Airport Sustainability Master Plan

Juneau International Airport

City & Borough of Juneau

Juneau Airport Board

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Sustainability Master Plan

JUNEAU INTERNATIONAL AIRPORT

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Sustainability Master Plan

JUNEAU INTERNATIONAL AIRPORT

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1 EXECUTIVE SUMMARY

1.1 INTRODUCTION

The Juneau International Airport (JNU) Sustainability Master Plan (SMP) was developed to review, expand and define, revise and reprioritize development and maintenance projects at the airport. The inclusion of sustainability considerations allowed the City and Borough of Juneau (CBJ) to broaden their view of the airport and begin the work necessary to incorporate and integrate sustainability practices into the airport's business plan.

The Juneau International Airport Sustainability Master Plan has been developed over a 24-month period to guide future airport development to accommodate long-term growth in airline, air cargo, general aviation, aviation industrial and military needs while giving full consideration to long term sustainability of the facilities. The successful completion of the master plan is the result of a collaborative effort among airport and community stakeholders which include the City and Borough of Juneau (CBJ), the Federal Aviation Administration (FAA), airport tenants, and the general public.

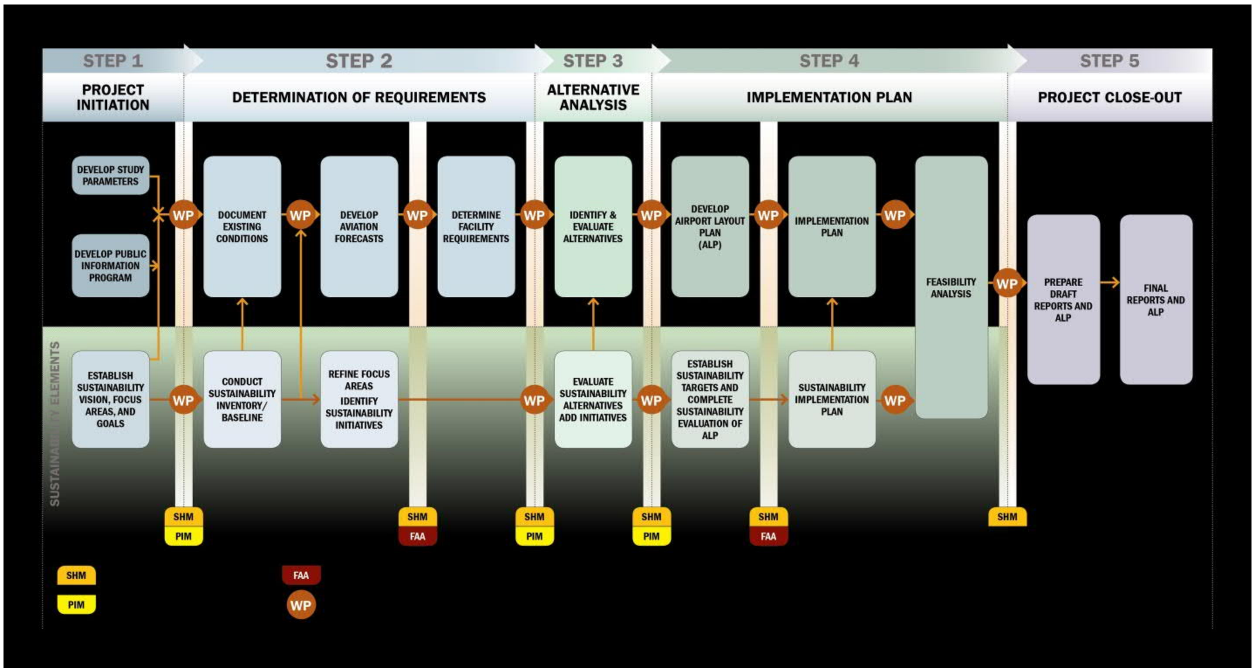
A well-developed Sustainability Master Plan fully integrates sustainability into the airport's long-range planning using baseline assessments of environmental resources and community outreach to identify sustainability objectives that will reduce environmental impacts, realize economic benefits, and improve community relations. Sustainability is relevant to many topics essential to a comprehensive airport master plan including:

- Pre-Planning
- Public Involvement Program
- Environmental Considerations in Airport Master Planning
- Existing Conditions
- Aviation Forecasts
- Facility Requirements

- Alternatives Development and Evaluation
- Airport Layout Plans
- Facilities Implementation Plan
- Financial Feasibility Analysis

The process that was followed in this master plan is depicted in Figure 1-1

Figure 1-1– The Sustainability Master Plan Process



1.2 WHAT IS THE GOAL OR PURPOSE OF THIS AIRPORT SUSTAINABILITY MASTER PLAN?

The goal of the master plan is to provide a framework to guide future airport development to effectively satisfy aviation demand, while giving full consideration of potential environmental and socioeconomic impacts. The master plan provides the tools necessary to react to uncertainties by examining key trends in the aviation industry, such as changing airline business models, improvements in technology, and local/regional economics that could affect airport activity.

1.3 WHAT ARE THE PROJECT'S MISSION STATEMENTS?

Airport users as represented by the Technical Advisory Committee (TAC) and the members of the Airport Board were asked to identify and list topics or ideas they had regarding the airport to serve as the basis for development of an airport mission and vision statement. A draft mission statement was developed based on the eight topics identified during the work session. These results were presented to the public during an open public meeting. The Mission Statement is stated as follows.

- **Gateway and Vital Transportation Hub –** Juneau International Airport is a gateway to the State Capitol, and to northern Southeast Alaska. It functions as a vital regional transportation hub for passengers and air cargo, and provides a safe, dependable, and welcoming facility for the residents of Juneau and Southeast Alaska.
- **Safe and Reliable Customer Service –** The airport provides a safe and reliable level of service for its users and stakeholders. It has pursued innovative navigation improvements and prides itself in placing safety foremost in its operational priorities—for commercial and private pilots, employees, and the community.
- **Fiscal Responsibility –** As a municipally owned facility, the airport is fiscally responsible. It balances sources of public and tenant revenue, with expenditures, charges and fees, in order to provide essential services and airport improvements.
- **Sustainability –** The airport strives to incorporate sustainability, through use of innovative technology such as geothermal energy for heat and a program for recycling waste at the airport. It works to provide maximum levels of service with minimum impacts to the community and environment.
- **Environment and Recreation –** The airport's setting and lands surrounding the airfield are a resource highly valued by Juneau residents. Juneau balances public access with security, and works to minimize its footprint on surrounding lands and waters.
- **Operational Efficiency –** The airport provides an airport/airfield design that works well for large and small air carrier operations and for recreational pilots. It makes best use of its employees and facilities as valued assets to run an efficient airport operation.
- **Economic Development –** The airport is an economic driver for Juneau and Southeast Alaska. In supporting regional air cargo and tourism, the Airport is a hub that diversifies the local and regional economy.
- **Community Service –** The citizens of Juneau and State of Alaska take pride in their airport. JNU strives to be an integral part of the community framework.

1.4 WHAT WERE THE KEY ISSUES FOR THIS MASTER PLAN?

Key elements for this master planning effort were identified as follows.

Passenger Terminal: Determining the long range plan for the passenger terminal including an examination of how people get to the airport and whether or not structured parking should be considered.

Air Cargo: This plan addressed where the all-cargo area will be in the future as well as define how big the area needs to be to properly serve the carriers.

General Aviation: The airport has two areas that have been prepared for development and have environmental clearance for construction projects. They also have 13 people on a wait list for T-hangars and 4 waiting for space to build new box hangars. The current Fixed Base Operator (FBO) has expressed interest in expanding their facilities to respond to changing markets and constructing a more modern “Jet Center” type of operation. This master plan will examine the optimal plan for development of the areas and explore layouts that will optimize site usage as well as provide space to match demand.

Sustainability: The plan has a strong sustainability element. This element will allow JNU to develop a long-term comprehensive and integrated perspective that considers the natural environment, community interests, economic factors and operational efficiency. The airport sought "practical" considerations for sustainability improvements – those that can improve the overall efficiency of the airport in the short term and also prepare it for sustainable development in the future.

CIP and Implementation Planning: A new Capital Improvement Program (CIP) that includes capital projects, sustainability related projects and maintenance projects will be prepared to help the Board continue the efficient operation of JNU.

Community Engagement and Support: By packaging the results of the master plan and sustainability plan together and integrating sustainability into long-rang planning, JNU will have a communication tool that can be used to present the value of the airport to the City and build a coalition of airport support to help implement the required capital projects.

1.5 STUDY FINDINGS

1.5.1 Aviation Demand Forecasts

Development of forecasts for JNU followed a process described in FAA Advisory Circular (AC) 150/5070-6B, Airport Master Plans. The following is a summary of the forecasting results.

- Historical records show that the number of enplaned passengers at JNU fluctuated over the past ten years at about the same rate as did passenger levels nationally. The indication is that much of the passenger activity at JNU is tied to tourism. This is certainly true with the On-Demand passengers where records show it to be seasonal. The Part 121 and 135 passengers also peak during the summer months, which suggests this activity is tied to the tourist market. In the future, enplaned passengers are expected to continue to increase at about the same rate as the national forecast prepared by the FAA. The forecast used herein tempered the national growth trends with the growth expected in the regional population to reflect that part of the market that includes connections to other destinations within Southeast Alaska.
- Operationally it is anticipated that the Part 121 carrier traffic will continue to be offered using narrow body jet aircraft having 124 to 181 seats represented by the Boeing 737-series aircraft. Flights will continue to include nonstop service to Seattle and Anchorage as well as flights that make multiple stops into and out of Juneau. Overall levels of growth in this category will be driven by the growth in enplaned passengers.
- Air taxi and commuter flights include the Part 135 carriers, the on-demand carriers, air cargo flights, and other for hire air taxi activity. Historically this category has comprised the majority of operations at JNU. This is expected to continue in the future with growth rates tied to both passenger growth in the commuter market, growth in the regional population, and forecast increases in the amount of freight and mail.
- General aviation activity makes up a small portion of the total operations. The growth in this category is expected to be moderate over the 20-year forecast period and driven primarily by local population growth and economic conditions.
- Military activity at JNU has fluctuated in the past but is a minimal portion of overall activity and the future is not expected to see any growth in this category.

Table 1-1 shows a summary of the forecasts prepared for JNU that will be used in the remainder of this master plan. Details of historical information, assumptions, and decisions regarding these forecasts are contained in this chapter.

Table 1-1: Summary of Forecasts

Category	Base 2014	2020	2025	2030	2035
Annual Enplaned Passengers					
Air Carrier	262,252	287,289	304,616	323,231	343,272
Commuter	31,262	33,132	34,212	35,467	36,814
On Demand	64,965	71,970	77,128	83,000	89,694
Total Passengers	358,479	392,391	415,956	441,698	469,780
Annual Operations					
Air Carrier	8,319	8,453	8,586	8,720	8,853
Air Taxi & Commuter	70,540	80,531	89,682	99,226	109,992
General Aviation	16,287	16,954	17,625	18,352	19,118
Military	440	775	775	775	775
Total Operations	95,586	106,713	116,668	127,073	138,738
Based Aircraft	332	346	364	383	403

Note: The base year for the forecasts is 2014 the most recent year where comprehensive records where available for all activity categories.

1.5.2 Airport Requirements

Determining the need for future facilities was approached by comparing the capacity of the existing facility with the demand from the forecast activity levels. Any identified deficits were addressed by recommending facility improvements or expansion. Table 1-2 summarizes the conclusions of this facility requirement analysis.

Table 1-2: Summary of Facility Requirements

Facility	Category	Summary of Requirements
Airfield		
Runway 8-26	Design Criteria	The runway should be classified as D-III based on forecast use by the Boeing 737-900 aircraft. With the newly reconstructed runway, most Federal Aviation Administration (FAA) D-III Design Criteria are met.
	Runway Length	At 8,857 feet the runway length can accommodate all flights and all aircraft projected to use the airport.
	Wind Coverage	Wind rose analyses show that coverage on Runway 8-26 exceeds 99% under all-weather conditions and is near 100% for instrument flight rules (IFR) conditions
	Capacity	The capacity of a single runway is calculated to be approximately 220,000 annual operations, 98 hourly operations under visual flight rules (VFR) conditions and less than 50 hourly operations under IFR conditions. Based on the forecasts for 2035, annual operations will be 138,738 VFR demand will be approximately 110, and IFR demand will be 6 to 20. Therefore, runway capacity is not an issue.
Runway 8W-26W	Design Criteria	The water runway is classified as A-II by FAA. It meets all design criteria except for the distance from centerline to the centerline for RW 8-26. Since the float pond is located lower than the paved runway this does not create any operational issues. .
Taxiways	Design Criteria	The design criteria for the taxiway system is TDG-3. All taxiways meet these criteria.
	Safety	The existing taxiway system presents some issues that have been identified by FAA as contributing to the potential for runway incursions. These include wide expanses of pavement, mid-runway access points, and taxiways that provide direct apron to runway access. Taxiway layout decisions will need to be made to increase situational awareness on the taxiways and minimize the potential for safety issues to arise.
Other	Airport Traffic Control Tower (ATCT)	The ATCT is located on the southwest corner of the terminal building and is in need of upgrade or relocation decisions.
	Security/Perimeter Fencing	There are "gaps" in the airport's perimeter fencing in the southeast. These have been deemed as acceptable given the natural obstacles that exist but will require upgrades when repairs or relocation is needed.
Terminal Area		
Passenger Terminal	Capacity	The increase in enplaned passengers will require additional space in the terminal building. Particularly problematic are two areas: 1) the passenger holdroom area in the main terminal is currently undersized, and 2) the facilities for the in-terminal

Facility	Category	Summary of Requirements
		Part 135 carriers. The north wing reconstruction project will address the Part 135 areas.
Terminal Apron	Capacity Part 121	The Part 121 apron is adequate for operations through the forecast period. A need for two RON positions has been identified as required.
	Capacity Part 135	The Part 135 carriers based in the terminal building park aircraft and load passengers on the apron to the west of the terminal. These carriers use ground loading procedures where passenger loading and unloading is done directly onto the apron, and the carriers escort passengers to and from the building. No outside covers exist.
	Other	The terminal area apron to the west of the building also serves the needs of the air cargo carriers including Alaska Airlines, and Alaska Central.
Parking	Capacity	Roughly 100 additional public parking spaces are required prior to 2035 and 50 additional spaces for rental cars. Employee parking should be adequate unless a major change (outside the forecast) occurs.
Roadways/Curb Frontage		The terminal curbfront experiences periods of congestion during peak periods year round but is particularly an issue during summer months when additional flights are added to the schedule. The congestion is caused by several factors 1) the terminal configuration, which requires a right-angle turn at the main terminal entrance, 2) the mix of private automobiles, taxi/van services, and tour buses that are loading, unloading, or waiting for passengers along the same section of the access road, and 3) the lack of consistent enforcement of the no waiting policies.
Air Cargo		
Cargo Storage Facilities		The current Alaska Airlines ground facility is the only full service cargo facility on the airport offering refrigeration, secure storage, etc. The size and capacity of the facility is adequate to serve Alaska's needs now and in the future. A second cargo building should be planned to accommodate the other cargo carriers that may operate at JNU in the future.
		The regional cargo carriers (FedEx and Alaska Central) provide cargo transfer facilities on the airport. No increase in size or capacity has been identified for either facility.
Aircraft Parking		A single aircraft position is provided for all-cargo aircraft processing. This is currently used by Alaska Airlines but is available for others. A second position should be constructed in the future.

General Aviation		
Fixed-Base Operator (FBO)	Capacity	The current FBO (Aero Services) is planning to expand its services to respond to current markets. Aero Services has expressed interest in constructing a new "Jet Service" facility. The site for this facility needs to include a new hangar and office facility, transient aircraft parking apron, and public access and parking.
Corporate Hangars	Capacity	As the number of based aircraft increases and airport property is developed, the need for additional corporate hangars will arise.
T-Hangars	Capacity	The increase in the number of based aircraft and redevelopment of airport property parcels will also affect the need for additional T-hangars.
Tie-downs	Capacity	As the number of based aircraft increases, there will be an increase in the demand for additional outdoor tie-downs.
Transient Aircraft Parking	Capacity	Transient aircraft parking positions are expected to be associated with the new FBO facilities where the parked aircraft can also be serviced.
Float Pond Dock Positions	Capacity	The increase in based aircraft will include floatplanes. These will need docking facilities on the float pond during the summer months.
Helicopter Takeoff and Landing Areas	Capacity/Safety	Given the high level of helicopter activity at JNU There is a need to continue to assure that these operations are conducted safely. In addition, the helicopter operations have an impact on the neighborhoods near the airport. It has been suggested that a single centralized helicopter landing area be established. Currently operations occur in three areas, depending on the location of the operator each of which has an established operational corridor based on letters of agreement between the operators and the FAA's ATCT personnel.
Other		
Snow Removal Equipment Facility (SREF)		The SREF should be moved to the northwest area.
Airport Maintenance and Storage		A new airport maintenance and storage building is needed. The current building has serious roof issues and a replacement should be constructed in the short term.
FIS Facility	Capacity	U.S. Customs and Immigration has indicated that they would like to have additional space in the terminal building during recent terminal planning projects but given the nature of existing international operations Customs could also be housed in a new FBO facility.
Fueling	Capacity and Supply	In most areas it is desirable to maintain at least a 7-day supply of fuel at the airport. In Juneau, since all fuel needs to be barged in, it is suggested that a longer supply be maintained to assure that service is not interrupted.

1.5.3 Airport Development Plan

The facilities that require physical improvements were identified and alternative ways to meet them were developed and compared with a preferred development plan selected as the basis for the Airport Layout Plan (ALP). The findings of the alternative analyses are summarized in the following table.

Table 1-3: Summary of Alternatives Considered

Area/Facility	Recommendation	Summary
Airfield		
Taxiways	Recommend closure or relocation of connector Taxiway D1 and realignment of Taxiway C.	The Juneau Runway Safety Action Team (RSAT) identified potential safety related issues related to the current taxiway layout. This analysis examined four different methods to fix the identified issues including realigning the exit taxiways, realigning the connector taxiways, and closing portions of the existing system. In the end, a hybrid alternative was selected that maximized the existing layout while improving overall system safety.
Remain Overnight (RON) Positions	Two RON positions have been identified as required. After looking at two possible locations it was determined that they should be located east of the terminal at a location that may be converted to gate positions in the future.	An alternative location further to the east was considered, but rejected based on the longer time period required to develop the site as well as the greater distance between the terminal and the RONs.
Cargo Positions	A single cargo aircraft parking position is available on the central apron at JNU. In the future, a second position should be available.	An alternative location was examined that would require the relocation of some of the existing users of the central apron area. This was rejected since a less obtrusive alternative was available.
Airport Traffic Control Tower (ATCT)	Recommend encouraging FAA to relocate the ATCT to a site along Shell Simmons Road, east of the terminal building.	This recommendation will need to be verified and validated by FAA. The need for relocation, the site selected, and the cost of construction are all the responsibility of FAA.

Area/Facility	Recommendation	Summary
Helicopter Landing Areas	No changes in the current use	During public meetings there was a suggestion that the helicopter landing areas should either be consolidated in one location or moved off airport altogether. Analysis of this situation showed that current operational procedures for the helicopters were based at least partially on the flight paths that were available to handle the number of flights, as well as to minimize impacts on the community. The concept of moving the helicopters off airport was the subject of two previous studies, both of which recommended that no action be taken.
Terminal Area		
Terminal Building	The Juneau International Airport Terminal Area Plan recommended that the north wing of the terminal be modernized and expanded to accommodate the Part 135 carriers and that the increased demand for Part 121 carriers be accommodated by expanding the main terminal to the east. These recommendations were adopted in the master plan.	No alternatives to the recommendations made in the Terminal Area Plan have been studied in this master plan. The expansion of the terminal will accommodate forecast demand levels.
Vehicle Parking	The public parking lot at JNU will require expansion in the future. Analyses showed that the best course of action is to maximize the existing surface facility while working with the CBJ to improve public transit connectivity between the airport and downtown Juneau. As a long-term solution a parking structure should be planned.	Other alternatives considered included doing nothing and building a parking structure. Doing nothing would not meet demand while the cost of constructing a parking structure made it infeasible.
Other		
Airfield Maintenance Building	Currently the airport's maintenance storage needs are accommodated in a variety of locations and some of the equipment is stored outdoors. It is recommended that when the new Snow Removal Equipment Facility is constructed, that a new maintenance building for both equipment and material storage be	No alternatives were identified for the maintenance building.

Area/Facility	Recommendation	Summary
	built in an adjacent location. The adjacency is important because many of the staff that conducts maintenance and snow removal are the same.	
Aircraft Rescue and Fire Fighting Building (ARFF)	The ARFF facility at JNU needs to be updated to include both larger bays, as well as a realignment of the building to allow for more direct access to the airfield. This revision will be done at the existing location.	No alternatives were considered for the ARFF. The ARFF Update is scheduled to be completed in 2017.
Snow Removal Equipment Facility (SREF)	A new SREF has been planned and located in previous studies and will be constructed in the new western general aviation (GA) area.	No alternative SREF locations were included in this study.
Fueling	Increasing fuel storage capacity will be required over the next 20 years. This will be supplied at the existing locations.	No alternative fuel facilities were considered in this study.
General Aviation		
GA Expansion	General Aviation expansion plans have been approved that include the both eastern and western areas. This analysis consisted on developing potential layouts for these areas.	No alternative GA locations were included in this study.

1.5.4 Airport Layout Plan

The Airport Layout Plan depicts both existing airport facilities and the airside and landside projects that have been recommended for the 20-year planning period. Specifically the following items are shown:

1.5.5 Airfield

Airfield improvements are in support of continued safe and efficient operations including;

1. Rehabilitation of Taxiway A and rehabilitation and reconfiguration of taxiway E-1
2. Address geometry issues on Taxiways C, D and E

3. Float Pond Improvements including the South Road, replacement of the inlet valve and stabilization of the banks.
4. Redesignation of the Runway from 8/26 to 9/27 to account for magnetic variation (MAGVAR)

1.5.6 FAA ATO Recommendations

Two projects were identified as required in the master plan but decisions regarding need, timing, location and funding are the responsibility of FAA and outside the Master Planning Process. These projects have been included on the ALP with recognition that they are not part of the airport's Capital Improvement Program (CIP). These include

1. Complete a full a MALSR on Runway 26
2. Relocate the FAA ATCT outside the passenger terminal building

1.5.7 Terminal Area

Projects shown for the terminal area are driven by the needs of the commercial passengers, airlines and other terminal users. These include;

1. Replace the north wing (Part 135 area) of the terminal building
2. Renovate the terminal building – knuckle area
3. Expand the terminal to provide additional passenger waiting space in the secure area
4. Passenger terminal parking lot rehabilitation
5. Relocate rental car ready/return area
6. Rehabilitate the Part 135 parking apron
7. Rehabilitate the Part 121 parking apron
8. Add two overflow aircraft parking spaces (RON Positions)
9. Add a second air cargo parking position
10. Improve and expand public and employee parking area
11. Construct a Parking Garage

1.5.8 General Aviation

The master plan includes provisions for the growth of general aviation facilities in two major areas, as well as redevelopment of facilities and opportunities along Alex Holden Way. A summary of the recommendations includes;

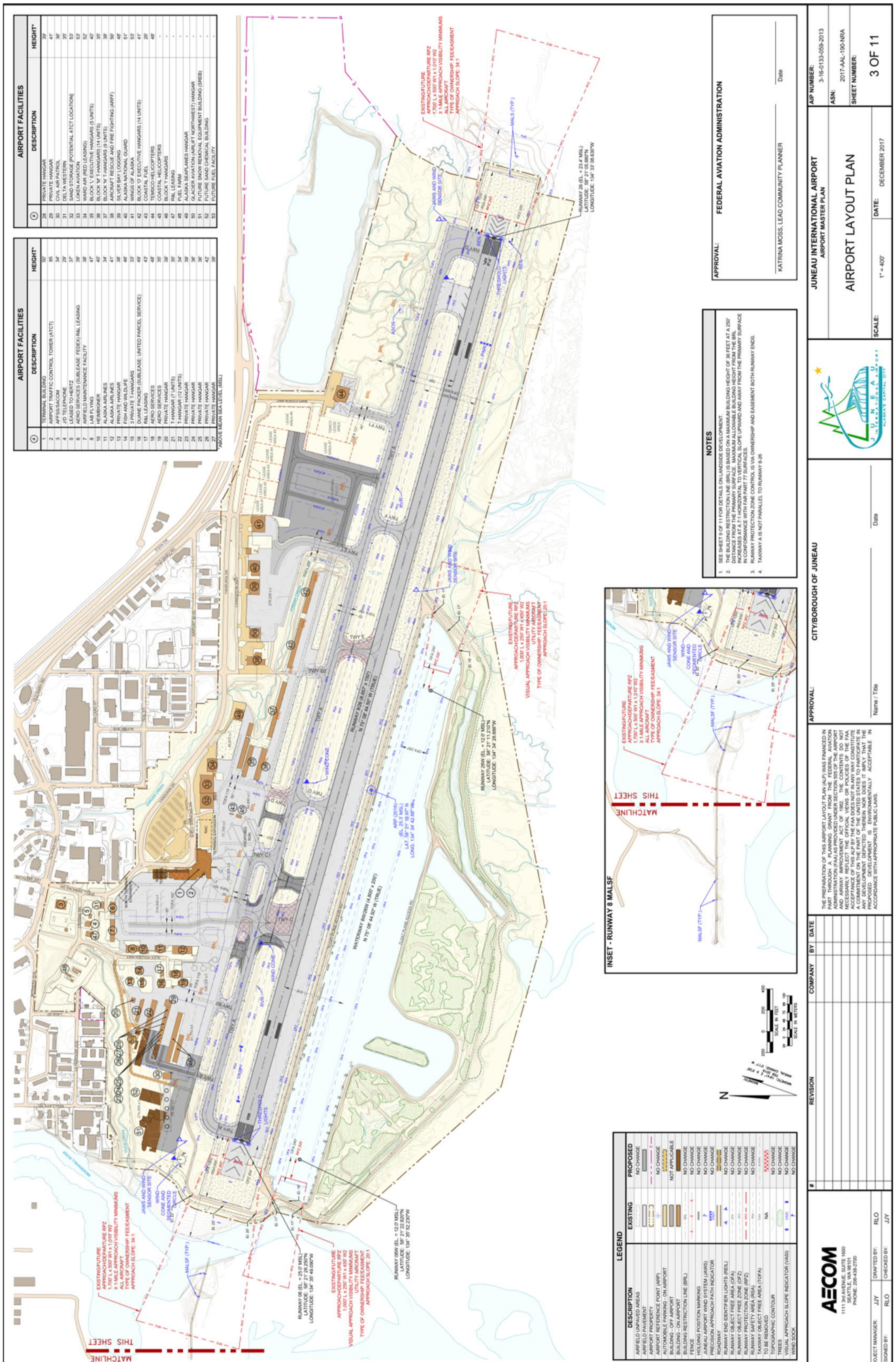
1. Northeast development area
2. Development area infrastructure
3. Joint use apron/tiedown construction
4. Fencing and security improvements
5. Northwest development area
6. Development area infrastructure
7. Joint use apron/tiedown construction
8. Fencing and security improvements
9. Install a Geo Loop field in the northwest development area
10. Design & Reconstruct Alex Holden Way, Cargo Way and Utilities
11. Civil Air Patrol Hangar Relocation
12. Fish & Wildlife Service Hangar Relocation

