastic bags with the highest level of recycled content possible and that meet the requirement of EPA's Comprehensive Procurement Guidelines and GS-42 are utilized.

The contract for Maine Standard Biofuels is executed by HOST, a tenant of the Jetport, and the contract was not available for FST's review.

4. Tenant Leases

The Airline Signatory Lease dated May 19, 2010 was provided to FST for review. According to Section 6.07 "Trash Collection" of the lease, the city shall provide appropriate and adequate waste removal and recycling. Forty percent of the monthly cost for trash and recycling shall be paid for by the city and other tenants, and sixty percent of the monthly cost will be prorated among the Signatory Airlines based on their percentage of total passenger boardings each month.

5. Construction and Demolition Waste Management

Two of the Construction Specifications for projects completed at the Jetport were reviewed. The Terminal Building Project "Construction Waste Management and Disposal" construction specification discusses salvaging non-hazardous demolition and construction waste, recycling nonhazardous demolition and construction waste, and disposing of nonhazardous demolition and construction waste. This specification is a model for future construction projects at the Jetport involving demolition. The "Selective Demolition" specification for the Communications Center Renovations discusses the demolition and removal of selected portions of a building. This specification discusses the reuse, salvage, and re-installment of materials when practical.

The Construction Waste Management and Disposal Specification from the Terminal Building Project and a Selective Structure Demolition Specification for the Communications Center Renovations are included in Supplemental Information, Part VI.

F. Potential for Cost Savings or Revenue Generation

For FY 2014, the total cost of hauling and disposal of recyclable materials and general trash was approximately $67,500. According to the city's lease with US Airways, the city with its own forces shall provide appropriate and adequate waste removal and recycling, the cost of which shall be reimbursed to the city calculated as 40 percent of the monthly cost borne by the city and other tenants; the remaining 60 percent of the monthly cost will be prorated among signatory airlines based on their percentage of total passenger enplanements for the month. Based on the 40 percent covered by the city, the city's cost for waste management in FY 2014 was approximately $27,000.

1. Comparison of Recycling vs. Landfilling

Based on the rate of recycling for the past two years, there was a cost incentive to recycle in 2013 but not in 2014. In Fiscal Year 2013, the cost of recycling (including cardboard and single sort recycling) was $121.47 per ton and $148.85 per ton for the haul out of general trash. In FY 2014, it cost $174.13 per ton to recycle and $158.52 per ton for the haul out of general trash. Although the cost of recycling was greater than general trash in FY 2014, a higher recycling rate would result in a lower recycling cost in comparison to hauling out general trash. This is due to the flat rate cost vs. disposal per ton. For example, the cost of emptying the recycling compactors costs the same each month regardless of the tonnage, with the exception of the small environmental fee, which is based upon tonnage. However, for general trash, there is a disposal per ton fee along with an environmental fee also based on tonnage. The dollar per ton fee for hauling out general waste is approximately $100.75/ton. The recycling compactors are currently not full when emptied each month. Assuming recyclable materials are currently co-mingled with trash in some instances, if more of MSW was recycled, the cost to recycle per ton would decrease while at the same time the tonnage of waste will decrease and cost less due to the decrease in tonnage. More recycling efforts, along with a performance based waste management contract, are expected to be more cost-effective than the current system.

2. Composting Organic Materials

Organic waste, and specifically food waste, constitutes approximately 25% of the MSW waste stream at airports[1]. The Jetport has the potential and resources to compost organics. PWM can reduce waste generated by composting all food, landscaping, and other organic material. Composting is economically feasible because of the low cost of collection, and the savings from weight reductions of landfilled waste. Currently the Jetport's food waste is disposed of with general trash and ultimately is incinerated by ecomaine. Food concessionaires at the Jetport include a Burger King, Starbucks, Shipyard Brewpub restaurant, The Great American Bagel Bakery, and Linda Bean's Lobster Café. All locations have the potential to collect food scraps for composting. The composting effort would need to have the dedication

[1] Based on waste audits conducted at other airports, such as Portland International Airport, Dane County Regional Airport, and San Francisco International Airport.

of both management and other staff. Management staff of the establishments would need to make sure the composting containers were readily available and that the pick-up process was efficient and timely. Staff would need to be dedicated to separating out biodegradable waste during food preparation and collection of biodegradable waste from customers at each establishment. If the Jetport were to implement a compost program, it would need to quantify the quantity of composted materials by weight in order to have the ability to track performance and plan for future improvements.

One program available in the Portland area is Garbage to Garden, which picks up all material suitable for composting on a weekly basis, and can return finished compost for landscape use. Garbage to Gardens charges a low commercial cost to dispose of waste that contributes a significant amount to the total weight of the general waste. According to Garbage to Gardens, Shipyard facilities outside of the Jetport are already utilizing the program.

3. Current Waste Management Contract

The current waste management contract was competitively bid through the city's RFQ process. As discussed in Subsection E "Review of Waste Management Contract," there could be an opportunity to enter into a contract structured differently to create cost savings when achieving waste reduction goals. Based on the contract between WM and ecomaine, WM receives additional payment per ton of SSRM based upon the income ecomaine receives. It would be beneficial to WM and ecomaine if the Jetport's recycling rate was increased. A Resource Management Contract between WM, ecomaine, and the City of Portland that is based on performance in achieving waste reduction goals would be beneficial to WM and the City of Portland. This type of contract provides a monetary incentive to manage resources more efficiently. It would also provide more cost savings if the recycling compactors were emptied on an as-needed basis rather than once a month.

G. Plan to Minimize Solid Waste Generation

1. Airport's Current Recycling Program

Generally, the Jetport's current recycling program consists of the recycling of OCC, all paper products including newspapers, glass and metal, and plastic with numbers 1 through 7. The tenants also all recycle returnable bottles and cans, but the tonnage information is not included in the baseline data because it is not available. The current recycling program at the Jetport is reducing the solid waste ultimately disposed of in landfills by recycling. However, the adjustments listed below and in "Potential Opportunities to Enhance Management and Recycling Performance" could further reduce the amount of MSW ultimately landfilled including: (1) changing from a Waste Management Contract to a Resource Management Contract between WM and the City of Portland; (2) obtaining recycling collection data from tenants and vendors; (3) establishing recycling goals; (4) recognition/reward for achieving recycling goals; and (5) additional education/signage for the recycling bins in public areas.

2. Potential Opportunities to Enhance Management and Recycling Performance

As mentioned earlier, the State of Maine has a goal of recycling 50 percent of the solid waste generated, and has identified materials reduction as the number one priority to reduce waste disposal in landfills. While a 50%recycling rate may not be feasible for PWM, the current recycling rate of approximately 11 percent indicates the opportunity exists to enhance recycling performance. A recycling rate of 20 percent would be a reasonable goal for PWM, particularly if composting is implemented and improved recycling education is provided.

The following present some initial potential opportunities for enhancing the Jetport's waste management and recycling systems.

- Include recycling requirements (similar to those of the Terminal Expansion Project) in contracts for construction projects above a certain size. Each construction project could be assessed individually for specific areas of recycling opportunity and funding impacts.
- Coordinate with airlines to encourage Aircraft Flight Crew to separate trash and recycling. Returnable bottles and cans are currently separated; however, cups, plastics, cardboard, newspapers, and other recyclable materials could also be collected separately or separated from trash.
- Increase number of recycling bins available in the terminal so that each trash bin has an adjacent recycling bin. This will require the addition of recycling bins throughout the Airport Terminal Building as well as outside public areas, including the entrances and exits and parking garage and the rental car garage.
- Signage could be improved for the recycling bins throughout the Jetport Terminal Building. Currently, the signs for some of the recycle bins are located on the sides of the containers. Signage above waste containers at eye level would be more easily viewed.
- Educate janitorial staff about proper recycling procedures.
- Providing language in tenant lease agreements to require recycling, document recycling percentages and encourage materials reduction and reuse. As mentioned on pages 32 to 33 of the "Airline Signatory Operating Agreement and Lease at the Portland International Jetport," airlines are required to pay 60 percent of the cost for waste removal and recycling. The remaining 40 percent of waste removal costs are covered by the City of Portland and airport tenants. Waste reduction is an incentive to achieve cost savings for the tenants, airlines, and the City of Portland. Future modifications to agreements to incentivize recycling efforts may help to improve recycling rates.
- Change current Waste Management Contract between WM and the City of Portland to a Resource Management Contract that is based on performance in achieving waste reduction goals.
- Consider composting through Garbage to Gardens, a local Portland composting company, to reduce cost and reduce the amount of waste brought to landfills.
- Conduct regular waste audits to monitor recycling performance and identify opportunities to improve recycling management systems at the Jetport.

3. Reduction of Waste Disposed in Landfills

Based on the MaineDEP hierarchy for the management of solid waste, land disposal of waste is listed as the last item on the hierarchy in terms of priority. All of the items listed above land disposal of waste are important to implement in order to reduce the amount of waste sent to a landfill. Reduction of waste at the source, reuse of waste, recycling of waste, composting of biodegradable waste, and waste processing that reduces the volume of waste needing land disposal including incineration are all listed above land disposal of waste. Currently, the Jetport implements all of the items with the exception of composting of biodegradable waste. The Jetport reduces waste at the source through hiring companies that support sustainability such as ISS. ISS includes language in their RFP for custodial services about utilizing paper products in bathrooms that reduce the amount of waste. Examples of reuse at the Jetport is the restaurants that use washable and reusable plates and utensils rather than paper, and the construction of the Runway 29 Safety area extension which reused clay soils excavated at the terminal building area. Another example of reuse during construction at the Jetport was during the Runway 18-36 Earthwork Preload project; 112,500 cubic yards of blasted rock was excavated and used as rock-fill and preload material to complete the project. The recycling of waste at the Jetport is implemented by the ecomaine single-sort recycling containers and OCC collection. Lastly, the waste that is not recycled or reused at the Jetport that is collected by WM is involved in a process that reduces the volume of waste needing land disposal. This is completed through incineration by ecomaine. All of these programs and processes ultimately reduce the waste disposed of in landfills.

The Jetport is committed to waste reduction, recycling, and purchase of environmentally preferable materials: PWM requires ISS to support environmentally friendly products, creating construction specifications to require reuse and recycling of demolition materials, and meeting the Gold Rating with 39 points for LEED for the New Construction of the Terminal Expansion Project.

H. Recycling of Spent Aircraft Deicing Fluid

The spent aircraft deicing fluid recycling program at the Portland International Jetport has the opportunity for annual cost reduction, has reduced environmental impacts to the Fore River, and is on the forefront of sustainable solutions to collecting and processing of spent aircraft deicing fluids at airports.

The aircraft deicing fluid recycling facility operated by Inland Technologies at the Jetport has been awarded the Pretreatment Excellence Award given by the Maine Water Environment Association (MeWEA). This award recognizes industrial facilities (indirect chargers) that have made exemplary efforts toward meeting the requirements of a State/National Pretreatment Program permit or State or local authority control mechanism. This award also considers the extra effort and originality in system design and/or operations, as well as the efforts made by individuals or the organization to meet internal environmental stewardship and sustainability goals.

1. Regulatory Overview

In October 2007, the MaineDEP requested a plan from the City of Portland to remove as much spent aircraft deicing fluid (propylene glycol) as practicable from the Jetport's stormwater discharge. At the same time, the EPA was developing effluent limit guidelines related to aircraft deicing operations. With future EPA effluent limit guidelines unknown, the City of Portland hired FST to prepare a Deicing Study to review options for removal of propylene glycol from the Jetport's stormwater discharge.

Several options were considered, including disposal at Portland or South Portland's Publicly Owned Treatment Works (POTW), trucking to SAPPI's Waste Water Treatment Facility (WWTF), or to Clean Harbors treatment facility; treating with an on-site lagoon or aerated gravel beds; treating on-site with an anaerobic system; treating with engineered wetlands; and recycling. After extensive review of solutions utilized at other airports, review of current FAA guidance, and several meetings with the city and MaineDEP staff, recycling with distillate discharge to the City of Portland's POTW was ultimately chosen as the solution for the Jetport. MaineDEP requested that the recycling facility be operational by November 1, 2010. A portion of an article published in Airport Improvement Magazine (September 2011) related to the MaineDEP/EPA environmental regulations spotlighting the Denver International & Portland International Jetport titled "Denver Int'l & Portland Jetport Stand Ready for New Glycol Regs" is included in Supplemental Information, Part VI.

2. Facility Construction and Operation

An aircraft deicing collection pad was designed and constructed in 2009 as part of an ARRA project for which construction was funded 100 percent by the FAA. The deicing fluid recycling building, associated 500,000-gallon underground storage tank, automatic valve control structure, additional snow storage shoulder, and expanded aircraft apron were built by Sargent Corporation in 2010, for which they received a Maine Build Award from the Associated General Contractors of Maine.

In preparation for operation of the facility beginning in November 2010, the City of Portland established an aircraft deicing fluid recycling management contract with Inland Technologies for collecting spent aircraft deicing fluid and removing propylene glycol from airport stormwater. Inland is required to ensure that un-permitted levels of glycol do not enter the sanitary sewer via the Jetport wastewater flow, or otherwise remain on-site at the Jetport. The system Inland uses is summarized in Supplemental Information, Part VI. Regardless of the process used, there can be no discharge of stored fluid into the Jetport wastewater flow to the sanitary sewer having glycol levels that exceed a daily BOD loading of 170 pounds. A copy of the current Industrial Discharge Permit for the facility is included in Supplemental Information, Part VI.

3. Propylene Glycol Capture / Recycling Rate

The facility has now been operational for four years. The overall percentage of propylene glycol collected varies by year due to dilution rates associated with various storm events, glycol being windblown beyond the limits of the aircraft deicing collection pad, and the fact that Type IV deicing fluid tends to stay attached to the aircraft and shears off during takeoff and flight. According to Inland Technologies, the company that performs aircraft fluid recycling services for the city, the mix of stormwater and propylene glycol captured typically contains 6 percent glycol by volume, which results in the following approximate capture rate based upon reported volumes sprayed and collected.

TABLE E-3
Approximate % of Aircraft Deicing Fluid Captured (Recycled) Vs. Used
Portland International Jetport

Year	Gallons Used (Sprayed on Aircraft)	Gallons of Mixed Collected	Approx. % of Glycol by Volume	Gallons Recaptured and Recycled	% Collected
2010-2011	62,110	455,138	6	27,308	44%
2011-2012	31,465	339,482	6	20,369	65%
2012-2013	49,757	555,822	6	33,349	67%
2013-2014	62,118	777,756	6	46,665	75%
Total	**205,450**	**2,128,198**	**6**	**127,692**	**62%**

The following statement was obtained from an April 2012 EPA Fact Sheet titled “Effluent Guidelines for Airport Deicing Discharges”:

> *“New airports with 10,000 annual departures located in cold climate zones are required to collect 60 percent of aircraft deicing fluid after deicing. Airports that discharge the collected aircraft deicing fluid directly to waters of the U.S. must also meet numeric discharge requirements for chemical oxygen demand. The rule does not establish requirements for aircraft deicing discharges at existing airports. Such requirements will continue to be established in general permits, or for individual permits on a site-specific, best professional judgment basis.”*

The EPA “Effluent Guidelines for Airport Deicing Discharges” factsheet is included in Supplemental Information, Part VI.

Although PWM is not a new airport, **Table E-3** above indicates that PWM has achieved an average 62 percent propylene glycol removal rate over the past four years, which exceeds the removal rate for a new airport and meets the intent of “site-specific, best professional judgment basis” for existing airports. **Table E-3** also shows that the propylene glycol removal rate has been consistently increasing over the past four years.

4. Fiscal Summary

The City has itemized their costs associated with the deicing fluid recycling facility over the past few years, and based upon this information has established their fiscal year cost per gallon for deicing fluid sprayed as $15.39. This is a high cost to airlines for the Jetport to remain cost competitive with other airports, and efforts to reduce this amount by bringing in off-site propylene glycol for distillation commenced in 2011.

Deicing collection and recycling costs include mobilization of the recycling contractor (covered during initial years of operation), collection and recycling of the deicing fluid, yearly fluid tank cleaning, yearly frac tank cleaning and sludge removal. City operating costs include City labor, facility maintenance and repairs, water and sewer fees, and electricity. The recycling building construction was funded by the city; therefore, the building costs have been amortized over 20 years at 6 percent for inclusion with the overall facility costs. The resulting yearly costs for collection, recycling, and the building based upon historic data is $774,020, and the average annual amount of aircraft deicing fluid sprayed based upon the previous five years is 50,281 gallons. Without credits for the processing of off-site fluids, the yearly cost would be approximately $192,500 greater. An opportunity to increase the volume of off-site fluid processed at the Jetport and further increase credits exists, and is being collaboratively pursued by the city and recycling contractor.

A significant cost for operation of the deicing facility in 2014 was electricity at $139,412. The kW hours used and options for decreasing energy consumption are discussed in the Energy Assessment of this Sustainable Airport Master Plan. The City currently pays for the electricity used at the facility, and future contracts should provide a metric for back-charging or reducing the recycling contractor's payment based upon electricity or other energy sources used. This would provide an incentive for using of the most energy efficient equipment and process available.

The ability to obtain certification to reuse the recycled propylene glycol as aircraft deicing fluid at the Jetport, market demand for recycled propylene glycol for other uses, and ability to collaborate on facility modifications with the recycling contractor may affect future deicing fluid recycling costs. Longer-term contracts with the recycling contractor may reduce annual costs for any needed equipment and facility modifications to convert energy sources, expand capacity, and provide a potential building expansion.

The spent aircraft deicing fluid recycling program at the Jetport has the opportunity for annual cost reduction, and recycled aircraft deicing fluid has the potential to be reused on aircraft at PWM in the future.

Portland International Jetport

APPENDIX F

ENHANCING THE CIP THROUGH SUSTAINABILITY

SUSTAINABLE AIRPORT MASTER PLAN

Appendix F: Enhancing the Jetport's Capital Improvement Program through Sustainability

This appendix presents details on suggested sustainability enhancements for the Recommended Master Plan Concept, as **Table 7A** of the Portland International Jetport (PWM or the Jetport) Sustainable Airport Master Plan (SAMP) identifies. It organizes the discussion by project type, and includes case studies and other guidance documents, as available. Table F-1 of this appendix reproduces **Table 7A** of the PWM SAMP below.

Table F-1: Suggested Sustainability Enhancements and Example Recommended Master Plan Concept Applications

Suggested Sustainability Enhancements	Example Applications for the Recommended Master Plan Concept
Install Pervious and Permeable Pavements	In the construction of a public surface parking lot, incorporate permeable pavements to minimize stormwater runoff and reduce associated operations and maintenance costs.
For utilities or flat work construction, apply the Envision® sustainable infrastructure rating system	The Envision® rating system would provide projects like the ramp extension with a framework for evaluating and rating its sustainability performance over the course of its life cycle.[1]
Incorporate resiliency measures into the maintenance and design of the Jetport's existing and future critical assets	Consider incorporating resiliency measures, tailored to the unique conditions of southern Maine, into the planning and design of any terminal building expansion. This would help protect the Jetport's significant investments in its critical assets as well as minimize future operational disruptions due to the potential impacts of climate change.
In accordance with applicable regulations, accommodate water reclamation and reuse systems	New buildings such as the expanded maintenance building could include water reclamation systems such as rainwater harvesting equipment. The Jetport could use the reclaimed water for irrigation purposes, which would reduce the Jetport's overall potable water consumption and related costs.
Use highly reflective roofing and pavement materials	On acquiring the Maine Aviation Maintenance Hangar, retrofit it with highly reflective roofing materials to mitigate the urban heat island effect. Dark, non-reflective surfaces can create microclimates by increasing temperatures within built areas relative to their surroundings.
Integrate green stormwater infrastructure such as bio-swales and rain gardens into existing and future facilities	For all projects that increase the area of impervious surfaces at the Jetport such as the construction of a by-pass taxiway, consider installing green stormwater infrastructure such as bio-swales, planters, and rain gardens on Jetport property to collect and/or treat stormwater onsite, thereby limiting run-off. The Jetport should ensure that the design of such infrastructure does not attract hazardous wildlife.
Incorporate recycled materials in all pavement installations	Minimize the use of virgin materials when expanding or reconfiguring airfield pavements such as the terminal aprons and the perimeter service road by using discarded asphalt or fly-ash concrete. This would have the added benefit of reducing greenhouse gas emissions associated with the extraction, manufacturing, and distribution of raw materials.
Design for Deconstruction	For new construction such as the development of the FIS customs facilities, consider designing for deconstruction. This would provide for flexibility in future interior fit-outs, minimize waste during renovations, and allowing for disassembly at the time the facility becomes obsolete.

[1] Institute for Sustainable Infrastructure. (2016). *Envision® Sustainable Infrastructure Rating System*. Retrieved January 11, 2016, from https://www.sustainableinfrastructure.org/rating/

Pervious/Permeable Pavements

The installation of pervious or permeable pavements would assist the Jetport in managing stormwater onsite, as they allow rain and snowmelt to infiltrate the water table that lies below. This would reduce the quantity of stormwater runoff and associated pollutants, the potential for erosion, and the need for stormwater drains. An additional benefit of permeable pavements, particularly in northern communities that experience cold climates, is the lessened requirement for deicing throughout the winter season. They are also more resistant to frost than standard pavements.[2] Typical airport applications of permeable pavements include runway shoulders, service roads, and parking lots.

Case Studies:

- **Stewart International Airport:** In 2010, Stewart International Airport installed nearly 6 acres of permeable pavement at an expanded onsite parking lot at a cost of $9 million.[3] This parking lot expansion additionally includes bio-swales, infiltration trenches, a large void sub-base, and rain tanks. The combined system achieved 100 percent infiltration of all stormwater, and did not require any connections to the existing storm drainage system.[4]
- **San Diego International Airport:** In 2012, San Diego International Airport installed a demonstration project at the Terminal 2 parking lot to test the ability of permeable pavement to reduce stormwater runoff volume at the site. The airport designed the permeable pavement installations to accommodate the volume of runoff from its respective drainage areas in association with the 85th percentile storm event.[5]

Resources:

- Permeable Pavement Design Guidance (California Department of Transportation), http://www.uni-groupusa.org/PDF/Caltrans%20DG-Pervious-Pvm_102913.pdf
- Permeable Pavements (Permeable Pavements Task Committee, American Society of Civil Engineers)
- Guidance for Usage of Pervious Pavement at Airport (Airport Cooperative Research Program [ACRP] 02-64), http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=3837 (*In Progress)*

Envision® Sustainable Infrastructure Rating System

The Envision® Sustainable Infrastructure Rating System provides a framework for evaluating and optimizing sustainability performance of non-building construction projects (i.e., roadways, bridges, pipelines, water treatment facilities, etc.). Envision takes a holistic approach to sustainability by evaluating infrastructure projects against five core areas including quality of life, natural world, leadership, resources allocation, and climate and risk. Even if the Jetport is not interested in pursuing full certification for a project, it can use the best practices and resources within the Envision® planning guide to develop projects that maximize sustainability performance. Using this rating system in conjunction with other building rating systems would ensure the integration of sustainability into all airport construction or capital improvement projects at the Jetport.

Case Studies:

- **San Diego International Airport:** The San Diego International Airport considered the Envision® rating system to examine its Green Build project, which consisted of several non-terminal infrastructure

[2] Water Environment Federation. (2012). *Porous Pavement Performance in Cold Climates*. Retrieved January 10, 2016, from http://stormwater.wef.org/2012/01/porous-pavement-performance-in-cold-climates/

[3] New York State Department of Environmental Conservation. (2016). *Stewart Airport Pervious Asphalt Pavement*. Retrieved January 10, 2016, from http://www.dec.ny.gov/lands/73105.html

[4] SAGA. (2015). *Install Permeable Pavement*. Retrieved December 28, 2015, from http://www.airportsustainability.org/practice/255

[5] San Diego County. (2014). *Demonstration Project Case Studies*. Retrieved January 10, 2016, from http://www.sandiegocounty.gov/content/dam/sdc/dpw/WATERSHED_PROTECTION_PROGRAM/susmppdf/lid_san_diego_airport.pdf

improvements such as dual-level roadway for curb front traffic congestion relief, curbside check-in enhancement, aircraft parking area expansion, and taxiway improvement.[6]

Resources:

- Envision® Sustainable Infrastructure Rating System (Institute for Sustainable Infrastructure), https://www.sustainableinfrastructure.org
- Prototype Airport Sustainability Rating System—Characteristics, Viability, and Implementation Options (ACRP Report 119), http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_119.pdf

Integration of Climate Adaptation Planning

Airports around the globe are grappling with the realities of a changing climate. Extreme weather events like Hurricanes Sandy and Katrina, Tropical Storm Irene, and winter storm Nemo created awareness around the ways climate change is influencing current and future weather patterns, and how these changes can impact transportation infrastructure. This is particularly relevant to airports, as they operate critical infrastructure that supports regional economies and act as important connections that link communities to one another, an important aspect when considering the role airports play in disaster response. As 70 percent of delays at airports are the result of extreme weather events, and such events are on the rise, airports should consider the potential impacts of climate change with respect to their own environmental conditions as they make investments in the ongoing maintenance of their critical assets and through their capital improvement programs.[7]

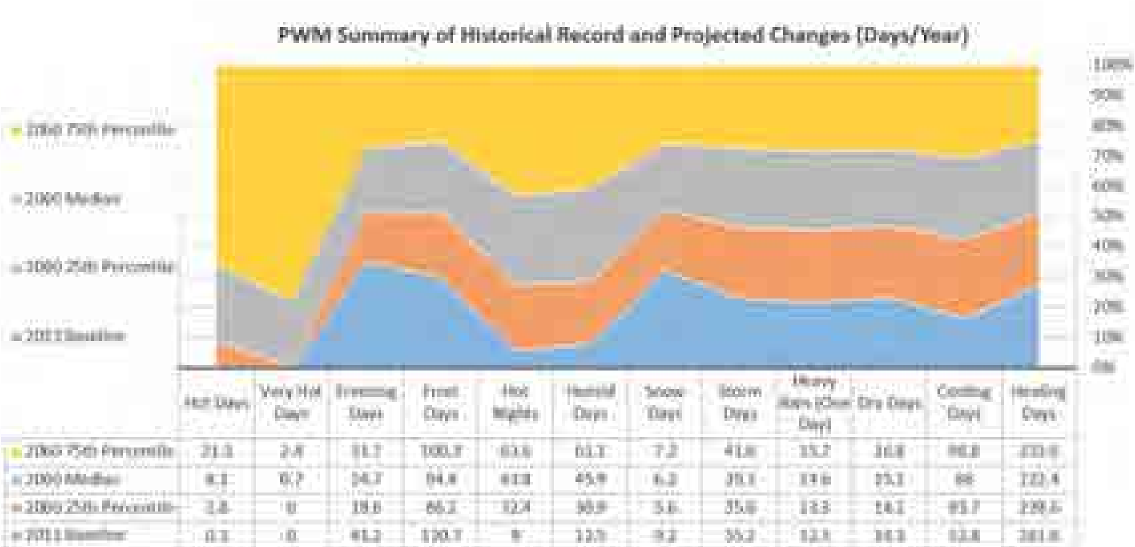
Although the Jetport is not directly at risk from sea level rise, as demonstrated by a mapping assessment conducted by the Maine Geological Survey, Department of Conservation,[8] leadership should still consider the broader impacts of climate change in its planning and development activities. The Transportation Research Board (TRB) developed the Airport Climate Risk Operational Screening (ARCOS) tool to estimate levels of risk for airport assets and impacts to operations. Based on the ARCOS report generated for PWM, Jetport planners and operators should expect a warmer and wetter climate through 2060, and should consider how these conditions could impact its critical assets. For example, how will increased storm and heavy rain days affect the Jetport's stormwater systems? Will warmer weather impact the performance of the Jetport's tarmac pavement, and how will it require changes to the Jetport's building systems, particularly its heating, ventilation, and air conditioning (HVAC) equipment? Table B-2 summarizes climate change data that the ARCOS tool provided based on the Jetport's location and 2014 climate indicators.

[6] SAGA. (2015). *Use the Envision™ rating system to assess the sustainability performance of airport infrastructure projects and development programs*. Retrieved January 12, 2016 from http://www.airportsustainability.org/practice/23

[7] ACRP. (2012). *ACRP Synthesis 33: Airport Climate Adaptation and Resilience*. Retrieved January 10, 2016, from http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_033.pdf

[8] Maine Department of Conservation. (2011). *Preparing Portland for the Potential Impacts of Sea Level Rise*. Retrieved January 10, 2016, from http://www.portlandmaine.gov/DocumentCenter/View/6323

Table B-2: Summary of Historical and Projected Climate Changes for PWM



Source: Airport Climate Risk Operational Screening (Version 4.0.5715.27958). (2014). Climate Change Data for PWM Jetport.

Case Studies:

- **Boston Logan International Airport:** At Boston Logan International Airport, the Massachusetts Port Authority (Massport) established a comprehensive resiliency program that anticipates and prepares for future climate events through strategic convening, research and planning, resilient design, education and training, and operational preparedness. As part of this program, Massport developed the Disaster and Infrastructure Resiliency Planning Study (DIRP), which assessed the risks associated with extreme weather events at Logan Airport and Massport's maritime facilities. It also created a Floodproofing Design Guide that provides planning and design considerations for improving the resiliency of Massport's critical facilities with respect to flooding events. More information on Massport's resiliency program is at https://www.massport.com/business-with-massport/resiliency/.

Resources:

- Airport Climate Adaptation and Resilience (ACRP Synthesis 33), http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_033.pdf
- Climate Change Adaptation Planning: Risk Assessment for Airports (ACRP Report 147), http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_147.pdf

Water Reclamation and Reuse Systems

The Jetport can incorporate water reclamation and reuse systems into buildings and/or operations to reduce overall water consumption and reliance on potable freshwater systems. Water treatment plants treat potable water to meet stringent drinking water quality standards, which makes it a valuable, but limited commodity. Non-potable water, such as reclaimed water or stormwater, is a more cost-effective option that the Jetport can use for general purposes. The Jetport can install rainwater harvesting equipment, stormwater filtration devices, or more advance wastewater treatment systems to process reclaimed water for uses such as landscape irrigation, air conditioning, construction activities, and aircraft or car washing services. Capitalizing on rainwater and modifying water practices at the Jetport is an economical and environmentally sound option for long-term sustainability planning.

Case Studies:

- **Chandler Municipal Airport:** In 2015, the Arizona Water Association named the Chandler Airport's Water Reclamation Facility expansion project as the Water Reuse Project of the Year. Completed in fall of 2014, it included new reservoir, aeration basins, clarifiers, and the expansion of filtration and flocculation facilities. This project increased the airport's capacity from 10 million gallons per day (MGD) to 15 MGD.[9]
- **Frankfurt Airport:** Since 2001, the Frankfurt Airport has maintained its potable water volume at the same level, despite increasing passenger numbers. This is due, in part, to airport-operated rainwater treatment plants that supply non-potable water, or service water, to Terminals 1 and 2. The airport maintains separate stormwater and sewage water treatment systems, which reduces the volume of water that it needs to treat at the facility.[10]

Resources:

- A Handbook for Addressing Water Resource Issues Affecting Airport Development Planning (ACRP Report 53), http://www.trb.org/main/blurbs/165998.aspx
- Sustainable Airport Environments: A Review of Water Conservation Practices in Airports (Resources, Conversation & Recycling), http://www.repositorio.ufop.br/bitstream/123456789/5568/1/ARTIGO_SustainableAirportEnvironments.pdf
- Water Conservation and Efficiency at Vancouver International Airport (University of British Columbia), https://open.library.ubc.ca/cIRcle/collections/undergraduateresearch/34125/items/1.0075688
- Rainwater Use in Airports: A Case Study in Brazil (Resources, Conversation & Recycling), http://www.dec.ufv.br/modules/mastop_publish/files/PublicacoesdoPrograma/LUCIA_Resources,%20Conservation%20and%20Recycling_2012_2.pdf

Reflective Roofing and Pavement Materials

Developed areas with large amounts of heat-retaining concrete and dark surfaces absorb a high percentage of solar radiation, which contributes to increased temperatures across surrounding areas, otherwise known as the *heat island effect*.[11] This not only increases the amount of energy used for cooling buildings, but it also impacts the surrounding vegetation, wildlife, and community at large. To mitigate the heat island effect, the Jetport can use roofing or pavement materials that are highly reflective and do not retain heat. Best practices indicate that pavement materials should have a solar reflectance index (SRI) of at least 29 or higher (standard black surface is "0" and a standard white surface is "100").[12] Accordingly, the Jetport can paint rooftop surfaces lighter colors to reflect solar radiation or install rooftop vegetation to help keep buildings cool and manage stormwater runoff. Reflective and vegetated roofs have been shown to reduce energy demand for building cooling by up to 50 percent.[13]

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[9] McCarthy Building Companies. (2015). *Chandler Airport Water Reclamation Facility Expansion Project 2015 Water Reuse Project of the Year by Arizona Water Association.* Retrieved January 12, 2016 from http://www.mccarthy.com/news/2015/05/20/chandler-airport-water-reclamation-facility/

[10] Frankfurt Airport Environmental Statement. (2014). *Environmental Statement 2014 Including the Environmental Program until 2017.* Retrieved January 12, 2016 from http://www.fraport.com/content/fraport/en/misc/binaer/sustainability1/stakeholder-dialog/environmental_statements/environmental-statement/jcr:content.file/environmental-statement-2014.pdf

[11] US EPA. (2016). *Heat Island Effect*. Retrieved January 13, 2016, from: http://www.epa.gov/heat-islands

[12] Institute for Sustainable Infrastructure. (2016). Envision® Sustainable Infrastructure Rating System Planning Guide Credit Climate and Risk 2.5. Retrieved January 13, 2016, from: https://www.sustainableinfrastructure.org

[13] Natural Resources Defense Council. (2012). *Looking Up: How Green Roofs and Cool Roofs Can Reduce Energy Use, Address Climate Change, and Protect Water Resources in Southern California*. Retrieved from https://www.nrdc.org/sites/default/files/GreenRoofsReport.pdf

Case studies:

- **Chicago O'Hare International Airport:** In 2009, O'Hare International Airport incorporated reflective concrete pavers and a 9,000 square foot green roof at the airport's North Air Traffic Control Tower as part of the a sustainable, whole-building approach.[14]
- **Denver International Airport:** A fabric roof encloses the Jeppesen Terminal at the Denver International Airport, which includes steel masts and cables that support a tensile membrane material covered by a lightweight fiberglass exterior that reflects 76 percent of solar radiation. This level of reflectivity and type of roofing material reduces heat retention, while providing sufficient daylighting in the terminal.[15]

Resources:

- Guidelines for Selecting Cool Roofs (United States Department of Energy), https://heatisland.lbl.gov/sites/all/files/coolroofguide_0.pdf
- Towards Sustainable Pavement Systems: A Reference Document (United States Department of Transportation, Federal Highway Administration [FHWA]), http://www.fhwa.dot.gov/pavement/sustainability/hif15002/hif15002.pdf
- Reducing Urban Heat Islands: Compendium of Strategies – Cool Pavements (United States Environmental Protection Agency [US EPA]), http://www.epa.gov/sites/production/files/2014-06/documents/coolpavescompendium.pdf

Green Stormwater Infrastructure

Impervious surfaces decrease the rate at which the ground can absorb and filter water. They also accelerate stormwater runoff, which can lead to soil erosion and is a major source of water pollution. The Jetport can complement its construction projects with green infrastructure design strategies to help manage stormwater, improve regional water quality, and save on energy costs by reducing the volume of water diverted to water treatment plants. Examples of such strategies include bioswales, green roofs, permeable pavements, planter boxes, rain gardens, and rainwater harvesting. In developing these strategies, the Jetport should avoid vegetation that attracts unwanted wildlife.

Case Studies:

- **Paris-Orly Airport:** In spring 2014, the Paris-Orly Airport established a 70,000 square foot filter marsh to supplement their stormwater treatment processes. This includes a two-step process. First, the airport pre-treats stormwater and water contaminated by de-icing pollutants in a buffer tank, and second, the airport transfers the water to the marsh for filtering. The marsh consists of filtering materials such as reeds in sand and aggregate. To monitor water quality at the marsh, the airport installed sensors.[16]
- **Chattanooga Airport:** Through collaborative efforts with the City of Chattanooga, the Chattanooga Airport engaged in a water quality demonstration project that converted impervious surfaces (two buildings and parking lots) into bio retention areas for stormwater management. The implementation of this project reduced local flooding issues, diverted stormwater away from wastewater treatment facilities, improved soil conditions, and restored ecological habitats.[17]

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[14] Aviation Pros. (2009). *A Model for Sustainability*. Retrieved January 12, 2016, from http://www.aviationpros.com/article/10372998/a-model-for-sustainability

[15] Roof Consultants Institute. (2006). *A Fabric Roof for Denver's New Airport Terminal.* Retrieved January 12, 2016, from http://www.rci-online.org/interface/2006-cts-barden.pdf

[16] Paris-Orly Airport. (2014). *Paris-Orly Airport begins using its "filter marsh" An innovative process for the treatment of stormwater run-off*. Retrieved on January 13, 2016, from: https://www.aeroportsdeparis.fr/docs/default-source/groupe-fichiers/presse/cp_avril-juin-2014/2014_04_08-presse-paris_orly_airport_begins_using_filter_marsh.pdf?

[17] Chattanooga Airport. (2016). *Water Quality Demonstration Project* Retrieved on January 13, 2016, from: http://www.chattairport.com/www/docs/155.2060/chattanooga-airport-water-quality-demonstration-.html

Resources:

- Green Infrastructure Directory (New England Environmental Finance Center), http://digitalcommons.usm.maine.edu/cgi/viewcontent.cgi?article=1005&context=sustainable_communities
- Green Infrastructure (US EPA), http://www.epa.gov/green-infrastructure

Recycled Pavements

Appropriate reuse of pavement can significantly reduce material costs and greenhouse gas emissions associated with the production and transport of virgin materials while diverting reusable materials from landfills. The Jetport can mill pavement materials from previous service roads, or other obsolete concrete or asphalt uses, to offset project costs for pavement expansions or installations for new runways, parking lots, parking garages, building structures, and access roads. Recycling solutions include incorporating reclaimed asphalt pavement (RAP) mixtures and/or recycled concrete aggregate (RCA) through efficient on-site processes such as warm-mix asphalt, cold-in-place recycling (CIR), or hot-in-place recycling (HIR). In addition, the subbase granular materials can be recycled as parts of a new subbase for planned pavement construction projects to further reduce material costs.

Case Studies:

- **Nashville International Airport:** Nashville International Airport saved millions of dollars on a pavement reconstruction project by reusing 35-year-old pavement. The airport's existing runway pavement was deteriorating due to an alkali-silica reaction, which causes the aggregate gel to expand within the concrete and cause pavement cracking. The airport was able to mill this existing pavement and transform it from rubble into usable aggregate. This eliminated the need for trucking materials, which reduced fuel costs and associated greenhouse gas emissions. BNA estimated that recycling the aggregate reduced project costs by approximately $2 million in aggregate costs alone.[18]
- **Boston Logan International Airport:** Massport used recycled asphalt pavement during a runway-resurfacing project at Boston Logan International Airport. It used an on-site, warm-mix asphalt process that incorporated 18 percent recycled materials. This helped the organization avoid transportation costs and emissions from the production and distribution of virgin materials, which led to an estimated reduction of 4,500 tons in carbon dioxide emissions (about 20 percent lower compared to the conventional hot-mix method) and saved approximately 450,000 gallons of diesel fuel.[19]
- **Waukesha County Airport:** The Waukesha County Airport in Wisconsin used fly ash concrete to rebuild an auxiliary runway and roadways. The airport purchased fly ash from a nearby coal fired power plant, which saved the airport an estimated 25 percent in material costs, while diverting fly ash from nearby landfills.[20]

Resources:

- What's Next in Airport Pavements? (Airport Consultants Council), https://www.acconline.org/documents/SpecialFeature.pdf
- Reclaimed Asphalt Pavement in Asphalt Mixtures: State of the Practice (FHWA), http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/11021/11021.pdf
- Asphalt Pavement Recycling with Reclaimed Asphalt Pavement (FHWA), http://www.fhwa.dot.gov/pavement/recycling/rap/index.cfm
- Fly Ash Facts for Highway Engineers (FHWA), http://www.fhwa.dot.gov/pavement/recycling/fach02.cfm

[18] Infrastructure Quarterly – Volume 2 Issue 3. (2010). *Reclaiming Water and Revenue.* Retrieved January 13, 2016, from https://garverusa.com/iq/201023/27/recycled-runway/
[19] Massport. (2013). *Boston Logan Airport Completes $100 Million in Runway Safety Projects*. Retrieved January 13, 2016, from http://www.massport.com/news-room/news/boston-logan-airport-completes-$100-million-in-runway-safety-projects/
[20] Aggregate Research Institute. (2006). *Recycling Coal for a Runway.* Retrieved January 13, 2016, from http://www.aggregateresearch.com/articles/9337/Recycling-coal-for-a-runway.aspx

- Pavement Life-Cycle Cost Analysis Software (FHWA), http://www.fhwa.dot.gov/infrastructure/asstmgmt/lccasoft.cfm

Designing for Deconstruction

Designing for Deconstruction (DfD) prioritizes the reuse or repurposing of materials and buildings prior to or in lieu of demolition. The DfD approach considers the life-cycle elements of structures and materials to enhance flexibility and increase the possibility of alternative future uses. The value of materials recovered and landfill tipping fees are key factors in developing standards for DfD. Deconstruction takes longer then demolishing a building, which should be a consideration in developing related construction contracts. At a minimum, the Jetport can advertise the demolition of a building so that contractors can have an opportunity to remove and reuse valuable materials.

Case Studies:

- **San Francisco International Airport:** The San Francisco International Airport established Sustainable Planning, Design, and Construction Guidelines to improve sustainability performance in project development. Part of the sustainability assessment protocol is to "document the impact of building deconstruction procedures for the alternative conceptual models." The airport provides a checklist of requirements to ensure that contractors are designing with highly durable materials, products, and equipment that can be deconstructed, repurposed, reused, or recycled.[21]
- **London Gatwick Airport:** The London Gatwick Airport developed a design scheme that includes initiatives to manage and mitigate waste during construction and operation. Included in this scheme is guidance on DfD and an associated checklist.[22]

Resources:

- Design for Deconstruction Manual (US EPA), http://www3.epa.gov/region9/greenbuilding/pdfs/DesignForDeconstrManual.pdf
- Design for Disassembly: A Guide to Closed-Loop Design and Building (King County, Washington), http://your.kingcounty.gov/solidwaste/greenbuilding/documents/Design_for_Disassembly-guide.pdf

[21] San Francisco International Airport. (2015). *Sustainable Planning, Design and Construction Guidelines - Delivering Healthy, High Performing, and Resilient Facilities – Version 4.* Retrieved on January 13, 2016, from: http://media.flysfo.com/media/sfo/community-environment/sfo-dc-sustainability-guidelines-sm.pdf
[22] London Gatwick Airport. *A Second Runway for Gatwick, Appendix A31 Waste*. Retrieved on January 18, 2016, from https://www.gatwickairport.com/globalassets/publicationfiles/business_and_community/all_public_publications/second_runway/airports_commission/gatwick_appendix_a31_waste.pdf

APPENDIX G
ENVIRONMENTAL OVERVIEW

Appendix G: Environmental Overview

Analysis of the potential environmental impacts of proposed airport development projects, as discussed in Chapter Six and depicted on Exhibit 6A, is an important component of the airport master plan process. The purpose of this appendix is to identify Federal Aviation Administration (FAA)-approved significance thresholds for the various resource categories contained in Order 1050.1F, *Environmental Impacts: Policies and Procedures*, and Order 5050.4B, *National Environmental Policy Act* (NEPA) *Implementation Instructions for Airport Actions.* The overview then evaluates the development program to determine whether future development identified in the airport master plan could individually or collectively affect the quality of the environment.

The construction of any improvements depicted on the recommended development concept plan would require compliance with NEPA to receive federal financial assistance. For projects not "categorically excluded" under FAA Order 1050.1F, compliance with NEPA is generally satisfied through the preparation of an Environmental Assessment (EA). In instances where significant environmental impacts are expected, an Environmental Impact Statement (EIS) may be required. While this portion of the planning process is not designed to satisfy the NEPA requirements for a categorical exclusion, EA, or EIS, it is intended to supply a preliminary review of environmental issues. This overview identifies which projects under the proposed development plan may require further analysis.

AIR QUALITY

Air quality in a given location is described by the concentrations of various pollutants in the atmosphere. The significance of a pollution concentration is determined by comparing it to the state and federal air quality standards. In 1971, the U.S. Environmental Protection Agency (EPA) established standards that specify the maximum permissible short-term and long-term concentrations of various air contaminants. The National Ambient Air Quality Standards (NAAQS) consist of primary and secondary standards for six criteria pollutants which include: Ozone (O_3), Carbon Monoxide (CO), Sulfur Dioxide (SO_2), Nitrogen Oxide (NO_x), Particulate matter (PM_{10} and $PM_{2.5}$), and Lead (Pb).

Based on both federal and state air quality standards, a specific geographic area can be classified as either an "attainment," "maintenance," or "non-attainment" area for each pollutant. The threshold for non-attainment designation varies by pollutant. Cumberland County, where the Portland International Jetport (Jetport or PWM) is located, is an attainment area for all criteria pollutants.

The proposed Jetport construction projects (parallel taxiway construction, apron expansion, hangar development, automobile parking area) could result in impacts to air quality. These air quality impacts would be temporary as they are related to construction activities. Exhaust emissions from the operation of construction vehicles and fugitive dust from ground disturbance and pavement removal are common air pollutants during construction. More permanent operational air quality impacts will result from the forecasted increase in operations at the Jetport. These potential impacts may need to be evaluated as part of any required environmental documentation for planned projects.

BIOLOGICAL RESOURCES

Biotic resources include the various types of plants and animals that are present in a particular area. The term also applies to rivers, lakes, wetlands, forests, and other habitat types that support plants, birds, and/or fish. Typically, development in areas such as previously disturbed airport property, populated places, or farmland would result in minimal impacts to biotic resources.

The U.S. Fish and Wildlife Service (USFWS) is charged with overseeing the requirements contained within Section 7 of the *Endangered Species Act*. This Act was put into place to protect animal or plant species whose populations are threatened by human activities. Along with the FAA, the USFWS reviews projects to determine if a significant impact to these protected species will result with implementation of a proposed project. Significant impacts occur when the proposed action could jeopardize the continued existence of a protected species or would result in the destruction or adverse modification of federally designated critical habitat in the area.

There are two species protected under the federal Endangered Species Act with potential habitat in the vicinity of the Jetport: the New England cottontail rabbit and the northern long-eared bat. Prior to previous projects at PWM, field surveys for the New England Cottontail rabbit indicated the presence of habitat to support this species, which includes on-airport wetland areas discussed below. During implementation of previous improvements at the Jetport, portions of the New England Cottontail rabbit habitat were removed; however, some habitat for this species may still be present. Additional field surveys may be required prior to implementing any project that involves land disturbance.

Based on a review of the USFWS Information for Planning and Conservation, 25 birds are protected under the Migratory Bird Treaty Act (MBTA). These species, including the season during which the species is protected, are listed in **Table G1**. It is important to note that any activity which results in the taking of migratory birds or eagles is prohibited unless authorized by the USFWS.

Table G1
Migratory Bird Treaty Act Species Known to Occur within the Vicinity of Portland International Jetport

Species	Protected Season
American Oystercatcher	Breeding
American Bittern	Breeding
Artic Tern	Breeding
Bald Eagle	Year-round
Bay-breasted Warbler	Breeding
Black-billed Cuckoo	Breeding
Blue-winged Warbler	Breeding
Canada Warbler	Breeding
Great Cormorant	Wintering
Hudsonian Godwit	Migrating
Least Bittern	Breeding
Least Tern	Breeding
Nelson's Sparrow	Breeding
Olive-sided Flycatcher	Breeding
Peregrine Falcon	Breeding
Pied-billed Grebe	Breeding
Purple Sandpiper	Wintering
Saltmarsh Sparrow	Breeding
Short-eared Owl	Wintering
Snowy Egret	Breeding
Upland Sandpiper	Breeding
Wood Thrush	Breeding

Prior to implementing the improvements outlined in this Master Plan, field surveys may be required to determine the presence of these species. However, based on previous coordination with USFWS, vegetation at the Jetport is not unique from a population standpoint for those species that occur in and adjacent to the project area. Bird species that breed regularly in and adjacent to the project area are likely to be common to the region because habitats in the area are widespread and largely disturbed.

Biological surveys conducted in 2008 as part of the Runway 18-36 extension project indicated the presence of the Upland sandpiper, which is classified as a threatened species under the Maine Endangered Species Act. The Jetport's ongoing vegetation maintenance program helps to sustain the habitat for this grassland shorebird. Based on coordination with the Maine Department of Inland Fisheries and Wildlife, Upland sandpipers require large (greater than 150 acres) fields with open short grass areas and prefer a mix of short and tall (less than 24-inch) grass interspersed with patches of bare ground; therefore, it is unlikely that the proposed improvements outlined in this Master Plan would affect this species.

Additionally, there are no wildlife refuges or areas of designated critical habitat within the anticipated project areas associated with the improvements outlined in this Master Plan.

COASTAL RESOURCES

As discussed in Chapter One, in accordance the *Coastal Zone Management Act of 1972*, states with coastal lands may prepare and submit a Coastal Zone Management Plan (CZM) plan for approval with the National Oceanic and Atmospheric Administration (NOAA). These plans/programs are intended to preserve, protect, and enhance designated coastal areas. In 1978, the State of Maine initiated a coastal management program in accordance with the *Coastal Zone Management Act of 1972*. Coastal management policies are found within Title 38 of Maine Revised States, *Water and Navigation*, Chapter 19 *Coastal Management Policies*. Maine Revised Statutes Title 18, *Waters and Navigation*, Chapter 3, *Protection and Improvement of Waters*, Subchapter 1, *Environmental Protection Board*, Section 435, *Shoreland Areas*, establishes that shoreland areas in the State of Maine be subject to zoning and land use controls. Section 438-A, *Municipal Authority; State Oversight*, of Title 18, *Waters and Navigation*, Chapter 3, *Protection and Improvement of Waters*, Subchapter 1, *Environmental Protection Board*, compels municipalities to adopt zoning and land use controls for shoreland protection. The City of Portland adopted Chapter 14, Land Use, Article, III Zoning, Division 26, Shoreland Regulations, and the City of South Portland enacted Chapter 27, Zoning, Article XII, Shoreland Area, pursuant to Section 438-A of the state statutes. Consistent with state law, these ordinances establish shoreland protection areas. The limits of the shoreland protection areas are shown on **Exhibit G1**. As indicated on the exhibit, portions of improvements, including the proposed Yellowbird Road realignment, hangar development and parking lot area on the east side of the Jetport, would occur within the City of Portland Shoreland Overlay District and the City of South Portland Shoreland Area. Prior to initiating these projects, coordination with the City of Portland Planning and Urban Development Department and the City of South Portland Planning and Development Department should be done to ensure that the proposed improvements would comply with the shoreland regulations.

CLIMATE

The International Panel on Climate Change (IPCC) estimates that aviation accounts for 4.1 percent of global transportation greenhouse gas (GHG) emissions. In the U.S., EPA data indicates that commercial aviation contributed 6.6 percent of total CO_2 emissions in 2013, compared with other sources, including the remainder of the transportation sector (20.7 percent), industry (28.2 percent), commercial (16.9 percent), residential (16.9 percent), agricultural (9.7 percent), and U.S. territories (0.05 percent) (U.S. EPA 2015). Scientific research is ongoing to better understand climate change, including any incremental atmospheric impacts that may be caused by aviation.

Although there are no Federal standards for aviation-related emissions, the Council on Environmental Quality (CEQ) has indicated that climate should be considered in NEPA analyses. Draft CEQ guidance also emphasizes that agency analyses should be commensurate with projected GHG emissions and climate


PWM
Portland International Jetport
LEGEND
Airport Property Line
City Limit Line
Airport Fence Line
Relocated Blast Wall
Runway Protection Zone (RPZ)
Runway High Energy Area
Ultimate Pavement
Pavement to be Removed
Ultimate Parking/Roadway
Ultimate Building
No Taxi Island
Shoreland Overlay District
Floodplain
Historic District
Wetland
Wetland Label
0
800
SCALE IN FEET
Stroudwater Historic District
Westbrook Street
Yellowbird Road
PORTLAND
SOUTH PORTLAND
Johnson Road
Jetport Boulevard
AC
B
H
D
N
300'
75'
60'
400'
Future Water Quality Filter
RUNWAY 11-29 (7,200' x 150') ULTIMATE (7,600' x 150')
RUNWAY 18-36 (6,100' x 150')
Perimeter Road
Glideslope Antenna Relocation Area
Westbrook St.
T
V
State Reform School Brick Hill Historic District
Exhibit G1

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impacts and should employ appropriate quantitative or qualitative analytical methods to ensure useful information is available to inform the public and the decision-making process in distinguishing between alternatives and mitigations. Quantitative analyses are typically performed in conjunction with air quality modeling prepared as part of an analysis of operational changes or construction projects at airports. As previously discussed, air quality modeling would likely be required as part of NEPA documentation for improvements such as the parallel taxiway projects, apron expansion, hangar development, and automobile parking area.

Due to the Jetport's proximity to the Atlantic Ocean, FAA guidance recommends that potential impacts associated with sea level rise be considered. Data is available from the NOAA, which projects land inundation at high tide based on a six-foot sea level rise. Based on a review of the data, the extent of the six-foot sea level rise, which is the maximum level available from NOAA, coincides with the 100-year floodplain located east of the Jetport. None of the proposed improvements would occur in the projected six-foot sea level rise area.

DEPARTMENT OF TRANSPORTATION ACT, SECTION 4(F)

Section 4(f) of the DOT Act, which was recodified and renumbered as Section 303(c) of 49 USC, provides that the Secretary of Transportation will not approve any program or project that requires the use of any publicly owned land from a historic site, public parks, recreation areas, or waterfowl and wildlife refuges of national, state, regional, or local importance unless there is no feasible and prudent alternative to the use of such land, and the project includes all possible planning to minimize harm resulting from the use.

The following list summarizes the nearest properties of each type that may be protected under Section 4(f) of the DOT Act:

- Wilderness Area – Sandwich Range Wilderness (53 miles northwest)
- Historic Sites Listed on the National Register – Stroudwater Historic District (adjacent north); Tate House (within Stroudwater District); Leonard Bond Chapman House (<1mile northwest); State Reform School Historic District (<1 mile south)
- Locally Owned Public Park – Multiple within two miles: Dougherty Field (northeast); South Portland Municipal Golf Course (south); Fore River Sanctuary (north); and Capisic Pond Park (north)
- Wildlife Refuge – Rachel Carson National Wildlife Refuge (12 miles southwest)

It is unlikely that any physical or constructive use of any properties protected under Section 4(f) would result through implementation of the projects outlined within this Master Plan.

FARMLANDS

Under the *Farmland Protection Policy Act* (FPPA), federal agencies are directed to identify and take into account the adverse effects of federal programs on the preservation of farmland, to consider appropriate alternative actions which could lessen adverse effects, and to assure that such federal programs are, to the extent practicable, compatible with state or local government programs and policies to protect farmland. Due to the Jetport's location within a U.S. Census Bureau designated urban area, projects outlined within this Master Plan would be exempt from FPPA requirements.

HAZARDOUS MATERIALS, SOLID WASTE, AND POLLUTION PREVENTION

Federal, state, and local laws regulate hazardous materials use, storage, transport, and disposal. These laws may extend to past and future landowners of properties containing these materials. In addition, disrupting sites containing hazardous materials or contaminates may cause significant impacts to soil, surface water, groundwater, air quality, and the organisms using these resources. According to the EPA's EJView website, seven hazardous waste generators regulated under the RCRA are located on Jetport property. These sites are required to report to state environmental agencies because they generate, transport, treat, store, or dispose of hazardous waste. None of these sites would be affected by proposed improvements described in this Master Plan. Additionally, the EJView website does not indicate the presence of any Superfund or Brownfield sites at or within two miles of PWM.

HISTORICAL, ARCHITECTURAL, ARCHEOLOGICAL, AND CULTURAL RESOURCES

Determination of a project's environmental impact to historic and cultural resources is made under guidance in the *National Historic Preservation Act* (NHPA) *of 1966*, as amended, the *Archaeological and Historic Preservation Act* (AHPA) *of 1974*, the *Archaeological Resources Protection Act* (ARPA), and the *Native American Graves Protection and Repatriation Act* (NAGPRA) *of 1990*. In addition, the *Antiquities Act of 1906*, the *Historic Sites Act of 1935*, and the *American Indian Religious Freedom Act of 1978* also protect historical, architectural, archaeological, and cultural resources. Impacts may occur when the proposed project causes an adverse effect on a property which has been identified (or is unearthed during construction) as having historical, architectural, archaeological, or cultural significance.

As previously discussed, the nearest historic sites listed on the National Register of Historic Places are the State Reform School/Brick Hill and Stroudwater Historic Districts (including the Tate House) located immediately south and north of the Jetport respectively. All of the proposed improvements outlined within this Master Plan would occur on Jetport property; therefore, no direct impacts would occur to properties protected under the NHPA. For improvements such as the southern apron hangar and taxiway projects, consultation with the State Historic Preservation Officer would be required to determine if any indirect impacts could occur as a result of the proposed improvements.

NATURAL RESOURCES AND ENERGY SUPPLY

In instances of proposed actions, such as the expansion of utilities, power companies or other suppliers of energy will need to be contacted to determine if the proposed project demands can be met by existing or planned utility/power production facilities.

Increased use of energy and natural resources are anticipated as the operations at the Jetport grow. Temporary increases in resource consumption can be anticipated during construction. None of the planned development projects are anticipated to result in significant increases in energy consumption.

NOISE AND COMPATIBLE LAND USE

As discussed in Chapter One, an airport's compatibility with surrounding land uses is usually associated with the extent of the airport's noise impacts. Airport projects such as those needed to accommodate fleet mix changes, an increase in operations at the airport, or air traffic changes are examples of activities which can alter noise exposure on surrounding land uses. The FAA established noise thresholds for the evaluation of potential impacts associated with proposed development projects at airports, which is defined as an increase in noise of 1.5 dB DNL or more, at or above the 65 DNL noise exposure level when compared to the no action alternative for the same timeframe. The noise analysis in the previous environmental assessment prepared in 2009 indicated there were no noise sensitive uses inside the 65 DNL contours. Forecast operations in this master plan are less for 2035 than were forecasts in the 2009 EA. Since there are no improvements planned that will result in changes to runways, significantly increase operational capacity, or changes in the runway design code, an airport noise analysis is will not likely be needed.

SOCIOECONOMICS, ENVIRONMENTAL JUSTICE, AND CHILDREN'S ENVIRONMENTAL HEALTH AND SAFETY RISKS

Socioeconomic impacts known to result from airport improvements are often associated with relocation activities or other community disruptions, including alterations to surface transportation patterns, division or disruption of existing communities, interferences with orderly planned development, or an appreciable change in employment related to the project.

Executive Order 12898, *Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations,* and the accompanying Presidential Memorandum, and Order DOT 5610.2, *Environmental Justice*, require FAA to provide for meaningful public involvement by minority and low-income populations as well as analysis that identifies and addresses potential impacts on these populations that may be disproportionately high and adverse.

The EPA's *EJview* online tool was consulted regarding the presence of environmental justice areas within the Jetport environs. According to the tool, the population below the poverty level within the Census tracts encompassing the Jetport ranges between 8.7 percent and 20.9 percent. Additionally, the population of the Census block groups which encompass the Jetport are between 4.2 percent and 35.4 percent minority. Based on these figures, it is unlikely that the proposed improvements would have disproportionately high and adverse human health or environmental effects on minority populations and low-income populations.

Pursuant to Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks,* federal agencies are directed to identify and assess environmental health and safety risks that may disproportionately affect children. These risks include those that are attributable to products or substances that a child is likely to come in contact with or ingest, such as air, food, drinking water, recreational waters, soil, or products to which they may be exposed.

During construction of the projects outlined within the Master Plan, appropriate measures should be taken to prevent access by unauthorized persons to construction project areas. Additionally, best management practices should be implemented to decrease environmental health risks to children.

VISUAL EFFECTS

Airport lighting is characterized as either airfield lighting (i.e., runway, taxiway, approach and landing lights) or landside lighting (i.e., security lights, building interior lighting, parking lights, and signage). Generally, airport lighting does not result in significant impacts unless a high intensity strobe light, such as a REIL, would produce glare on any adjoining site, particularly residential uses.

Visual impacts relate to the extent that the proposed development contrasts with the existing environment and whether a jurisdictional agency considers this contrast objectionable. The visual sight of aircraft, aircraft contrails, or aircraft lights at night, particularly at a distance that is not normally intrusive, should not be assumed to constitute an adverse impact.

As indicated on **Exhibit G1**, much of the land surrounding the Jetport is developed with commercial, residential, and industrial development. Lighting changes at the Jetport would occur with many of the proposed projects outlined in this Master Plan including the south, west, and east land side developments (apron, hangars, automobile access) and taxiway projects.

If the potential for lighting or visual impacts is determined to be associated with the planned development, consultation with local residents and the owners of light-sensitive sites may be needed to determine possible alternatives to minimize these effects without risking aviation safety or efficiency. Measures such as shielding guidance lighting so that they are only visible to pilots or using vegetative buffers could be used to reduce the effects of airport-related light emissions. Additional coordination with state, regional, or local art or architecture councils, tribes, or other organizations having an interest in Jetport-associated visual effects may be necessary.

WATER RESOURCES

Wetlands. The U.S. Army Corps of Engineers regulates the discharge of dredged and/or fill material into waters of the United States, including adjacent wetlands, under Section 404 of the *Clean Water Act*. Wetlands are defined in Executive Order 11990, *Protection of Wetlands*, as "those areas that are inundated by surface or groundwater with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetation or aquatic life that requires saturated or seasonably saturated soil conditions for growth and reproduction." Wetlands can include swamps, marshes, bogs, sloughs, potholes, wet meadows, river overflows, mud flats, natural ponds, estuarine areas, tidal overflows, and shallow lakes and ponds with emergent vegetation. Wetlands exhibit three characteristics:

the soil is inundated or saturated to the surface at some time during the growing season (hydrology), has a population of plants able to tolerate various degrees of flooding or frequent saturation (hydrophytes), and soils that are saturated enough to develop anaerobic conditions during the growing season (hydric).

As mentioned in Chapter One, freshwater and tidal wetlands at the Jetport, shown on **Exhibit G1**, were field-delineated based on the 1987 *U.S. Army Corps of Engineers Wetlands Delineation Manual* during four separate periods between 1991 and 2007. **Table G2** summarizes the wetland type and wetland functional value of the wetlands on Jetport property. This information was prepared prior to implementation of improvements, which were the subject of the *Final Environmental Assessment for Proposed Airfield and Terminal Area Improvements at Portland International Jetport*, November 2009. Based on wetland delineation described above, a total of 13.07 acres of wetlands were impacted by implementation of the Jetport's Wildlife Hazard Management Plan, Runway 18-36 extension, cargo facility improvements and terminal area improvements. These impacts occurred in wetlands, AC, AE, H, L, S, W, and V.

TABLE G2
Summary of Wetland Characteristics
Portland International Jetport

Wetland	Wetland Type [1]	Wetland Function/Value(s) [2]
A	E2EM1 (Fore River)	FFA, FSH, PE, SS, WLH, R, A
D	Mowed (airfield) PEM2	Surface water conveyance
E	Mowed (airfield) PEM2 (isolated)	Unknown?
F	Mowed (airfield) PEM2 (isolated)	ESH
H	Drainage ditch PEM1	Surface water conveyance
L	PEM1 (wildlife hazard) / PSS1	WLH, ESH (PSS portion)
N	PSS1	Surface water conveyance
S	Mowed PEM2	WLH
T (B)	PEM1	STPR, WLH
V (D)	PEM1	STPR, NRRT, WLH
W (E)	POWh	STPR, NRRT, WLH, A
X (F)	PEM1	STPR, NRRT, WLH, A
Y (G)	E2EM1 (Long Creek)	FFA, FSH, PE, SS, WLH, R, A
Z (H)	PSS1 (isolated)	WLH
AC	PEM1/PSS1	STPR, WLH
AE	PF01 (now isolated)	WLH

[1] Wetland types from USFWS *Classification of Wetlands and Deepwater Habitats* (Cowardin et al, 1979):
E2EM – Estuarine, inter-tidal, persistent emergent
POWh – Palustrine, open water, diked/impounded
PEM1 – Palustrine, persistent emergent
PEM2 – Palustrine, non-persistent (mown) emergent
PSS1 – Palustrine, broad-leaved deciduous scrub shrub
PFO1 – Palustrine, broad-leaved deciduous forested

[2] Based on the September 1999 supplement to the New England Division of the Corps Descriptive Approach to assessing wetland functions and values described in The Highway Methodology Workbook. Functions and values present in wetlands at PWM include: FFA – floodflow alteration; F/SH – fish/shellfish habitat; STPR – sediment, toxicant, pollutant retention; NRRT – nutrient removal/retention/transformation; PE – production export; SS – sediment/shoreline stabilization; WLH – wildlife habitat; R – recreation; A – Visual quality/aesthetics; ESH – threatened/endangered species habitat. Wetland functions and values are described in greater detail in Attachment 12 of the NRPA application.

Source: Natural Resources Protection Act Application, October 2008, Updated March 12, 2009

The proposed terminal apron expansion, southern ramp construction, and eastern parking lot will result in impacts to wetlands AC, B, H, D and T. Prior to implementing these projects, coordination with the U.S. Army Corps of Engineers may be required to determine if Section 404 *Clean Water Act* permits are required for placing fill in these wetland areas.

Floodplains. Executive Order 11988 directs federal agencies to take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values served by the floodplains. Based on a review of Federal Emergency Management Agency (FEMA) maps, the Jetport is covered by Community Panels Nos. 2300510012C, 2300510013B, 2300530004C and 2300530005C. Based on these map panels, much of the Jetport property is designated Zone C – Areas of Minimal Flooding. Additionally, portions of the Jetport property along the Fore River east of the runway system may be encompassed by the Zone AE, 100-year floodplain; however, none of the proposed improvements are located within a 100-year floodplain.

Surface Waters. The *Clean Water Act* provides the authority to establish water quality standards, control discharges, develop waste treatment management plans and practices, prevent or minimize the loss of wetlands, and regulate other issues concerning water quality. Water quality concerns related to airport development most often relate to the potential for surface runoff and soil erosion, as well as the storage and handling of fuel, petroleum products, solvents, etc. Additionally, Congress has mandated (under the *Clean Water Act*) the Maine Pollutant Discharge Elimination System. This program addresses non-agricultural storm water discharges.

Prior to implementing the proposed improvements, the Jetport will need a construction-related Maine Construction General Permit. This permit requires a Notice of Intent for all construction activities disturbing one acre or more of land. A Stormwater Pollution Prevention Plan (SWPPP) for the construction projects will be designed and implemented in the field prior to construction and inspected and maintained during construction in compliance with the construction general permit.

Groundwater. Groundwater is subsurface water that occupies the space between sand, clay, and rock formations. The term aquifer is used to describe the geologic layers that store or transmit groundwater, such as to wells, springs, and other water sources. Examples of direct impacts to groundwater could include withdrawal of groundwater for operational purposes, or reduction of infiltration or recharge area due to new impervious surfaces. The nearest sole source aquifer is the Mohegan Island aquifer, located approximately 50 miles east of the Jetport; therefore no impacts to aquifers would result from implementation of the improvements outlined in this Master Plan. Many of the proposed projects, such as taxiway construction, apron construction, and parking lots and roadways will increase impervious surfaces at the Jetport. The changes in impervious surfaces may need to be considered as part of future NEPA analyses.

Wild and Scenic Rivers. The nearest Wild or Scenic Rivers, as designated by the *Wild and Scenic Rivers Act*, is the Lamprey River located approximately 50 miles southwest of the Jetport in New Hampshire. None of the proposed improvements outlined in this Master Plan would affect the Lamprey River.

Portland International Jetport

APPENDIX H

ECONOMIC BENEFIT ANALYSIS



SUSTAINABLE AIRPORT MASTER PLAN

ECONOMIC BENEFIT ANALYSIS

This section presents an analysis of economic benefits created by Portland International Jetport (PWM). The Jetport is the primary aviation gateway for the State of Maine, welcoming commerce and visitors while providing residents with access for outward travel to national and intercontinental destinations. The Jetport creates significant benefits that extend beyond the aviation community to impact economic growth and development as well as the quality of life of Maine residents. The availability of air transport is invariably listed by business executives as a key criterion for business location and expansion. Public safety and national security objectives are supported by aviation operations of police officers and government agencies. Medical transport, search and rescue, aerial mapping, air cargo, and express delivery services are all essential functions provided at Portland International Jetport every day of the year.

> ***The Jetport creates significant benefits that extend beyond the aviation community to impact economic growth as well as the quality of life of Maine residents.***

Airline travelers from across the nation or around the globe come to Maine to conduct business, meeting with clients and suppliers, and placing orders for goods and services produced in the state. Even greater numbers come for personal reasons, to visit friends and relatives, or to hike, fish, hunt, or simply vacation in the midst of world class scenery and recreation opportunities. General aviation flyers based at PWM enjoy the benefits of on-demand flight schedules to destinations within the state or any of the nearly 3,000 general aviation airports that provide access to large and small communities across the country.

DEFINITIONS AND METHODOLOGY

Although qualitative advantages created by an airport are important, they are also challenging to measure. In studying the economic benefits of airports and aviation, regional analysts have emphasized economic benefits that can be quantified:

- **Employment** is the number of jobs supported by economic activity created by the presence of Portland International Jetport.
- **Payroll** includes income to workers as employee compensation (the dollar value of payments received by workers as wages and benefits) and proprietor's income to business owners.
- **Output** is the value of the production of private firms and public agencies. For a private firm, output is equal to the annual value of revenue or gross sales at producer prices (before addition of further margins or transportation costs), including sales or excise taxes. Output, revenue, and sales are interchangeable synonymous terms used throughout this study and, in turn, these are equal to spending or expenditures from the perspective of the buyer. For government units, the agency budget is used as the measure of output.

Consistent with the FAA methodology, this study views Portland International Jetport as a source of measurable benefits that impact the Maine economy and the residents of the state. Aviation activity creates revenues for firms, and employment and income for workers on and off the airport.

Economic benefit studies differ from cost-benefit analyses, which are often used to support a "go-no-go" decision to undertake a proposed project. Analysis of economic benefits is related to measurement of the economic contribution of an industry or a particular component of the economy. This methodology was standardized in the publication by the Federal Aviation Administration, *Estimating the Regional Economic Significance of Airports*, Washington DC, 1992, and has been closely followed in recent years by public and private sector aviation analysts. Consistent with the FAA methodology, this study views Portland International Jetport as a source of measurable benefits that impact the Maine economy and the residents of the state. Aviation activity creates revenues for firms and employment and income for workers on and off the airport.

On-airport activity by private aviation-related firms and government agencies located on the Jetport is one source of output, jobs, and worker payrolls. Business spending on the airport injects revenues into the community when firms and public sector agencies buy products from local and regional suppliers, and again when employees of the airport spend for goods and services in their communities. Included in on-airport economic benefits are capital improvement projects which provide for growth and enhance air safety.

Off-airport spending by visitors that arrive via airliner or general aviation aircraft is a second source of economic benefits. Air visitor spending creates jobs, income, and revenues in Maine's lodging, food service, ground transportation, retailing and recreation industries.

DIRECT, SECONDARY, AND TOTAL ECONOMIC BENEFITS

Economic activity (such as purchase of fuel by the pilot of a transient aircraft) creates an initial economic impact or benefit when the purchase is made. The spending by the pilot provides revenue to the Fixed Base Operator, a portion of which is retained as margin, and the remainder is used for payments to suppliers or to pay salaries to workers (who then spend their wages in their home communities). As payments are received by suppliers or spent by workers, the initial direct spending from the fuel purchase recirculates in the economy in a series of successive transactions known as multiplier or secondary benefits, illustrated in Figure A. These combined direct and secondary benefits summed together provide a measure of total economic benefits.

Figure A. Direct, Secondary, and Total Economic Benefits

The terminology is explained in greater detail below.

- **Direct benefits** measure the initial output, employment, and payroll when businesses and agencies on the Jetport generate sales and revenues, hire workers, and make payments to employees. Off-airport direct benefits result when visitors that arrive by air spend for goods and services, including lodging, restaurants, auto rental, retail items, or recreational activity.

- **Secondary benefits** (often known as multiplier effects or "ripple effects") are created when the initial spending on system airports or by visitors circulates and recycles through the economy. The secondary benefits measure the magnitude of successive rounds of re-spending in the broader regional economy.

- **Total economic benefits** are the combined sum of direct and secondary benefits created both on and off the airport. The on-airport direct benefits are tabulated by obtaining data on revenues received by airport employers, the number of workers, and compensation paid.

Air visitor direct spending benefits are based on surveys of passengers. These initial direct benefit figures are the "inputs" to the input-output model to estimate secondary benefits. The sum of the direct plus secondary benefits provides a measure of total economic benefits.

In turn, there are two components that make up secondary benefits.

- **Indirect benefits** include activity by suppliers and vendors who sell to airports or hospitality businesses, along with the jobs created and incomes paid to workers by these suppliers. For example, businesses and agencies on the Jetport purchase services such as insurance and hard goods, such as tools or office furniture from off-airport providers. The revenues to suppliers and jobs supported, as well as wages, paid are indirect benefits.

- **Induced benefits** measure the consumer spending of workers who produced both the direct or indirect goods and services. For example, when an aircraft technician's salary is spent for consumer goods, such as groceries or medical services, this contributes to additional employment and income in the general economy for providers of these goods and services.

Economic benefit studies rely on multiplier factors from input-output models to estimate how direct spending on the goods and services of a particular industry or set of industries creates secondary indirect and induced benefits or multiplier effects. An input-output model incorporates inter-industry relationships within a state or region that account for changes in employment, payroll, and output in related industries set off by a change in demand in an initial industry.

Economic benefit studies rely on multiplier factors from input-output models to estimate how direct spending on the goods and services of a particular industry or set of industries creates secondary indirect and induced benefits or multiplier effects.

The indirect and induced spending coefficients used for this study were from the IMPLAN input-output model based on data on the Maine economy from the U. S. Bureau of Economic Analysis. This model is frequently used for studying the economic benefits of airports and aviation across the nation, as well as economic impacts associated with changes in regional economies, such as closing of a military base or construction of a major sports venue. Because the Jetport is an existing facility, the current IMPLAN application is a contribution study, analyzing the benefits the airport creates annually for the Maine economy. The time period of the study is July 2014 - June (FY 2015) and figures are expressed in 2015 dollars. However, it should be noted that some final activity data (such as enplanements) were not yet released through FY 2015, and in those instances, the latest available reports were used.

SUMMARY OF FINDINGS

The total economic benefits of the Portland International Jetport included 8,261 jobs with payroll of $269.6 million and output of $1.0 billion, incorporating all multiplier or secondary benefits. The secondary and total economic benefits flowing from the initial direct benefits of on-airport commercial service and general aviation activity are set out in **Table 1** and explained in the following sections.

TABLE 1
Summary of Economic Benefits
Portland International Jetport

SOURCE	EMPLOYMENT	PAYROLL	OUTPUT
Direct Economic Benefits			
On-Airport Direct Benefits: *Private Firms, Government Agencies & Capital Improvement Projects*	1,329	$54,061,000	$287,999,000
Air Visitor Direct Benefits: *Commercial Service and General Aviation Travelers*	3,929	92,960,000	351,702,000
Direct Benefits	**5,258**	**147,021,000**	**639,701,000**
Secondary Economic Benefits			
Indirect Benefits: *Activity by Suppliers & Vendors*	1,571	65,877,000	225,311,000
Induced Benefits: *Activity by Workers as Consumers*	1,432	56,667,000	178,129,000
Secondary Benefits	**3,003**	**122,544,000**	**403,440,000**
Total Economic Benefits			
Total Benefits	**8,261**	**$269,565,000**	**$1,043,141,000**

Note: On-airport spending for auto rental is included as on-airport benefits and not included as air visitor spending off-airport. Secondary benefits are computed from the IMPLAN input-output model with Maine coefficients. Figures are in 2015 dollars.

SUMMARY: ON-AIRPORT DIRECT BENEFITS

On-airport direct benefits include employment, payroll, and output created by private firms and government agencies on the Jetport. Capital improvement projects are also included in on-airport benefits since these outlays generate employment and payroll as funds are disbursed to private contractors for their on-airport activity. Private employment accounted for four out of five jobs on the airport.

There were 31 private on-airport tenants, including commercial and cargo airlines, air transport support firms, and passenger services, including auto rental, retailing, and food services. Fixed Base Operators

(FBOs) and other aviation firms serve the general aviation flying community by providing fueling, maintenance, avionics, charters, and flight instruction. Direct on-airport employment was 1,329 jobs in combined private aviation-related or construction firms and government units. Payroll for on-airport workers was $54.1 million. The direct output created by on-airport tenants, public agencies, and capital improvement project spending was $288.0 million.

SUMMARY: AIR VISITOR DIRECT BENEFITS

Air visitors arrive at Portland international Jetport by commercial service carrier or by general aviation (GA) aircraft. According to the Origin and Destination (O&D) database of the U.S. Department of Transportation, 418,910 commercial service visitors enplaned at the Jetport (2014 figures). A passenger survey found visitors stayed an average of 5.8 days and spent $945 during their trip. Direct off-airport commercial service visitor spending on lodging, food and drink, retail goods and services, recreation, and ground transportation injected $347.9 million into the economy of the state (excluding on-airport visitor spending for auto rental, which is included as part of on-airport activity). The economic contribution by visitors boarding an average departing airliner was calculated to be $20,640 during their stay.

In addition, there were 4,460 transient (visiting) general aviation aircraft that arrived at the Jetport in FY 2015. Of these, 1,829 remained overnight and the remaining 2,641 stayed for one day or less. Visitor spending estimates were computed for overnight aircraft passengers and for those aircraft staying four hours or longer at the airport, reflecting the fact that many aircraft stop only for fuel and travelers do not spend off the airport. There were 1,026 general aviation aircraft that stayed on the ground an average of 7.2 hours and 1,606 that stayed 2.1 hours. Passengers on overnight general aviation aircraft spent an average of $1,866 per aircraft on their visit and one-day visitors staying four or more hours spent $326 per aircraft. The sum of direct general aviation visitor spending on lodging, food and drink, retail, recreation, and ground transportation was $3.7 million.

The direct spending by combined commercial service and general aviation visitors was $351.7 million off the airport in the Maine hospitality industry during FY 2015, creating 3,929 jobs off the airport with payroll to workers of $93.0 million. The sum of on-airport and air visitor direct benefits related to activity at Portland International Jetport was $639.7 million of output, employment of 5,258 workers, and payroll of $147.0 million in FY 2015.

SUMMARY: SECONDARY BENEFITS

The production of goods and services on the airport and for air visitors requires intermediate inputs from suppliers and vendors, creating secondary benefits in the form of additional output, employment, and payroll in the economy. As the initial direct benefits of Portland International Jetport recirculated, secondary benefits, as estimated by the IMPLAN model, added output of $403.4 million and 3,003 additional jobs with payroll of $122.5 million. Each 100 direct jobs supported an additional or secondary 57 jobs in other sectors of the economy and each one million dollars of direct output created an additional $631,000 of secondary spending in the general economy.

Of the 3,003 secondary jobs due to the presence of the Jetport, 1,571 were indirect jobs adding to the number of workers in supplier industries to airport operations and visitor industries. These are non-aviation industries, such as finance and insurance, business services, transportation and warehousing, information and communication, and government agencies. Indirect benefits included output of $225.3 million and payroll to workers of $65.9 million. In addition, on-airport and tourism workers, as well as workers for suppliers, spent their payroll in their home communities. There were 1,432 additional jobs induced by employee household spending across a broad spectrum of consumer industries, including health care, food service, retail trade, and personal services. These secondary induced benefits added $178.1 million to the economy spending stream.

SUMMARY: TOTAL ECONOMIC BENEFITS

The total benefits are the sum of the direct and secondary benefits. Including benefits from on-airport economic activity, commercial service, and general aviation visitor spending, and all multiplier effects, Portland International Jetport contributed total economic benefits for FY 2015 as shown in **Exhibit A**.

8,261 ***JOBS SUPPORTED***	***$269.6 mil.*** ***PAYROLL***	***$1.0 bil.*** ***OUTPUT***

Exhibit A. Total Economic Benefits

A DAY AT PORTLAND INTERNATIONAL JETPORT

Airports are available to serve the flying public and support the economy every day of the year. The Portland International Jetport is a “24/7” source of revenues, employment, and income for the service area economy. During an average day, the Portland International Jetport generates $2,858,000 of total economic benefits (including secondary or multiplier benefits) and supports 8,261 workers bringing home daily income of $812,000 for spending in their home communities (**Table 2**).

On an average day at the Jetport, there are more than 125 operations by aircraft involved in local or itinerant activity including touch-and-go operations, corporate travel on business jets, or commercial flights bringing passengers visiting the area for personal travel or on business. The average number of enplanements daily is 2,295 passengers, and 1,147 of these are visitors whose trip averaged 5.3 days in duration. On an average day, there are 6,171 air visitors in the area who are spending for lodging, food and drink, retail goods and services, recreation, and ground transportation. This spending injects over one million dollars per day into the Maine economy.

Aviation activity at Portland International Jetport is supported by 42 on-airport employers who provide jobs for 1,329 workers. The daily direct benefits of on-airport activity at the Jetport include daily output of $789,000 and purchases of goods and services from Maine suppliers and vendors of $292,000.

TABLE 2
Economic Benefits for an Average Day
Portland International Jetport

Activity	Average Day
All Aircraft Operations	127 Aircraft Operations Daily
On-Airport Employment	1,329 On-Airport Workers
Commercial Service Passengers	2,295 Enplanements Daily
Air Visitors (Airline + GA)	6,171 Visitors in the Area Daily
Air Visitor Spending	$1,095,000 Visitor Spending Daily*
Total Employment	8,261 Total Jobs Supported
Total Economic Benefits	$2,858,000 Economic Benefits Daily

***Includes spending at on-airport auto rental agencies**

Sources: FAA Operations Data (ATAS FY 2015), FAA Passengers (ACAIS CY 2014) Portland International Jetport Visitor Survey; IMPLAN Input-Output model using Maine Coefficients

ON-AIRPORT ECONOMIC BENEFITS

The on-airport sources of direct economic benefits include employment, payroll, and output for public agencies and private firms located on-site and within airport property lines, as well as capital improvement projects undertaken by private contractors.

The on-airport sources of direct economic benefits include employment, payroll, and output for public agencies and private firms located on-site and within airport property lines, as well as capital improvement projects undertaken by private contractors.

There are 11 governmental units on-site, including the City of Portland airport staff, City police, and Air Rescue and Fire Fighting (ARFF) personnel; the Federal Aviation Administration Air Traffic Control Tower and other FAA offices; U.S. Department of Homeland Security employees from the Transportation Security Administration (TSA) Customs and Border Protection and U.S. Immigration and Customs Enforcement; the U.S. Weather Service; and the U.S. Marshall office.

Thirty-one private on-airport tenants include commercial and cargo airlines and related support firms that provide ramp services, baggage handling, and private security. Within the terminal are passenger services, including ticketing, sky caps, and auto rental. Concession outlets available to Jetport passengers feature local branded gifts and general merchandise and food service with a distinct Maine focus.

Fixed Base Operators (FBO) and other firms serve the general aviation community, providing fueling, maintenance, inspection and repair services, aircraft sales and charter, flight instruction, avionics, and aircraft storage. Private firms provide a range of services, including medivac and express parcel transport. Off-airport contractors support food service operations on the Jetport, shuttle and taxi transportation, janitor services, technical consulting, and operation of the on-site parking facility.

In addition to the above, the Jetport requires capital improvement services from private construction, design and technical firms to build and maintain structures, ramps and runways to provide for growth in aviation activity, and ensure safety standards are met. These projects contribute jobs, payroll, and additional output for the Maine economy. There were 34 private firms providing contract services at the Jetport in FY 2015, ranging from elevator servicing in the terminal to runway snow removal.

Table 3 depicts the employment, payroll, and output created by aviation activity on Portland International Jetport for FY 2015. Jetport staff provided considerable data and collaboration in support of this study. To compile the direct benefits shown in the table, Jetport staff facilitated on-site interviews with airport tenants who provided information on their operations, including average employment levels during the prior 12 months. Telephone follow-up contact was made as necessary. Respondents were informed that the individual employer results were confidential and only aggregate totals would appear in the written report.

The 31 private sector aviation employers reported output (revenues) of $232.9 million and employment of 925 workers with compensation of $30.5 million. The employment count follows the Bureau of Labor Statistics methodology used in the *Current Employment Statistics* survey of tallying the number of workers without distinction between full time and part time workers. The reported numbers represent head counts rather than full time equivalent positions. The eleven government agencies reported combined budgets of $34.2 million, with 257 employees and payrolls of $17.3 million.

TABLE 3
On-Airport Economic Benefits
Portland International Jetport

SOURCES	EMPLOYMENT	PAYROLL	OUTPUT
Direct Economic Benefits			
Private Aviation Employers (31)	925	$30,495,000	$232,927,000
Commercial Aviation Services (Airlines & Support Services)	*287*	*9,416,000*	*100,627,000*
General Aviation Services (FBO Services, Charter & Sales)	*158*	*5,272,000*	*53,518,000*
Air Freight and Cargo Services (Cargo & Courier Services)	123	*4,459,000*	*18,920,000*
All Other Private On-Site Firms (Auto Rental, Concessions, Contractors, Other Services)	*357*	*11,348,000*	*59,862,000*
Capital Improvement Projects (10 Year Average Value) *Construction, Design of Buildings* *Improvements & Upgrades* *Equipment Purchases*	147	6,264,000	20,880,000
Government Agencies (11) *City of Portland* *FAA ATCT & Other FAA* *Dept. of Homeland Security* *U.S. Marshall*	257	17,302,000	34,192,000
Direct Benefits	***1,329***	***54,061,000***	***287,999,000***
Secondary Economic Benefits			
Indirect Activity by Suppliers & Vendors	683	29,170,000	106,679,000
Induced Spending by Workers & Proprietors	560	22,151,000	69,628,000
Secondary Benefits	***1,243***	***51,321,000***	***176,307,000***
Total Economic Benefits			
Total Benefits	**2,572**	**$105,382,000**	**$464,306,000**

Source: On-site tenant interviews and IMPLAN input-output model.

CAPITAL IMPROVEMENT PROJECTS

Capital improvement projects are also included as a source of on-airport economic benefits, since construction activity generates spending and employment. Runway improvements, fencing, drainage projects, and building construction are all examples of capital improvements that enhance safety and provide for growth. Typically such projects are undertaken by outside contractors, creating jobs and payroll for private sector workers on the airport.

Major capital improvement projects that begin at a particular point in time can extend over more than one year and reported outlays can vary sharply from year to year when larger projects are underway. In order to smooth out the annual variation in capital improvement spending, economic benefit studies average outlays over a multi-year period. For this study, figures on acquisition and construction of capital assets were obtained from Jetport financial statements and averaged over the ten-year period from 2005 through 2014. This period includes the $75 million terminal expansion at Portland International Jetport that opened in 2011 and began in 2010.

The financial statements include information on three types of capital projects: new structures, improvements, and equipment. Converted to 2015 dollars, the ten-year averages were determined to be $11.5 million for construction, $8.1 million for improvements, and $1.3 million for equipment. The average value overall was $20.9 million. These separate spending categories, along with adjustments for design costs, were entered into the IMPLAN model to obtain the employment estimate of 147 workers and payroll of $6.3 million as representative values for Jetport capital improvement activity.

DIRECT, SECONDARY, AND TOTAL ON-AIRPORT BENEFITS

The combined direct benefits of on-airport private firms, government agencies, and capital improvement projects were $288.0 million of output, 1,329 jobs, and payroll of $54.1 million. The ratio of private sector on-airport jobs to all direct on-airport jobs was 1,072/1,329 = 81 percent private sector jobs. Secondary benefits as estimated by the IMPLAN model added output of $176.3 million and 1,243 additional jobs as the initial direct spending recirculated. As noted earlier, secondary effects come from two sources. On-airport private firms and public agencies make purchases from suppliers and vendors, who, in turn, purchase inputs and hire employees to support production of goods and services for airport customers. This effect is known as the indirect benefit. Simultaneously, employees of airport firms and agencies and employees of their suppliers are also consumers who spend incomes in their home communities. This spending by aviation-related workers stimulates additional jobs and output in the sectors serving consumers, creating induced benefits.

Of the 1,243 secondary jobs created by airport operations, 683 were indirect jobs adding to the number of workers in supplier industries to airport operations, such as finance and insurance, business services, transportation and warehousing, information and communication, and government agencies. There were 560 additional jobs induced by Jetport and supplier employee household spending across a broad spectrum of consumer industries including health care, food service, retail trade, and personal services.

The total benefits of on-airport operations are the sum of the combined direct and secondary benefits. The total benefits were $464.3 million of output, 2,572 jobs supported, and payroll of $105.4 million added to the economy.

Comparison of total benefit figures with the initial direct benefits yields the multiplier values for each component. For example, the 1,329 direct on-airport Jetport jobs support total employment of 2,572, a multiple of 1.93. The economic interpretation is that, on average, each 100 on-airport jobs support an additional 93 jobs in the general economy. Similarly, each one million dollars of payroll distributed to on-airport workers supports $949,000 of additional or secondary payrolls.

VALUE ADDED AND INTERMEDIATE INPUTS

Table 4
On-Airport Direct Value Added
Portland International Jetport

Category	Value
On-Airport Direct Output	*$287,990,000*
Intermediate Purchases From Suppliers & Vendors	145,020,000
Value Added (GDP)	*142,970,000*
Paid to Employees	48,644,000
Retained by Business as Gross Operating Surplus	52,847,000
Paid to Governments For Sales, Excise and All Other Taxes & Fees	41,479,000

Source: Derived from analysis of input-output relationships obtained from IMPLAN model.

The on-airport output measure consists of two components that can be analyzed to gain an understanding of the contribution of an industry or a major facility to the economy (**Table 4**).

Output, typically expressed as the dollar volume of sales or revenues, also can be measured as the sum of value added plus intermediate inputs. Value added is made up of employee compensation, taxes, and gross operating surplus (which includes depreciation, other costs of capital, and profits). Intermediate inputs refer to the value of goods and services purchased as part of the production process for the industry or facility. In brief, value added does not include intermediate purchases, while the broader measure of output does.

The decomposition of output into value added and intermediate inputs provides insight into how indirect and induced benefits are created. In **Table 4**, the (rounded) direct output of the Jetport is $288 million, intermediate purchases are $145 million, and value added is $143 million. The value added of $143 million is a direct contribution to the economy of Maine, since it is received by Jetport workers, proprietors, and businesses as income. Of the value of all intermediate purchases of $145 million, three-quarters is spent by Jetport business and agencies to purchase intermediate goods from local Maine suppliers. To see this, note from **Table 3** that indirect activity is $107 million. The indirect purchases (benefits) represent spending within the state that creates non-aviation jobs and income in Maine industries such as wholesalers who supply terminal concessions, insurance carriers for tenants, or fuel distributors.

The maximum potential for local intermediate purchases is $145 million, but some of this is spent to purchase supplies and materials from out of state providers. This is because modern economies import across state lines for cost efficiencies and to obtain products manufactured outside the state. For example, aircraft require large amounts of jet fuel and low lead aviation gas, but these products are produced elsewhere and must be brought into Maine. In the terminology of input-output analysis, wen payments is made, some dollars are said to “leak” outside the state.

COMMERCIAL SERVICE VISITOR ECONOMIC BENEFITS

Visitors travel to Maine for diverse purposes, including business and personal reasons. Some come to fish, hunt, camp, hike, or vacation. Others come to meet business clients or as customers of Maine firms and suppliers. Many others come to the state to visit friends and relatives, renewing and strengthening relationships by personal contact.

Table 5
Commercial Service Visitors
Portland International Jetport

Category	Value
Enplanements	837,820
Percent Visitors	50%
Number of Visitors	418,910
Spending Per Trip	$945
Visitor Spending*	$395,670,000

***Includes on-airport auto rental spending**

Source: FAA; U.S. Department of Transportation; Portland International Jetport Visitor Survey.

One common characteristic among travelers to the state is that, while away from home, they make expenditures on a daily basis, creating employment, incomes, and revenues for workers, businesses, and governments of the state. A recent study by the Maine Office of Tourism reported direct visitor spending in Maine was $5.5 billion in 2014, supporting over 94,000 jobs.

Portland International Jetport contributes to Maine's visitor industry by providing commercial service links for air travelers coming from across the country and from other nations. According to the 2014 figures on enplanements from the FAA Air Carrier Activity Information System (ACAIS), there were 837,820 airline enplanements at Portland International Jetport (**Table 5**). Preliminary 2015 figures will not be available until June 2016.

Analysis of passenger origination data from the U.S. Department of Transportation revealed that 50 percent, or 418,910, of enplaning Jetport passengers were visitors to the area during the four-quarter period ending mid-year 2015**.** Visitor enplanements at the Jetport have a strong seasonal pattern, with the greatest percentage in the July – September quarter (62 percent) and the smallest visitor percentage in the January – March quarter (34 percent). The calculated 50 percent visitor figure represents an average value over the entire four quarters.

Average spending per visitor per trip was $945. Multiplied over all visitors, the annual commercial service direct visitor spending benefit was calculated to be $395,670,000.

COMMERCIAL SERVICE VISITOR SURVEY

Visitor spending per trip is a function of length of stay and the distribution of spending over lodging, food, auto rental, other transport, retail, and entertainment/recreation. Business travelers tend to have shorter stays but spend more on lodging and auto rental compared to those traveling to visit relatives, for example, who may stay longer and have no lodging expenses but spend more on retail or entertainment.

To obtain information on spending patterns by Jetport airline travelers, surveys were administered to more than 2,000 enplaning visitors in the terminal during 2015.

To obtain information on spending patterns by Jetport airline travelers, surveys were administered to more than 2,000 enplaning visitors in the terminal during 2015. Surveys were distributed at various hours of the day and during each day of the week to passengers who were visitors to Maine. The final sample obtained reflected usable responses by 1,880 travelers. (A sample size of approximately 1,540 is required for a 2.5 percent margin of error at the 95 percent confidence level.) Reponses from persons who stayed longer than 14 days were not included, as it was apparent their spending patterns were significantly smaller per day than other travelers.

One individual for each travel party completed the survey for the visitors in the party. Travel party information on air visitor spending for lodging, food, retail goods and services, recreation, and ground transportation was provided by responding visitors, as well as party size and purpose of the trip.

COMMERCIAL SERVICE VISITOR SPENDING

Table 6 presents summary information from the commercial service visitor survey. Responses are separated into those visitors reporting business and personal purpose for travel. The “business” group included any mention of business such as “business and pleasure,” while the “personal” group reported no mention of any business purpose for their trip. Business visitors accounted for 31 percent of respondents, while those traveling for personal reasons accounted for the remaining 69 percent.

Because business visitors reported a shorter length of stay (4.3 days), business visitors accounted for 25 percent of visitor days while those traveling for personal reasons had a longer length of stay (5.8 days) and accounted for 75 percent of visitor days. Applying the survey results to the total population of 418,910 visitors, there were 2,234,885 visitor days for the 2014 calendar year. On an average day, there were 6,123 commercial service passengers visiting in Maine and spending for lodging, auto rental, and various other goods and services.

In spite of shorter stays, Jetport business visitors spent more per person than personal travelers on their trips. Business spending for accommodations per person per trip was $529 as compared to $431 for personal travelers. One out of four personal travelers reported no lodging expenses, suggesting they stayed with friends or relatives, while 88 percent of business travelers used paid lodging. Spending on food and drink per trip by business travelers ($200) was very similar to spending by those traveling for personal reasons ($197), but note again that business travelers stayed an average of 1.5 fewer days. Retail spending per trip was greater for the non-business visitor, while business visitors spent more for ground transportation, primarily auto rental.

Table 6 Commercial Service Direct Visitor Spending Portland International Jetport			
	BUSINESS	**PERSONAL**	**OVERALL**
Commercial Service Visitors			
Number of Visitors	129,862	289,048	418,910
Percent of Visitor Trips	31%	69%	100%
Length of Stay (Days)	4.3	5.8	5.3
Number of Visitor Days	558,407	1,674,478	2,234,885
Percent of Visitor Days	25%	75%	100%
Average Spending Per Visitor Per Trip			
Accommodations	$529	$431	$462
Food & Drink	200	197	198
Retail Goods & Services	65	110	96
Recreation & Entertainment	57	59	58
Ground Transportation	155	120	131
Spending per Visitor per Trip	*$1,006*	*$917*	*$945*
Commercial Service Direct Visitor Spending			
Visitor Direct Spending	$130,669,000	$265,001,000	$395,670,000

Source: FAA passenger statistics; Portland International Jetport Passenger Survey; some figures are rounded. Spending per visitor per trip for ground transportation component and direct visitor spending tally includes on-airport auto rental.

The average spending per person per commercial service trip was $1,006 for business visitors and $917 for those traveling for personal reasons.

The average spending per person per commercial service trip was $1,006 for business visitors and $917 for those traveling for personal reasons. The weighted average for all visitors was $945 spending per person per trip. Direct spending by commercial service visitors was calculated by multiplying the number of business and personal travelers by the average reported spending per trip from the Jetport passenger survey. Business spenders spent $130.7 million and those traveling for personal reasons spent $265 million, yielding direct commercial service visitor spending benefits of $395.7 million.

GENERAL AVIATION VISITOR ECONOMIC BENEFITS

Visitors travel on general aviation aircraft to Portland International Jetport for the same purposes as those arriving by commercial service flights - as vacationers, to visit friends and relatives, and for business. Although general aviation travel is sometimes viewed as a luxury mode of transport, the efficiencies and flexibility of schedule made possible by general aviation are highly desirable, especially to corporate travelers.

Business aviation travel on private aircraft reduces costs and increases effectiveness in individual firms. Annual studies by the National Business Aviation Association show that those firms with business aircraft outperform those without aircraft with earnings 230 percent higher and average revenue growth 22 percent greater. Among Business Week's "50 Most Innovative Companies," 95 percent of the S&P 500 companies listed were users of business aircraft (*National Business Aviation Association Fact Book*, 2014).

In order to analyze general aviation traffic patterns at the Jetport, an FAA database of 2,400 general aviation flight plans involving Portland International Jetport as either destination or origin for travel was obtained. There were 7,433 itinerant general aviation (GA) arrivals at the Jetport in FY 2015 **(Table 7**).

Both based and non-based GA aircraft contribute to itinerant activity on any given day. When a PWM based aircraft returns to Portland International Jetport from Burlington (BVT), for example, that is an itinerant operation. When an aircraft based at another airport arrives at Portland International Jetport, that aircraft is classified as a transient itinerant. It is these transient aircraft that represent outside spending brought to the airport service area, and are therefore an important source of economic benefits.

According to analysis of flight records, there were 4,460 transient GA aircraft arrivals at Portland International Jetport in FY 2015. Of these, 1,829 remained overnight and the remaining 2,641 stayed for one day or less. To compute a conservative estimate of economic benefits of GA visitors, one day aircraft were further partitioned into those staying less than 4 hours and 4 hours or more, using arrival and departure time as reported in the FAA operations database. Separate analyses were conducted for those GA visitors with an overnight stay and those whose visit was one day or less in duration.

Table 7
General Aviation Transient Aircraft
Portland International Jetport

Category	Value
Itinerant GA Arrivals	7,433
Transient GA Arrivals	4,460
Overnight Transient AC	1,829
Transient AC > 4 Hour Stay	1,026
Transient AC < 4 Hour Stay	1,606

Source: Derived from FAA operations Data and Airport IQ database for Portland International Jetport, FY 2015

Visitor spending estimates were computed only for those aircraft staying 4 hours or longer at the airport, reflecting the fact that many aircraft stop only for fuel and travelers do not spend for food, retail shopping, or ground transportation off the airport. There were 1,026 general aviation aircraft that stayed on the ground four hours or more during the year and 1,606 that stayed fewer than four hours.

GENERAL AVIATION VISITOR SPENDING

From analysis of the FAA flight plan database, it was determined that the average length of stay of overnight general aviation aircraft was 2.7 days. The length of stay for those day visitor aircraft that were on the airport for more than four hours was 7.2 hours, and for those that stayed less than four hours the time of stay was 2.1 hours. The average number of passengers per aircraft was based on calculated proportions of 15 percent jet arrivals, 31 percent turboprop and 54 percent piston. Average passenger counts were 6 for the jet category (including crew), 3.5 for turboprop, and 2 for piston aircraft. The weighted average over all aircraft types was 3.1 persons per arriving aircraft.

Spending estimates for transient general aviation aircraft were developed by performing adjustments to the spending figures obtained from the commercial service visitor survey. A specific survey for general aviation visitors was not used. The assumption was made that there would be overlap between accommodations, restaurants, auto rental and other outlays between general aviation travelers and the average spending of commercial service visitors.

Visitors arriving on jet or turboprop aircraft were assumed to spend the same average amounts for each category as reported by business travelers in the passenger survey. Visitors arriving on piston aircraft were assumed to spend during their visit using the same average spending values as reported by those traveling for personal reasons obtained in the passenger survey.

Applying these average values for lodging and other expenditures, spending per aircraft was based on average number of passengers per aircraft and length of stay.

Passengers on overnight GA aircraft spent an average of $1,866 per aircraft on their 3.1 day visit and one day GA visitors staying four or more hours spent $326 per aircraft (**Table 8**). Lodging accounted for 52 percent of overnight GA visitor spending, averaging $969 per aircraft travel party. The second largest spending category for overnight travelers was food and drink, at $414 per party. Food and drink also was the largest spending category for one day visitors ($149 per party). Multiplication of 1,829 overnight GA aircraft by spending per trip of $1,866 yields total expenditures of $3.4 million. Similarly, the 1,026 one day aircraft parties spent a total of $334,000. The sum of direct general aviation visitor spending benefits was $3.7 million.

Table 8
Spending Per General Aviation Aircraft Per Trip
Portland International Jetport

Category	Overnight GA Aircraft	Day Visit GA Aircraft
Accommodations	$969	
Food & Drink	414	$149
Retail Goods & Services	143	54
Recreation & Entertainment	107	38
Ground Transportation	233	85
Spending per Trip Per AC	*$1,866*	*$326*
Number of Aircraft	1,829	1,026
Direct GA Spending	$3,413,000	*$334,000*

Source: Derived from FAA operations data and Portland International Jetport visitor survey.

COMBINED COMMERCIAL SERVICE AND GA VISITOR BENEFITS

Commercial service and general aviation visitors combined to spend $351.7 million off the airport in the Maine hospitality industry during FY 2015, creating 3,929 jobs off the airport with earnings to workers of $93.0 million (see **Table 9**).

There were 2,252,344 visitor days attributable to commercial and general aviation travelers during the year. Ninety nine percent of visitor days (2,234,885) were due to commercial air travelers and one percent of days (17,459) were from general aviation transient visitors.

On an average day, there were 6,171 air visitors in the service area. Average daily off-airport spending by all air travelers was $964,000 (the on-airport portion of auto rental expenditures is excluded from these figures and Table 9).

The largest spending category by aviation visitors was expenditures for hotel or other accommodations, with outlays of $195.1 million. Through application of the IMPLAN model, it was calculated that the level of lodging employment associated with this spending level was 2,216 jobs and payroll of $58 million. Similar applications of the input-output model show 1,016 jobs created in food services, 164 in retail sales, 436 in recreation, and 97 in the off-airport portion of ground transportation spending.

The total economic benefits from air visitor spending were $532.9 million in output (revenues) and 5,690 jobs supported throughout the economy, with payroll income to workers of $161.5 million.

The total economic benefits from air visitor spending were $532.9 million in output (revenues) and 5,690 jobs supported throughout the economy, with payroll income to workers of $161.5 million. The indirect benefits created by purchase of intermediate goods and services from suppliers to the hospitality industry were output of $115.8 million and 888 additional jobs. The induced spending by workers as consumers created benefits of $105.9 million revenues and 872 jobs. Both the indirect and induced spending recirculated within the Maine economy to increase revenues to business, create jobs for workers, and provide payroll for further expenditures. The secondary benefits due to multiplier effects sum to $221.7 million of revenues, 1,760 jobs, and $170.1 million of payroll.

The overall output multiplier for combined commercial service and GA visitor spending was $532.9/$351.7 = 1.52, indicating that each one million dollars of direct air visitor spending recycled in the economy to create total final output of $1.52 million (or $520,000 of secondary spending benefits per million dollars of direct spending). The employment multiplier (comparing direct employment of 3,929 with total employment of 5,690) was 1.45. Each 100 direct jobs related to air visitor spending created an additional 45 jobs in the overall economy.

Table 9
Combined Economic Benefits: Commercial Service and GA Visitors
Portland International Jetport

Category	Employment	Payroll	Output
Direct Economic Benefits			
Accommodations	2,216	$57,960,000	$195,100,000
Food & Drink	1,016	19,423,000	83,940,000
Retail Goods & Services	164	4,218,000	40,417,000
Recreation & Entertainment	436	9,050,000	24,693,000
Ground Transportation	97	2,309,000	7,552,000
Direct Benefits	**3,929**	**92,960,000**	**351,702,000**
Secondary Economic Benefits			
Indirect Activity by Suppliers & Vendors	888	36,113,000	115,776,000
Induced Spending by Workers & Proprietors of Businesses	872	33,958,000	105,887,000
Secondary Benefits	**1,760**	**70,071,000**	**221,663,000**
Total Economic Benefits			
Total Benefits	**5,690**	**$161,528,000**	**$532,895,000**

Source: FAA passenger statistics; Portland International Jetport passenger survey; FAA flight plan database; employment estimates from IMPLAN input-output model based on Maine coefficients from U. S. Bureau of Economic Analysis; on-airport auto rental not included in off-airport visitor spending tally. Some figures are rounded.

BENEFITS OF A DEPARTING AIRLINER

The figures for spending per person per trip can be applied to illustrate the economic value of visitor expenditures from a typical commercial service aircraft operation at Portland International Jetport (**Table 10**).

There were 13,034 air carrier departures during the 2013 base period used in this example. There were an average of 65 passenger enplanements per departure during the period. Drawing from the U. S. Department of Transportation Origin and Destination data on round trip ticketing, the average proportion of visitors among enplaning passengers was 50 percent at Portland International Jetport.

The computed average number of visitors on a typical departing commercial service flight can be estimated as

Table 10
Economic Benefits of Departing Airliner
Portland International Jetport

Activity	Value
Annual Airline Departures	13,034
Enplaning Passengers	843,944
Enplanements per Departure	65
Percent Visitors	50%
Average Visitors/Aircraft	32
Trip Expenditures/Person	$945
Benefit of Departing Airliner	**$20,640**

Source: FAA and Portland International Jetport Visitor Survey. Figures in $ 2015; some are rounded.

32 (50 percent of 65, rounded). These 32 visitors per aircraft will have spent on average $945 per person during their trip, based on figures from the Jetport passenger survey. Total airline visitor spending of $20,640 was injected into the local economy for a typical departing airliner, on average, expressed in 2015 dollars.

FUTURE ECONOMIC BENEFITS

Socioeconomic variables, including population, employment, and income, are expected to record steady growth in Maine and the Portland area over the next two decades (see *Sustainable Airport Master Plan,* Chapter Two, Table 2B). By 2035, the Portland Four-County Area is projected to add an additional 168,000 residents, with growth of 10 percent by 2020 and 27 percent by 2035, an annual average growth rate of 0.96 percent. Employment is projected to grow at a similar pace. As the regional economy grows, the demand and supply of aviation services will rise, bringing an increase in future economic benefits.

Table 11 shows a baseline summary of current economic benefits associated with the presence of Portland International Jetport. **Tables 12 through 14** illustrate the future benefits of the airport based on projections for the short, intermediate, and long term periods.

The methodology for estimating future economic benefits is a linear extrapolation of current baseline values of the primary benefits in **Table 11** using growth rates for aviation activity developed in Chapter Two of the *Master Plan*. All figures are expressed in 2015 dollars. On-airport aviation revenues, employment, and income increase by the forecast growth rate of combined annual operations: 9.2 percent by 2020, 9.4 percent between 2020 and 2025, and 18.7 percent from 2025 to 2035.
Air visitor spending, employment, and income increase by the forecast growth rate of passenger enplanements: 15.1 percent by 2020, 7.1 percent from 2020 to 2025, and 14.2 percent from 2025 to 2035. These extrapolations are based on the standard assumption of "ceteris paribus," or no change in economic relationships (including the multiplier value of IMPLAN coefficients for secondary benefits) in the years ahead.

Table 11
Baseline Economic Benefits
Portland International Jetport

Source	Employment	Payroll	Output
On-Airport	1,329	$54,061,000	$287,999,000
Air Visitors	3,929	92,960,000	351,702,000
Direct Benefits	5,258	147,021,000	639,701,000
Secondary Benefits	3,003	122,544,000	403,440,000
Total Benefits	8,261	$269,565,000	$1,043,141,000

Source: On-airport employer interviews, passenger surveys, and IMPLAN input-output model based on Maine coefficients from the U. S. Bureau of Economic Analysis. Figures shown are in 2015 dollars and some are rounded.

The time periods (short, intermediate, and long term) are demand driven but generally correspond to forecast activity levels five, ten, and twenty years from the base year. The short term is associated with enplanements of 971,000 and total annual operations of approximately 58,000, expected by 2020. The intermediate term is associated with one million enplanements and 63,400 operations by 2025. There are 1.2 million enplanements forecast in the long term, along with 75,000 operations projected by 2035.

Jetport direct benefits from on-airport activity rise from $288 million output and 1,329 aviation-related jobs in FY 2015 to $314.4 million output and 1,451 jobs in the short term (2020). Over the five-year period, both measures increase by approximately nine percent (**Table 12**).

At the intermediate milestone (approximately 2025) on-airport output is projected to be $344 million, with 1,587 on-site jobs. Long term on-airport output is estimated as $408.1 million, with 1,883 direct jobs. Compared to the base year, output and employment on the Jetport increase by approximately 40 percent over the twenty-year time horizon.

Similarly, off-airport air visitor spending is projected to increase from $351.7 million in FY 2015 to $404.8 million by the end of the short term period, and then to $433.5 million in the intermediate term and reach $495.1 million by 2035. Employment created by direct visitor spending rises from 3,929 in the base year to 5,531 by 2035.

Assuming no changes in the inter-industry relationships incorporated in the IMPLAN model, the ratios of indirect and induced benefits to initial direct benefits remain stable while the economy and Jetport related activity grow. Total output increases from the base year level of 1.0 billion to $1.5 billion in 2035, while total employment rises from 8,261 to 11,648 over the same period (see **Tables 11, 12, 13, and 14**).

Table 12
Projected Economic Benefits: Short Term
Portland International Jetport

Source	Employment	Payroll	Output
On-Airport	1,451	$59,009,000	$314,361,000
Air Visitors	4,522	106,991,000	404,786,000
Direct Benefits	5,973	166,000,000	719,147,000
Secondary Benefits	3,411	138,363,000	453,544,000
Total Benefits	9,384	$304,363,000	$1,172,691,000

Source: Based on activity levels associated with 58,000 annual operations and passenger enplanements of 971,000.

Table 13
Projected Economic Benefits: Intermediate Term
Portland International Jetport

Source	Employment	Payroll	Output
On-Airport	1,587	$64,563,000	$343,951,000
Air Visitors	54,842	114,571,000	433,464,000
Direct Benefits	6,430	179,134,000	777,415,000
Secondary Benefits	3,672	149,311,000	490,292,000
Total Benefits	10,102	$328,445,000	$1,267,707,000

Source: Based on activity levels associated with 63,400 annual operations and passenger enplanements of 1,000,000.

Table 14
Projected Economic Benefits: Long Term
Portland International Jetport

Source	Employment	Payroll	Output
On-Airport	1,883	$76,607,000	$408,111,000
Air Visitors	5,531	130,854,000	495,070,000
Direct Benefits	7,414	207,461,000	903,181,000
Secondary Benefits	4,234	172,922,000	569,609,000
Total Benefits	11,648	$380,383,000	$1,472,790,000

Source: Based on activity levels associated with 75,000 annual operations and passenger enplanements of 1,200,000.

POTENTIAL TAX BENEFITS

Because of the output, jobs, and income created by the presence of Portland International Jetport, the facility is an important source of public revenues. As Jetport activity expands, tax revenues will continue to grow. Estimated tax potential is set out in **Table 15**. The table shows the revenues for each tax category derived from the IMPLAN model. The model uses current average tax rates across the state of Maine for profits, personal income, property, and sales taxes and applies these rates to direct and secondary economic activity. Federal taxes are applied using current federal rates for Social Security taxes, income, profits, and federal excise taxes and fees.

Table 15
Potential Tax Revenue
Portland International Jetport

Source	FY 2015	Short Term	Intermediate Term	Long Term
Federal Taxes				
Corporate Profits Tax	$14,766,000	$16,599,000	$17,944,000	$20,847,000
Personal Income Tax	15,128,000	17,007,000	18,384,000	21,359,000
Social Security Tax	30,903,000	34,741,000	37,555,000	43,631,000
All Other Federal Taxes	7,128,000	8,013,000	8,662,000	10,064,000
Total Federal Taxes	**$67,925,000**	**$76,360,000**	**$82,545,000**	**$95,901,000**
State and Local Taxes				
Corporate Profits Tax	$3,391,000	$3,812,000	$4,121,000	$4,788,000
Property Tax	30,417,000	34,194,000	36,965,000	42,945,000
Sales Tax	24,017,000	26,999,000	29,187,000	33,909,000
Personal Income Tax	5,586,000	6,280,000	6,789,000	7,887,000
All Other State & Local	4,290,000	4,823,000	5,214,000	6,057,000
Total State & Local Taxes	**$67,701,000**	**$76,108,000**	**$82,276,000**	**$95,586,000**
Total Federal, State and Local Taxes				
Total Taxes	**$135,626,000**	**$152,468,000**	**$164,821,000**	**$191,487,000**

Source: Calculations from the IMPLAN input-output model based on state and local tax rates for Maine and current federal rates. All figures are in 2015 dollars.

The first column shows tax revenues associated with the baseline level of activity and total economic benefits of $1.0 billion (as seen in Table 11). The total economic benefits include direct and secondary benefits from on-airport aviation activity and air visitor spending. The 8,261 total workers supported by Jetport activity receive payrolls of $269.6 million. Employers and workers are subject to various federal, state, and local taxes as estimated in the table. The largest federal component is the social security tax, with contributions from employers and workers of $30.9 million in FY 2015. The second largest federal tax category is the personal income tax paid by workers and proprietors of $15.1 million. Overall, federal tax revenues estimated for FY 2015 due to economic activity associated with Portland International Jetport are calculated to be $67.9 million.

State and local tax revenues, shown in the lower portion of the table, sum to an approximately similarly sized total of $67.7 million for FY 2015. The largest state and local component is property taxes for home owners and businesses of $30.4 million, followed by sales taxes of $24.0 million. Combined federal, state, and local taxes are $135.6 million at the FY 2015 level of airport activity and visitor spending.

Combined federal, state, and local taxes are $135.6 million at the FY 2015 level of airport activity and visitor spending.

Projected tax revenues rise as future economic activity levels increase. In the short term, total economic benefits created by the presence of Portland International Jetport are projected to be $1.2 billion, with 9,384 jobs supported in the region and worker compensation of $304.4 million (in 2015 dollars). The higher levels of employment and income will be accompanied by an increase of business and employee social security contributions paid to $34.7 million, and federal personal income taxes rise to $17.0 million (assuming constant 2015 tax rates). Total annual state and federal tax collections will be $152.5 million in the short term (2020), an increase of $16.8 million.

Total economic benefits due to the airport are projected to increase to $1.3 billion in the intermediate term (approximately 2025). Jobs supported rise to 10,102 and worker and proprietor income will be $328.4 million (2015 dollars). Total state and federal tax collections will be $164.8 million in in the intermediate term, an increase of $12.3 million, some 8 percent above the short term level.

Within the twenty-year long term time horizon (2035), total economic benefits from activity at Portland International Jetport are projected to increase to $1.5 billion, with 11,648 jobs supported and payroll of $380.4 million (in 2015 dollars). Annual federal tax collections in the long term are estimated to be $95.9 million, with social security contributions of $43.6 million and personal income taxes paid of $21.4 million (assuming rates under current law). At the state and local levels, annual sales tax collections increase to $33.9 million and property tax collections rise to $42.9 million. Combined state and federal tax collections will be $191.5 million, an increase of 41 percent over the FY 2015 base year collections.

CATALYTIC ECONOMIC BENEFITS

The analysis above has identified the economic benefits of Portland International Jetport to the Maine economy in the form of jobs, payroll and output related to air visitors and operations of suppliers of aviation services. As these direct benefits circulate in the economy, they create secondary indirect and induced activity that results in a multiplied series of impacts, generating additional employment, income and output, all related to the presence of the Jetport. This methodology, relying on input-output models, has been approved by the FAA and allows for a standardized quantification of benefits.

However, it is important for citizens and policy makers to recognize that qualitative benefits, although difficult to measure in dollar terms, are vital to the residents and businesses of the state. Maine residents depend on the presence of the Jetport to enhance their quality of life, bringing contact with friends and relatives, business opportunities, and the pleasures of travel not only to U.S. destinations, but virtually to anywhere on the globe. Aviation facilities regularly provide medical transport for health care professionals and their patients, and support law enforcement and national security.

"Air transport's most far-reaching economic contribution is via its contribution to the performance of other industries and as a facilitator of their growth."

Recently, the methodology of the study of airport benefits has evolved to recognize the "catalytic" influence an airport has on the economy. A study by the Air Transport Action Group, an international air travel organization, notes that "Air transport's most far-reaching economic contribution is via its contribution to the performance of other industries and as a facilitator of their growth. These 'catalytic' or 'spin-off' benefits of aviation affect industries across the whole spectrum of economic activity." (See *Benefits Beyond Borders*, Air Transport Action Group, 2012, Geneva, Pg. 11).

Airports are vital components of the industrial infrastructure for a region. Businesses in Maine rely upon the Jetport to transport their people and products, in the same way residents depend on air travel as an important contributor to modern life. Site location studies consistently emphasize the importance of airports for economic development. When major businesses in Maine were asked to rank the top reasons why they chose their location, convenient access to a commercial service airport was ranked fourth, while access to a general aviation airport was ranked ninth. Approximately 40 percent of all businesses indicated a commercial service airport was essential or important to their location decision (see *The Economic Impact of Airports in Maine*, Maine Department of Transportation, 2006, page 25).

Analysis of consumer spending patterns by Maine households as incorporated in the IMPLAN model shows that travel by Maine households accounts for approximately two-thirds of the demand for commercial service travel originating at the Jetport, while business-related travel makes up the remaining one third, or some 139,500 outbound business trips (calendar year 2014 data). Based on Portland metro area employment of 220,953 (U.S. Bureau of Labor Statistics, *Quarterly Census of Employment and Wages*, 2014), there were 632 business trips per 1,000 workers in that year. These employees brought sales revenue into the region and supported additional Maine jobs as they traveled outbound from the Jetport to meet clients, sell products and services, and negotiate with suppliers and customers.

Similarly, just as consumers have come to expect speedy delivery of purchases by air express, businesses depend on air cargo and couriers to bring in necessary supplies, parcels and freight, and to transport outbound products produced in Maine. In 2014, combined inbound and outbound cargo at the Jetport totaled 24,070,000 pounds, or 12,035 tons. Applying the same metric as above, 54 tons of air cargo moved through the Jetport for every 1,000 workers in the greater Portland area.

A summary review of Maine's major employers provides some insight into the catalytic role played by the Jetport in supporting Jobs in the regional economy. Considering just five of the largest employers (Hanaford Brothers, Wal-Mart, Mainehealth, Bath Iron Works and L.L. Bean, as determined from records of the Maine Department of Labor), it is evident that air transport is vital to the supply chains of these employers.

Both Hannaford Brothers and Wal-Mart, as major sellers of goods to consumers, require interaction with wholesalers to obtain products for their shelves. While many are produced locally in Maine, others are brought in from facilities out of state. The IMPLAN input-out model provides detailed information on inputs purchased by each industry in Maine. According to the model, wholesale trade firms are the single largest purchaser of air transport services in Maine. Similarly, L. L. Bean works with wholesalers for supplies and is also a shipper of products across the nation. And the many health care providers in Maine rely on air travel to support specialized medical care. Surprisingly the second largest purchaser of air transport services is ship building and repair. The industry uses air cargo to transport materials and supplies and employees travel outbound to conduct business and support contracts.

Manufacturing in the Portland area accounts for 9,500 employees and much of the manufacturing is characterized by high technology. Cargo for these employers has a high value to weight ratio, and often speedy delivery of critical parts and components means that air transport is the best means of order fulfillment.

In summary, the catalytic effects of the Portland International Jetport include benefits to quality of life for residents and increased productivity, employment, output, and market reach for Maine businesses. The Jetport brings in outside dollars through visitor spending, but also adds to the productive capacity of the Maine economy by expanding markets and providing for speedy movement of people and goods, supporting the regional economy.

Portland International Jetport

APPENDIX J

OUTER CONGRESS STREET LAND USE

SUSTAINABLE AIRPORT MASTER PLAN

Portland, Maine — Yes. Life's good here.

Planning & Urban Development Department

Outer Congress Street Land Use

Outer Congress Street, with its historic residential district, natural resource and open space amenities, trail network, and proximity to major transportation infrastructure and commercial areas, presents a series of challenges and opportunities distinct from other areas of Portland. In part as a function of these diverse attributes, the area has experienced considerable and varied land use pressure at times over the past several decades. Recently, improvements to the transportation system, positive trends in the use of the Jetport, and an evolving real estate market, coupled with the presence of large tracts of undeveloped and underdeveloped land, have again brought this tension to the forefront. The city's recent deliberations over the proposal to rezone the property at 1945 Congress Street exemplify the challenge of balancing these competing factors. This white paper is intended to inform the ongoing discussion by describing the existing land use climate and presenting a basic outline for land use policy in the area. The outlined approach is founded on recent land use planning work on the part of the city, the Jetport's master planning process, previous land use discussions for the area, national best practices, and public input received through the course of the 1945 Congress Street deliberations.

Land Use Pattern

The permanent settlement of present day outer Congress Street dates to the colonial community of Stroudwater, the neighborhood first established around the junction of the Fore and Stroudwater Rivers in the 18th century. Rural agricultural land ringed the settlement through the turn of the 20th century, when Stroudwater Field, the precursor to today's Jetport, was founded. The mid-1900s brought connections to I-95 and the country's vast highway network, along with a corresponding increase in commercial development in areas to the immediate south and north. In the years since, the area has changed markedly and in ways common to many communities - with increasing pressure from auto-dependent retail and office uses, expanding residential development, and an over-burdened road network carrying large volumes of traffic.

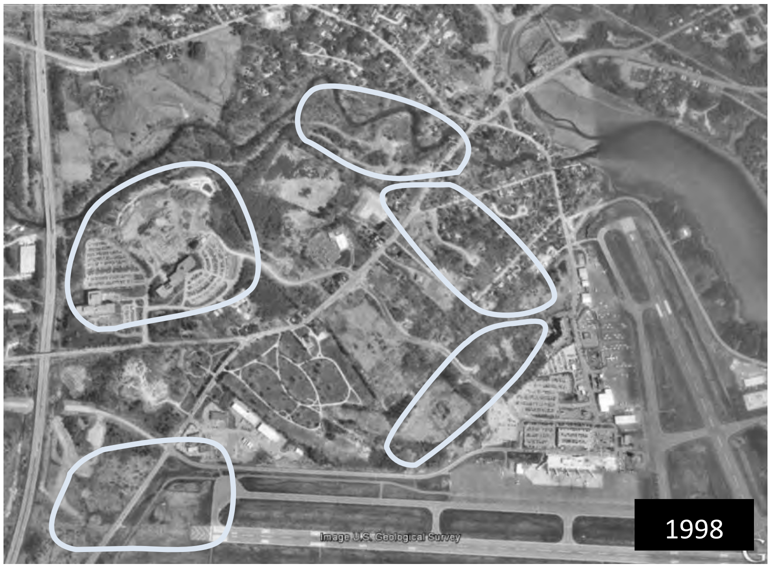
Today, the area, which can generally be defined as the stretch of Congress Street from I-95 to Frost Street, exhibits a few general areas of land use and form:

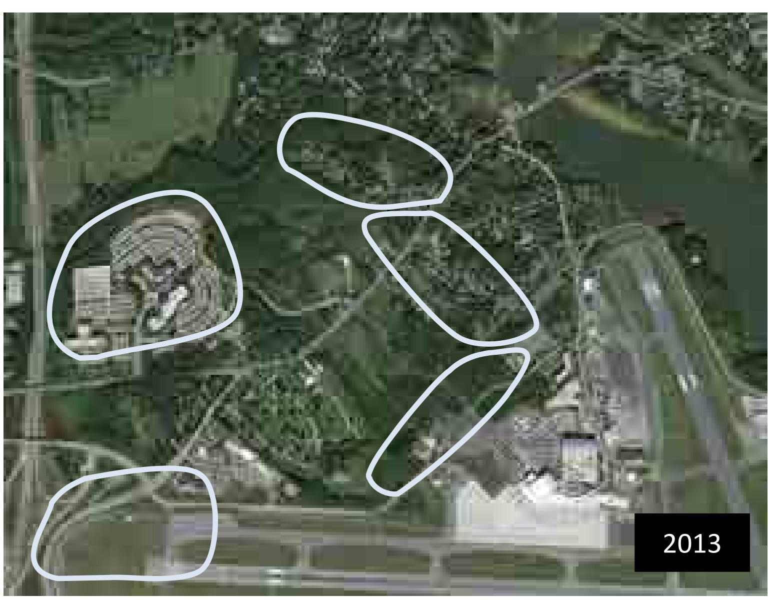
1. Stroudwater residential: Stroudwater, a strong and largely single-family residential neighborhood, is focused around the intersection of Congress Street, Westbrook Street, and the Stroudwater River, a busy juncture which, in recent years, has worked to maintain its pedestrian scale. Originally, the airport gained entrance from Westbrook Street through the densest part of this neighborhood. The decision to move the airport entrance to the west on Congress Street has helped to preserve the neighborhood's traditional residential feel. A significant portion of the neighborhood lies in a local historic district.

Stroudwater has been zoned low-density residential, R-1 and R-2, since the late 1950s, and there has been some recent residential development off Congress Street in the R-2 zone, including the buildout of Old Mast Road in the 1980s and Tide Mill Road in the 1990s. In the early 2000s, the city established a small area of Neighborhood Business B-1 at the intersection of Congress Street and the Fore River, reflecting the location's centuries-old traditional use for commercial purposes. The neighborhood is also home to a contract zone used to create the River's Edge residential subdivision, which was developed in the 1990s.

2. Congress Street institutional: To the west of the residential neighborhood of Stroudwater, as Congress Street widens to four lanes, the land use pattern changes markedly. Institutional uses, including several churches, a fraternal club, and two cemeteries, the Brooklawn and Temple Beth El Memorial Parks, predominate. These institutions generally occupy large lots and either have broad front setbacks or are undeveloped by nature, such that they create a greenscape along Congress Street. Interspersed among these institutional uses are several residential properties, with homes which sitin close proximity to Congress Street. Several of these homes have recently been repurposed for office use, with the rest continuing as residential.

Much of this area remains in residential zoning in the city's R-1 and R-2 zones, where institutional uses are permitted under conditional status. However, commercial zoning, including the Airport Business (A-B) and Office Park (O-P) has expanded northward and eastward closer to and into this area in recent years. There is also some Residence-Professional zoning west of the Jetport entrance, which has been used to accommodate residential-to-office conversions.