1.5.9 Other Projects

Several other projects have been identified as required but which do not fall into the primary categories listed. These projects include;

1. Construct the Snow Removal Equipment Facility (SREF)
2. Design and construct a new sand and chemical storage facility
3. Rehabilitate and reconstruct the Aircraft Rescue and Firefighting (ARFF) Facility
4. Extend the Emergency Vehicle Access Road (EVAR)
5. Acquire a Wetlands Access Vehicle

Figure 1-2 – Airport Layout Plan



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2 VISION/MISSION, FOCUS AREAS, & GOALS

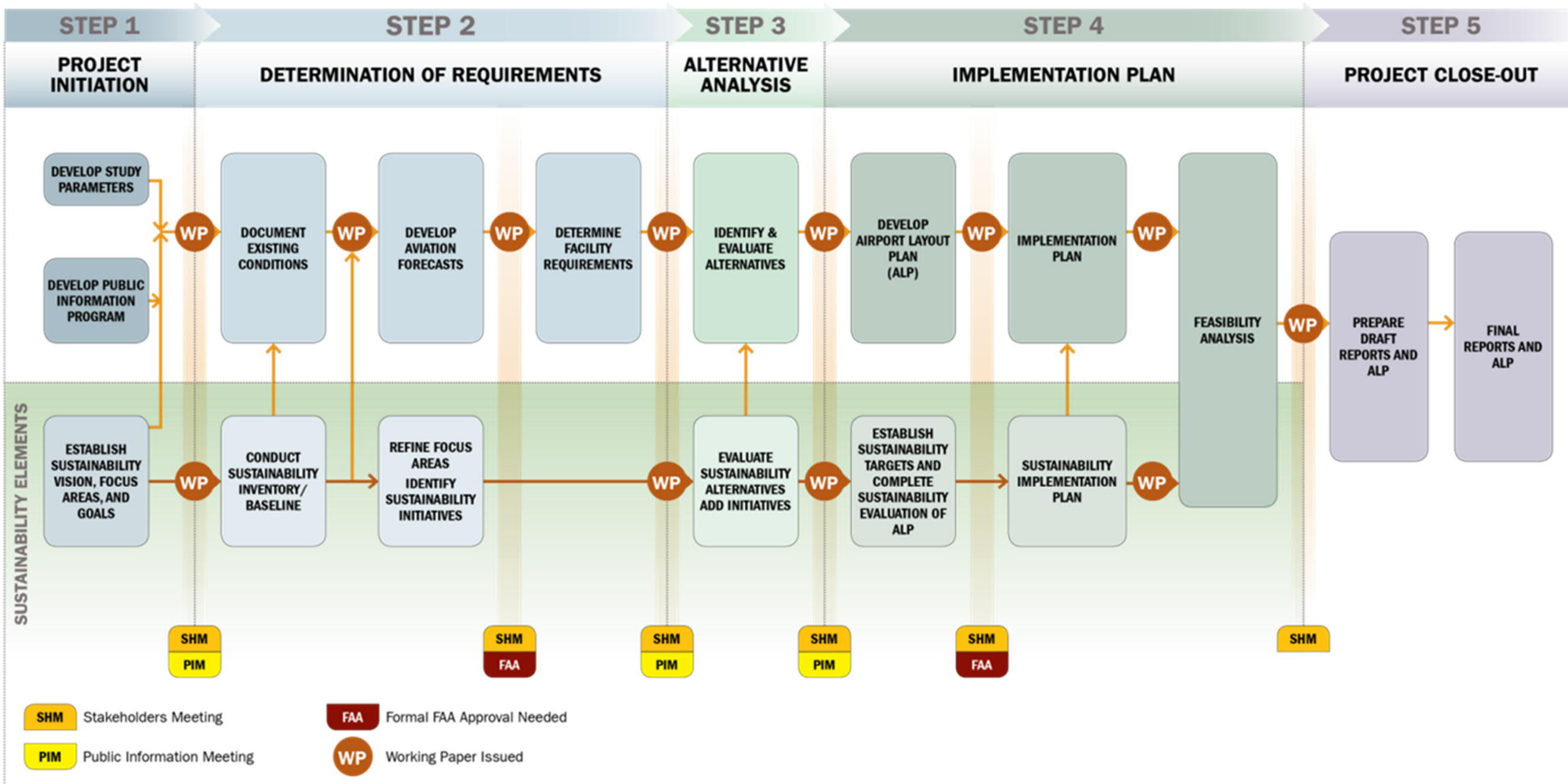
2.1 INTRODUCTION

The City and Borough of Juneau (CBJ) has embarked on a Sustainability Master Plan (SMP) for the Juneau International Airport (JNU). The purpose of the Sustainability Master Plan is to review, revise and reprioritize development options associated with JNU. The SMP was prepared as a means of assuring that JNU will continue to contribute to the regional economy and transportation system in a manner that keeps pace with demand while maintaining environmental and sustainability factors as important decision criteria. The SMP is supported by Federal Aviation Administration (FAA) grant funding through the Airport Improvement Program (AIP). The SMP contains the work elements in the following and was prepared using the process depicted in Figure 2-3.

- Prepare an inventory of the existing airport conditions, current and historical activity levels, environmental conditions, and community demographic information.
- Identify sustainability categories, or Focus Areas.
- Collect relevant information for a sustainability baseline report.
- Forecast future aviation activity levels.
- Determine the future requirements for facility expansion or upgrade needed to accommodate activity growth.
- Establish goals or targets to minimize the airport's footprint and improve sustainability performance.
- Identify specific initiatives to improve the airport's sustainability performance and achieve the established goals or targets.
- Develop alternative concepts for airport development and analyze the best course for future development decisions with respect to cost, environmental factors, land use compatibility, and other factors.
- Develop a financial implementation plan.

- Conduct an environmental review/analysis.
- Prepare the Airport Layout Plan (ALP) in accordance with federal airport operating and design standards.

Figure 2-3: JNU Planning Process



2.2 DRAFT VISION/MISSION STATEMENT

Airport users as represented by the Technical Advisory Committee (TAC) and the members of the Airport Board were asked to identify and list topics or ideas they had regarding the airport to serve as the basis for development of an airport mission and vision statement. A draft mission statement was developed based on the eight topics identified during the work session. A draft vision statement was also developed and organized under topics from the work sessions. These results were presented in the Executive Summary.

2.2.1 Vision Statement

The following vision statements were developed.

Gateway and Vital Transportation Hub

- Be the airport that customers remember when they transit, providing an efficient and high-quality experience.
- Serve as a competitive regional hub for air cargo.

Safe and Reliable Customer Service

- Maintain reputation as a safe and technologically advanced airport.
- Create a business environment that attracts and sustains aviation and aviation support tenants.

Community Service and Fiscal Responsibility

- Grow with the community and regional needs, while respecting limits to growth.
- Involve the community in airport planning and garner their support for airport improvement projects.

Sustainability

- Maximize the full potential of lands and buildings and be able to adapt to changes in the business and natural environment.
- Minimize the airport's footprint on surrounding wetlands, waters, and neighborhoods.

Environment and Recreation

- Develop the airport in balance with the adjacent wetlands environment.
- Maintain access for recreational activities on the Emergency Vehicle Access Road as long as security of the airport can be maintained.

Economic Development

- Become a primary driver for economic opportunity and jobs for Juneau and all of Southeast Alaska.
- Achieve economic stability based on sustainable and responsible practices.

Leadership

- Make JNU a great place to work; attract and retain great employees.
- Continue to pursue innovation and technological advances.
- Be the "best darned airport in Alaska."
- Serve as a model airport for Alaska.

2.3 SUSTAINABILITY FOCUS AREAS

The identification of sustainability categories, or Focus Areas, for the SMP is a foundational exercise that informs the planning process and serves as a building block upon which many of the master plan and sustainability elements are built. It answers the critical question of what the sustainability priorities are for the airport and what topics the airport is impacted by or has the ability to impact. The Focus Areas are a primary aspect of the SMP as well as the airport's overall sustainability program. Eventually, the sustainability inventory/baseline, sustainability initiatives, airport development plan, and airport layout plan will be evaluated in terms of the Focus Areas. The process of defining sustainability Focus Areas, which began early in the project, is discussed in the following sections.

2.3.1 Airport Definition for Sustainability

Prior to the selection of Focus Areas, a definition for sustainability was established for the project and Airport. This provided context for the selection of Focus Areas and captures the holistic nature of sustainability. The Project Team and JNU management and staff adopted a common definition for sustainability that is regularly used and referenced in the aviation and air transportation industry. This definition, which was developed by the Airports Council International-North America (ACI-NA) Airport Sustainability Committee, defines airport sustainability as:

"A holistic approach to managing an airport so as to ensure the integrity of the Economic viability, Operational efficiency, Natural resource conservation and Social responsibility (EONS) of the airport."

This four-part definition to sustainability takes the typical triple bottom line view of sustainability (i.e., social, environmental, economic) one step further by incorporating operational efficiency and captures holistic airport management. EONS is the acronym for the four functional parts and is referenced in this document and will be used throughout the SMP project.

2.3.2 Focus Area List

Since the Focus Areas play a crucial role in the SMP project and sustainability at the airport, a broad range of potential Focus Areas were identified in order to allow the airport to, first, think broadly about sustainability. The list of Focus Areas was then evaluated and/or refined during subsequent steps. To capture the broadest and most holistic view of airport sustainability, the Project Team referenced sustainability aspects from one of the foremost guidance documents for sustainability management—the Global Reporting Initiative (GRI) Airport Operators Sector Disclosure (AOSD)[1]. This guidance document was reviewed along with FAA sustainability guidance[2] and used to identify potential Focus Areas. Many of the Focus Areas found in the initial list came from the GRI AOSD with additional areas identified based on FAA/SMP recent guidance and Project Team experience. The topics were then categorized under the appropriate larger EONS category.

The following comprises the full list of 23 potential Focus Areas that were considered for JNU.

2.3.2.1 Economic: (EONS: Economic viability)

- Economic performance
- Indirect economic impacts
- Procurement practices

2.3.2.2 Operational (EONS: Operational efficiency)

- Cost control
- Operations and maintenance
- Service quality

[1] Global Reporting Initiative (2014). *Airport Operators Sector Disclosure*. Retrieved from https://www.globalreporting.org/resourcelibrary/GRI-G4-Airport-Operators-Sector-Disclosures.pdf
[2] See links under "Resources" at following website: http://www.faa.gov/airports/environmental/sustainability/

- Business continuity and emergency preparedness

2.3.2.3 Environmental: (EONS: Natural resource conservation)

- Materials
- Energy
- Water
- Biodiversity
- Emissions
- Effluents and waste
- Transport
- Inter-modality
- Noise

2.3.2.4 Social: (EONS: Social responsibility)

- Employment
- Occupational health and safety
- Training and education
- Diversity and equal opportunity
- Alaska Native (indigenous) communities
- Local communities
- Customer health and safety

2.3.3 Scoring/Ranking and Prioritizing Focus Areas

The Focus Areas were scored, ranked, and prioritized over a series of workshops and meetings to come up with a manageable set to be used in the SMP. This process involved meeting with the TAC, Airport Board, and other stakeholders to gather feedback and input and was completed through facilitator-led discussions and surveys. The following sections describe the process that was used to arrive at a final list of Focus Areas.

2.3.3.1 Focus Areas Workshops

During meetings at the airport on November 13, 2014, the members of the TAC and Airport Board participated in an exercise to rank the importance of the Focus Areas included in the initial list. This was done through a facilitated workshop led by the Project Team.

The initial Focus Areas (including the 23 Focus Areas in Section 2.3.2) were ranked by attendees in each group. Attendees had the opportunity to write in a Focus Area under "Other" in each EONS category and rank that area. Each attendee ranked a total of 18 Focus Areas, including any Other write-ins, leaving the rest blank. The Focus Areas were ranked (with a corresponding score) by each attendee in the following manner:

- Rank six (6) Focus Areas as a high priority
- Rank six (6) Focus Areas as a medium priority
- Rank six (6) focus areas as a low priority

Focus Areas that had an average group score (TAC or Airport Board) above "1" were identified as higher ranking priorities for the airport. As a result, from the list of 23 possible sustainability Focus Areas and write-ins, the following 17 Focus Areas were identified and proposed for further consideration.

1. Economic performance
2. Cost control
3. Service quality
4. Indirect economic impacts
5. Business continuity and emergency preparedness
6. Procurement practices
7. Local communities
8. Effluents and waste
9. Operations and maintenance
10. Energy
11. Transport

12. Training and education
13. Employment
14. Materials
15. Water
16. Occupational health and safety
17. Customer health and safety

2.3.3.2 Applicability to SMP Project

The list of Focus Areas was further refined to determine applicability with the sustainability portion of the SMP to allow for more in-depth analysis. The following were removed or qualified based on the stated considerations:

- **Economic performance**. Decision: This Focus Area will be kept for baseline data, but will not include extensive evaluation or identification of economic initiatives. This topic is typically addressed in an airport economic impact study which is not included in a Master Plan or SMP. Therefore, available baseline information prepared by others will be presented or summarized (such as the Juneau Economic Development Plan).
- **Service quality**. Decision: Removed. This is an overall goal of the SMP and will be addressed as part of the airport master planning effort. It is not included in the sustainability baseline effort or as sustainability Focus Area.
- **Indirect economic impacts**. Decision: Removed. This topic is typically addressed in other airport/community studies. The Project Team will not be able to gather/develop a baseline for this topic within the project scope.
- **Operations and maintenance**. Decision: Removed. This is a typical consideration for the master plan but is not appropriate as a discrete sustainability Focus Area. The SMP will identify capital projects that may impact and/or improve operations and maintenance (O&M) overall at JNU. Note that, even though operations and maintenance is removed as a discrete Focus Area, sustainability will be addressed for O&M issues since the alternatives analysis and Capital Improvement Plan (CIP) will be evaluated in terms of sustainability.
- **Occupational health and safety**. Decision: Removed. This topic is not a typical component of an SMP. Occupational health and safety is a critical component of airport plans and operational procedures and is more effectively addressed in other programs or initiatives.

- **Customer health and safety**. Decision: Removed. This topic is not a typical component of an SMP. Customer health and safety is a critical component of airport plans and operational procedures and is more effectively addressed in other programs or initiatives.

2.3.4 Final Focus Areas

The project started with a broad list, adopting and adding to the industry-accepted framework of GRI and FAA sustainability guidance, to cast a wide net of sustainability categories and to help the Airport Board and TAC understand the broad nature of a sustainability program. However, in SMPs and sustainability programming efforts, a refined list is identified that includes specific environmental and social areas that may not be considered in other plans, programs, or policies (e.g., unlike operations and maintenance and health and safety).

The following list is the proposed final list of Focus Areas. It includes specific topics within each Focus Area that are important to JNU and its stakeholders and that will be incorporated into the next phase of work—the sustainability baseline inventory effort.

2.3.4.1 Economic: (EONS: Economic viability)

- Economic performance
    - Direct economic value generated
    - Other economic data
    - Identified costs and risks as a result of impacts from extreme weather or flood events or events related to climate change
- Procurement practices
    - Environmentally preferred or sustainability procurement policy (for ongoing operational purchases, equipment and assets, and for CIP, contracting, and building programs)
    - Emphasis on local products and businesses
    - Green building program, incorporating green building requirements into design and construction contracts and procurement of building related materials

2.3.4.2 Operational (EONS: Operational efficiency)

- Cost control
    - Cost saving measures

- Energy efficiency

- Business continuity and emergency preparedness
    - Climate change vulnerability/adaptation
    - Emergency preparedness
    - Infrastructure resiliency

2.3.4.3 Environmental: (EONS: Natural resource conservation)

- Materials
    - Recycling and waste volumes
    - Recycling and composting program
- Energy
    - Electricity, heating, cooling, and steam use
    - Fuel use
    - Energy efficiency
    - Greenhouse gas (GHG)
- Water
    - Surface and stormwater management
    - Stream water quality
    - Water efficiency/potable water use reduction
    - Water reclamation
- Effluents and waste
    - De-icing/de-ice fluid management program
    - Contaminated sites
    - Fuel/hazardous materials management
- Transport
    - Ground transportation for passengers, staff, visitors, and suppliers
    - Fleet management
    - Parking

- Public transportation
- Accessibility of airport for community and customers

2.3.4.4 Social: (EONS: Social responsibility)

- Employment
  - Full-time employee count
  - Labor management relations
  - Employee programs (health and wellness, social, etc.)
- Training and education
  - Training and skills management programs
- Local communities
  - Community engagement and sponsorship
  - Supporting local business
  - Juneau and regional community information
  - Community access and use of the airport and terminal facility by the community
  - Managing the impact of airport operations on community

2.4 PROJECT GOALS

Goal setting and development is another component of the SMP. The groundwork for goals is established earlier in the project and aligned to the selected Focus Areas. At this stage no goals have been identified. However, sustainability initiatives have been compiled with several that may eventually serve as goals. Also, feedback on goals is being gathered from the public and TAC through surveys. The following section presents the process used to develop goals and summarizes activities completed to date.

2.4.1 Background on Goal Setting and Development

Goal setting is an iterative and evolving process. It is common in early project stages that sustainability goals are strategic, high level, or aspirational, with the thought they can be refined at a later time. Therefore, goals will likely remain "draft" and open to revision until the final elements of the SMP project or when associated targets are established. A goal setting workshop will be completed later in the project, when the sustainability baseline is complete and a substantial or complete list of sustainability initiatives has been developed.

When sustainability goals are developed they should aim to be SMART (Specific, Measurable, Attainable, Realistic, and Timely). Goals that fit this standard are the most relevant and will have the most impact in the development of sustainability programs. For the SMP, the goals will also be considered in relation to the master plan horizons (i.e., 5-, 10-, and 20-year periods).

Since goals, targets, and initiatives are often used interchangeably or in combination (or there is confusion about the difference), the following guide can be referenced to understand the difference between each:

- **Goals:** strategies to improve performance in a Focus Area or specific topic. These should be developed to be SMART (e.g., increase use of renewable energy at airport).
- **Initiatives**: specific actions or tactics to achieve goals and improve performance. These are more specific than a goal, however the level of detail can vary (e.g., expand on-site energy production systems and sell excess power).
- **Targets**: typically numerical values established to gauge progress on a goal or set of initiatives (e.g., use geothermal to heat over 90% of terminal within 5 years).

2.4.2 Public Surveys

During a public meeting at the airport on March 10, 2015, the community of Juneau was given the opportunity to engage airport staff and the Project Team to learn more about the SMP and sustainability aspects of the project. Community members were also given a public comment form (Figure 2-2) to provide feedback on Focus Areas, goals, and initiatives for the SMP.

Information from the public surveys, including any proposed goals or ideas for goals is being collected by the Project Team to facilitate goal setting with the TAC and Airport Board later in the project.

Figure 1: Public Comment Form

Page 1

PUBLIC COMMENT FORM – JUNEAU INTERNATIONAL AIRPORT (JNU)
SUSTAINABILITY FOCUS AREAS, GOALS, AND INITIATIVES

Purpose: We are seeking your feedback and input on the **Juneau International Airport Sustainability Master Plan** (SMP) to help inform the planning process. Please use this comment form to provide your **thoughts** on the **Focus Areas** and **initiatives** and **goals** the airport could consider to improve on sustainability.

Name (optional):
Contact information (optional):
Name of organization/business you are representing (optional):
Relationship to the airport:

	Airport Affiliate / Business Partner		Public/Community organization
	Airport Tenant		Community/Individual
	Other: please explain		

JNU Sustainability FOCUS AREAS	Specific Topics	When you think of this FOCUS AREA in terms of the airport, what comes to mind? What's most important for JNU?	What GOALS could JNU consider establishing to improve on sustainability in this area?	Examples of sustainability initiatives	What INITIATIVES (actions) could JNU consider implementing to improve on sustainability in this area?
Economic					
Economic Performance	Economic impacts, economic value			Expand on-site energy production systems and sell excess power	
Procurement Practices	Local purchasing, environmentally preferred purchasing, green building			Implement green building/sustainable procurement policy	
Operational					
Cost Control	Cost saving measures, energy efficiency, renewable energy			Complete an airport-wide energy audit and complete low / no cost efficiency measures	

2.4.3 TAC Survey

During a meeting at the airport on March 10, 2015, the members of the TAC were given a comment form (Figure 2-3) to provide feedback on sustainability topics, goals, and initiatives for the SMP. Information from this survey, including any proposed goals or ideas for goals is being collected by the Project Team to facilitate goal setting with the TAC and Airport Board later in the project.

Figure 2: TAC Comment Form

Feedback / Comment Form – Sustainability Focus Areas, Initiatives, and Goals

Purpose: We are seeking your feedback and input on the Juneau International Airport **Sustainability Master Plan** (SMP) to help inform the planning process. Please use this comment form to provide your **thoughts** on the **Focus Areas** and **initiatives** and **goals** the airport can implement to improve on sustainability.

JNU Sustainability **FOCUS AREAS**	Specific Topics	Example sustainability initiatives	What sustainability **GOALS** should the airport establish to improve on sustainability?	What sustainability **INITIATIVES** should the airport consider to improve on sustainability?	Are there any other sustainability **TOPICS** missing that you think should be addressed?
Economic					
Economic Performance	Economic impacts, economic value	Expand on-site energy production systems and sell excess power			
Procurement Practices	Local purchasing, environmentally preferred purchasing, green building	Implement green building/sustainable procurement policy			
Operational					
Cost Control	Cost saving measures, energy efficiency, renewable energy	Complete an airport-wide energy audit and complete low / no cost efficiency measures			
Business Continuity and Emergency Preparedness	Climate change risk, emergency preparedness, green building	Expand use of geothermal and consider solar energy for new construction			
Environmental					
Materials	Recycling programs, materials tracking and management, new diversion opportunities	Evaluate and expand solid waste / recycling management program			

2.4.4 Goal Setting Workshop

After collecting additional information the Project Team will facilitate a goal setting workshop with the TAC and Airport Board. Prior to the workshop, the Project Team will send recommended goals to attendees providing participants a basis for goal ideas and selection. To frame the conversation during the workshop, the Project Team will summarize the results of the sustainability baseline and present sustainability initiatives identified up to that point as well as draft or proposed goals received from the surveys completed in March 2015.

The Project Team will also present any local or regional goals, such as those identified in the Juneau Climate Action Plan, to be considered for the SMP and also to determine how the airport will impact, or be impacted by, those goals.

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3

3 EXISTING CONDITIONS

3.1 INTRODUCTION

This chapter of the master plan provides an inventory of the existing conditions at the Juneau International Airport (JNU) as they existed in late 2014. The purpose of this information is to establish the conditions that the master plan will be based on. The information was assembled in November 2014 during a site visit in which the planning team conducted a physical inventory of the airport and the surrounding neighborhoods, reviewed airport records, and obtained copies of previous airport planning and environmental documents as listed below:

1. Juneau International Airport - Airport Master Plan, March 1999
2. Juneau International Airport Economic Impact Study, December 2000.
3. Juneau International Airport Noise Compatibility Plan and Noise Exposure Maps, December 2000
4. Juneau International Airport Terminal Feasibility Study, March 2004
5. Juneau International Airport Terminal Study, December 2005
6. Juneau International Airport Final Environmental Impact Statement and Section 4(f) Evaluation, April 2007
7. Economic and Community Contributions of Selected Alaska Airports: 12 Case Studies, October 2011
8. Juneau Climate Action and Implementation Plan, November 2011
9. Alaska Aviation System Plan, Airport Needs Inspection Pilot Project, April 2013

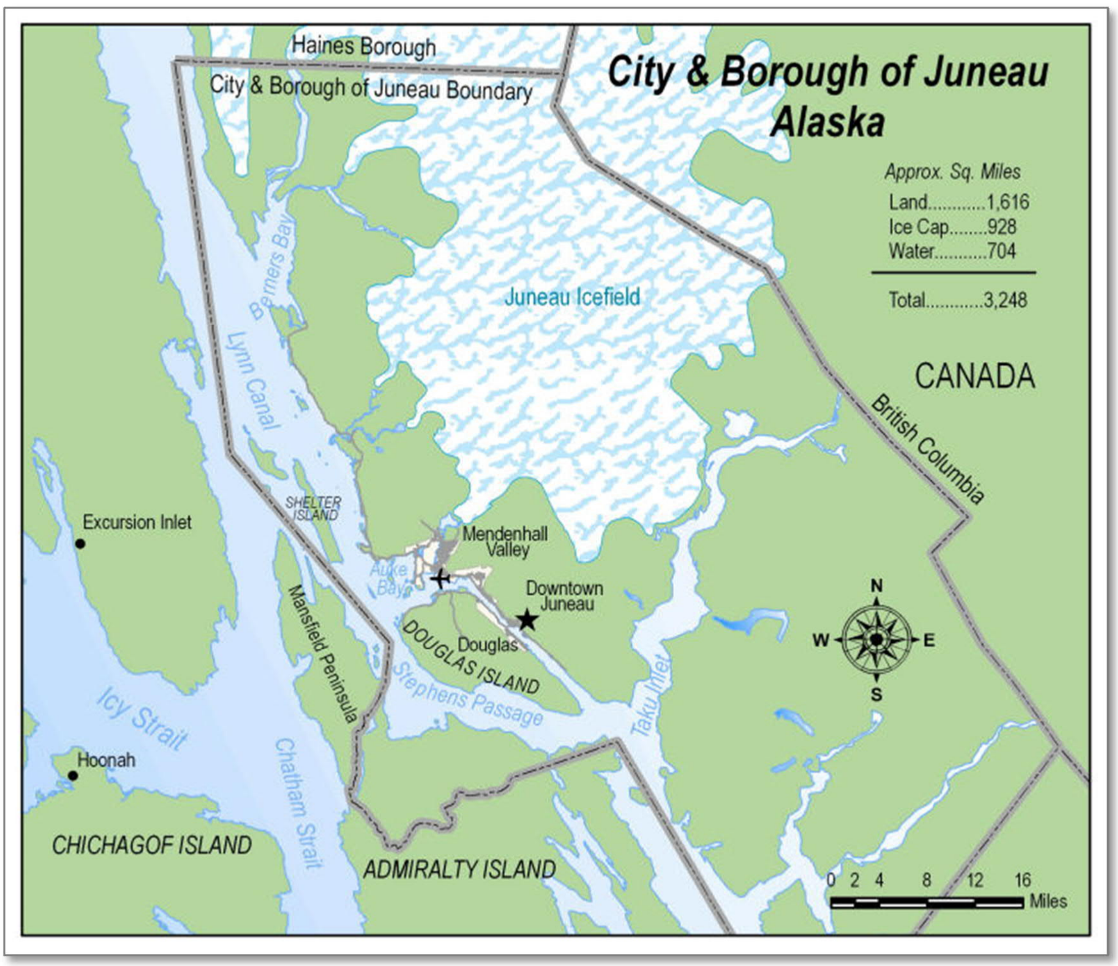
Select information from these documents as well as the site visits made during the fall of 2014 will be used as the basis for the Forecasts of Aviation Demand and the Determination of Airport Facility Requirements.