3. I-95 Industrial/Office: Office and industrial uses become more prevalent to the west of Johnson Road around the I-95 interchange. UNUM, which occupies a large campus north of Congress Street, owns a great deal of the undeveloped land in this area. Other light industrial and large offices can be found west of I-95. These office and industrial uses generally lie on very large lots with significant front yard setbacks. This area is zoned O-P and Moderate Impact Industrial (I-M).

Land Use Change

Though this general pattern exists, it is far from concrete. For example, over the past 20 years, residential development has pushed westward from Stroudwater with the buildout of River's Edge and Tide Mill Road. These have emerged as strong single-family neighborhoods, with access to Congress Street, the river, the local trail system, and the historic resources of Stroudwater.

At the same time, commercial interests have expanded on the west end of Congress Street, where UNUM has grown, office and industrial uses have emerged, , and historically residential uses have turned over into commercial from Johnson Road east. Simultaneously, the downstream commercial area associated with the Maine Mall has continued to develop over time. Altogether, these changes, when coupled with suburban growth beyond the city line, have resulted in large traffic volumes on Congress Street through this area.

The cumulative effect is to place outer Congress Street at the crux of very disparate patterns of development, with each pressing its current boundaries. As this pressure mounts, the area around the airport entrance road, with its large tracts of undeveloped or underdeveloped land, has come to serve a critical purpose in the transition from the commercial and industrial complexes to the south and west and the single-family, historic residential neighborhood to the east.

Current Plans

Recent planning work on the part of the city has attempted to address the nature of this transition. The second phase of the city's Congress Street Corridor Study has taken a careful look at Congress Street between Garrison Street and the Fore River and identified a series of improvements with the intent of reinforcing the street's human scale in this area. The plans include a road diet, landscaped medians, crosswalks, sidewalks, bicycle treatments, and transit improvements.

Likewise, ongoing planning around the Jetport considers land use change as airport operations continue to evolve. The Sustainable Airport Master Plan shows the airport entrance road remaining largely undeveloped under the existing R-2 zoning; however, southern portions of this road have been identified as potential locations for commercial development as the demand for airport-related business grows.

Policy Direction

As development pressure continues on Outer Congress Street, it is important that the city establish a policy direction for future land use decisions in this area:

1. Protect the residential area of Stroudwater and emphasize pedestrian, bicycle, and transit improvements on Congress Street in this area, particularly east of the airport entrance road and the Congress Street neckdown. The residential neighborhood east of the Jetport entrance is well-established. The city should continue to support this residential neighborhood and reinforce pedestrian, bicycle, and transit improvements, in keeping with the Congress Street Corridor Stud, in this area.

2. Focus commercial development and/or higher density residential development where the road network can support it and low-density residential development is unlikely. The areas surrounding I-95 and the Maine Mall benefit both from proximity to the highway and from a road network that is designed to carry high volumes of traffic. In addition to these assets, the Jetport is a significant economic development resource, and should be leveraged appropriately to support the health and vitality of the city as a whole. Because of these factors, these areas are likely to experience additional highway-oriented commercial, industrial, and office pressures. There is no one "right" boundary where these commercial areas should end and residential neighborhoods should begin, but the capacity of Congress Street is one indicator. Currently, commercial uses are generally located west of where Congress Street increases to four lanes at Garrison Street. The lots in this area tend to be larger in size than those to the east.

The city should continue to balance commercial development with impacts to Congress Street, prioritizing good access management, pedestrian and transit connections, and high quality design. Further, the city should use the site plan review process to emphasize thoughtful, context-sensitive development where this commercial development occurs, reinforcing the idea of a gradual transect from commercial/industrial/office to residential. Lastly, the city should continue to support higher density nodal residential development in proximity or even co-located with commercial uses as a matter of smart growth.

3. Preserve a greenscape along Congress Street in the vicinity of the airport entrance road to soften the transition between commercial areas to the south and west and the residential areas to the east. The green space associated with the Brooklawn and Temple Beth El cemeteries, as well as the manner in which UNUM, the airport, and the institutional uses east of the airport entrance road have developed have combined to create a sense of buffering between more commercially developed areas to the west and south and residential areas to the north and east. The city should continue to encourage planting and landscape preservation in this area. Sites along Congress Street should be carefully designed to help enhance this transition.

4. Reinforce small-scale nodal commercial and mixed-use development within the existing B-1 zone in Stroudwater proper. This existing B-1 zone at the intersection of Waldo Street and Congress Street could serve the surrounding residential area with walkable, neighborhood-scaled retail. Further, this intersection could potentially support mixed-use development with additional upper story housing, taking advantage of water views, Congress Street transit connections, and access to trails. Either of these uses would reinforce the pedestrian scale in this area of Congress Street, calm traffic, and reduce vehicular trips.

5. Continue to mitigate the airport's impacts on the surrounding neighborhood by preserving a vegetated buffer around the airport itself. The relationship between the airport and its neighbors, particularly its residential neighbors to the north, is at least in part a function of the health of the buffer between them. The undeveloped natural areas which currently border the airport to the north and south should be maintained to the extent possible, while still allowing the airport to serve the critical function of supporting the Portland region's economy.

6. Emphasize transit, bicycle, and pedestrian connections; context-sensitive site planning; and high quality design to minimize development impacts. In all cases, the city should focus on preserving and encouraging the elements of outer Congress Street that make it a desirable place for people to live, work, and shop, including accessibility and mobility, natural resource protection, trail development, historic resource protection, and high quality design.

PWM
Portland International Jetport

APPENDIX K
AIRPORT LAYOUT PLAN SET



SUSTAINABLE AIRPORT MASTER PLAN

AIRPORT LAYOUT PLANS

FOR

PORTLAND INTERNATIONAL JETPORT

PORTLAND, MAINE

JULY 2018

VICINITY MAP
N.T.S.

INDEX

LOCATION MAP
N.T.S.

REV	DESCRIPTION	DATE	BY	APP'D
4	SUBMITTED TO CITY, MDOT AND FAA FOR FINAL APPROVAL	07.09.18	DDA	DDA
3	SUBMITTED TO FAA FOR APPROVAL	11.29.17	DDA	DDA
2	ISSUED DRAFT ALP TO CITY AND FAA	11.17.16	DDA	DDA
1	ISSUED TO CLIENT FOR REVIEW	07.26.16	DDA	DDA

REVISIONS

THE CONTENTS OF THIS PLAN DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THIS DOCUMENT BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS.

PORTLAND INTERNATIONAL JETPORT
COVER SHEET
PORTLAND, MAINE

Stantec Consulting Services Inc.
482 Payne Road
Scarborough, ME
Tel. 207.883.3355
WWW.STANTEC.COM

PLANNED BY: Jay Wood
DETAILED BY: Lori Anthony /
APPROVED BY: Dwight Anderson / Steve Benson
FILE NAME: OP-M116 COVER
July 2018
SHEET 1.0

Coffman Associates Airport Consultants

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RUNWAY DATA

ITEM DESCRIPTION		RUNWAY 11-29 (EXISTING)		RUNWAY 11-29 (ULTIMATE)		RUNWAY 18-36 9 (EXISTING)		RUNWAY 18-36 (ULTIMATE)	
RUNWAY DESIGN CODE (RDC)		C-IV		D-IV		B-III		B-III	
APPROACH REFERENCE CODE (APRC)		D/IV/1600, D/V/2400		D/IV/1600, D/V/2400		B/III/5000, D/II/5000		B/III/5000, D/II/5000	
DEPARTURE REFERENCE CODE (DPRC)		D/V		D/V		B/III, D/II		B/III, D/II	
CRITICAL DESIGN AIRCRAFT		A300-600		747-200 & D-I/D-II LEAR & GS		Q400		Q400	
PAVEMENT STRENGTH (in thousand lbs.)[1]		75(S)/169(D)/300(DT)		75(S)/205(D)/375(DT)		75(S)/165(D)/300(DT)		75(S)/165(D)/300(DT)	
MATERIAL TYPE		HOT MIX ASPHALT		HOT MIX ASPHALT		HOT MIX ASPHALT		HOT MIX ASPHALT	
PAVEMENT STRENGTH BY PCN		#/F/D/X/U		#/F/D/X/U		#/F/D/X/U		#/F/D/X/U	
PAVEMENT SURFACE TREATMENT		GROOVED		GROOVED		GROOVED		GROOVED	
EFFECTIVE RUNWAY GRADIENT (%)		0.46%		0.46%		0.01%		0.01%	
PERCENT (%) WIND COVERAGE		91.7		91.7		93.97		93.97	
RUNWAY DIMENSIONS (LENGTH X WIDTH)		7,200 X 150		7,200 X 150		6,100 X 150		6,100 X 150	
RUNWAY BEARING		N 84.7833° W		N 84.7833° W		N 16.7833° W		N 16.7833° W	
		RUNWAY 11	RUNWAY 29	RUNWAY 11	RUNWAY 29	RUNWAY 18	RUNWAY 36	RUNWAY 18	RUNWAY 36
		EXISTING	EXISTING	ULTIMATE	ULTIMATE	EXISTING	EXISTING	ULTIMATE	ULTIMATE
DISPLACED THRESHOLD ELEVATION		NA	NA	NA	NA	47.6MSL	45.5MSL	47.6MSL	45.5MSL
RUNWAY SAFETY AREA DIMENSIONS (L beyond dep. END X W)		1,000 X 500	1,000 X 500	1,000 X 500	1,000 X 500	600 X 300	600 X 300	600 X 300	600 X 300
RUNWAY END COORDINATES	LATITUDE	N 43*38'45.102"	N 43*38'38.521"	N 43*38'45.102"	N 43*38'38.521"	N 43*39'16.104"	N 43*38'18.424"	N 43*39'16.104"	N 43*38'18.424"
	LONGITUDE	W 70*19'33.855"	W 70*17'56.369"	W 70*19'33.855"	W 70*17'56.369"	W 70*18'26.350"	W 70*18'02.392"	W 70*18'26.350"	W 70*18'02.392"
	ELEVATION	75.7MSL	42.2MSL	75.7MSL	42.2MSL	44.8MSL	44.3MSL	44.8MSL	44.3MSL
DISPLACED THRESHOLD COORDINATES	LATITUDE	NA	NA	NA	NA	N 43*39'11.848"	N 43*38'23.152"	N 43*39'11.848"	N 43*38'23.152"
	LONGITUDE	NA	NA	NA	NA	W 70*18'24.583"	W 70*18'04.355"	W 70*18'24.583"	W 70*18'04.355"
	ELEVATION	NA	NA	NA	NA	47.6MSL	45.5MSL	47.6MSL	45.5MSL
	DISTANCE	NA	NA	NA	NA	450	500	450	500
RUNWAY LIGHTING TYPE		HIRL	HIRL	HIRL	HIRL	MIRL	MIRL	MIRL	MIRL
RUNWAY PROTECTION ZONE (RPZ)	APPROACH (In X L X Out)	1,000 X 2,500 X 1,750	1,000 X 2,500 X 1,750	1,000 X 2,500 X 1,750	1,000 X 2,500 X 1,750	500 X 1,000 X 700	500 X 1,000 X 700	500 X 1,000 X 700	500 X 1,000 X 700
	DEPARTURE (In X L X Out)	500 X 1,700 X 1,010	500 X 1,700 X 1,010	500 X 1,700 X 1,010	500 X 1,700 X 1,010	500 X 1,000 X 700	500 X 1,000 X 700	500 X 1,000 X 700	500 X 1,000 X 700
RUNWAY MARKING TYPE		PRECISION	PRECISION	PRECISION	PRECISION	NON-PRECISION	NON-PRECISION	NON-PRECISION	NON-PRECISION
14 CRF PART 77 APPROACH CATEGORY SLOPE		43:1	35:1	50:1	35:1	23:1	20:1	30:1	30:1
APPROACH TYPE		PRECISION	PRECISION	PRECISION	PRECISION	NON-PRECISION	NON-PRECISION	NON-PRECISION	NON-PRECISION
VISIBILITY MINIMUMS		1/2 MILE	1/2 MILE	1/2 MILE	1/2 MILE	3/4 MILE	1 MILE	3/4 MILE	1 MILE
TYPE OF AERONAUTICAL SURVEY REQUIRED FOR APPROACH		VG	VG	VG	VG	VG	NVG	VG	NVG
RUNWAY DEPARTURE SURFACE		YES	YES	YES	YES	YES	YES	YES	YES
RUNWAY OBJECT FREE AREA (ROFA) (L beyond RW END X W)		775 X 800 (MOD TO STD)	240 X 800 (MOD TO STD)	775 X 800 (MOD TO STD)	240 X 800 (MOD TO STD)	0 X 800 (MOD TO STD)	0 X 800 (MOD TO STD)	0 X 800 (MOD TO STD)	0 X 800 (MOD TO STD)
OBSTACLE FREE ZONE (ROFZ) (L X W)		7,600 X 400	7,600 X 400	7,600 X 400	7,600 X 400	6,500 x 400 (MOD for Vehicle)	6,500 x 400 (MOD for Vehicle)	6,500 x 400 (MOD for Vehicle)	6,500 x 400 (MOD for Vehicle)
TSS	APPROACH	34:1, 30:1	34:1, 30:1	34:1, 30:1	34:1, 30:1	20:1	20:1	20:1	20:1
	DEPARTURE	40:1	40:1	40:1	40:1	40:1	40:1	40:1	40:1
VISUAL AND INSTRUMENT NAVAIDs		PAPI / ALSF-2 / TDZL / RVR	PAPI / MALSR / RVR	PAPI / ALSF-2 / TDZL / RVR	PAPI / MALSR / RVR	REIL / PAPI	REIL / PAPI	REIL / PAPI	REIL / PAPI
TOUCHDOWN ZONE ELEVATION (FIRST 3,000 FT)		75.7MSL	56.4MSL	75.7MSL	56.4MSL	50.4MSL	48.9MSL	50.4MSL	48.9MSL
TAXIWAY WIDTH		75	75	75	75	TW B (60) TW C (50, 60 & 75)	TW B (60) TW C (50, 60 & 75)	TW B (60) TW C (50, 60 & 75)	TW B (60) TW C (50, 60 & 75)
TAXIWAY SAFETY AREA DIMENSIONS		171	171	171	171	118	118	118	118
TAXIWAY OBJECT FREE AREA		259	259	259	259	186	186	186	186
TAXIWAY SEPARATION (TW CL to Fixed Object)		129.5	129.5	129.5	129.5	93	93	93	93
TAXIWAY LIGHTING		MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL
TAKEOFF RUN AVAILABLE (TORA)		7,200'	7,200'	7,200'	7,200'	6,100'	6,100'	6,100'	6,100'
TAKEOFF DISTANCE AVAILABLE (TODA)		7,200'	7,200'	7,200'	7,200'	6,100'	6,100'	6,100'	6,100'
ACCELERATE-STOP DISTANCE AVAILABLE (ASDA)		7,200'	7,200'	7,200'	7,200'	5,600'	5,650'	5,600'	5,650'
LANDING DISTANCE AVAILABLE (LDA)		7,200'	7,200'	7,200'	7,200'	5,150'	5,150'	5,150'	5,150'

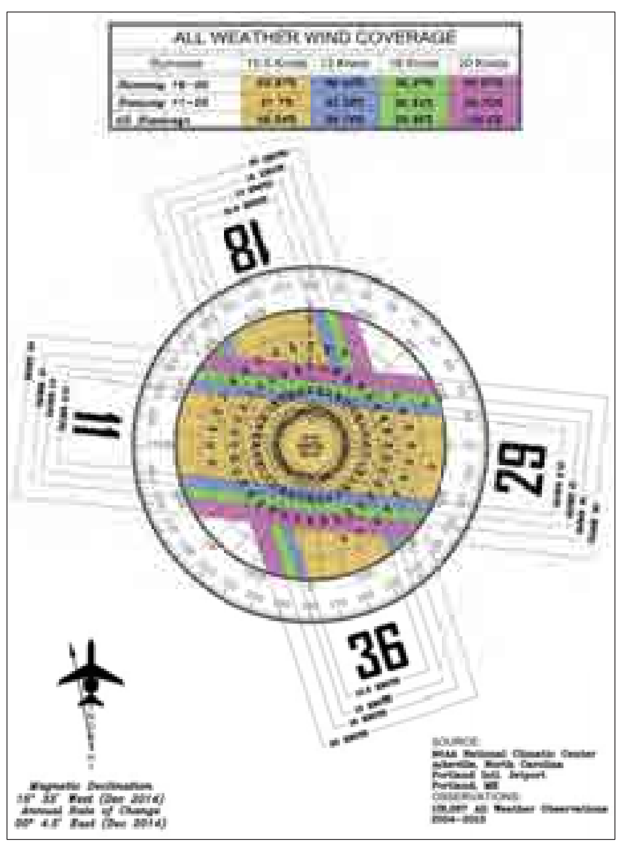
[1] Pavement strengths are expressed in Single (S), Dual (D), Dual Tandem (DT), and/or Double Dual Tandem (DDT) wheel loading capacities.

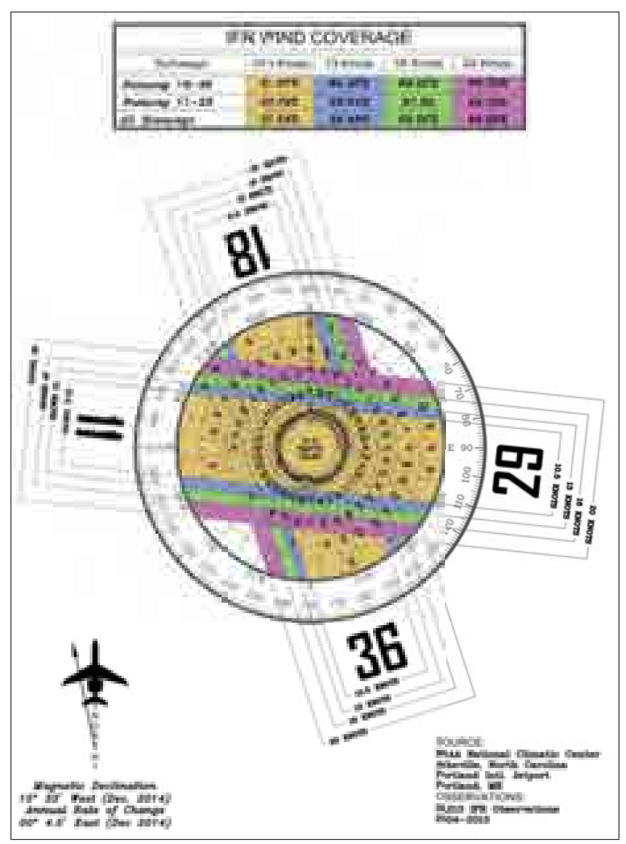
APPROVED MODIFICATIONS TO DESIGN STANDARDS

DESCRIPTION	EXISTING/PLANNED	STANDARD	REMARKS	DATE APPROVED
Runway 11 Object Free Area	775'/775'	1,000' Beyond Runway End	To Remain	January 29, 2008
Runway 29 Object Free Area	240'/240'	1,000' Beyond Runway End	To Remain	January 29, 2008
Runway 18 Object Free Area	140'/140'	600' Beyond Runway End	Displace Threshold/Declared Distances	January 29, 2008
Runway 36 Object Free Area	100/100'	600' Beyond Runway End	Displace Threshold/Declared Distances	January 29, 2008
Runway 36 Object Free Zone	200' West & 176' East	400' Wide (200' Each Side)	Contact ATCT Before Crossing OFA	April 28, 2011
Taxiway A and Taxiway C Non-movement Boundary 2012-ANE-149-NRA	98.27' From Centerline	129.5' From Centerline	To Remain	August 22, 2013

AIRPORT DATA

		EXISTING	ULTIMATE
AIRPORT SERVICE LEVEL		Commercial Service	Commercial service
AIRPORT REFERENCE CODE		C-IV	D-IV
AIRPORT ELEVATION (NAVD 1988)		75.70 MSL	75.70 MSL
MEAN MAXIMUM TEMPERATURE OF HOTTEST MONTH		79° F (JULY)	79° F (JULY)
AIRPORT REFERENCE POINT (ARP) COORDINATES (NAD 1983)	LATITUDE	43° 38' 44.317" N	43° 38' 44.317" N
	LONGITUDE	070° 18' 31.019" W	070° 18' 31.019" W
AIRPORT ACREAGE		769	769
AIRPORT AND TERMINAL NAVIGATIONAL AIDS		Rotating Beacon CAT II ILS DME NDB ASR GPS	Rotating Beacon CAT II ILS DME NDB ASR GPS





GENERAL NOTES:

1. The Horizontal Datum for this ALP is based on NAD 1983. The Vertical Datum is based on NAVD 88.
2. Depiction of features and objects, including related elevations and clearances, within the runway protection zones are depicted on the INNER PORTION OF APPROACH SURFACE DRAWINGS.
3. Details concerning terminal improvements are depicted on the TERMINAL AREA AND AIR CARGO AREA DRAWINGS.
4. Recommended land uses within the airport environs are depicted on the ON-AIRPORT LAND USE DRAWING.
5. Building Restriction Line (BRL) is established in accordance with 14 C.F.R. Part 77 criteria, location utilizes 35 foot vertical object height. Building Restriction Line location may be reduced in accordance to Part 77 criteria, to limits of the Runway Object Free Area, Runway Safety Area, and/or Runway Protection Zone criteria.

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		AVIGATION EASEMENT
		MUNICIPAL BOUNDARY
BRL		BUILDING RESTRICTION LINE (BRL)
ROFA		RUNWAY OBJECT FREE AREA (ROFA)
ROFZ		RUNWAY OBJECT FREE ZONE (ROFZ)
RSA		RUNWAY SAFETY AREA (RSA)
POFZ		PRECISION OBSTACLE FREE ZONE (POFZ)
		BUILDING REMOVAL
		PAVEMENT REMOVAL
		ILS CRITICAL AREA
		PROPERTY ACQUISITION
		AIRPORT BUSINESS
		AIRPORT BUFFER AREA
		BUILDING / STRUCTURES
		FACILITY CONSTRUCTION - AIRFIELD
		FACILITY CONSTRUCTION - OTHER
		WATER QUALITY FILTER
		NO TAXI ISLAND
X	X	FENCING
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
PAPI-4		NAVIGATIONAL AID LIGHTS (PAPI)
REIL		RUNWAY END IDENTIFICATION LIGHT (REIL)
		AIRFIELD LIGHTS
		SEGMENTED CIRCLE / WIND INDICATOR
		WIND INDICATOR (LIGHTED)
1080		TOPOGRAPHY
		WETLAND

REV	DESCRIPTION	DATE	BY	APP'D
4	SUBMITTED TO CITY, MDOT AND FAA FOR FINAL APPROVAL	07.09.18	DDA	DDA
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REVISIONS

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PORTLAND INTERNATIONAL JETPORT

AIRPORT DATA SHEET

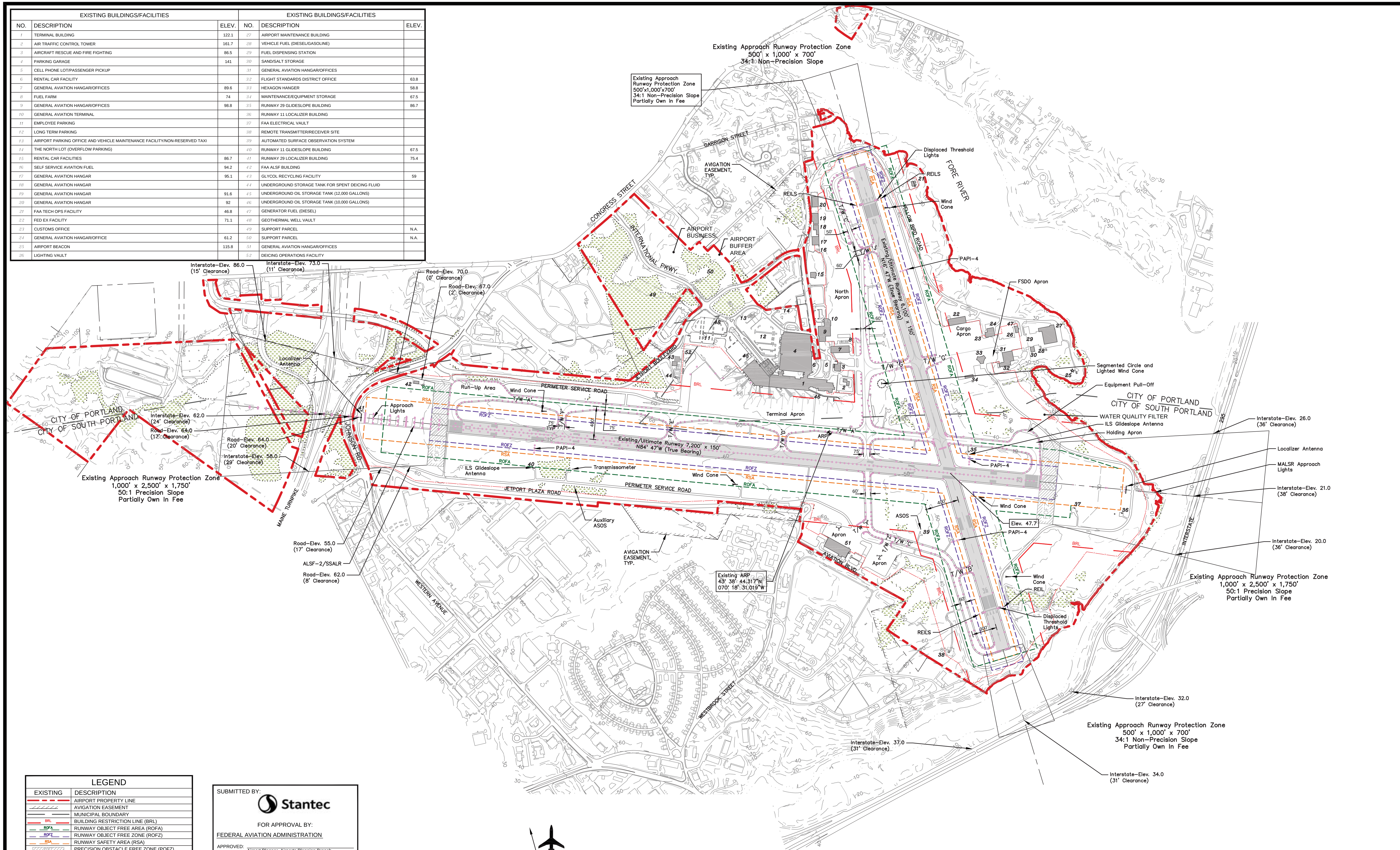
PORTLAND, MAINE

PLANNED BY: Jay Wood
DETAILED BY: Lori Anthony /
APPROVED BY: Dwight Anderson / Steve Benson
FILE NAME: OP-M116_DATA_SHEETS
July 2018
SHEET 2.0

Coffman Associates Airport Consultants

NO.	DESCRIPTION	ELEV.
1	TERMINAL BUILDING	122.1
2	AIR TRAFFIC CONTROL TOWER	161.7
3	AIRCRAFT RESCUE AND FIRE FIGHTING	86.5
4	PARKING GARAGE	141
5	CELL PHONE LOT/PASSENGER PICKUP	
6	RENTAL CAR FACILITY	
7	GENERAL AVIATION HANGAR/OFFICES	89.6
8	FUEL FARM	74
9	GENERAL AVIATION HANGAR/OFFICES	98.8
10	GENERAL AVIATION TERMINAL	
11	EMPLOYEE PARKING	
12	LONG TERM PARKING	
13	AIRPORT PARKING OFFICE AND VEHICLE MAINTENANCE FACILITY/NON-RESERVED TAXI	
14	THE NORTH LOT (OVERFLOW PARKING)	
15	RENTAL CAR FACILITIES	86.7
16	SELF SERVICE AVIATION FUEL	94.2
17	GENERAL AVIATION HANGAR	95.1
18	GENERAL AVIATION HANGAR	
19	GENERAL AVIATION HANGAR	91.6
20	GENERAL AVIATION HANGAR	92
21	FAA TECH OPS FACILITY	46.8
22	FED EX FACILITY	71.1
23	CUSTOMS OFFICE	
24	GENERAL AVIATION HANGAR/OFFICE	61.2
25	AIRPORT BEACON	115.8
26	LIGHTING VAULT	

NO.	DESCRIPTION	ELEV.
27	AIRPORT MAINTENANCE BUILDING	
28	VEHICLE FUEL (DIESEL/GASOLINE)	
29	FUEL DISPENSING STATION	
30	SAND/SALT STORAGE	
31	GENERAL AVIATION HANGAR/OFFICES	
32	FLIGHT STANDARDS DISTRICT OFFICE	63.8
33	HEXAGON HANGER	58.8
34	MAINTENANCE/EQUIPMENT STORAGE	67.5
35	RUNWAY 29 GLIDESLOPE BUILDING	86.7
36	RUNWAY 11 LOCALIZER BUILDING	
37	FAA ELECTRICAL VAULT	
38	REMOTE TRANSMITTER/RECEIVER SITE	
39	AUTOMATED SURFACE OBSERVATION SYSTEM	
40	RUNWAY 11 GLIDESLOPE BUILDING	67.5
41	RUNWAY 29 LOCALIZER BUILDING	75.4
42	FAA ALSF BUILDING	
43	GLYCOL RECYCLING FACILITY	59
44	UNDERGROUND STORAGE TANK FOR SPENT DEICING FLUID	
45	UNDERGROUND OIL STORAGE TANK (12,000 GALLONS)	
46	UNDERGROUND OIL STORAGE TANK (10,000 GALLONS)	
47	GENERATOR FUEL (DIESEL)	
48	GEOTHERMAL WELL VAULT	
49	SUPPORT PARCEL	N.A.
50	SUPPORT PARCEL	N.A.
51	GENERAL AVIATION HANGAR/OFFICES	
52	DEICING OPERATIONS FACILITY	



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	SEGMENTED CIRCLE / WIND INDICATOR
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	WETLAND

SUBMITTED BY:

Stantec

FOR APPROVAL BY:

FEDERAL AVIATION ADMINISTRATION

APPROVED: ______________________
Airport Planner, Airports Planning Branch

DATE: ______________

MAINE DEPARTMENT OF TRANSPORTATION

APPROVED: ______________________
Aviation Director

DATE: ______________

CITY OF PORTLAND, MAINE

APPROVED: ______________________
Airport Director

DATE: ______________

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REVISIONS

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PORTLAND INTERNATIONAL JETPORT

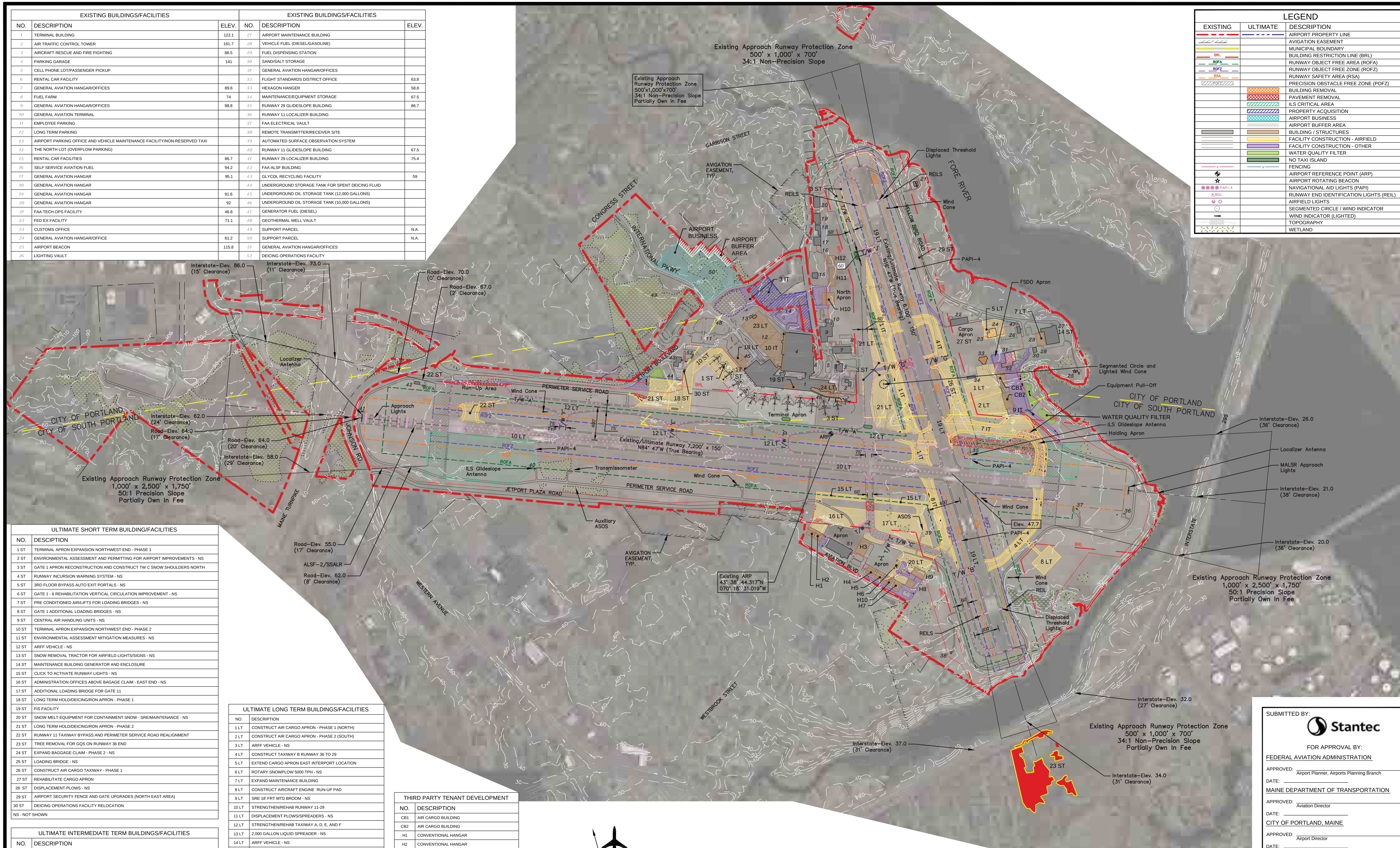
EXISTING FACILITIES PLAN

PORTLAND, MAINE

PLANNED BY: Dwight Anderson / Steve Benson
DETAILED BY: Lori Anthony / Tim Kahmann
APPROVED BY: Mike Dmyterko
FILE NAME: op_m116_site / 195350010

July 2018 | SHEET 3.0

Coffman Associates Airport Consultants



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45	UNDERGROUND OIL STORAGE TANK (12,000 GALLONS)	
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47	GENERATOR FUEL (DIESEL)	
48	GEOTHERMAL WELL VAULT	
49	SUPPORT PARCEL	N.A.
50	SUPPORT PARCEL	N.A.
51	GENERAL AVIATION HANGAR/OFFICES	
52	DEICING OPERATIONS FACILITY	

LEGEND		
EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		AVIGATION EASEMENT
		MUNICIPAL BOUNDARY
BRL		BUILDING RESTRICTION LINE (BRL)
ROFA		RUNWAY OBJECT FREE AREA (ROFA)
ROFZ		RUNWAY OBJECT FREE ZONE (ROFZ)
RSA		RUNWAY SAFETY AREA (RSA)
POFZ		PRECISION OBSTACLE FREE ZONE (POFZ)
		BUILDING REMOVAL
		PAVEMENT REMOVAL
		ILS CRITICAL AREA
		PROPERTY ACQUISITION
		AIRPORT BUSINESS
		AIRPORT BUFFER AREA
		BUILDING / STRUCTURES
		FACILITY CONSTRUCTION - AIRFIELD
		FACILITY CONSTRUCTION - OTHER
		WATER QUALITY FILTER
		NO TAXI ISLAND
x	x	FENCING
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
PAPI-4		NAVIGATIONAL AID LIGHTS (PAPI)
REIL		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		AIRFIELD LIGHTS
		SEGMENTED CIRCLE / WIND INDICATOR
		WIND INDICATOR (LIGHTED)
1080		TOPOGRAPHY
		WETLAND

ULTIMATE SHORT TERM BUILDING/FACILITIES	
NO.	DESCRIPTION
1 ST	TERMINAL APRON EXPANSION NORTHWEST END - PHASE 1
2 ST	ENVIRONMENTAL ASSESSMENT AND PERMITTING FOR AIRPORT IMPROVEMENTS - NS
3 ST	GATE 1 APRON RECONSTRUCTION AND CONSTRUCT TW C SNOW SHOULDERS NORTH
4 ST	RUNWAY INCURSION WARNING SYSTEM - NS
5 ST	3RD FLOOR BYPASS AUTO EXIT PORTALS - NS
6 ST	GATE 1 - 6 REHABILITATION VERTICAL CIRCULATION IMPROVEMENT - NS
7 ST	PRE CONDITIONED AIR/LIFTS FOR LOADING BRIDGES - NS
8 ST	GATE 1 ADDITIONAL LOADING BRIDGES - NS
9 ST	CENTRAL AIR HANDLING UNITS - NS
10 ST	TERMINAL APRON EXPANSION NORTHWEST END - PHASE 2
11 ST	ENVIRONMENTAL ASSESSMENT MITIGATION MEASURES - NS
12 ST	ARFF VEHICLE - NS
13 ST	SNOW REMOVAL TRACTOR FOR AIRFIELD LIGHTS/SIGNS - NS
14 ST	MAINTENANCE BUILDING GENERATOR AND ENCLOSURE
15 ST	CLICK TO ACTIVATE RUNWAY LIGHTS - NS
16 ST	ADMINISTRATION OFFICES ABOVE BAGAGE CLAIM - EAST END - NS
17 ST	ADDITIONAL LOADING BRIDGE FOR GATE 11
18 ST	LONG TERM HOLD/DEICING/RON APRON - PHASE 1
19 ST	FIS FACILITY
20 ST	SNOW MELT EQUIPMENT FOR CONTAINMENT SNOW - SRE/MAINTENANCE - NS
21 ST	LONG TERM HOLD/DEICING/RON APRON - PHASE 2
22 ST	RUNWAY 11 TAXIWAY BYPASS AND PERIMETER SERVICE ROAD REALIGNMENT
23 ST	TREE REMOVAL FOR GQS ON RUNWAY 36 END
24 ST	EXPAND BAGGAGE CLAIM - PHASE 2 - NS
25 ST	LOADING BRIDGE - NS
26 ST	CONSTRUCT AIR CARGO TAXIWAY - PHASE 1
27 ST	REHABILITATE CARGO APRON
28 ST	DISPLACEMENT PLOWS - NS
29 ST	AIRPORT SECURITY FENCE AND GATE UPGRADES (NORTH EAST AREA)
30 ST	DEICING OPERATIONS FACILITY RELOCATION
NS - NOT SHOWN	

ULTIMATE INTERMEDIATE TERM BUILDINGS/FACILITIES	
NO.	DESCRIPTION
1 IT	CONSTRUCT TAXIWAY C REALIGNMENT - PHASE 1
2 IT	LOADING BRIDGE - NS
3 IT	LAND ACQUSITION AND PARKING EXPANSION
4 IT	CONSTRUCT AIR CARGO TAXIWAY - PHASE 2
5 IT	LOADING BRIDGES - NS
6 IT	REPLACE REGIONAL BOARDING RAMPS AT GATE 1B AND 1C - NS
7 IT	RELOCATE TAXIWAY A EAST OF RUNWAY 18-36
8 IT	CONSTRUCT TAXIWAY C REALIGNMENT - PHASE 2
9 IT	RELOCATE SERVICE ACCESS ROAD EAST OF CARGO
10 IT	PARKING GARAGE EXPANSION - PHASE 3
NS - NOT SHOWN	

ULTIMATE LONG TERM BUILDINGS/FACILITIES	
NO.	DESCRIPTION
1 LT	CONSTRUCT AIR CARGO APRON - PHASE 1 (NORTH)
2 LT	CONSTRUCT AIR CARGO APRON - PHASE 2 (SOUTH)
3 LT	ARFF VEHICLE - NS
4 LT	CONSTRUCT TAXIWAY B RUNWAY 36 TO 29
5 LT	EXTEND CARGO APRON EAST INTERPORT LOCATION
6 LT	ROTARY SNOWPLOW 5000 TPH - NS
7 LT	EXPAND MAINTENANCE BUILDING
8 LT	CONSTRUCT AIRCRAFT ENGINE RUN-UP PAD
9 LT	SRE 18' FRT MTD BROOM - NS
10 LT	STRENGTHEN/REHAB RUNWAY 11-29
11 LT	DISPLACEMENT PLOWS/SPREADERS - NS
12 LT	STRENGTHEN/REHAB TAXIWAY A, D, E, AND F
13 LT	2,000 GALLON LIQUID SPREADER - NS
14 LT	ARFF VEHICLE - NS
15 LT	CONSTRUCT SOUTH APRON TAXIWAY
16 LT	CONSTRUCT SOUTH GENERAL AVIATION APRON - PHASE 1
17 LT	CONSTRUCT SOUTH GENERAL AVIATION APRON - PHASE 2
18 LT	TERMINAL WESTERLY EXPANSION
19 LT	REHABILITATE RUNWAY 18-36, TAXIWAY B AND TAXIWAY J
20 LT	CONSTRUCT SOUTH GENERAL AVIATION APRON - PHASE 3
21 LT	RAMP EXPANSION EAST OF AIR TRAFFIC CONTROL TOWER
22 LT	SNOW PLOWS - NS
23 LT	PARKING GARAGE EXPANSION - PHASE 4
24 LT	TERMINAL EASTERLY EXPANSION/RENOVATION
NS - NOT SHOWN	

THIRD PARTY TENANT DEVELOPMENT	
NO.	DESCRIPTION
CB1	AIR CARGO BUILDING
CB2	AIR CARGO BUILDING
H1	CONVENTIONAL HANGAR
H2	CONVENTIONAL HANGAR
H3	CONVENTIONAL HANGAR
H4	CONVENTIONAL HANGAR
H5	CONVENTIONAL HANGAR
H6	CONVENTIONAL HANGAR
H7	CONVENTIONAL HANGAR
H8	GENERAL AVIATION HANGAR/OFFICES
H9	GENERAL AVIATION HANGAR/OFFICES
H10	CONVENTIONAL HANGAR
H11	CONVENTIONAL HANGAR
H12	CONVENTIONAL HANGAR
NS - NOT SHOWN	

NORTH

Magnetic Declination 15° 26' 09" West (March 2016)
Annual Rate of Change 00° 05' East (March 2016)

GRAPHIC SCALE

500 0 250 500 1000

(IN FEET)
1 inch = 500 ft.

SUBMITTED BY:
Stantec

FOR APPROVAL BY:

FEDERAL AVIATION ADMINISTRATION
APPROVED: ______ Airport Planner, Airports Planning Branch
DATE: ______

MAINE DEPARTMENT OF TRANSPORTATION
APPROVED: ______ Aviation Director
DATE: ______

CITY OF PORTLAND, MAINE
APPROVED: ______ Airport Director
DATE: ______

REV	DESCRIPTION	DATE	BY	APP'D
4	SUBMITTED TO CITY, MDOT AND FAA FOR FINAL APPROVAL	07.09.18	DDA	DDA
3	SUBMITTED TO FAA FOR APPROVAL	11.29.17	DDA	DDA
2	ISSUED DRAFT ALP TO CITY AND FAA	11.17.16	DDA	DDA
1	ISSUED TO CLIENT FOR REVIEW	07.26.16	DDA	DDA

REVISIONS

THE CONTENTS OF THIS PLAN DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THIS DOCUMENT BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS.

Stantec Consulting Services Inc.
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PORTLAND INTERNATIONAL JETPORT

ULTIMATE FACILITIES PLAN

PORTLAND, MAINE

PLANNED BY: Dwight Anderson / Steve Benson
DETAILED BY: Lori Anthony / Tim Kahmann
APPROVED BY: Mike Dmyterko
FILE NAME: op_m116_site / 195350010
July 2018
SHEET 4.0

Coffman Associates
Airport Consultants

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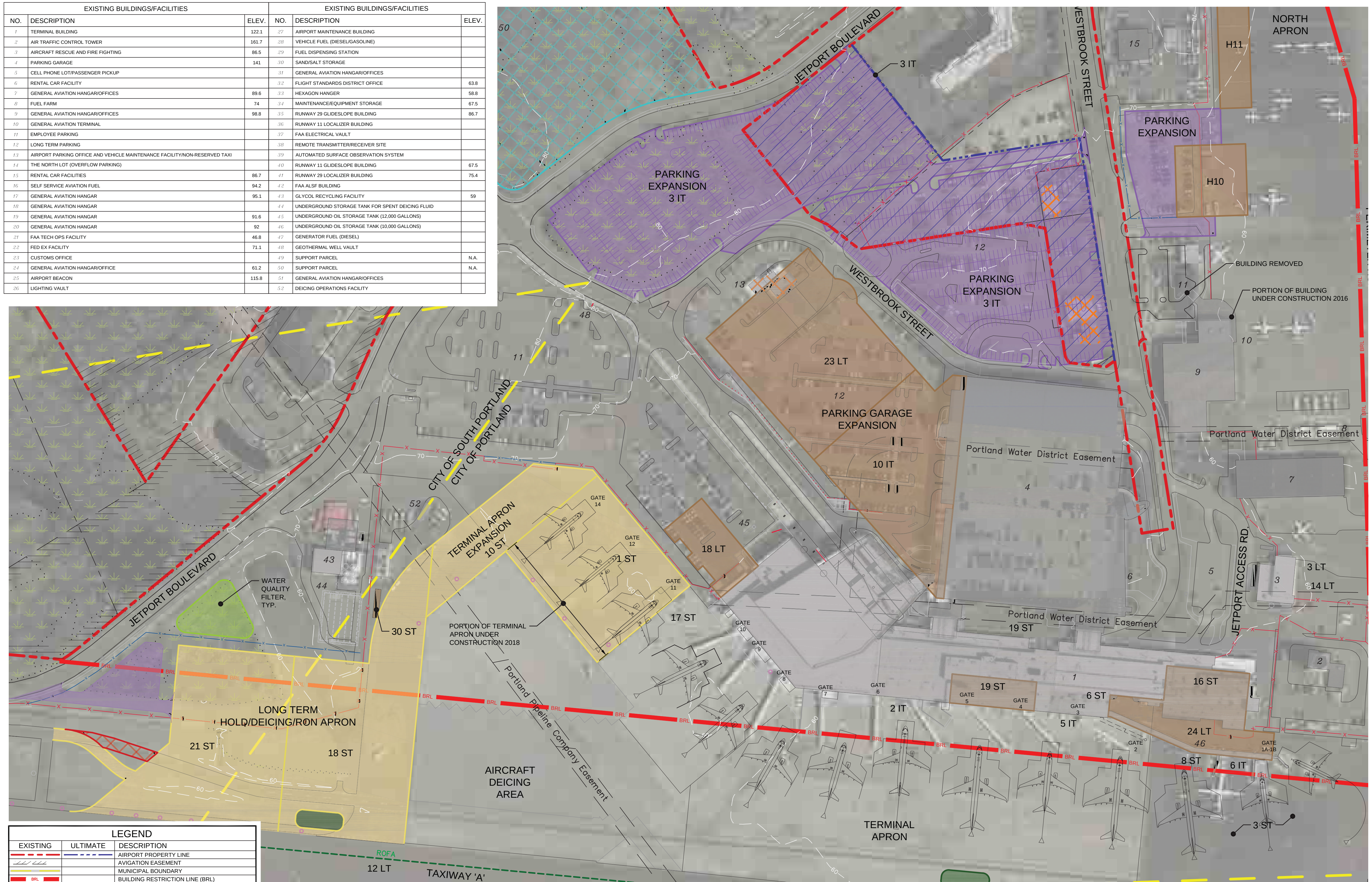
EXISTING BUILDINGS/FACILITIES		
NO.	DESCRIPTION	ELEV.
1	TERMINAL BUILDING	122.1
2	AIR TRAFFIC CONTROL TOWER	161.7
3	AIRCRAFT RESCUE AND FIRE FIGHTING	86.5
4	PARKING GARAGE	141
5	CELL PHONE LOT/PASSENGER PICKUP	
6	RENTAL CAR FACILITY	
7	GENERAL AVIATION HANGAR/OFFICES	89.6
8	FUEL FARM	74
9	GENERAL AVIATION HANGAR/OFFICES	98.8
10	GENERAL AVIATION TERMINAL	
11	EMPLOYEE PARKING	
12	LONG TERM PARKING	
13	AIRPORT PARKING OFFICE AND VEHICLE MAINTENANCE FACILITY/NON-RESERVED TAXI	
14	THE NORTH LOT (OVERFLOW PARKING)	
15	RENTAL CAR FACILITIES	86.7
16	SELF SERVICE AVIATION FUEL	94.2
17	GENERAL AVIATION HANGAR	95.1
18	GENERAL AVIATION HANGAR	
19	GENERAL AVIATION HANGAR	91.6
20	GENERAL AVIATION HANGAR	92
21	FAA TECH OPS FACILITY	46.8
22	FED EX FACILITY	71.1
23	CUSTOMS OFFICE	
24	GENERAL AVIATION HANGAR/OFFICE	61.2
25	AIRPORT BEACON	115.8
26	LIGHTING VAULT	

EXISTING BUILDINGS/FACILITIES		
NO.	DESCRIPTION	ELEV.
27	AIRPORT MAINTENANCE BUILDING	
28	VEHICLE FUEL (DIESEL/GASOLINE)	
29	FUEL DISPENSING STATION	
30	SAND/SALT STORAGE	
31	GENERAL AVIATION HANGAR/OFFICES	
32	FLIGHT STANDARDS DISTRICT OFFICE	63.8
33	HEXAGON HANGER	58.8
34	MAINTENANCE/EQUIPMENT STORAGE	67.5
35	RUNWAY 29 GLIDESLOPE BUILDING	86.7
36	RUNWAY 11 LOCALIZER BUILDING	
37	FAA ELECTRICAL VAULT	
38	REMOTE TRANSMITTER/RECEIVER SITE	
39	AUTOMATED SURFACE OBSERVATION SYSTEM	
40	RUNWAY 11 GLIDESLOPE BUILDING	67.5
41	RUNWAY 29 LOCALIZER BUILDING	75.4
42	FAA ALSF BUILDING	
43	GLYCOL RECYCLING FACILITY	59
44	UNDERGROUND STORAGE TANK FOR SPENT DEICING FLUID	
45	UNDERGROUND OIL STORAGE TANK (12,000 GALLONS)	
46	UNDERGROUND OIL STORAGE TANK (10,000 GALLONS)	
47	GENERATOR FUEL (DIESEL)	
48	GEOTHERMAL WELL VAULT	
49	SUPPORT PARCEL	N.A.
50	SUPPORT PARCEL	N.A.
51	GENERAL AVIATION HANGAR/OFFICES	
52	DEICING OPERATIONS FACILITY	



LEGEND		
EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		AVIGATION EASEMENT
		MUNICIPAL BOUNDARY
BRL		BUILDING RESTRICTION LINE (BRL)
ROFA		RUNWAY OBJECT FREE AREA (ROFA)
ROFZ		RUNWAY OBJECT FREE ZONE (ROFZ)
RSA		RUNWAY SAFETY AREA (RSA)
POFZ		PRECISION OBSTACLE FREE ZONE (POFZ)
		BUILDING REMOVAL
		PAVEMENT REMOVAL
		ILS CRITICAL AREA
		PROPERTY ACQUISITION
		AIRPORT BUSINESS
		AIRPORT BUFFER AREA
		BUILDING / STRUCTURES
		FACILITY CONSTRUCTION - AIRFIELD
		FACILITY CONSTRUCTION - OTHER
		WATER QUALITY FILTER
		NO TAXI ISLAND
X	X	FENCING
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
PAPI–4		NAVIGATIONAL AID LIGHTS (PAPI)
REIL		RUNWAY END IDENTIFICATION LIGHT (REIL)
		AIRFIELD LIGHTS
		SEGMENTED CIRCLE / WIND INDICATOR
		WIND INDICATOR (LIGHTED)
1080		TOPOGRAPHY
		WETLAND

ULTIMATE SHORT TERM BUILDING/FACILITIES	
NO.	DESCIPTION
1 ST	TERMINAL APRON EXPANSION NORTHWEST END - PHASE 1
2 ST	ENVIRONMENTAL ASSESSMENT AND PERMITTING FOR AIRPORT IMPROVEMENTS - NS
3 ST	GATE 1 APRON RECONSTRUCTION AND CONSTRUCT TW C SNOW SHOULDERS NORTH
4 ST	RUNWAY INCURSION WARNING SYSTEM - NS
5 ST	3RD FLOOR BYPASS AUTO EXIT PORTALS - NS
6 ST	GATE 1 - 6 REHABILITATION VERTICAL CIRCULATION IMPROVEMENT
7 ST	PRE CONDITIONED AIR/LIFTS FOR LOADING BRIDGES - NS
8 ST	GATE 1 ADDITIONAL LOADING BRIDGES
9 ST	CENTRAL AIR HANDLING UNITS - NS
10 ST	TERMINAL APRON EXPANSION NORTHWEST END - PHASE 2
11 ST	ENVIRONMENTAL ASSESSMENT MITIGATION MEASURES - NS
12 ST	ARFF VEHICLE - NS
13 ST	SNOW REMOVAL TRACTOR FOR AIRFIELD LIGHTS/SIGNS - NS
14 ST	MAINTENANCE BUILDING GENERATOR AND ENCLOSURE
15 ST	CLICK TO ACTIVATE RUNWAY LIGHTS - NS
16 ST	ADMINISTRATION OFFICES ABOVE BAGAGE CLAIM - EAST END
17 ST	ADDITIONAL LOADING BRIDGE FOR GATE 11
18 ST	LONG TERM HOLD/DEICING/RON APRON - PHASE 1
19 ST	FIS FACILITY
20 ST	SNOW MELT EQUIPMENT FOR CONTAINMENT SNOW - SRE/MAINTENANCE - NS
21 ST	LONG TERM HOLD/DEICING/RON APRON - PHASE 2
22 ST	RUNWAY 11 TAXIWAY BYPASS AND PERIMETER SERVICE ROAD REALIGNMENT
23 ST	TREE REMOVAL FOR GQS ON RUNWAY 36 END
24 ST	EXPAND BAGGAGE CLAIM - PHASE 2 - NS
25 ST	LOADING BRIDGE - NS
26 ST	CONSTRUCT AIR CARGO TAXIWAY - PHASE 1
27 ST	REHABILITATE CARGO APRON
28 ST	DISPLACEMENT PLOWS - NS
29 ST	AIRPORT SECURITY FENCE AND GATE UPGRADES (NORTH EAST AREA)
30 ST	DEICING OPERATIONS FACILITY RELOCATION
NS - NOT SHOWN	

ULTIMATE INTERMEDIATE TERM BUILDINGS/FACILITIES	
NO.	DESCRIPTION
1 IT	CONSTRUCT TAXIWAY C REALIGNMENT - PHASE 1
2 IT	LOADING BRIDGE
3 IT	LAND ACQUSITION AND PARKING EXPANSION
4 IT	CONSTRUCT AIR CARGO TAXIWAY - PHASE 2
5 IT	LOADING BRIDGES
6 IT	REPLACE REGIONAL BOARDING RAMPS AT GATE 1B AND 1C
7 IT	RELOCATE TAXIWAY A EAST OF RUNWAY 18-36
8 IT	CONSTRUCT TAXIWAY C REALIGNMENT - PHASE 2
9 IT	RELOCATE SERVICE ACCESS ROAD EAST OF CARGO
10 IT	PARKING GARAGE EXPANSION - PHASE 3
NS - NOT SHOWN	

ULTIMATE LONG TERM BUILDINGS/FACILITIES	
NO.	DESCRIPTION
1 LT	CONSTRUCT AIR CARGO APRON - PHASE 1 (NORTH)
2 LT	CONSTRUCT AIR CARGO APRON - PHASE 2 (SOUTH)
3 LT	ARFF VEHICLE
4 LT	CONSTRUCT TAXIWAY B RUNWAY 36 TO 29
5 LT	EXTEND CARGO APRON EAST INTERPORT LOCATION
6 LT	ROTARY SNOWPLOW 5000 TPH - NS
7 LT	EXPAND MAINTENANCE BUILDING
8 LT	CONSTRUCT AIRCRAFT ENGINE RUN-UP PAD
9 LT	SRE 18' FRT MTD BROOM - NS
10 LT	STRENGTHEN/REHAB RUNWAY 11-29
11 LT	DISPLACEMENT PLOWS/SPREADERS - NS
12 LT	STRENGTHEN/REHAB TAXIWAY A, D, E, AND F
13 LT	2,000 GALLON LIQUID SPREADER - NS
14 LT	ARFF VEHICLE
15 LT	CONSTRUCT SOUTH APRON TAXIWAY
16 LT	CONSTRUCT SOUTH GENERAL AVIATION APRON - PHASE 1
17 LT	CONSTRUCT SOUTH GENERAL AVIATION APRON - PHASE 2
18 LT	TERMINAL WESTERLY EXPANSION
19 LT	REHABILITATE RUNWAY 18-36, TAXIWAY B AND TAXIWAY J
20 LT	CONSTRUCT SOUTH GENERAL AVIATION APRON - PHASE 3
21 LT	RAMP EXPANSION EAST OF AIR TRAFFIC CONTROL TOWER
22 LT	SNOW PLOWS - NS
23 LT	PARKING GARAGE EXPANSION - PHASE 4
24 LT	TERMINAL EASTERLY EXPANSION/RENOVATION
NS - NOT SHOWN	

THIRD PARTY TENANT DEVELOPMENT	
NO.	DESCRIPTION
CB1	AIR CARGO BUILDING
CB2	AIR CARGO BUILDING
H1	CONVENTIONAL HANGAR
H2	CONVENTIONAL HANGAR
H3	CONVENTIONAL HANGAR
H4	CONVENTIONAL HANGAR
H5	CONVENTIONAL HANGAR
H6	CONVENTIONAL HANGAR
H7	CONVENTIONAL HANGAR
H8	GENERAL AVIATION HANGAR/OFFICES
H9	GENERAL AVIATION HANGAR/OFFICES
H10	CONVENTIONAL HANGAR
H11	CONVENTIONAL HANGAR
H12	CONVENTIONAL HANGAR
NS - NOT SHOWN	

NORTH

Magnetic Declination 15° 26' 09" West (March 2016)
Annual Rate of Change 00° 05' East (March 2016)

GRAPHIC SCALE

100 0 50 100 200

(IN FEET)
1 inch = 100 ft.

REV	DESCRIPTION	DATE	BY	APP'D
4	SUBMITTED TO CITY, MDOT AND FAA FOR FINAL APPROVAL	07.09.18	DDA	DDA
3	SUBMITTED TO FAA FOR APPROVAL	11.29.17	DDA	DDA
2	ISSUED DRAFT ALP TO CITY AND FAA	11.17.16	DDA	DDA
1	ISSUED TO CLIENT FOR REVIEW	07.26.16	DDA	DDA

REVISIONS

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PORTLAND INTERNATIONAL JETPORT

TERMINAL AREA

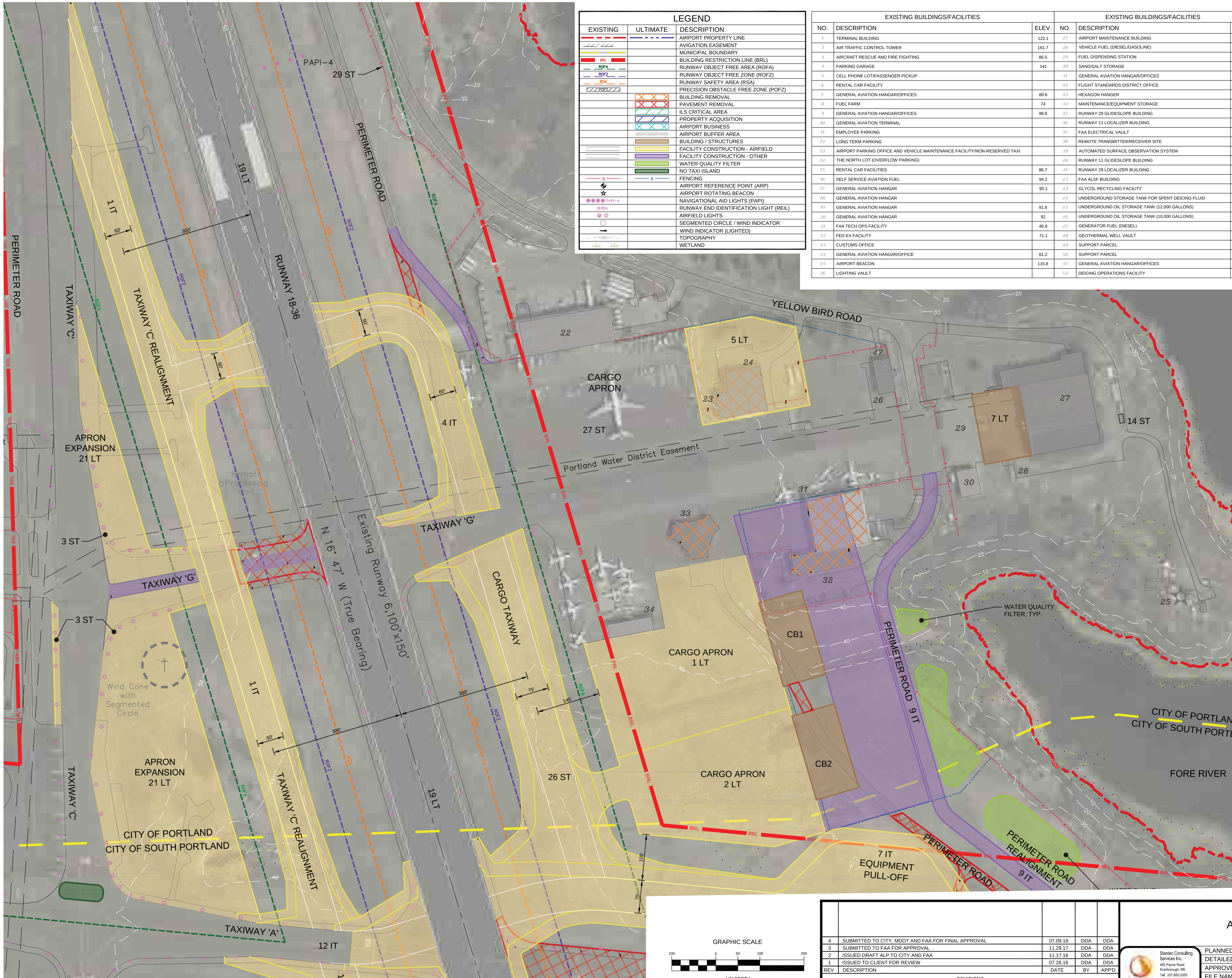
PORTLAND, MAINE

PLANNED BY: Dwight Anderson / Steve Benson
DETAILED BY: Lori Anthony / Tim Kahmann
APPROVED BY: Mike Dmyterko
FILE NAME: op_m116_site / 195350010

July 2018

SHEET 5.0

Coffman Associates
Airport Consultants



LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		AVIGATION EASEMENT
		MUNICIPAL BOUNDARY
BRL		BUILDING RESTRICTION LINE (BRL)
ROFA		RUNWAY OBJECT FREE AREA (ROFA)
ROFZ		RUNWAY OBJECT FREE ZONE (ROFZ)
RSA		RUNWAY SAFETY AREA (RSA)
POFZ		PRECISION OBSTACLE FREE ZONE (POFZ)
		BUILDING REMOVAL
		PAVEMENT REMOVAL
		ILS CRITICAL AREA
		PROPERTY ACQUISITION
		AIRPORT BUSINESS
		AIRPORT BUFFER AREA
		BUILDING / STRUCTURES
		FACILITY CONSTRUCTION - AIRFIELD
		FACILITY CONSTRUCTION - OTHER
		WATER QUALITY FILTER
		NO TAXI ISLAND
X	X	FENCING
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
PAPI-4		NAVIGATIONAL AID LIGHTS (PAPI)
REIL		RUNWAY END IDENTIFICATION LIGHT (REIL)
		AIRFIELD LIGHTS
		SEGMENTED CIRCLE / WIND INDICATOR
		WIND INDICATOR (LIGHTED)
1080		TOPOGRAPHY
		WETLAND

EXISTING BUILDINGS/FACILITIES

NO.	DESCRIPTION	ELEV.	NO.	DESCRIPTION	ELEV.
1	TERMINAL BUILDING	122.1	27	AIRPORT MAINTENANCE BUILDING	
2	AIR TRAFFIC CONTROL TOWER	161.7	28	VEHICLE FUEL (DIESEL/GASOLINE)	
3	AIRCRAFT RESCUE AND FIRE FIGHTING	86.5	29	FUEL DISPENSING STATION	
4	PARKING GARAGE	141	30	SAND/SALT STORAGE	
5	CELL PHONE LOT/PASSENGER PICKUP		31	GENERAL AVIATION HANGAR/OFFICES	
6	RENTAL CAR FACILITY		32	FLIGHT STANDARDS DISTRICT OFFICE	63.8
7	GENERAL AVIATION HANGAR/OFFICES	89.6	33	HEXAGON HANGER	58.8
8	FUEL FARM	74	34	MAINTENANCE/EQUIPMENT STORAGE	67.5
9	GENERAL AVIATION HANGAR/OFFICES	98.8	35	RUNWAY 29 GLIDESLOPE BUILDING	86.7
10	GENERAL AVIATION TERMINAL		36	RUNWAY 11 LOCALIZER BUILDING	
11	EMPLOYEE PARKING		37	FAA ELECTRICAL VAULT	
12	LONG TERM PARKING		38	REMOTE TRANSMITTER/RECEIVER SITE	
13	AIRPORT PARKING OFFICE AND VEHICLE MAINTENANCE FACILITY/NON-RESERVED TAXI		39	AUTOMATED SURFACE OBSERVATION SYSTEM	
14	THE NORTH LOT (OVERFLOW PARKING)		40	RUNWAY 11 GLIDESLOPE BUILDING	67.5
15	RENTAL CAR FACILITIES	86.7	41	RUNWAY 29 LOCALIZER BUILDING	75.4
16	SELF SERVICE AVIATION FUEL	94.2	42	FAA ALSF BUILDING	
17	GENERAL AVIATION HANGAR	95.1	43	GLYCOL RECYCLING FACILITY	59
18	GENERAL AVIATION HANGAR		44	UNDERGROUND STORAGE TANK FOR SPENT DEICING FLUID	
19	GENERAL AVIATION HANGAR	91.6	45	UNDERGROUND OIL STORAGE TANK (12,000 GALLONS)	
20	GENERAL AVIATION HANGAR	92	46	UNDERGROUND OIL STORAGE TANK (10,000 GALLONS)	
21	FAA TECH OPS FACILITY	46.8	47	GENERATOR FUEL (DIESEL)	
22	FED EX FACILITY	71.1	48	GEOTHERMAL WELL VAULT	
23	CUSTOMS OFFICE		49	SUPPORT PARCEL	N.A.
24	GENERAL AVIATION HANGAR/OFFICE	61.2	50	SUPPORT PARCEL	N.A.
25	AIRPORT BEACON	115.8	51	GENERAL AVIATION HANGAR/OFFICES	
26	LIGHTING VAULT		52	DEICING OPERATIONS FACILITY	

ULTIMATE SHORT TERM BUILDING/FACILITIES

NO.	DESCIPTION
1 ST	TERMINAL APRON EXPANSION NORTHWEST END - PHASE 1
2 ST	ENVIRONMENTAL ASSESSMENT AND PERMITTING FOR AIRPORT IMPROVEMENTS - NS
3 ST	GATE 1 APRON RECONSTRUCTION AND CONSTRUCT TW C SNOW SHOULDERS NORTH
4 ST	RUNWAY INCURSION WARNING SYSTEM - NS
5 ST	3RD FLOOR BYPASS AUTO EXIT PORTALS - NS
6 ST	GATE 1 - 6 REHABILITATION VERTICAL CIRCULATION IMPROVEMENT - NS
7 ST	PRE CONDITIONED AIR/LIFTS FOR LOADING BRIDGES - NS
8 ST	GATE 1 ADDITIONAL LOADING BRIDGES - NS
9 ST	CENTRAL AIR HANDLING UNITS - NS
10 ST	TERMINAL APRON EXPANSION NORTHWEST END - PHASE 2
11 ST	ENVIRONMENTAL ASSESSMENT MITIGATION MEASURES - NS
12 ST	ARFF VEHICLE - NS
13 ST	SNOW REMOVAL TRACTOR FOR AIRFIELD LIGHTS/SIGNS - NS
14 ST	MAINTENANCE BUILDING GENERATOR AND ENCLOSURE
15 ST	CLICK TO ACTIVATE RUNWAY LIGHTS - NS
16 ST	ADMINISTRATION OFFICES ABOVE BAGAGE CLAIM - EAST END - NS
17 ST	ADDITIONAL LOADING BRIDGE FOR GATE 11
18 ST	LONG TERM HOLD/DEICING/RON APRON - PHASE 1
19 ST	FIS FACILITY
20 ST	SNOW MELT EQUIPMENT FOR CONTAINMENT SNOW - SRE/MAINTENANCE - NS
21 ST	LONG TERM HOLD/DEICING/RON APRON - PHASE 2
22 ST	RUNWAY 11 TAXIWAY BYPASS AND PERIMETER SERVICE ROAD REALIGNMENT
23 ST	TREE REMOVAL FOR GQS ON RUNWAY 36 END
24 ST	EXPAND BAGGAGE CLAIM - PHASE 2 - NS
25 ST	LOADING BRIDGE - NS
26 ST	CONSTRUCT AIR CARGO TAXIWAY - PHASE 1
27 ST	REHABILITATE CARGO APRON
28 ST	DISPLACEMENT PLOWS - NS
29 ST	AIRPORT SECURITY FENCE AND GATE UPGRADES (NORTH EAST AREA)
30 ST	DEICING OPERATIONS FACILITY RELOCATION
NS - NOT SHOWN	

ULTIMATE INTERMEDIATE TERM BUILDINGS/FACILITIES

NO.	DESCRIPTION
1 IT	CONSTRUCT TAXIWAY C REALIGNMENT - PHASE 1
2 IT	LOADING BRIDGE - NS
3 IT	LAND ACQUSITION AND PARKING EXPANSION
4 IT	CONSTRUCT AIR CARGO TAXIWAY - PHASE 2
5 IT	LOADING BRIDGES - NS
6 IT	REPLACE REGIONAL BOARDING RAMPS AT GATE 1B AND 1C - NS
7 IT	RELOCATE TAXIWAY A EAST OF RUNWAY 18-36
8 IT	CONSTRUCT TAXIWAY C REALIGNMENT - PHASE 2
9 IT	RELOCATE SERVICE ACCESS ROAD EAST OF CARGO
10 IT	PARKING GARAGE EXPANSION - PHASE 3
NS - NOT SHOWN	

ULTIMATE LONG TERM BUILDINGS/FACILITIES

NO.	DESCRIPTION
1 LT	CONSTRUCT AIR CARGO APRON - PHASE 1 (NORTH)
2 LT	CONSTRUCT AIR CARGO APRON - PHASE 2 (SOUTH)
3 LT	ARFF VEHICLE - NS
4 LT	CONSTRUCT TAXIWAY B RUNWAY 36 TO 29
5 LT	EXTEND CARGO APRON EAST INTERPORT LOCATION
6 LT	ROTARY SNOWPLOW 5000 TPH - NS
7 LT	EXPAND MAINTENANCE BUILDING
8 LT	CONSTRUCT AIRCRAFT ENGINE RUN-UP PAD
9 LT	SRE 18' FRT MTD BROOM - NS
10 LT	STRENGTHEN/REHAB RUNWAY 11-29
11 LT	DISPLACEMENT PLOWS/SPREADERS - NS
12 LT	STRENGTHEN/REHAB TAXIWAY A, D, E, AND F
13 LT	2,000 GALLON LIQUID SPREADER - NS
14 LT	ARFF VEHICLE - NS
15 LT	CONSTRUCT SOUTH APRON TAXIWAY
16 LT	CONSTRUCT SOUTH GENERAL AVIATION APRON - PHASE 1
17 LT	CONSTRUCT SOUTH GENERAL AVIATION APRON - PHASE 2
18 LT	TERMINAL WESTERLY EXPANSION
19 LT	REHABILITATE RUNWAY 18-36, TAXIWAY B AND TAXIWAY J
20 LT	CONSTRUCT SOUTH GENERAL AVIATION APRON - PHASE 3
21 LT	RAMP EXPANSION EAST OF AIR TRAFFIC CONTROL TOWER
22 LT	SNOW PLOWS - NS
23 LT	PARKING GARAGE EXPANSION - PHASE 4
24 LT	TERMINAL EASTERLY EXPANSION/RENOVATION
NS - NOT SHOWN	

THIRD PARTY TENANT DEVELOPMENT

NO.	DESCRIPTION
CB1	AIR CARGO BUILDING
CB2	AIR CARGO BUILDING
H1	CONVENTIONAL HANGAR
H2	CONVENTIONAL HANGAR
H3	CONVENTIONAL HANGAR
H4	CONVENTIONAL HANGAR
H5	CONVENTIONAL HANGAR
H6	CONVENTIONAL HANGAR
H7	CONVENTIONAL HANGAR
H8	GENERAL AVIATION HANGAR/OFFICES
H9	GENERAL AVIATION HANGAR/OFFICES
H10	CONVENTIONAL HANGAR
H11	CONVENTIONAL HANGAR
H12	CONVENTIONAL HANGAR
NS - NOT SHOWN	

NORTH

Magnetic Declination 15° 26' 09" West (March 2016)
Annual Rate of Change 00° 05' East (March 2016)

GRAPHIC SCALE

100 0 50 100 200

(IN FEET)
1 inch = 100 ft.

REV	DESCRIPTION	DATE	BY	APP'D
4	SUBMITTED TO CITY, MDOT AND FAA FOR FINAL APPROVAL	07.09.18	DDA	DDA
3	SUBMITTED TO FAA FOR APPROVAL	11.29.17	DDA	DDA
2	ISSUED DRAFT ALP TO CITY AND FAA	11.17.16	DDA	DDA
1	ISSUED TO CLIENT FOR REVIEW	07.26.16	DDA	DDA

REVISIONS

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Stantec Consulting Services Inc.
482 Payne Road
Scarborough, ME
Tel. 207.883.3355
WWW.STANTEC.COM

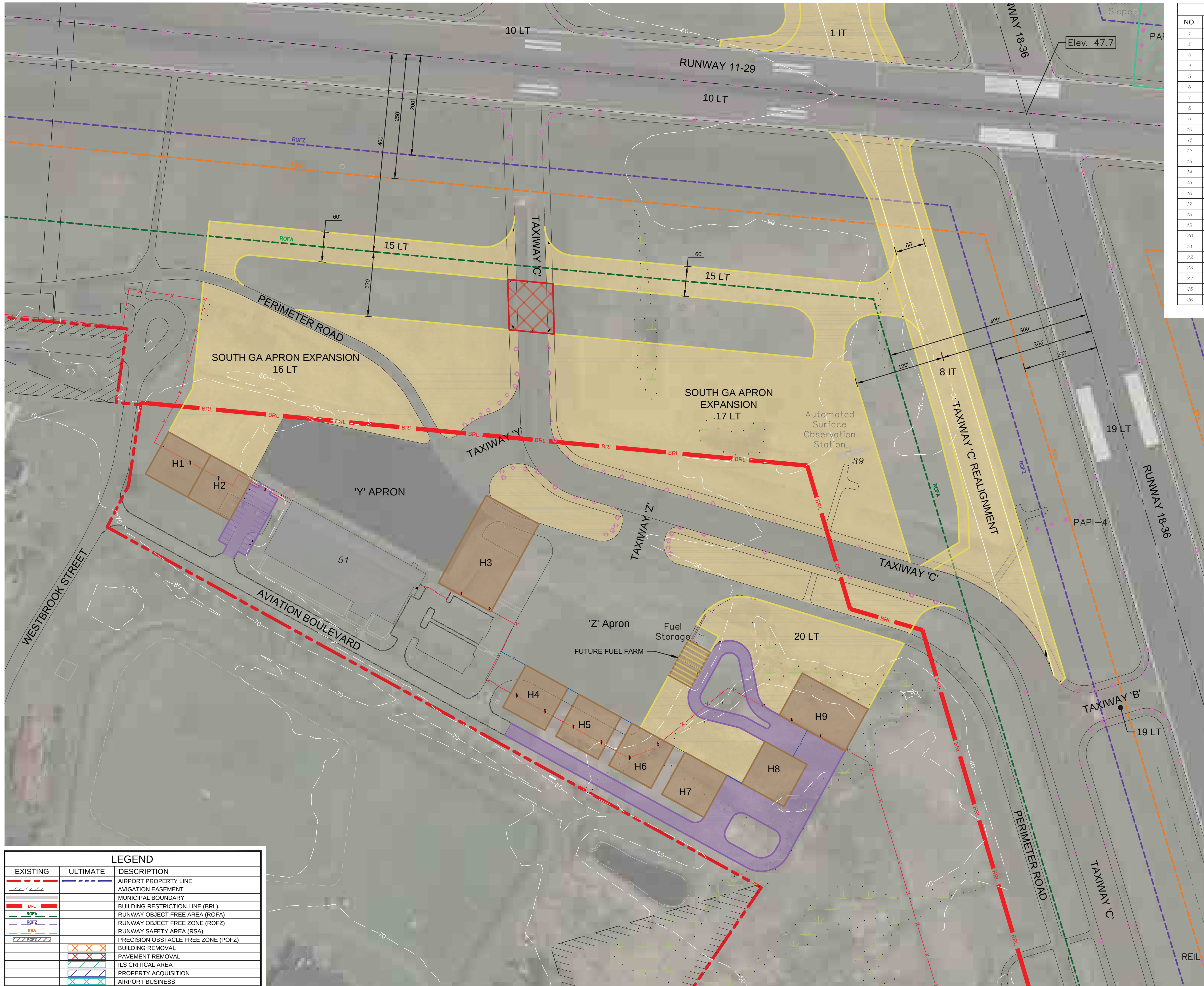
PORTLAND INTERNATIONAL JETPORT

AIR CARGO AND TAXIWAY 'C'

PORTLAND, MAINE

PLANNED BY:	Dwight Anderson / Steve Benson
DETAILED BY:	Lori Anthony / Tim Kahmann
APPROVED BY:	Mike Dmyterko
FILE NAME:	op_m116_site / 195350010
July 2018	SHEET 6.0

Coffman Associates Airport Consultants



EXISTING BUILDINGS/FACILITIES

NO.	DESCRIPTION	ELEV.	NO.	DESCRIPTION	ELEV.
1	TERMINAL BUILDING	122.1	27	AIRPORT MAINTENANCE BUILDING	
2	AIR TRAFFIC CONTROL TOWER	161.7	28	VEHICLE FUEL (DIESEL/GASOLINE)	
3	AIRCRAFT RESCUE AND FIRE FIGHTING	86.5	29	FUEL DISPENSING STATION	
4	PARKING GARAGE	141	30	SAND/SALT STORAGE	
5	CELL PHONE LOT/PASSENGER PICKUP		31	GENERAL AVIATION HANGAR/OFFICES	
6	RENTAL CAR FACILITY		32	FLIGHT STANDARDS DISTRICT OFFICE	63.8
7	GENERAL AVIATION HANGAR/OFFICES	89.6	33	HEXAGON HANGER	58.8
8	FUEL FARM	74	34	MAINTENANCE/EQUIPMENT STORAGE	67.5
9	GENERAL AVIATION HANGAR/OFFICES	98.8	35	RUNWAY 29 GLIDESLOPE BUILDING	86.7
10	GENERAL AVIATION TERMINAL		36	RUNWAY 11 LOCALIZER BUILDING	
11	EMPLOYEE PARKING		37	FAA ELECTRICAL VAULT	
12	LONG TERM PARKING		38	REMOTE TRANSMITTER/RECEIVER SITE	
13	AIRPORT PARKING OFFICE AND VEHICLE MAINTENANCE FACILITY/NON-RESERVED TAXI		39	AUTOMATED SURFACE OBSERVATION SYSTEM	
14	THE NORTH LOT (OVERFLOW PARKING)		40	RUNWAY 11 GLIDESLOPE BUILDING	67.5
15	RENTAL CAR FACILITIES	86.7	41	RUNWAY 29 LOCALIZER BUILDING	75.4
16	SELF SERVICE AVIATION FUEL	94.2	42	FAA ALSF BUILDING	
17	GENERAL AVIATION HANGAR	95.1	43	GLYCOL RECYCLING FACILITY	59
18	GENERAL AVIATION HANGAR		44	UNDERGROUND STORAGE TANK FOR SPENT DEICING FLUID	
19	GENERAL AVIATION HANGAR	91.6	45	UNDERGROUND OIL STORAGE TANK (12,000 GALLONS)	
20	GENERAL AVIATION HANGAR	92	46	UNDERGROUND OIL STORAGE TANK (10,000 GALLONS)	
21	FAA TECH OPS FACILITY	46.8	47	GENERATOR FUEL (DIESEL)	
22	FED EX FACILITY	71.1	48	GEOTHERMAL WELL VAULT	
23	CUSTOMS OFFICE		49	SUPPORT PARCEL	N.A.
24	GENERAL AVIATION HANGAR/OFFICE	61.2	50	SUPPORT PARCEL	N.A.
25	AIRPORT BEACON	115.8	51	GENERAL AVIATION HANGAR/OFFICES	
26	LIGHTING VAULT		52	DEICING OPERATIONS FACILITY	

ULTIMATE SHORT TERM BUILDING/FACILITIES

NO.	DESCIPTION
1 ST	TERMINAL APRON EXPANSION NORTHWEST END - PHASE 1
2 ST	ENVIRONMENTAL ASSESSMENT AND PERMITTING FOR AIRPORT IMPROVEMENTS - NS
3 ST	GATE 1 APRON RECONSTRUCTION AND CONSTRUCT TW C SNOW SHOULDERS NORTH
4 ST	RUNWAY INCURSION WARNING SYSTEM - NS
5 ST	3RD FLOOR BYPASS AUTO EXIT PORTALS - NS
6 ST	GATE 1 - 6 REHABILITATION VERTICAL CIRCULATION IMPROVEMENT - NS
7 ST	PRE CONDITIONED AIR/LIFTS FOR LOADING BRIDGES - NS
8 ST	GATE 1 ADDITIONAL LOADING BRIDGES - NS
9 ST	CENTRAL AIR HANDLING UNITS - NS
10 ST	TERMINAL APRON EXPANSION NORTHWEST END - PHASE 2
11 ST	ENVIRONMENTAL ASSESSMENT MITIGATION MEASURES - NS
12 ST	ARFF VEHICLE - NS
13 ST	SNOW REMOVAL TRACTOR FOR AIRFIELD LIGHTS/SIGNS - NS
14 ST	MAINTENANCE BUILDING GENERATOR AND ENCLOSURE
15 ST	CLICK TO ACTIVATE RUNWAY LIGHTS - NS
16 ST	ADMINISTRATION OFFICES ABOVE BAGAGE CLAIM - EAST END - NS
17 ST	ADDITIONAL LOADING BRIDGE FOR GATE 11
18 ST	LONG TERM HOLD/DEICING/RON APRON - PHASE 1
19 ST	FIS FACILITY
20 ST	SNOW MELT EQUIPMENT FOR CONTAINMENT SNOW - SRE/MAINTENANCE - NS
21 ST	LONG TERM HOLD/DEICING/RON APRON - PHASE 2
22 ST	RUNWAY 11 TAXIWAY BYPASS AND PERIMETER SERVICE ROAD REALIGNMENT
23 ST	TREE REMOVAL FOR GQS ON RUNWAY 36 END
24 ST	EXPAND BAGGAGE CLAIM - PHASE 2 - NS
25 ST	LOADING BRIDGE - NS
26 ST	CONSTRUCT AIR CARGO TAXIWAY - PHASE 1
27 ST	REHABILITATE CARGO APRON
28 ST	DISPLACEMENT PLOWS - NS
29 ST	AIRPORT SECURITY FENCE AND GATE UPGRADES (NORTH EAST AREA)
30 ST	DEICING OPERATIONS FACILITY RELOCATION
NS - NOT SHOWN	

ULTIMATE INTERMEDIATE TERM BUILDINGS/FACILITIES

NO.	DESCRIPTION
1 IT	CONSTRUCT TAXIWAY C REALIGNMENT - PHASE 1
2 IT	LOADING BRIDGE - NS
3 IT	LAND ACQUSITION AND PARKING EXPANSION
4 IT	CONSTRUCT AIR CARGO TAXIWAY - PHASE 2
5 IT	LOADING BRIDGES - NS
6 IT	REPLACE REGIONAL BOARDING RAMPS AT GATE 1B AND 1C - NS
7 IT	RELOCATE TAXIWAY A EAST OF RUNWAY 18-36
8 IT	CONSTRUCT TAXIWAY C REALIGNMENT - PHASE 2
9 IT	RELOCATE SERVICE ACCESS ROAD EAST OF CARGO
10 IT	PARKING GARAGE EXPANSION - PHASE 3
NS - NOT SHOWN	

ULTIMATE LONG TERM BUILDINGS/FACILITIES

NO.	DESCRIPTION
1 LT	CONSTRUCT AIR CARGO APRON - PHASE 1 (NORTH)
2 LT	CONSTRUCT AIR CARGO APRON - PHASE 2 (SOUTH)
3 LT	ARFF VEHICLE - NS
4 LT	CONSTRUCT TAXIWAY B RUNWAY 36 TO 29
5 LT	EXTEND CARGO APRON EAST INTERPORT LOCATION
6 LT	ROTARY SNOWPLOW 5000 TPH - NS
7 LT	EXPAND MAINTENANCE BUILDING
8 LT	CONSTRUCT AIRCRAFT ENGINE RUN-UP PAD
9 LT	SRE 18' FRT MTD BROOM - NS
10 LT	STRENGTHEN/REHAB RUNWAY 11-29
11 LT	DISPLACEMENT PLOWS/SPREADERS - NS
12 LT	STRENGTHEN/REHAB TAXIWAY A, D, E, AND F
13 LT	2,000 GALLON LIQUID SPREADER - NS
14 LT	ARFF VEHICLE - NS
15 LT	CONSTRUCT SOUTH APRON TAXIWAY
16 LT	CONSTRUCT SOUTH GENERAL AVIATION APRON - PHASE 1
17 LT	CONSTRUCT SOUTH GENERAL AVIATION APRON - PHASE 2
18 LT	TERMINAL WESTERLY EXPANSION
19 LT	REHABILITATE RUNWAY 18-36, TAXIWAY B AND TAXIWAY J
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23 LT	PARKING GARAGE EXPANSION - PHASE 4
24 LT	TERMINAL EASTERLY EXPANSION/RENOVATION
NS - NOT SHOWN	

THIRD PARTY TENANT DEVELOPMENT

NO.	DESCRIPTION
CB1	AIR CARGO BUILDING
CB2	AIR CARGO BUILDING
H1	CONVENTIONAL HANGAR
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H10	CONVENTIONAL HANGAR
H11	CONVENTIONAL HANGAR
H12	CONVENTIONAL HANGAR
NS - NOT SHOWN	

N O R T H

Magnetic Declination 15° 26' 09"
West (March 2016)
Annual Rate of Change 00° 05'
East (March 2016)

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		AVIGATION EASEMENT
		MUNICIPAL BOUNDARY
BRL		BUILDING RESTRICTION LINE (BRL)
ROFA		RUNWAY OBJECT FREE AREA (ROFA)
ROFZ		RUNWAY OBJECT FREE ZONE (ROFZ)
RSA		RUNWAY SAFETY AREA (RSA)
POFZ		PRECISION OBSTACLE FREE ZONE (POFZ)
		BUILDING REMOVAL
		PAVEMENT REMOVAL
		ILS CRITICAL AREA
		PROPERTY ACQUISITION
		AIRPORT BUSINESS
		AIRPORT BUFFER AREA
		BUILDING / STRUCTURES
		FACILITY CONSTRUCTION - AIRFIELD
		FACILITY CONSTRUCTION - OTHER
		WATER QUALITY FILTER
		NO TAXI ISLAND
X	X	FENCING
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
PAPI-4		NAVIGATIONAL AID LIGHTS (PAPI)
REIL		RUNWAY END IDENTIFICATION LIGHT (REIL)
		AIRFIELD LIGHTS
		SEGMENTED CIRCLE / WIND INDICATOR
		WIND INDICATOR (LIGHTED)
1080		TOPOGRAPHY
		WETLAND

GRAPHIC SCALE

100 0 50 100 200

(IN FEET)
1 inch = 100 ft.

REV	DESCRIPTION	DATE	BY	APP'D
4	SUBMITTED TO CITY, MDOT AND FAA FOR FINAL APPROVAL	07.09.18	DDA	DDA
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PORTLAND INTERNATIONAL JETPORT

SOUTH GENERAL AVIATION AND TAXIWAY 'C'

PORTLAND, MAINE

Stantec Consulting Services Inc.
482 Payne Road
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Tel. 207.883.3355
WWW.STANTEC.COM

PLANNED BY: Dwight Anderson / Steve Benson
DETAILED BY: Lori Anthony / Tim Kahmann
APPROVED BY: Mike Dmyterko
FILE NAME: op_m116_site / 195350010
July 2018
SHEET 7.0

Coffman Associates
Airport Consultants

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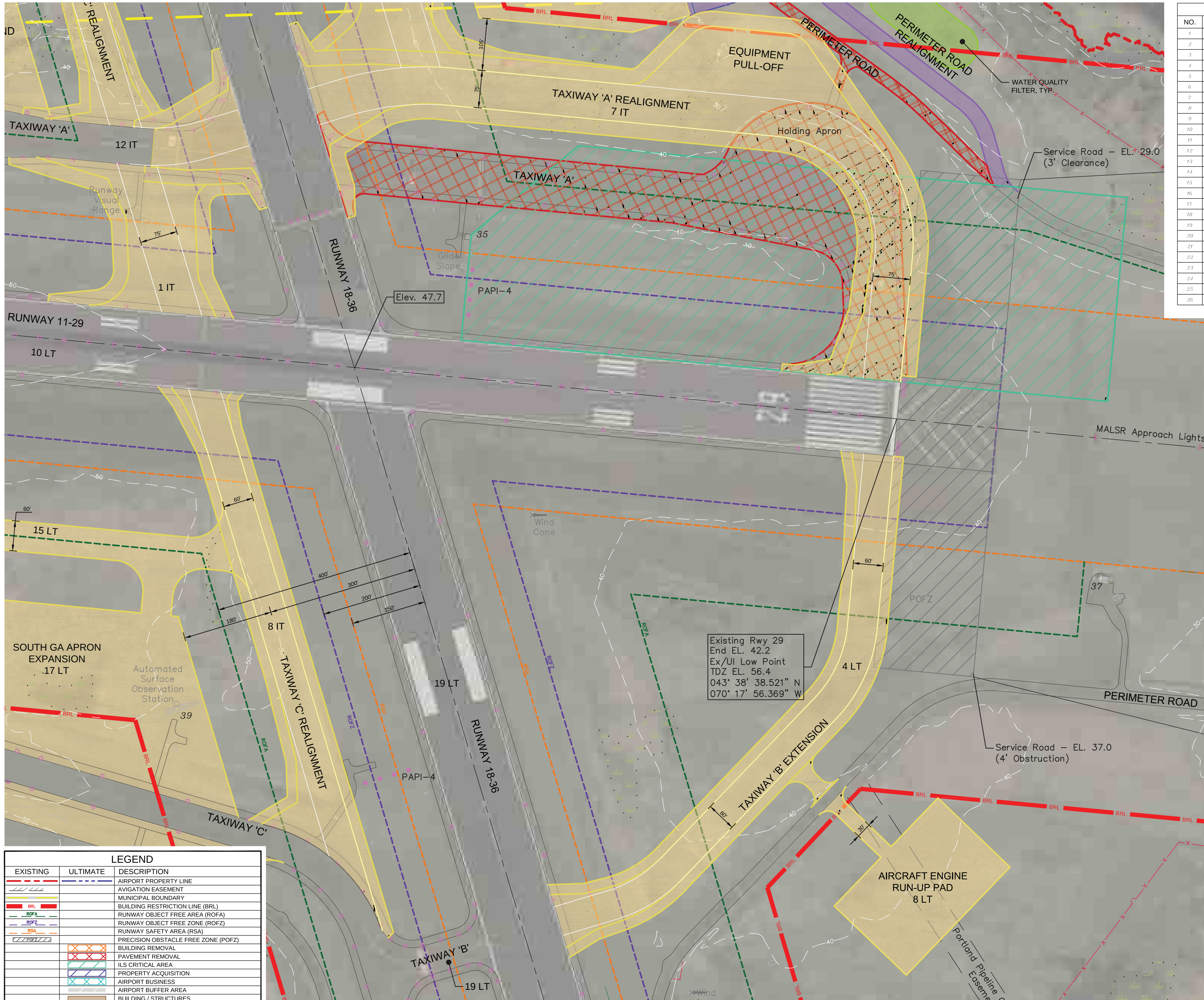

EXISTING BUILDINGS/FACILITIES					
NO.	DESCRIPTION	ELEV.	NO.	DESCRIPTION	ELEV.
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2	AIR TRAFFIC CONTROL TOWER	161.7	28	VEHICLE FUEL (DIESEL/GASOLINE)	
3	AIRCRAFT RESCUE AND FIRE FIGHTING	86.5	29	FUEL DISPENSING STATION	
4	PARKING GARAGE	141	30	SAND/SALT STORAGE	
5	CELL PHONE LOT/PASSENGER PICKUP		31	GENERAL AVIATION HANGAR/OFFICES	
6	RENTAL CAR FACILITY		32	FLIGHT STANDARDS DISTRICT OFFICE	63.8
7	GENERAL AVIATION HANGAR/OFFICES	89.6	33	HEXAGON HANGER	58.8
8	FUEL FARM	74	34	MAINTENANCE/EQUIPMENT STORAGE	67.5
9	GENERAL AVIATION HANGAR/OFFICES	98.8	35	RUNWAY 29 GLIDESLOPE BUILDING	86.7
10	GENERAL AVIATION TERMINAL		36	RUNWAY 11 LOCALIZER BUILDING	
11	EMPLOYEE PARKING		37	FAA ELECTRICAL VAULT	
12	LONG TERM PARKING		38	REMOTE TRANSMITTER/RECEIVER SITE	
13	AIRPORT PARKING OFFICE AND VEHICLE MAINTENANCE FACILITY/NON-RESERVED TAXI		39	AUTOMATED SURFACE OBSERVATION SYSTEM	
14	THE NORTH LOT (OVERFLOW PARKING)		40	RUNWAY 11 GLIDESLOPE BUILDING	67.5
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23	CUSTOMS OFFICE		49	SUPPORT PARCEL	N.A.
24	GENERAL AVIATION HANGAR/OFFICE	61.2	50	SUPPORT PARCEL	N.A.
25	AIRPORT BEACON	115.8	51	GENERAL AVIATION HANGAR/OFFICES	
26	LIGHTING VAULT		52	DEICING OPERATIONS FACILITY	

ULTIMATE SHORT TERM BUILDING/FACILITIES	
NO.	DESCIPTION
1 ST	TERMINAL APRON EXPANSION NORTHWEST END - PHASE 1
2 ST	ENVIRONMENTAL ASSESSMENT AND PERMITTING FOR AIRPORT IMPROVEMENTS - NS
3 ST	GATE 1 APRON RECONSTRUCTION AND CONSTRUCT TW C SNOW SHOULDERS NORTH
4 ST	RUNWAY INCURSION WARNING SYSTEM - NS
5 ST	3RD FLOOR BYPASS AUTO EXIT PORTALS - NS
6 ST	GATE 1 - 6 REHABILITATION VERTICAL CIRCULATION IMPROVEMENT - NS
7 ST	PRE CONDITIONED AIR/LIFTS FOR LOADING BRIDGES - NS
8 ST	GATE 1 ADDITIONAL LOADING BRIDGES - NS
9 ST	CENTRAL AIR HANDLING UNITS - NS
10 ST	TERMINAL APRON EXPANSION NORTHWEST END - PHASE 2
11 ST	ENVIRONMENTAL ASSESSMENT MITIGATION MEASURES - NS
12 ST	ARFF VEHICLE - NS
13 ST	SNOW REMOVAL TRACTOR FOR AIRFIELD LIGHTS/SIGNS - NS
14 ST	MAINTENANCE BUILDING GENERATOR AND ENCLOSURE
15 ST	CLICK TO ACTIVATE RUNWAY LIGHTS - NS
16 ST	ADMINISTRATION OFFICES ABOVE BAGAGE CLAIM - EAST END - NS
17 ST	ADDITIONAL LOADING BRIDGE FOR GATE 11
18 ST	LONG TERM HOLD/DEICING/RON APRON - PHASE 1
19 ST	FIS FACILITY
20 ST	SNOW MELT EQUIPMENT FOR CONTAINMENT SNOW - SRE/MAINTENANCE - NS
21 ST	LONG TERM HOLD/DEICING/RON APRON - PHASE 2
22 ST	RUNWAY 11 TAXIWAY BYPASS AND PERIMETER SERVICE ROAD REALIGNMENT
23 ST	TREE REMOVAL FOR GQS ON RUNWAY 36 END
24 ST	EXPAND BAGGAGE CLAIM - PHASE 2 - NS
25 ST	LOADING BRIDGE - NS
26 ST	CONSTRUCT AIR CARGO TAXIWAY - PHASE 1
27 ST	REHABILITATE CARGO APRON
28 ST	DISPLACEMENT PLOWS - NS
29 ST	AIRPORT SECURITY FENCE AND GATE UPGRADES (NORTH EAST AREA)
30 ST	DEICING OPERATIONS FACILITY RELOCATION
NS - NOT SHOWN	

ULTIMATE LONG TERM BUILDINGS/FACILITIES	
NO.	DESCRIPTION
1 LT	CONSTRUCT AIR CARGO APRON - PHASE 1 (NORTH)
2 LT	CONSTRUCT AIR CARGO APRON - PHASE 2 (SOUTH)
3 LT	ARFF VEHICLE - NS
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6 LT	ROTARY SNOWPLOW 5000 TPH - NS
7 LT	EXPAND MAINTENANCE BUILDING
8 LT	CONSTRUCT AIRCRAFT ENGINE RUN-UP PAD
9 LT	SRE 18' FRT MTD BROOM - NS
10 LT	STRENGTHEN/REHAB RUNWAY 11-29
11 LT	DISPLACEMENT PLOWS/SPREADERS - NS
12 LT	STRENGTHEN/REHAB TAXIWAY A, D, E, AND F
13 LT	2,000 GALLON LIQUID SPREADER - NS
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15 LT	CONSTRUCT SOUTH APRON TAXIWAY
16 LT	CONSTRUCT SOUTH GENERAL AVIATION APRON - PHASE 1
17 LT	CONSTRUCT SOUTH GENERAL AVIATION APRON - PHASE 2
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19 LT	REHABILITATE RUNWAY 18-36, TAXIWAY B AND TAXIWAY J
20 LT	CONSTRUCT SOUTH GENERAL AVIATION APRON - PHASE 3
21 LT	RAMP EXPANSION EAST OF AIR TRAFFIC CONTROL TOWER
22 LT	SNOW PLOWS - NS
23 LT	PARKING GARAGE EXPANSION - PHASE 4
24 LT	TERMINAL EASTERLY EXPANSION/RENOVATION
NS - NOT SHOWN	

ULTIMATE INTERMEDIATE TERM BUILDINGS/FACILITIES	
NO.	DESCRIPTION
1 IT	CONSTRUCT TAXIWAY C REALIGNMENT - PHASE 1
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8 IT	CONSTRUCT TAXIWAY C REALIGNMENT - PHASE 2
9 IT	RELOCATE SERVICE ACCESS ROAD EAST OF CARGO
10 IT	PARKING GARAGE EXPANSION - PHASE 3
NS - NOT SHOWN	

THIRD PARTY TENANT DEVELOPMENT	
NO.	DESCRIPTION
CB1	AIR CARGO BUILDING
CB2	AIR CARGO BUILDING
H1	CONVENTIONAL HANGAR
H2	CONVENTIONAL HANGAR
H3	CONVENTIONAL HANGAR
H4	CONVENTIONAL HANGAR
H5	CONVENTIONAL HANGAR
H6	CONVENTIONAL HANGAR
H7	CONVENTIONAL HANGAR
H8	GENERAL AVIATION HANGAR/OFFICES
H9	GENERAL AVIATION HANGAR/OFFICES
H10	CONVENTIONAL HANGAR
H11	CONVENTIONAL HANGAR
H12	CONVENTIONAL HANGAR
NS - NOT SHOWN	

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		AVIGATION EASEMENT
		MUNICIPAL BOUNDARY
BRL		BUILDING RESTRICTION LINE (BRL)
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ROFZ		RUNWAY OBJECT FREE ZONE (ROFZ)
RSA		RUNWAY SAFETY AREA (RSA)
		PRECISION OBSTACLE FREE ZONE (POFZ)
		BUILDING REMOVAL
		PAVEMENT REMOVAL
		ILS CRITICAL AREA
		PROPERTY ACQUISITION
		AIRPORT BUSINESS
		AIRPORT BUFFER AREA
		BUILDING / STRUCTURES
		FACILITY CONSTRUCTION - AIRFIELD
		FACILITY CONSTRUCTION - OTHER
		WATER QUALITY FILTER
		NO TAXI ISLAND
		FENCING
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
PAPI-4		NAVIGATIONAL AID LIGHTS (PAPI)
REIL		RUNWAY END IDENTIFICATION LIGHT (REIL)
		AIRFIELD LIGHTS
		SEGMENTED CIRCLE / WIND INDICATOR
		WIND INDICATOR (LIGHTED)
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N O R T H

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3	SUBMITTED TO FAA FOR APPROVAL	11.29.17	DDA	DDA
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482 Payne Road
Scarborough, ME
Tel. 207.883.3355
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PORTLAND INTERNATIONAL JETPORT

RUNWAY 29 AND TAXIWAY B

PORTLAND, MAINE

PLANNED BY: Dwight Anderson / Steve Benson
DETAILED BY: Lori Anthony / Tim Kahmann
APPROVED BY: Mike Dmyterko
FILE NAME: op_m116_site / 195350010
July 2018
SHEET 8.0

Coffman Associates
Airport Consultants

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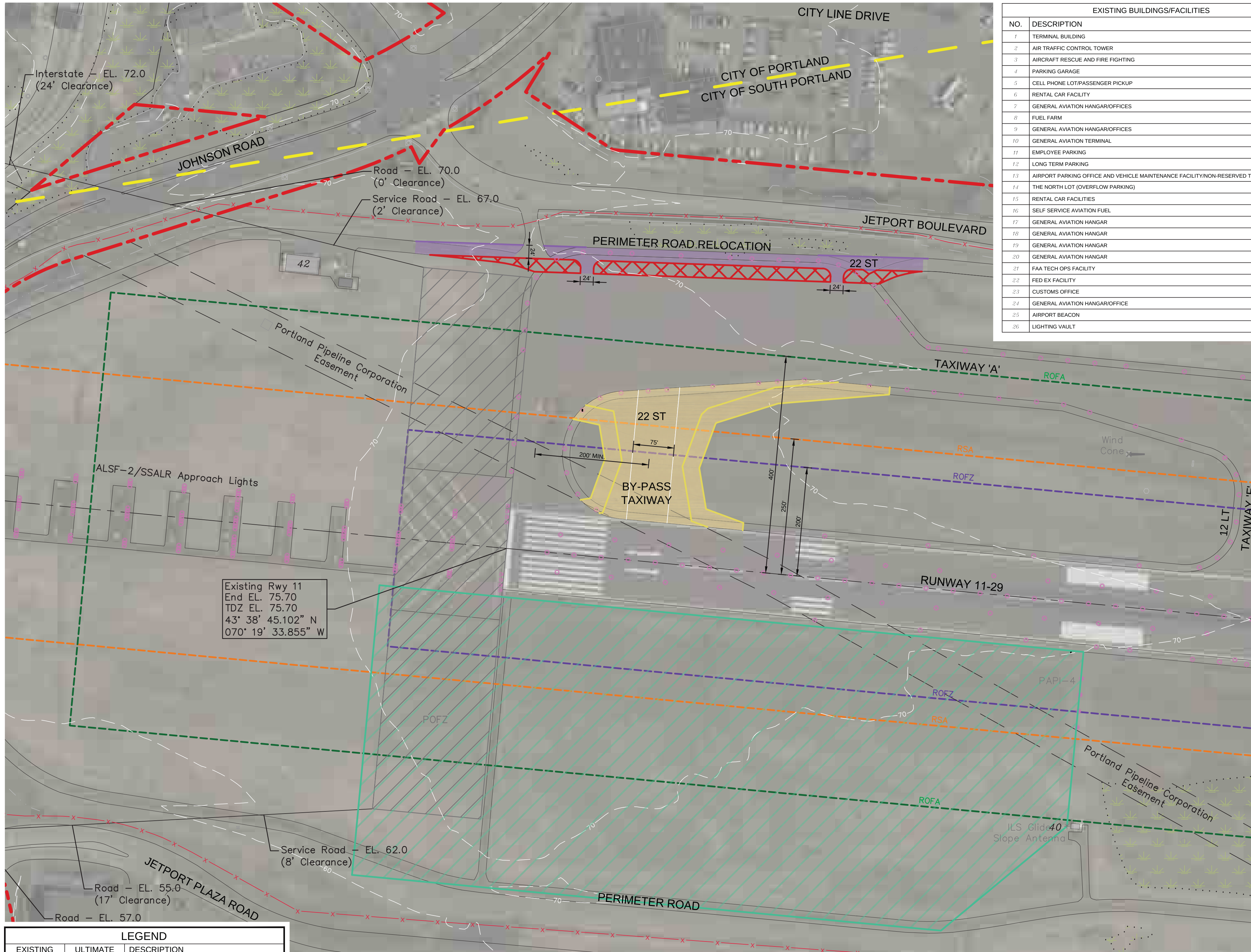


LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		AVIGATION EASEMENT
		MUNICIPAL BOUNDARY
BRL		BUILDING RESTRICTION LINE (BRL)
ROFA		RUNWAY OBJECT FREE AREA (ROFA)
ROFZ		RUNWAY OBJECT FREE ZONE (ROFZ)
RSA		RUNWAY SAFETY AREA (RSA)
POFZ		PRECISION OBSTACLE FREE ZONE (POFZ)
		BUILDING REMOVAL
		PAVEMENT REMOVAL
		ILS CRITICAL AREA
		PROPERTY ACQUISITION
		AIRPORT BUSINESS
		AIRPORT BUFFER AREA
		BUILDING / STRUCTURES
		FACILITY CONSTRUCTION - AIRFIELD
		FACILITY CONSTRUCTION - OTHER
		WATER QUALITY FILTER
		NO TAXI ISLAND
X	X	FENCING
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
PAPI–4		NAVIGATIONAL AID LIGHTS (PAPI)
REIL		RUNWAY END IDENTIFICATION LIGHT (REIL)
		AIRFIELD LIGHTS
		SEGMENTED CIRCLE / WIND INDICATOR
		WIND INDICATOR (LIGHTED)
1080		TOPOGRAPHY
		WETLAND

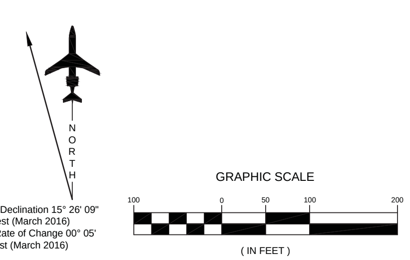
EXISTING BUILDINGS/FACILITIES			EXISTING BUILDINGS/FACILITIES		
NO.	DESCRIPTION	ELEV.	NO.	DESCRIPTION	ELEV.
1	TERMINAL BUILDING	122.1	27	AIRPORT MAINTENANCE BUILDING	
2	AIR TRAFFIC CONTROL TOWER	161.7	28	VEHICLE FUEL (DIESEL/GASOLINE)	
3	AIRCRAFT RESCUE AND FIRE FIGHTING	86.5	29	FUEL DISPENSING STATION	
4	PARKING GARAGE	141	30	SAND/SALT STORAGE	
5	CELL PHONE LOT/PASSENGER PICKUP		31	GENERAL AVIATION HANGAR/OFFICES	
6	RENTAL CAR FACILITY		32	FLIGHT STANDARDS DISTRICT OFFICE	63.8
7	GENERAL AVIATION HANGAR/OFFICES	89.6	33	HEXAGON HANGER	58.8
8	FUEL FARM	74	34	MAINTENANCE/EQUIPMENT STORAGE	67.5
9	GENERAL AVIATION HANGAR/OFFICES	98.8	35	RUNWAY 29 GLIDESLOPE BUILDING	86.7
10	GENERAL AVIATION TERMINAL		36	RUNWAY 11 LOCALIZER BUILDING	
11	EMPLOYEE PARKING		37	FAA ELECTRICAL VAULT	
12	LONG TERM PARKING		38	REMOTE TRANSMITTER/RECEIVER SITE	
13	AIRPORT PARKING OFFICE AND VEHICLE MAINTENANCE FACILITY/NON-RESERVED TAXI		39	AUTOMATED SURFACE OBSERVATION SYSTEM	
14	THE NORTH LOT (OVERFLOW PARKING)		40	RUNWAY 11 GLIDESLOPE BUILDING	67.5
15	RENTAL CAR FACILITIES	86.7	41	RUNWAY 29 LOCALIZER BUILDING	75.4
16	SELF SERVICE AVIATION FUEL	94.2	42	FAA ALSF BUILDING	
17	GENERAL AVIATION HANGAR	95.1	43	GLYCOL RECYCLING FACILITY	59
18	GENERAL AVIATION HANGAR		44	UNDERGROUND STORAGE TANK FOR SPENT DEICING FLUID	
19	GENERAL AVIATION HANGAR	91.6	45	UNDERGROUND OIL STORAGE TANK (12,000 GALLONS)	
20	GENERAL AVIATION HANGAR	92	46	UNDERGROUND OIL STORAGE TANK (10,000 GALLONS)	
21	FAA TECH OPS FACILITY	46.8	47	GENERATOR FUEL (DIESEL)	
22	FED EX FACILITY	71.1	48	GEOTHERMAL WELL VAULT	
23	CUSTOMS OFFICE		49	SUPPORT PARCEL	N.A.
24	GENERAL AVIATION HANGAR/OFFICE	61.2	50	SUPPORT PARCEL	N.A.
25	AIRPORT BEACON	115.8	51	GENERAL AVIATION HANGAR/OFFICES	
26	LIGHTING VAULT		52	DEICING OPERATIONS FACILITY	

ULTIMATE SHORT TERM BUILDING/FACILITIES	
NO.	DESCRIPTION
1 ST	TERMINAL APRON EXPANSION NORTHWEST END - PHASE 1
2 ST	ENVIRONMENTAL ASSESSMENT AND PERMITTING FOR AIRPORT IMPROVEMENTS - NS
3 ST	GATE 1 APRON RECONSTRUCTION AND CONSTRUCT TW C SNOW SHOULDERS NORTH
4 ST	RUNWAY INCURSION WARNING SYSTEM - NS
5 ST	3RD FLOOR BYPASS AUTO EXIT PORTALS - NS
6 ST	GATE 1 - 6 REHABILITATION VERTICAL CIRCULATION IMPROVEMENT - NS
7 ST	PRE CONDITIONED AIR/LIFTS FOR LOADING BRIDGES - NS
8 ST	GATE 1 ADDITIONAL LOADING BRIDGES - NS
9 ST	CENTRAL AIR HANDLING UNITS - NS
10 ST	TERMINAL APRON EXPANSION NORTHWEST END - PHASE 2
11 ST	ENVIRONMENTAL ASSESSMENT MITIGATION MEASURES - NS
12 ST	ARFF VEHICLE - NS
13 ST	SNOW REMOVAL TRACTOR FOR AIRFIELD LIGHTS/SIGNS - NS
14 ST	MAINTENANCE BUILDING GENERATOR AND ENCLOSURE
15 ST	CLICK TO ACTIVATE RUNWAY LIGHTS - NS
16 ST	ADMINISTRATION OFFICES ABOVE BAGAGE CLAIM - EAST END - NS
17 ST	ADDITIONAL LOADING BRIDGE FOR GATE 11
18 ST	LONG TERM HOLD/DEICING/RON APRON - PHASE 1
19 ST	FIS FACILITY
20 ST	SNOW MELT EQUIPMENT FOR CONTAINMENT SNOW - SRE/MAINTENANCE - NS
21 ST	LONG TERM HOLD/DEICING/RON APRON - PHASE 2
22 ST	RUNWAY 11 TAXIWAY BYPASS AND PERIMETER SERVICE ROAD REALIGNMENT
23 ST	TREE REMOVAL FOR GQS ON RUNWAY 36 END
24 ST	EXPAND BAGGAGE CLAIM - PHASE 2 - NS
25 ST	LOADING BRIDGE - NS
26 ST	CONSTRUCT AIR CARGO TAXIWAY - PHASE 1
27 ST	REHABILITATE CARGO APRON
28 ST	DISPLACEMENT PLOWS - NS
29 ST	AIRPORT SECURITY FENCE AND GATE UPGRADES (NORTH EAST AREA)
30 ST	DEICING OPERATIONS FACILITY RELOCATION
NS - NOT SHOWN	

ULTIMATE INTERMEDIATE TERM BUILDINGS/FACILITIES	
NO.	DESCRIPTION
1 IT	CONSTRUCT TAXIWAY C REALIGNMENT - PHASE 1
2 IT	LOADING BRIDGE - NS
3 IT	LAND ACQUSITION AND PARKING EXPANSION
4 IT	CONSTRUCT AIR CARGO TAXIWAY - PHASE 2
5 IT	LOADING BRIDGES - NS
6 IT	REPLACE REGIONAL BOARDING RAMPS AT GATE 1B AND 1C - NS
7 IT	RELOCATE TAXIWAY A EAST OF RUNWAY 18-36
8 IT	CONSTRUCT TAXIWAY C REALIGNMENT - PHASE 2
9 IT	RELOCATE SERVICE ACCESS ROAD EAST OF CARGO
10 IT	PARKING GARAGE EXPANSION - PHASE 3
NS - NOT SHOWN	

ULTIMATE LONG TERM BUILDINGS/FACILITIES	
NO.	DESCRIPTION
1 LT	CONSTRUCT AIR CARGO APRON - PHASE 1 (NORTH)
2 LT	CONSTRUCT AIR CARGO APRON - PHASE 2 (SOUTH)
3 LT	ARFF VEHICLE - NS
4 LT	CONSTRUCT TAXIWAY B RUNWAY 36 TO 29
5 LT	EXTEND CARGO APRON EAST INTERPORT LOCATION
6 LT	ROTARY SNOWPLOW 5000 TPH - NS
7 LT	EXPAND MAINTENANCE BUILDING
8 LT	CONSTRUCT AIRCRAFT ENGINE RUN-UP PAD
9 LT	SRE 18' FRT MTD BROOM - NS
10 LT	STRENGTHEN/REHAB RUNWAY 11-29
11 LT	DISPLACEMENT PLOWS/SPREADERS - NS
12 LT	STRENGTHEN/REHAB TAXIWAY A, D, E, AND F
13 LT	2,000 GALLON LIQUID SPREADER - NS
14 LT	ARFF VEHICLE - NS
15 LT	CONSTRUCT SOUTH APRON TAXIWAY
16 LT	CONSTRUCT SOUTH GENERAL AVIATION APRON - PHASE 1
17 LT	CONSTRUCT SOUTH GENERAL AVIATION APRON - PHASE 2
18 LT	TERMINAL WESTERLY EXPANSION
19 LT	REHABILITATE RUNWAY 18-36, TAXIWAY B AND TAXIWAY J
20 LT	CONSTRUCT SOUTH GENERAL AVIATION APRON - PHASE 3
21 LT	RAMP EXPANSION EAST OF AIR TRAFFIC CONTROL TOWER
22 LT	SNOW PLOWS - NS
23 LT	PARKING GARAGE EXPANSION - PHASE 4
24 LT	TERMINAL EASTERLY EXPANSION/RENOVATION
NS - NOT SHOWN	

THIRD PARTY TENANT DEVELOPMENT	
NO.	DESCRIPTION
CB1	AIR CARGO BUILDING
CB2	AIR CARGO BUILDING
H1	CONVENTIONAL HANGAR
H2	CONVENTIONAL HANGAR
H3	CONVENTIONAL HANGAR
H4	CONVENTIONAL HANGAR
H5	CONVENTIONAL HANGAR
H6	CONVENTIONAL HANGAR
H7	CONVENTIONAL HANGAR
H8	GENERAL AVIATION HANGAR/OFFICES
H9	GENERAL AVIATION HANGAR/OFFICES
H10	CONVENTIONAL HANGAR
H11	CONVENTIONAL HANGAR
H12	CONVENTIONAL HANGAR
NS - NOT SHOWN	



Magnetic Declination 15° 26' 09"
West (March 2016)
Annual Rate of Change 00° 05'
East (March 2016)

REV	DESCRIPTION	DATE	BY	APP'D
4	SUBMITTED TO CITY, MDOT AND FAA FOR FINAL APPROVAL	07.09.18	DDA	DDA
3	SUBMITTED TO FAA FOR APPROVAL	11.29.17	DDA	DDA
2	ISSUED DRAFT ALP TO CITY AND FAA	11.17.16	DDA	DDA
1	ISSUED TO CLIENT FOR REVIEW	07.26.16	DDA	DDA

REVISIONS

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PORTLAND INTERNATIONAL JETPORT

TAXIWAY A RUN-UP AREA

PORTLAND, MAINE

Stantec Consulting Services Inc.
482 Payne Road
Scarborough, ME
Tel. 207.883.3355
WWW.STANTEC.COM

PLANNED BY: Dwight Anderson / Steve Benson
DETAILED BY: Lori Anthony / Tim Kahmann
APPROVED BY: Mike Dmyterko
FILE NAME: op_m116_site / 195350010
July 2018
SHEET 9.0

Coffman Associates Airport Consultants

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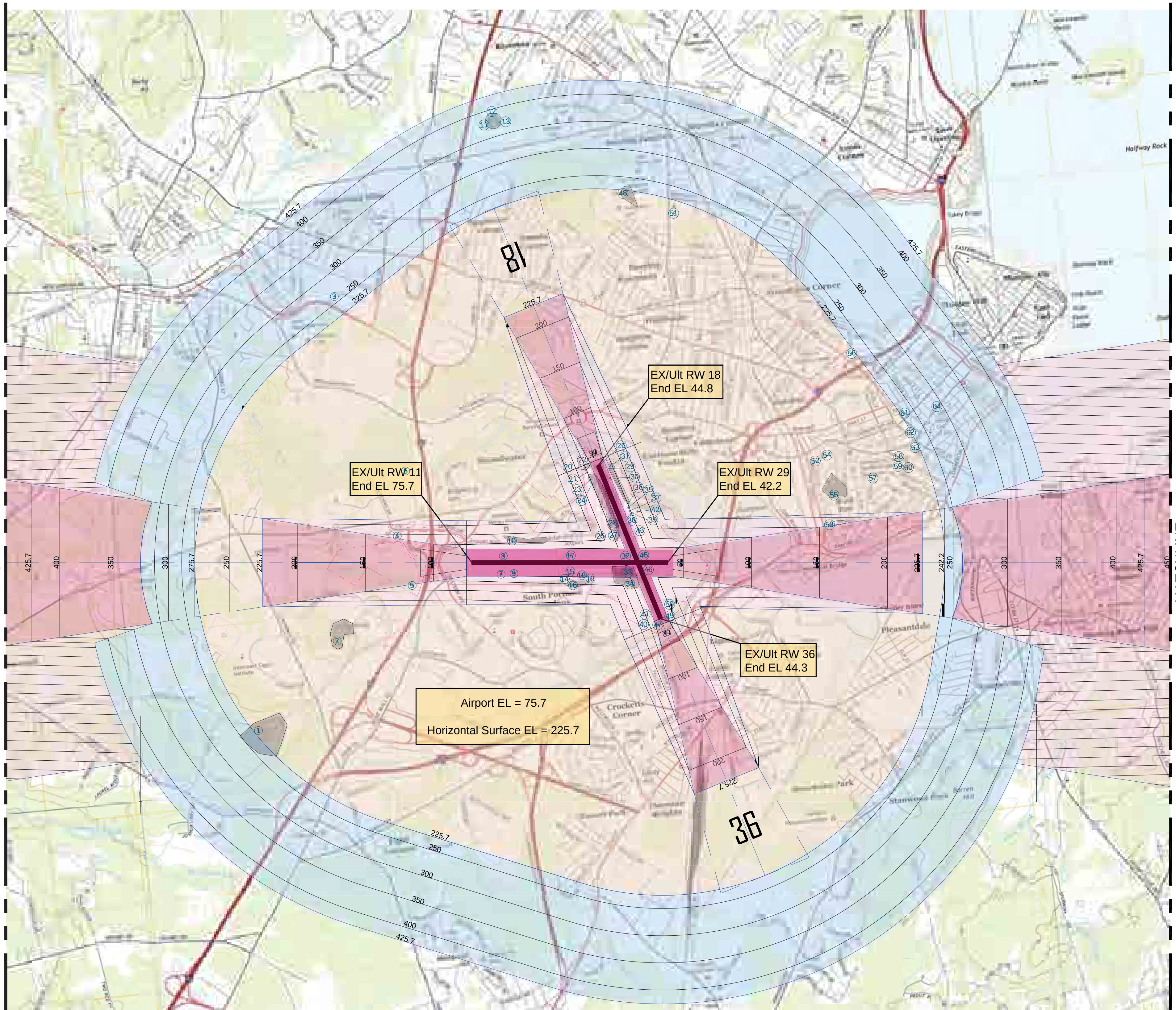

No	Description	Top Elevation (msl)	Obstructed PT 77 Surface	Object Penetration	Ground Elevation (msl)	Date of Survey	Remediation
1	TREE GROUP	244.51	HORIZONTAL	18.81	158.36	JUNE 2010	TRIM OR REMOVE
2	TREE GROUP	240.66	HORIZONTAL	14.96	148.93	JUNE 2010	TRIM OR REMOVE
3	COMMUNICATION TOWER	273.18	CONICAL	12.05	70.29	NOV 2012	REMAIN LIT
4	TREE	152.58	TRANSITIONAL	2.16	112.45	JUNE 2010	TRIM OR REMOVE
5	TREE	137.12	TRANSITIONAL	7.41	68.43	JUNE 2010	TRIM OR REMOVE
6	BUILDING & STACK	254.58	HORIZONTAL	28.88	39.17	NOV 2012	REMAIN LIT
7	NAVAID	119.02	PRIMARY	48.1	66.40	JUNE 2010	LIGHT/REMAIN LIT
8	NAVAID	76.51	PRIMARY	5.99	68.00	JUNE 2010	LIGHT/REMAIN LIT
9	NAVAID	84.58	PRIMARY	16	64.29	JUNE 2010	LIGHT/REMAIN LIT
10	TREE GROUP	128.38	TRANSITIONAL	9.79	65.72	JUNE 2010	TRIM OR REMOVE
11	COMMUNICATION TOWER	428.42	CONICAL	52.2	70.80	NOV 2012	REMAIN LIT
12	COMMUNICATION TOWER	431.94	CONICAL	42.87	71.06	NOV 2012	REMAIN LIT
13	COMMUNICATION TOWER	428.61	CONICAL	55.74	69.86	NOV 2012	REMAIN LIT
14	GEN UTIL	66	PRIMARY	6.57	61.48	MAY 2011	LIGHT/REMAIN LIT
15	NAVAID	78.42	PRIMARY	19.22	61.12	JUNE 2010	LIGHT/REMAIN LIT
16	TREE GROUP	129.94	TRANSITIONAL	6.16	65.94	JUNE 2010	TRIM OR REMOVE
17	NAVAID	69.66	PRIMARY	10.62	58.00	JUNE 2010	LIGHT/REMAIN LIT
18	NATURAL HIGH POINT	59.66	PRIMARY	2.69	59.01	JUNE 2010	GRADE PER PART 77.19, C
19	POLE	91.06	TRANSITIONAL	1.96	59.16	JUNE 2010	REMAIN LIT
20	TREE	93.85	PRIMARY	50.34	48.05	NOV 2012	TRIM OR REMOVE
21	SOUND WALL	68.45	PRIMARY	23.11	50.00	NOV 2012	RELOCATE
22	PRIMARY ROAD	54.75	PRIMARY	11.24	40.00	NOV 2012	GRADE PER PART 77.19, C
23	WINDSOCK	73.47	PRIMARY	26.27	56.64	NOV 2012	REMAIN LIT
24	NATURAL HIGH POINT	56.05	PRIMARY	7.96	56.96	NOV 2012	GRADE PER PART 77.19, C
25	ATCT ANTENNA	161.73	TRANSITIONAL	17.08	57.51	NOV 2012	REMAIN LIT
26	CONTROL BOX	44.85	PRIMARY	1.34	43.11	NOV 2012	RELOCATE
27	WINDSOCK	77.29	PRIMARY	28.4	52.38	NOV 2012	REMAIN LIT
28	RPU	74.97	PRIMARY	25.61	51.38	NOV 2012	REMAIN LIT
29	PRIMARY ROAD GROUP	47.84	PRIMARY	1.4	32.70	NOV 2012	GRADE PER PART 77.19, C
30	WINDSOCK	53.38	PRIMARY	5.1	45.56	NOV 2012	REMAIN LIT
31	TREE GROUP	90.42	PRIMARY	44.46	32.79	NOV 2012	TRIM OR REMOVE
32	CONTROL BOX	65.6	PRIMARY	17.94	48.00	NOV 2012	RELOCATE
33	NATURAL HIGH POINT	53.91	PRIMARY	6.85	52.00	NOV 2012	GRADE PER PART 77.19, C
34	NAVAID	81.27	TRANSITIONAL	31.96	49.92	JUNE 2010	REMAIN LIT
35	FENCE	53.14	PRIMARY	3.4	44.58	NOV 2012	RELOCATE
36	PRIMARY ROAD	59.27	PRIMARY	9.39	44.00	NOV 2012	GRADE PER PART 77.19, C
37	POLE	71.64	PRIMARY	22.1	44.17	NOV 2012	REMAIN LIT
38	POLE	73.65	PRIMARY	24.2	44.20	NOV 2012	REMAIN LIT
39	TREE	65.46	PRIMARY	15.99	42.94	NOV 2012	TRIM OR REMOVE
40	ANTENNA	152.03	TRANSITIONAL	16.74	84.29	NOV 2012	REMAIN LIT
41	NATURAL HIGH POINT	51.47	PRIMARY	6.37	69.08	NOV 2012	GRADE PER PART 77.19, C
42	BUILDING	71.1	TRANSITIONAL	21.63	42.15		REMAIN LIT
43	BUILDING	67.51	TRANSITIONAL	18.78	43.34		REMAIN LIT
44	GLIDESLOPE	86.72	PRIMARY	39.46	42.29	NOV 2012	REMAIN LIT
45	GLIDESLOPE	86.72	PRIMARY	40.29	42.29	NOV 2012	REMAIN LIT
46	WINDSOCK	51.91	PRIMARY	4.83	43.18	NOV 2012	REMAIN LIT
47	NATURAL HIGH POINT	46.39	PRIMARY	2.13	58.40	NOV 2012	GRADE PER PART 77.19, C
48	TREE GROUP	235.33	HORIZONTAL	9.63	130.38	NOV 2012	TRIM OR REMOVE
49	FENCE	45.33	PRIMARY	1.07	38.33	NOV 2012	RELOCATE
50	TREE	46.73	PRIMARY	1.68	38.98	JUNE 2010	TRIM OR REMOVE
51	BUILDING	251.34	HORIZONTAL	25.64	125.60	NOV 2012	REMAIN LIT
52	STACK	247	HORIZONTAL	21.3	70.48	FEB 2013	REMAIN LIT
53	TREE	221.57	TRANSITIONAL	26.31	156.17	JUNE 2010	TRIM OR REMOVE
54	BUILDING PAIR	310	HORIZONTAL	84.3	142.25	NOV 2012	REMAIN LIT
55	TREE	237.63	HORIZONTAL	11.93	158.84	NOV 2012	TRIM OR REMOVE
56	COMMUNICATION TOWER	318.79	HORIZONTAL	93.09	15.02	NOV 2012	REMAIN LIT
57	BUILDING	234.43	HORIZONTAL	8.73	139.03	NOV 2012	REMAIN LIT
58	BUILDING	248.94	HORIZONTAL	23.24	122.80	NOV 2012	REMAIN LIT
59	COMMUNICATION TOWER	239	HORIZONTAL	13.3	121.40	JUNE 2010	REMAIN LIT
60	COMMUNICATION TOWER	244.23	HORIZONTAL	18.53	123.76	JUNE 2010	REMAIN LIT
61	ANTENNA	241.93	CONICAL	4.02	69.17	JUNE 2010	REMAIN LIT
62	COMMUNICATION TOWER	293.24	HORIZONTAL	67.54	107.67	NOV 2012	REMAIN LIT
63	COMMUNICATION TOWER	271.69	HORIZONTAL	45.99	112.01	JUNE 2010	REMAIN LIT
64	TOWER	318	CONICAL	28.4	77.25	NOV 2012	REMAIN LIT

NORTH

Magnetic Declination
15° 26' 09" West (March 2016)
Annual Rate of Change
00° 05.0' East (March 2016)

0 2000 4000
SCALE IN FEET

GENERAL NOTES:

1. THE FAR PART 77 IMAGINARY SURFACES REPRESENT THE EXISTING HEIGHT HAZARD LIMITATIONS FOR PORTLAND INTERNATIONAL JETPORT AIRPORT.
2. GROUND SURVEYS DATED JUNE 2010 & NOVEMBER 2012 BY WOOLPERT.
3. HORIZONTAL DATUM: NORTH AMERICAN DATUM 1983 - NAD83; VERTICAL DATUM: NORTH AMERICAN DATUM 1988 - NAVD88
4. OBSTRUCTIONS IDENTIFIED BY COFFMAN ASSOCIATES FROM AIRPORT-GIS SURVEYS JUNE 2010 & NOVEMBER 2012
5. SUPPLEMENTAL DATA EXAMINED INCLUDE FAA DIGITAL OBSTACLE FILE (DOF), RELEASE DATE MONTH DAY YEAR, AND THE NGS AERONAUTICAL DATA SHEET, SURVEY DATE 06/12/2006.
6. THE FOLLOWING USGS 7.5 QUAD MAPS OF THE STATE OF MAINE WERE APPLIED AS BACKGROUND: PORTLAND EAST, PORTLAND WEST, SOUTH HARPSWELL, CAPE ELIZABETH, PROUTS NECK, OLD ORCHARD BEACH, BAR MILLS, STANDISH, AND GORHAM.
7. SEE INNER PORTION OF THE APPROACH SURFACE DRAWINGS FOR CLOSE-IN APPROACH DETAILS.
8. ALL ELEVATIONS IN MSL FEET.