3.2 AIRPORT SETTING

Juneau International Airport (JNU) is located on approximately 662 acres of land within the City and Borough of Juneau (CBJ), Alaska, approximately 9 miles from downtown Juneau. Figure 3-1 shows the airport location. JNU is classified as a Commercial Service Primary airport by the Federal Aviation Administration (FAA) and as a Regional Class Airport (RCA) in the Alaska Aviation System Plan.

JNU is a municipally owned facility. The airport is an enterprise of the CBJ. A seven-person airport board, appointed by the CBJ Assembly, governs the airport. The airport board hires an Airport Manager and staff to oversee the maintenance and operations of the airport.

Figure 3-1: Airport Location Map



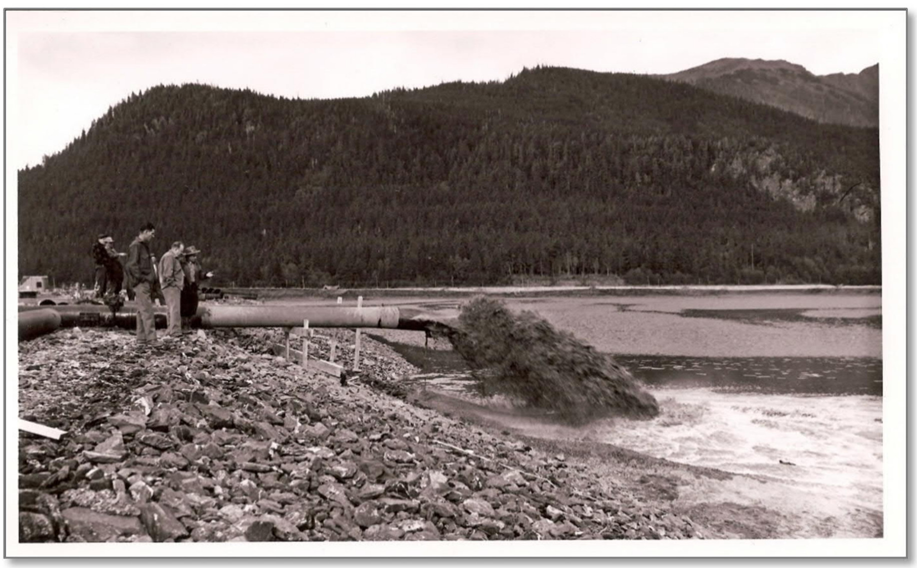
3.3 AIRPORT HISTORY

The Juneau Airport was developed by the U.S. to support military Air Corps operations in Alaska. Prior to World War II the area was served by limited small aircraft, mostly floatplanes. Following the war, Pan American Airlines and Pacific Northern Airlines established service to both Seattle and Anchorage. The runway was paved in 1942. Figures 3-2 through 3-4 show airfield construction.

In 1953 the airport was transferred from Federal ownership to the City of Juneau. In 1961 the runway was extended in anticipation of new jet service to Juneau that was initiated in 1962. In 1989 the full parallel taxiway was built. The Runway Safety Area was brought into compliance with FAA criteria in 2010 and the runway is scheduled to be rehabilitated in 2015.

The passenger terminal building was constructed in 1948, and expanded in 1957 and 1984.

Figure 3-2: Construction of the Juneau International Airport

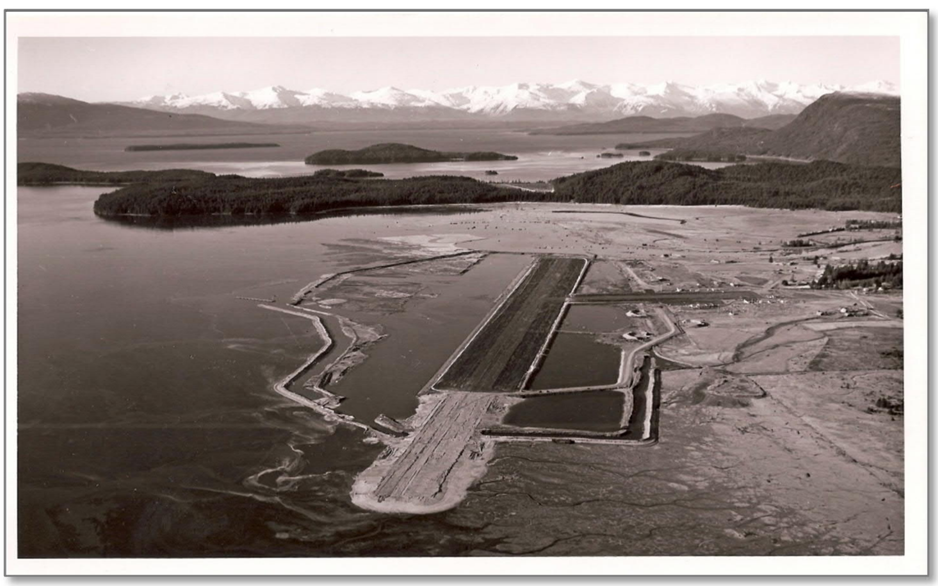


Source: Juneau International Airport Management

Figure 3-3: Construction of the Juneau International Airport Looking Northwest

Source: Juneau International Airport Management

Figure 3-4: Construction of the Juneau International Airport Looking West



Source: Juneau International Airport Management

3.4 APPLICABLE FEDERAL/STATE PLANS

The National Plan of Integrated Airport Systems (NPIAS) is used by the Federal Aviation Administration (FAA) to identify airports within the United States and its territories that are critical to the nation's air transportation system. Airports listed in the NPIAS are eligible for Federal Development Grants under the Airport Improvement Program (AIP).

Juneau International Airport is listed as a small hub primary airport' in the NPIAS. NPIAS defines a small hub primary airport as a commercial service airport that enplanes from 0.05 to 0.25% of the country's annual passenger boardings.

JNU is also a Part 139 airport under Federal Aviation Regulations (FAR). A Part 139 airport serves scheduled and unscheduled air carriers with more than 30 seats, and scheduled air carriers with more than 9 but less than 31 seats. An airport with Part 139 certification has agreed to certain operational and safety standards that are intended to ensure safety in air transportation. Both Part 121 (domestic, flag, and supplemental) and Part 135 (commuter and on demand) operations can occur at Part 139 airports.

3.5 COMMUNITY INVENTORY

Juneau is the capital city of the state of Alaska. It is located on the Gastineau Channel in Southeast Alaska, and is the second largest city in the United States by area. Juneau has been the capital of Alaska since 1906. The municipality unified on July 1, 1970, when the city of Juneau merged with the city of Douglas and Juneau Borough.

The city is named after gold prospector Joe Juneau, though the place was for a time called Rockwell and then Harrisburg. Juneau is unusual among U.S. capitals in that there are no roads connecting the city to the rest of the state or to North America. Ferry service is available for cars. This makes Juneau a de-facto island in terms of transportation, since all goods coming in and out must go by plane or boat. Downtown Juneau sits at sea level below steep mountains. Atop these mountains is the Juneau Icefield from which about 30 glaciers flow.

As of the 2010 Census, the CBJ had a population of 31,275. In July 2013, the population estimate from the United States Census Bureau was 32,660, making Juneau the second most populous city in the state (after Anchorage). Between the months of May and September, Juneau's daily population can increase by up to 15,000 people due to visiting tourists.

Table 3-1: Population Projections

Year	CBJ	Southeast Region
2012	32,832	74,423
2017	33,419	74,863
2022	33,839	74,849
2027	34,045	74,384
2032	34,042	73,511
2037	33,879	72,419
2042	33,617	71,170

The Southeast Region of Alaska, for which JNU serves as an air transportation hub for both passengers and cargo, had a population of 74,423 in 2012. In the publication "Alaska Population Projections 2012 through 2042" published by the Alaska Department of Labor in April of 2014, population for the CBJ was projected to grow at a steady rate over the next 20 years. After 2032 the population is expected to decrease slightly from 34,042 to 33,617 in 2042. Overall the Southeast Region is expected to show a short-term increase from 74,423 in 2012 to 74,849 in 2022. After that the region will experience a long-term decrease. Table 3-1 shows the population projections for both the CBJ and the Southeast Region.

3.6 AIRPORT FACILITIES

Existing airport facilities at JNU include one paved runway (8-26) with a full parallel taxiway system, runway and taxiway lighting systems, visual and electronic navigational aids, and a water runway (8W/26W) located approximately 500 feet south of the paved runway. The airfield is supported by a passenger terminal building and associated facilities, an Airport Traffic Control Tower (ATCT), and general aviation hangars and tiedown facilities. Table 3-2 shows the basic airport information and Figure 3-5 shows the existing facilities at JNU. These are discussed in the following section.

Table 3-2: Basic Airport Data Table

	Existing
Airport Identifier	JNU/PAJN
Airport Elevation (Surveyed)	25.3 ft
Airport Reference Point	
Latitude	58º21'16.97"N
Longitude	134º34'42.88"W
Airport Reference Code (ARC)	C-III
Design Aircraft	Boeing 737
Taxiway Design Group (TDG)	TDG-3
Taxiway Lighting	MITL
Mean Maximum Temperature (degrees F)	65
Wind Coverage (16 knots)	99.99%
Airport and Terminal NAVAIDS	ILS, NDB, GPS
Magnetic Declination	19º41'E ±0º26' (change 0º17'W per year)
NPIAS Service Level	Small hub Primary Airport

Source: Airport Layout Plan accepted by FAA 5/27/2014
Report to Congress, National Plan of Integrated Airport Systems, 2015–2019

GPS - global positioning system
ILS - instrument landing system
MITL - medium intensity taxiway lighting
NAVAIDS - navigational aids
NDB - nondirectional beacon
NPIAS - National Plan of Integrated Airport Systems

3.6.1 Runways and Taxiways

The airfield at JNU includes one paved runway, 8/26 which is 8,857 feet long, 150 feet wide, and has nonprecision instrument approaches available to both runway ends. Taxiway Alpha, the full length parallel taxiway, is 75 feet wide and has a runway/taxiway centerline separation distance of 400 feet. Exit taxiways Bravo, Charlie, Delta Echo, Foxtrot, and Gulf provide exiting from the runway onto Taxiway Alpha. The runway has been reconstructed to meet FAA design standards for safety and operational efficiency. Relevant data for Runway 8/26 is listed in Table 3-3.

Figure 3-5: Existing Airport Facilities

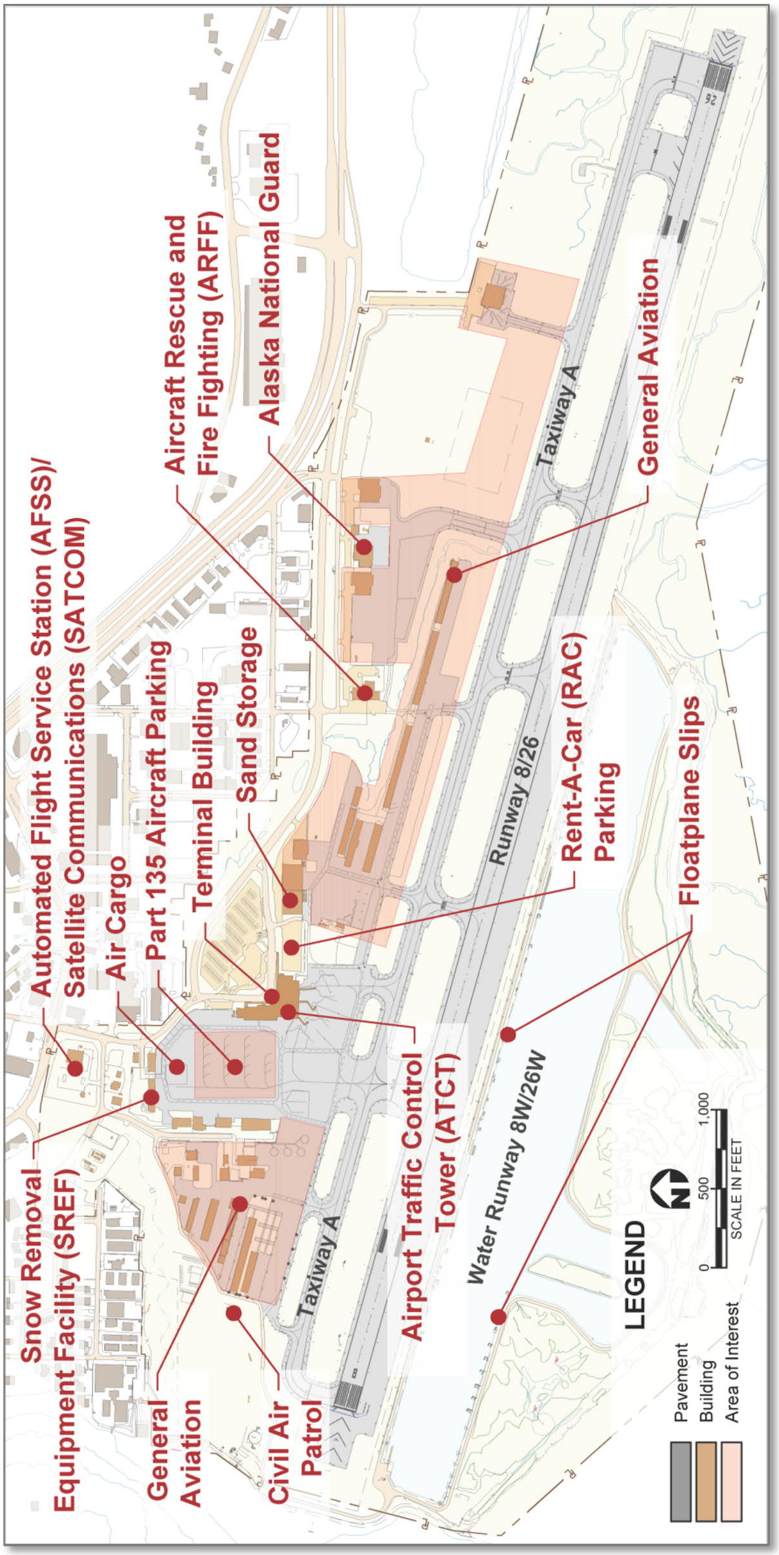


Table 3-3: Runway 8/26 Data

		Runway 8	Runway 26
Runway Dimensions	Length	8,857 ft.	
	Width	150 ft.	
Effective Gradient		0.02%	
Orientation		N75 - 08W	
Line-of-Sight		No Issues	
Surface Type		Asphalt (Grooved)	
Strength (Pounds)	Single Wheel	120	
	Dual Wheel	250	
	Double Tandem	550	
Marking		NPI	NPI
Lighting		HIRL	HIRL
Wind Coverage (16 knot)		99.99%	
Runway End	Elevation	25 ft MSL	23.4 ft MSL
	Latitude	58°21'28.25"N	58°21'05.88"N
	Longitude	134°35'49.09"W	134°33'08.63"W
Approach Type		NPI	NPI
Approach Slope (design)		34:1	34:1
Approach Aids		MALSF, LDIN, VASI, REIL, GPS	MALS, PAPI, REIL, GPS
NAVAIDS		LDA, NDB, GPS	REIL, VASI

Source: AECOM

GPS - global positioning system
HIRL - high intensity runway lights
LDA - localizer directional aid
LDIN – lead-in lights
MALS - medium-intensity approach lighting system
MALSF - medium-intensity approach light system with sequenced flashers
MSL - mean sea level
NAVAIDS - navigational aids
NDB - nondirectional beacon
NPI - nonprecision instrument
PAPI - precision approach path indicators
REIL - runway end identification light
VASI - visual approach slope indicator

3.6.1.1 Airport Design Criteria

Airport Design standards are predicated on the critical aircraft using the airport. The Airport Reference Code (ARC) was developed by the FAA to relate the operational and physical characteristics of the most demanding types of aircraft expected to operate at the airport on a regular basis (the critical aircraft) to the airport's design criteria. The ARC is based on two key characteristics of the critical aircraft. The first, denoted by a letter, is the Aircraft Approach Category. This is based on the aircraft's approach speed in the landing configuration. Generally, aircraft approach speed affects runway length, exit taxiway locations, and runway-related facilities. The ARC approach speed 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 166 knots or more

The second component, depicted by a roman numeral, is the Airplane Design Group. This is based on the aircraft's wingspan and is used to determine dimensional standards for the layout of airport facilities, such as separation between runways and taxiways, taxilanes, buildings, or objects potentially hazardous to aircraft movement on the ground. The ADG categories are as follows:

- Design Group I: Wingspan up to but less than 49 feet
- Design Group II: Wingspan 49 feet up to but less than 79 feet
- Design Group III: Wingspan 79 feet up to but less than 118 feet
- Design Group IV: Wingspan 118 feet up to but less than 171 feet
- Design Group V: Wingspan 171 feet up to but less than 214 feet
- Design Group VI: Wingspan 214 feet up to but less than 262 feet

Currently, JNU has an Airport Reference Code ARC of C-III based on use by the Boeing 737 aircraft. Refer to Table 3-4 for the critical aircraft characteristics.

Table 3-4: JNU Critical Aircraft

Critical Aircraft	Boeing 737-300
Wingspan	94.8 ft.
Tail Height	37.6 ft.
Approach Speed	135 knots
Weight (Maximum Take-off)	138,500 lbs.
Runway Design Code	C-III

The dimensional design criteria for a C-III category runway are shown in Table 3-5. This table also provides a comparison of

FAA standards to existing conditions on Runway 8-26.

Table 3-5: Existing Runway 8/26 Conditions Compared with C-III Design Criteria

Design Feature	Existing (ft.)	Standard (ft.)	Difference
Runway			
Width	150	150	Meets Standard
Runway Shoulder Width	25	25	Meets Standard
Runway Blast Pad Width	230	200	Meets Standard
Runway Blast Pad Length	230	200	Meets Standard
Runway Safety Area (RSA) Width	500	500	Meets Standard
RSA Length (beyond runway end)	600	600	Meets standard through the use of declared distances
Object Free Area (OFA) Width	800	800	Floatplanes parked on the north side of the floatpond are within the OFA.
Object Free Area Length (beyond runway end)	1,000	1,000	Meets Standard
Obstacle Free Zone (OFZ) Width	400	400	Meets Standard
Obstacle Free Zone Length (beyond runway end)	200	200	Meets Standard
Runway Centerline to:			
Taxiway Centerline	400	400	Meets Standard
Aircraft Parking Area	350	500	Floatplane Parking on the north end not to standard
Taxiway Centerline to Fixed or Movable Object	129.5	129.5	Meets Standard
Taxilane Centerline to Fixed or Movable Object	112.5	112.5	Meets Standard

Source: FAA Advisory Circular 150/5300-13A, Airport Design, Change 1

3.6.1.2 Runway Safety Areas

The Runway Safety Area (RSA) is a critical, two-dimensional area surrounding each active runway. The RSA must be:

- Cleared, graded, and free of potential hazardous surface variations;
- Properly drained;

- Capable of supporting Aircraft Rescue and Fire Fighting (ARFF) equipment, maintenance equipment, and aircraft; and
- Free of objects, except for those mounted using low-impact supports and whose location is fixed by function.

Based on FAA Criteria from Advisory Circular 150/5300-13A for a C-III runway, the RSA for Runway 8/26 is 500 feet wide extending 1,000 feet beyond each runway end. Upon completion of the runway reconstruction project in 2015 the RSAs at JNU are in compliance using declared distances.

3.6.1.3 Runway Object Free Areas

The Runway Object Free Area (OFA) is a two-dimensional ground area surrounding each runway. The OFA clearing standard precludes parked aircraft or other objects, except navigational aids (NAVAIDS) and other facilities whose locations are fixed by function, from this area. For Runway 8/26 the OFA is 800 feet wide, centered on the runway centerline, and extends 1,000 feet beyond the end of the runway. The floatplane parking positions located on the north end of the floatpond are within the OFA and the tail heights penetrate the OFA.

3.6.1.4 Runway Protection Zone

The Runway Protection Zone (RPZ) is trapezoidal in shape and centered on the extended runway centerline for each runway end. Its function is to enhance the protection of people and property on the ground. It begins 200 feet beyond the permanent runway threshold. The RPZ dimensions are based on the type of aircraft using the runway, type of operations (visual or instrument) being conducted, and visibility minimums associated with the most demanding approach available. RPZ dimensional standards are defined in the FAA Advisory Circular 150/5300-13A, Airport Design. The dimensions for the RPZs at JNU are shown in Table 3-6.

Table 3-6: Runway Protection Zone (RPZ)

Runway	Aircraft Served	Approved Approach	Zone Length (ft.)	Inner Width (ft.)	Outer Width (ft.)
8	Large	Nonprecision	1,700	500	1,010
26	Large	Nonprecision	1,700	500	1,010

The airport owns or has easements on all property within the RPZs.

3.6.1.5 Taxiway Standards

The taxiways at JNU are classified as TDG-3 according to AC 150/5300-13A. Table 3-7 shows the dimensional criteria associated with the taxiways as well as the current state of compliance.

Table 3-7: Taxiway Design Criteria

Design Feature	Standard (ft.)	Alpha (ft.)	Bravo (ft.)	Charlie (ft.)	Delta (ft.)	Echo (ft.)	Foxtrot (ft.)	Golf (ft.)
Width	50	75	102.5	260	50	100	75	242
Edge Safety Margin	10	10	10	10	10	10	10	10
Shoulder Width	20							
Taxiway Safety Area Width	118	118	118	118	118	118	118	118
Taxiway Object Free Area Width	186	186	186	186	186	186	186	186
Taxilane Object Free Area Width	162	162	162	162	162	162	162	162
Taxiway Centerline to Fixed or Movable Object	93	93	93	93	93	93	93	93
Taxilane Centerline to Fixed or Movable Object	81	81	81	81	81	81	81	81
Taxiway Wingtip Clearance	34	34	34	34	34	34	34	34
Taxilane Wingtip Clearance	23	23	23	23	23	23	23	23

All taxiways meet or exceed the design standards set by FAA. In fact the widths of the taxiways exceed standards in most cases. Three of the taxiways, Bravo, Charlie and Golf substantially exceed the standard creating a potential issue related to situational awareness.

3.6.1.6 Water Runway 8W/26W

The water runway at JNU is located in the float pond south of Runway 8/26 with a centerline to centerline separation of 575 feet. The designated water runway area officially measures 4,800 by 150 feet. Within the float pond there are docks for floatplane storage along the north and south banks with a total of 51 positions. During the summer months these positions are generally filled to capacity.

Within the float pond, aircraft taxi to and from the designated water runway ends within the floatpond, outside the designated water runway area. All aircraft taxi using a taxi channel, move in a clockwise direction.

3.6.1.7 *Airfield Lighting and Navigational Aids*

Table 3-8 shows the visual and electronic navigation and landing aids available at JNU.

Table 3-8: Navigational Aids

Navigational Aid	RWY 8	RWY 26
PAPI		✈
REIL		✈
VASI (4 box)	✈	
GPS	✈	✈
Rotating Beacon	✈	✈
MALSF	✈	✈
ILS – Glideslope Antenna	✈	
Localizer	✈	
Lighted Windsock	✈	✈

GPS - global positioning system
ILS - instrument landing system
MALSF - medium-intensity approach light system with sequenced flashers
PAPI - precision approach path indicator
REIL - runway end identification light
VASI - visual approach slope indicator

3.6.1.8 *Airfield Signage*

The airport incorporates standard runway and taxiway signage, and meets all FAA standards.

3.6.1.9 *Airspace and Air Traffic Control*

Air traffic into and out of JNU is directed by the FAA, which directs all traffic flying under Instrument Flight Rules (IFR) in controlled airspace across Alaska through the Anchorage Air Route Traffic Control Center (ARTCC). Thus all instrument approaches and departures at JNU require approval from the ARTCC.

To further enhance safe operations the FAA operates an ATCT at JNU. The control personnel in the tower provide landing and departure instructions to all aircraft operating at the airport as well as providing other services such as weather advisories and en route flight clearances. The ATCT is located atop the passenger terminal, in the southeast corner. The JNU ATCT operates from 6 a.m. through 11 p.m. during the summer and from 7 a.m. through 8 p.m. the remainder of the year.