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
— — —		AIRPORT PROPERTY LINE
(00)		OBSTRUCTION POINT
▬		OBSTRUCTION AREA

REV	DESCRIPTION	DATE	BY	APP'D

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PORTLAND INTERNATIONAL JETPORT
AIRPORT AIRSPACE DRAWING I
PORTLAND, MAINE

Stantec Consulting Services Inc.
482 Payne Road
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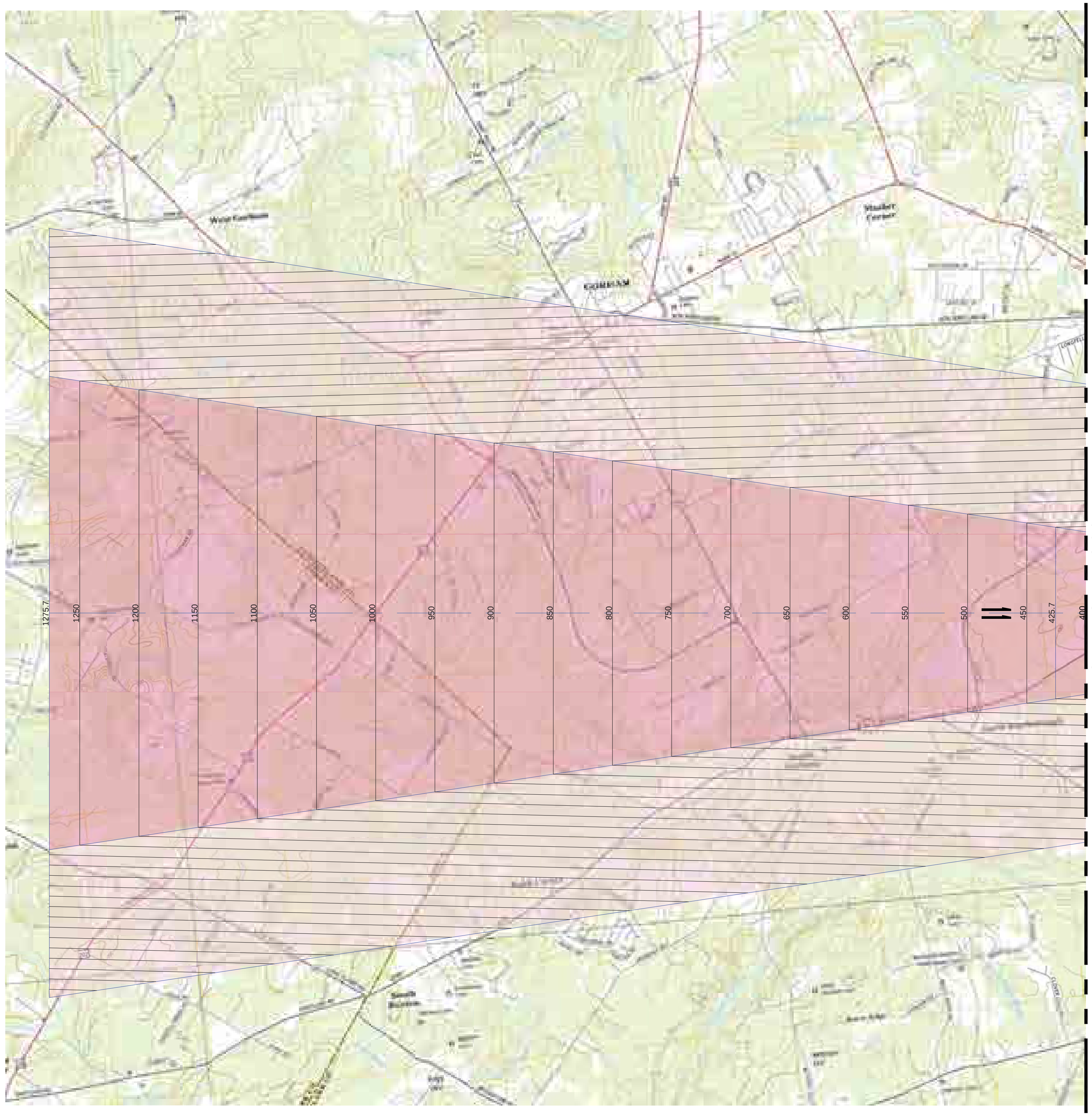
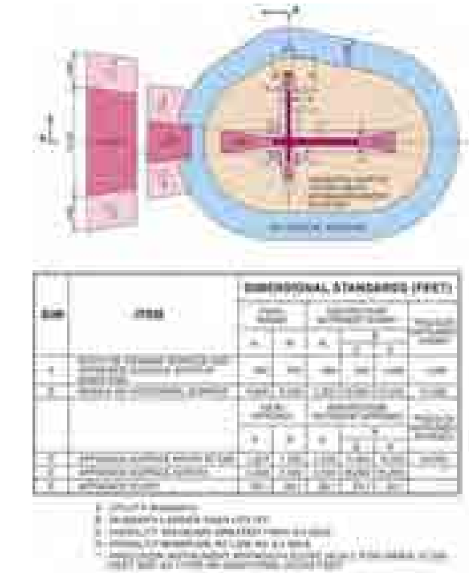
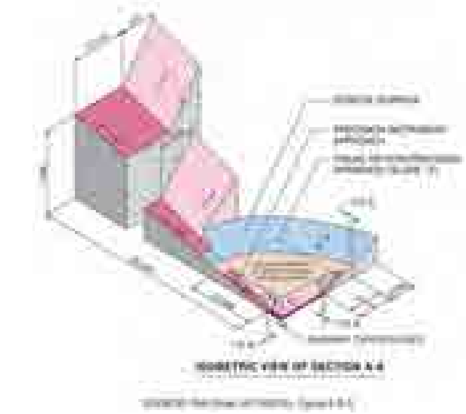
Tel. 207.883.3355
WWW.STANTEC.COM

PLANNED BY: Dwight Anderson / Steve Benson
DETAILED BY: Lori Anthony / Diana Przybycien
APPROVED BY: Mike Dmyterko
FILE NAME: -
July 2018
SHEET C-10.0

Coffman Associates
Airport Consultants
www.coffmanassociates.com







LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		OBSTRUCTION POINT
		OBSTRUCTION AREA

NORTH

Magnetic Declination
15° 26' 09" West (March 2016)
Annual Rate of Change
00° 05.0' East (March 2016)

0 2000 4000
SCALE IN FEET

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PORTLAND INTERNATIONAL JETPORT

AIRPORT AIRSPACE DRAWING II

PORTLAND, MAINE

Stantec Consulting Services Inc.
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Scarborough, ME
Tel. 207.883.3355
WWW.STANTEC.COM

PLANNED BY: Dwight Anderson / Steve Benson
DETAILED BY: Lori Anthony / Diana Przybycien
APPROVED BY: Mike Dmyterko
FILE NAME: -

July 2018

SHEET C-11.0

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Airport Consultants
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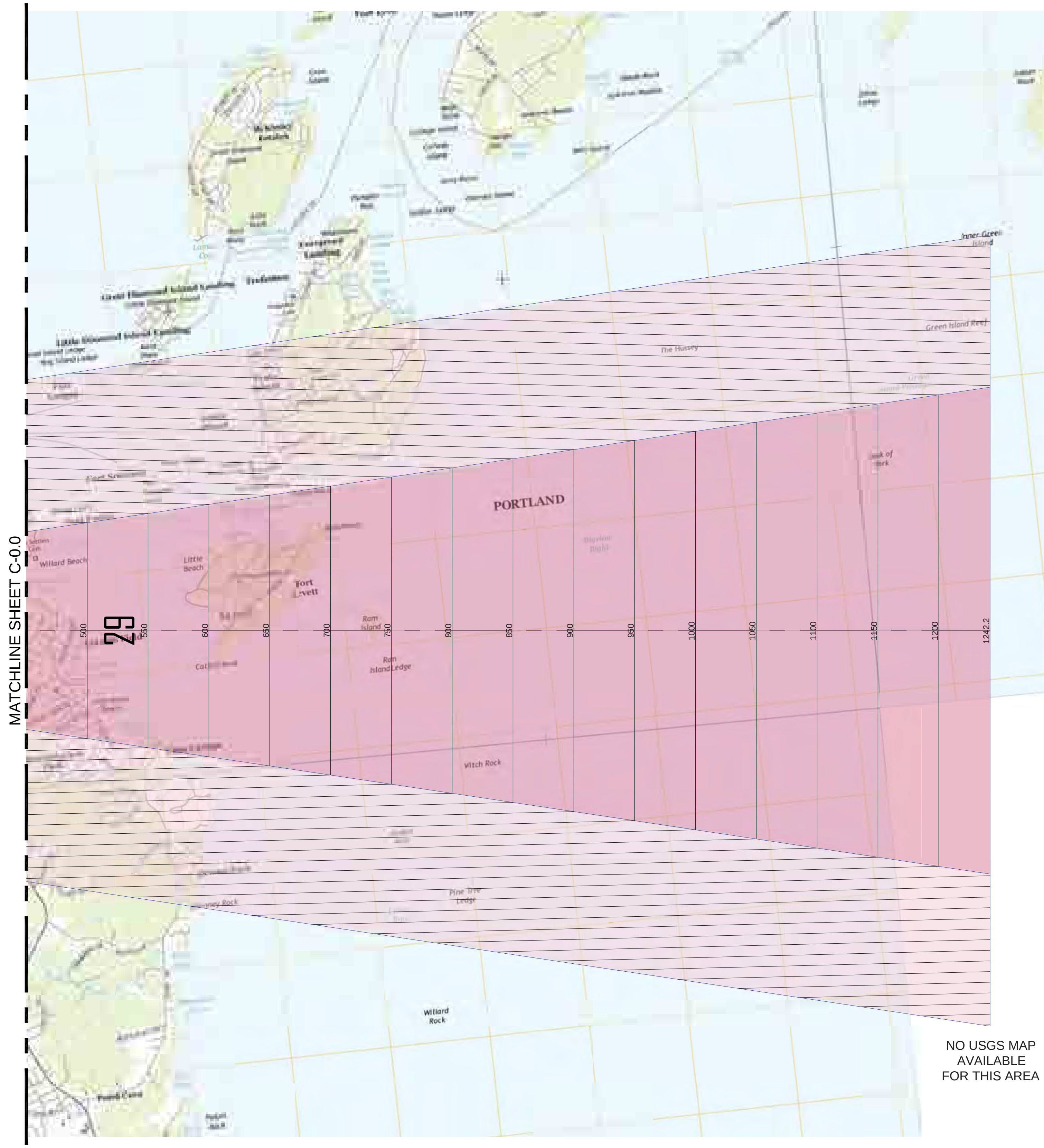

NO USGS MAP AVAILABLE FOR THIS AREA

LEGEND		
EXISTING	ULTIMATE	DESCRIPTION
— — —		AIRPORT PROPERTY LINE
(00)		OBSTRUCTION POINT
▒		OBSTRUCTION AREA

N O R T H

Magnetic Declination
15° 26' 09" West (March 2016)
Annual Rate of Change
00° 05.0' East (March 2016)

0 2000 4000
SCALE IN FEET

REV	DESCRIPTION	DATE	BY	APP'D

REVISIONS

PORTLAND INTERNATIONAL JETPORT
AIRPORT AIRSPACE DRAWING III
PORTLAND, MAINE

Stantec Consulting Services Inc.
482 Payne Road
Scarborough, ME
Tel. 207.883.3355
WWW.STANTEC.COM

PLANNED BY: Dwight Anderson / Steve Benson
DETAILED BY: Lori Anthony / Diana Przybycien
APPROVED BY: Mike Dmyterko
FILE NAME: -
July 2018
SHEET C-12.0

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Airport Consultants
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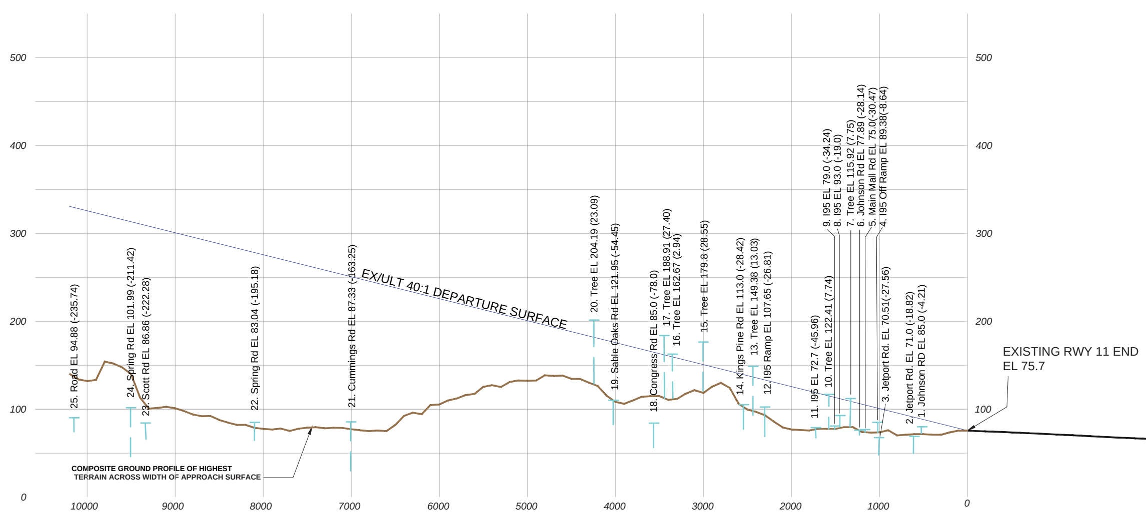

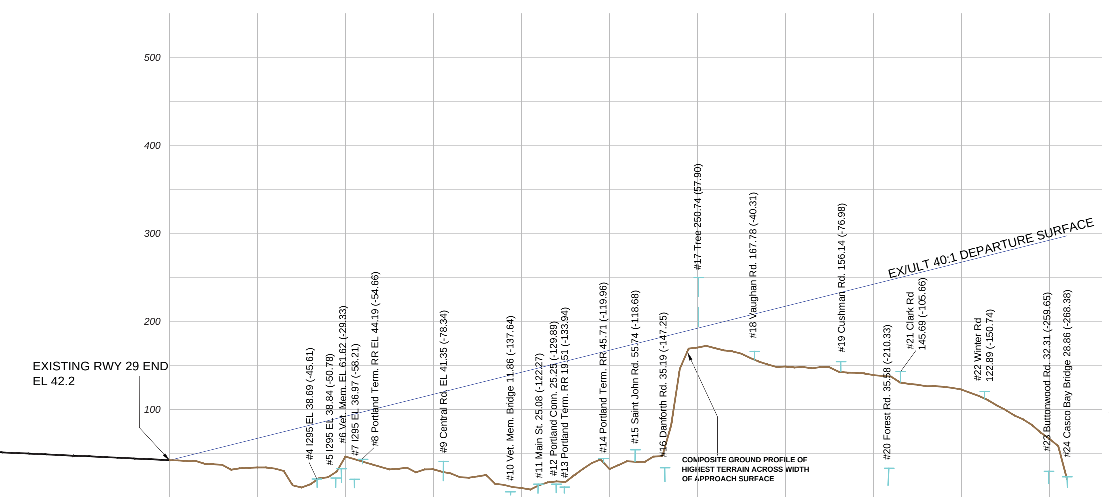

Magnetic Declination
15° 26' 09" West (March 2016)
Annual Rate of Change
00° 05.0' East (March 2016)

HORIZONTAL SCALE IN FEET (0, 1000, 2000)

VERTICAL SCALE IN FEET (0, 100, 200)

EXISTING/ULTIMATE RUNWAY 11 DEPARTURE OBSTRUCTION TABLE

No.	Description	Top Elevation MSL/AGL	Penetration	Remediation
7	Tree Group	115.92' / 56'	7.75'	Remove
10	Tree Group	122.41' / 57'	7.74'	Remove
13	Tree Group	149.38' / 88'	13.03'	Remove
15	Tree Group	179.80' / 81'	28.55'	Remove
16	Tree Group	162.67' / 84'	2.94'	Remove
17	Tree Group	188.91' / 78'	27.40'	Remove
20	Tree Group	204.19' / 79'	23.09'	Remove

APPLY STANDARDS SET FORTH IN FAA ORDER 8260.46E DEPARTURE PROCEDURE (DP) PROGRAM
Survey Date: Nov. 2012

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
— — —		AIRPORT PROPERTY LINE
⊕		OBSTRUCTION POINT
▭		OBSTRUCTION AREA
○		ROAD POINT

EXISTING/ULTIMATE RUNWAY 29 DEPARTURE OBSTRUCTION TABLE

No.	Description	Top Elevation MSL/AGL	Penetration	Remediation
17	Tree Group	250.74' / 84'	47.90'	Remove

APPLY STANDARDS SET FORTH IN FAA ORDER 8260.46E DEPARTURE PROCEDURE (DP) PROGRAM
Survey Date: Nov. 2012

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REV	DESCRIPTION	DATE	BY	APP'D

REVISIONS

PORTLAND INTERNATIONAL JETPORT

RUNWAY 11-29 DEPARTURE SURFACE DRAWING

PORTLAND, MAINE

Stantec Consulting Services Inc.
482 Payne Road
Scarborough, ME
Tel. 207.883.3355
WWW.STANTEC.COM

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APPROVED BY: Mike Dmyterko
FILE NAME: -

July 2018

SHEET C-13.0

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Airport Consultants
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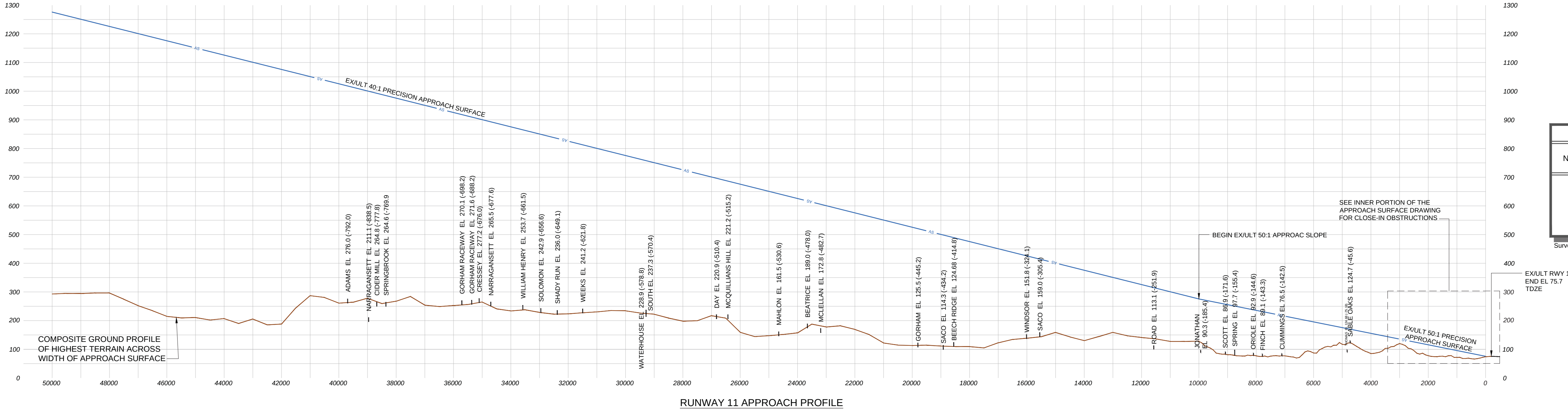


RUNWAY 11 APPROACH PROFILE

EXISTING/ULTIMATE RUNWAY 11 OBSTRUCTION TABLE

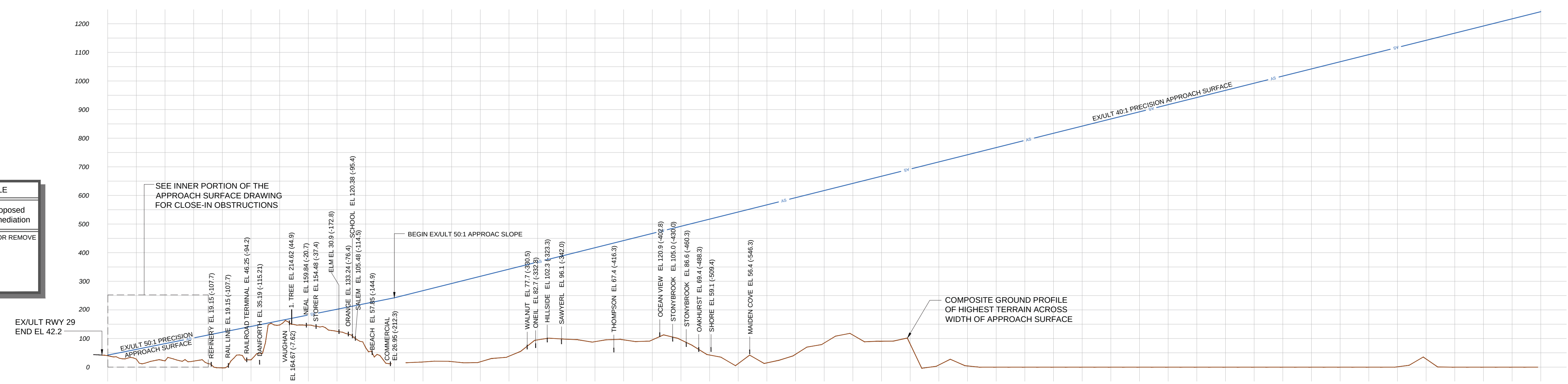
No.	Description	Top Elevation MSL/AGL	PT77 Approach Penetration	Proposed Remediation
	NONE			

Survey Date: Nov. 2012

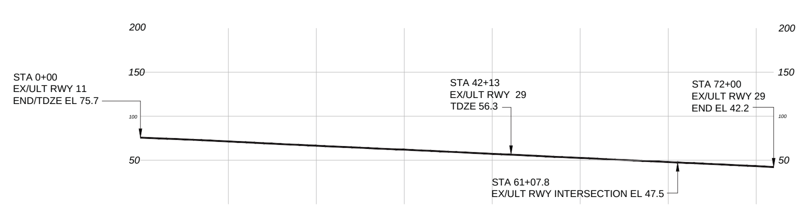
EXISTING/ULTIMATE RUNWAY 29 OBSTRUCTION TABLE

No.	Description	Top Elevation MSL/AGL	PT77 Approach Penetration	Proposed Remediation
1	TREE	214.62' / 00'	44.86'	TRIM OR REMOVE

Survey Date: Nov. 2012



RUNWAY 29 APPROACH PROFILE



RUNWAY 11-29 PROFILE

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NORTH

Magnetic Declination
15° 26' 09" West (March 2016)
Annual Rate of Change
00° 05.0' East (March 2016)

REV	DESCRIPTION	DATE	BY	APP'D

REVISIONS

PORTLAND INTERNATIONAL JETPORT

RUNWAY 11-29 AIRSPACE APPROACH PROFILE DRAWING

PORTLAND, MAINE

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FILE NAME: -

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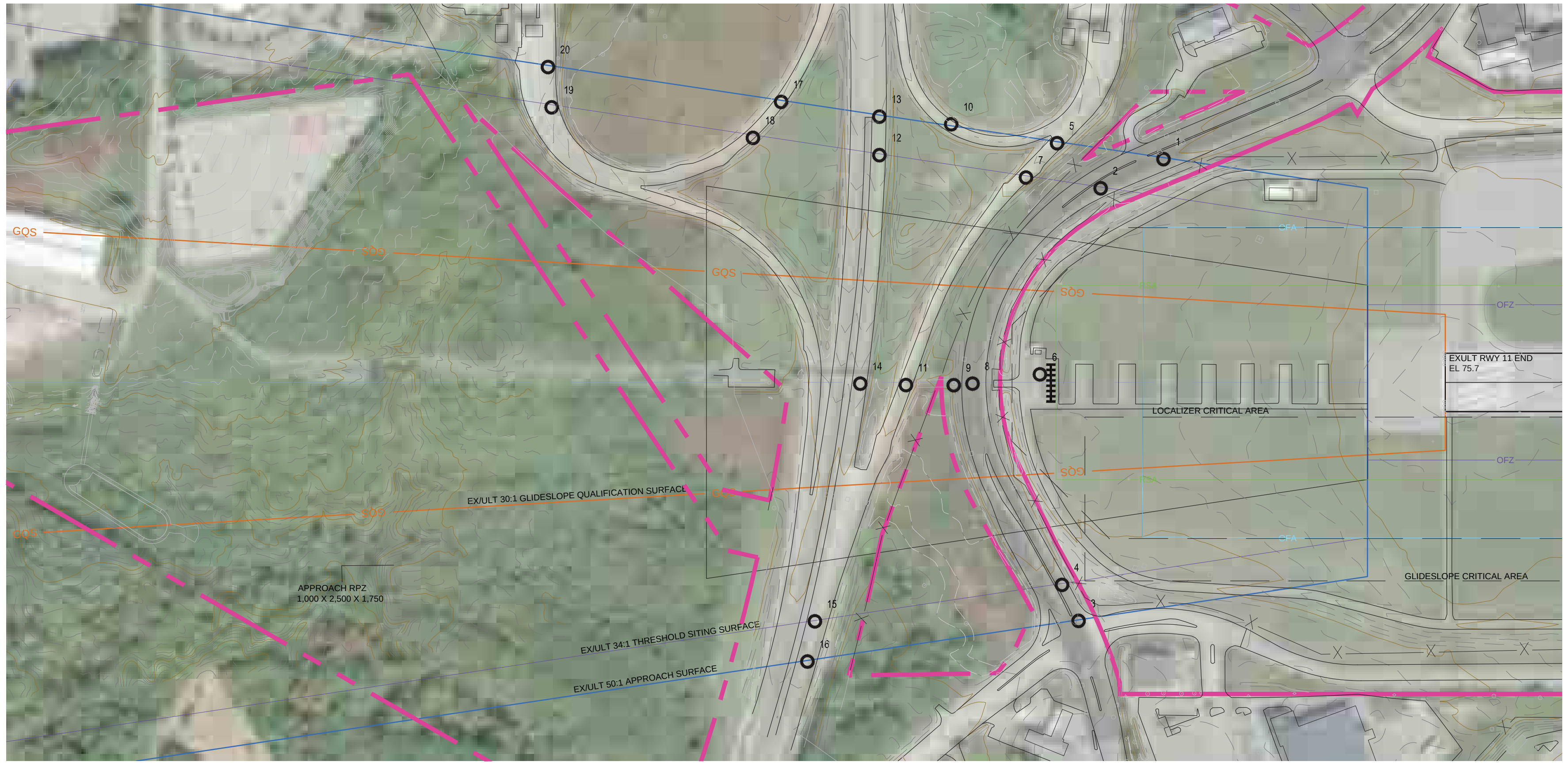

No.	Description	Top Elevation MSL/AGL	PT77 Approach Penetration	TSS Penetration	Triggering Event	Remediation
6	Navaid	92.54' / 29'	0.84'	N/A	N/A	To Remain
9	Navaid	96.94' / 38'	1.5'	N/A	N/A	To Remain

EXISTING/ULTIMATE OBSTRUCTION TABLE

Survey Date: Nov. 2012

LEGEND

EX/ULT Symbol	DESCRIPTION
	AIRPORT PROPERTY LINE
	EASEMENT
OFA	RUNWAY OBJECT FREE AREA (ROFA)
OFZ	RUNWAY OBJECT FREE ZONE (ROFZ)
RSA	RUNWAY SAFETY AREA (RSA)
	PRECISION OBSTACLE FREE ZONE (POFZ)
1000	TOPOGRAPHY
RPZ	RUNWAY PROTECTION ZONE
	OBSTRUCTION GROUPING
	OBSTRUCTION POINT
	ROAD POINT

GENERAL NOTES:

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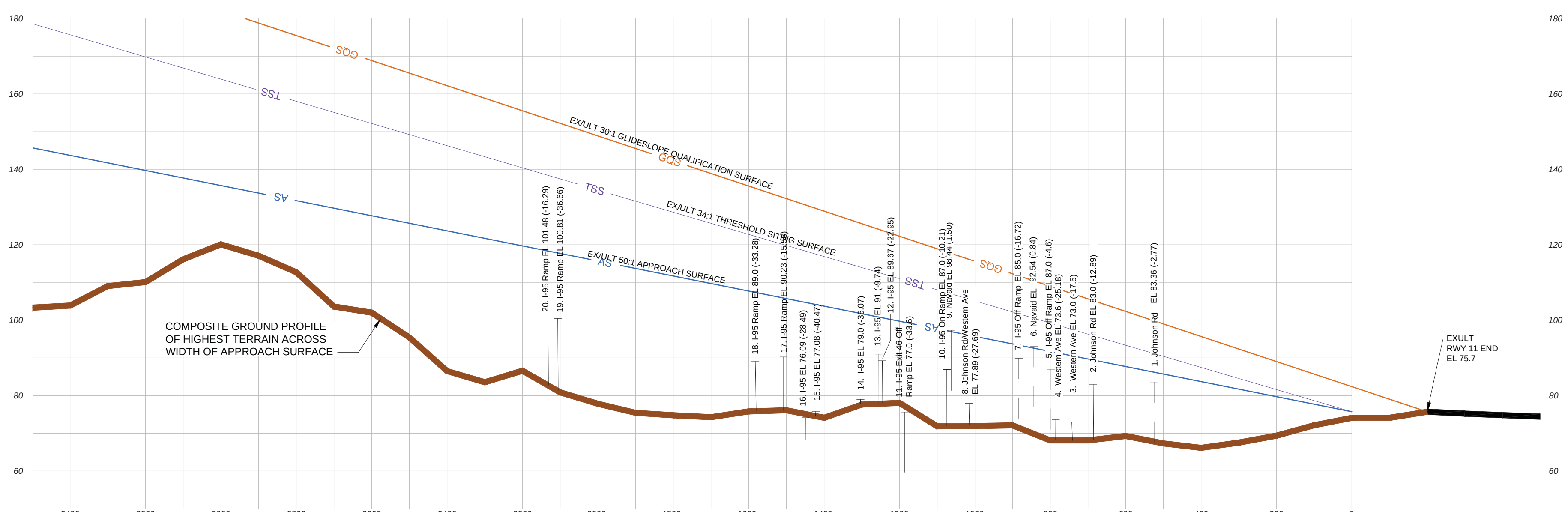

Magnetic Declination
15° 26' 09" West (March 2016)
Annual Rate of Change
00° 05.0' East (March 2016)

NORTH

0 200 400
HORIZONTAL SCALE IN FEET

0 20 40
VERTICAL SCALE IN FEET

REV	DESCRIPTION	DATE	BY	APP'D

REVISIONS

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PORTLAND INTERNATIONAL JETPORT

RWY 11 INNER PORTION OF THE APPROACH SURFACE DRAWING

PORTLAND, MAINE

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FILE NAME: -

July 2018 | SHEET C-15.0

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EXISTING/ULTIMATE OBSTRUCTION TABLE

No.	Description	Top Elevation	PT77 Approach Penetration	TSS Penetration	Triggering Event	Remediation
	NONE					

Survey Date: Nov. 2012

LEGEND

EX/ULT Symbol	DESCRIPTION
	AIRPORT PROPERTY LINE
	EASEMENT
OFA	RUNWAY OBJECT FREE AREA (ROFA)
OFZ	RUNWAY OBJECT FREE ZONE (ROFZ)
RSA	RUNWAY SAFETY AREA (RSA)
	PRECISION OBSTACLE FREE ZONE (POFZ)
1080	TOPOGRAPHY
RPZ	RUNWAY PROTECTION ZONE
	OBSTRUCTION GROUPING
	OBSTRUCTION POINT
	ROAD POINT

GENERAL NOTES:

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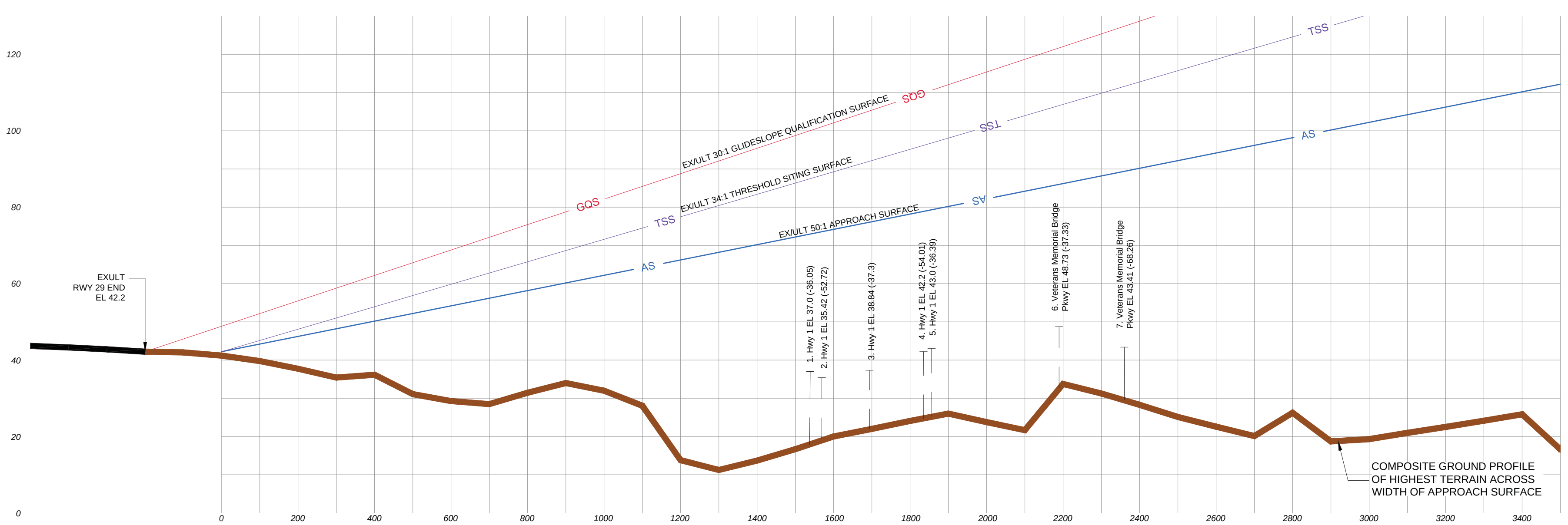

Magnetic Declination
15° 26' 09" West (March 2016)
Annual Rate of Change
00° 05.0' East (March 2016)

NORTH

0 200 400
HORIZONTAL SCALE IN FEET

0 20 40
VERTICAL SCALE IN FEET

REV	DESCRIPTION	DATE	BY	APP'D

REVISIONS

PORTLAND INTERNATIONAL JETPORT

RWY 29 INNER PORTION OF THE APPROACH SURFACE DRAWING

PORTLAND, MAINE

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FILE NAME: -

July 2018 SHEET C-16.0

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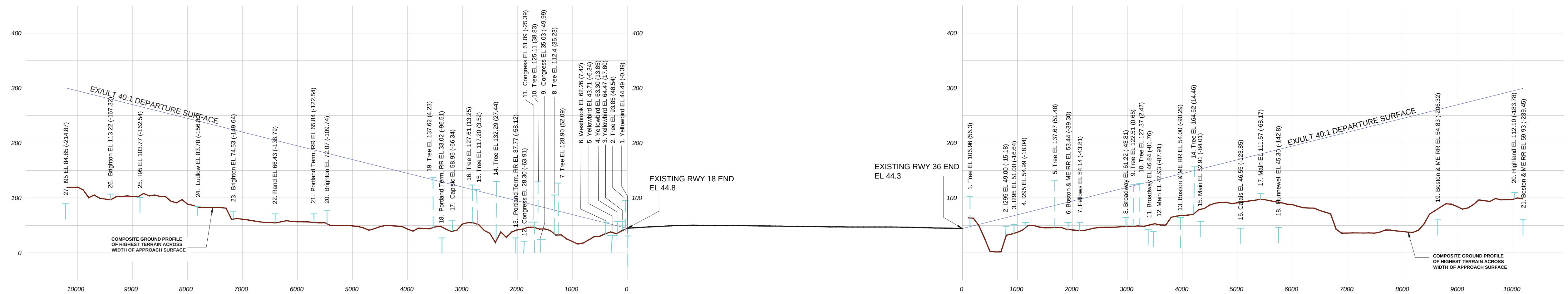

EXISTING/ULTIMATE RUNWAY 36 DEPARTURE OBSTRUCTION TABLE

No.	Description	Top Elevation MSL/AGL	Penetration	Remediation
2	Tree Group	93.85' / 46'	48.54'	Remove
3	Yellowbird Rd.	64.47' / 15'	17.80'	To Remain
4	Yellowbird Rd.	63.30' / 15'	13.85'	To Remain
6	Westbrook Rd.	62.26' / 15'	7.42'	To Remain
7	Tree Group	128.90' / 87'	52.09'	Remove
8	Tree Group	112.40' / 80'	35.23'	Remove
10	Tree Group	125.11' / 84'	38.83'	Remove
14	Tree Group	132.29' / 82'	27.44'	Remove
15	Tree Group	117.20' / 74'	3.52'	Remove
16	Tree Group	127.61' / 70'	13.25'	Remove
19	Tree Group	137.62' / 86'	4.23'	Remove

APPLY STANDARDS SET FORTH IN FAA ORDER 8260.46E DEPARTURE PROCEDURE (DP) PROGRAM
Survey Date: Nov. 2012

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
— — — —		AIRPORT PROPERTY LINE
⊕		OBSTRUCTION POINT
▭		OBSTRUCTION AREA
○		ROAD POINT

EXISTING/ULTIMATE RUNWAY 18 DEPARTURE OBSTRUCTION TABLE

No.	Description	Top Elevation MSL/AGL	Penetration	Remediation
5	Tree Group	137.67' / 96'	51.48'	Remove
9	Tree	122.51' / 75'	0.65'	Remove
10	Tree	127.37' / 99'	2.47'	Remove
14	Tree Group	164.62' / 94'	14.46'	Remove

APPLY STANDARDS SET FORTH IN FAA ORDER 8260.46E DEPARTURE PROCEDURE (DP) PROGRAM
Survey Date: Nov.2012

Magnetic Declination
15° 26' 09" West (March 2016)
Annual Rate of Change
00° 05.0' East (March 2016)

0 1000 2000
HORIZONTAL SCALE IN FEET

0 100 200
VERTICAL SCALE IN FEET

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REVISIONS

PORTLAND INTERNATIONAL JETPORT

RUNWAY 18-36 DEPARTURE SURFACE DRAWING

PORTLAND, MAINE

Stantec Consulting Services Inc.
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FILE NAME: -
July 2018
SHEET C-17.0

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Airport Consultants
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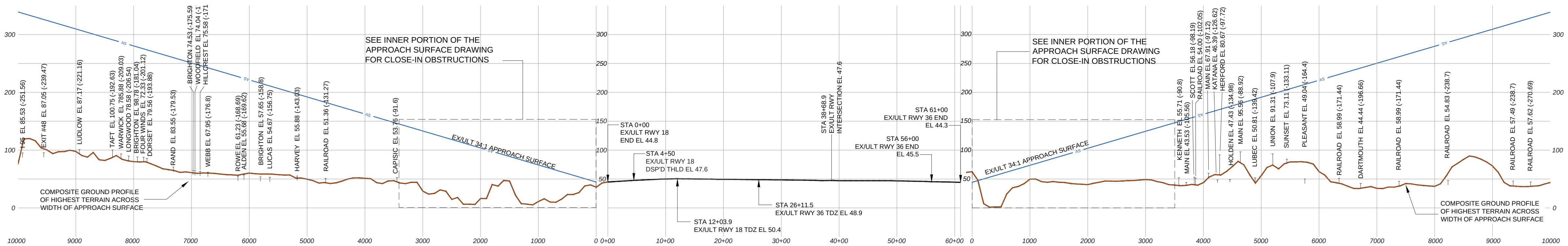

EXISTING/ULTIMATE RUNWAY 18 OBSTRUCTION TABLE				
No.	Description	Top Elevation MSL/AGL	PT77 Approach Penetration	Proposed Remediation
	NONE			

Survey Date: Nov. 2012

0 500 1000 2000

HORIZONTAL SCALE IN FEET

0 50 100 200

VERTICAL SCALE IN FEET

EXISTING/ULTIMATE RUNWAY 36 OBSTRUCTION TABLE				
No.	Description	Top Elevation MSL/AGL	PT77 Approach Penetration	Proposed Remediation
	NONE			

Survey Date: Nov. 2012

NORTH

Magnetic Declination
15° 26' 09" West (March 2016)
Annual Rate of Change
00° 05.0' East (March 2016)

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PORTLAND INTERNATIONAL JETPORT

RUNWAY 18-36 AIRSPACE APPROACH PROFILE DRAWING

PORTLAND, MAINE

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PLANNED BY: Dwight Anderson / Steve Benson
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APPROVED BY: Mike Dmyterko
FILE NAME: -

July 2018 SHEET C-18.0

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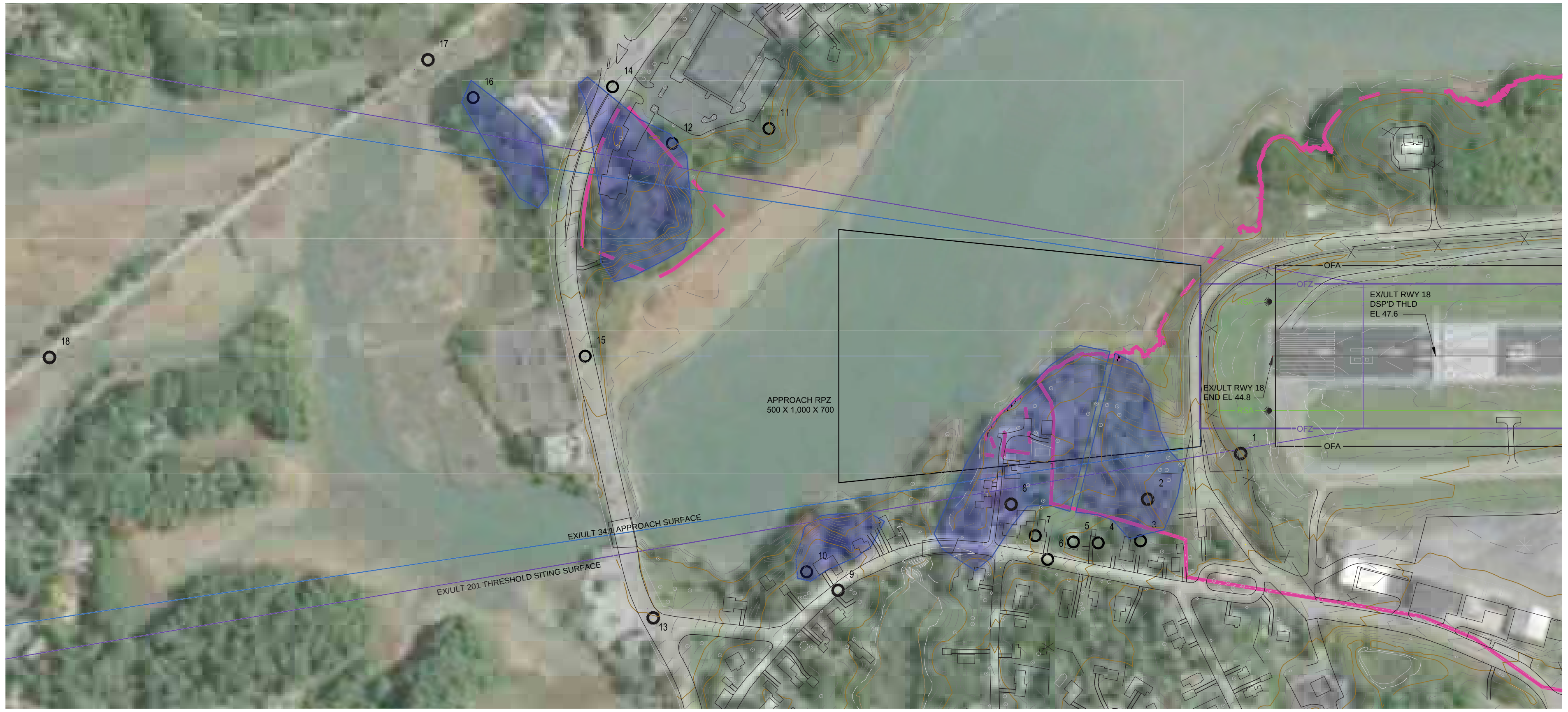


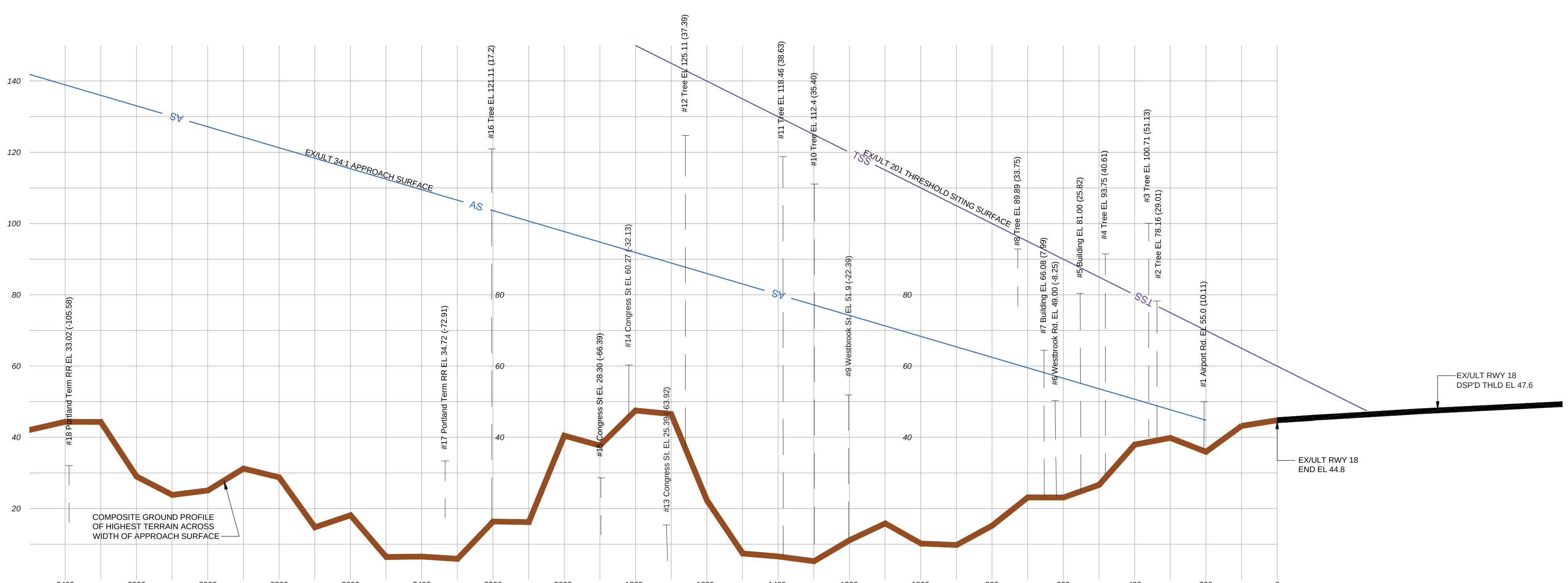
EXISTING/ULTIMATE OBSTRUCTION TABLE

No.	Description	Top Elevation MSL/AGL	PT77 Approach Penetration	TSS Penetration	Triggering Event	Remediation
1	Sound Wall	68.00' / 20'	N/A	10.3	N/A	Light/Relocate
2	Tree Group	78.16' / 43'	29.01'	0.66'	N/A	Remove
3	Tree	100.71' / 54'	51.13'	N/A	N/A	Remove
4	Tree	93.75' / 52'	40.61'	N/A	N/A	Remove
5	Building	81.00' / 41'	25.82'	N/A	N/A	Light
7	Building	66.08' / 36'	7.99'	N/A	N/A	Light
8	Tree Group	93.89' / 69'	33.75'	N/A	N/A	Remove
10	Tree	112.40' / 80'	35.40'	N/A	N/A	Remove
11	Tree	118.46' / 79'	38.63'	N/A	N/A	Remove
12	Tree Group	125.11' / 84'	37.39'	N/A	N/A	Remove
16	Tree Group	121.11' / 91'	17.2'	N/A	N/A	Remove

Survey Date: Nov. 2012

LEGEND

EX/ULT Symbol	DESCRIPTION
	AIRPORT PROPERTY LINE
	EASEMENT
OFA	RUNWAY OBJECT FREE AREA (ROFA)
OFZ	RUNWAY OBJECT FREE ZONE (ROFZ)
RSA	RUNWAY SAFETY AREA (RSA)
	PRECISION OBSTACLE FREE ZONE (POFZ)
1080	TOPOGRAPHY
RPZ	RUNWAY PROTECTION ZONE
	OBSTRUCTION GROUPING
	OBSTRUCTION POINT
	ROAD POINT



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NORTH

Magnetic Declination
15° 26' 09" West (March 2016)
Annual Rate of Change
00° 05.0' East (March 2016)

0 200 400
HORIZONTAL SCALE IN FEET

0 20 40
VERTICAL SCALE IN FEET

REV	DESCRIPTION	DATE	BY	APP'D

REVISIONS

PORTLAND INTERNATIONAL JETPORT

RWY 18 INNER PORTION OF THE APPROACH SURFACE DRAWING

PORTLAND, MAINE

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FILE NAME: -

July 2018

SHEET C-19.0

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www.coffmanassociates.com

EXISTING/ULTIMAGE OBSTRUCTION TABLE						
No.	Description	Top Elevation MSL/AGL	PT77 Approach Penetration	TSS Penetration	Triggering Event	Remediation
9	Tree Group	137.67' / 96'	49.98'	N/A	N/A	Remove
14	Tree Group	137.45' / 91'	19.39'	N/A	N/A	Remove

Survey Date: Nov. 2012

LEGEND

EX/ULT Symbol	DESCRIPTION
	AIRPORT PROPERTY LINE
	EASEMENT
OFA	RUNWAY OBJECT FREE AREA (ROFA)
OFZ	RUNWAY OBJECT FREE ZONE (ROFZ)
RSA	RUNWAY SAFETY AREA (RSA)
	PRECISION OBSTACLE FREE ZONE (POFZ)
1000	TOPOGRAPHY
RPZ	RUNWAY PROTECTION ZONE
	OBSTRUCTION GROUPING
	OBSTRUCTION POINT
	ROAD POINT

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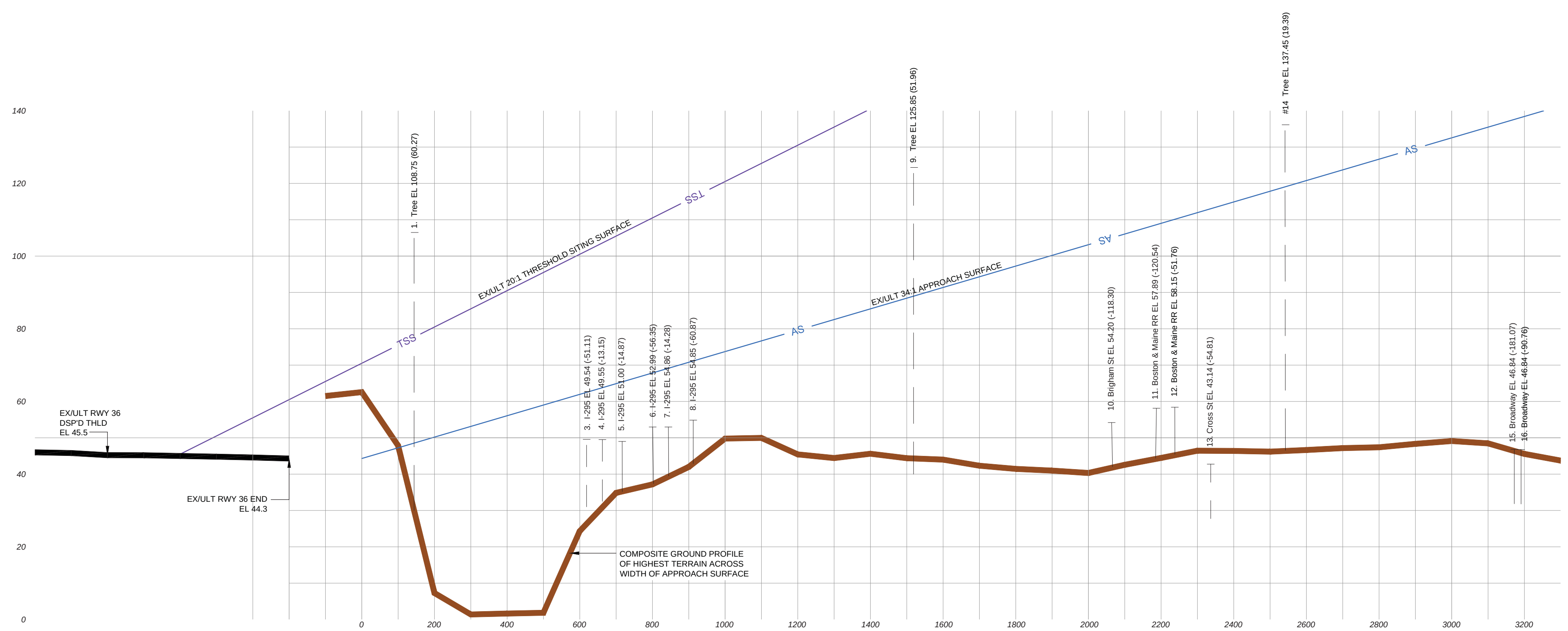

NORTH

Magnetic Declination
15° 26' 09" West (March 2016)
Annual Rate of Change
00° 05.0' East (March 2016)

0 200 400
HORIZONTAL SCALE IN FEET

0 20 40
VERTICAL SCALE IN FEET

REV	DESCRIPTION	DATE	BY	APP'D

REVISIONS

PORTLAND INTERNATIONAL JETPORT

RWY 36 INNER PORTION OF THE APPROACH SURFACE DRAWING

PORTLAND, MAINE

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FILE NAME: -
July 2018
SHEET C-20.0

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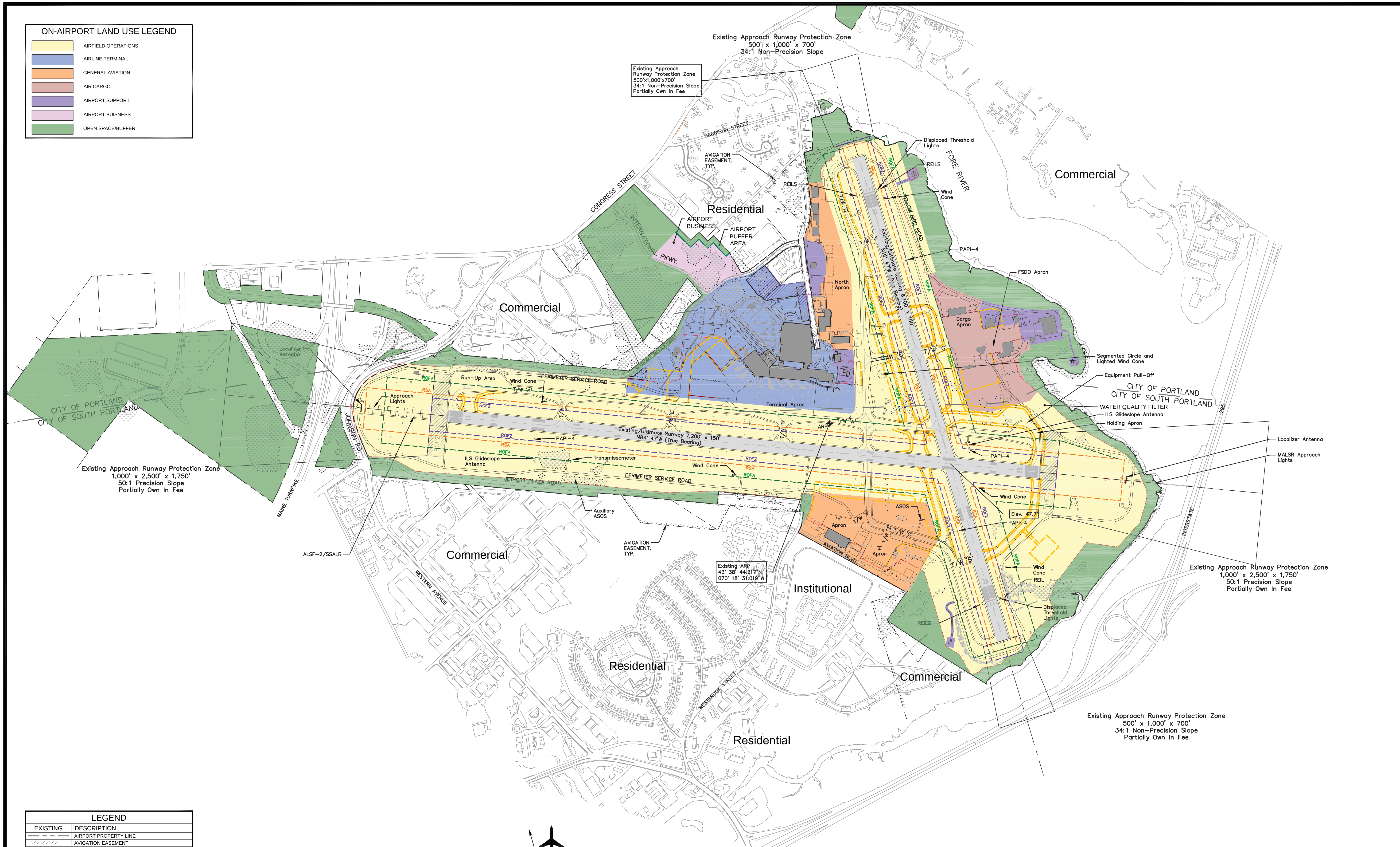
ON-AIRPORT LAND USE LEGEND
AIRFIELD OPERATIONS
AIRLINE TERMINAL
GENERAL AVIATION
AIR CARGO
AIRPORT SUPPORT
AIRPORT BUISNESS
OPEN SPACE/BUFFER



LEGEND	
EXISTING	DESCRIPTION
	AIRPORT PROPERTY LINE
	AVIGATION EASEMENT
	MUNICIPAL BOUNDARY
ROFA	RUNWAY OBJECT FREE AREA (ROFA)
ROFZ	RUNWAY OBJECT FREE ZONE (ROFZ)
RSA	RUNWAY SAFETY AREA (RSA)
	PROPERTY ACQUISITION
	BUILDING / STRUCTURES
	AIRPORT REFERENCE POINT (ARP)
	AIRPORT ROTATING BEACON
	FACILITY CONSTRUCTION
	FENCING
	WETLAND

NORTH

Magnetic Variance 16° 06' West
(March 2007)
Annual Rate of Change 00° 05'
East (March 2007)

GRAPHIC SCALE

500 0 250 500 1000

(IN FEET)
1 inch = 500 ft.

REV	DESCRIPTION	DATE	BY	APP'D
4	SUBMITTED TO CITY, MDOT AND FAA FOR FINAL APPROVAL	07.09.18	DDA	DDA
3	SUBMITTED TO FAA FOR APPROVAL	11.29.17	DDA	DDA
2	ISSUED DRAFT ALP TO CITY AND FAA	11.17.16	DDA	DDA
1	ISSUED TO CLIENT FOR REVIEW	07.26.16	DDA	DDA

REVISIONS

THE CONTENTS OF THIS PLAN DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THIS DOCUMENT BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS.