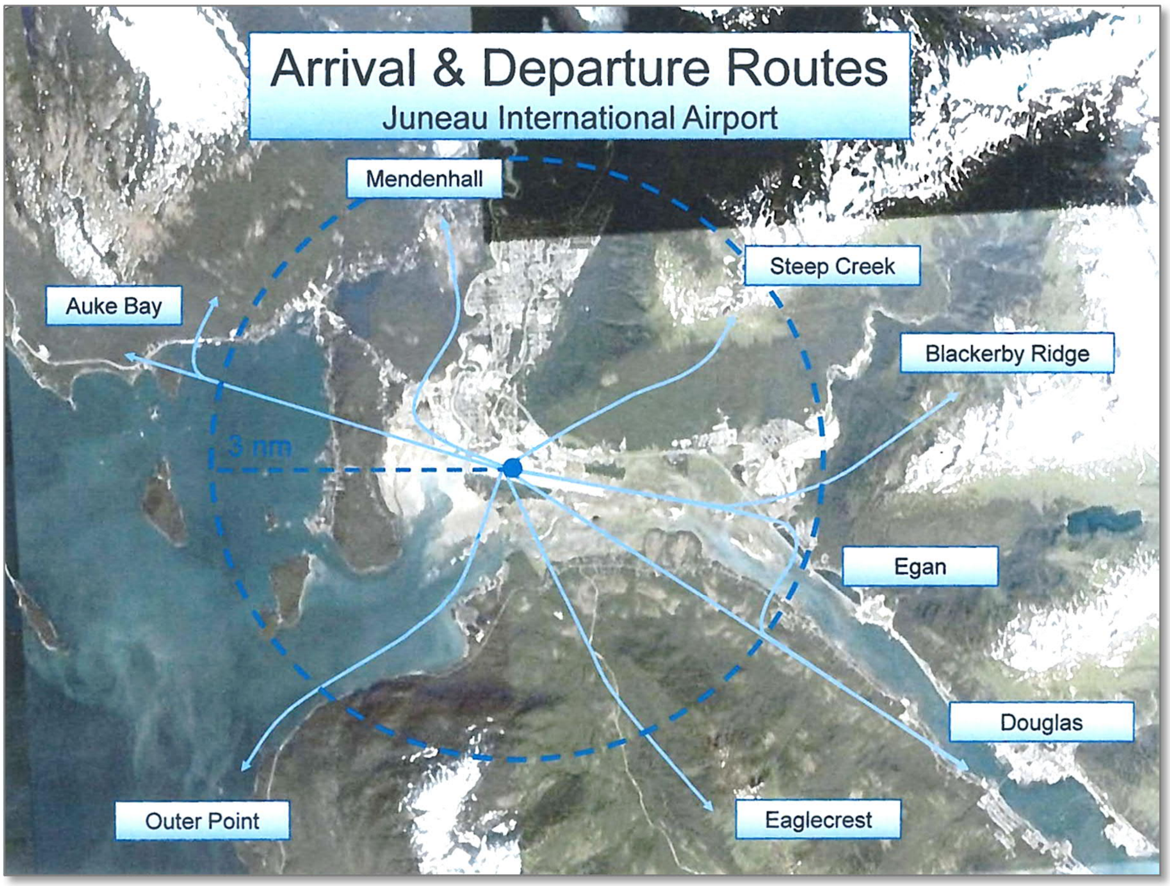
3.6.1.10 *Approach and Departure Procedures*

JNU is located in the mountainous region of Southeast Alaska and the terrain in the region makes approach and departure procedures into JNU unique. Due to the regional terrain, ATCT personnel have also established specific approach and departure routes at JNU for visual flights. These are shown on Figure 3-6.

The FAA has published two nonprecision instrument procedures and one departure procedure. These are shown on Figure 3-7 and Figure 3-8.

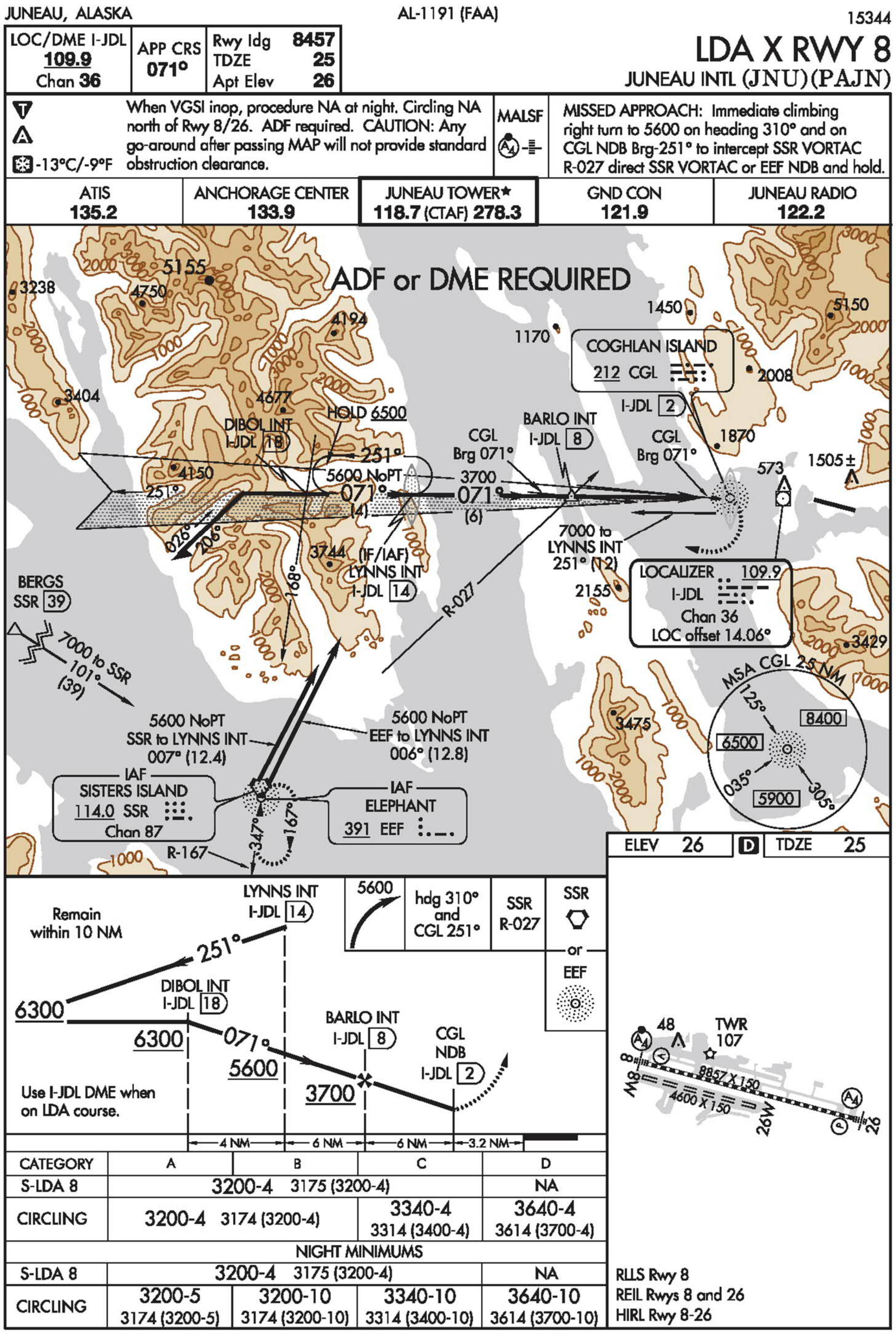
In addition some companies have developed special instrument procedures for arrivals and departures at JNU and these have been approved by FAA. These are unique to each company's operations and reduce minimums for their operations.

Figure 3-6: JNU Visual Approach and Departure Routes



Source: FAA Air Traffic Control – Juneau Tower

Figure 3-7: LDA X Approach, Runway 8

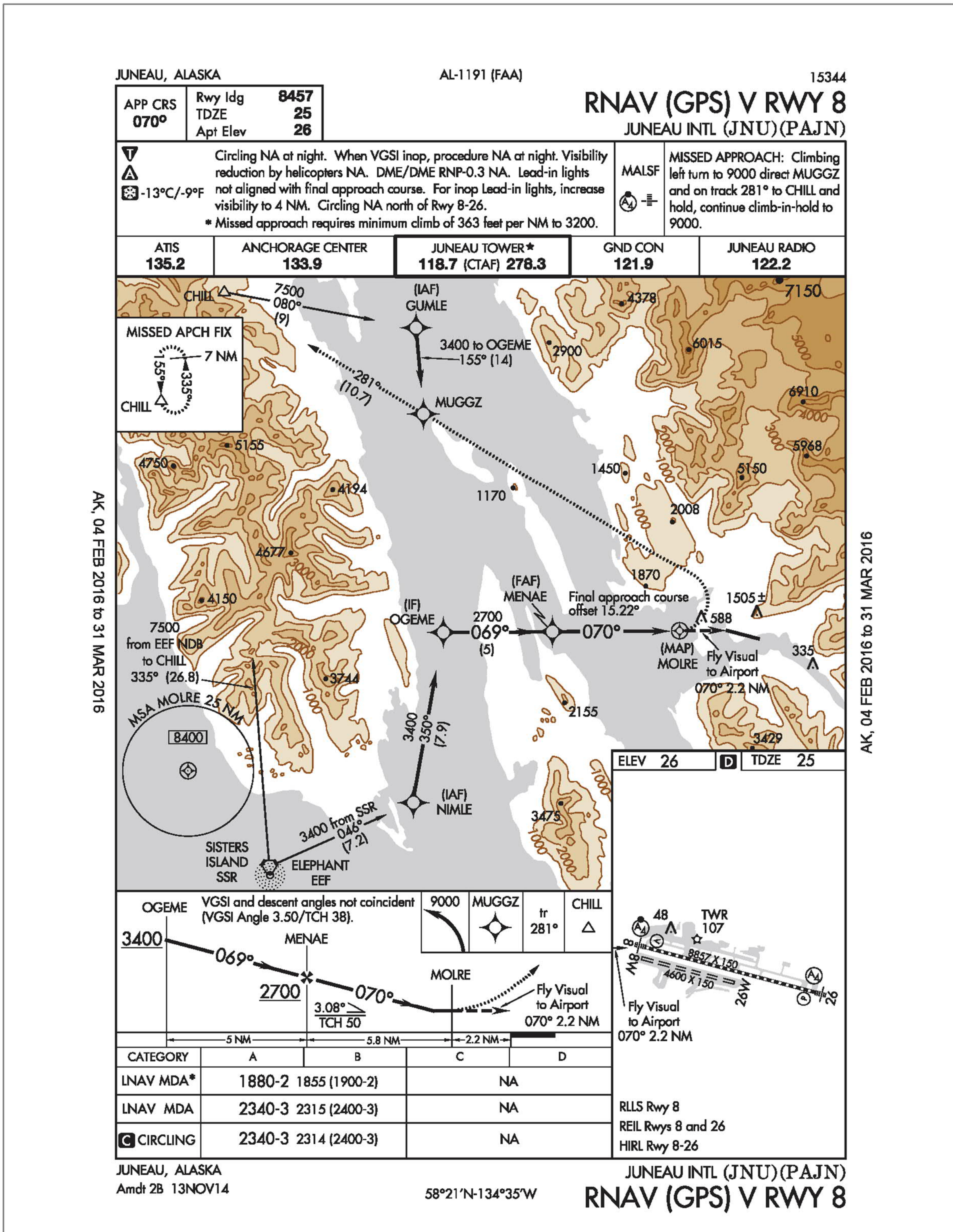


CATEGORY	A	B	C	D
S-LDA 8	3200-4 3175 (3200-4)			NA
CIRCLING	3200-4 3174 (3200-4)		3340-4 3314 (3400-4)	3640-4 3614 (3700-4)
NIGHT MINIMUMS				
S-LDA 8	3200-4 3175 (3200-4)			NA
CIRCLING	3200-5 3174 (3200-5)	3200-10 3174 (3200-10)	3340-10 3314 (3400-10)	3640-10 3614 (3700-10)

RLLS Rwy 8
REIL Rwys 8 and 26
HIRL Rwy 8-26

JUNEAU, ALASKA
Amdt 12B 13NOV14
58°21′N-134°35′W
JUNEAU INTL (JNU)(PAJN)
LDA X RWY 8

Figure 3-8: RNAV (GPS) V Approach, Runway 8



3.6.1.11 FAR Part 77 Surfaces

Under Part 77 of the Federal Aviation Regulations (FAR), standards are established for determining obstructions to navigable airspace.

Local jurisdictions protect FAR Part 77 surfaces by incorporating them into their zoning regulations and practices. The objective is to maintain the surrounding airspace and keep it free of obstacles that impede aircraft operations. Part 77 regulations dictate the type of infrastructure and development allowed adjacent to and near the airport as well as the height of these objects. The five surfaces that together make up the FAR Part 77, Imaginary Surfaces are the Primary, Approach, Transitional, Horizontal, and Conical Surfaces. Figure 3-9 shows the Part 77 Surfaces for JNU.

Primary Surface

The primary surface is longitudinally centered on the runway and extends 200 feet beyond each runway end. The elevation of any point of the primary surface is equal to the elevation of the nearest point on the runway centerline. The width varies, depending on the type of approach available to the runway. For JNU, Runways 8 and 26 have a nonprecision instrument approach. As a result, the primary surface is 500 feet wide centered on the runway centerline.

For Runway 8W/26W the primary surface is 250 feet wide, reflecting the runway's visual nature.

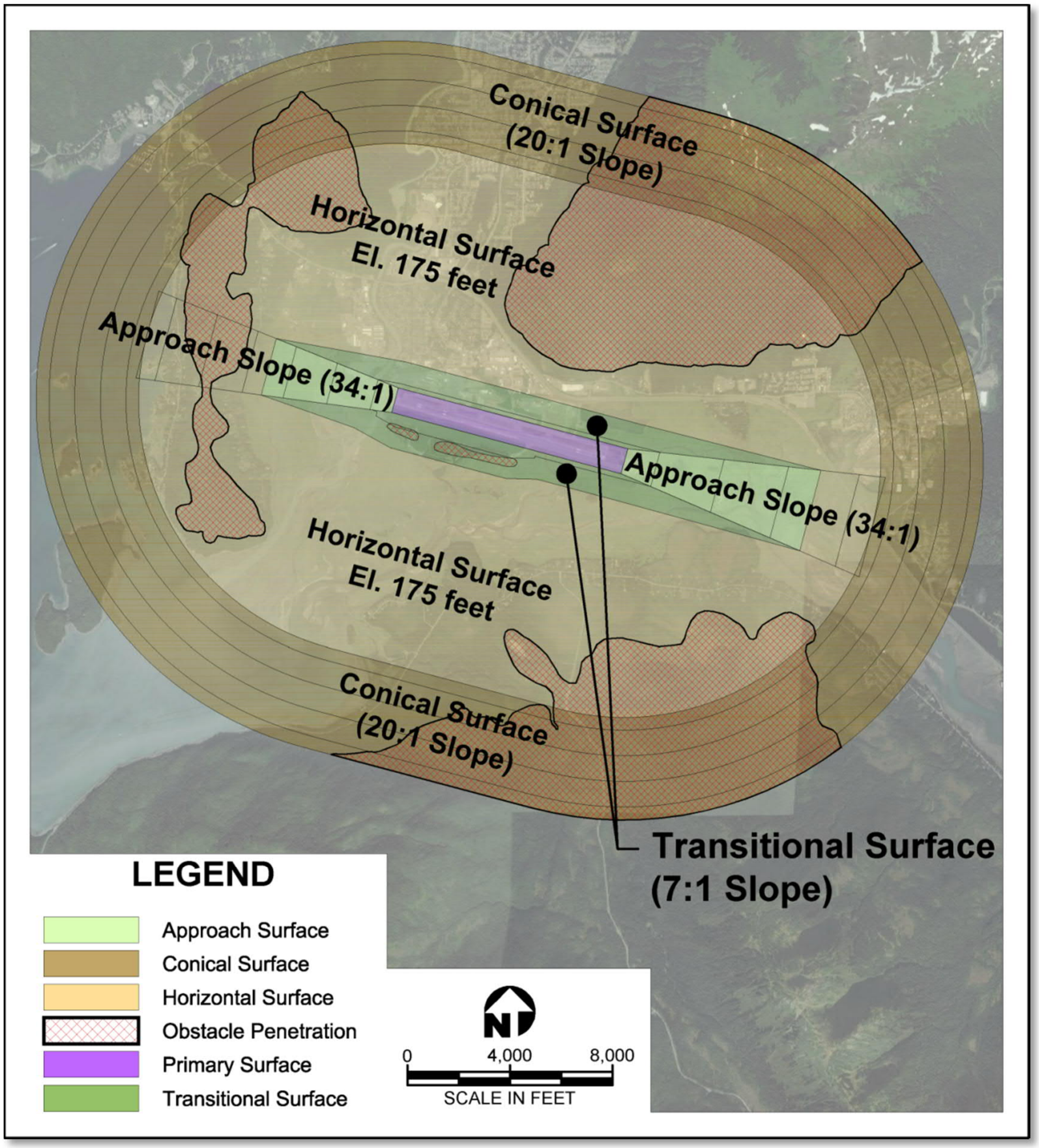
Approach Surface

The approach surface is an inclined slope extending outward and upward from each end of the primary surface, centered on the extended runway centerline. The inner width of the surface is the same as that of the primary surface. The approach surface is applied to each end of the runway based on the type of approach available.

Runway 8/26 is designated as a nonprecision instrument runway. The approach surface for both ends is 500 feet wide where it intersects with the primary surface and expands uniformly for a distance of 10,000 feet at a slope of 34:1.

Runway 8W/26W is a visual runway with approach surfaces that are 2,560 feet wide where they intersect with the primary surface and extend upward and outward at a slope of 20:1 for a distance of 5,000 feet, at which point it is 750 feet wide.

Figure 3-9: FAR Part 77 Surfaces for JNU



Transitional Surface

The transitional surface is an inclined plane with a slope of 7:1, extending upward and outward at right angles to the runway centerline from the primary surface and the sides of the approach surfaces. These surfaces terminate where they intersect with the horizontal surface or another surface with more critical restrictions.

Horizontal Surface

The horizontal surface is a horizontal plane 150 feet above the established airport elevation. JNU has an established elevation of 25.3 feet MSL (above Mean Sea Level) so the horizontal surface is 175.3 feet MSL. The perimeter of the surface is determined by arcs extending from the centerline of the runway and its intersection with the primary surface. The radii of these arcs correspond with the approach surface lengths for each of the runway ends.

Conical Surface

The conical surface is an inclined plane at a slope of 20:1, extending upward and outward from the periphery of the horizontal surface for a distance of 4,000 feet.

JNU Part 77 Summary

As seen on Figure 3-9 the only surfaces that are clear of penetration at present are the primary and transitional surfaces. The topography of the airport's vicinity creates one of the more complex airspace environments in the United States.

3.7 TERMINAL AREA

The terminal area at Juneau International Airport, shown in Figure 3-10, is located north of the runway. The area includes the passenger terminal building, the commercial aviation aircraft parking apron, the ATCT, and Rental car, employee and public automobile parking. Access is via Shell Simmons Drive.

3.7.1 Passenger Terminal Building

The passenger terminal building is an L-shaped structure composed of a one-story north wing that primarily accommodates Part 135 air carrier operations and a two-story east wing that accommodates facilities for Part 121 air carriers. The terminal building totals approximately 94,200 square feet of floor area.

For the most part, the north and east wings of the terminal building function independently due to the differing operating characteristics and security requirements of the Part 121 and Part 135 air carriers. There is minimal common usage of facilities as a result of these differing operating requirements.

Terminal floor plans are shown in Figure 3-11 and Figure 3-12. As these figures show, the lower levels of both the north and east wings have linear functional areas arranged parallel to the terminal curb and aircraft parking apron along a central access corridor. Building entries, concession spaces, car rental counters, and a variety of support spaces including mechanical rooms and restrooms are located along the front façade of the building adjacent to the terminal curb front. A Part 135 air carrier holdroom/greeter area is located along this façade of the north wing. A Federal Inspection Services (FIS) area for clearance of arriving international passengers is also located in this area.

Figure 3-10: Terminal Area Plan

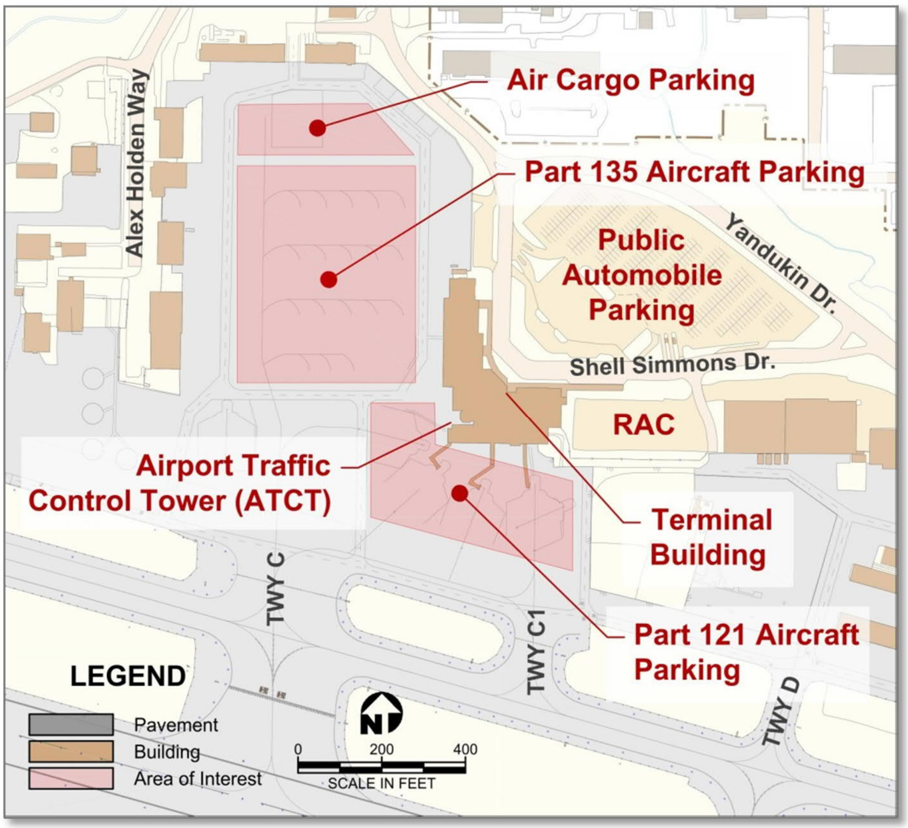


Figure 3-11: Terminal Floor Plan – Level One

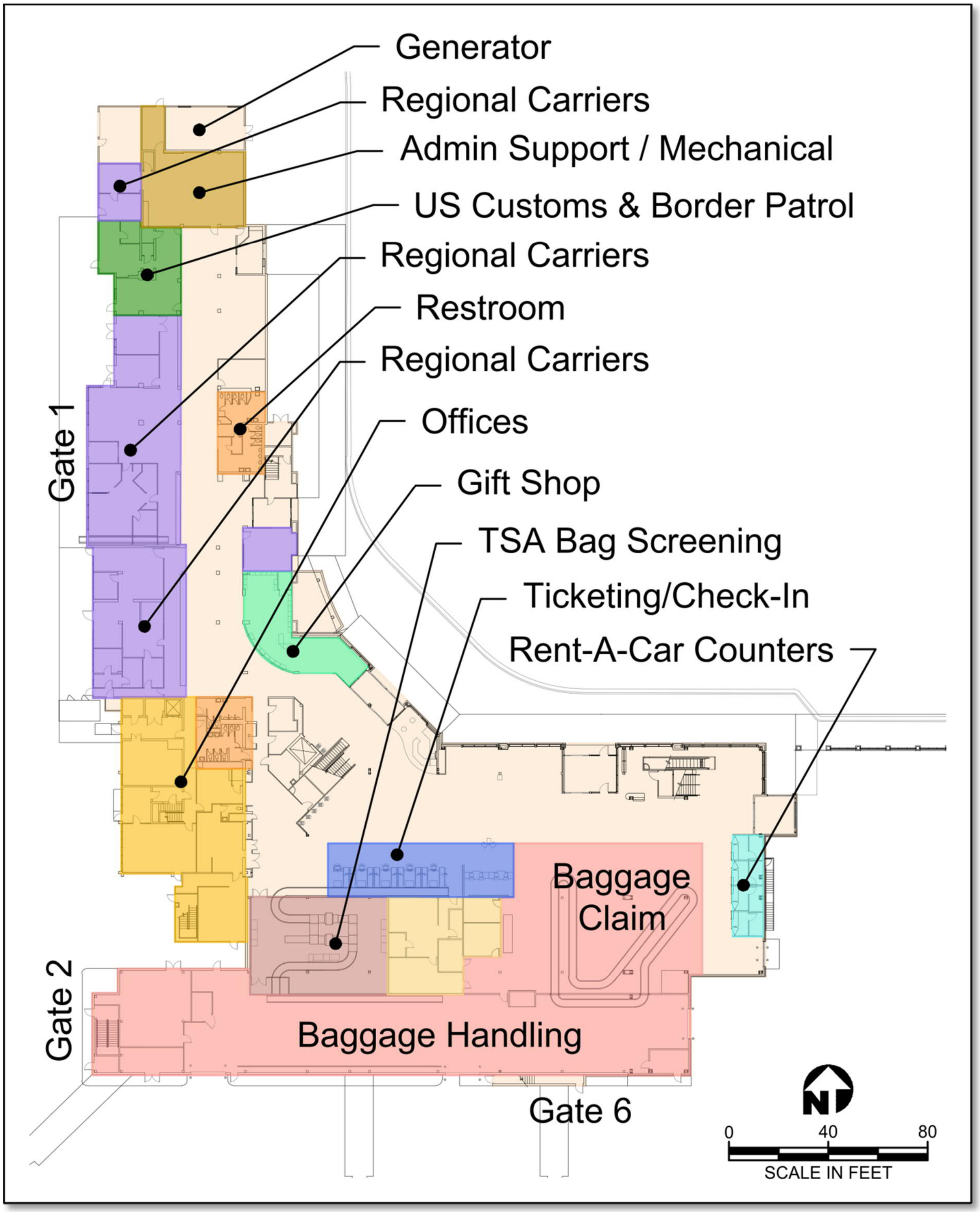
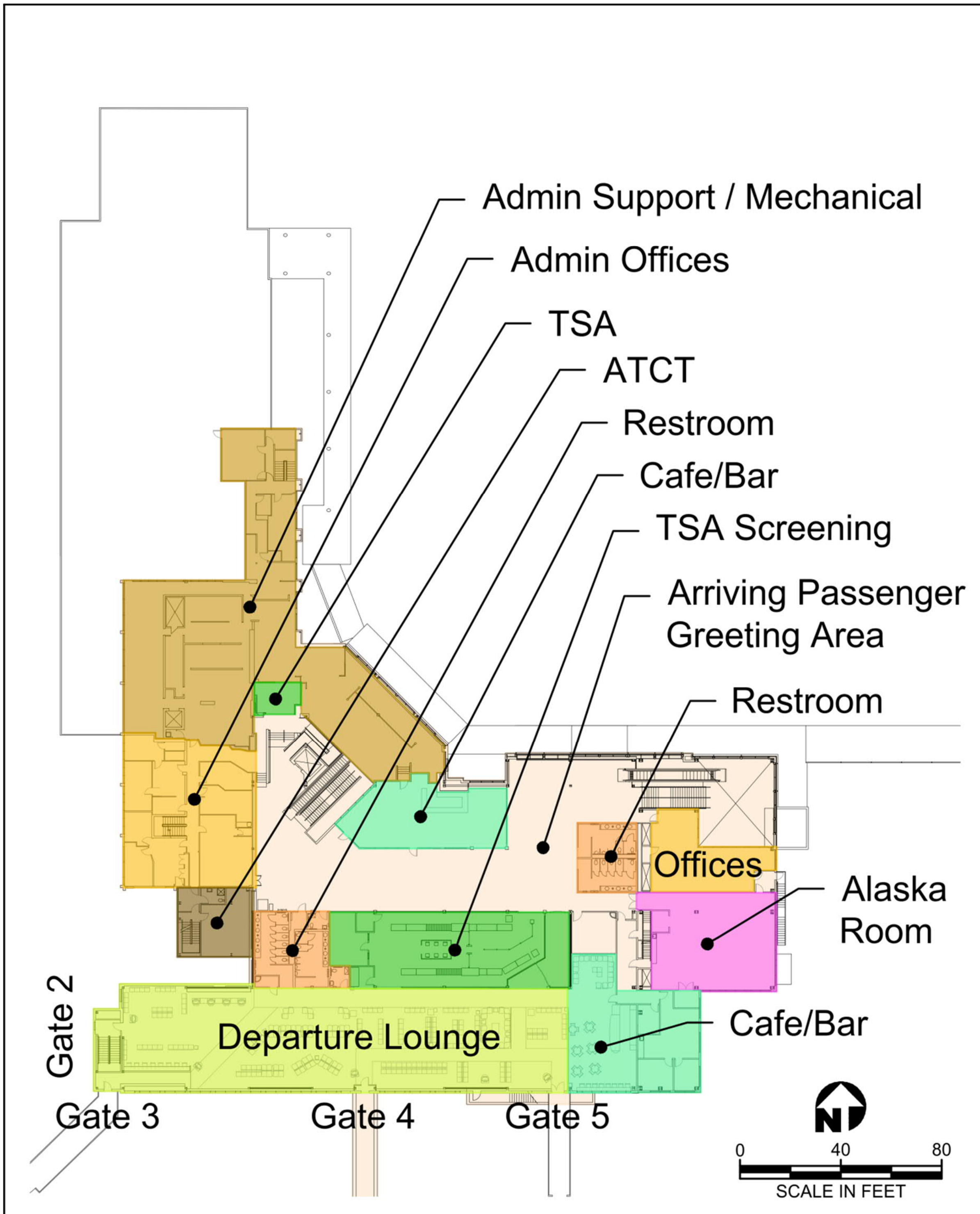


Figure 3-12: Terminal Floor Plan – Level Two



The central access corridor provides public circulation space. A central bank of stairs, escalator, and elevator serving the upper level are located at the point where the north and east wings of the terminal building intersect. Along the rear building façade, adjacent to the aircraft apron, are airline ticket counters, airline offices, baggage handling space, and miscellaneous support functions including the airport police office, airport/tenant storage, and other airport and tenant maintenance areas.