PORTLAND INTERNATIONAL JETPORT

ON-AIRPORT LAND USE DRAWING

PORTLAND, MAINE

Stantec Consulting Services Inc.
482 Payne Road
Scarborough, ME
Tel. 207.883.3355
WWW.STANTEC.COM

PLANNED BY: Dwight Anderson / Steve Benson
DETAILED BY: Lori Anthony / Tim Kahmann
APPROVED BY: Mike Dmyterko
FILE NAME: 195350010
July 2018
SHEET 21.0

Coffman Associates Airport Consultants

V:\1953\active\195350010\cadd\alp\dwg\op_m116_land_use.dwg lranthony 7/11/2018 11:18 AM

EASEMENTS ON AIRPORT PROPERTY

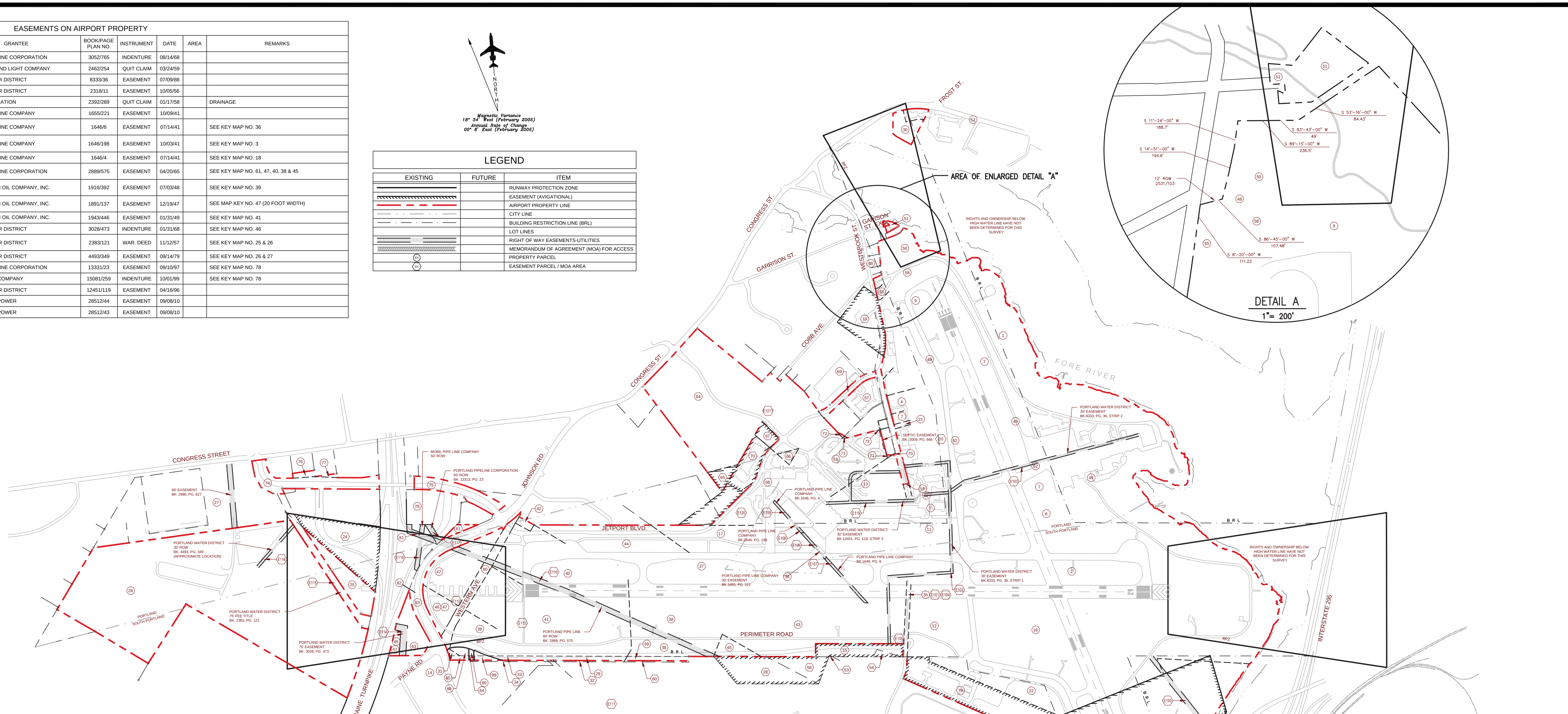
MAP KEY	GRANTOR	GRANTEE	BOOK/PAGE PLAN NO.	INSTRUMENT	DATE	AREA	REMARKS
E100	STATE OF MAINE	PORTLAND PIPE LINE CORPORATION	3052/765	INDENTURE	08/14/68		
E101	CITY OF PORTLAND	PORTLAND GAS AND LIGHT COMPANY	2462/254	QUIT CLAIM	03/24/59		
E103	CITY OF PORTLAND	PORTLAND WATER DISTRICT	8333/36	EASEMENT	07/09/88		
E104	CITY OF PORTLAND	PORTLAND WATER DISTRICT	2318/11	EASEMENT	10/05/56		
E105	CITY OF PORTLAND	CHAPLIN CORPORATION	2392/289	QUIT CLAIM	01/17/58		DRAINAGE
E106	CITY OF PORTLAND	PORTLAND PIPE LINE COMPANY	1655/221	EASEMENT	10/09/41		
E107	BURTON DENSMORE & GERTRUDE L. DENSMORE	PORTLAND PIPE LINE COMPANY	1646/6	EASEMENT	07/14/41		SEE KEY MAP NO. 36
E108	WALTER C. & ELEANOR JOHNSON NIELSEN, NELLIE R. JOHNSON	PORTLAND PIPE LINE COMPANY	1646/198	EASEMENT	10/03/41		SEE KEY MAP NO. 3
E109	ISSAC FAIRWEATHER	PORTLAND PIPE LINE COMPANY	1646/4	EASEMENT	07/14/41		SEE KEY MAP NO. 18
E110	CITY OF PORTLAND	PORTLAND PIPE LINE CORPORATION	2889/575	EASEMENT	04/20/65		SEE KEY MAP NO. 61, 47, 40, 38 & 45
E111	WILFRED A. HAY, TRUSTEE OF CLINTON C. PHINNEY	SOCONY-VACUUM OIL COMPANY, INC.	1916/392	EASEMENT	07/03/48		SEE KEY MAP NO. 39
E112	FRANK P. CUMMINGS, TRUSTEE OF LEON F. CUMMINGS	SOCONY-VACUUM OIL COMPANY, INC.	1891/137	EASEMENT	12/19/47		SEE MAP KEY NO. 47 (20 FOOT WIDTH)
E113	FRNCIS B. EVANS	SOCONY-VACUUM OIL COMPANY, INC.	1943/446	EASEMENT	01/31/49		SEE KEY MAP NO. 41
E114	CITY OF PORTLAND	PORTLAND WATER DISTRICT	3028/473	INDENTURE	01/31/68		SEE KEY MAP NO. 46
E115	EDWARD S. FINKS AND DOROTHY L. FINKS	PORTLAND WATER DISTRICT	2383/121	WAR. DEED	11/12/57		SEE KEY MAP NO. 25 & 26
E116	CITY OF PORTLAND	PORTLAND WATER DISTRICT	4493/349	EASEMENT	09/14/79		SEE KEY MAP NO. 26 & 27
E117	CITY OF PORTLAND	PORTLAND PIPE LINE CORPORATION	13331/23	EASEMENT	09/10/97		SEE KEY MAP NO. 78
E118	CITY OF PORTLAND	MOBIL PIPE LINE COMPANY	15081/259	INDENTURE	10/01/99		SEE KEY MAP NO. 78
E119	CITY OF PORTLAND	PORTLAND WATER DISTRICT	12451/119	EASEMENT	04/16/96		
E120	CITY OF PORTLAND	CENTRAL MAINE POWER	28512/44	EASEMENT	09/08/10		
E121	CITY OF PORTLAND	CENTRAL MAINE POWER	28512/43	EASEMENT	09/08/10		

NORTH

Magnetic Variance
18° 34' West (February 2005)
Annual Rate of Change
00° 8' East (February 2005)

LEGEND

EXISTING	FUTURE	ITEM
		RUNWAY PROTECTION ZONE
		EASEMENT (AVIGATIONAL)
		AIRPORT PROPERTY LINE
		CITY LINE
		BUILDING RESTRICTION LINE (BRL)
		LOT LINES
		RIGHT OF WAY EASEMENTS-UTILITIES
		MEMORANDUM OF AGREEMENT (MOA) FOR ACCESS
XX		PROPERTY PARCEL
XX		EASEMENT PARCEL / MOA AREA



INVENTORY OF PARCELS

MAP KEY	GRANTOR	GRANTEE	INST.	BOOK	PAGE	DATE	Ac.	REMARKS
1 ●	HAROLD SEIDERS	CITY OF PORTLAND	WAR. DEED	1548	80	4/23/38	1.15	PART OF 1 ALSO TAKEN BY CONDEMN. 1532/305
2 ●	HERBERT JACKSON	CITY OF PORTLAND	CONDEMNATION	1634	492	5/2/41	124.4	PARCEL 1 IN 1634/492
3 ●	FAIRWEATHER, NEILSON & LARRABEE	CITY OF PORTLAND	CONDEMNATION	1634	492	5/2/41	28.1	PARCEL 2 IN 1634/492
4 ●	GEORGE W. MILLS	CITY OF PORTLAND	WAR. DEED	1639	63	5/6/41	2.29	PART OF 4 ALSO TAKEN BY CONDEMN. 1532/305
5 ●	STATE OF MAINE	CITY OF PORTLAND	Q.C. DEED	1647	460	7/30/41	4.59	
6 ●	CLIFFORD STRANGE	CITY OF PORTLAND	WAR. DEED	1543	276	3/1/38	15.3	
6 ●	CLIFFORD STRANGE	CITY OF PORTLAND	CONDEMNATION	1532	305	6/30/37	-	
7 ●	PORTLAND CITY AIRPORT	CITY OF PORTLAND	WAR. DEED	1543	277	3/1/38	139.2	
7 ●	PORTLAND CITY AIRPORT	CITY OF PORTLAND	CONDEMNATION	1532	305	6/30/37	-	
8 ●	FLOELLA A. MAXWELL	CITY OF PORTLAND	WAR. DEED	1504	410	9/23/36	2.06	ROAD R.O.W. B 1504 P 409, POLE LINE R.O.W. B 1507, P275
9 ●	MILLIKEN HEIRS & CUMMINGS ESTATE	CITY OF PORTLAND	CONDEMNATION	1634	492	5/2/41	24.05	PARCEL 3 IN 1634/492
10 ●	ROBERT D. JACKSON	CITY OF PORTLAND	EASEMENT	1532	301	6/30/37	-	CONDEMNATION OF AIR RIGHTS
11	CLIFFORD STRANGE	CITY OF PORTLAND	WAR. DEED	1897	140	9/25/47	1.6	FEDERAL PROJECT NO. 9-17-001-702
11	CLIFFORD STRANGE	CITY OF PORTLAND	CONDEMNATION	1880	157	8/5/47	1.6	FEDERAL PROJECT NO. 9-17-001-702
12	STATE OF MAINE	CITY OF PORTLAND	WAR. DEED	2238	63	7/22/55	8.61	FEDERAL PROJECT NO. 9-17-001-508
13	ELEANOR J. NIELSON	CITY OF PORTLAND	WAR. DEED	2361	436	7/9/57	9.60	FEDERAL PROJECT NO. 9-17-001-5811
14	EDNA MAXFIELD	CITY OF PORTLAND	EASEMENT	72	256	6/17/55	-	- CONDEMNATION OF AIR RIGHTS, 9-17-001-508
15	MERLE P. CHAPLIN	CITY OF PORTLAND	EASEMENT	72	256	6/17/55	-	- CONDEMNATION OF AIR RIGHTS, 9-17-001-508
16	STATE OF MAINE	CITY OF PORTLAND	Q.C. DEED	3028	471	1/24/68	16.5	FEDERAL PROJECT NO. 9-17-001-C916
17	BROOKLAWN MEM. PARK	CITY OF PORTLAND	CONDEMNATION	3007	617	6/19/67	6.3	PARCEL B-3 IN 3007/617, 9-17-001-C916
18	BERTRAM J. FAIRWEATHER	CITY OF PORTLAND	WAR. DEED	3009	666	8/30/67	12.6	FEDERAL PROJECT NO. 9-17-001-C916
18	BERTRAM J. FAIRWEATHER	CITY OF PORTLAND	CONDEMNATION	3007	617	6/19/67	-	SEE PARCEL B-4 IN 3007/617, 9-17-001-C916
19	CUMBERLAND COUNTY COMMISSONERS	CITY OF PORTLAND	DISCONTINUED	DOCKET	1175	JAN.1957	1.18	CUMBERLAND CO. COMM. RECORDS, 9-17-001-508
20	LLEWELLYN PRESSLEY	CITY OF PORTLAND	EASEMENT	2365	139	7/18/57	792SF	GROWTH RESTRICTION, 9-17-001-5811
21 ●	PORTLAND CITY AIRPORT	CITY OF PORTLAND	Q.C. DEED	1503	216	7/13/36	1.30	
22	STATE OF MAINE	CITY OF PORTLAND	Q.C. DEED	3028	471	1/24/68	24.5	FEDERAL PROJECT NO. 9-17-001-C916
23	STATE OF MAINE	CITY OF PORTLAND	EASEMENT	3028	469	1/24/68	96	EASEMENT FOR UNOBSTRUCTED AIR SPACE 9-17-001-C916
24	HARRY HARMON & GEORGE HUTCHINS	CITY OF PORTLAND	EASEMENT	3010	683	8/31/67	9.2	EASEMENT FOR UNOBSTRUCTED AIR SPACE 9-17-001-C916
24	HARRY HARMON & GEORGE HUTCHINS	CITY OF PORTLAND	EASEMENT	3007	617	6/19/67	9.2	PARCEL D-1 IN 3007/617, 9-17-001-C916
25	EDWARD S. & DOROTHY L. FINKS	CITY OF PORTLAND	WAR. DEED	2457	262	2/13/59	4.30	FEDERAL PROJECT NO. 9-17-001-5912
26	EDWARD S. & DOROTHY L. FINKS	CITY OF PORTLAND	WAR. DEED	2457	262	2/13/59	86.09	FEDERAL PROJECT NO. 9-17-001-5912
27	CITY OF PORTLAND	W.H. NICHOLS CO.	WAR. DEED	2990	627	4/4/67	28.77	PARCEL SOLD-FAA RELEASE 2/27/67 AVIG. ESMT. RETAINED
28	BERGEN ASSOCIATES INC.	CITY OF PORTLAND	EASEMENT	3007	617	6/19/67	5.62	PARCEL D-1 IN 3007/617, 9-17-001-C916
29	ADC BUILDING FUND INC. et. als.	CITY OF PORTLAND	CONDEMNATION	3007	617	6/19/67	1.01	PARCEL B-2 IN 3007/617, 9-17-001-C916
30	OTIS J. & DOROTHY J. AUGUST	CITY OF PORTLAND	WAR. DEED	3909	306	9/17/76	2.25	6-23-0038-10
31	ADC BUILDING FUND INC.	CITY OF PORTLAND	CONDEMNATION	3007	617	6/17/67	0.11	PARCEL B-6 IN 3007/617, 9-17-001-C916
32	ADC BUILDING FUND INC.	CITY OF PORTLAND	EASEMENT	3007	617	6/17/67	0.28	PARCEL E-2 IN 3007/617, 9-17-001-C916
33	ADC BUILDING FUND INC.	CITY OF PORTLAND	CONDEMNATION	3007	617	6/17/67	1.31	PARCEL B-1 IN 3007/617, 9-17-001-C916
34	ADC BUILDING FUND INC.	CITY OF PORTLAND	EASEMENT	3007	617	6/17/67	0.32	PARCEL E-1 IN 3007/617, 9-17-001-C916
35	CUMBERLAND COUNTY COMMISSIONERS	CITY OF PORTLAND	DISCONTINUED	21	226	1955	2.30	FEDERAL PROJECT NO. 9-17-001-508
36	BURTON DENSMORE	CITY OF PORTLAND	WAR. DEED	2236	399	7/12/55	20	FEDERAL PROJECT NO. 9-17-001-508
36	BURTON DENSMORE	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	-	FEDERAL PROJECT NO. 9-17-001-508
37	BROOKLAWN MEM. PARK	CITY OF PORTLAND	WAR. DEED	2257	189	9/13/55	5.22	FEDERAL PROJECT NO. 9-17-001-508
37	BROOKLAWN MEM. PARK	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	-	FEDERAL PROJECT NO. 9-17-001-508
38	CLINTON C. PHINNEY & ROBERT D. SCHWARTZ	CITY OF PORTLAND	Q.C. DEED	2255	428/9	11/28/55	15.2	FEDERAL PROJECT NO. 9-17-001-508
38	CLINTON C. PHINNEY & ROBERT D. SCHWARTZ	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	-	FEDERAL PROJECT NO. 9-17-001-508
39	CLINTON C. PHINNEY & ROBERT D. SCHWARTZ	CITY OF PORTLAND	Q.C. DEED	2255	428/9	11/28/55	8.03	FEDERAL PROJECT NO. 9-17-001-508
39	CLINTON C. PHINNEY & ROBERT D. SCHWARTZ	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	-	FEDERAL PROJECT NO. 9-17-001-508
40	JOHN M. DENSMORE	CITY OF PORTLAND	WAR. DEED	2257	271	10/27/55	49	FEDERAL PROJECT NO. 9-17-001-508
40	JOHN M. DENSMORE	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	-	FEDERAL PROJECT NO. 9-17-001-508
41	JOHN M. DENSMORE	CITY OF PORTLAND	WAR. DEED	2257	271	10/27/55	49	FEDERAL PROJECT NO. 9-17-001-508
41	MOBIL PIPE LINE CO.	CITY OF PORTLAND	Q.C. DEED	3051	721	8/1/68	21.8	
41	FRANCIS B. EVANS	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	-	FEDERAL PROJECT NO. 9-17-001-508
42	JOHN E. DENSMORE	CITY OF PORTLAND	WAR. DEED	2241	473	8/8/55	0.50	FEDERAL PROJECT NO. 9-17-001-508
42	JOHN E. DENSMORE	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	0.50	FEDERAL PROJECT NO. 9-17-001-508
43	MERLE P. CHAPLIN	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	24.1	FEDERAL PROJECT NO. 9-17-001-508
44	CHRISTIAN KRAGELUND	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	22.9	FEDERAL PROJECT NO. 9-17-001-508

INVENTORY OF PARCELS

MAP KEY	GRANTOR	GRANTEE	INST.	BOOK	PAGE	DATE	Ac.	REMARKS
45	SOUTH PORTLAND GARDENS	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	1.72	FEDERAL PROJECT NO. 9-17-001-508
46	WALTER & STELLA KORZENIEWSKI	CITY OF PORTLAND	WAR. DEED	2279	228	3/5/55	6.80	FEDERAL PROJECT NO. 9-17-001-508
46	WALTER & STELLA KORZENIEWSKI	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	-	FEDERAL PROJECT NO. 9-17-001-508
47	FRANK P. CUMMINGS ESTATE	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	10.9	FEDERAL PROJECT NO. 9-17-001-508
48	THOMAS J. JR. & PAT A. FOLEY	CITY OF PORTLAND	WAR. DEED	4040	177	6/22/77	0.23	SEE ACTUAL DESCRIPTION IN 2531/103, 6-23-0038-11
49 ●	PORTLAND CITY AIRPORT	CITY OF PORTLAND	Q.C. DEED	1503	217	10/24/35	19.62	
50	JAMES C. MORRIS (TRUSTEE)	CITY OF PORTLAND	WAR. DEED	3420	256	6/18/73	4.65	
51	KENNETH I. PARKER (PER REP)	CITY OF PORTLAND	WAR. DEED	7715	172	4/7/87	0.5	3-23-0038-19
52	ROBERT D. SCHWARTZ et. al.(TRUSTEE)	CITY OF PORTLAND	EASEMENT	2453	324	1/15/59	-	RIGHT TO ENTER 10' STRIP
53	EDWARD F. GALLAGHER	CITY OF PORTLAND	EASEMENT	72	256	6/17/55	-	FEDERAL PROJECT NO. 9-17-001-508
54	CHAPLIN CORP.	CITY OF PORTLAND	EASEMENT	72	256	6/17/55	-	FEDERAL PROJECT NO. 9-17-001-508
55	RAY L. LITTLEFIELD III	CITY OF PORTLAND	WAR. DEED	3894	331	3/14/77	1.0	6-23-0038-11
56	DIAMOND GARDNER CORP	CITY OF PORTLAND	EASEMENT	3007	617	6/19/67	2.6	PARCEL D-18 -3007/617 9-17-001-C916
57	NEVER OWNED BY CITY, PARCEL B-4 IN CONDEMNATION DEED 3007/617 IN ERROR SEE AFFIDAVIT 3458/116							
58	RAY L. & JOLAN L. LITTLEFIELD	CITY OF PORTLAND	WAR. DEED	3550	07	5/24/74	0.60	
59	AIRPORT REALTY CORP.	CITY OF PORTLAND	CONDEMNATION	3007	617	6/19/67	0.82	PARCEL B-8 IN 3007/617, 9-17-001-C916
60	AIRPORT REALTY CORP.	CITY OF PORTLAND	EASEMENT	3007	617	6/19/67	0.25	PARCEL E-3 IN 3007/617, 9-17-001-C916
61	FRANK P. CUMMINGS ESTATE	CITY OF PORTLAND	CONDEMNATION	72	256	6/17/55	3.79	FEDERAL PROJECT NO. 9-17-001-508
62 ●	PORTLAND CITY AIRPORT	CITY OF PORTLAND	WAR. DEED	1465	141	1/23/35	12.8	
63	CITY OF PORTLAND	STATE OF MAINE	CONDEMNATION	11456	276	5/31/94	0.13	
64	BCD AIRPORT PARTNERS	CITY OF PORTLAND	CONDEMNATION	9492	231	3/4/91	45.5	
65	APEX INC.	CITY OF PORTLAND	QUITCLAIM	10203	192	7/8/92	1.06	
65	CITY OF PORTLAND	BROOKLAWN MEM. PARK	Q.C. W/COVEN	13400	006	10/23/97	1.06	PART OF 64
65	BROOKLAWN MEMORIAL PARK	CITY OF PORTLAND	AVIG. ESMT.	13395	309	10/24/97	1.06	
66	APEX INC.	CITY OF PORTLAND	QUITCLAIM	10203	192	7/8/92	0.32	
67	CITY OF PORTLAND	BROOKLAWN MEM. PARK	Q.C. W/COVEN	13400	006	10/23/97	0.94	PART OF 64
67	BROOKLAWN MEMORIAL PARK	CITY OF PORTLAND	AVIG. ESMT.	13395	309	10/16/97	0.94	
68	BROOKLAWN MEMORIAL PARK	CITY OF PORTLAND	Q.C. W/COVEN	13395	305	10/16/97	7.48	3-23-0038-36 SUBJ. TO DRAINAGE ESMT BK. 8272, PG. 208
69	THOMAS A. TOYE , III	CITY OF PORTLAND	Q.C. W/COVEN	13434	266	10/16/97	1.28	
70	BROOKLAWN MEMORIAL PARK	CITY OF PORTLAND	AVIG. ESMT.	13395	309	10/24/97	6.23	
71	TOYE AIRPORT PARK LLC	CITY OF PORTLAND	WAR. DEED	16971	184	11/19/01	0.06	
72	TOYE REALTY HOLDINGS LLC	CITY OF PORTLAND	Q.C. W/COVEN	16971	190	11/19/01	0.03	
73	CITY OF PORTLAND	TOYE AIRPORT PARK LLC	QUITCLAIM	16971	193	11/19/01	0.02	
74	MAINE TURNPIKE AUTHORITY	CITY OF PORTLAND	Q.C. W/COVEN	21040	64	3/31/04	5.14	SUBJECT TO ALL EASEMENTS OF RECORD
75	MAINE TURNPIKE AUTHORITY	CITY OF PORTLAND	Q.C. W/COVEN	21040	64	3/31/04	3.47	SUBJECT TO ALL EASEMENTS OF RECORD
76	MAINE TURNPIKE AUTHORITY	CITY OF PORTLAND	Q.C. W/COVEN	21040	74	3/31/04	0.37	
77	MAINE TURNPIKE AUTHORITY	CITY OF PORTLAND	Q.C. W/COVEN	21040	74	3/31/04	0.13	
78	CITY OF PORTLAND	MAINE TURNPIKE AUTHORITY	Q.C. W/COVEN	21040	60	3/31/04	4.95	ACQUIRED UNDER FAAP 508, FAA APPROVED RELEASE ON 3-26-02
79	STATE OF MAINE	CITY OF PORTLAND	RELEASE DEED	17126	328	12/26/01	70.4	ACQUIRED AIP 3-23-0038-54
79	STATE OF MAINE	CITY OF PORTLAND	AVIG. ESMT.	17126	332	12/26/01		ACQUIRED AIP 3-23-0038-54
80	STATE OF MAINE	CITY OF PORTLAND	VACATION	19510	56	6/06/03	-	VACATION OF JOHNSON ROAD/WESTERN AVENUE, LAND SWAP
81	PORTLAND PIPE LINE CORPORATION	CITY OF PORTLAND	RELEASE	14138	238	9/10/98		RELEASE OF EASEMENT WITH COVENANT
82	MOBIL PIPE LINE COMPANY	CITY OF PORTLAND	RELEASE	15081	274	10/01/99		RELEASE OF EASEMENT WITH COVENANT
83	CITY OF PORTLAND	STATE OF MAINE	CONDEMNATION	15801	296	10/24/00	5.91	JOHNSON ROAD/WESTERN AVENUE RELOCATION, LAND SWAP
84	CITY OF SOUTH PORTLAND	CITY OF PORTLAND	RELEASE	23141	42	8/01/05	2.32	ORIGINAL DEED 4940/8; FAA RELEASE 4-23-82 BK 4947 PG.32
85	CITY OF SOUTH PORTLAND	CITY OF PORTLAND	CITY COUNCIL ORDER	23154	238	9/15/05		DISCONTINUANCE OF A PORTION OF JETPORT PLAZA ROAD (290')
86	CITY OF PORTLAND	STATE OF MAINE	CONDEMNATION	24337	303	9/05/06	1.44	LAND SWAP RUNWAY 36 APPROACH / FAA APPROVAL 3-1-07
87	STATE OF MAINE	CITY OF PORTLAND	CONDEMNATION	24337	303	9/05/06	1.44	LAND SWAP RUNWAY 36 APPROACH
88	JETPORT PROPERTIES, LLC	CITY OF PORTLAND	LEASE	25698	194	12/07/07	0.77	LEASE / FAA APPROVAL 6-11-08
89	JETPORT PROPERTIES, LLC	CITY OF PORTLAND	LEASE	25698	194	12/07/07	0.40	LEASE / FAA APPROVAL 6-11-08
90	CITY OF PORTLAND	CITY OF PORTLAND	EASEMENT	25698	194	12/07/07	0.16	RIGHT-OF-WAY
91	STATE OF MAINE	CITY OF PORTLAND	MOA	-	-	7/01/11	0.44	OBSTRUCTION REMOVAL MEMORANDUM OF AGREEMENT FOR ACCESS

NOTES:
1. THIS IS AN EXHIBIT A PROPERTY MAP, PART OF THE AIRPORT IMPROVEMENT PROGRAM FEDERAL GRANT APPLICATION. IT IS NOT A BOUNDARY SURVEY. THE PRIMARY INTENT IS TO IDENTIFY ALL LAND WHICH IS DESIGNATED AIRPORT PROPERTY AND TO PROVIDE AN INVENTORY OF ALL PARCELS WHICH MAKE UP THE AIRPORT. PHYSICAL SURVEY OF BOUNDARIES IS GENERALLY NOT REQUIRED. REFER TO AC 150/5100-17.
2. THE DESCRIPTION OF PARCEL NO. 10 INCLUDES OTHER AVIGATIONAL EASEMENTS WHICH WERE LATER EXTINGUISHED WHEN THE PARCELS WERE ACQUIRED BY THE CITY OF PORTLAND.
3. PARCEL NO. 49 INCLUDES PORTIONS OF PARCEL NO. 62 WHICH HAD BEEN PREVIOUSLY CONVEYED.
4. "●" INDICATES PARCELS THAT COMPRISE LIMITS OF AP-4 AFFECTED LAND (C.A.A. DOCKET NO. S-904-17-19).
5. FOR PARCELS ACQUIRED UNDER CITY COUNCIL ORDER, DATED JUNE 20, 1955, RECORDED IN THE PORTLAND CITY CLERKS RECORDS IN VOLUME 72, PAGE 256, SEE AFFIDAVIT OF ELIZABETH L. BOYNTON, DATED AUGUST 4, 1997, RECORDED IN THE CUMBERLAND COUNTY REGISTRY OF DEEDS IN BOOK 13265, PAGE 102.
6. REFERENCE IS MADE TO THE EXHIBIT "A" DOCUMENT FOR THE PORTLAND INTERNATIONAL JETPORT ON FILE IN THE TERMINAL AT THE AIRPORT MANAGER'S OFFICE, 1001 WESTBROOK STREET, PORTLAND,

REV	DESCRIPTION	DATE	BY	APP'D
4	SUBMITTED TO CITY, MDOT AND FAA FOR FINAL APPROVAL	07.09.18	DDA	DDA
3	SUBMITTED TO FAA FOR APPROVAL	11.29.17	DDA	DDA
2	ISSUED DRAFT ALP TO CITY AND FAA	11.17.16	DDA	DDA
1	SUBMITTED TO CLIENT FOR REVIEW	07.26.16	DDA	DDA

REVISIONS

GRAPHIC SCALE

600 0 300 600 1200

1 inch = 600 feet

PORTLAND INTERNATIONAL JETPORT
EXHIBIT 'A'
PORTLAND, MAINE

Stantec Consulting Services Inc.
482 Payne Road
Scarborough, ME
Tel. 207.883.3355
WWW.STANTEC.COM

PLANNED BY: Mike Dmyterko
DETAILED BY: Lori Anthony / Tim Kahmann
APPROVED BY: Dwight Anderson / Steve Benson
FILE NAME: STANTEC-EXHIBIT_A

July 2016 SHEET EXHIBIT 'A'

Coffman Associates Airport Consultants

Portland International Jetport

APPENDIX L
PUBLIC INVOLVEMENT

SUSTAINABLE AIRPORT MASTER PLAN

Appendix L: Public Involvement

The planning process for the Sustainable Airport Master Plan for Portland International Jetport was designed to provide the opportunity for the public, airport users, and local, state, and federal agencies to participate throughout the development of the plan. Materials were prepared by the consultant team and submitted for review and discussion at several key points in the planning process.

A Planning Advisory Committee, the names and affiliations of which are included behind this document's cover sheet, was established to review and comment on these submissions. The Planning Advisory Committee met five times through the preparation of the Sustainable Airport Master Plan during the afternoons of October 21, 2014; January 20, May 19, and September 21, 2015; and February 23, 2016. The Attendance Record for each meeting is attached. A call-in and video set-up was made available for committee members who could not attend in person. All committee members were provided the draft chapters to be covered ahead of each meeting.

In addition, to the Planning Advisory Committee meetings, the public was invited to four public information workshops on the evenings after all but the first committee meeting. The workshops were all held on the ground floor of the Jetport Terminal Building in open space between the ticketing and baggage claim areas. Announcements of each workshop were placed in the local newspaper, mailings, the Jetports' website and Facebook page, as well as a project website and Facebook page. An announcement example is included following this introduction. The Attendance Record for each of the workshops follows those of the Planning Advisory Committee meetings. Display placards were set up for visitor viewing and consultant team staff as well as the Jetport Director and Assistant Director were available to discuss the information one-on-one and in small groups.

Along with discussion at the meetings, committee members and workshop attendees were provided comment sheets. The comments sheets listed several means to submit written comments. Both the announcements and the comment sheets pointed out that study materials were available on the project website thejetport.airportstudy.com. The website included not only the draft master plan documents, but also the slide show presentations from each committee meeting.

Copies of written comments submitted are included in this appendix. Where appropriate, responses to comments are provided. Some were submitted directly by e-mail to the commenter, while others were submitted by letter response. Those and any additional responses are included in this appendix following the comment. For some longer submittals, comments requiring a response are highlighted in yellow and numbered for reference to the response.




NOTICE OF PUBLIC INFORMATION WORKSHOP

regarding the Sustainable Airport Master Plan for

PWM
Portland International Jetport

Tuesday, May 19, 2015
5:30 - 7:00 P.M.

Portland International Jetport
(lower level concourse of passenger terminal building between ticketing and baggage)
1001 Westbrook Street
Portland, Maine 04102

EVERYONE WELCOME!

OPEN HOUSE FORMAT... DROP IN ANYTIME
For more information, please call the Jetport:
207-874-8877
or visit: www.thejetport.airportstudy.com

PLANNING ADVISORY COMMITTEE MEETING ATTENDANCE RECORD

Meeting: PAC Meeting #1 Date: October 21, 2014 Time: 2:00 p.m.

Place: Jetport Conference Room

Please Print Neatly

NAME	REPRESENTING	PHONE # / E-MAIL
1. Zach Sundquist	PWM	Phone #: 207-272-4898 E-mail: zjs@portlandmaine.gov
2. Dexter Tatum	Northeast Air	Phone #: 207 432-5366 E-mail: dexter[illegible]@northeastair.com
3. Tony Seavey	American Airlines	Phone #: 207 749 5139 E-mail: anthony.seavey@aa.com
4. Mike Watson	AOPA / Gen'l Aviation	Phone #: 512 786 9194 E-mail: [illegible]
5. Lynn Tillotson	Convention & Visitors Bureau	Phone #: 772-4994 x233 E-mail: ltillotson@visitportland.com
6. Mark Collins	FAA Air Traffic Control	Phone #: 207 775 0602 x121 E-mail: MARK.A.COLLINS@FAA.GOV
7. Andy Holmes	Maine ASTA Travel Agent	Phone #: 207-882-5525 E-mail: cruises@gwi.net
8. Sandy Beal	Stroudwater Village Association	Phone #: 207-653-7085 E-mail: abeal@medicalmarket.com
9. Aaron Keller	PWM	Phone #: 207-772-6652 E-mail: aek@portlandmaine.gov
10. Judy Savage	IDEXX	Phone #: 207-807-8078 E-mail: judy-savage@idexx.com
11. MIKE ANDERSON	GD/RIW) FLT. DEPT.	Phone #: 207-595-1046 E-mail: michael.anderson@gd.com
12. Ed Suslovic	Portland City Council	Phone #: 207-671-6380 E-mail: eds@portlandmaine.gov
13. Michael Foley	Westbrook City Council	Phone #: 207 907-2115 E-mail: mfoley@westbrook.me.us
14. Jerry Angier	Portland Regional Chamber	Phone #: 207-767-2271 E-mail: JERRY4INS@AOL.COM
15. Phil Spiller	Captain, JetBlue Airways/ALPA	Phone #: 850-529-3283 E-mail: [illegible]
16. John Duncan	PACTS	Phone #: 207-774-9891 E-mail: jduncan@gpcog.org
17. Stacie Haskell	Maine DOT	Phone #: (207) 624-3243 E-mail: stacie.haskell@maine.gov
18. Steve Riefland	EST	Phone #: 781-221-[illegible] E-mail: sriefland@estinc.com
19. CUTLER FEAGLES	PWM	Phone #: 207-756-8313 E-mail: CPF@PORTLANDME.GOV
20. Paul Bradbury	PWM	Phone #: 207-756-8029 E-mail: PBB@PORTLANDMAINE.gov

PLANNING ADVISORY COMMITTEE MEETING ATTENDANCE RECORD

PWM Portland International Jetport

Meeting: PAC Meeting #1 Date: October 21, 2014 Time: 2:00 p.m.

Place: Jetport Conference Room

Please Print Neatly

NAME	REPRESENTING	PHONE # / E-MAIL
1. Dwight Anderson	FST	Phone # 207-775-1121 E-mail dwight.anderson@fstinc.com
2. STEVE BENSON	COFFMAN ASSOCIATES	Phone # 816-524-3500 E-mail sbenson@coffmanassociates.com
3. EMMANUELLE HUMBLET	VHB	Phone # 612 695-5858 E-mail ehumblet@vhb.com
4. CAROL LURIE	VHB	Phone # 61? 835 0294 E-mail clurie@vhb.com
5.		Phone # E-mail
6.		Phone # E-mail
7.		Phone # E-mail
8.		Phone # E-mail
9.		Phone # E-mail
10.		Phone # E-mail
11.		Phone # E-mail
12.		Phone # E-mail
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19.		Phone # E-mail
20.		Phone # E-mail

PLANNING ADVISORY COMMITTEE MEETING ATTENDANCE RECORD

PWM Portland International Jetport

Meeting: PAC Meeting #2 Date: January 20, 2015 Time: 2:00 p.m.

Place: Jetport Conference Room

Please Print Neatly

NAME	REPRESENTING	PHONE # / E-MAIL
1. Mike Dmyterko	Coffman Associates	Phone #: 800 892 7772 E-mail: miked@coffmanassociates.com
2. Dwight Anderson	FST	Phone #: 207-775-1121 E-mail: dwightanderson@fstinc.com
3. Steve Benson	Coffman	Phone #: 1-800-892-7772 E-mail: sbenson@coffmanassociates.com
4. Danny Tesi-Kolb	VHB	Phone #: 617 607 2146 E-mail: DTESI-KOLB@VHB.COM
5. Emmanuelle Humblet	VHB	Phone #: 212-289-6468 E-mail: ehumblet@vhb.com
6. (FOR MIKE MORAN) Kathy K Moran	BIW (Corporate Aviation)	Phone #: 774-1417 E-mail:
7. Zach Sundquist	PWM	Phone #: 207-272-9848 E-mail:
8. Cheryl Miner	Dist #1	Phone #: 207-766-5570 E-mail:
9. Tony Seaney	American Airlines	Phone #: 207 749 5439 E-mail: anthony.seaney@aa.com
10. Mike Watson	AOPA	Phone #: 572 786 9194 E-mail: [illegible]
11. Bob Kincaid	JetBlue	Phone #: 917-502-3260 E-mail: robert.kincaid@jetblue.com
12. Mark Collins	FAA Tower	Phone #: 207 7750600 x121 E-mail: MARK.A.COLLINS@FAA.COM
13. Adrian Dowling	City of South Portland	Phone #: 207-347-0368 E-mail: adriandowling@earthlink.net
14. Ralph Nicosia-Rusin	FAA Airports Division	Phone #: 781-238-7612 E-mail: ralph.nicosia-rusin@faa.gov
15. Ed Suslovic	Portland City Council	Phone #: 671-6310 E-mail: edsuslovic@portlandmaine.gov
16. Michael Foley	Westbrook City Council	Phone #: 207-807-2203 E-mail: mfoley@westbrook.me.us
17. Jerry Angier	Portland Regional Chamber	Phone #: 767-2271 E-mail: JERRY4INS@AOL.COM
18. Phil Spiller	JetBlue (Pilot/Airline Union)	Phone #: 850-529-3283 E-mail: pilsflynavy@gmail.com
19. Stacie Haskell	MaineDOT	Phone #: (207) 624-3243 E-mail: stacie.haskell@maine.gov
20. Steve Riesland	FST	Phone #: 781-221-1[illegible] (Cell) E-mail: sriesland@fstinc.com

SUSTAINABLE AIRPORT MASTER PLAN

PLANNING ADVISORY COMMITTEE MEETING ATTENDANCE RECORD

Meeting: PAC Meeting #2

Date: January 20, 2015 Time: 2:00 p.m.

Place: Jetport Conference Room

Please Print Neatly

NAME	REPRESENTING	PHONE # / E-MAIL
1. Paul Bradbury	PWM	Phone #: 207 756 8029 E-mail: pbb@portlandmaine.gov
2. Dexter Tatum	Northeast Air	Phone #: 207 774-6318 E-mail: dexter@northeastair.com
3. Alexander Beal	Stroudwater Village Assoc.	Phone #: 653-7095 E-mail: [illegible]@medicalmutual.com
4.		Phone #: E-mail:
5.		Phone #: E-mail:
6.		Phone #: E-mail:
7.		Phone #: E-mail:
8.		Phone #: E-mail:
9.		Phone #: E-mail:
10.		Phone #: E-mail:
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SUSTAINABLE AIRPORT MASTER PLAN

PLANNING ADVISORY COMMITTEE MEETING ATTENDANCE RECORD

Portland International Jetport

Meeting: PAC Meeting #3 Date: May 19, 2015 Time: 2:00 p.m.

Place: Jetport Conference Room

Please Print Neatly

NAME	REPRESENTING	PHONE # / E-MAIL
1. Steve Benson	Coffman Associates	Phone #: 1-800-892-7772 E-mail: sbenson@coffmanassociates.com
2. Mike Dmyterko	" "	Phone #: " " E-mail: miked@coffmanassociates.com
3. Carol Lune	VHB	Phone #: 617 607 2708 E-mail: clune@vhb.com
4. Danny Boris-Kolb	VHB	Phone #: E-mail: DBORIS-KOLB@VHB.COM
5. Amie Chiasson	FST	Phone #: E-mail: achiasson@FSTinc.com
6. Dwight Anderson	FST	Phone #: 207-775-1121 E-mail: [illegible]
7. Mark Collins	FAA PWM ATCT	Phone #: 207 775 0642 E-mail: MARK.A.COLLINS@FAA.GOV
8. Paul Bradbury	PWM ADMIN	Phone #: 207-874-8877 E-mail: [illegible]@portlandmaine.gov
9. Andy Holmes	Maine ASTA	Phone #: 207 831-5525 E-mail: [illegible]
10. Jerry Angier	Portland C. of C.	Phone #: 207-767-2271 E-mail: [illegible]@AOL.COM
11. Pam Holcomb	Stroudwater Village	Phone #: 617-216-3700 E-mail: stroudwatervillageassociation@[illegible]
12. [illegible]	District 1	Phone #: 207-766-5570 E-mail: [illegible]
13. Ed Suslovic	City of Portland Dist 3	Phone #: 207-671-6110 E-mail: [illegible]
14. Tony Searcy	American Airlines	Phone #: 207 749 5439 E-mail: anthony.searcy@aa.com
15. Adrian Dowling	City of South Portland	Phone #: 207-767-[illegible] E-mail: adowling@[illegible].net
16. Jeremy Martin	Portland	Phone #: 838-0707 E-mail: [illegible]
17. Stacie [illegible]	MaineDOT	Phone #: (207)624-3243 E-mail: [illegible]@maine.gov
18. Zach Sundquist	PWM	Phone #: 207-272-4895 E-mail: [illegible]@portlandmaine.gov
19.		Phone #: E-mail:
20.		Phone #: E-mail:

SUSTAINABLE AIRPORT MASTER PLAN

PLANNING ADVISORY COMMITTEE MEETING ATTENDANCE RECORD

Meeting: PAC Meeting #4 Date: September 21, 2015 Time: 12:00 p.m.

Place: Jetport Conference Room

Please Print Neatly

NAME	REPRESENTING	PHONE # / E-MAIL
1. Stephen Becker	FAA	Phone #: 617 240 8314 E-mail: stephen.becker@faa.gov
2. Dwight Anderson	FST	Phone #: 207 775-1121 E-mail: dwightanderson@fstinc.com
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4. Paul Bradbury	PWM	Phone #: 207 756 8029 E-mail: pab@portlandmaine.gov
5. Steve Riesenauer	FST	Phone #: 781-221-1288 E-mail: [illegible]@fstinc.com
6. Mark Collins	FAA PWM ATCT	Phone #: 207 775 0602 E-mail: mark.a.collins@faa.gov
7. Donna Davis-Kolb	VHB	Phone #: E-mail: DDavis-Kolb@vhb.com
8. Matthew Egge	VHB	Phone #: E-mail: megge@vhb.com
9. Adrian Dowling	City of South Portland	Phone #: E-mail: adriandowling@earthlink.net
10. Judy Savage	IDEXX	Phone #: 207-807-8078 E-mail: judy-savage@idexx.com
11. Ed Suslovic	City of Portland	Phone #: E-mail:
12. Barry Hammer	FAA	Phone #: 781-238-7625 E-mail: barry.hammer@faa.gov
13. Jerry Angier	Chamber	Phone #: ON FILE E-mail:
14. Lynn Tillotson	CVB	Phone #: 772-4994 x233 E-mail: LTillotson@visitportland.com
15. Stacie Haskell	MaineDOT	Phone #: (207) 624-3243 E-mail: stacie.haskell@maine.gov
16. Jeremy Morton	Portland Res. + GA.	Phone #: E-mail:
17. Michael Stickney	Bath Iron Works	Phone #: 207-751-0851 E-mail: mike.stickney@gdbiw.com
18. Andy Holmes	Maine ASTA	Phone #: 207 881-5525 E-mail: cruises@gwi.net
19. Tony Searcy	American Airlines	Phone #: 207 749 8419 E-mail: anthony.searcy@aa.com
20. Zach Sundquist	PWM	Phone #: 207 272 4898 E-mail: zts@portlandmaine.gov

PLANNING ADVISORY COMMITTEE MEETING ATTENDANCE RECORD

Meeting: PAC Meeting #4

Date: September 21, 2015 Time: 12:00 p.m.

Place: Jetport Conference Room

Please Print Neatly

NAME	REPRESENTING	PHONE # / E-MAIL
1. Cheryl Miner	Dist [illegible]	Phone #: 207-766-5570 E-mail: [illegible]
2.		Phone #: E-mail:
3.		Phone #: E-mail:
4.		Phone #: E-mail:
5.		Phone #: E-mail:
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SUSTAINABLE AIRPORT MASTER PLAN

PLANNING ADVISORY COMMITTEE MEETING ATTENDANCE RECORD

Meeting: PAC Meeting #5 Date: February 23, 2016 Time: Noon

Place: Jetport Conference Room

Please Print Neatly

NAME	REPRESENTING	PHONE # / E-MAIL
1. Dwight Anderson	Stantec	Phone #: 207-775-[illegible] E-mail: [illegible]
2. Amy Kutz	MAC	Phone #: 571-257-9740 E-mail: [illegible]
3. Julie Maisano	MAC	Phone #: 513-487-2547 E-mail: [illegible]
4. Donna Gerris Kolb	VHB	Phone #: E-mail: [illegible]kolb@vhb.com
5. Steve Benson	Coffman	Phone #: 816-524-3500 E-mail: [illegible]
6. Carol Lurie	VHB	Phone #: 617 [illegible] E-mail: [illegible]
7. Lee McWaters	Coffman Assoc	Phone #: 480-965-5462 E-mail: lee.mcwaters@[illegible]
8. Zach Sundquist	PWM	Phone #: 207-272-4898 E-mail: zts@portlandmaine.gov
9. Ryan Tenny	PWM	Phone #: 207-756-8[illegible] E-mail: [illegible]@portlandmaine.gov
10. Phil Spiller	JetBlue Airways/ALPA	Phone #: 857 524 3283 E-mail: [illegible]
11. Amina Tretiakova	Delta Air Lines	Phone #: (404) 714-[illegible] E-mail: [illegible].com
12. Ed Suslovic	City of Portland	Phone #: 671-6029 E-mail: [illegible]@portlandmaine.gov
13. Cheryl Turner	Peaks Island	Phone #: 207 766 2270 E-mail: [illegible]@gmail.com
14. Jerry Angier	Regional Chamber	Phone #: 207 931-4854 E-mail: jerry4[illegible]@aol.com
15. Stacie Haskell	MaineDOT	Phone #: (207) 624-3243 E-mail: stacie.haskell@maine.gov
16. Mike Anderson	Corporate Aviation	Phone #: (207) 774-1417 E-mail: [illegible]
17. Paul Bradbury	PWM	Phone #: 207 756 8029 E-mail: [illegible]
18. Michael Foley	City of Westbrook	Phone #: 207-767-2151 E-mail: mfoley@westbrook[illegible]
19. Mike Watson	AOPA	Phone #: 512 [illegible] 9144 E-mail: [illegible]
20.		Phone #: E-mail:

SUSTAINABLE AIRPORT MASTER PLAN

PLANNING ADVISORY COMMITTEE MEETING ATTENDANCE RECORD

Meeting: PAC Meeting #5 Date: February 23, 2016 Time: Noon

By Phone Place: Jetport Conference Room

Please Print Neatly

NAME	REPRESENTING	PHONE # / E-MAIL
1. Ralph Nicosia-Rusin	FAA	*Phone #* *E-mail*
2. Michelle Ricci	FAA	*Phone #* *E-mail*
3. Lynn Tillotson	Convention + Visitor Ctr.	*Phone #* *E-mail*
4. Dan Koloski	Stroudwater	*Phone #* *E-mail*
5. Jon Overstreet	Unum Group	*Phone #* *E-mail*
6.		*Phone #* *E-mail*
7.		*Phone #* *E-mail*
8.		*Phone #* *E-mail*
9.		*Phone #* *E-mail*
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20.		*Phone #* *E-mail*

SUSTAINABLE AIRPORT MASTER PLAN

PUBLIC INFORMATION WORKSHOP MEETING ATTENDANCE RECORD

PWM
Portland International Jetport

Meeting: PIW Meeting #1

Date: January 20, 2015 Time: 5:30-7:00 p.m.

Place: Portland International Jetport

Administration Conference Room, 2nd Level

Please Print Neatly

NAME	ADDRESS	PHONE # / E-MAIL
1. Peter M Siladi	104 Country Ln. Westbrook	Phone #: 207 591-5140 E-mail:
2. Thomas Lothrop	P.O. Box 651 Sanford ME	Phone #: 207 · 907 · 8949 E-mail: Flyhangar[illegible]@Gmail.com
3. Jim Stenberg	25 Stroudwater Rd Portland	Phone #: 207 632 8973 E-mail: jim@jsenginees.com
4. Charmayne Cousteline	1052 Congress	Phone # E-mail: charmayne@[illegible].com
5. Mike Watson	31 Forest Cape E	Phone #: 572 788 9194 E-mail: fn.watson@gwi.net
6. Jeffery Bedrosian	5 Park Cir, Cape Elizabeth	Phone #: 215-439-2464 E-mail: jbed[illegible]@gmail.com
7.		Phone #: E-mail:
8.		Phone #: E-mail:
9.		Phone #: E-mail:
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12.		Phone #: E-mail:
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20.		Phone #: E-mail:

PUBLIC INFORMATION WORKSHOP MEETING ATTENDANCE RECORD

Meeting: PIW Meeting #1 Date: January 20, 2015 Time: 5:30-7:00 p.m.

Place: Portland International Jetport

Administration Conference Room, 2nd Level

Please Print Neatly

NAME	ADDRESS	PHONE # / E-MAIL
1. Amie Chiasson		*Phone #* 207 [illegible] *E-mail* [illegible]
2.		*Phone #* *E-mail*
3.		*Phone #* *E-mail*
4.		*Phone #* *E-mail*
5.		*Phone #* *E-mail*
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20.		*Phone #* *E-mail*

PUBLIC INFORMATION WORKSHOP MEETING ATTENDANCE RECORD

PWM Portland International Jetport

Meeting: PIW Meeting #2 Date: May 19, 2015 Time: 5:30-7:00 p.m.

Place: Portland International Jetport (lower level concourse between ticketing and baggage)

Please Print Neatly

NAME	ADDRESS	PHONE # / E-MAIL
1. Jim Stenberg	25 Stroudwater Rd Portland	Phone #: 207 632 8973 E-mail: jim@jsengineer.com
2. Jon Godfrey	Yarmouth	Phone #: 207-838-0676 E-mail: jgodfrey@maine.rr.com
3. Rodney Lake	64 Stonybrook Rd. Cape Eliz ME 04107	Phone #: 207-[illegible]-0814 E-mail: rlake@dwmlaw.com
4. Jeff Bodman	5 Mach Cir Cape Eliz	Phone #: 207 420 3037 E-mail: [illegible]
5.		Phone #: E-mail:
6.		Phone #: E-mail:
7.		Phone #: E-mail:
8.		Phone #: E-mail:
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SUSTAINABLE AIRPORT MASTER PLAN

PUBLIC INFORMATION WORKSHOP MEETING ATTENDANCE RECORD

Meeting: PIW Meeting #2 Date: May 19, 2015 Time: 5:30-7:00 p.m.

Place: Portland International Jetport (lower level concourse between ticketing and baggage)

Please Print Neatly

NAME	ADDRESS	PHONE # / E-MAIL
1. LT COL JEFF WEINSTEIN	PO BOX 373 YARMOUTH ME 04096	Phone #: 207-846-1212 E-mail: LTCOL Jeff@MediaGuys.net
2. SANDY + JOAN BEAL	37 OLD MAST RD. PORTLAND, ME 04102	Phone #: 207-653-7045 E-mail: sbeal@medicalmutual.com
3. Alan Cukaj	PO BOX 66735 04105	Phone #: E-mail:
4.		Phone #: E-mail:
5.		Phone #: E-mail:
6.		Phone #: E-mail:
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20.		Phone #: E-mail:

PUBLIC INFORMATION WORKSHOP MEETING ATTENDANCE RECORD

PWM Portland International Airport

Meeting: PIW Meeting #3

Date: September 21, 2015 Time: 5:00-6:30 p.m.

Place: Portland International Jetport (lower level concourse between ticketing and baggage)

Please Print Neatly

NAME	ADDRESS	PHONE # / E-MAIL
1. Tom Pulling	80 Melbourne St Portland ME 04101	Phone #: 207 770 2453 E-mail: tjpulling@gmail.com
2. ANDY CHARLES	50 Market St STE 1A-258 SoPo 04106	Phone #: E-mail: acharles@maine.rr.com
3. [illegible signature]	45 Spring St Southport ME 04576	Phone #: E-mail: [illegible]
4.		Phone #: E-mail:
5.		Phone #: E-mail:
6.		Phone #: E-mail:
7.		Phone #: E-mail:
8.		Phone #: E-mail:
9.		Phone #: E-mail:
10.		Phone #: E-mail:
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SUSTAINABLE AIRPORT MASTER PLAN

PUBLIC INFORMATION WORKSHOP MEETING ATTENDANCE RECORD

Meeting: PIW Meeting #4

Date: February 23, 2016 Time: 5:00-6:30 p.m.

Place: Portland International Jetport (lower level concourse between ticketing and baggage)

Please Print Neatly

NAME	ADDRESS	PHONE # / E-MAIL
1. [illegible] Silk	1187 Westbrook St	Phone #: 653 5744 E-mail: [illegible]
2. Jason Barnes	7 [illegible] Rd.	Phone #: 207 894 6739 E-mail: [illegible]
3. Lisa Reece	320 Robinwood Rd Georgetown ME 04548	Phone #: 350-2122 E-mail: lisacub503@yahoo.com
4. Pearlene Gardner	22 Heritage Ct	Phone #: 267-395-0375 E-mail:
5. [illegible]	[illegible]	Phone #: 315-6357 E-mail: [illegible]
6.		Phone # E-mail:
7.		Phone # E-mail:
8.		Phone # E-mail:
9.		Phone # E-mail:
10.		Phone # E-mail:
11.		Phone # E-mail:
12.		Phone # E-mail:
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15.		Phone # E-mail:
16.		Phone # E-mail:
17.		Phone # E-mail:
18.		Phone # E-mail:
19.		Phone # E-mail:
20.		Phone # E-mail:

-----Original Message-----
From: thejetport.airportstudy.com - comments from: ROBERT DYKE
[mailto:RDYKE7@MYFAIRPOINT.NET]
Sent: Friday, September 18, 2015 4:24 PM
To: Mike Dmyterko <miked@coffmanassociates.com>; Steven Benson
<sbenson@coffmanassociates.com>; dwightanderson@fstinc.com
Subject: NOISE

From: ROBERT DYKE <RDYKE7@MYFAIRPOINT.NET>
Subject: NOISE

Organization:

P.O.BOX 234

CUMBERLAND, ME 04021

Comments
ISN'T IT CALLED PORTLAND INTERNATIONAL JETPORT? WHY IS SO. PORTLAND WASTEING TIME ON IT ?

--
This mail is sent via contact form on http://thejetport.airportstudy.com

-----Original Message-----
From: thejetport.airportstudy.com - comments from: Andy Charles [mailto:acharles@maine.rr.com]
Sent: Saturday, September 19, 2015 4:35 PM
To: Mike Dmyterko <miked@coffmanassociates.com>; Steven Benson
<sbenson@coffmanassociates.com>; dwightanderson@fstinc.com
Subject: Jet Noise

From: Andy Charles <acharles@maine.rr.com>
Subject: Jet Noise

Organization:

71 Clinton St

South Portland, ME - Maine 04106

Comments
Greetings,
As a resident of Meetinghouse Hill since 2004, I am very familiar with the frequent jet flyovers on both takeoff and approach. In warm weather with open windows the noise can be very annoying.
What I don't understand is why some pilots follow the Fore River (inbound or outbound) and make their turn offshore, while others cut directly over my home. Why can't the Jetport put rules in place to require all aircraft to stay over the river and avoid residential neighborhoods like in other US cities?
Respectfully,
Andy Charles

--
This mail is sent via contact form on http://thejetport.airportstudy.com

-----Original Message-----
From: Andy Charles [mailto:acharles@maine.rr.com]
Sent: Saturday, September 19, 2015 5:38 PM
To: Mike Dmyterko <miked@coffmanassociates.com>
Subject: RE: PWM noise

Thanks. To be honest, that sounds like a cop out. No one can argue with safety, yet I fail to see how approaching/departing over the Fore River versus over Meetinghouse Hill compromises safety - at least in the vast majority of flights. How do other cities get noise abatement rules in place and yet we can't do that here? I'm confused...

Andy

-----Original Message-----
From: Mike Dmyterko [mailto:miked@coffmanassociates.com]
Sent: Saturday, September 19, 2015 5:58 PM
To: Andy Charles <acharles@maine.rr.com>
Subject: Re: PWM noise

Generally speaking the pilot in command is offered the ability to make choices based upon safety of flight. The FAA is limited and what it can do in terms of restrictions and it's a very detailed answer but generally speaking the answer you were given is mostly on target

Mike Dmyterko, C. M.
Principal
Coffman Associates

> On Sep 19, 2015, at 4:49 PM, Andy Charles <acharles@maine.rr.com> wrote:
>
> Hi Mike,
>
> Thanks for the fast response. I've asked the same question to one of
> the advisory committee members, and the answer I got basically told me
> the Chief Pilot makes the rules and he (or she) has not required
> aircraft to operate in the manner I outlined. Is that roughly
> accurate? If so, the obvious follow up is why not, and how do we get
> the
rules changed?
>
> Will try to attend on Monday but not sure my schedule permits.
>
> Thanks,
> Andy
>
> -----Original Message-----
> From: Mike Dmyterko [mailto:miked@coffmanassociates.com]
> Sent: Saturday, September 19, 2015 5:45 PM
> To: acharles@maine.rr.com

> Subject: PWM noise
>
> Andy,
>
> Thank you for your response regarding the jetport master plan. Your
> question is a good one and is asked quite often. We would love to
> have the opportunity to explain the answer to you at the public
> meeting we are having at the Jetport Monday evening. Hope to see you
there.
>
> Mike Dmyterko, C. M
> Principal
> Coffman Associates
>

SUSTAINABLE AIRPORT MASTER PLAN

PUBLIC INFORMATION WORKSHOP MEETING COMMENT FORM

Meeting: PIW Meeting #3

Date: September 21, 2015 Time: 5:00-6:30 p.m.

Place: Portland International Jetport (lower level concourse between ticketing and baggage)

Please Print Neatly

- Curious as to whether dedicated Portland Transportation Center to/from Jetport shuttle has been evaluated. Are there enough dual-mode travelers to justify it? T Railing

-

Mail to:

COFFMAN ASSOCIATES, INC.
237 N.W. Blue Parkway, Suite 100
Lee's Summit, MO 64063
FAX: (816) 524-2575

Comments may also be submitted online at:
www.thejetport.airportstudy.com

https://www.facebook.com/jetportairportstudy

COMMENT SHEET

PORTLAND INTERNATIONAL JETPORT
Sustainable Airport Master Plan

The "draft" chapters outlined below will be presented and discussed at the next Planning Advisory Committee meeting at 12:00 p.m., Monday, February 23, 2016. The meeting will be held in the Airport Administration Conference Room located on the second floor of the Jetport Terminal Building. Please use this response sheet to submit any comments you may have on the following:

Chapter Seven –Capital Implementation Plan
Sustainability
Appendix H – Economic Benefit Analysis

☐ *I have read the material and have no comments.*

☒ *I have read the material and have the following comments.*
(Attach separate sheets, as necessary.)

1) Please break out the On-Airport Direct Benefits (Table 1, p. 5, first line) into
- Commercial Passenger service (baseline)
- General Aviation, and
- Freight

Economic Benefits.

2) Consider any way to estimate indirect benefits of Freight Operations.

Send comments to:

COFFMAN ASSOCIATES, INC.
237 NW Blue Parkway, Suite 100
Lee's Summit, MO 64063
Attn: Mike Dmyterko
FAX: 816.524.2575; Email: miked@coffmanassociates.com

Name: Mike Watson
Representing: AOPA
Phone: 572 786 9194

Please mail, fax, or email by March 4, 2016.

Comments may also be submitted online at:
www.thejetport.airportstudy.com

-----Original Message-----
From: thejetport.airportstudy.com - comments from: Sean Smith [mailto:s.smith@bestbees.com]
Sent: Tuesday, February 23, 2016 10:47 AM
To: Mike Dmyterko <miked@coffmanassociates.com>; Steven Benson <sbenson@coffmanassociates.com>; dwightanderson@fstinc.com
Subject: Honey Bee Program

From: Sean Smith <s.smith@bestbees.com>
Subject: Honey Bee Program

Organization:
The Best Bees Company
839 Albany Street

Boston, MA 02119

Comments
Hello,

I am a beekeeper for The Best Bees Company, a beekeeping service based out of Boston. I'm reaching out to see if The Portland International Jetport would be interested in including a honey bee program in their sustainability plans.

Honey bees are great not only as a sustainability initiative, but also for stakeholder engagement. Our company is always happy to do events with clients and figure out ways to get stakeholders, whether they be employees, investors or the public, engaged. One of our partners is a property management company that last year had us send custom labelled jars of honey to each of their properties with hives. Tenants loved this and became fascinated with the bees on their business' rooftop. We're following this up this year with Earth Day events that will have a beekeeper on site answering questions and offering honey for tasting.

As a conservation measure, having hives are great because honey bees are dying at unsustainable rates. By setting up hives, you're giving them a safe home managed by a professional to thrive in. You're also supporting our research efforts to improve honey bee health, being carried out by our sister non-profit organization, The Urban Beekeeping Laboratory.

If you'd be interested in discussing our options for The Jetport, please reach out to me at my email or call our office at 617-445-2322. I'd be happy to come up for a meeting.

Thanks,
Sean

--
This mail is sent via contact form on http://thejetport.airportstudy.com

-----Original Message-----
From: thejetport.airportstudy.com - comments from: David Silk [mailto:dsilk@curtisthaxter.com]
Sent: Tuesday, February 23, 2016 2:39 PM
To: Mike Dmyterko <miked@coffmanassociates.com>; Steven Benson <sbenson@coffmanassociates.com>; dwightanderson@fstinc.com
Subject: Meeting Notices

From: David Silk <dsilk@curtisthaxter.com>
Subject: Meeting Notices

Organization:
abutter
1187 Westbrook

Portland, ME

Comments
The pubic meeting notices on the master planning page of the jetport's webpage do not state where the meetings are to held. That should be corrected

--
This mail is sent via contact form on http://thejetport.airportstudy.com

David P. Silk
1187 Westbrook Street
Portland, Maine 04102-1928
207 653 5144

February 25, 2016

Steven G. Benson
COFFMAN ASSOCIATES, INC.
237 N.W. Blue Parkway, Suite 100
Lee's Summit, MO 64063

Re Portland International Jetport: Draft Master Plan PIW Meeting #4

Dear Mr. Benson:

Thanks you for meeting with me at the February 23, 2016 Public Meeting Workshop #4. You advised to submit my comments on the present draft Master Plan ("MP") in writing. Here are my comments:

1. **Goals and Objectives**

The draft MP once adopted is intended to serve as a guide for the Jetport's overall development, maintenance and operation for the next 20 years. As with other master planning processes undertaken in the City of Portland ("City"), I assume the MP will be presented to the City Council for inclusion in the City's Comprehensive Plan. The existing City's Comprehensive Plan addresses Transportation Resources and identifies as a regional issue "Conflict with Neighborhoods." The Comprehensive Plan states:

> Regional transportation facilities are, by their nature, sizable and often intrusive. This is especially so where neighborhoods historically grew up around transportation centers. The challenge to the City is to find, through siting, design, and negotiation, acceptable balance between these facilities and the neighborhoods. Portland has examples where this has worked: Merrill's Marine Terminal and the West End neighborhood, for example. It also has examples where vigilant neighborhoods and the City have been doing the hard work of looking for the balance, such as in the case of the Jetport and Stroudwater neighborhood.

Given the City's stated goal in the Comprehensive Plan of "looking for the balance" between the needs of regional transportation facilities like Jetport with the needs of its immediately surrounding neighborhoods like Stroudwater, I expected to see listed among the MP's stated goals and objectives the goal and objective of reviewing and recommending improvements to those aspects of the Jetport's present efforts to minimize the adverse impact of

Jetport operations on the surrounding neighborhoods. No such goal and objective is listed. Given the City's already stated goal of looking for that balance, and the MP's intent to set the tone for the next 20 years of Jetport operations, I believe such a goal and objective should be included among the MP's goals and objectives.

2. **Sustainability**

There is extensive discussion on sustainability in the draft MP but not with regard to the impact from airport operations on abutting neighborhoods.