The upper level of the terminal building contains a central circulation core with spaces generally arranged around these central stairs, escalator, and elevator core, and the public lobby. The lobby extends east to the security checkpoint.

3.7.1.1 Airside Facilities

Two aircraft parking aprons, one serving the Part 121 operators and the second serving the Part 135 carriers comprise the airside area of the terminal.

The Part 135 apron lies between the north wing of the terminal building and Taxiway B, encompassing approximately 5¾ acres. The Part 135 apron provides six rows of aircraft parking positions, with each row accommodating six to eight aircraft. This area includes parking for the Part 135 carriers, air cargo, and some general aviation activities. All aircraft power-in and power-out of these parking positions. A vehicle service road (VSR) is located along the building side of the aircraft parking rows. Part 135 passengers are escorted between the aircraft and the terminal by the pilot or another airline employee. Baggage is transferred between the terminal and aircraft across this ramp in a similar manner.

The Part 121 apron is located south of the terminal building and occupies approximately 6¾ acres. Four parking positions can accommodate Boeing 737 size aircraft on this apron.

Part 121 passengers typically enplane and deplane to and from the upper level holdroom. Part 121 aircraft are typically Boeing 737 passenger aircraft, however Alaska Airlines has daily flights using aircraft that combine passenger and cargo (combi-aircraft). These aircraft must enplane and deplane passengers via ground boarding, using the stairwell or ramp at the west end of the holdroom. Gates 3 through 5 on the south side of the terminal building are served by jet bridges. A stairwell, designated as Gate 6 and located between Gates 4 and 5 is used for ground boarding of aircraft at Gate 5 when required.

Part 121 aircraft power-in to their assigned gates and are pushed back. Taxiway C is occasionally blocked by departing aircraft that must wait to be disconnected from a tug, since there is no hold area available.

3.7.1.2 Landside

Primary access to the airport is provided from Egan Drive. Direct vehicle access to the terminal is provided from both Shell Simmons Drive and Yandukin Drive. An intersection between these two roadways is located just north of the terminal building. Vehicles traveling to and from the terminal use an extension of Shell Simmons Drive, which is restricted to one-way traffic flows.

Airport parking is provided for both public and airport employees, all of which are accommodated on surface lots. The public parking lot is managed under contract by Republic Parking. These lots contain 68 short-term spaces and 220 long-term spaces.

Rental cars are located at the east end of the terminal building, which provides a convenient, short walking distance from the rental car counters to the cars. The rental car area comprises an approximately 1-acre lot with a capacity 129 rental car spaces.

Transit (bus) service is provided by Capital Transit and links the Auke Bay area, the airport, the Valley, and downtown Juneau with hourly weekday service between 7 a.m. to 6 p.m., with limited service on weekends. The transit stop is located at the terminal curbside.

3.8 AIRPORT SUPPORT FACILITIES

Support facilities at JNU include Air Cargo, Aircraft Rescue and Fire Fighting, Snow Removal Equipment, Airport Maintenance, Fuel Facilities, and the Fixed Base Operator. Each of these is discussed in the following.

3.8.1 Air Cargo Facilities

Three air cargo facilities exist at JNU. Alaska Airlines maintains a cargo facility consisting of two buildings from which the airline processes freight. Their facility is located west of the passenger terminal apron. These facilities process most of the freight that comes into or leaves JNU as belly cargo on Alaska Airlines. The aircraft used for this freight service are Boeing 737 aircraft, some of which also carry passengers in combi-aircraft where a portion of the passenger capacity is given up to allow for Alaska to handle a heavier cargo volume. The freight on these combi-aircraft is loaded and unloaded at the terminal gates. Alaska also operates an all-freight flight to Juneau that parks and receives service at a designated parking position on the central terminal apron.

Also operating on the central terminal apron is Empire Airlines who operate the FedEx facility using ATR 72 aircraft. And Alaska Central Express uses Beech 1900 aircraft. Their operations also take place on the central apron area.

3.8.2 Aircraft Rescue and Fire Fighting Facility

The airport operates an ARFF facility located east of the terminal area, accessible off Crest Street. The JNU ARFF is a shared facility where the northern portion of the building is operated by the Glacier Valley Fire Department to respond to community fire events and the southern portion is an Index C ARFF facility that responds to airport emergencies. Plans are currently (Summer 2015) being developed to construct a new ARFF facility on the existing site.

The ARFF facility houses a 2016 Rosenbauer truck with a capacity for 3,000 gallons of water, 400 pounds of AFFF and 500 pound of dry chemicals, a 2003 Oshkosh truck with a capacity for 1,585 gallons of water, 205 pounds of AFFF and 500 pounds of dry chemicals, and a 1993 Oshkosh Truck with a capacity for 1,585 gallons of water 205 pou8nds of AFFF and 700 pounds of dry chemicals.

3.8.3 Snow Removal Equipment (SRE)

JNU has a fleet of snow removal equipment dedicated to keeping the airport operational during winter storm events. The SRE is currently stored near the airport's maintenance facility but there are plans to construct a new SRE storage facility. Currently the Airport maintains 13 vehicles to support snow removal operations. These are listed in Table 3-9.

Table 3-9: JNU Snow Removal Equipment Fleet

Manufacture Year	Manufacturer	Model
1996	Oshkosh	Tanker Model P2552
1998	Oshkosh	Runway Plow Truck/Dump Truck
1998	Oshkosh	Runway Plow Truck/Dump Truck
1998	Oshkosh	Runway Plow Truck/Dump Truck
2004	Elgin	Geovac vacuum sweeper
2003	MB/OSHKOSH	High Speed Runway Broom
2003	MB/OSHKOSH	High Speed Runway Broom
2003	MB/OSHKOSH	High Speed Runway Broom
1989	International	Truck - Sand
2003	Freightliner	Dump/Sander
2004	Chevrolet	Trailblazer
2003	Oshkosh	Snow Blower
1992	Oshkosh	Snow Blower
2001	Volvo	Grader
2000	Champion	Grader
2004	CAT	Loader 980
1992	Cat	Loader
2002	Case	Skid Steer
2016	Bobcat	Track Loader

3.8.4 Airport Maintenance

The CBJ owns and operates a maintenance building on the airport. The building is located on the central apron. Additionally, there is a sand storage building used for supplies located east of the terminal building. A new Snow Removal Equipment Facility is scheduled to open in 2018.

3.8.5 Fuel Facilities

Bulk fuel storage is located north of the airport across Alex Holden Way. In this area there are 4 – 30,000 Jet A tanks, 1 – 30,000 gallon 100LL Avgas tank, and 1- 20,000 gallon 100LL Avgas tank. The storage tanks are above ground. Fuel can be purchased from the Fixed Base Operator.

3.8.6 Fixed-Base Operator (FBO)

Aero Services Inc. operates the only full-service FBO facility at JNU. They are located to the west of the central apron area and offer a full range of services including aircraft storage, fueling, de-icing, flightline maintenance, and pilot's lounge/flight planning.

3.9 GENERAL AVIATION (GA) FACILITIES

GA facilities are currently located in two areas, the east GA area and the west GA area (west of the main ramp). Figure 3-13 shows these areas. The west GA generally extends to the western airport property line. This area also includes a variety of buildings as shown on Figure 3-14 and as listed in Table 3-10.

The east GA area contains a combination of facilities including the CBJ sand storage building, the ARFF facility, and numerous T-hangars and executive hangars, and air ambulance (medivac) facilities. Figure 3-15 and Table 3-11 show the building locations and building inventory for this area.

Figure 3-13: GA Area Key Plan

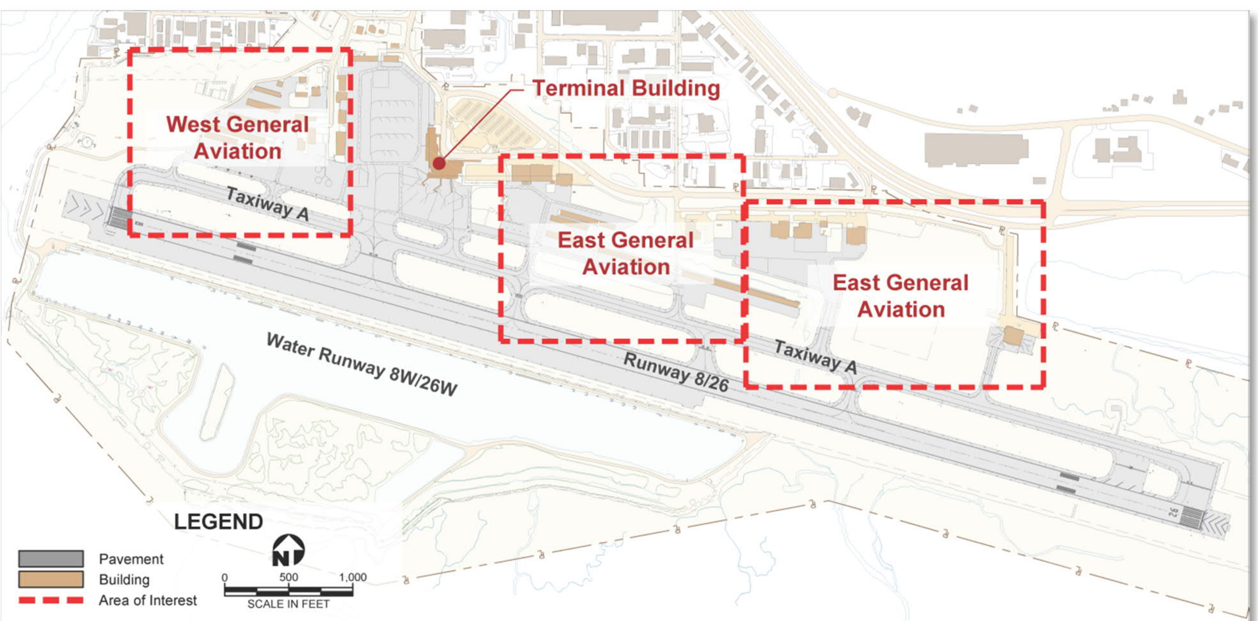


Figure 3-14: West GA Area

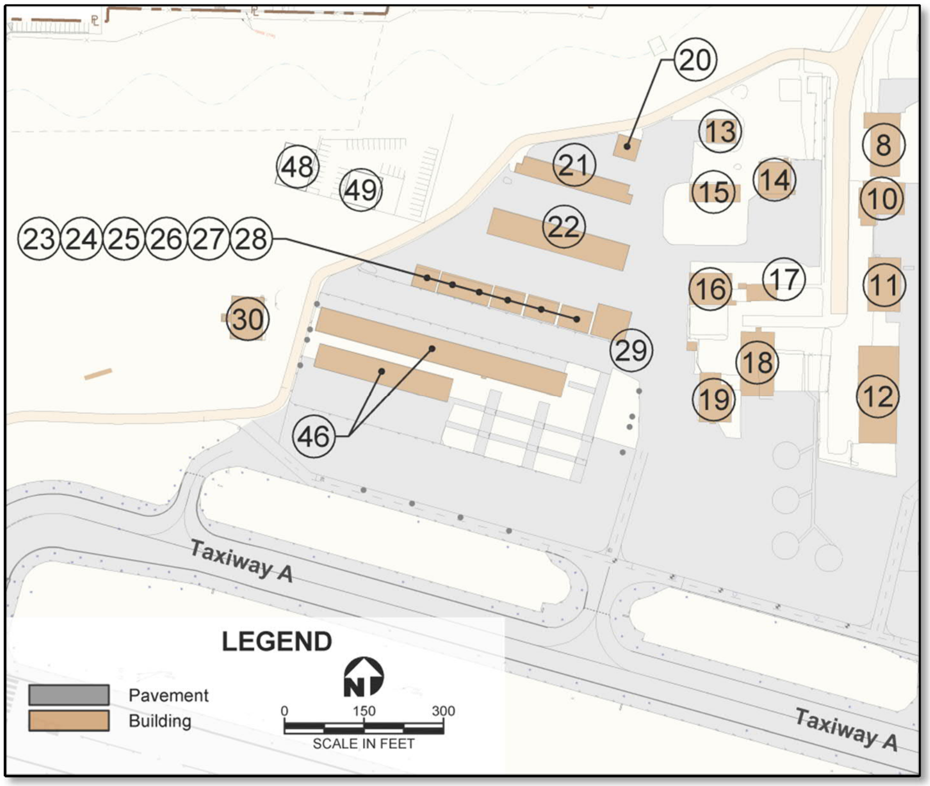
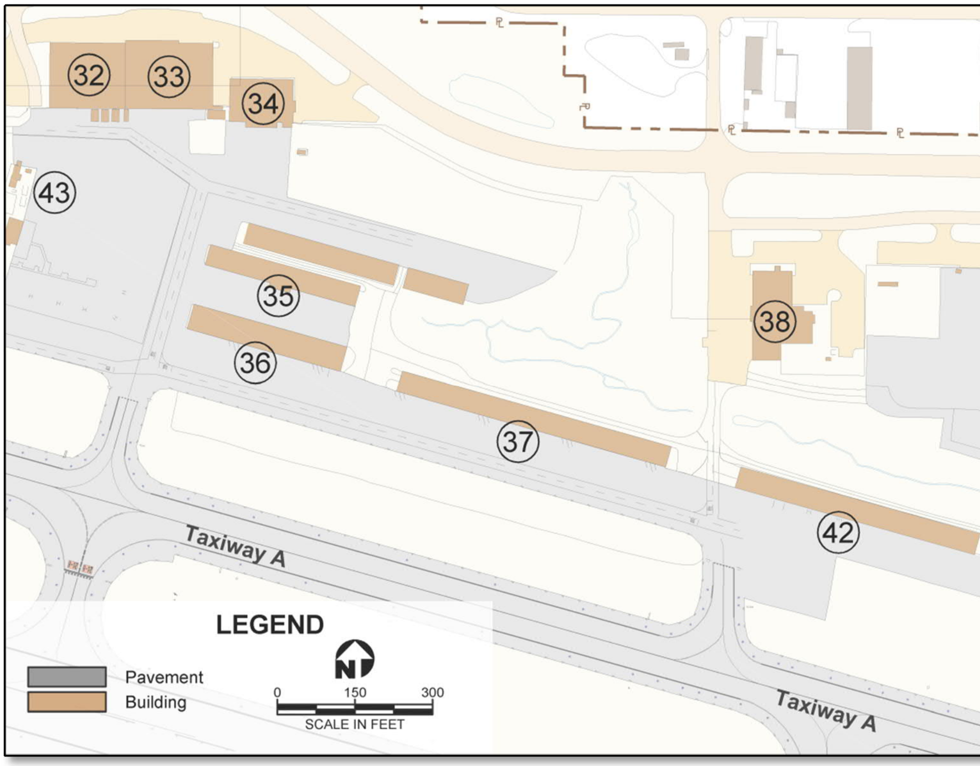


Table 3-10: West GA Area Building Inventory

Building	Structure Name	Use
8	Commercial	Aircraft Hangar
10	Commercial	Aircraft Hangar
11	Alaska Airlines	Air Cargo
12	Alaska Airlines	Air Cargo
13	Private Hangar	Aircraft Hangar
14	US Fish and Wildlife	Aircraft Hangar
15	Private Hangars	3 T-Hangars
16	Duane Packer	Air Cargo (UPS)
17	R&L Leasing	
18	Aero Services	Fixed Base Operator
19	Aero Services	Fixed Base Operator
20	Private Hangar	Aircraft Hangar
21	Private Hangar	Aircraft Hangar
22	Private Hangar	Aircraft Hangar
23	Private Hangar	Aircraft Hangar
24	Private Hangar	Aircraft Hangar
25	Private Hangar	Aircraft Hangar
26	Private Hangar	Aircraft Hangar
27	Private Hangar	Aircraft Hangar
28	Private Hangar	Aircraft Hangar
29	Private Hangar	Aircraft Hangar
30	Civil Air Patrol	Aircraft Hangar

Figure 3-15: East GA Area



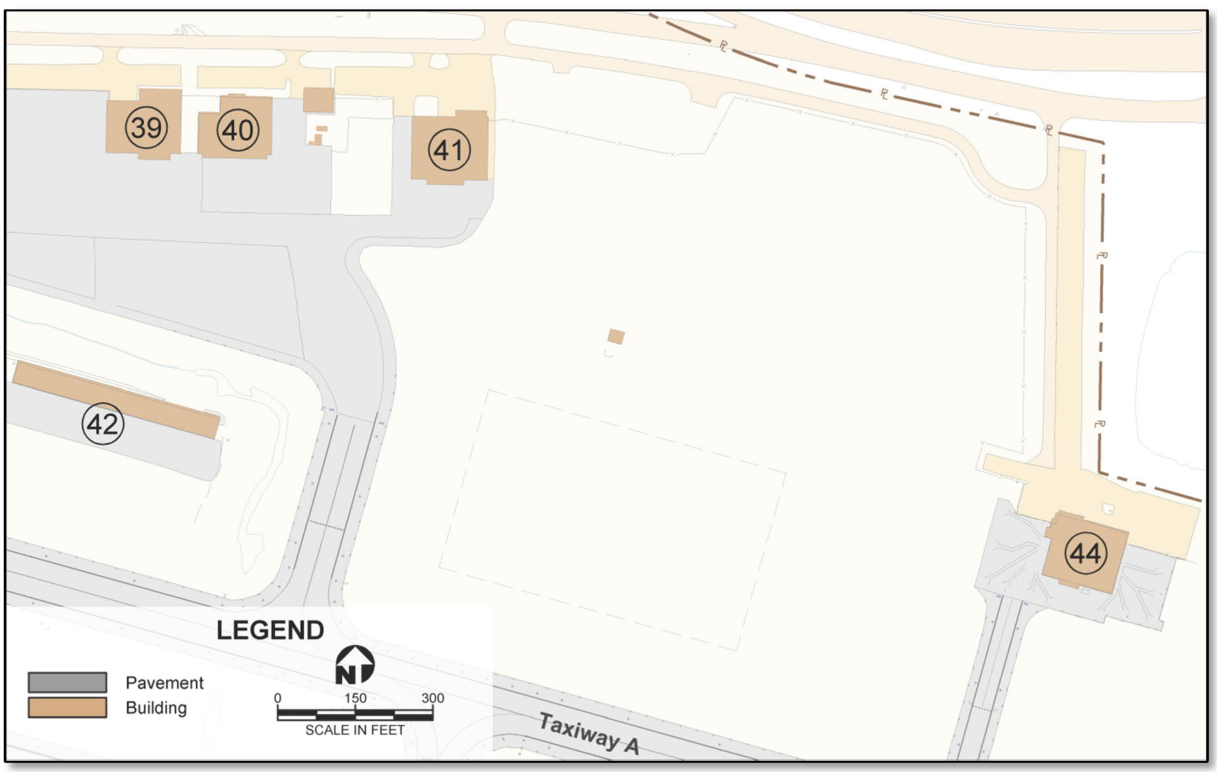


Table 3-11: East GA Area Building Inventory

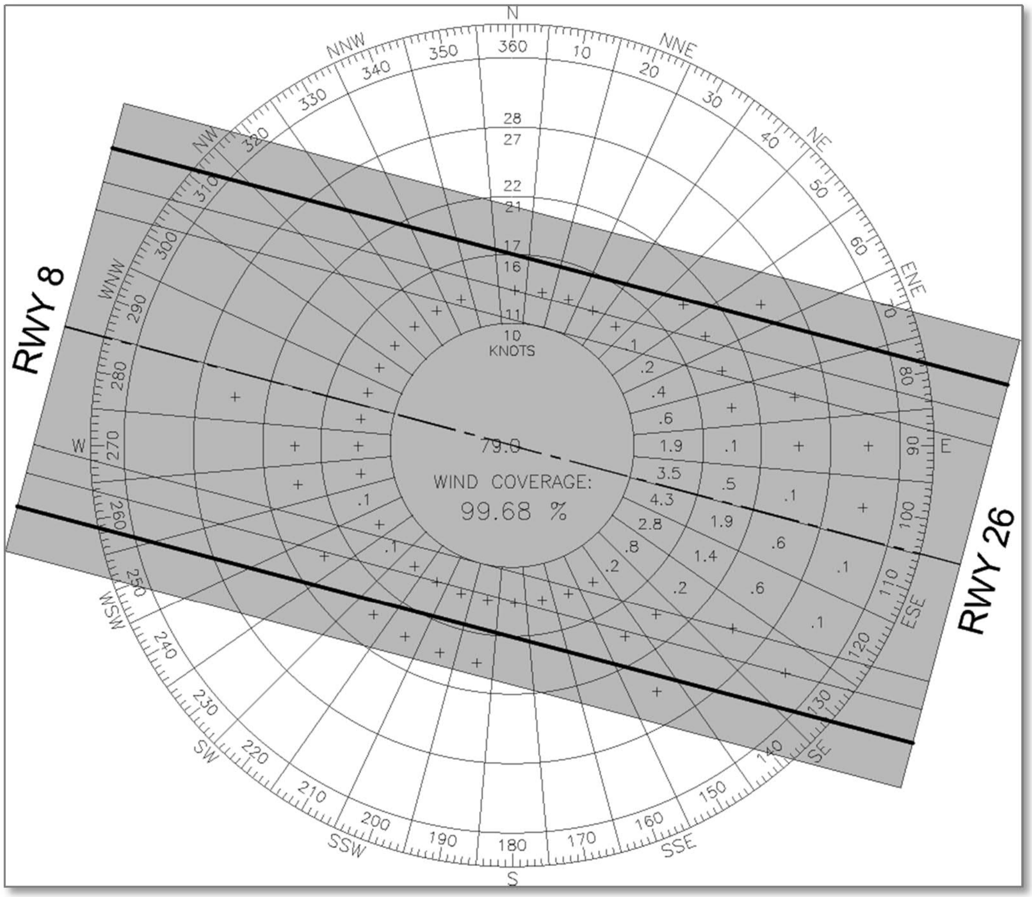
Building	Structure Name	Use
32	Sand Storage Building	Airport Support
33	Loken Aviation	Not on Airport Property
34	Ward Air	Air Taxi Service
35	Block L	T-Hangars
36	Block M	T-Hangars
37	Block N	T-Hangars
38	ARFF	Airport Support
39	Aero Services	Private Hangar
40	Alaska National Guard	Private Hangar
41	Wings Airways	Hangar
42	Block O	T-Hangars
43	Coastal Fuel/Helicopter	

3.9.1 Wind and Weather

Weather conditions such as cloud ceiling, visibility, and wind, are significant factors in the operation of an airport. Weather has a direct impact on aircraft flight, primarily on the equipment needed in the aircraft to navigate to and land at airports, particularly for instrument flight conditions where less than clear weather exists. Accordingly, a weather condition classification system has been developed. Visual Meteorological Conditions (VMC) occur when visibility is at least three statute miles and the ceiling is a least 1,000 feet. Visual Flight Rules (VFR) are in effect under VMC. Instrument Meteorological Conditions (IMC) occur whenever visibility is at least one statute mile but less than three statute miles and/or the ceiling is at least 500 feet but less than 1,000 feet. Instrument Flight Rules (IFR) are in effect under IMC. Poor Visibility and Ceiling (PVC) conditions exist whenever visibility is less than one statute mile and/or the ceiling is less than 500 feet.

Historical wind and weather data for the airport was obtained from the National Climatic Center for the years 1998 through 2008. It shows that, based on all-weather wind coverage with a 16-knot crosswind limitation, Runway 8/26 provides total wind coverage of 99.99 percent of the time. Winds are calm (0 to 10 knots) an average of 79.0 percent of the time. This data is presented in Figure 3-16 as an all-weather wind rose and includes calculations for 10.5-, 13-, 16-, and 20-knot crosswind coverage.

Figure 3-16: All Weather Wind Rose



All Weather (82,558 Observations)

Crosswind	Runway 8-26
10.5 knots	96.88%
13 knots	99.92%
16 knots	99.99%
20 knots	100.00%

Source: National Oceanic and Atmospheric Administration, National Climatic Data Center. Station 70381 - Juneau, Washington. Annual Period Record: 1998–2008

3.10 HISTORICAL OPERATIONS DATA

The Juneau International Airport is the primary commercial service airport in Southeast Alaska. Two commercial airlines, certified under FAR Part 121, offer service to and from JNU. Alaska Airlines offers year-round service to/from Seattle, Anchorage, Ketchikan, Petersburg, Sitka, Yakutat, Wrangell and Cordova. Delta offers service to/from Seattle.

Figure 3-17: Communities Served From Juneau

Three Part 135 Scheduled Commuter Carriers, Wings of Alaska, Harris Air, and Alaska Seaplanes offer scheduled Air Taxi service to and from JNU using land based aircraft and one, Ward Air operates using floatplanes. These airlines serve Angoon, Hoonah, Haines, Sitka, Tenakee, Gustavus, Kake and Skagway.

Figure 3-17 shows the communities served by scheduled commercial airlines or air taxis from Juneau.

In addition to these scheduled carriers, there are other carriers that offer on-demand passenger services using both conventional fixed-wing aircraft (both land-based and floatplanes) and helicopters. These on-demand carriers serve a multitude of customers including the tourist market, mining camps and others.

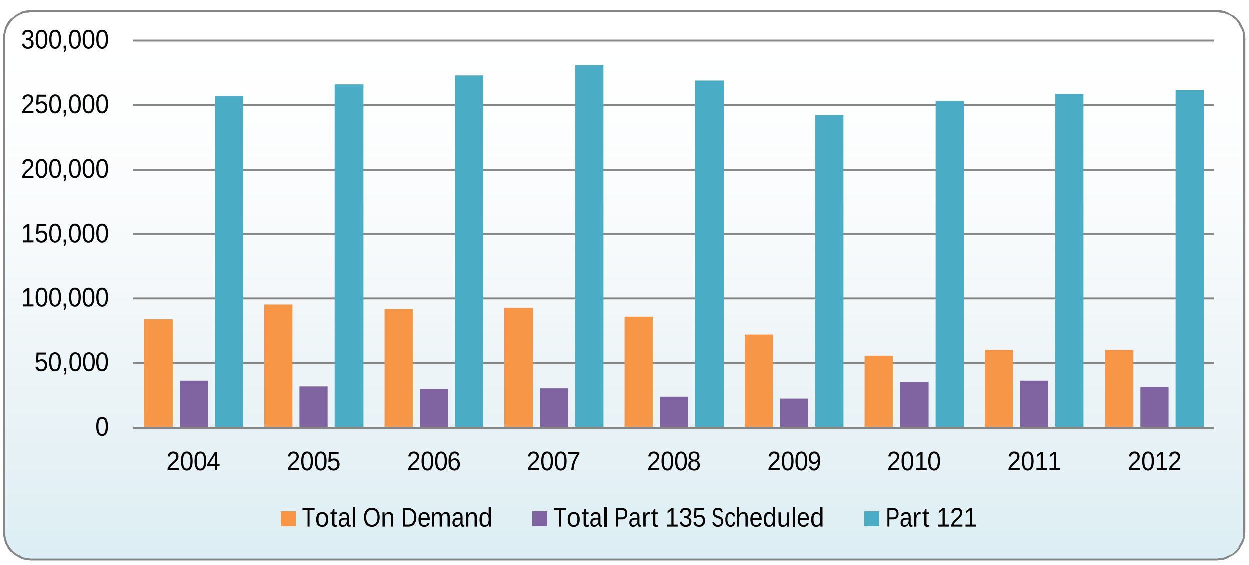
The total number of passengers at JNU has generally grown over the past 10 years but this growth was negated somewhat by decreases in passenger levels in 2008 and 2009. These decreases are consistent with decreased passenger levels at airports across the country so are not seen as specific reactions to the situation in Juneau. Table 3-12 and Figure 3-18 shows the recorded passenger levels by type for JNU from 2004 through 2012.

Table 3-12: JNU Historical Recorded Passenger Levels

	2004	2005	2006	2007	2008	2009	2010	2011	2012
On Demand Carriers									
Land Based	998	10,231	2,143	844	799	931	914	826	269
Floatplanes	21,610	6,177	14,545	15,628	18,484	14,063	8,224	7,372	8,829
Helicopters	61,181	78,871	75,244	76,271	66,724	57,195	46,406	51,996	51,028
Total On Demand	83,789	95,279	91,932	92,743	86,007	72,189	55,544	60,194	60,126
Part 135 - Scheduled									
Land Based	35,011	30,167	27,495	26,645	20,950	19,751	23,044	22,656	18,212
Floatplanes	1,458	1,975	2,482	3,729	3,120	2,961	12,580	13,897	13,050
Total Part 135 Scheduled	36,469	32,142	29,977	30,374	24,070	22,712	35,624	36,553	31,262
Part 121	257,247	266,032	273,020	280,708	268,664	242,137	252,869	258,655	261,441
Total Enplaned Passengers	**377,505**	**393,453**	**394,929**	**403,825**	**378,741**	**337,038**	**344,057**	**355,499**	**353,048**

Source: Juneau International Airport Records

Figure 3-18: JNU Historical Recorded Passenger Levels



Source: Juneau International Airport Records

Passenger traffic at JNU is highly seasonal with the heaviest loads occurring during the summer months of June, July and August when 36 percent of all passenger activity occurs. During the winter months (December, January, and February) less than 19 percent occurs. This despite the fact that the legislative session begins in January and lasts until April.

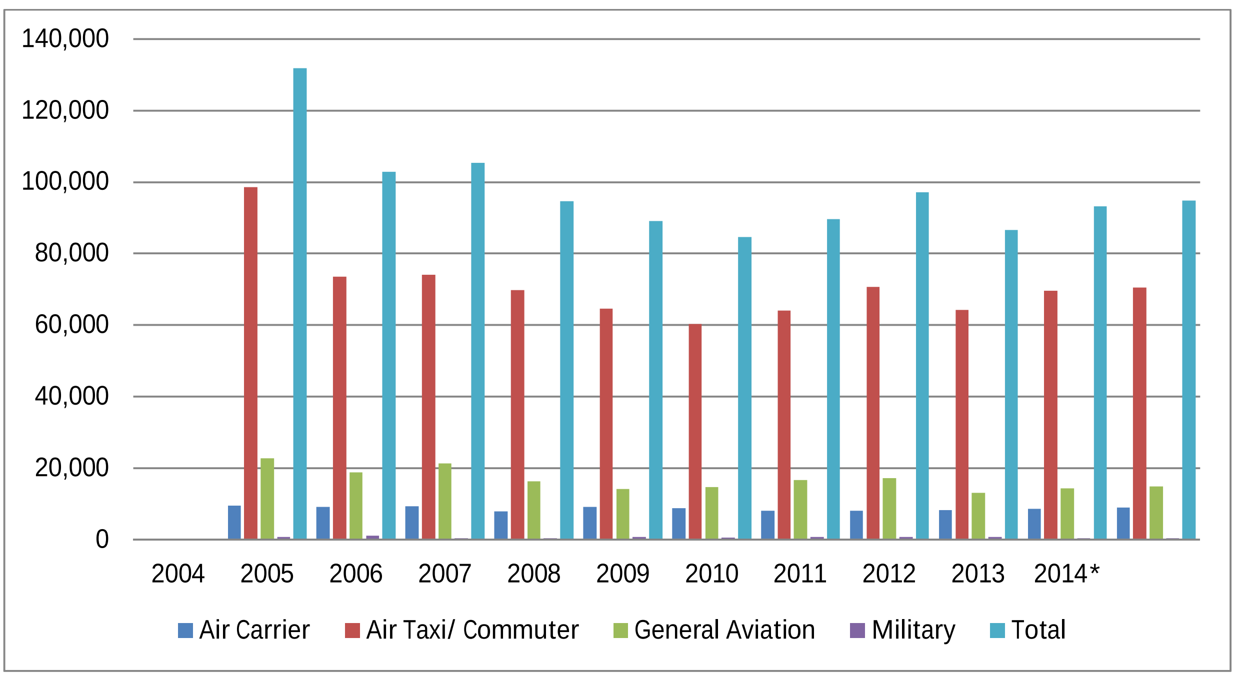
Table 3-13: Historical Recorded Seasonal Passenger Levels

Year	Winter	Spring	Summer	Fall	Total
2004	96,472	122,209	208,062	120,105	546,848
2005	95,005	133,841	215,279	120,424	564,549
2006	99,167	135,252	215,703	125,515	575,637
2007	104,159	136,982	225,279	127,681	594,101
2008	101,114	130,608	219,283	117,647	568,652
2009	97,347	119,150	184,817	114,115	515,429
2010	99,221	126,958	191,611	117,995	535,785
2011	104,115	130,576	191,393	120,653	546,737
2012	103,358	130,235	192,717	120,412	546,722
2013	107,573	128,456	198,633	118,063	552,725

Table 3-14: Historical Aircraft Operations Levels

Year	Air Carrier	Air Taxi/ Commuter	General Aviation	Military	Total
2004	9,514	98,565	22,874	870	131,823
2005	9,277	73,507	18,902	1,187	102,873
2006	9,393	74,070	21,459	463	105,385
2007	8,022	69,847	16,312	491	94,672
2008	9,226	64,656	14,274	892	89,048
2009	8,888	60,300	14,717	660	84,565
2010	8,127	64,118	16,697	784	89,726
2011	8,217	70,738	17,248	865	97,068
2012	8,319	64,313	13,104	795	86,531
2013	8,748	69,703	14,335	440	93,226
2014*	8,966	70,540	14,906	440	94,852

Figure 3-19: Historical Aircraft Operations Levels



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4 ENVIRONMENTAL INVENTORY

This section describes environmental conditions at the Juneau International Airport (JNU) considered during the planning process. The inventory adheres to Federal Aviation Administration (FAA) guidelines, and briefly examines the impact categories identified in FAA Order 1050.1E, Environmental Impacts: Policies and Procedures.

Four of the impact categories are not described for JNU because they apply to land designations that do not exist on airport property or in the vicinity of JNU. These categories are described in Table 4-1. The remaining relevant FAA Order 1050.1E impact categories are described for JNU in this section.

Table 4-1: Impact Categories Not Present in the Vicinity of the Juneau Airport

Impact Category Not Present for JNU	Status
Coastal Barriers	The Coastal Barriers Resources Act of 1982 was passed to remove federal incentive to develop sensitive coastal barrier areas along the Atlantic and Gulf coasts. There are no coastal barriers defined by the Coastal Barrier Resources Act in Alaska, and the impact category does not apply to JNU.
Coastal Zone Management	The Federal Coastal Zone Management Act (CZMA) gives each state the authority to review federal actions or federally permitted actions that affect coastal areas. The Alaska Coastal Management Act of 1977 created the Alaska Coastal Management Program (CMP), and placed primary management power with local government. The City and Borough of Juneau (CBJ) developed a Juneau CMP in 1986. However, the Alaska CMP program expired in 2011 and ended statutory authority for local CMPs. A state bill failed in 2012 to reestablish the Alaska CMP. It is possible, but unlikely that the program will be reinstated.
Farmlands	There are no prime or unique farmlands, farmlands of statewide importance, or farmlands of local importance under federal and state definitions on airport property or within the vicinity of JNU. The impact category does not apply to JNU.

Table 4-1: Impact Categories Not Present in the Vicinity of the Juneau Airport (Continued)

Impact Category Not Present for JNU	Status
Wild and Scenic Rivers	The National Wild and Scenic Rivers Act was passed to preserve rivers with remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. There are no designated wild and scenic rivers on airport property or within the vicinity of the JNU, and the impact category does not apply to JNU.

4.1 AIR QUALITY

The Clean Air Act was passed in 1970, and amended in 1977 and 1990. This federal statute mandated the Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) and develop National Emissions Standards for Hazardous Air Pollutants (NESHAPs) to protect public health.

NAAQS are set by the EPA for the following criteria pollutants: sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter equal to or less than 10 microns in size (PM_{10}), fine particulate matter equal to or less than 2.5 microns in size ($PM_{2.5}$), and lead (Pb). The State of Alaska Department of Environmental Conservation has also established standards that largely follow the federal standards. CO is the greatest quantity air pollution emitted by aircraft and ground support equipment at JNU (CBJ 2007).

Areas that do not meet the NAAQS must develop a State Implementation Plan (SIP) with emission control measures to meet air quality standards. Areas that were previously designated nonattainment and have since demonstrated compliance with a NAAQS are designated "maintenance" for 20 years after the effective date of attainment. Maintenance areas must have a maintenance plan to ensure continued long-term emissions control.

The Mendenhall Valley area of Juneau was designated as a nonattainment area for coarse particulate matter (PM_{10}) in 1991, requiring SIP to improve air quality. JNU was outside the boundary of this nonattainment area, but land immediately to the north and west of airport property exceeded acceptable values for particulate matter. In 2009, the Mendenhall Valley met the NAAQS, and was removed from the list of nonattainment areas. Wood stove regulations and education as well as a street paving effort to limit road dust helped bring the area into compliance. The Mendenhall Valley is now considered a maintenance area, and has a required maintenance plan (ADEC 2009).

Greenhouse gases (GHGs) trap heat in the atmosphere and pose a threat to public health (EPA 2009). GHGs also contribute to climate change. GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxides (NOx), and ozone (O_3). Volatile organic compounds (VOCs) may also contribute to GHG formation as some VOCs react with NOx to form O_3. The Juneau Greenhouse Gas Emissions Inventory (CBJ 2009) estimated that air transport accounted for about ten percent of total GHG emissions from the Juneau community. GHGs are discussed in more detail in the Sustainability Baseline section of this plan.

Construction plans for the 2014–2015 Runway Rehabilitation included measures to control short-term and temporary fugitive dust. These included pre-watering sites, applying a dust palliative, covering fill material, and control of construction traffic patterns.

4.2 BIOTIC RESOURCES

Biotic resources on, adjacent to, or near JNU consist of vegetation and wildlife. Birds and fish are discussed as individual biotic resource categories.

4.2.1 Vegetation

There are woodland, shrub-scrub, and herbaceous vegetation communities within or adjacent to JNU property (CBJ 2007). Some of these areas are classified as wetlands under the jurisdiction of the U.S. Army Corps of Engineers (see Wetlands section for more detail). Many areas have disturbed vegetation communities, and no federal or state listed threatened or endangered plants are known to occur at JNU. Figure 4-1 shows vegetation at JNU.

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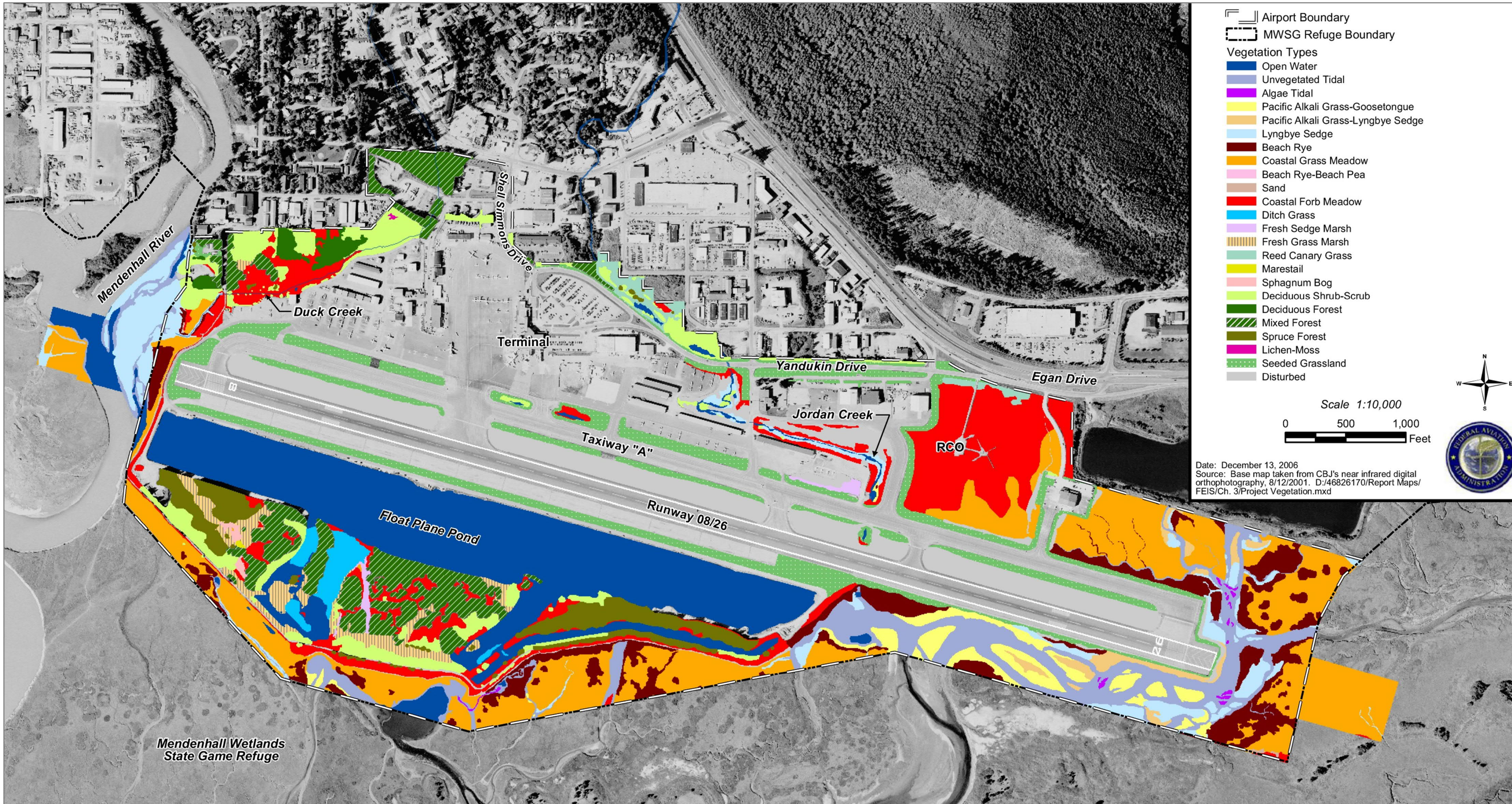
Figure 4-1: Juneau International Airport Vegetation



Source: CBJ 2009

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Low tidal slough and low intertidal zone cover types include Pacific alkali grass and goosetongue, Pacific alkali grass and Lyngbye sedge communities, and Lyngbye sedge. A large stand of Lyngbye sedge is adjacent to the northwest JNU boundary where Duck Creek joins the Mendenhall River. Lyngbye sedge is important to wildlife in the area. Upper tidal slough and high marsh communities have cover types of beach rye and coastal grass meadow. Coastal grass meadow dominant plants include foxtail barley, red fescue, tufted hairgrass, and meadow barley. Ditch grass is an aquatic plant at the south end of the Float Plane Basin, and it is important to waterfowl.

Supratidal areas that are marginal to and above high tide levels include vegetative covers of beach rye and beach pea, lichen and mosses, and coastal forb meadow. The lichen-moss cover type occurs in a small patch north of Duck Creek. Coastal forb meadow is found along lower Duck Creek, uplands within the Float Pond Woodland, and above high marsh vegetation. Coastal forb meadow dominant species include beach rye, beach pea, red fescue, yarrow, Nootka lupine, cow parsnip, beach lovage, hemlock parsley, Indian paintbrush, fireweed, and chocolate lily. Reed canary grass, an invasive species, occurs in the northeast and northwest areas of the airport along Jordan Creek north of Yandukin Drive, and along Duck Creek.

Freshwater marsh includes cover types of fresh sedge marsh and fresh grass marsh. These are found in the Float Pond Woodland and Float Pond Woodland wetland complex. Marestail is also found in a small portion of the Float Pond Woodland wetland complex.

Shrub-scrub vegetation in the area is deciduous and dominated by Barclay and Sitka willow and Sitka alder species. Forest vegetation includes mixed woodland, Sitka spruce forest, and deciduous forests of cottonwood, willows, alders, mountain ash, and ferns. A sphagnum bog occurs in the Float Pond Woodland.

4.2.2 Wildlife

In the vicinity of JNU, river otter and mink inhabit open water and adjacent upland habitat. Sitka black-tailed deer use upland and wetland habitats (CBJ 2007). Sitka black-tailed deer likely use the Float Pond Woodland in summer, but not in the winter. Black bear occasionally use the forest habitat near JNU. Other small mammals found in habitat near or adjacent to JNU include red squirrels, short-tailed weasels, snowshoe hares, ermines, muskrats, deer mice, and masked shrews. Little brown bats, vole, hoary marmots, snowshoe hares, porcupine, muskrats, and harbor seals also likely inhabit the forests, grasslands, marshes, and open water habitat in the vicinity of JNU. In addition, domestic dogs are often near airport property with their owners, particularly along the Emergency Vehicle Access Road (EVAR) Dike Trail.

Aircraft collisions have occurred with wildlife at JNU, none resulting in injury or loss of life. Due to these strikes, the FAA required JNU to conduct a Wildlife Hazard Assessment in 1999, which resulted in a Wildlife Hazard Management Plan (WHMP). The WHMP was reviewed and revised in 2014 (CBJ 2014). The greatest potential magnitude wildlife hazards are animals that flock (e.g., gulls, ducks, and shorebirds), large animals (e.g., Canada geese, eagles, herons, and deer), juvenile animals, and migratory species.

4.2.3 Birds

JNU and adjacent lands support a diversity of bird species because of the variety of habitats. Common local bird species that use a wide variety of habitats in the vicinity of JNU include the bald eagle, northwestern crow, and common raven (CBJ 2007). Bald eagles are protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Waterfowl species generally migrate through the area and are the most abundant in aquatic habitats, with mallards and Canada geese having particularly high numbers. Waterfowl numbers are highest in March and April. Sandpipers are common shorebirds; shorebird numbers are highest in May and September. The WHMP notes that birds are the most common hazard at JNU (CBJ 2014).

The 2007 JNU Environmental Impact Statement (EIS) and Section 4(f) Evaluation relied on a Birds of Mendenhall Checklist (Armstrong and Gordon 2002) and the JNU Environmental Assessment (USKH Inc.) to determine bird species in the area. Armstrong and Gordon categorized bird species as common, fairly common, uncommon, and rare or accidental. A total of 167 species were observed on JNU property, with 86 of these occurring annually and 81 considered rare or accidental (CBJ 2007). Of these, the United States Forest Service (USFS) lists trumpeter swans and Queen Charlotte goshawk as sensitive species (USFS 2008). The trumpeter swan is considered uncommon during spring and fall migration on the Mendenhall Wetlands. Trumpeter swans occasionally use the Float Plane Basin (CBJ 2007). The Queen Charlotte goshawk rarely uses the JNU Float Pond Woodland.

4.2.4 Fish

Fish habitat at or adjacent to airport property includes tidal wetlands (sloughs and salt marshes), freshwater streams (Duck Creek, Jordan Creek, and the Mendenhall River), and the Float Plane Basin (CBJ 2007). Aside from the Float Plane Pond, aquatic areas within or adjacent to airport property are considered Essential Fish Habitat within the Congressional definition of, "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1802(10)), under the jurisdiction of the National Marine Fisheries Service. Anadromous chum, coho, pink, and sockeye salmon are known to use freshwater rivers and estuarine low marsh habitats on airport property and in the vicinity of JNU. Coho salmon are particularly found in Jordan Creek, and to a lesser extent in Duck Creek. Anadromous eulachon use the lower reaches of freshwater streams, and sculpin, flounder, and stickleback species tolerant of freshwater and saltwater are also present. Capelin and Pacific herring move into and out of these habitats with saltwater tides. Hatchery pink salmon were released between 2003 and 2005, and may still constitute some of the current pink salmon population.

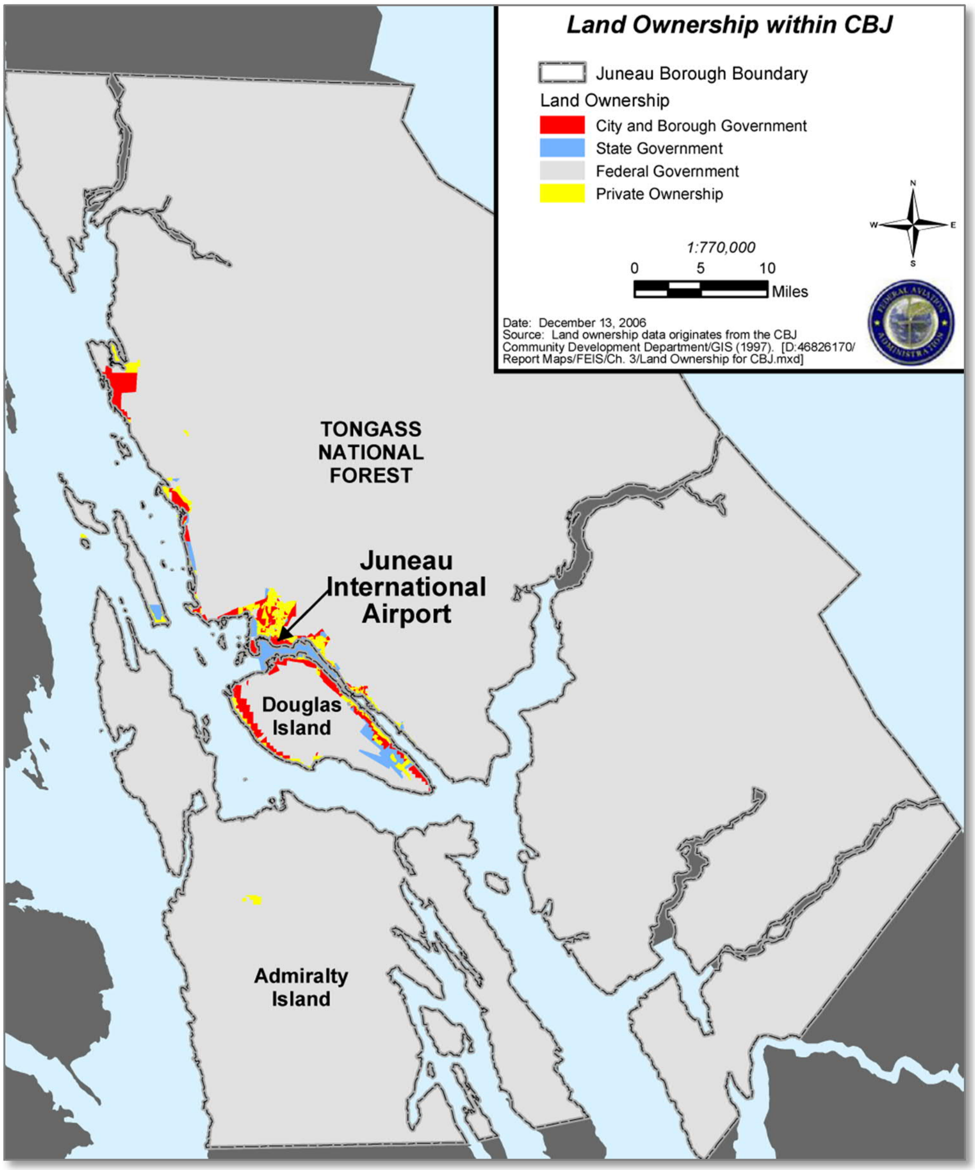
Staghorn sculpins use brackish waters, with coastrange sculpins and prickly sculpins using areas upstream from tides. Other fish known to occur in the JNU area are the sandlance. Fish are important food sources for birds, Steller sea lions, and humpback whales.