(a) **Traffic** I see some inventory (baseline information), discussion and analysis regarding the traffic to and from the Jetport. (Chapter 3, pages 46-55.). I see the acknowledgment that traffic is anticipated to increase by 2016 by 180 vehicles per day. It mentions improvement to certain intersections have been recommended. It also mentions a draft Traffic Demand Management plan ("TDM") from 2009 that apparently is still in draft form. Since the MP is looking out 20 years, it should be looking at traffic changes anticipated over the next 20 years, not just in 2016, to account for any increase demand. The MP should be more specific and set goals for the actual adoption of the TDM, assignment of responsibility for the implementation and oversight of the TDM, review of and identification of steps taken to reduce vehicle trips per day on Congress Street (signage for example) as that street is at capacity at times, identification of the intersections to be improved and at what cost, and a timeline for the those improvements to be aired and implemented. The report does not address what the airport has done with the money set aside for traffic improvements as a condition imposed on the terminal expansion. Has that money been spent and if so on what projects and what is the present baseline? Any sustainability analysis of traffic should include the offsite impacts of traffic generated at the airport. I do not see any such analysis.

(b) **Noise** I see mention of (Ch. 3, page 6) but no analysis of the effectiveness of present noise abatement processes or discussion of areas of improvement. Apparently this is to be "further evaluated" (Ch. 3, page 71) as part of "a subsequent task in the sustainability master planning process." Nor do I see any articulation of where the airport wants to be in 20 years on minimizing noise impacts on surrounding neighborhoods. There is the claim that the present noise program is "robust" but no data to back up the claim. I am not aware of any survey or engagement with those immediately impacted by noise. Many area residents think the noise reporting process to be a black hole, with no responses to folks who make complaints. There appears to be no accountability and no follow up. If numbers are down, without investigation, it is equally plausible to conclude that the system is unresponsive and does not work as opposed to complaints have lessened. Any sustainability analysis should include a review of the present noise abatement and reporting processes and effectiveness of present efforts to direct and control patterns to minimize adverse impacts and obstacles in place. The analysis should be *at least as thorough* as the MP's detailed analysis of the airport's present waste management and recycling programs and detailed identification of ways to improve.

I would like information on when the "further evaluation" phase will begin as part of the "sustainability master planning process." Can you add me to your notice list so I can be kept informed on that process.

While there is a very brief mention of several noise/blast walls I see no analysis on the effectiveness and/or need for modifications to those walls. There should be a coordinated effort to solicit feedback from those impacted by noise and who have attempted to use the present procedures for noise reporting to see if the present process is effective and can be improved to allow for greater public access to noise complaint history and follow up. Other airports (MSP for example) offer on line data on noise complaints and have on staff a person whose job description includes handling and responding to noise issues. I do not see any such responsibility assigned as part of the organizational chart contained in the draft MP. Some airports have entered into voluntary agreements with aircraft carriers to limit the use of certain aircraft at certain hours (MSP for example). Some airports work closely with the ATC on noise issues caused by arrivals and departures. What is the baseline on the Jetport's interaction with ATC on for example FEDEX's voluntarily compliance with noise abatement protocals? Other airports have pilot education programs and noise abatement sensitivity training. What is the baseline information on such efforts at the airport? Does it include air cargo carriers? There should be an analysis of the effectiveness of the present programs and development of goals to improve the program. Given the repeated failures of FEDEX to comply with noise abatement procedures it can hardly be said the present system cannot be improved.1

(c) **Joint Planning** I see no mention or discussion of future land use needs of the airport over the next 20 years with both the City and the City of South Portland. Should that portion of Johnson Road located within South Portland be further developed with uses unrelated to Jetport uses (e.g.. State office buildings) and if not, what goals or objectives are there to address rezoning the area along Johnson Road? What efforts if any should be undertaken to coordinate airport related development with the City and the City of South Portland? I was surprised that this is no mention anywhere in the draft MP given the recent placement of a non-airport related use along Johnson Road. If the MP is intended to serve as a planning guide for the next 20 years, there is no reason not to identify and set goals on joint planning.

(d) **Portland Trails**. The Jetport often proudly proclaims it is a downtown airport but at the same it resists efforts to take steps to benefit the community. Expanding throughout the City the trail network is an existing Comprehensive Plan goal. Portland Trails has over the years expressed an interest in working with the airport to develop a perimeter trail that takes advantage of the spectacular river front. At both much larger airports and airports of similar size trails have been installed and could be considered enhanced security if appropriately designed/built as is the case with Atlanta, Baltimore, Reagan in DC, Gunnison in Colorado and a host of others. In the area of sustainability (or elsewhere in the draft MP) I see no mention of exploring over the next 20 years with Portland Trails the possibility of extending the trail along some or all of the Jetport property along the Fore River. As a City owned facility, focused on sustainability, the airport

1 The inventory on air cargo notes FEDEX's typical departure time of one plane but does not mention or quantify the incoming FEDEX related air feeder traffic and the impact of that traffic on the surrounding areas. If the goal is accuracy and completeness, I am not sure why that information is also not included

should have as a MP goal over the next 20 years to examine and explore the possibility with Portland Trails of extending the trail network along some or the entire waterfront airport periphery.

3. **Omission of any mention of the Stroudwater Historic District and Tate House from the MP**

As part of the draft MP there is an inventory and map of nearby historic structures. Obviously the idea is to paint a complete picture of the present environment both on and nearby the Jetport property in order to help inform long term planning goals. I was very surprised to see the complete omission from both the applicable map (Exhibit 1U) attached and the description of Historical Resources (Ch. 1, page 61 of draft MP) of any mention of the Stroudwater Historical District and/or the Tate House. The draft report identifies four properties listed on the National Register of Historic Places located within 2 miles of the airport. Not identified or mentioned are either the Stroudwater Historic District (listed in 1973) or the Tate House (which is a National Historic Landmark and is located in the Stroudwater Historic District).

As noted in the draft, the National Historic Preservation Act of 1966, Section 106, as amended ("Section 106"), requires federal agencies to take into account the impacts of their undertakings on historic properties, whether those impacts are by physical destruction or introduction of incompatible visual, atmospheric or audible elements. The Jetport trough the FAA uses federal funds all the time. The Stroudwater Historic District abuts the airport and the Tate House is located less than 1000 feet from the edge of the RPZ for RW 18-36.

As part of the MP planning process, since these historic areas are not identified anywhere in the MP, there is no analysis of the impact of Jetport operations, noise and light, fuel disbursement, and air traffic patterns on these areas, no base line inventory in other words. Nor is there any discussion in the draft MP on what steps the airport can take to minimize those effects. Without such an inventory it is not possible to identify goals over the next 20 years to reduce the impacts. This should not be ignored.

While clearly well versed in airport design and operations, it is not clear to me that anyone at Coffman Associates has any particular expertise in looking at impacts of airport operations on historic districts. If there is I would like to learn more about that person's background and involvement to date in the draft MP's analysis on Section 106 review and compliance and experience in other similar circumstances.

I note in Chapter 4, page 25 (attached) there is mention of the airport's consideration of acquiring homes located in the RPZ at the west end of RW 18-36. Those homes appear to me to be located on Garrison Street extension and in the historic district. See map attached. I see no analysis of how the airport's consideration of acquiring these properties can comply with Section 106 and/or the City's well anchored goal of protecting and preserving historic districts from encroachment. It should not be a MP goal for the airport to acquire and demolish homes in the historic district. Have the specific property owners been alerted to this provision of the draft

MP? Has the City's office of Historic Preservation been consulted as well? If not they should be. The airport should clearly be looking at other options. Further physical intrusion into a historic district that predates the airport by over 150 years should be off the table.

In Chapter 5, there is a listing of airport development objectives. Again no mention is made of any objective for the airport to work with the immediate neighborhoods to monitor and continually look for more effective ways to lessen the impact the airport creates. There is no mention that the airport boarders an historic district.

A future-oriented Master Plan could be expected to reference the sensitive environmental urban locus of PWM located on a riverfront with facing promontory that tends to focus noise back onto the river, which itself is uniquely conditioned to carry noise longer distances. This river, and especially the associated marsh, are ecologically sensitive (as acknowledged by the City at the time of the oil spill after a tanker collided with the Million Dollar Bridge), yet there appears to me to be no planning attention given these sensitivities. Further, a forward-focused MP I would expect to mention the impending jet (and airplane) emissions regulations now being formulated by the FAA and consideration of making available new fuel sources that will reduce harmful emissions (SEA-TAC just made available a bio-fuel with the goal of that fuel being used on every flight), and other forward looking initiatives.

In sum, the draft MP falls short on those aspects of airport operations that immediate impact abutting neighborhoods. I fail to see in the draft MP any goal of the Jetport to review and improve on minimizing off sight impacts like noise, emissions and traffic. I fail to see in the draft MP any articulation of the need for joint planning with the City of South Portland. I fail to see identification of enhancing City-wide Comprehensive Plan goals such as working with Portland Trials on the possibility of trail expansion along the Fore River and a connection to South Portland. I feel to see any Section 106 analysis, both of the effectiveness of present efforts and possible ways to improve mitigating impacts, on the immediately adjacent nationally listed historic district and historic place.

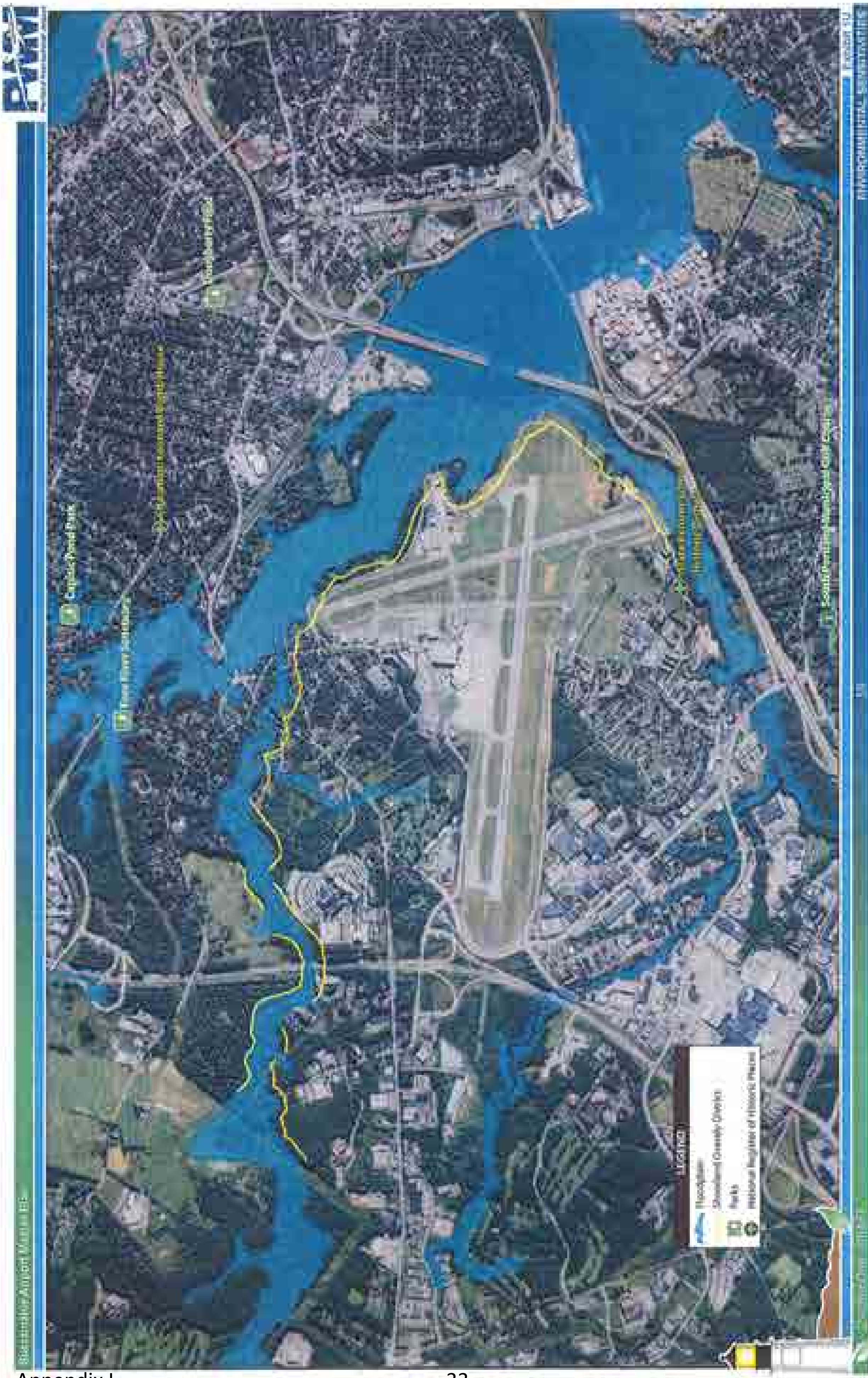
If you want to discuss these or any other concerns please feel free to give me a call. As noted above I do want timely notice of the further sustainability analysis mentioned in the draft report.

Sincerely,

David P. Silk

cc: Hon. Ethan Strimling, Mayor, City of Portland
Jeff Levine, Director of Planning and Urban Development, City of Portland
Jon Jennings, City Manager, City of Portland

Deb Andrews, Historic Preservation, City of Portland
Dan Koloski, Stroudwater Village Association
Ralph Carmona, Tate House
Tom Jewell, Portland Trails
Elizabeth Hoglund
James Robbins
Andrea Hawkes
Roger Hinchliffe
Thomas Ainsworth
Charlton Smith, River's Edge



outside of airport property over the Fore River. The approach RPZ for Runway 18 extends beyond airport property, with the northwestern corner located atop a residential area. The departure RPZs for both Runway 18 and 36 extend well beyond airport property, as depicted on **Exhibit 4F**. Consideration should be given to acquiring the property in the approach and departure RPZs wherever feasible and/or practical. At a minimum, avigation easements should be pursued.

Runway/Taxiway Separation

The design standards for the separation between runways and parallel taxiways are a function of the critical design aircraft and the instrument approach visibility minimum. The runway to taxiway separation standard for RDC C/D-IV runways served by published instrument approaches providing less than ½-mile visibility minimums is 400 feet (centerline to centerline). This standard applies to parallel Taxiway A, which is properly located 400 feet north serving Runway 11-29.

Taxiway C serves crosswind Runway 18-36, which has published instrument approaches offering not lower than one-mile visibility minimums. As noted earlier, Runway 18-36 should follow RDC B-III design which calls for a 300-foot runway/taxiway separation. Most of parallel Taxiway C exceeds this dimension, while the northern and southern parallel portions of Taxiway C are set at 300-foot separation. As such, Taxiway C is properly spaced from Runway 18-36

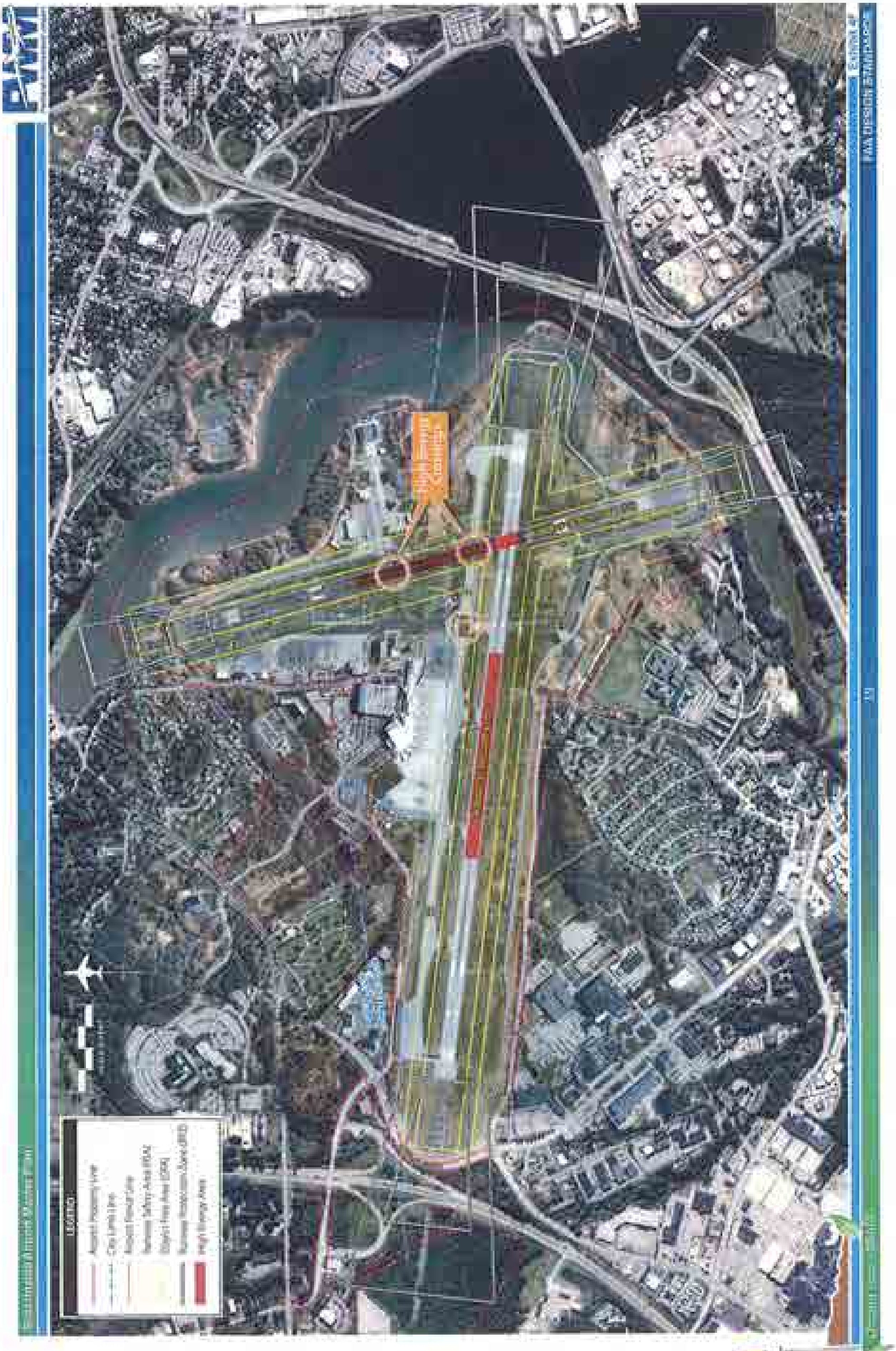
RUNWAYS

The adequacy of the existing runway system at Portland International Jetport has been analyzed from a number of perspectives, including runway orientation and adherence to safety area standards. From this information, requirements for runway improvements were determined for the airport. Runway elements, such as length, width, and strength, are now presented.

Runway Length

The determination of runway length requirements for the airport is based on five primary factors:

- Mean maximum temperature of the hottest month
- Airport elevation
- Runway gradient
- Critical aircraft type expected to use the runway
- Stage length of the longest nonstop destination (specific to larger aircraft)



Steven G. Benson

February 25, 2016

Coffman Associates, Inc.

237 N.W. Blue Parkway, Suite 100

Lee's Summit, MO 64063

Dear Mr Benson,

I have with interest read your firm's "Jetport Master Plan" for the Portland, Maine airport (PWM), as well as the comments by David Silk concerning your "study".

I must say your "study" is indeed masterful in the absolute manner it ignores and avoids multiple issues of primary importance to our neighborhood of Stroudwater, where the Jetport is located, and the City of Portland. My home is about 130 yards from the northern edge of the airport and I am sorry to say we have a long list of concerns which need to be attended to, most of which Mr. Silk describes in his comments. Mr. Silk and his family, by the way, live 50 yards closer to the airport than we do.

I strongly suggest that you address in writing every issue Mr. Silk raises in the comments he submits to you, as we cannot possibly approve your Plan in its present form. We demand that the Jetport take these issues into account, and in case you are not personally familiar with the areas we mention, please contact us if and when you come to Portland in the near future.

I attempted to call you today, but you were apparently unavailable. Again we ask that you familiarize yourselves with Mr. Silk's comments and in writing provide answers to our comments. Thank you.

Sincerely,

Roger Hinchliffe

Roger Hinchliffe, (member of the Stroudwater Village Association)

1221 Westbrook Street

Portland, Maine 04102

Tel 207 775 7501

James E. Robbins
8 Garrison Street Ext
Portland, Maine 04102

February 25, 2016

Steven G. Benson
Coffman Associates Inc.
237 N.W. Blue Parkway, Suite 100
Lee's Summit, MO 64063

Re: Portland International Jetport draft Master Plan (MP)

Dear Mr. Benson,

As it relates to certain comments you've recently received from Mr. David Silk regarding his observations and concerns over the draft proposed Master Plan (MP), I believe that Mr. Silk raised several valid questions about critical gaps and omissions in the document.

Correspondingly, I would state that the most startling and egregious omission in the draft MP, as identified by Mr. Silk, is the complete exclusion or even reference to the Historic Stroudwater neighborhood. Not only is the Stroudwater neighborhood a prominent abutter; it is at the heart of Portland's historically significant landmarks with both national and local prominence. Stroudwater is Portland's only remaining contiguous neighborhood consisting of colonial era dwellings and structures and vividly depicts Portland's earliest days as a city. And it sits right at the end of RW 18-36. Further, Stroudwater is virtually a gateway to one of Portland's most significant and stunning estuaries as it encompasses the Stroudwater and Fore Rivers. However, far from being an obsolete mausoleum, Stroudwater is home to dozens of Portland families and homeowners spanning generations and is a cross section of Portland's socioeconomic diversity.

Accordingly, a MP without the inclusion of Stroudwater as an integral planning component for a 20 year future and beyond is a failed plan. It will fail because the substance of a MP is not only about the economic and logistical viability of sources and uses; it is about the impact upon and compatibility with the people who comprise the city which hosts our jetport.

I urge you to pause and reconsider some of the criteria that is currently absent from your proposed MP. There is a tremendous opportunity here for the continued success of our jetport as well as our City's neighborhoods.

Respectfully,

James E. Robbins

cc: Hon. Ethan Strimling, Mayor, City of Portland
Jeff Levine, Director of Planning and Urban Development, City of Portland
Jon Jennings, City Manager, City of Portland
Deb Andrews, Historic Preservation, City of Portland
Dan Kolioski, Stroudwater Village Association

Charlton Smith, President
Stroudwater Farms Homeowners Association
85 River's Edge Drive
Portland, ME 04102

February 28, 2016

Steven G. Benson
Coffman Associates, Inc.
237 N.W. Blue Parkway, Suite 100
Lee's Summit, MO 64063

Re: Portland International Jetport Master Plan

Dear Mr. Benson:

As President of Stroudwater Farms Homeowners Association I represent 28 owners of properties located in the Portland subdivision known as River's Edge.

River's Edge subdivision is part of the Stroudwater Village neighborhood and a portion of River's Edge is included in the Stroudwater Historic District. River's Edge is also adjacent to the section of the Portland Trail system running along the Stroudwater River.

I have read David Silk's February 25, 2016 letter to you regarding his extensive concerns relating to the Stroudwater Historic District and the residential areas immediately adjacent to the Jetport. I fully support Mr. Silk's concerns and hope that you will give them every possible consideration as you develop the Jetport Master Plan.

The historic village of Stroudwater is a very important part of what makes Portland such a desirable city. It deserves a much more prominent role in the Jetport Master Plan.

Thank you for your consideration of our concerns in this very important matter.

Sincerely,

Charlton Smith, President
Stroudwater Farms Homeowners Assn.

cc: Ethan Strimling, Mayor
Jon Jennings, City Manager
Jeff Levine, Director of Planning and Urban Development
Deb Andrews, Director of the Historic Preservation
Dan Koloski, Stroudwater Village Association

-----Original Message-----
From: thejetport.airportstudy.com - comments from: Micah Engber [mailto:maineguy@gmail.com]
Sent: Friday, March 11, 2016 12:58 PM
To: Mike Dmyterko <miked@coffmanassociates.com>; Steven Benson <sbenson@coffmanassociates.com>; dwightanderson@fstinc.com
Subject: Master Plan

From: Micah Engber <maineguy@gmail.com>
Subject: Master Plan

Organization:

405 Western Avenue, #311

South Portland, Maine 04106

Comments
The Portland "Transportation Hub" Amtrak/Bus Station is less a mile from the front door to the PWM passenger terminal as the crow flies, about 2,000 feet from the east end of the airport and less than three miles by car. If PWM is really trying to do something sustainable, there should be light rail connecting directly to that transportation center, or in the best case scenario, the city of Portland should move that center to the airport so there can be a true transportation center with air, rail, and bus all from one central location, and light rail back and forth to downtown Portland.

The current "Sustainable Airport Master Plan" will really do nothing for passengers as numbers will not increase dramatically. There is no place for them to come from, unless PWM robs passenger from BGR. Both airports are spokes, not hubs and oil prices will not remain low enough to make flying to either particularly advantageous to direct routes.

If PWM wants to attract tourists, make transportation easier by making it a true inter modal passenger hub.

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This mail is sent via contact form on http://thejetport.airportstudy.com

Coffman Associates
Airport Consultants

March 28, 2016

Mr. David P. Silk
1187 Westbrook Street
Portland, ME 04102-1928

Re: Portland International Jetport Draft Master Plan PIW #4

Greetings Mr. Silk:

It was a pleasure meeting you at our public workshop in February. You mentioned several things at the workshop that I requested that you also detail in writing. I appreciate that you have done that. It is the purpose of our public review process to make sure we take into consideration all the input and comments that we can get. Sometimes we may have not been aware of certain issues, or simply left them out by mistake. The public involvement process is designed to help us prepare the best Sustainable Airport Master Plan (SAMP) we can for the City and its constituents, as well as the airport's neighbors and users. It's likely that many residents of Stroudwater fall into each of those categories.

Let me first apologize for any perception that we have not taken Stroudwater and the other Jetport neighborhoods into consideration in our planning. That was certainly not the case, but thanks to your comments, we intend to strengthen the SAMP in that aspect. I have been personally involved in planning for the Jetport for more than 20 years, and Stroudwater has been a significant factor in our planning throughout. Perhaps most glaring was Exhibit 1U in Chapter One of the Sustainable Airport Master Plan. Inadvertently, the Tate House and the Stroudwater Historic District were missing from the exhibit, even though both were referenced in text on the previous page. A copy of the revised Exhibit 1U is attached.

With regard to your other comments (**excerpted in bold**), I offer the following responses:

1. **Goals and Objectives**

   The existing City's Comprehensive Plan addresses Transportation Resources and identifies as a regional issue, "Conflict with Neighborhoods" .... Given the City's stated goal of "looking for balance," .... I expected to see listed among the MP's stated goals and objectives .... reviewing and recommending improvements to those aspects of the Jetport's present efforts to minimize the adverse impact of Jetport operations on the surrounding neighborhoods...

   On Page 2 of the Introduction to the Sustainable Airport Master Plan, the first paragraph under *Master Plan Goals and Objectives* reads as follows:

   The primary objective of the sustainable airport master plan (SAMP) is to provide the community, City of Portland and its airport administration with proper guidance for future improvements and processes that incorporate sustainability principles in addressing aviation demand and airport operations in a manner that is wholly compatible with the environment. Making sustainability a part of the core objective of the planning process will promote design, project implementation, and financial decisions that will help the airport identify ways to reduce energy *consumption, environmental impacts, and carbon footprint.* ***As a result of incorporating sustainability issues into the master planning process, the airport can become a more environmentally friendly business place and neighbor. The plan will benefit all residents of the area by providing a single comprehensive plan which supports and balances aviation activities and the environmental preservation of the surrounding environs.***

While it may not be specifically listed later as a bullet-point, you can see from this lead paragraph to the section, the primary objective of the Sustainable Airport Master Plan is to strive for a plan that supports and balances aviation activities and the preservation of the surrounding environs, which of course, includes Stroudwater.

2. **Sustainability**

Traffic – I see some inventory ... regarding traffic to and from the Jetport (Chapter 3, pages 46-55). I see the acknowledgement that traffic is anticipated to increase by 2016 by 180 vehicles per day..... It also mentions a draft Traffic Demand Management plan from 2009.... Since the MP is looking our 20 years, it should be looking at traffic changes anticipated over the next 20 years, not just 2016, to account for any increase demand.

The Traffic Demand Management Plan you mention was taken from a Traffic Impact Study completed in early 2009 as part of the terminal design project. That study used 2016 as its design year. The 2016 enplanement forecast level used in the Traffic Impact Study was 1,075,000. By comparison, enplaned passengers at the Jetport in 2015 totaled just under 867,000. The new Master Plan forecast does not anticipate exceeding that level until at least 2027, with 1,188,000 projected for 2035.

This will result in just over a 10 percent increase in traffic compared to the Traffic Study forecast, with airport-generated vehicles increasing from 782 to 863 in the peak hour. The Traffic Study indicated that the 1,075,000 level of passengers would not have a significant impact on the Level of Service (LOS) or delay along Congress Street. It did note that the intersection of Congress Street and Stroudwater was already operating at LOS F in 2008, but the delay would not be increased significantly.

If the Sustainable Airport Master Plan is approved by the City Council, the Jetport's Sustainability Objectives under its Sustainability Goal for Access and Transportation will include:

- *Provide choice to Jetport's passengers by encouraging high-occupancy modes of transportation...*
- *Encourage the use of high-occupancy modes of transportation among employees commuting to and from the Jetport.*
- *Leverage regional partners to enhance and promote bicycle, pedestrian, and high-occupancy modes of transportation available to Jetport employees, customers, and visitors.*

These objectives will serve to mitigate the forecast increase in passenger traffic over the next 20 years. We will, however, add some additional discussion regarding airport traffic to the master plan.

Noise – I see mention of (Ch. 3, page 6) but no analysis of the effectiveness of present noise abatement processes of discussions of areas of improvement…. Any sustainability analysis should include a review of the present noise abatement and reporting processes and effectiveness of present efforts to direct and control patterns to minimize adverse impacts and obstacles in place…. While there is very brief mention of several noise/blast walls, I see not analysis on the effectiveness and/or need for modifications to those walls.

As mentioned on page 2 of *Chapter Three – Baseline Assessment*, the Jetport is already proactive in the categories of Water Quality and Noise. The sustainability screening process eliminated those two so that more resources could be focused on the remaining six. As you read on page 6, it was recommended that the Jetport maintain its existing noise programs. The Jetport Noise Advisory Committee is the best place to register any of your concerns related to noise.

Also factoring into this decision was the fact that the 14 CFR Part 150 Study prepared in 2002 was based upon operations forecast for 2007. Both the current Jetport operations and the Master Plan operations forecast for 2035 are lower than the Part 150 forecast was for 2007. Contours were also prepared in 2009 for the *Environmentol Assessment (EA) for Airfield and Terminal Improvements*. The EA forecast for 2017 was also lower than the Master Plan forecast for 2035. The table below compares the three forecasts as well as actual activity in 2002 and 2015:

	Actual Activity		Study Forecasts		
	2012	2015	Part 150 2007	EA 2017	Master Plan 2035
Total Operations	102,630	48,898	99,540	82,721	69,300
Air Carrier Operations	40,076	27,920	48,188	48,906	35,700

Since the 2002 Part 150 Study, operations have declined to less than half of what they were when it was prepared. It is evident that not only are total operations forecast to remain far lower than the Part 150 Study factored in, but so are the commercial operations which include the passenger airlines and air cargo carriers. Since 2002, the airlines have also retired their noisiest aircraft. The air cargo operators (Airborne and FedEx) were still operating DC-9 and Boeing 727 aircraft into the Jetport in 2002. Now Airborne is gone and FedEx is operating larger, but quieter aircraft like the Boeing 757-200 and the Airbus 300. The airlines have been required by law to transition to quieter aircraft, now the same is true for corporate jet operators. Making this transition economically feasible has been the fact that the quieter jets are also more fuel efficient. Finally, there are no recommendations for increasing runway capabilities such as runway length or capacity that would mandate new noise contours.

With regards to further noise evaluations, each capital project recommendation in the master plan will be subject to *National Environmental Policy Act* (NEPA) review and documentation prior to receiving funding from the FAA. If required by NEPA, further noise analysis will be prepared before the project can be eligible for funding.

Since the 2017 contours are representative of the current airfield runway layout, we will include a copy of those noise contours in the master plan as a benchmark, also explaining the differences in the forecasts will result in smaller noise exposure contours both currently and in the future.

The master plan does include a recommendation for an aircraft engine run-up pad in the south-east corner of the airport. This location can be found on Exhibit 7C, and is designed to direct run-up noise towards Interstate 295 and unpopulated industrial areas to the southeast of the Jetport. The NEPA documentation for funding approval of this project will require a noise analysis.

Joint Planning – I see no mention or discussion of future land use needs of the airport over the next 20 years with both the City of Portland and the City of South Portland... What efforts, if any should be undertaken to coordinate airport related development with the City and the City of South Portland?

The Jetport has a history of coordinating its planning efforts with both cities. The SAMP review process involved a Planning Advisory Committee representing a significant cross-section of the community, including Stroudwater, the City of Portland, and the City of South Portland. In fact, a City Councilor from each city was actively involved. The committee met five times during the process to review, discuss, and provide input at each phase of the SAMP as it was being developed. The same information provided to them is what you and others have been able to review ~~on the project website, as well as come visit with us at the public workshops. Next, the Master~~ Plan will be going through the City's approval process.

Portland Trails – Expanding throughout the City the trail network is an existing Comprehensive Plan goal.... Portland Trails has over the years expressed an interest in working with the airport to develop a perimeter trail that takes advantage of the spectacular river front.... In the area of sustainability (or elsewhere in the MP) I see no mention of exploring over the next twenty years with Portland Trails the possibility of extending the trail along some or all the Jetport property along the Fore River.

One of the Sustainability Objectives of the SAMP is to *Leverage regional partners to enhance and promote bicycle, pedestrian, and high-occupancy modes of transportation available to Jetport employees, customers, and visitors*. Recommended Sustainability Actions include: *Encourage employees and passengers to use the existing bike and walking paths connected to the Jetport, while advocating for their enhancement.*

As we discussed at the workshop, safety and security are first and foremost at any airport, and especially at CFR Part 139 certificated airports such as the Jetport. The City and the Jetport can certainly consider proposals from bicycle proponents such as Portland Trails. Any proposal for a trail on the airport or around the perimeter of the airport, however, will be subject to review and scrutiny by not only Jetport Operations and Security, but also by the FAA and the Department of Homeland Security.

3. **Omission of any mention of the Stroudwater Historic District and Tate House from the MP – As part of the draft MP there is an inventory and map of the nearby historic structures.... I was very surprised to see the complete omission from both the applicable map (Exhibit 1U) .... and the description of Historical Resources (Ch. 1, page 61 of draft MP) ....**

Again, I apologize for the omission of the identification of the Stroudwater Historic District and the Tate House from Exhibit 1U. Hopefully, the revised version of the exhibit that is attached corrects that mistake.

Both of the properties are protected under Section 4(f) of the Department of Transportation Act of 1966. The text on the page (58) previous to Exhibit 1U specifically states this as well as pointing out that both are on the National Register of Historic Places. It is even evident from the text you mention (page 61) that Exhibit 1U inadvertently left off the two sites. That text references the four properties listed on the National Register, yet only two were actually shown on Exhibit 1U.

You indicate that the SAMP does not identify the two historic areas anywhere. Perhaps you missed the text on page 58 as well as Exhibit 6 in Appendix G which shows the Stroudwater Historic District and other close-in environmental sensitivities in relation to the Jetport's recommended development plan. In addition, the Stroudwater Historic District, which includes the Tate House, is mentioned again on Page 8 of Appendix G under Historic, Architectural, Archeological, and Cultural Resources.

I note in Chapter 4, page 25 there is mention of the airport's consideration of acquiring homes located in the RPZ at the west end of RW 18-36. Those homes appear to be in the historic district.... It should not be a MP goal for the airport to acquire and demolish homes in the historic district.

The exact wording you referenced in Chapter 4, page 25 is as follows:

Consideration should be given to acquiring the property in the approach and departure RPZs wherever feasible or practical. At a minimum, avigation easements should be pursued.

The key wording is ***wherever feasible or practical***. Obviously, acquiring homes in the historic district is neither feasible or practical. In fact, as evidenced later in both Chapters 6 and 7, the Master Plan does not show any recommendation for the acquisition of any of these properties. We will, however, add wording to page 25 to indicate that acquisition within the RPZ was found to be neither feasible or practical and explain why.

In Chapter 5, there is a listing of airport development objectives. Again no mention is made of any objective for the airport to work with the immediate neighborhoods to monitor or continually look for more effective ways to lessen the impact the airport creates.

While not said in those exact words, the objectives listed in Chapter 5 do include:

- *To be reflective and supportive of the long term planning efforts currently applicable to the region.*
- *To ensure the future development is environmentally compatible and technically feasible.*
- *To develop a balanced facility that is socially and politically feasible.*
- *To incorporote a public involvement program and provide for an appropriate level of public involvement.*

A future-oriented Master Plan could be expected to reference the sensitive environmental urban locus of PWM located on a riverfront.... This river, and especially the associated marsh, are ecologically sensitive, ... yet it appears to me to be no planning attention given these sensitivities.

The Jetport and the master plan do consider the potential effect on Fore River water quality. The Jetport already collects all glycol used in de-icing aircraft for recycling at an innovative plant right next to the terminal apron. The master plan design of additional apron and the eventual rehabilitation of existing apron pavement takes into account the collection of glycol for recycling. In addition, the plan also includes the design and installation of a water quality filter prior to the Jetport's run-off entering the river. The location is illustrated as part of the Short Term Development Program on Exhibit 7A.

I hope this helps you find the areas within the SAMP that we are taking into account Stroudwater as well as your other concerns. Regardless, please be assured that we are taking your comments into consideration to assist us in strengthening the Jetport's Sustainable Airport Master Plan.

Sincerely,

Steven G. Benson

Steven G. Benson
Chief Executive Officer

cc: Paul Bradbury, Portland International Jetport
Dwight Anderson, Stantec
Hon. Ethan Strimling, Mayor City of Portland
Jeff Levine, Director of Planning and Urban Development, City of Portland
Jon Jennings, City Manager, City of Portland
Deb Andrews, Historic Preservation, City of Portland
Dan Kosloski, Stroudwater Village Association, SAMP PAC Member
Ralph Carmona, Tate House
Tom Jewell, Portland Trails
Elizabeth Hoglund
James Robbins
Andrea Hawkes
Roger Hinchliffe
Thomas Ainsworth
Charlton Smith, President Stroudwater Farms Homeowners Association
Sandy Beal
Ed Suslovic

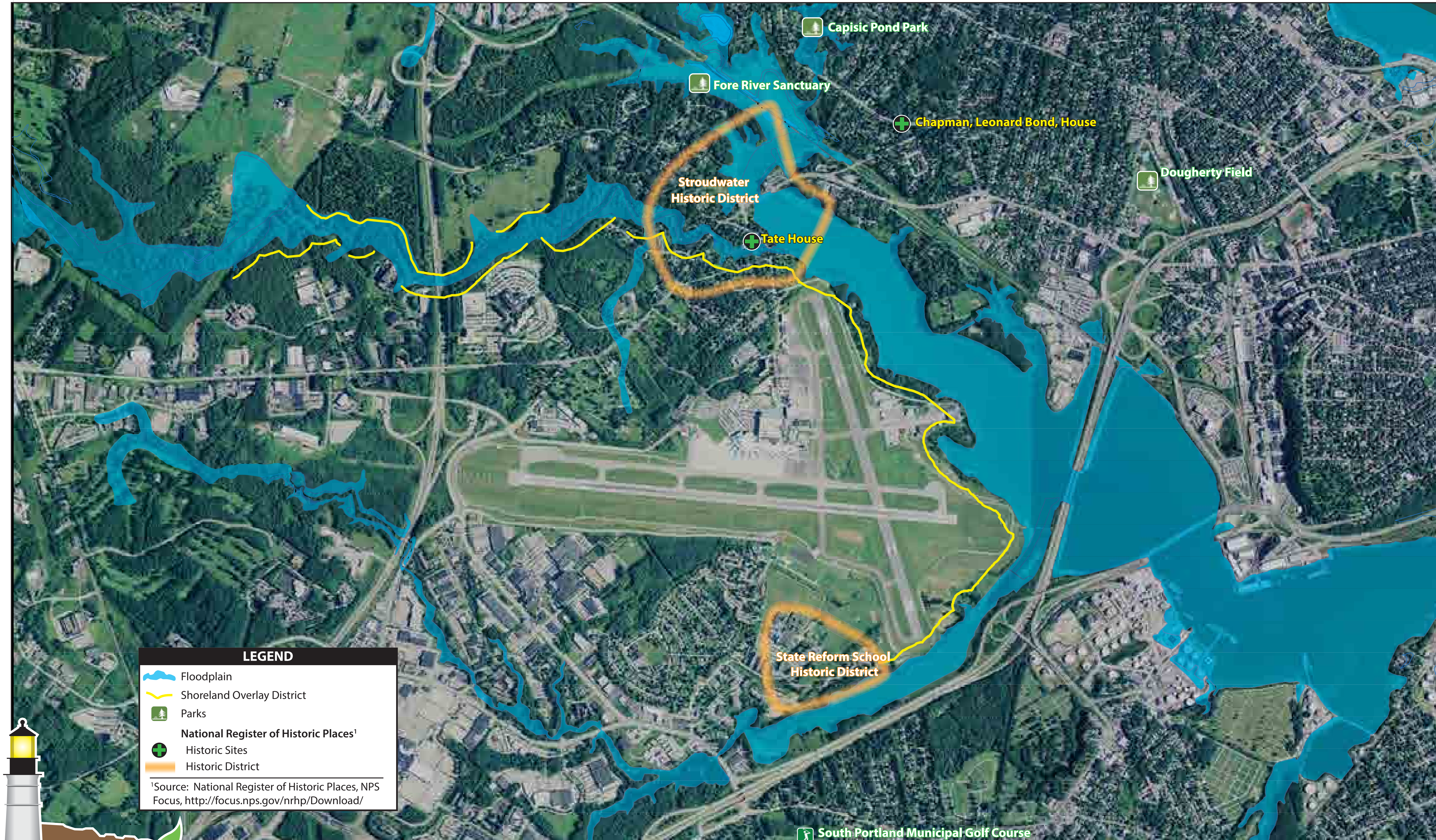

Exhibit 1U
ENVIRONMENTAL SENSITIVITIES

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---------- Forwarded message ----------
From: **Beal, Sandy** <abeal@medicalmutual.com>
Date: Mon, Mar 14, 2016 at 1:08 PM
Subject: Jetport Master Plan
To: "Paul Bradbury <PHB@portlandmaine.gov> (PHB@portlandmaine.gov)" <PHB@portlandmaine.gov>
Cc: Stroudwater Village Association Board of Trustees <stroudwatervillageassociation@gmail.com>, Anita Jones <anitabjones@gmail.com>, Connie Bodley <conniebodley@gmail.com>, Dan Koloski <dan.koloski@gmail.com>, Eric Griffin <Eric_Griffin@miltoncat.com>, Joan Beal <joan.beal@gmail.com>, Kathleen Stokes <kastokes@yahoo.com>, Michael Rogers <michael.rogers66@gmail.com>, Mihku Paul-Anderson <mihkupaul@gmail.com>, Parke Burmeister <parke.burmeister@gmail.com>, Shawn Box <shawn.box@gmail.com>, Stroudwater Falls <stroudwaterfalls@gmail.com>, Tarlan Ahmadov <tarlan.ahmadov@gmail.com>

Good afternoon Paul,

I know that at the end of the very first meeting at the jetport about the master plan revision, I stated that everyone needed to know and understand that the airport sits right next to a neighborhood that is on the National Register of Historic Places. In other words, we are not a new neighborhood for the most part, and houses that are within the Stroudwater Village historic district have mostly 2 x 4 construction, with single-paned windows and very little insulation to act as a sound barrier. Therefore the Stroudwater Village houses especially are very sensitive to noise. Hopefully someone kept notes from each meeting, and you can look at the notes from that meeting to see that I did, in fact, express these concerns.

I think that David Silk has done a super job with his analysis and comments, and I am very concerned that there is no mention of the Stroudwater Historic District and the Tate House in the Master Plan. The attached "Westbrook Street Walking Tour" helps to show you the properties and when they were built.

I'd appreciate some feedback from you, Paul, as to incorporation of these concerns into the current Master Plan proposal.

Thanks,

Sandy Beal

Westbrook Street Walking Tour

The village of Stroudwater is an architectural gem. Many of the old homes in this area have been preserved and maintained with an eye toward historical accuracy. The pride of ownership is evident in many of this village's homes. It must be remembered, however, that the village has undergone transformations in the past and continues to evolve today. Many of the homes exhibit various layers of change in their architectural styles. It can be observed, by studying these layers of change, the evolving economic conditions and requirements of the people who lived and continue to live in the community.

Stroudwater was originally a busy, messy, backwater village. There were no esthetic improvements. The safe harbor that made the growth of this area viable produced a village busy as Portland, and then called Falmouth.

The Stroudwater River is characteristic of many of the rivers along Maine's coast. These rivers tend to be above sea level until they are very close to the ocean, they then drop down in a series of falls. These falls were seen by settlers as having great potential for development. The lure of water power helped to populate the coast of Maine in the 1700's.

Colonel Thomas Westbrook, mast agent for King George II of England, set up the first permanent settlement. His workers cleared rough roads over which to haul the mast trees from the forests to the Fore River. The huge timbers were then floated down the Fore river to waiting ships then transported them to England. Also built was a bridge across the Fore River for the only road to Portland from the south, a garrisoned house for protection from the American Indians, a dam, a saw mill, and the first paper mill in Maine. Westbrook's activities drew people to this tiny settlement on the Fore River.

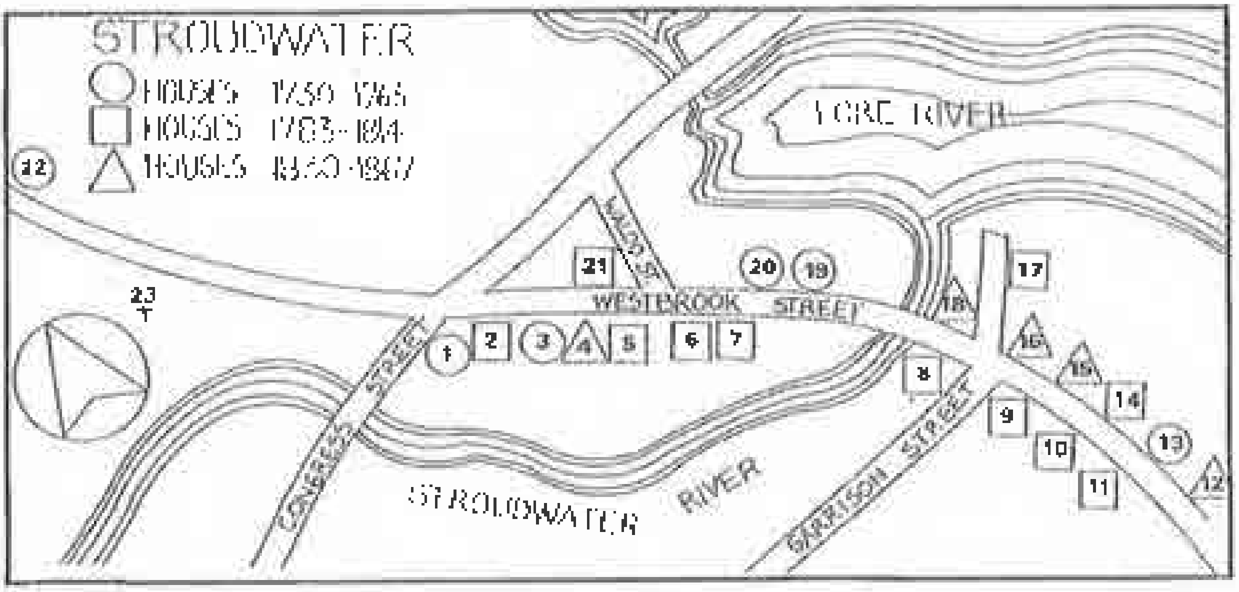
The next major period of growth for Stroudwater came after the Revolution. Attracted by the possibility of land ownership, new settlers came. Lumber was sawn and exported and vessels were built on the banks of the Fore River. A small store was opened and a tannery built. Even with these new developments Stroudwater continued to be a simple little settlement. Prosperity ended with the Embargo Act of 1807. After the commercial depression resulting from the Act and the War of 1812, business improved gradually.

Some new life returned to the Stroudwater area with the 1830 completion of the Cumberland and Oxford Canal. A bark mill powered by tidal current was built by the bridge, a tannery operated, and a new saw mill was built on the Stroudwater River.

The Atlantic and St. Lawrence Railroad, built through several towns in Oxford County and completed in 1853, took away a considerable portion of the canal traffic. As activity diminished Stroudwater became a bedroom community for Portland.

For some time the Stroudwater River was used as a recreational resource. Canoes could be rented for day trips along the river. The Stroudwater River was badly polluted and the recreational appeal dwindled for a time. After some clean up efforts were undertaken in the last decade the River is again being used for recreation, even swimming. The River continues to be a pleasing amenity to the neighborhood for its scenic beauty and wildlife.

The change in the use of the neighborhood from small manufacturing, to recreation, to suburban illustrates the variety of personalities a small area like Stroudwater can assume.



Although the neighborhood is on the National Register of Historic Places it remains endangered. The widening of Congress Street continues to affect the spirit of the neighborhood. Concrete embankments were put in place with little thought to esthetic or historic considerations. The airport traffic has also had its toll on the area. Much of the through traffic is people rushing to catch a plane and not minding posted speed limits. The neighborhood remains a fragile area which has survived remarkably well.

#1 David Patrick House, circa 1743

1288 Westbrook Street

This home is typical of the other older houses in this settlement. It is a simple one story three-quarters cape structure. It is still one story high and has a garret. There is a large center chimney which has been reduced in size and the front door is a little off center with one window at one side of the door with two windows at the right. Frequently in this type of dwelling the roof sloped snugly downward, with the separation of only one clapboard between it and the windows. Alterations in the original structure include a raised roof in the rear and the front doorway with side lights which replaced a transomed door. The gable roof is covered with 20th century asphalt shingles as are all the homes on this street.

When Congress Street was widened in 1988 this house was moved from its original site and placed on a brick foundation which was higher than the original foundation.

The original owner, David Patrick, ran a brick yard where he moulded and fired the bricks. He built the Tate House chimney.

#2 Tristam and Samuel Stevens House, circa 1805

1282 Westbrook Street

This home was built by two brothers who were ship carpenters. It was built to accommodate both of their families. The residence has remained in the same family since the original construction of the home and has always been a two family dwelling. The house is a Federal style structure with a hip roof, and two chimneys which are supported by a vaulted arch in cellar. The rear porch and the Federal style fanlight front entrance and its surrounding portico are a 1916 Colonial Revival revision executed by Frederick A. Thompson, a Portland architect.

The house has been carefully maintained with historical accuracy. During the widening of Congress Street in 1988 the sloping concrete retaining walls were added by the City of Portland. They distract from the overall ambi-ance of this well preserved building.

#3 George Tate House, circa 1755

1270 Westbrook Street

Tate House is a two-and-a-half story, gambrel roof structure with a center chimney built in the Georgian style. It retains its original unpainted feather-edge clapboards on the exterior. The unusual windows in the raised section on the gambrel roof allowed Tate, a Mast Agent for the Royal Navy, to see approaching ships. The third story gambrel is most unusual and affords full head room. The clerestory gives the impression of a full third story. From the front windows a clear view of the activity on the river can be observed. The house retains its original raised paneling and bolection mouldings. This house has been restored as a museum by the National Society of Colonial Dames of America in the State of Maine. Captain George Tate was appointed Mast Agent for the Royal Navy after the demise of Col. Westbrook's.

#4 Martin Hawes House, circa 1835

1260 Westbrook Street

This is a two-and-half story, gable roof Greek Revival style house. It is the only Stroudwater house built entirely of brick. It has plain exterior detailing which in-cludes granite lintels over the windows and door. The simplified Greek Revival style was prevalent at this era and was often used in the building of town homes and mills. The plain brick wall combined with the dressed granite foundation and squared lintels above the window and door openings are representative of the simplified Greek Re-vival style. The roof line is a holdover from Colonial and Federal traditions, with its close-cropped eaves and minimal overhang. The use of scroll cut stone eave returns on the gable ends of the house is a distinguishing feature. The original six over six window sash survives.

This house replaced the John Quinby frame house built in 1795 which was moved to Portland's Longfellow Square.

The room with the large window on the second floor served as a studio for Mr. Rupert Lovejoy who was a gifted 20th century painter. His wife, Myrtle Kilbridge Lovejoy, was the village historian. She wrote the informative book *This Was Stroudwater* which is for sale at the Tate House gift shop.

#5 Archelaus Lewis, circa 1783

1258 Westbrook Street

This is a simple frame house in the Post-Colonial style. It has retained much of its original character including its surface form and finish work. The Lewis House is representative of the locally popular two story Georgian block form with a gable roof. The doorway is a late 19th century modification. The molded window caps on the front and side facades are original details. The window sash and front door are modern reproductions of appropriate period features.

Lewis married three times and had fifteen children, of whom only eight survived to adulthood.

#6 Oaks Sampson House, circa 1802

1246 Westbrook Street

This is a two-story, hip roof structure with a center chimney built in the Colo-nial/Federal style. One of the smaller houses built in the area in the early 19th century, it contains window seats and domed ceilings under it's hipped roof. There is a cove ceiling around entire second floor. The three bay front facade is asymmetrical. The original owner, Oaks Sampson, was a house wright.

The house was once owned in the 1920's by the noted American Impressionist painter Walter Griffin. His studio was located on the edge of the Stroudwater River. The house was also owned by Mrs. Aliah Johnston who was Griffin's niece. She was at one time the headmistress of Dana Hall, a well known girls school in Wellesley Massachusetts. As a young woman Mrs. Johnston spent time in China and later wrote a book about her experiences there.

#7 Joshua Shaw House, circa 1804-05

1242 Westbrook Street

The Shaw house is in the late Colonial, early Federal style. It has two chimneys and a gable roof. The scale and style of this home compliment the surrounding buildings. There have been few alterations to its original structure. The early clapboards with narrow weather exposure and the molded window caps of the first floor front windows are part of the original structure. Major changes in the house include the Victorian Style bracketed head over the transomed front entry and the enclosed entry vestibule on the side of the house. Shaw was a hat maker.

#8 William Slemons house, circa 1786

17 Garrison Street

This is a two-and-a-half story, simple frame house. It has been extensively altered. Originally built in the late colonial style around 1786, a mid-19th century remodeling in the Greek Revival style gave the house its present appearance. The wide paneled corner pilasters and the simple window architrave are important features.

#9 Samuel Fickett House, circa 1795

1190 Westbrook Street

This is a gable roof structure with a center chimney built in the Post-Colonial style. The dormer windows and doorway were a later addition and are in the Greek Revival style. The house's visual impact is heightened by its prominent placement on a low rise of land. The house seems to be essentially the same as the Captain John Quinby House. The Quinby House was built at Stroudwater in 1785 and moved to Longfellow square in Portland in 1826. The Quinby House, which no longer exists, was built by housewright John Kimball and it is probable that Kimball was also the builder of the Fickett house.

The Fickett House was built on the site of the Harrow House, Colonel Westbrook's 1727 home.

#10 William Waterhouse House, circa 1795

1174 Westbrook Street

This building was once a boat shop which was moved to its current site from the river front and converted into a private residence. The house has been extensively altered. As the house stands today there is absolutely no original design concept or detailing surviving that is clearly visible. It was once a high posted story-and-a-half cape style structure with a central chimney, central entrance way, and one window opening on either side of the doorway, mak-ing a three bay entrance facade

 # 11 Dr. Jeremiah Barker House, circa 1799

1168 Westbrook Street

This is a hip roof dwelling with two chimneys in the Colonial/Federal style. It has feathered clapboards on the exterior. The shallow hipped roof and interior end chimney on the left of the house are in the Federal style. The large interior chimney to the right of the front door shows a lingering remnant of the Georgian style. The simple transomed front doorway surround, composed of flat pilasters and a heavy molded cornice is an important surviving architectural element of the house. Barker was the first physician to settle in this area. He was a Revolutionary War veteran.

#12 Francis Fickett House, circa 1865

1141 Westbrook Street

This is a two-and-a half story gable roof frame dwelling built in the Italianate style. The entrance door is on the end, facing the street

#13 Joseph Small House, circa 1743-46

1161 Westbrook Street

In

This is a center chimney, simple vernacular style extended cape with a gable roof. It is one of Stroudwater's earliest standing buildings. Originally it was a Simple one-story structure with a garret. The lights surrounding the door allow light to the tiny hall and steep stairs that lead to the garret. Surviving architectural details include the pitch of the roof line, shallow eaves, and the fenestration placement. The Small house was moved twice. It was originally located next to the burying ground.

#14 Jonathan Smith House, circa 1814

1169 Westbrook Street

This is a large Federal style frame home with a center chimney and gable roof. The window caps on the side of the facades are original features of the structure. The Smith House has been extensively altered. The two bay windows on the first floor are Italianate and they flank the Greek Revival doorway both of which were added at a later date. This house has a splendid flying staircase.

#15 Elias Jacobs House, circa 1845

1181 Westbrook Street

The Jacobs house is a well preserved residence in the late Greek Revival style. It has a three bay entrance facade, paired interior chimneys and a gable roof. It replaced a home built in 1795. Notable details include the heavy paneled corner pilaster, the simple window cornices, and the front door surround. The bay window at the right rear is likely a 19th century addition.

#16 Robert Waterhouse House, circa 1867

1193 Westbrook Street

This is a three bay, early balloon frame structure with clapboard sheathing and a gable roof. The woodwork at the cornice and corner pilasters are typical of the Greek Revival style although that style was no longer popular when this house was constructed. The bay windows on either side of the front entry, and the double doors leading to the front hall are notable original features. There is an interesting porch that wraps around two sides of the first floor. The porch is a later addition to the house, presumably from around 1890-1900.

#17 William Waterhouse Jr. House, circa 1795

8 Garrison Street

This house is a fairly typical Post-Colonial two story gable end structure. The three bay front facade with it's doorway and central second floor openings are in line with each other but are slightly off center. Notable original features include the clapboards and the early Federal style window caps on the first floor front as well as the side windows. The bracketed door hood over the central front door opening is in the Victorian style and was a later addition.

#18 James Parker House, circa 1845

11 Garrison Street

This is a one-and-a-half story front cape with a center chimney.

#19 Isaac Fly House, Early 18th Century

1227 Westbrook Street

This dwelling was originally a cape with the entrance facing southeast. It is now a two and a half story frame house with a gable roof. This home mixes the Colonial style with the Greek Revival style and has been extensively altered. Surviving original features might be the attic level windows, the placement of the window openings on the second floor sides, and the general five bay opening arrangement of the second floor front facade. The exterior retains its mid-nineteenth century siding and simplified Greek revival trim. The house shows the evolutionary expansion of a modest house to meet changing demands.

#20 Richard Farder House, circa 1730

1235 Westbrook Street

This home, like it's neighbor the Fly House, was originally a cape and is now a two-and-a-half story frame house with a gable roof. It also mixes the Colo-nial and the Greek Revival styles. Much of this house has been altered over time. A remodeling enlargement that took place circa 1840-1850 totally changed any original design features. The house as it stands today has Greek Revival style corner pilasters and heavy cornice finish work on the Westbrook gable facade.

#21 Capt. James Means House, circa 1797

2 Waldo Street

The Means house is one of Stroudwater's most notable landmarks. This is a Georgian inspired five bay structure with brick ends and a clapboard front and rear. It is a two-story house with a hip roof and four chimneys. The con-struction combines the lighter detailing of the emerging Federal period with the solidity and massing of a Georgian structure.

The rationale behind the two brick end walls is of particular interest. Brick was much more expensive than wood. Substantial savings in construction costs were achieved by building the two weight bearing walls of brick and filling the non-weight bearing walls with wood.

#22 Francis Waldo-Daniel Dole House, circa 1765

1365 Westbrook Street

The Waldo-Dole house was built on a hilltop with a fine view of the river. This traditional gambrel roof structure has a large attic. The owner kept his black slaves in a walled off attic room.

#23 Burial Ground

This cemetery contains some fine examples of early burial markers. Evolu-tionary changes in stone carving iconography can be readily observed. The transition from winged death heads, to angels, to winged portraits of the de-ceased is of particular interest. Many of the Tates are buried here including Mary and George Tate.

The information contained in this script was obtained by Denyse M. Cunningham
in the Summer of 1994 through various sources including the following:
The files of Greater Portland Landmarks, 165 S. State Street, Portland, Maine
Portland Historic Resources Inventory, 1991. Surveyor: Tom Johnson
This Was Stroudwater by Myrtle Kittredge Lovejoy
Published by National Society of Colonial Dames of America in the State of Maine, 1985
United States Department of Interior, National Parks Service, National Register of Historic Places
Inventory Nomination Form on file at Tate House
Professor Ken Severens, University of Southern Maine, Portland, Maine
A special thanks to Mrs. Millard Peabody for her insight into the area and to the Maine Humanities
Council for special funding

---------- Forwarded message ----------
From: **David Silk** <DSilk@curtisthaxter.com>
Date: Wed, Jun 8, 2016 at 11:28 AM
Subject: Proposed Jetport Master Plan
To: "jpj@portlandmaine.gov" <jpj@portlandmaine.gov>, Jeff Levine <jlevine@portlandmaine.gov>
Cc: Judith Rosen <JHG@portlandmaine.gov>, "estrimling@maine.rr.com" <estrimling@maine.rr.com>, "THM@portlandmaine.gov" <THM@portlandmaine.gov>

Hi Jon and Jeff: I see that on the Council's workshop agenda for next Monday is consideration of the proposed updated Jetport Master Plan. Attached is a letter to the Mayor and members of the Council regarding the proposed Master Plan that I would like to be provided to Council members on this issue. I am not sure how best to deliver this letter to Council members. From my days on the Planning Board there was a point person who received public comment and who would ensure public comments were shared with all board members. If the process is different with the Council let me know. Or if I should email this directly to each Council member let me know.

Also I am correct that oral public comment is not taken at workshop sessions?

Thanks and have a great day.

David Silk

1187 Westbrook St

653-5144

David P. Silk
1187 Westbrook Street
Portland, ME 04102-1928

June 8, 2016

Honorable Ethan K. Strimling,
Mayor, City of Portland
389 Congress Street
Portland, ME 04101

RE: Jetport Master Plan

Dear Mayor Strimling and Members of the City Council:

Consideration of an updated Jetport Master Plan is on the Council's June 13, 2016 workshop agenda. I have provided detailed comments to the firm hired by the City to prepare the Master Plan and they are attached hereto.

I urge you not to adopt as part of the City's Comprehensive Plan the proposed Jetport Master Plan ("MP") in its present form. The draft MP is incomplete and falls way short of what the City should expect as a master planning document.

A master plan is intended to guide development activities into the future. It does that by first inventorying and reviewing existing conditions. Then it articulates goals, for example, where do we want to be in 2030. Then based on those goals in identifies and priorities strategies to achieve those goals.[1]

The focus of the Jetport draft MP is on sustainability of its internal operations. Mr. Bradbury acknowledged before the Standing Committee on Energy and Sustainability that the draft MP does not really address sustainability of Jetport operations outside its footprint.[5] But that leaves out half of the equation. To be a viable master plan worthy of adoption as part of the City's Comprehensive Plan, the plan should examine, in the same comprehensive manner it examined the impact of the Jetport's onsite operations, the sustainability of Jetport operations offsite.

The Jetport is an urban airport abutting two residential neighborhoods and two rivers, the Stroudwater and the Fore. By not considering offsite impacts and identifying strategies to improve offsite impacts, the proposed Master Plan cannot serve as a useful guide for future development. It is prepared as if the Jetport exists in a vacuum.[6] But that is not the case.

The impact of the Jetport's operations offsite includes noise, air emissions, traffic. The draft MP makes no effort to examine those impacts and identify ways to improve Jetport operations so as to improve the sustainability of the surrounding neighborhoods. As an example, draft makes no reference to the FAA's initiatives on reducing harmful emissions that impact both air and water. Given the Jetports location, it escapes me why the master plan does not have as a goal for the Jetport to be at the fore front of FAA's initiatives.[29] Other airports are actively exploring the use of solar electrical generation facilities located either on the buildings and garages existing or planned or in other areas of open space. Yet the Master Plan omits any mention of exploring the development solar energy.[30] It clearly should be a goal of the Master Plan to explore solar generation options.