4.3 COMPATIBLE LAND USE

4.3.1 Land Ownership

JNU is within the City and Borough of Juneau (CBJ). The CBJ covers a large land area (2,080,000 acres), which includes the Juneau Icefield. Approximately 82% of land within CBJ boundaries is federal public land managed by the USFS as part of the Tongass National Forest. The Alaska Department of Natural Resources (ADNR) owns 17% of land within the CBJ. Submerged lands and tidelands adjacent to or within the Tongass National Forest have ownership claims by both ADNR and USFS. The CBJ owns 23,000 acres. All land in the CBJ is covered by CBJ land use and zoning policies regardless of the landowner. Figure 4-2 depicts land ownership within CBJ boundaries.

Figure 4-2: Land Ownership within the City and Borough of Juneau (CBJ)



Source: CBJ 2009

4.3.2 Land Use

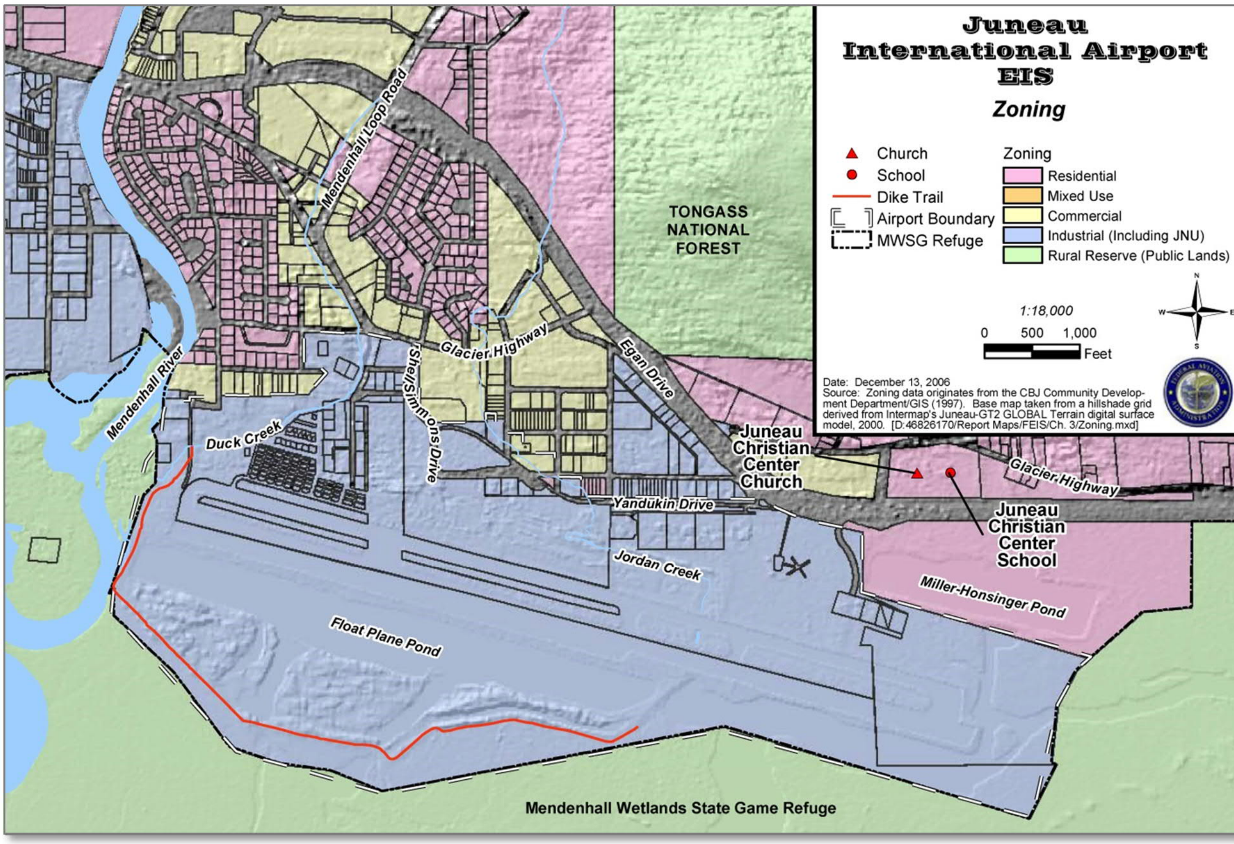
The FAA provides guidance on land uses within and adjacent to airport boundaries, particularly when FAA grants are involved. Within airport boundaries, the FAA has guidance on making lands available to aviation related uses, and limits an airport's ability to restrict land use associated with aviation and economic activities related to airport operations. Land within JNU boundaries is owned by the CBJ, aside from a part of one hangar and parking area that is owned by Channel Flying, Inc.ices.

Incompatible land use development in the vicinity of airports has the potential to limit their services. Figure 4-3 shows CBJ land zoning in the vicinity of JNU. The FAA has regulations protecting airspace, operations, and land use to prevent landowner conflicts and ensure a safe airspace that is not limited by surrounding development. FAA grant assurances also require compliance with performance measures. Existing land uses in the vicinity of JNU include residential and commercial areas immediately north, commercial/residential/industrial uses to the west, and wildlife/fish habitat and recreation areas to the immediate south and east. Noise from JNU brings forth potential conflicts among landowners (see discussion under Land Use Management and Plans, and under Noise).

The Mendenhall Wetlands State Game Refuge surrounds JNU on three sides (west, south, and east). West of the refuge are the mainly residential areas of the Mendenhall Peninsula and Fritz Cove, and a marine related industrial area to the northwest. Across the Gastineau Channel is the North Douglas area, which is also mainly residential with some recreational use. Pederson Hill is on the Mendenhall Peninsula and contains FAA navigational aid equipment, a NOAA weather camera, and telecommunications towers. The Egan Expressway is north of JNU, and has commercial/industrial and residential use on either side of it. Land to the immediate northeast of JNU around the Miller-Honsinger Pond is zoned for residential use, and is the only residential land adjacent to JNU. The Juneau Christian Center School and Church are across the Egan Expressway at the east end of the runway. Glacier Gardens is north and southeast of the Juneau Christian Center and offers tours as well as a private commercial garden. Commercial fishing occurs about four miles southeast of JNU in the Gastineau Channel (CBJ 2007).

No local land use jurisdictions have enacted noise compatibility guidelines in the vicinity of JNU. Federal land use noise compatibility guidelines state that most land uses are compatible with an annual day-night average sound level (DNL) of 65 DNL. Noise sensitive properties in the vicinity of JNU include the Mendenhall Golf Course, the EVAR, the Mendenhall Wetlands State Game Refuge, and the Juneau Christian Center Church and School.

Figure 4-3: Land Zoning in the Vicinity of Juneau International Airport



Source: CBJ 2009

Recreation is an important use on and adjacent to airport property. Figure 4-4 shows recreation features within the vicinity of JNU. JNU is used by recreational aircraft owned by both locals and non-locals. Recreational aircraft include fixed wing aircraft, helicopters, ultralights, and powered parachutes. The popular EVAR (or Dike Trail) abuts the west and southern boundary of the airport and is a major access point to the Mendenhall Wetlands State Game Refuge. Hunting and fishing are popular recreational activities in the CBJ, including some duck hunting in the refuge. In 1998, 25 percent of hunter days and ducks shot in Southeast Alaska were in the Mendenhall wetlands (CBJ 2007). Hiking is also popular in the CBJ. The EVAR accessing the refuge crosses airport property, and recreational trails are in the hills and ridges north of JNU, along the Mendenhall Peninsula, and south of JNU on Douglas Island (CBJ 2007). A trail climbing Pederson Hill in the Mendenhall Peninsula was rerouted at FAA's suggestion to reduce the number of people near FAA navigational aid equipment at the top of the hill. Some trails are also used for skiing, biking, and off-road vehicle riding. In addition, scenic views of the refuge lands adjacent to JNU are enjoyed by homeowners and motorists on the Egan Expressway. The Mendenhall River supports recreational boating, with the majority being nonmotorized kayakers and rafters. A boat launch ramp is across Gastineau Channel from JNU on Douglas Island. For more information, see the Parks and Recreational Facilities section.

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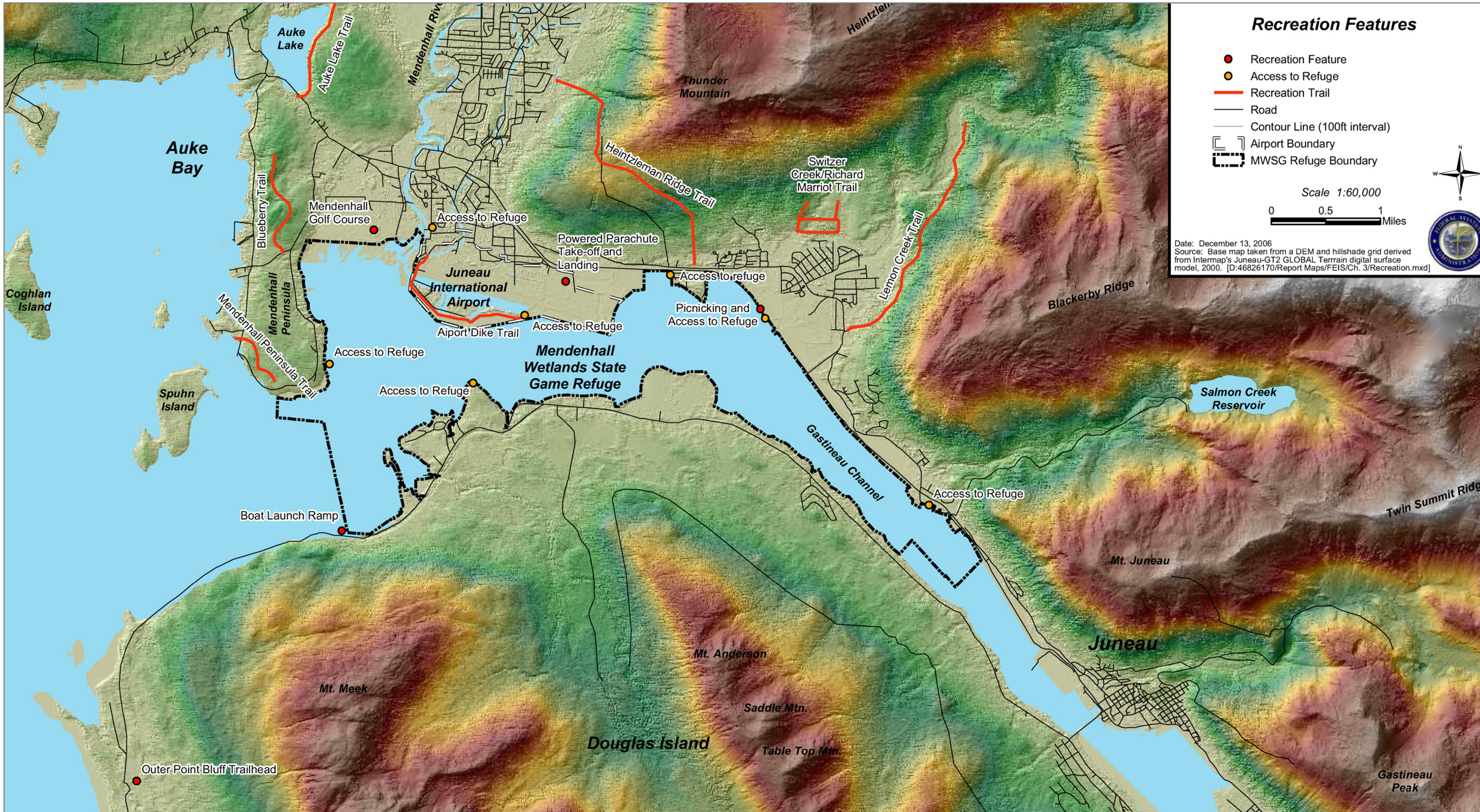
Figure 4-4: Recreation Features in the Vicinity of Juneau International Airport



Source: CBJ 2007

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4.3.3 Land Use Management and Plans

Land use in the CBJ is guided by the *Comprehensive Plan of the City and Borough of Juneau* (CBJ 2013a), which was adopted by ordinance in 2008 and updated in 2013. The comprehensive plan outlines community growth, development, and conservation in the CBJ through 2020. It noted JNU as an important gateway into the CBJ that is critical for moving goods and people (CBJ 2013a). JNU is specifically addressed under Air Transportation in Chapter Eight of the comprehensive plan. Standard Operating Procedures for Policy 8.5 acknowledge potential land use conflicts in the vicinity of JNU, and a desire to protect JNU lands from displacement. A separate noise section of the plan discusses mitigation of airport noise impacts. The comprehensive plan also adopted guidelines development from JNU's 1999 International Airport Master Plan (CBJ 1999a) into the CBJ's land use code. JNU was classified in the Land Use section of the plan into Subarea 4, which includes airport property and East Mendenhall Valley. Guidelines for this area include maintenance of public access to the Mendenhall Wetlands State Game Refuge along the Dike Trail, and careful review of development proposals by the CBJ for impacts to the impaired water bodies of Duck Creek and Jordan Creek.

The *City and Borough of Juneau Land Management Plan* is part of municipal code and contains policies for land under CBJ ownership (CBJ 1999b). The plan categorizes land into zones. JNU is zoned for industrial use. The Mendenhall Wetlands State Game Refuge south of JNU and the Tongass National Forest northwest of JNU are classified as rural reserve (public lands). Adjacent and north of JNU is residential and commercial land. A planning process is underway to update the CBJ Land Management Plan, with a draft plan released in August 2015 (CBJ 2015a).

Alaska Department of Fish and Game (ADF&G) adopted the *Mendenhall Wetlands State Game Refuge Management Plan* in 1990. ADNR manages surface and subsurface tidelands by state statute, but ADNR actions impacting habitat must conform to the Refuge Management Plan developed by ADF&G. State statute prohibits actions on the refuge that would affect aviation safety. ADNR and ADF&G must assist the CBJ with filling water bodies adjacent to JNU that may act as attractants to waterfowl. The Refuge Management Plan states that under certain conditions the CBJ may acquire refuge land for JNU expansion, and a utility or pipeline may cross refuge property (ADF&G 1990). The plan bans dredging, filling, or otherwise altering the natural shoreline aside from maintenance of the Gastineau navigational channel.

Sustainability is addressed in plans adopted by the CBJ. CBJ adopted the *Juneau Climate Action and Implementation Plan* in 2011. The plan discusses the ground source heat pumps at JNU that reduce fossil fuel consumption (CBJ 2011), and places JNU in the context of overall Juneau

GHG emissions. The CBJ Comprehensive Plan also includes a chapter on Sustainability (CBJ 2013a).

The *Juneau Economic Development Plan* was finalized and adopted by the CBJ through ordinance in February 2015. The plan notes Juneau's dependence on air transportation and the important role of JNU to the local economy (CBJ 2015b). The CBJ Economic Development Plan references the planning process that was underway for the JNU Sustainability Master Plan at the time of writing, and hopes this plan will account for regional and industry trends, contain provisions for JNU to be a welcoming gateway to Juneau, and provide efficient and revenue-oriented lease lot opportunities and configurations (CBJ 2015b).

The *Tongass National Forest Land and Resource Management Plan* (USDA 2008) guides land management for the Tongass National Forest, which surrounds most areas of the CBJ. USFS does not own land immediately adjacent to JNU.

4.4 PARKS AND RECREATIONAL FACILITIES

Section 4(f) of the Department of Transportation (DOT) Act of 1966 was codified to protect public parks, recreation spaces, wildlife refuges, and cultural resources from public transportation facilities development. Transportation programs or projects using federal funds or requiring a federal DOT agency approval may not use Section 4(f) lands "unless there is no feasible and prudent alternative" with documented analysis of effects and actions to minimize impacts. Uses of Section 4(f) lands include property acquisition, temporary occupancies, and proximate impacts of transportation facilities that adversely impact the purposes of Section 4(f) properties. FAA in partial consultation with property managers must determine the Section 4(f) status of parks, recreation lands, wildlife refuges, and cultural resources for properties that may be adversely impacted by aviation transportation facilities.

The 2007 EIS and Section 4(f) Evaluation for JNU development activities determined that Section 4(f) applied to the Mendenhall Wetlands State Game Refuge and the EVAR. Section 4(f) status may change for future JNU projects.

4.4.1 Mendenhall Wetlands State Game Refuge

The Mendenhall Wetlands State Game Refuge is approximately 4,000 acres in size and borders JNU to the east, south, and west. Public recreation activities in the refuge include wildlife viewing, waterfowl hunting, fishing, boating, horseback riding, and general sightseeing (ADF&G 1990). The refuge has no maintained trails, but there are 13 access points for walking, including the EVAR Dike Trail. About 4,563 people annually use the refuge, and thousands more enjoy views of the refuge from their home or the Egan Expressway (CBJ 2013a). Legislation creating the refuge anticipated potential land use conflicts between JNU and the refuge (CBJ 2007). The legislation states that refuge activity may not create a hazard to aircraft, the CBJ may acquire land to expand JNU, and superior public needs or uses may be permitted on refuge lands.

4.4.2 Emergency Vehicle Access Road (EVAR): Dike Trail

The CBJ constructed a dike at the west end of the JNU runway and Float Plane Pond in 1960. An emergency vehicle access road was also built alongside and atop the dike, which is the primary purpose of the trail. The EVAR Dike Trail developed for recreation as residents used the top of the dike as a walking path. The CBJ made aesthetic upgrades and extended the emergency access capabilities to the EVAR Dike Trail in 1994 and again in 2010. The EVAR is a popular recreation trail, and recreation use is allowed at the discretion of JNU.

The EVAR is on JNU property, and it is one of five major access points to the Mendenhall Wetlands State Game Refuge. The EVAR is a flat, gravel trail that is about three-fourths of a mile long. Recreation uses include walking, running, biking, skiing, and wildlife viewing. A 1997 study projected annual use of the Dike Trail to be 77,178 person trips (Roberds 1997), and a 1995 Trail Survey showed this trail having the highest use of the CBJ trails studied.

4.5 FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES

Congress passed the Endangered Species Act (ESA) in 1973, and it has been amended several times. The ESA provides for the conservation of endangered or threatened species and the ecosystems upon which they depend. A species is considered endangered if it is in danger of extinction throughout all or a significant portion of its range. A species is considered threatened if it is likely to become endangered in the foreseeable future (NOAA 2015).

The humpback whale (*Megaptera novaeangliae*) is a federally listed species under the ESA with potential to occur in the vicinity of JNU. The North Pacific population migrates to Southeast Alaska in the summer and fall. Humpback whales are occasionally spotted in the southern portion of the Gastineau Channel, but are unlikely to use the northern portion closer to JNU due to shallow water depths (CBJ 2007). Humpback whales frequent Portland and Shelter Islands and Fritz Cove. The tidal sloughs adjacent to the airport are also important larva areas for Auke Bay herring, a food source for humpback whales.

Humpback whales are increasing in abundance in much of their range. In April 2015, the National Marine Fisheries Service (NMFS) proposed to revise the ESA listing of the humpback whale by creating 14 distinct population segments (DPSs). NMFS would like to have two humpback whale DPSs as endangered, two DPSs as threatened, and the remaining ten DPSs not listed. If NMFS's proposal is accepted, the stock around Juneau would be delisted. The public comment period for the proposal is through July 20, 2015.

The Eastern DPS of Steller sea lions (*Eumetopias jubatus*) proximate to JNU were delisted from the ESA in 2013. Steller sea lions are divided into Western and Eastern DPSs, with the dividing line at Cape Suckling, Alaska (144° Longitude). The Western DPS is listed as endangered. The Eastern DPS in the Juneau area was delisted from the ESA, and moved from a threatened status to a recovered one.

4.6 ENERGY SUPPLIES, NATURAL RESOURCES, AND SUSTAINABLE DESIGN

FAA Order 1050.1, Environmental Impacts: Policies and Procedures, asserts that airport improvement projects will be examined to identify effects on local energy supplies or natural resources. If impacts are identified, energy producers and environmental stakeholders must coordinate activities. In its appendix, the FAA order makes reference to Executive Order 13123. Executive Order 13123 encourages the use of renewable energy and requires federal agencies to reduce air emissions and the consumption of petroleum, energy, and water.

JNU installed a geothermal/ground source heat pump system in 2011. This renewable energy system uses the relatively constant temperature of the ground and a heat pump system to provide heating, cooling, and ventilation for parts of the terminal building. It also provides an ice-melt system for sidewalk areas outside the passenger terminal. JNU has made several upgrades in energy efficient lighting to reduce energy consumption. In addition, much of the power purchased from Alaska Electric Light and Power by JNU is generated by hydropower, which reduces GHG emissions for JNU.

Water is purchased through CBJ Procurement from the CBJ Public Works Water Utility. The CBJ has plans to improve its water management based upon the results of an in-progress water study. JNU has implemented some projects to conserve water, such as installing efficient flush and flow fixtures and lavatory aerators.

A Recycling, Reuse, and Waste Reduction Plan was developed for JNU as part of the JNU Sustainability Master Plan, and is included as an appendix to the plan. The airport independently launched a recycling program in 2014.

The CBJ adopted the Juneau Climate Action and Implementation Plan in 2011, and the CBJ Comprehensive Plan also includes a chapter on Sustainability (CBJ 2013a). The Juneau Commission on Sustainability researches and advises the CBJ on community sustainability.

4.7 FLOODPLAINS

Executive Order 11988, issued in 1977 by President Carter, directs federal agencies to avoid potential adverse impacts to floodplains and to avoid floodplain development wherever there is a practical alternative. Floodplains are the lowland and relatively flat areas that adjoin inland and coastal waters, including flood prone areas of offshore islands. Executive Order 11988 directs federal agencies to see if an action is within the 100-year floodplain (1% or more annual chance for flooding), and in the 500-year floodplain (0.2% annual chance for flooding) for critical infrastructure.

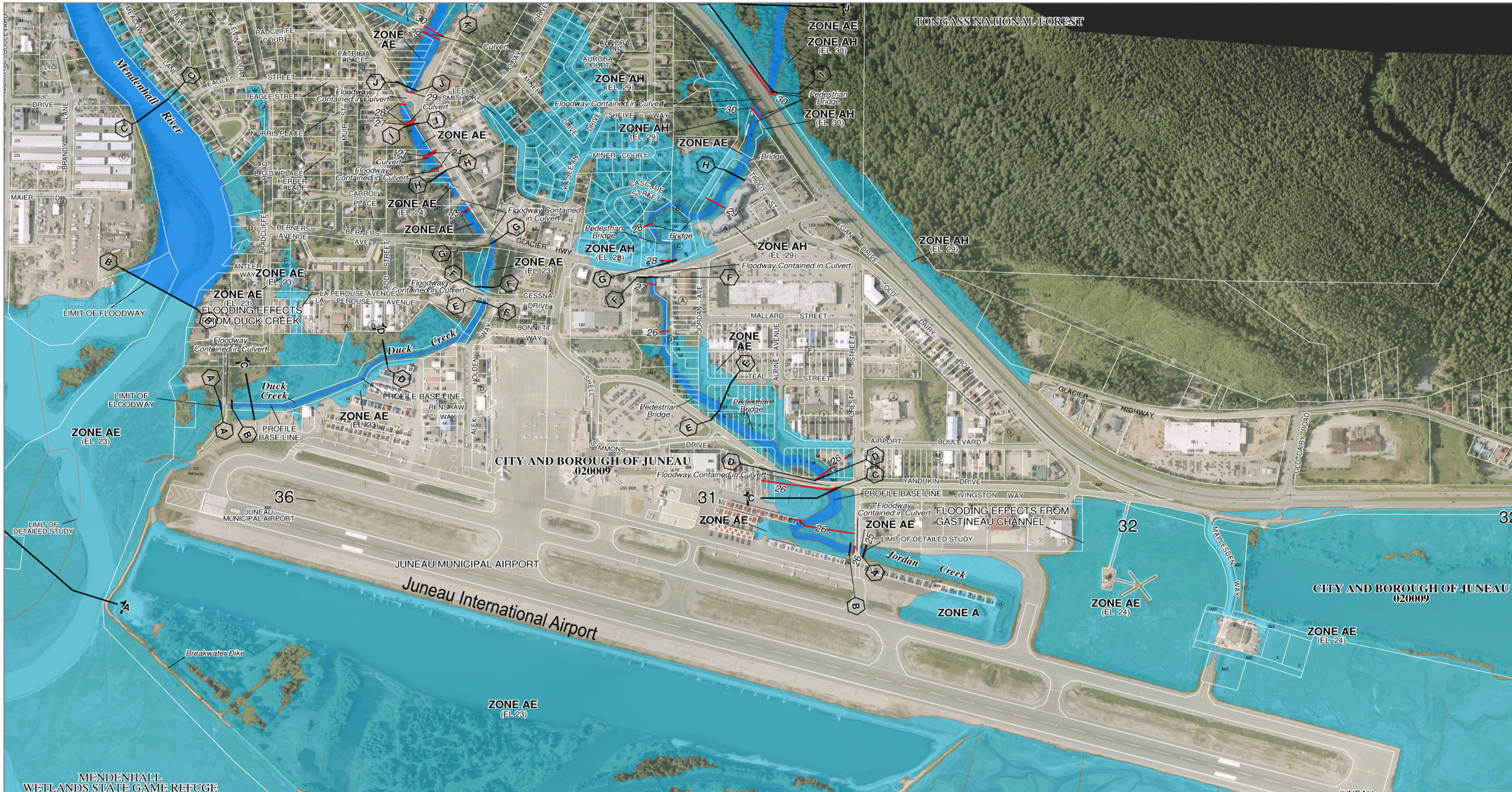
Executive Order 13689 amended Executive Order 11988, and was issued in January 2015 by President Obama. The new executive order identifies three methods for determining the elevation and flood hazard area: the climate-informed science approach (use climate science data), the free-board value approach (add 2–3 feet to the 100-year floodplain), and the 500-year elevation approach (use area that has a 0.2% annual chance for flooding). The Federal Emergency Management Agency (FEMA) simultaneously published "Revised Guidelines for Implementing Executive Order 11988" that reflect these changes.