Councilor Suslovic recently commented at a Standing Committee on Energy and Sustainability meeting that in an urban environment where people live and work in close proximity, we need to especially mindful about how actions taken on private property impact neighbors. The logic applies equally if not greater to activities on City owned property given that for City owned property, the City should set the example for others to follow. Yet the draft MP does not undertake any meaningful analysis examining and recommending steps the Jetport can take to improve the sustainability areas offsite impacted by its activities.[7]

The City is presently considering being part of the 2030 District Initiative. That initiative includes focusing on reducing emissions from transportation to and from sites. The draft MP makes no effort to examine and set as goals ways to reduce traffic the Jetport generates. Per the draft MP the Jetport Traffic Demand Management plan has remained in draft form since 2009. No goal is even set for the adoption of the TDM plan.[23] Is that the example the City wants to set in a Master Plan for City owned property?

Back in 2012 the FAA issued a report on the sustainability master planning process including lessons learned. http://www.aci-na.org/content/faa-issues-sustainable-master-plan-pilot-program-report. The report lists notable sustainability goals and initiatives. Numerous items listed related to analyzing and mitigating offsite impacts from noise, traffic, emissions and lighting. As examples: reduce percentage of drop-off-pick/up activity by 15% to that is not the primary means of transportation to the airport by passengers; review local and regional transit connections and opportunities; identify opportunities to connect to City trail systems; review noise complaint tracking and record keeping processes; and promote airport compatible land uses for properties near the airport. None of these items are analyzed in any meaningful way in the proposed Master Plan[8] before you and clearly not analyzed in the same manner and depth as onsite impacts.

Clearly the FAA envisioned an airport sustainability master planning process to include examining offsite impacts and recommending changes to improve sustainability for those impacted by aviation activities. Other airports have included in their sustainability master planning process detailed analysis and recommendations to further mitigate offsite impacts.

For example, the 2012 Fresno Yosemite plan has as stated goals:

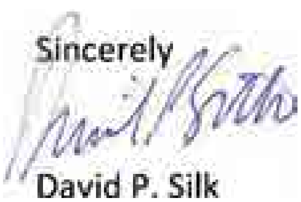
- "Noise Goal: Minimize disruption on the community from noise generated by airport activities."
- "Surface Transportation Goal: Reduce vehicle miles traveled by passengers and employees"

Each of these goals includes sub-goals and an analysis of the effectiveness of existing programs, identification of areas of improvement and action items with timelines to meet the stated goals. This demonstrates that a credible airport master plan premised on sustainability cannot ignore setting goals and making recommendations relative to offsite impacts like traffic and noise. Yet that is what is what has occurred with the master planning process undertaken here.[9]

Last June, the City authorized spending in excess of $825,000 (Order 295-14/15) for a Jetport "Update Master Plan." At that time FAA guidance on the scope of sustainability master planning was well known. Yet the resulting product is not consistent with the FAA guidance, with similar airport sustainability analysis, and most importantly, with the master planning process used in the City.[31]

If the City is serious about sustainability, including mitigating negative impacts on sustainability created by City owned property, then you should vote against the adoption the draft update MP before you. Instead, you should insist that the Jetport include in its proposed master plan a sustainability analysis of offsite impacts created by Jetport operations, similar and scope and depth to the onsite analysis, and articulate goals and priorities to reduce those impacts, so as to address and improve offsite sustainability.

Thanks you for considering my comments as you undertake a review of the proposed master plan.



Enclosures

David P. Silk
1187 Westbrook Street
Portland, Maine 04102-1928
207 653 5144

June 7, 2016

Steven G. Benson
COFFMAN ASSOCIATES, INC.
237 N.W. Blue Parkway, Suite 100
Lee's Summit, MO 64063

Re Portland International Jetport: Draft Master Plan

Dear Mr. Benson:

I am responding to your letter to me dated March 28[1]h. I found some of your comments helpful but thought you did not address all of my comments. Here is what I find lacking in your response:

1. Goals and Objectives:

I did not see confirmation from you one way or the other whether the MP is intended to become part of the City's Comprehensive Plan and intended to guide the Jetport's overall development for the next 20 years.[2]

You explained that the primary purpose of the MP is to incorporate sustainability principles in addressing aviation demand and airport operations. You then say the resulting plan will benefit all residents of the area because it will support and balance aviation activities and environmental preservation of the surrounding area. I think the MP should be more specific and include as a bullet-point that identifies as a plan purpose "supports and balances aviation activities and the habitability of the surrounding environs, including those neighborhoods that immediately abut Jetport operations, Historic Stroudwater in Portland and Redbank in South Portland."[3] Why not make this clear?

My chief complaint with the draft MP process is that it provides an exhaustive inventory and review of internal Jetport operations and practices, with an eye toward improving sustainability. But the analysis stops at the Jetport boundary. The draft MP does not provide the same rigorous analysis with respect to examining sustainability offsite.[10]

For example, numerous pages in the draft MP are devoted to analyzing the energy consumption of existing vending machines and providing detailed recommendations on ways to improve the energy consumption of the vending machines. That is all to the good. But there should be an equal if not greater level of analysis devoted to analyzing offsite impacts created by aviation activities, examining the effectiveness of any existing efforts to mitigate those impacts and providing recommendations on ways to improve the mitigating efforts. As an MP set to govern Jetport goals and improvements over the next 20 years, it baffles me why no such analysis has been performed. Those impacts- which include air pollution, noise, lighting, traffic, and water pollution[11]– have a far greater impact on the surrounding area then reducing the energy consumption of vending machines. Without that inventory and analysis, I question how the draft MP can serve as a guiding document for City comprehensive planning.

As an example, recently the Jetport announced at a meeting of the Portland Jetport's (PWM) Noise Advisory Committee that Southwest Airlines is scheduling a 5:15am departure from PWM starting in June. The proposed early morning departure contravenes PWM's FAA-approved Noise Abatement Policy establishing hours of non-scheduled commercial air traffic from 11:30 pm to 6:15 a.m. the following morning. While all involved know this policy is not an outright ban on commercial flights, it is a very important component on sustainability for the surrounding environs. There is no analysis whatsoever in the draft MP on the impact off site of changing the Noise Abatement Policy. There is no analysis whatsoever of the effectiveness of the present Noise Abatement Policy. There is no analysis whatsoever of ways that it can be improved as part of the balancing of aviation activities with sustainability.[14]

The obvious intent of the Noise Abatement Policy is to preserve nighttime peace for the airport's abutting neighborhoods, including the Stroudwater neighborhood of Portland, by not actually scheduling flights during these overnight hours. PWM is located in the City beside Portland's largest and oldest National Historic District (Stroudwater Village), across the Fore River from another Historic District in Portland's Western Promenade neighborhood, and beside yet another smaller Historic District in the Brick Hill section of South Portland.

Each of these Historic Districts is a vibrant residential neighborhood impacted by air traffic noise, other airport and motor vehicle noise, light, and general traffic congestion. If a flight departs at 5:15 am, the Jetport opens and gears up for departing passengers a couple hours before departure thereby eroding noise policy protections created for these neighbors by the Jetport. It creates a wider window for noise and traffic and their impact on offsite sustainability nowhere analyzed or discussed in the draft MP.

Also recently the surrounding areas learned of a recent change in the interpretation of the Noise Abatement Policy regarding Preferential Use of Runway 11/29 that will significantly and negatively impact surrounding areas. Until recently, most of us understood Preferential Use of Runway 11/29 portion of the Noise Abatement Policy as directing all air traffic (that can be safely routed there) to the east-west runway. This interpretation was part of language of the Jetport's noise policy submitted to the FAA for approval some 25 years ago, and contemplated the tower providing the noise sensitivity advisory to all commercial and/or jet traffic intending to use 18/36, regardless of the time of day of the intended use of 18/36. Now it appears that the Tower Chief understands that non-commercial aircraft are not subjected to the noise sensitivity advisory even when air traffic can be safely routed there. What is the impact on offsite sustainability created by this new interpretation and if not positive, what steps can be taken to improve sustainability through revisiting the scope of the noise sensitivity advisory?[15]

The draft MP should examine the impact of the change and make recommendations if any to reduce the impact from the change. The change certainly weakens the notion that the Jetport is taking all reasonable steps to educate aircraft operators about the noise sensitivity advisory for all commercial and/or jet users of 18/36 and diminishes the effectiveness of the Preferential Use of Runway Policy for 11/29 (when safe to do so), which again was intended to lessen the impact of noise on surrounding residential neighborhoods.

Both of these changes are not mentioned in the draft MP. They both have a far greater impact on sustainability then improving energy consumption of vending machines.

2. **Sustainability:**

There is lacking meaningful discussion on sustainability in the draft MP with regard to the impact from airport operations on abutting neighborhoods.

(a) **Traffic:** Your response suggests only that there will be less traffic demand than anticipated. My point was regardless of the level of demand, there should be the same level of inventory, analysis and recommendation on what steps can be taken over the next 20 years to lessen the impact of the Jetport generated traffic which will improve sustainability for those areas through which the traffic passes.[24] The draft MP doesn't undertake such an analysis in any meaningful way.

For example, the draft MP mentions improvements to certain intersections have been recommended. What is the status of effectuating those improvements?[25] I did not see that covered m your response.

It also mentions a draft Traffic Demand Management plan ("TDM") from 2009 that apparently is still in draft form. Why six years later is the TDM plan still in draft form? What is the status of the Draft TDM?[26] I did not see that covered in your response.

I understand that enplanements in the near years will be lower than projected back in 2009 and how that will impact traffic. However, from a sustainability view, regardless of the number of enplanements, the questions I asked focused on reducing trips and the actual adoption of the TDM, assignment of responsibility for the implementation and oversight of the TDM, review of and identification of steps taken to reduce vehicle trips per day on Congress Street (signage for example)[27] as that street is at capacity at times, identification of the intersections to be improved and at what cost, and a timeline for the those improvements to be aired and implemented.

Your response did not address the fact that the draft MP does not address what the airport has done with the money set aside for traffic improvements as a condition imposed on the terminal expansion. Has that money been spent and if so on what projects and what is the present baseline?[28] Any sustainability analysis of traffic should include the offsite impacts of traffic generated at the airport regardless of the level of enplanements. In other words, I do not see reducing enplanements as the strategy to improve off site sustainability.

(b) Noise: You say with little empirical support that the Jetport is "proactive" in the area of noise and water quality and that the best place to register concerns on noise is with the Noise Advisory Committee.[16] I think you have this wrong. If the MP is to serve as a guide, then the draft MP should be analyzing the effectiveness of the existing means by which noise is addressed and providing recommendations as to how noise impacts can be lessened

Again I see mention of (Ch. 3, page 6) but no analysis of the effectiveness of present noise abatement processes or discussion of areas of improvement. Apparently this is to be "further evaluated" (Ch. 3, page 71) as part of "a subsequent task in the sustainability master planning process."[17] You did not address my request that you provide details of this master planning process. Will there be one or is this a misnomer?

The MP at a minimum should have as goals where the airport wants to be in 20 years on minimizing noise impacts on surrounding neighborhoods. There is the claim that the present noise program is "robust" but no data to back up the claim.[18] I am not aware of any survey or engagement with those immediately impacted by noise to see if those impacted by noise share your view that the present program is "robust."

For example, since my earlier letter, I learned that calls to the Noise Hotline answering machine are not even monitored and that a "noise incident" is not considered an incident unless 10 emails are received for the same incident. Much like you analyzed the energy efficiencies of vending machines, I would expect you would analyze the effectiveness of this reporting system, determine to what extent those impacted by noise are aware of the reporting requirements, and make recommendations to improve on this system.[19] Are these best practices to achieve offsite sustainability? Is there as much transparency as possible?

You made no comment on my observations that other airports offer on line data on noise complaints and have on staff a person whose job description includes handling and responding to noise issues. I do not see any such responsibility assigned as part of the organizational chart contained in the draft MP.[20] You did not address this issue, how the lack of designation may impact sustainability offsite and whether the Jetport should have as a goal to include within its organizational chart a point person on offsite sustainability?

You mention FEDEX as operating larger quieter aircraft but you make no mention ofthe number, frequency and timing of the smaller noisier aircraft that serve as contractors to FEDEX and how those aircraft impact off site sustainability.[21] You only looked at half the equation in other words and as such offered an incomplete response.

In short, your response confirms that as part of this MP process there is no intent to inventory the effectiveness of and make recommendations on improvements to noise abatement procedures and practices presently in place even though the impact of noise on sustainability is very high.[22]

(c) **Joint Planning:** You comment on the past coordination practice and that the SAMP process has included South Portland and others. That is all good.

But as a document intended to govern the future, the points I made (to which you did not respond) addressed the future, such as whether improvements could be made to the joint planning process. I mentioned I saw in the draft MP no mention or discussion of future land use needs of the airport over the next 20 years with both the City and the City of South Portland. Should that portion of Johnson Road located within South Portland be further developed with uses unrelated to Jetport uses (e.g., State office buildings) and if not, what goals or objectives are there to address rezoning the area along Johnson Road? What efforts if any should be undertaken to coordinate airport related development with the City and the City of South Portland?[32] Not to sound like a broken record but if the MP is intended to serve as a planning guide for the next 20 years, there is no reason not to identify and set goals on joint planning.

(d) **Portland Trails:** I had mentioned that expanding the trial network throughout the City is an existing Comprehensive Plan goal. I visited Pease in Portsmouth and saw recently built bike paths running alongside and in front of runways (separated by fencing). Again as a goal setting plan, the draft MP should place on the City and the Jetport the goal of exploring a perimeter trail that takes advantage of the spectacular river front. In the area of sustainability (or elsewhere in the draft MP) I see no mention of exploring over the next 20 years with Portland Trails the possibility of extending the trail along some or all of the Jetport property along the Fore River. As a City owned facility, focused on sustainability, the airport should have as a MP goal over the next 20 years to examine and explore the possibility with Portland Trails of extending the trail network along some or the entire waterfront airport periphery.[33] The City and the Jetport should be proactive to see if this can happen and it should be a specific goal of the MP. You apparently do not even want it mentioned in the MP. That is not consistent with sustainability and City wide goals.

3. **Omission of any mention of the Stroudwater Historic District and Tate House from the MP:**

It is good to see that the omission of the Stroudwater Historic District and the Tate House from the map of nearby historic structures will be corrected. Unfortunately, I see little in the draft MP that recognizes as part of the sustainability analysis the existence of these areas abutting the Jetport property.[34]

The National Historic Preservation Act of 1966, Section 106, as amended ("Section 106"), requires federal agencies to take into account the impacts of their undertakings on historic properties, whether those impacts are by physical destruction or introduction of incompatible visual, atmospheric or audible elements. The Jetport trough the FAA uses federal funds all the time. The Stroudwater Historic District abuts the airport and the Tate House is located less than 1000 feet from the edge of the RPZ for RW 18-36.

Correcting the map does not correct the greater problem I see in the draft MP. There is no analysis of the impact of Jetport operations, noise and light, fuel disbursement, and air traffic patterns on these areas, no base line inventory in other words.[12] Nor is there any discussion in the draft MP on what steps the airport can take to minimize those effects. Without such an inventory it is not possible to identify goals over the next 20 years to reduce the impacts. This should not be ignored.

I had asked whether anyone at Coffman Associates has any particular expertise in looking at impacts of airport operations on historic districts and on Section 106 reviews. I did not get any response.[35]

In Chapter 5, there is a listing of airport development objectives. Again no mention is made of any objective for the airport to work with the immediate neighborhoods to monitor and continually look for more effective ways to lessen the impact the airport creates. There is no mention that the airport borders an historic district.[4]

Also I saw no response to my observation that a future-oriented Master Plan could be expected to reference the sensitive environmental urban locus of PWM located on a riverfront with facing promontory that tends to focus noise back onto the river, which itself is uniquely conditioned to carry noise longer distances. Further, a forward-focused MP I would expect to mention the impending jet (and airplane) emissions regulations now being formulated by the FAA and consideration of making available new fuel sources that will reduce harmful emissions.[13]

In sum, even with the comments you make, I remain of the view the draft MP falls short on those aspects of airport operations that immediately impact abutting neighborhoods. I fail to see in the draft MP any goal of the Jetport to review and improve on minimizing offsite impacts like noise, emissions and traffic and improving sustainability with trails. The MP should have the same level of detail for offsite impacts (inventory, effectiveness and recommendations for improvement) as you provide for onsite aviation activities. Otherwise the draft MP falls far short of creating a comprehensive planning document for sustainability both on and offsite for the next 20 years.

Sincerely,

David P. Silk

cc: Hon. Ethan Strimling, Mayor, City of Portland
Jeff Levine, Director of Planning and Urban Development, City of Portland

Jon Jennings, City Manager, City of Portland
Deb Andrews, Historic Preservation, City of Portland
Dan Koloski, Stroudwater Village Association
Ralph Carmona, Tate House
Tom Jewell, Portland Trails
Elizabeth Hoglund
James Robbins
Andrea Hawkes
Roger Hinchliffe
Thomas Ainsworth
Charlton Smith, River's Edge

---------- Forwarded message ----------
From: <roger@amanofhiswords.com>
Date: Wed, Jun 8, 2016 at 4:55 PM
Subject: Jetport Master Plan ignores the surroundings
To: estrimling@maine.rr.com, jpj@portlandmaine.gov

Hi Ethan and Jon,

I've read the Coffman Jetport Master Plan and seen Dave Silk's comments, and can only concur with Dave.
The "MP" in effect ignores a long series of issues which are vital to the neighborhoods surrounding the airport, and this makes the MP in its present form totally unacceptable to us and the City of Portland.

PLEASE read Dave Silk's comments, and make sure that these matters are addressed before this MP can be approved.

Thank you for your attention.

Sincerely,

Roger Hinchliffe
Stroudwater Village Association
1221 Westbrook Street
207 775 7501

---------- Forwarded message ----------
From: **Thomas Ainsworth** <tainsworth@atrlaw.pro>
Date: Friday, June 10, 2016
Subject: Draft Jetport Master Plan Update
To: "estrimling@maine.rr.com" <estrimling@maine.rr.com>, "jpj@portlandmaine.gov" <jpj@portlandmaine.gov>
Cc: "dan.koloski@gmail.com" <dan.koloski@gmail.com>, David Silk <DSilk@curtisthaxter.com>, "charltonsmith@mac.com" <charltonsmith@mac.com>

To the Honorable Ethan Strimling, Mayor
City of Portland, Maine

Jon Jennings, Manager
City of Portland, Maine

Dear Mayor Strimling and Manager Jennings:

The City Council has scheduled a workshop session next Monday on the Jetport's Master Plan Update. While I do appreciate no comment from the public will be permitted at that time, I want to underscore the message you have received from other letter writers (David Silk and Carl Smith) expressing concern about the incompleteness of that document in its current form. The Master Plan process as outlined in Federal Regulations envisions assessment of the sustainability of an airport and its surrounding communities. As is evident from the current draft Master Plan Update, there is an unexplained dearth of analysis of the impact of the Jetport operations and projected growth on the surrounding communities. Indeed, there is little if any analysis of Jetport operations in the present "down" air travel market conditions, and even less of the community impact analysis of increased Jetport operations forecast in the Master Plan draft.

Please defer any formal action on the draft submission pending completion of the impact analysis of future growth projections (in the draft report already) on the liveability of surrounding communities, precisely because those communities will live with those impacts for the 20-year plus life of the Master Plan update. Having already addressed the quality of experience of the air traveler using the Jetport as evidenced by a recent award presented to the airport, it is now appropriate to address the quality of experience of the communities who live with the Jetport impacts all day, every day.

Sincerely,
Tom Ainsworth
12 Garrison Street Extension
Portland

Sent from my iPad

RESPONSE TO DAVID SILK'S COMMENTS

Comments relating to Master Plan goals, process,

1. A master plan is intended to guide development activities into the future. It does that by first inventorying and reviewing existing conditions. Then it articulates goals, for example, where do we want to be in 2030. Then based on those goals it identifies and priorities strategies to achieve those goals.

   The master plan is indeed intended to guide development activities into the future as stated. The process includes taking an inventory of current facilities, forecasting traffic into the future, identifying the challenges between current inventory and the needs to meet future capacity. Alternatives are considered, financial and environmental considerations are made and a final airport layout plan is created which will serve as the template for the FAA to fund future improvements. These improvements are often initiated based on safety, preservation maintenance, planning thresholds, or end of useful life. They are not necessarily at management discretion or specific goals.

   The primary focus of this Master Plan, as with all FAA-funded Airport Master Plans is on safety and capacity. It is a Sustainable Airport Master Plan, not a line item Sustainability Plan. The FAA selected the Jetport based upon its history of green initiatives including a LEED Gold terminal expansion, and implementation of a Voluntary Airport Low Emissions (VALE) grant for our geothermal system to engage in a Sustainable Airport Master Plan. A goal of this document is to lay the groundwork for consideration of sustainability within the context of an Airport Master Plan.

   The master plan discusses its goals and objectives in the Introduction. Later in the report, specific goals related to each sustainability category are established. These are made available to the public within the report. The Airport Master Plan should not be confused with two other planning-related documents eligible for FAA funding that a specifically designed to evaluate environmental impacts and recommend mitigation for significant impacts. Environmental documentation and approval under the National Environmental Policy Act (NEPA) is required of every federally-funded project prior to funding. The NEPA process may set forth certain actions to mitigate significant environmental impacts to below the established threshold of significance. In addition, CFR 14 Part 150 establishes the process for documenting noise exposure and land use compatibility, then, if necessary, establishing a suitable noise abatement plan.

2. I did not see confirmation from you one way or the other whether the MP is intended to become part of the City's Comprehensive Plan and intended to guide the Jetport's overall development for the next 20 years.

   At this time the City does not intend to make the Airport Master Plan a part of the City's Comprehensive Plan. This said, the determination of whether or not the Airport Master Plan is adopted as part of the City's Comprehensive Plan is the City's decision. It is not a requirement of the FAA or a part of the Sustainable Airport Master Plan Scope of Services.

   The first page of the Introduction states, "The airport master plan will provide systematic guidelines for the airport's overall development, maintenance, and operations for the next twenty years."

3. I think the MP should be more specific and include as a bullet-point that identifies as a plan purpose "supports and balances aviation activities and the habitability of the surrounding environs, including those neighborhoods that immediately abut Jetport operations, Historic Stroudwater in Portland and Redbank in South Portland."

   Opinion noted. Please refer to the response to comment #1.

   The Master Plan fully recognizes the historic neighborhood of Stroudwater as well as the Redbank neighborhood in several locations throughout the report.

   On the second page of the introduction, the Master Plan states, "As a result of incorporating sustainability issues into the master planning process, the airport can become a more environmentally friendly business place and neighbor. The plan will benefit all residents of the area by providing a single comprehensive plan which supports and balances aviation activities and the environmental preservation of the surrounding environs." Special recognition for the closest neighborhoods has been added with the following sentence: "This includes but is not limited to the immediately adjacent neighborhoods of historic Stroudwater in Portland and Redbank in South Portland."

4. In Chapter 5, there is a listing of airport development objectives. Again no mention is made of any objective for the airport to work with the immediate neighborhoods to monitor and continually look for more effective ways to lessen the impact the airport creates. There is no mention that the airport borders an historic district.

   While the objectives may be broader than Mr. Silk desires, the final three in the list that he cites are:

- *To ensure the future development is environmentally compatible and technically feasible,*
- *To develop a balanced facility that is socially and politically feasible.*
- *To incorporate a public involvement program and provide for an appropriate level of public involvement.*

Comments relating to offsite impacts

5. The focus of the Jetport draft MP is on sustainability of its internal operations. Mr. Bradbury acknowledged before the Standing Committee on Energy and Sustainability that the draft MP does not really address sustainability of Jetport operations outside its footprint

The Sustainable Airport Master Plan focuses on the operations and practices that the Jetport can control. The benefits of the Jetport's sustainability extend beyond its boundaries. The value of waste management and recycling at the Jetport is the reduction of waste in local landfills, which can impact local groundwater and aquifers, contaminate soil, and produce methane (a greenhouse gas). Energy conservation reduces the use of non-renewable energy supplies, but also reduces air emissions. The same is true for sustainable practices in ground access and transportation, with the added benefit of reducing airport-generated traffic on Congress Street, which runs through the Stroudwater community.

As noted in the Introduction to the master plan: "As a result of incorporating sustainability issues into the master planning process, the airport can become a more environmentally friendly business place and neighbor. The plan will benefit all residents of the area by providing a single comprehensive plan which supports and balances aviation activities and the environmental preservation of the surrounding environs."

Although the development and sustainability initiatives are certainly focused within the Jetport footprint; most if not all the sustainability categories extend beyond the boundaries of the airport. Goals to reduce greenhouse gas emissions, conserve energy, and utilize renewable energy provide sustainability benefits beyond the airport's boundaries. Admittedly, the categories of noise and water quality were not prioritized categories in this master plan. That was simply because the Jetport already dedicates substantial resources to ensure that it mitigates its impacts regarding noise and water quality to the greatest extent practicable.

The Jetport has and will continue to improve protections on the quality of water leaving the facility through collection and treatment of stormwater, as well as the collection and recycling of glycol. The Jetport has conducted a CFR 14 Part 150 Noise Compatibility Study and maintains a Noise Advisory Committee, which provide a higher degree of focus *on noise than could be provided through the master plan process.*

6. By not considering offsite impacts and identifying strategies to improve offsite impacts, the proposed Master Plan cannot serve as a useful guide for future development. It is prepared as if the Jetport exists in a vacuum.

   An airport's master planning documentation focuses on guiding "future airport development that will cost-effectively satisfy aviation demand, while considering potential environmental and socioeconomic impacts." – FAA Advisory Circular 150/5070-6B Airport Master Plans.

   The Jetport's Master Plan satisfies the intent of the FAA's Advisory Circular on Airport Master Plans, particularly in its consideration of environmental and socioeconomic impacts. Though the Master Plan's primary focus is the airport's on on-site development, it considers off-site impacts in the planning process. The sustainability component of the Master Plan considered sustainability criteria in the decision making process, particularly with regard to alternatives selection and the prioritization of sustainability-focused actions. The alternatives selection process focused on consistency with the plan's sustainability goals and objectives, and the sustainability action prioritization exercise looked at an action's potential to enhance air quality and human health, regional economic benefit, and natural resources (including water quality protection). Further, the Master Plan emphasizes future external stakeholder engagement, which will present opportunities to have open, two-way communications between the Jetport and its stakeholders to address ongoing and new concerns.

   An increased emphasis on noise and water quality has been incorporated into the Master Plan, including additional recommendations such as identifying noise-generating mechanical equipment that can be located/relocated away from residential areas and the installation of additional natural "green" infrastructure to control and treat stormwater onsite. Noise and water quality have also been added to the Jetport's annual sustainability reporting.

   In addition, each project associated with the Recommended Master Plan Concept will go through the regulatory process; they will be subject to additional review under the National Environmental Policy Act (NEPA) where natural resources, economic, and social effects will be identified and steps will be taken to avoid and minimize any negative effects.

7. Yet the draft MP does not undertake any meaningful analysis examining and recommending steps the Jetport can take to improve the sustainability areas offsite

impacted by its activities.

Please refer to responses to comments #5 and #6.

The Master Plan internalizes sustainability within the Jetport's organization, through tools and reporting mechanisms, so that sustainability principles become commonplace in its decision-making - not an afterthought. This lays the foundation for the infusion of sustainability into the Jetport's day-to-day operational processes and administrative procedures, for example its capital improvement program. This infusion will ensure the consideration of environmental and social concerns inclusive of the Jetport's local communities and their populations.

The Master Plan also lays out specific and timely sustainability goals, objectives, and targets, which will hold the Jetport accountable to reduce its environmental impact, improve its social and economic performance, and increase operational efficiency. The Master Plan includes sustainability-focused actions tailored to help the Jetport meet these goals, objectives, and targets, as well as metrics to assist the Jetport in measuring and reporting its related performance over time.

8. Numerous items listed related to analyzing and mitigating offsite impacts from noise, traffic, emissions, and lighting. As examples: reduce percentage of drop-off-pick/up activity by 15% to that is not the primary means of transportation to the airport by passengers; review local and regional transit connections and opportunities; identify opportunities to connect to City trail systems; review noise complaint tracking and record keeping processes; and promote airport compatible land uses for properties near the airport. None of these items are analyzed in any meaningful way in the proposed Master Plan

The sustainability-focused actions presented in the Master Plan represent potential strategies the Jetport can implement to achieve its high-level goals and more specific objectives, as well as to meet its measurable and timely targets. The Consultants in association with the Jetport and its stakeholders, have reviewed and prioritized these actions based on criteria that focus on feasibility, goal applicability, asset management, and estimated costs. Sustainability criteria also included estimated effects, which address several environmental factors (i.e., energy consumption and generation, local air quality and human health, GHG emissions reduction, water conservation, waste management and recycling, sustainable material use, and natural resources), the Jetport's ability to adapt to a changing climate, and several social factors (i.e., regional economic benefit, *customer and employee satisfaction, and safety).*

The identification and prioritization of these actions was followed by the creation of implementation plans that will assist the Jetport in putting these actions into effect. Proper implementation of many of the proposed sustainability-focused actions will require stakeholder engagement.

9. This demonstrates that a credible airport master plan premised on sustainability cannot ignore setting goals and making recommendations relative to offsite impacts like traffic and noise. Yet that is what has occurred with the master planning process undertaken here.

Please refer to responses to comments #5 and #6.

The Jetport's Master Plan specifies a high-level goal for the priority category of Ground Access and Transportation: "Enhance the efficiency of regional and local access to and from the Jetport with an emphasis on high-occupancy modes of transportation and parking infrastructure that meets the needs of the Jetport's users." It also specifies timely targets for this category, including the appointment of a transportation coordinator by 2017, and the identification of mode distribution of employees and passengers by 2018 and 2020, respectively.

Many of the goals and targets established for the priority sustainability categories relate to the reduction of offsite impacts. For example, mitigating the on-site generation of GHG emissions will also improve local air quality, and maintaining the Jetport's rate of recapturing and recycling of deicing fluid (approximately 70%) will continue to protect local water quality.

Although the Master Plan does not identify noise and water quality as priority sustainability categories, it includes their consideration in the baseline performance assessment (see Chapter 3, Baseline Assessment). In addition, the Consultants added these categories and related recommendations to the list of potential sustainability-focused actions and to the Sustainability Progress Report Template. Further, the Jetport's sustainability program is designed to be dynamic, allowing changes as it matures and as the context of the Jetport's operating environment evolves. The Jetport can further integrate noise and water quality, among other sustainability categories, to its sustainability framework in the future, as needed.

10. My chief complaint with the draft MP process is that it provides an exhaustive inventory and review of internal Jetport operations and practices, with an eye toward improving

sustainability. But the analysis stops at the Jetport boundary. The draft MP does not provide the same rigorous analysis with respect to examining sustainability offsite.

Please refer to responses to comments #5 and #6.

11. there should be an equal if not greater level of analysis devoted to analyzing offsite impacts created by aviation activities, examining the effectiveness of any existing efforts to mitigate those impacts and providing recommendations on ways to improve the mitigating efforts….. those impacts- which include air pollution, noise, lighting, traffic, and water pollution.

    Please refer to responses to comments #5 and #6.

    It appears that the commenter is perhaps confusing sustainability with the mitigation of environmental impacts under the National Environmental Policy Act (NEPA). To re-emphasize, the last paragraph in the response to comment #5 outlines that each recommended project in the master plan will be subject to the NEPA review and approval process. In addition, ***Appendix G*** *of the Master Plan provides an environmental overview. While not intended to replace the NEPA review, it is intended to provide a preliminary review of environmental issues within the NEPA environmental categories.*

12. There is no analysis of the impact of Jetport operations, noise and light, fuel disbursement, and air traffic patterns on these areas, no base line inventory in other words.

    Please refer to responses to comments #11.

13. Also I saw no response to my observation that a future-oriented Master Plan could be expected to reference the sensitive environmental urban locus of PWM located on a riverfront with facing promontory that tends to focus noise back onto the river, which itself is uniquely conditioned to carry noise longer distances. Further, a forward-focused MP I would expect to mention the impending jet (and airplane) emissions regulations now being formulated by the FAA and consideration of making available new fuel sources that will reduce harmful emissions.

    Nationwide, the FAA has been proactive in reducing the number of persons exposed to significant airport noise in proximity to airports by 95 percent, and improved fuel efficiency by 72 percent. The FAA's Continuous Lower Energy, Emissions, and Noise program is working with industry to develop technologies for the ultra-high bypass geared turbofan engine that enables a 25 EPNdb noise reduction relative to the Stage 4 noise standard while reducing fuel consumption by 20 percent. The CLEEN program is also involved in other technologies that reduce emissions such as the TAPS Combustor which reduces landing and takeoff nitrogen oxide (NO_x) emissions 55 percent below the most recent Committee of Aviation Environmental Protection (CAEP) standards, and *particulate matter PM 90 percent below ICAO's visibility smoke limit.*

It should be noted that the FAA has made these commitments to reduce air emissions, even though aviation's contribution comprises just 1.5 percent of air emissions from transportation sources.

The urban locus of PWM has benefited significantly from Congressional and FAA mandates and policies. As a recent example, over 1,100 Stage 2 business jets were forecast to operate at PWM in the 2007 Part 150 five-year forecast noise exposure contour. The phase-out of older/louder/less fuel efficient Stage 2 aircraft ordered by Congress and implemented by FAA was completed on December 31, 2015. Only new Stage 3 quieter, more energy efficient aircraft are allowed to fly into the Jetport and the contiguous United States. In addition, aircraft operations have declined significantly from a 2007 five-year forecast of 120,829 annual operations from the PWM Part 150 study to 69,300 forecast for 2035 in the Master Plan (42.6 percent). Therefore, the elimination of older/less fuel efficient Stage 2 aircraft and the sharp decline of total aircraft operations reduces the noise propagation down the Fore River and reduces the aircraft emission in Stroudwater and the rest of the Jetport's urban locus.

In recognition of the comments, additional information on these regulations and other FAA programs for mitigating noise and air emissions will be documented within the Sustainable Airport Master Plan.

Comments relating to noise

14. While all involved know this policy is not an outright ban on commercial flights, it is a very important component on sustainability for the surrounding environs. There is no analysis whatsoever in the draft MP on the impact off site of changing the Noise Abatement Policy. There is no analysis whatsoever of the effectiveness of the present Noise Abatement Policy. There is no analysis whatsoever of ways that it can be improved as part of the balancing of aviation activities with sustainability.

As recognized in the comment, there is not an outright ban on commercial flights between 11:00 pm and 6:15 am. As Stroudwater's representative on the Noise Advisory Committee, Mr. Silk understands that is prohibited by federal law. Rather, the Noise Abatement Policy calls for a voluntary compliance to avoid flights during the overnight hours.

The reductions in aircraft operations since the completion of the previous CFR 14 Part

150 Study have resulted in a reduction in noise. The noise exposure contours prepared for the 2009 Environmental Assessment confirmed that. In addition, the Jetport recorded 787 noise complaints in 2008 compared to 100 in 2013. Given these facts, the FAA specifically requested the preparation of new noise analyses be removed from the Master Plan Scope of Services.

The FAA primarily relies on the CFR 14 Part 150 Noise Study program to address the impact of noise and identify and evaluate alternatives to reduce impacts. Any recommendations or improvements to noise abatement procedures would be required to go through the Part 150 process to be approved by the FAA. Due to the decline in operations and the ongoing retirement of the noisiest jets since the Part 150, the 2009 Environmental Assessment (EA) for the Jetport found there were no persons living within the 65 DNL contour which is the threshold of significance regarding noise impacts. As mentioned in the previous letter to Mr. Silk, even the operations forecast for 2035 by the master plan are below the operations levels used in the noise analysis in the 2009 EA. Given lower operational levels combined with the continued evolution of a quieter mix of aircraft in the fleet, and the fact that the Jetport has a Noise Advisory Committee that meets on a regular basis, there is little to be gained from an evaluation of additional noise abatement procedures through this process. The Sustainable Master Plan, however, does recommend that the Noise Advisory Committee continue to monitor the situation, and at the appropriate time, may recommend to the City and its Airport Director an update to the Part 150 Study.

15. This interpretation was part of language of the Jetport's noise policy submitted to the FAA for approval some 25 years ago, and contemplated the tower providing the noise sensitivity advisory to all commercial and/or jet traffic intending to use 18/36, regardless of the time of day of the intended use of 18/36. Now it appears that the Tower Chief understands that non-commercial aircraft are not subjected to the noise sensitivity advisory even when air traffic can be safely routed there. What is the impact on offsite sustainability created by this new interpretation and if not positive, what steps can be taken to improve sustainability through revisiting the scope of the noise sensitivity advisory?

The first Part 150 for the Jetport was completed about 25 years ago, however, the Part 150 currently approved 2005 Study. In its Record of Approval Memorandum to the Jetport's Director on April 17, 2006, the FAA approved the Preferential Runway use measure as voluntary.

16. Noise: You say with little empirical support that the Jetport is "proactive" in the area of noise and water quality and that the best place to register concerns on noise is with the Noise Advisory Committee.

    The Noise Advisory Committee was established as the forum for registering noise concerns. Also please refer to responses to comments #5 and #6.

17. Again I see mention of (Ch. 3, page 6) but no analysis of the effectiveness of present noise abatement processes or discussion of areas of improvement. Apparently this is to be "further evaluated" (Ch. 3, page 71) as part of "a subsequent task in the sustainability master planning process."

    Please refer to responses to comments #1, #5, and #6.

18. The MP at a minimum should have as goals where the airport wants to be in 20 years on minimizing noise impacts on surrounding neighborhoods. There is the claim that the present noise program is "robust" but no data to back up the claim.

    Please refer to responses to comments #1, #5, and #6.

19. I learned that calls to the Noise Hotline answering machine are not even monitored and that a "noise incident" is not considered an incident unless 10 emails are received for the same incident…. I would expect you would analyze the effectiveness of this reporting system, determine to what extent those impacted by noise are aware of the reporting requirements, and make recommendations to improve on this system.

    Noise complaints are received and logged routinely via voice mail as well as webmail. All noise complaints are collected and reported to the Noise Advisory Committee at quarterly meetings. All complaints are treated the same with no "weighting" or "averaging".

20. You made no comment on my observations that other airports offer on line data on noise complaints and have on staff a person whose job description includes handling and responding to noise issues. I do not see any such responsibility assigned as part of the organizational chart contained in the draft MP.

    Noise complaint data is recorded and reported to the Noise Advisory Committee at its regular meetings. The same information made available to them is also available to the public on the Jetport's website in the Noise Advisory Committee meeting archive:

http://www.portlandjetport.org/noise

21. You mention FEDEX as operating larger quieter aircraft but you make no mention of the number, frequency and timing of the smaller noisier aircraft that serve as contractors to FEDEX and how those aircraft impact off site sustainability.

    Since the Part 150 Study was completed, FedEx has retired its fleet of Boeing 727-200 aircraft that served the Jetport at that time. It is currently operating the significantly quieter Boeing 757-200. The total air cargo jet operations have also declined from 1,579 in 2004 to 618 in 2015.

    The contractors who operate the smaller aircraft to fly priority packages to smaller community airports around Maine primarily operate the single engine turboprop Cessna 208. The Cessna 208 has a much smaller noise footprint than the 757. The commuter cargo operations are down from 2,819 to 2,474 in 2004.

    Overall air cargo operations at the Jetport totaled 3,092 in 2015 compared to 4,398 in 2004, a decline of over 28 percent. Over the next twenty years, the number of air cargo operations are expected to just reach the 2004 level, but with quieter aircraft.

22. In short, your response confirms that as part of this MP process there is no intent to inventory the effectiveness of and make recommendations on improvements to noise abatement procedures and practices presently in place even though the impact of noise on sustainability is very high.

    Please refer the responses to comments #5, #6, #19, #20, and #21.

Comments relating to surface traffic

23. The draft MP makes no effort to examine and set as goals ways to reduce traffic the Jetport generates. Per the draft MP the Jetport Traffic Demand Management plan has remained in draft form since 2009. No goal is even set for the adoption of the TDM plan.

    The Traffic Demand Management Plan (TDM) was adopted and is part of the site plan approval for the Jetport's most recent terminal expansion. The Master Plan does set goals and objectives as well as recommended actions for sustainable ground transportation and access.

24. regardless of the level of demand, there should be the same level of inventory, analysis and recommendation on what steps can be taken over the next 20 years to lessen the impact of the Jetport generated traffic which will improve sustainability for those areas through which the traffic passes.

From prior traffic studies it is understood that Jetport peak traffic times are significantly offset from the peak traffic times for the intersections around the Jetport. The morning bank from the Jetport is from 4:00 AM – 6:15 AM , and is well displaced from the peak morning traffic at these intersections which occurs from 6:45 AM – 8:00 AM. The Jetport is similarly offset from the evening peak of 4:00 PM to 6:00 PM, with its evening peak is from 10:45 PM – Midnight. These counts remain relevant with respect to Jetport traffic since passenger volumes are at the similar levels today.

The traffic study as part of the TDM found that less than 30 percent of the Jetport's traffic came to or from Congress Street west of International Parkway.

25. For example, the draft MP mentions improvements to certain intersections have been recommended. What is the status of effectuating those improvements?

It should be note that it is the responsibility of the Cities of Portland and South Portland to effectuate improvements to intersections along the Western Ave and Congress Street Corridors. The Jetport contributed funding for pedestrian improvements at the intersection of Westbrook St and Congress as part of the Terminal Expansion site plan approval. Additionally, the Jetport made improvements to Skyway Drive by adding a right hand turn lane from Skyway drive to the northbound I-95 on ramp.

26. It also mentions a draft Traffic Demand Management plan ("TDM") from 2009 that apparently is still in draft form. Why six years later is the TDM plan still in draft form? What is the status of the Draft TDM?

Please refer to the responses to comments #23 and #24.

27. the questions I asked focused on reducing trips and the actual adoption of the TDM, assignment of responsibility for the implementation and oversight of the TDM, review of and identification of steps taken to reduce vehicle trips per day on Congress Street (signage for example)

Please refer to the responses to comments #23 and #24.

The Master Plan incorporates several sustainability-focused actions into its Master Plan to reduce Jetport-generated vehicle trips, including, but not limited to, promoting ridesharing among employees and encouraging passengers/visitors and employees to use existing bike and walking paths connected or adjacent to the Jetport. It also includes a target to appoint a transportation coordinator by 2017, who will oversee the implementation of these and related future actions.

28. the draft MP does not address what the airport has done with the money set aside for traffic improvements as a condition imposed on the terminal expansion. Has that money been spent and if so on what projects and what is the present baseline?

These funds were disbursed to the City as required under the site plan approval conditions for the terminal expansion.

Also please refer to the response to comment #25.

Comments relating to FAA initiatives and guidance

29. As an example, draft makes no reference to the FAA's initiatives on reducing harmful emissions that impact both air and water. Given the Jetports location, it escapes me why the master plan does not have as a goal for the Jetport to be at the forefront of FAA's initiatives.

One of the key sustainability goals of the Master Plan is to reduce of greenhouse gas (GHG) emissions associated with the Jetport's operations, as well as from the operations of its business partners (e.g., airlines and other tenants). A reduction in GHG emissions is most often accompanied by a reduction in other, more localized air pollutants. This includes the six criteria pollutants that the Clean Air Act identifies and requires the U.S. Environmental Protection Agency to set standards for (i.e., National Ambient Air Quality Standards). For example, in addition to reducing GHG emissions, a reduction in vehicle miles traveled that could result from encouraging employees to use alternative forms of transportation (i.e., other than single-occupancy vehicles) in their daily commutes, as the Master Plan proposes, would reduce the localized emission of air pollutants such as particulate matter, nitrogen oxides, and carbon monoxide.

The Jetport has already implemented a number of actions aimed at reducing GHG emissions and improving local and regional air quality. One such action is the installation of ground power at the majority of loading bridges at the passenger terminal. This affords aircraft with the opportunity to plug into 400-hertz power, reducing the need *to utilize on-board auxiliary power and diesel-powered portable ground units.*

The Jetport operates under Maine's Multi-Sector General Permit for Stormwater Discharge Associated with Industrial Activity (MSGP) Permit Number MER05B838. As a requirement of this permit, the Jetport prepared and abides by a stormwater pollution prevention plan (SWPPP) that addresses sources of potential pollution and presents/describes practices to minimize and control pollutants. The Jetport goes beyond compliance in its protection of local/regional water quality. For instance, it has a state-of-the art deicing management facility, operated by Inland Technologies, that recaptures and recycles approximately 70 percent of aircraft deicing fluid. This facility will soon have the capability of processing spent fluid into reusable Type I aircraft deicing fluid.

The Master Plan suggests other ways the Jetport can mitigate its potential to impact local water quality such as reducing onsite stormwater volume through rainwater harvesting.

The Jetport reviewed and prioritized the sustainability-focused actions in the Master Plan using the Sustainability Action Evaluation Tool. This process included consideration of air quality and human health, as well as natural resources (including water quality protection). The Jetport will be able to use this tool in the future as other sustainability actions are suggested, or to evaluate the environmental and social effects of other projects

30. Other airports are actively exploring the use of solar electrical generation facilities located either on the buildings and garages existing or planned or in other areas of open space. Yet the Master Plan omits any mention of exploring the development solar energy.

One of the candidate sustainability actions evaluated and presented within the Master Plan was as follows: "Support the development of an onsite solar power purchase agreement to increase the Jetport's consumption of renewable energy. - Supporting a solar power purchase agreement (PPA) would enable the Jetport to increase the percentage of renewable power consumed. Solar PPAs also typically offer reduced electricity rates compared to traditional power sources. - Note: The City of Portland recently put out a Request for Proposals for a Solar PPA at municipal properties, including the Jetport. It did not receive responses for the Jetport due to glare concerns and the associated installation costs. The Jetport considers this a long-term opportunity, as conditions and costs may change."

As noted in the response to comment #29, a key goal of the Master Plan is to reduce GHG emissions. Often this can best be accomplished through reductions in overall energy consumption. Many options are proposed for energy reductions within the *master plan including: updates of site lighting to LED, improvements to HVAC systems, building supplied preconditioned air for aircraft, etc.*

31. At that time FAA guidance on the scope of sustainability master planning was well known. Yet the resulting product is not consistent with the FAA guidance, with similar airport sustainability analysis, and most importantly, with the master planning process used in the City.

    The FAA issued interim guidance on incorporating sustainability within a master plan (or as a stand-alone document) in May 2010. The Jetport's Master Plan conforms to this guidance. Accordingly, sustainability was a "core objective" of the planning process, initiated from the very beginning and carried through to the end. FAA's guidance directs sustainable master plans and stand-alone sustainable management plans to include six components, all of which the Jetport's Master Plan contains. These six components include:

    1. *A written sustainability policy or mission statement;*
    2. *Defined sustainability categories (specific categories not prescribed, but should be tailored to the specific operational and environmental context of the airport);*
    3. *A baseline inventory of performance for each chosen sustainability category;*
    4. *Measureable sustainability goals;*
    5. *The identification and description of a range of specific sustainability initiatives; and*
    6. *Public participation and outreach.*

    The FAA's interim guidance on incorporating sustainability into master plans is available at https://www.faa.gov/airports/environmental/sustainability/media/interim_guidance_sustainable_master_plan_pilot.pdf.

Comments relating to Land Use

32. I saw in the draft MP no mention or discussion of future land use needs of the airport over the next 20 years with both the City and the City of South Portland. Should that portion of Johnson Road located within South Portland be further developed with uses unrelated to Jetport uses (e.g., State office buildings) and if not, what goals or objectives are there to address rezoning the area along Johnson Road? What efforts if any should be undertaken to coordinate airport related development with the City and the City of South Portland?

33. I see no mention of exploring over the next 20 years with Portland Trails the possibility of extending the trail along some or all of the Jetport property along the Fore River. As a City owned facility, focused on sustainability, the airport should have as a MP goal over the next 20 years to examine and explore the possibility with Portland Trails of extending the trail network along some or the entire waterfront airport periphery.

The Master Plan does propose pursuing a bike-sharing program with connections to the Jetport. The expansion of Portland Trails to the Jetport, particularly the extensions of Stroudwater Trail, Fore River Trail, and Fore River Parkway Trail, would support this action. However, land use restrictions around the Jetport will constrain the potential for trail extensions/expansion. The Jetport is open to working with Portland Trails to see what connections are practicable.

34. It is good to see that the omission of the Stroudwater Historic District and the Tate House from the map of nearby historic structures will be corrected. Unfortunately, I see little in the draft MP that recognizes as part of the sustainability analysis the existence of these areas abutting the Jetport property.

The Jetport recognizes that historic preservation is inherently sustainable, as historic buildings contribute to the unique character of a community and the greenest buildings are often the ones that already exist. As in the past, the protection of proximate historic resources, including properties in the Stroudwater Historic District and the Tate House, will be a consideration that the Jetport will incorporate into its environmental reviews for projects subject to the National Environmental Policy Act (NEPA) and Department of Transportation Section 4(f). Further, the Master Plan emphasizes future stakeholder engagement, which will present the opportunity to discuss other protections, including those related to Jetport operations and projects not involving federal funds or approvals.

35. I had asked whether anyone at Coffman Associates has any particular expertise in looking at impacts of airport operations on historic districts and on Section 106 reviews. I did not get any response.

Having prepared over 200 NEPA Environmental documents for airports across the United States, Coffman Associates is well versed in Section 106 Reviews. Such a review would be undertaken as part of the environmental approval project for the various recommended projects in the master plan.

---------- Forwarded message ----------
From: Jon Jennings <jpj@portlandmaine.gov>
Date: Sat, Jun 11, 2016 at 12:23 PM
Subject: Fwd: Jetport Master Plan ignores noise
To: Paul Bradbury <pbb@portlandmaine.gov>

---------- Forwarded message ----------
From: raeleneg <raeleneg@maine.rr.com>
Date: Friday, June 10, 2016
Subject: Jetport Master Plan ignores noise
To: jpj@portlandmaine.gov
Cc: estrimling@maine.rr.com

Gentlemen,

In am a resident of the Rivers Edge neighborhood in Stroudwater. My house abuts Congress St. and I have lived there since 2004. Almost 16 years.
Until the last 6mos I had never really noticed air traffic noise. Negligable.[36]
I began to notice an increase in air traffic noise last fall.[37] First thing in the morning. Terrific. I can even feel it in the shower. Like a freight train rumbling through.
I attended a jetport meeting and asked the Manager about it. He said nothing had changed- which is just not true- and to keep track of the days and times. I did for a while but its daily occurrence.[38]
I am extremely concerned about the value of my property if this continues.
After reading the Jetport Master Plan I see that there is no defined provision to address this or prevent an increase in noise.[39] They want to respect their neighbors but are not willing to back up their commitment.
Once again, citizens have to pay big money to fight for existing rules to be upheld. We just went thru this with Verizon and I am tapped out. These big companies are rolling over our neighborhoods because most of us don't have the resources and/or time to fight them. And the zoning board and our councilor did not stand up for us against Verizon. Talk about David and Goliath and the city piled on with Goliath. One lone zoning board member held out for us. We filled the hearing room, we emailed the zoning board and we had a legal case but It made no difference. It was an embarrassment of total disregard for constituents. And we spent well over $30,000. Why does this keep happening?
It's all about money and rarely about community anymore.
I can see that the jetport wants to grow but it will destroy our historic neighborhood in the long run. People won't want to live here.
Please help us and protect our interest.
Thank you.

Raelene Gardner
22 Heritage Court
Stroudwater

Sent from my U.S. Cellular® Smartphone

RESPONSE TO RAELENE GARDNER'S COMMENTS

36. In am a resident of the Rivers Edge neighborhood in Stroudwater. My house abuts Congress St. and I have lived there since 2004. Almost 16 years. Until the last 6mos I had never really noticed air traffic noise. Negligible.

The following table compares the average daily aircraft operations (takeoffs and landings) as counted by the Jetport Control Tower for 2004, 2014, 2015, and the six months ending May 2016.

Annual Air Traffic	*2004*	*2014*	*2015*	*Dec. 15-May 16*
Average Daily Operations	*247*	*128*	*134*	*115*

It is interesting to note that in 2004, when Ms. Gardner moved into her home, there were an average of 247 daily aircraft operations at the Jetport. Over the last six months that Ms. Garner has noticed and increase in air traffic noise, the Jetport's daily operations have averaged 115, less than half of what they were when she moved in 12 years ago.

37. I began to notice an increase in air traffic noise last fall.

The following table compares the average daily operations in the fall (Sep. – Nov.) in 2004, 2014, and 2015:

Fall Air Traffic	*2004*	*2014*	*2015*
Average Daily Operations	*302*	*134*	*152*

While there was an increase in average operations in the fall of 2015 compared to the fall of 2014, operations were still nearly half of the average daily operations in the fall of 2004 when Ms. Garner moved into Stroudwater.

38. I attended a jetport meeting and asked the Manager about it. He said nothing had changed- which is just not true- and to keep track of the days and times. I did for a while but its daily occurrence.

While total operations do not provide any evidence that air traffic noise is up, a breakdown of operations by types of aircraft that might generate more noise was also examined: The following table examines the air carrier and air taxi operations. These are the operations that are made up primarily of passenger and air cargo airline operations:

Air Carrier & Air Taxi	*2004*	*2014*	*2015*	*Dec. 15-May 16*
Annual Avg. Daily Operations	*130*	*81*	*83*	*74*
Fall Avg. Daily Operations	*154*	*83*	*91*	*NA*

These operation counts indicate that while the percentage of air carrier and air taxi operations is higher recently than in 2004, the number of those operations is still significantly lower.

Next, the amount of jet activity was examined to see if that could be generating an increase in noise:

Jet Operations	*2004*	*2014*	*2015*	*Dec. 15-May 16*
Annual Avg. Daily Operations	*110*	*78*	*81*	*73*
Fall Avg. Daily Operations	*118*	*80*	*87*	*NA*

It becomes apparent when comparing the tables that jets also comprise a larger percentage of the activity at the airport today, but the number of jet operations is still noticeably less than in 2004.

Besides fewer operations both in total and by jets, the jets mix operating today has continued to evolve to be quieter, as the older, noisier, and less fuel efficient jets have been retired from the fleet. As mentioned in an earlier response, only Stage 3 and quieter civilian jets of permitted to operate in the contiguous United States as of January 1, 2016.

39. After reading the Jetport Master Plan I see that there is no defined provision to address this or prevent an increase in noise.

The FAA primarily relies on the CFR 14 Part 150 Noise Study program to address the impact of noise and identify and evaluate alternatives to reduce impacts. Any recommendations or improvements to noise abatement procedures would be required to go through the Part 150 process to be approved by the FAA. Due to the decline in operations and the ongoing retirement of the noisiest jets since the Part 150, the 2009 Environmental Assessment (EA) for the Jetport found there were no persons living within the 65 DNL contour which is the threshold of significance regarding noise impacts. The Sustainable Master Plan, does recommend that the Noise Advisory Committee continue to monitor the situation, and at the appropriate time, may recommend to the City and its Airport Director an update to the Part 150 Study.

---------- Forwarded message ----------
From: **Stroudwater Village Association Board of Trustees**
<stroudwatervillageassociation@gmail.com>
Date: Sunday, June 12, 2016
Subject: Statement from Stroudwater Village Association on Jetport Master Plan, June 13, 2016
To: Ethan Strimling <estrimling@portlandmaine.gov>, Jon Jennings <jpj@portlandmaine.gov>, Edward Suslovic <edsuslovic@portlandmaine.gov>
Cc: Sonia Bean <stb@portlandmaine.gov>

To Mayor Strimling, Manager Jennings and Councilor Suslovic,

Please share the statement below with the City Council as part of tomorrow's workshop. This statement is on behalf of the Stroudwater Village Association Trustees.

Thank you

-Dan Koloski, SVA President

Statement from Stroudwater Village Association on Jetport Master Plan, June 13, 2016

The Stroudwater Village Association has reviewed the proposed Jetport Master Plan in its entirety, and the SVA have also made it available to residents since it was published last month.[40]

Based on feedback from residents and Trustees, the SVA recommends the City Council reject it as written at this time, with a specific request to add additional material regarding sustainability vis-a-vis abutting residential Portland and South Portland neighborhoods such as Stroudwater, RedBank and similar. With this material, the plan could be re-submitted for consideration.

There are missed opportunities for collaboration and information to ensure the plan addresses compatibility with existing residential development patterns.[41] We reference letters from residents David Silk and Charlton Smith with some specific feedback as examples of points that can be included. SVA members have submitted some feedback directly during the plan development process, but now that the complete report is available it's clear that there is a structural lapse in the overall report as it relates to sustainability with surrounding communities.[42] The SVA would be happy to work with the Jetport to include these points of interest to residents. Please allow the Jetport and area residents more time to collaborate and to submit a plan that addresses sustainability with nearby surroundings as well as it does address on-Jetport sustainability issues.

Thank you for your consideration.

The Stroudwater Village Association is a Maine Non-Profit corporation. All residents of Stroudwater are members and invited to participate in all of our activities.

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RESPONSE TO STROUDWATER RESIDENTS ASSOCIATION COMMENTS

40. The Stroudwater Village Association has reviewed the proposed Jetport Master Plan in its entirety, and the SVA have also made it available to residents since it was published last month.

    For the record, the draft chapters of the Jetport Sustainable Airport Master Plan have been available for the public to review immediately after each were prepared beginning in January 2015. The draft material has been available at thejetport.airportstudy.com and also via a link on the Jetport's website. January 2015 was also when the first of four public information workshop were held over the course of 13 months.

41. There are missed opportunities for collaboration and information to ensure the plan addresses compatibility with existing residential development patterns.

    It should be noted that Mr. Koloski, the President of the Stroudwater Village Association, was a member of the Planning Advisory Committee throughout the development of the Sustainable Airport Master Plan. Mr. Koloski received invitations to each meeting as well as printed draft chapters to be discussed at each meeting. With each chapter, he was also provided with a Comment Sheet providing information upon where to send comments.

42. SVA members have submitted some feedback directly during the plan development process, but now that the complete report is available it's clear that there is a structural lapse in the overall report as it relates to sustainability with surrounding communities.

    As of the date of Mr. Koloski's comments, the report was still in its individual draft chapter forms. With the writing of this response the Sustainable Airport Master Plan is in its complete form. Comments have been taken into to account and additions and revisions have been made where appropriate. The complete report also provides the full integration of sustainability within the report.

Portland International Jetport

You're on your way.

Paul H. Bradbury, P.E.
Airport Director

Zachary R. Sundquist, A.A.E.
Assistant Airport Director

October 25, 2016

Mr. David P. Silk
1187 Westbrook Street
Portland, ME 04102

Reference: Sustainable Airport Master Plan – Portland International Jetport
Response to Comments

Dear Mr. Silk,

Thank you for your written comments and your willingness to meet with me to discuss the draft Sustainable Airport Master Plan (SAMP) for the Portland International Jetport. Your comments and those of others received during the development of the SAMP and responses to the comments are now included in Appendix L of the SAMP posted to the project website at www.thejetport.airportstudy.com.

When we last met you noted three primary concerns with the SAMP, namely:

1. The lack of a specific goal to incorporate trail development.
2. The need for a goal to review best practices for voluntary noise compliance.
3. The addition of a commitment to review, update and improve the Jetport's Transportation Demand Management (TDM) plan.

In response to these three primary comment categories I want to update you on changes that have been made in the Sustainable Airport Master Plan to address these comments.

TRAILS
Chapter 5, p. 56

Work with regional entities such as Portland Trails to seek the establishment of a public trail along the Fore River - The Jetport will reach out to local groups that have the aim to enhance regional bicycle and pedestrian infrastructure such as Portland Trails (http://trails.org/), and seek to develop trails adjacent to the Jetport within 2 to 5 years – particularly along the Fore River in the resource protection zone adjacent to Yellow Bird Road. This would be with the understanding that no through access around the Jetport's east perimeter would be provided, and this would provide an out-and-back trail. Public

Reference: Sustainable Airport Master Plan – Portland International Jetport

trails can enhance the quality-of-life for local residents, contribute to a sense of place, and conserve and/or create green space.

NOISE
Chapter 5, p. 58-59

The Jetport with NAC input and within 2 to 5 years, will review voluntary preferential use of Runway 11-29 incentives and industry best practices to ensure maximum compliance – The voluntary preferential use of Runway 11-29 is one of the FAA-approved measures from the 2005 Part 150 Study. Since its implementation, neighbors have raised concerns on how well it is followed. The Jetport can review the preferential use program with the NAC, and look for means to further encourage voluntary compliance. The review is needed to ensure the Jetport's outreach to pilots is following best practice and is providing the most effective compliance possible.

Continue to monitor operations and noise complaints with the NAC to recommend an update to the 14 CFR Part 150 study at the appropriate time – Current operational levels suggest that an update in the short term would be premature. The Jetport along with the NAC can continue to monitor changes in operational levels, aircraft fleet mix, compliance with the current noise abatement program, as well as noise complaints for when an update to the Part 150 study would be appropriate.

TRANSPORTATION DEMAND MANAGEMENT PLAN (TDM)
Chapter 3, p. 40-41 / Chapter 5, p. 55 / Chapter 6, p. 22

As part of the expansion of the passenger terminal building, the Jetport developed the 2009 TDM Plan, which the Jetport adopted and the City of Portland accepted. This plan identified strategies to reduce single occupancy vehicle trips including:

- The appointment of a transportation coordinator;
- The implementation of employee and customer rideshare programs with preferential parking for participants;
- The establishment of incentives to use public transportation;
- The installation of covered bicycle parking areas and related facilities; and
- The implementation of an employee survey relative to transportation options to and from the Jetport that could be reviewed by Jetport management and used to provide recommendations for the city-based review process of Jetport facilities and operations.

The Jetport will review and update the TDM plan to ensure it is following and consistent with current best practices.

Reference: Sustainable Airport Master Plan – Portland International Jetport

The entire revised DRAFT SAMP document including the changes noted above has been posted to the SAMP website at www.thejetport.airportstudy.com.

Best regards,

Paul H. Bradbury, PE

Airport Director

November 17, 2016

Jon Hinck, Chair, Energy and Sustainability Committee
c/o Jon Jennings, City Manager and Troy Moon
Portland City Hall
389 Congress Street
Portland, ME 04101

Re Jetport Sustainability Master Plan

Dear Jon:

Next week the City as owner/operator of the Jetport will be presenting to the full Council for approval a Jetport Sustainability Master Plan. Speaking on behalf of Stroudwater Village Association ("SVA"), at the first reading of the plan earlier this summer I offered by letter comments on the plan and for the reasons expressed in my letter urged the Council not to approve the plan in its then present form.

The SVA was concerned that the plan focused only on operations within the four corners of the Jetport property and had little if any sustainability analysis with respect to JetPort operations beyond its borders -- such as traffic, land use planning, trail potential, and noise mitigation. From the SVA's perspective, any comprehensive sustainability analysis should look at all impacts from Jetport operations, both internal and external. As an example, part of the study devoted pages to analyzing the energy consumption of vending machines. While SVA certainly supports the City's use of vending machines that use the least amount of energy, spending in equal amount of time analyzing present efforts to minimize offsite impacts would have had a more far reaching impact.

Since the first read, I have met with Paul Bradbury on several occasions and shared with him the SVA's concerns. Mindful that the funds for the report ($800,000) have been pretty much spent, we discussed steps the Jetport could take over the coming near years to address the above concerns. After some brain storming Paul arrived at proposed changes to the plan that in our view will provide meaningful steps if followed to address the concerns. In essence each of the steps will provide for some level of Jetport self-evaluation to help see whether the Jetport is using best practices with respect to such things as its Traffic Management Plan, Noise Abatement Programs, and exploring potential for trail development on some portion of the Jetport property along the river. We very much applaud Paul for working with us to arrive at a sensible solution to the issues SVA raised.

So with the proposed changes to the plan that I expect on Monday night Paul to call to your attention, the SVA is in favor of the Council adopting the plan as amended.

Sincerely,

David P. Silk.
Stroudwater Village Association Trustee


Stantec
Coffman Associates
Airport Consultants
vhb
MAC Consulting, LLC