FEMA designates floodplains and provides Flood Insurance Rate Maps (FIRMs). These maps are available from the FEMA Flood Map Service Center (msc.fema.gov). The maps identify the Special Flood Hazard Area, which has at least a one percent chance of flooding in any given year. The Special Flood Hazard Area is also known as the 100-year floodplain or base floodplain, and is further divided into various zones. The runway is outside of the flood zone because it has been elevated on fill to protect it from stream flooding. Dikes protect JNU from coastal flooding. However, areas surrounding the runway are at a high risk of flooding.

The CBJ conducted a Flood Insurance Study in 2013 that resulted in flood overlay maps created by overlaying FIRM flood zone boundaries over aerial photographs taken in 2005. The 2013 overlay flood map for the southern Mendenhall Valley is shown in Figure 4-5. There are three zone categories within the Special Flood Hazard Area on or adjacent to JNU property. Most areas to the south, west, east, and northeast of Runway 8/26 are in the AE zone. Zone AE has at least a one percent annual chance to flood determined by detailed methods, also known as the 100-year flood plain or base floodplain. Noted underneath the AE designations in parenthesis are the computer elevations that flood waters are expected to rise during a base (one percent annual chance) flood. These estimates are called base flood elevations (BFEs). An area on JNU property near Jordan Creek is in the A zone. The A zone is subject to a one percent annual chance of a flood event using approximating methods, which does not make BFE determinations possible for this zone. There are also some areas in Zone AH north of JNU. Zone AH is subject to a one percent annual chance for shallow flooding and ponding with average depths between one and three feet. Zone AH shows BFEs derived from detailed methods. The A, AE, and AH zones are all mandatory for flood insurance purchase requirements.

The CBJ has flood regulations to reduce the probability of flood damage. These regulations, the new flood maps, and the Flood Insurance Study comply with the National Flood Insurance Program (NFIP). NFIP is a voluntary program which allows communities to purchase flood insurance if they also adopt and enforce standards, flood maps, and studies as flood protection measures.

Figure 4-5: 2013 FEMA Overlay Flood Map for the Southern Half of the Mendenhall Valley



Source: CBJ 2013b

Disclaimer: This is not an official adopted FEMA flood insurance rate map (FIRM). This map was created by using flood zone boundaries of FIRM and overlaid onto a 2006 aerial photograph. CBJ assumes no responsibility for errors or omissions that exist on this map. Aerial photo taken June 2006.

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4.8 HAZARDOUS MATERIALS

The Resource Conservation and Recovery Act (RCRA) of 1976 directs the EPA to protect the environment and human health and welfare from improper hazardous waste management practices. The RCRA requires labeled and effective containers for hazardous waste, record keeping, and transport manifests. Hazardous materials at JNU include aviation fuel, antifreeze, and deicing fluids. When these materials are discarded, they may fall under RCRA regulations as hazardous waste.

Hazardous materials that have been spilled or improperly stored create contaminated sites. Contaminated sites may pose public health risks, and may be challenging or costly to mediate. A search of the ADEC database of contaminated sites yielded four sites on JNU property or nearby that are classified as "Open," which means that remediation cleanup activities have not been completed. Table 4-2 shows data for these four sites. Contaminated sites that are not classified as Open have completed remediating cleanup activities. There are approximately 30 contaminated sites in the vicinity of JNU where cleanup is complete.

Table 4-2: Open Contaminated Sites in the Vicinity of Juneau International Airport

Hazard ID	Site Name	Location	Notes
1450	Federal Aviation Administration (FAA) Juneau Station	Juneau International Airport	About 25 cubic yards of oily soil. Diesel release in 2006.
2987	Juneau Airport Fueling Facility	2085 Alex Holden Way, Juneau International Airport	Subsurface soil and groundwater are contaminated by historical releases of gasoline and diesel fuel.
3863	Mendenhall Wastewater Treatment Plant	2009 Radcliffe Road, adjacent to Juneau International Airport	Fuel transfer system leak of oil into the wet well on the north side of the facility in 2002. Below ground fuel leak in 2004. Below ground leak of about 20–30,000 gallons in the boiler fuel pipeline on the south side in 2008.
26362	Channel Flying Juneau Airport	8995 Yandukin Drive, Juneau International Airport	Petroleum compounds in soil and groundwater and metals in soil. These have historically leaked from private property onto JNU airport.

Source: ADEC 2015

There are two "Open" leaking underground storage tank (LUST) sites at JNU or nearby. These two sites are detailed in Table 4-3.

Table 4-3: Active Underground Storage Tank (UST) Sites in the Vicinity of Juneau International Airport

Hazard ID	Site Name	Location	Notes
22996	Alaska Airlines – Juneau Cargo Facility	1915 Alex Holden Way, Juneau International Airport	Residual contamination consists of primarily gasoline and some diesel in soils at 8–12 feet below ground surface in the proximity of the former underground storage tanks (USTs).
24941	Federal Aviation Administration (FAA) – Juneau SFOP Delta Western	9341 Glacier Highway, Juneau, AK	This Event ID covers several underground storage tanks that were removed in 1992 and 1996. Decommissioning reports were reviewed again in 2007 and it was determined that all tanks with the exception of Building 300 Tank 39-A-4 could be closed.

Source: ADEC 2015

4.9 HISTORIC AND CULTURAL RESOURCES

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and its implementing regulation in 36 CFR 800, requires the FAA to consider potential effects to historic properties from airport projects. Historic properties include Traditional Cultural Properties (TCPs) or prehistoric or historic districts, sites, buildings, structures, and objects included in or eligible for inclusion in the National Register of Historic Places (NRHP), per 36 CFR 800.16(1). The Alaska Historic Preservation Act (AHPA) mandates that activities on state lands also must consider cultural and historic resources.

There is archaeological evidence that people lived in Southeast Alaska for at least the last 10,000 years. The Auke tribe of Tlingit Indians had settled the Juneau area when gold mining operations were established in the 18th and 19th centuries. Juneau has a Tlingit history, and a strong historical influence from early mining prospectors (DCCED 2015). World War II military installations also contribute to Juneau's historical sites.

There are no sites eligible for the NRHP within airport property. South of the Float Plane Pond is an area where spruce roots are gathered in order to weave traditional Alaska Native baskets. This area is accessed by special permission. Written comment expressed concern for spruce forest alterations during the scoping period for the 2007 JNU EIS and Section 4(f) Evaluation (CBJ 2007).

The 2014–2015 runway rehabilitation included a programmatic agreement that would stop work if items of historic or cultural significance were found during construction. JNU staff would evaluate, avoid, and mitigate impacts to cultural resources for future projects as prescribed under NEPA, AHPA, and Section 106 of the NHPA in consultation with the State Historic Preservation Officer (SHPO), tribal governments, and other relevant entities.

4.10 LIGHT EMISSIONS AND VISUAL EFFECTS

4.10.1 Light Emissions

There are lights for the runway, aircraft approach, parking lot, building, and roads at JNU. The Airport is open 24 hours per day, requiring some lighting at all times.

The design report for the JNU Runway 8/26 Rehabilitation (CBJ 2013c) describes lighting and navigational aid upgrades to be undertaken in 2014–2015. The runway lighting system, including the runway centerline, edge, and threshold lighting will be replaced. Approach lighting will use a medium-intensity approach lighting system with runway alignment indicator lights (MALSR). Taxiways A and B1 will have their lighting replaced, and Taxiways C and E will have guard lights installed. Lighted signs will also be replaced. Light fixtures will use LED bulbs when possible to reduce energy consumption.

4.10.2 Visual Effects

JNU is within the Mendenhall River watershed, an area that has residential, commercial, and rural areas. JNU abuts the Mendenhall Wetlands State Game Refuge, and is framed by Mount Juneau, Thunder Mountain, and the Mendenhall Glacier. The 2007 JNU EIS and Section 4(f) Evaluation identified four areas with high scenic value in the vicinity of JNU. These areas were the west end of Runway 8, the east end of Runway 26, Duck Creek, and the Dike Trail.

The west end of Runway 8 is composed of flat terrain that includes wetland grasses and shrubs. This area includes and is surrounded by many waterways that break up the topography and colors. These waterways include the Mendenhall River west of the airport boundary, Duck Creek north of the runway, and the Float Plane Pond south of the runway.

The landscape on the east end of Runway 26 is also a relatively flat wetland vegetated by grasses and shrubs. Clusters of evergreen trees on dredge piles appear to break up the landscape. There are no notable visual features in this area, in part because of the protections given by its location in the refuge. There is not a fence or other boundary structure that separates the refuge from airport property due to tidal action.

Duck Creek is a small stream located along the northwestern boundary of JNU. This is a flat to very gently rolling landscape with forest-to-wetland vegetation. Duck Creek creates a clear contrast between the surrounding vegetation. This area is not without human disruption as buildings are visible from a distance, but trees generally obscure the structures. Duck Creek has been relocated for airport development, making it an unnaturally linear visual feature.

The EVAR/Dike Trail begins north of the runway, bends along the western end of the runway, and trends west-east on the south side of the Float Plane Pond. This is a flat area with wetlands to the south and stands of dense evergreen and alder trees to the north between the Float Plane Pond and the EVAR and Dike Trail. The Float Plane Pond creates smaller fingers of water to the south, which allows the JNU to be visible despite the trees. While trees are the dominant view, Gastineau Channel, Douglas Island, and Mansfield Peninsula are also visible in many locations on the EVAR/Dike Trail.

4.11 NOISE

Noise is typically defined as loud, unwanted, unpleasant, or unexpected sound that is usually associated with human activity and interferes with or disrupts normal activities. Noise may cause hearing loss and possibly adversely affect mental health. Consequently, airports generate measures of existing and projected noise along with noise mitigation measures.

4.11.1 Measurements of Noise

The magnitude of sound is measured by the decibel (dB), which is logarithmic, because the range of sound pressures that occurs is so large. However, human perception and response to noise does not follow a similar scale. Therefore, the A-weighted noise curve (dBA) compensates for human judgments of sound loudness. The dBA noise-weighting curve is the basis for most airport noise evaluations.

Day-night average sound level (DNL) estimates airport noise impacts to a community. DNL is the average sound level during a 24-hour period that includes a nighttime noise penalty. Sounds occurring during nighttime hours (between 10 p.m. and 7 a.m.) are given a 10-dBA weighting penalty to account for the added intrusiveness of noise occurring during generally quieter hours of the day when many people are asleep.

The DNL metrics were developed by the EPA, and are employed by several federal agencies, including FAA. The Aviation Safety and Noise Abatement Act of 1979 (ASNA) established the Federal Aviation Regulation Part 150 process that standardized evaluation of airport noise. An FAA Part 150 study includes a noise exposure maps (NEM) that identifies noise in areas proximate to the airport as well as a noise compatibility program (NCP) to reduce impacts of airport noise. Part 150 studies are not required, but there are financial incentives for conducting them. Federal funds may be available both to conduct a Part 150 study and to implement measures recommended in the NCP.

4.11.2 Noise Exposure Maps (NEMs)

Noise exposure maps (NEMs) depict noise contours for areas surrounding an airport. The FAA's Integrated Noise Model generates noise contours for 65, 70, and 75 DNL. The Integrated Noise Model incorporates data from the fleet mix, number of operations, flight tracks, time of day, and the environmental setting. Noise contour maps show the average annual DNL around the airport, and the maps are different from single event noise levels.

The FAA considers residential land use to be compatible with airport noise less than 65 DNL. DNLs of 75 or more are incompatible with most land uses. DNLs between 65 and 75 are compatible for some land uses, such as commercial, manufacturing, and recreational uses. Noise sensitive land uses within a contour of 65 DNL or greater are eligible for federal noise mitigation funding.

JNU developed a NEM in 1987, and updated it in 2000. The JNU NEM meets FAA Part 150 noise requirements. The 2000 contours showed that the area affected by JNU noise at 65 DNL or above was relatively small. There were no residential areas within the 65 DNL or higher noise contour. JNU is updating their Part 150 study in conjunction with the Sustainability Master Plan process, and it will be included in later sections of this plan.

Single-event noise measurements, such as float planes and helicopters, do not impact DNL as much as large aircraft jet noise. Single-event noise at JNU is typically of low magnitude for a fairly long duration, and is often associated with tourism-related operations.

4.11.3 Noise Compatibility Program (NCP)

The Noise Compatibility Program (NCP) contains measures to reduce noise impacts and incompatible land uses. JNU's NCP was approved by the FAA in 2000. It had five noise abatement measures, three land use measures, and six continuing program measures.

The noise abatement measures included maximization of Runway 8 for turbojet departures, Runway 26 departure path and Runway 8 approach path adjustments, voluntary restrictions on the use of reverse thrust from turbojet aircraft at night, and voluntary adoption of noise abatement departure profile procedures on Runway 26 (FAA 2000). Establishment of helicopter flight corridors and groupings to minimize individual helicopter flights was another noise abatement measure.

Three land use measures have been enacted by JNU; the first was a fee-simple land acquisition of one residential property that was inside the 65 DNL noise contour boundary. Another measure was to educate residents about the Airport Master Plan and NEMs. The third land use measure recommended CBJ development planning that would limit the potential for incompatible land uses, such as new residential structures placed within the 65 DNL noise contour boundary.

Continuing program measures include formalizing the noise complaint response procedures, reviewing the existing NEM and NCP, designating a Noise Abatement community liaison, and reminding pilots of noise abatement procedures through handouts, signs, and verbal cues.

4.11.4 Other Studies and Plans for JNU Generated Noise

Several studies of flightseeing noise have been conducted in Juneau (CBJ 2004). A flightseeing noise assessment was completed in 2001. The CBJ examined flightseeing noise as part of its 2002 Juneau Tourism Management Plan, and a Heliport Evaluation was conducted in 2001. The volunteer Tourism Best Management Practices Program (TBMP) was established in 1996 to find ways to minimize noise impacts from float planes and helicopters.

The CBJ Comprehensive Plan includes a noise section encouraging development in a manner compatible with various noise levels (CBJ 2013a). CBJ policy is to minimize resident exposure to excessive or obtrusive noise and to control noise pollution such that commerce and public safety are not adversely affected. The CBJ Comprehensive Plan also outlines an implementation action to adopt any noise guidelines developed in the JNU Sustainability Master Plan into the CBJ Land Use Code.

4.12 SOCIAL ENVIRONMENT

Executive Order 12898, Environmental Justice, requires federal agencies to identify and address disproportionate adverse impacts from projects to minority and/or low-income populations. JNU is within Census Tract 3 of the CBJ. Three of the five remaining CBJ census tracts are adjacent to the tract containing JNU—Census Tracts 2, 4, and 6. Table 4-4 gives minority and low-income data for these census tracts, as well as for reference geographies of the CBJ and the State of Alaska. Census Tract 3 containing JNU is close to the poverty percent and median income for the State of Alaska, which is below the CBJ. Census Tract 3 has a lower percent minority population than the State of Alaska or the CBJ. Census Tract 2, adjacent to JNU, has a higher income and lower poverty rate. Census Tract 2 has a non-white population that is similar to Census Tract 3. Census Tract 4, adjacent to JNU, has a higher percent minority population and a lower income than the State of Alaska or the CBJ. Census Tract 6, adjacent to JNU, has a lower percent minority population. This tract has a high income compared to the State of Alaska, and a slightly lower income when referenced to the CBJ.

Table 4-4: Minority and Low-Income Populations, 2009–2013 5-Year Estimates

Location	Population	Percent Non-White	Percent Below Poverty Level	Median Household Income
State of Alaska	736,732	32.7%	9.9%	$70,760
City and Borough of Juneau	32,626	30.7%	6.2%	$81,490
Census Tract 3 (contains Juneau International Airport)	5,616	27.8%	9.7%	$71,389
Census Tract 2 (adjacent to Juneau International Airport)	7,199	27.7%	3.5%	$86,875
Census Tract 4 (adjacent to Juneau International Airport)	4,846	37.0%	6.5%	$68,458
Census Tract 6 (adjacent to Juneau International Airport)	5,675	21.4%	8.3%	$77,298

Source: U. S. Census Bureau 2013

Executive Order 12045, Protection of Children from Environmental Health and Safety Risks, requires federal agencies to identify and assess disproportionate environmental health and safety risks to children. There are hazardous wastes and contaminated sites at JNU, but children do not have access to these areas and would not be exposed to contaminated materials.

If future JNU projects would require the relocation of residential or commercial properties, compensation would be made under the Uniform Relocation Assistance and Real Property Acquisition Policies Act, as amended by the Surface Transportation and Uniform Relocation Act.

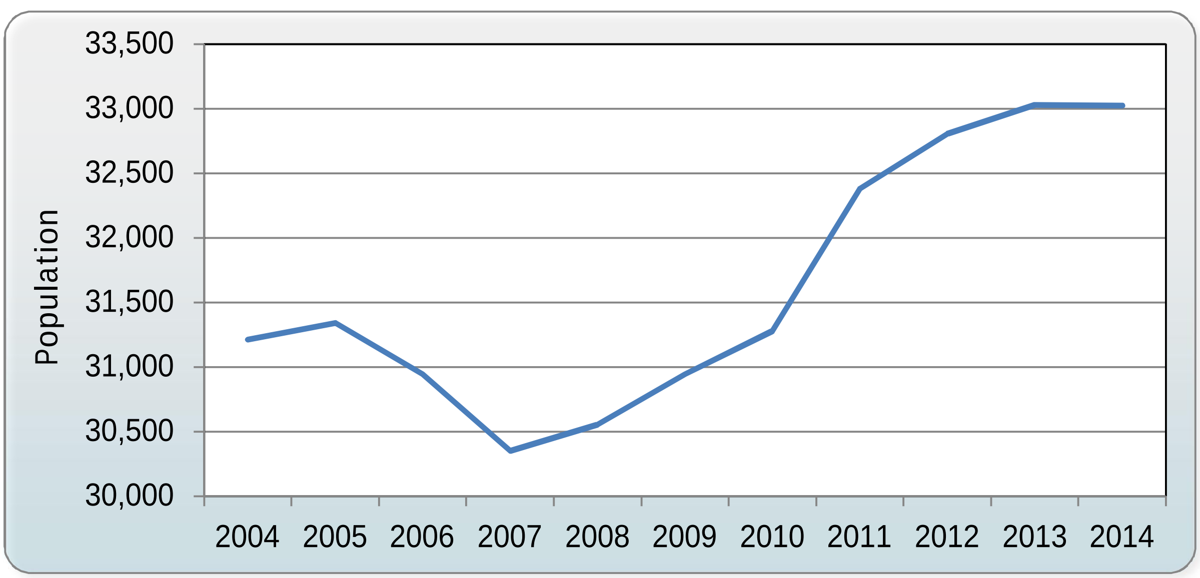
4.13 SOCIOECONOMICS

Local socioeconomic factors, such as population, employment, and income, have an impact on aviation travel demand. JNU is a transportation hub for Southeast Alaska, and has an important role in Juneau's economy. JNU is an essential tie for the CBJ to other parts of Alaska, the Lower 48, and the world.

4.13.1 Population

While the volume of visitor and nonlocal traffic affects JNU operations to a greater extent than local traffic, populations of the CBJ and Southeast Alaska do affect JNU aviation forecasts. The CBJ's population has increased over the past decade (Figure 4-6), and is projected to continue a trend of modest increase. The population of Southeast Alaska is projected to decline, while Alaska's state population is expected to increase. Table 4-5 shows historical and projected populations for the CBJ, Southeast Alaska, and the state.

Figure 4-6: Historical Population of the City and Borough of Juneau, 2004–2014



Source: Alaska Department of Labor and Workforce Development 2015

Table 4-5: Projected and Historical Population of Juneau, Southeast Alaska, and the State of Alaska

	Juneau	Southeast Alaska	State of Alaska
Historical			
2002	31,047	72,214	641,729
2007	30,350	70,219	680,169
2012	32,832	74,423	732,298
Projected			
2017	33,419	74,863	770,417
2022	33,839	74,849	806,479
2027	34,045	74,384	839,191
2032	34,042	73,511	868,902
2037	33,879	72,419	897,034
2042	33,617	71,170	925,042

Source: Alaska Department of Labor and Workforce Development 2014

4.13.2 Economy and Employment

Juneau is the state capital of Alaska, and Southeast Alaska is a popular tourist destination. This is reflected in state government and leisure and hospitality being in the top five Southeast Alaska employment sectors. Trade, transportation, and utilities, local government, and educational and health services comprise the remaining top five industries. Together, these accounted for 71% of employment in Southeast Alaska, with trade, transportation, and utilities being the largest employment sector (19%). Table 4-6 shows historical employment in Southeast Alaska.

Table 4-6: Historical Employment in Southeast Alaska, 2010–2014

Employment Sector	2010	2011	2012	2013	2014
Trade/Transportation/Utilities	7,000	7,000	6,950	7,050	6,950
Local Government	6,100	6,050	6,250	6,150	6,050
State Government	5,550	5,650	5,650	5,500	5,500
Leisure and Hospitality	3,500	3,500	3,700	3,800	3,900
Educational and Health Services	3,800	3,950	4,050	3,950	3,850
Manufacturing	1,900	2,050	2,050	2,200	2,250

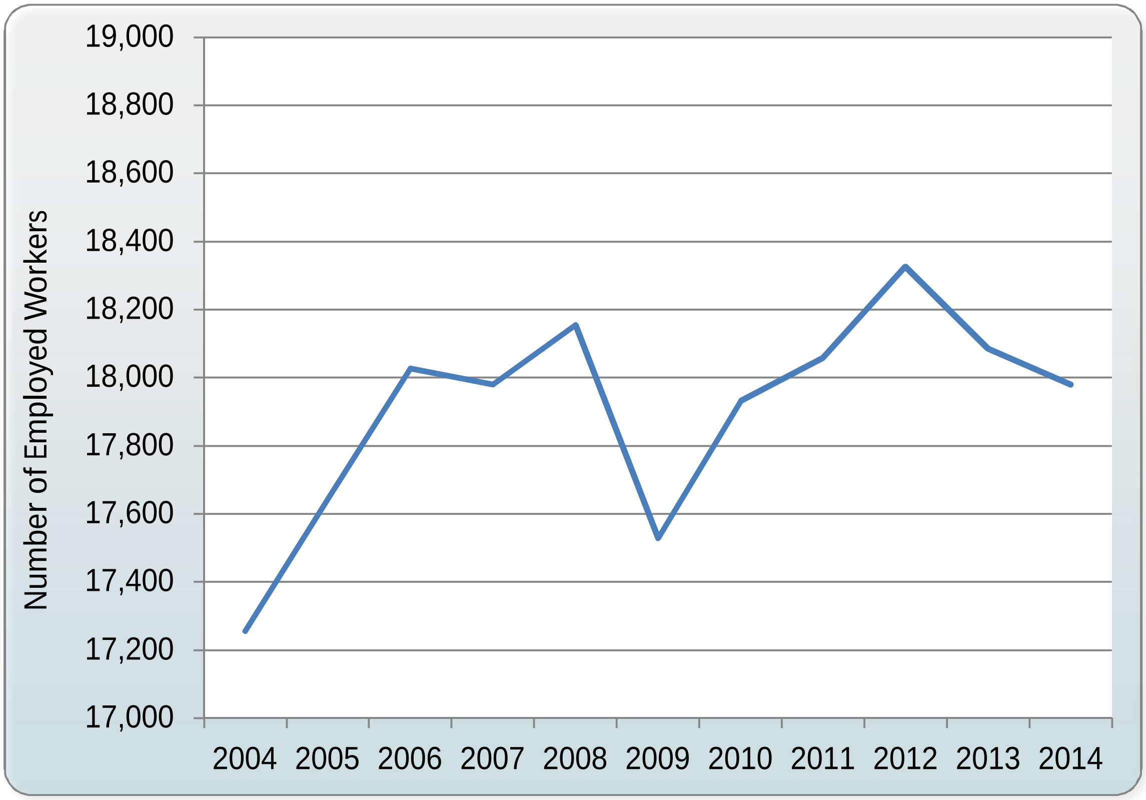
Employment Sector	2010	2011	2012	2013	2014
Construction	1,400	1,450	1,550	1,650	1,600
Professional Services	1,450	1,550	1,550	1,500	1,550
Federal Government	1,750	1,700	1,700	1,550	1,500
Other Services	1,200	1,200	1,250	1,250	1,250
Financial Activities	1,300	1,250	1,200	1,100	1,100
Mining and Logging	750	850	1,000	950	950
Information	450	450	450	500	500

Source: Alaska Department of Labor and Workforce Development 2015.

Petroleum, mining, tourism, and international freight were predicted by the Institute of Social and Economic Research (ISER) to have the most potential for employment growth in Alaska (ADOT&PF 2014). ISER predicts that seafood industry employment will remain constant. Juneau is affected by the national economy because outside visitors are an important revenue source to the community. Tourism to Juneau was adversely affected by the December 2007 to June 2009 recession.

Overall employment in the CBJ has been mostly steady over the last decade. A dip followed the December 2007 to June 2009 recession. Figure 4-7 graphs average quarterly employment for the CBJ over the last ten years.

Figure 4-7: Average Quarterly Employment for the City and Borough of Juneau, 2004-2014



Source: Alaska Department of Labor and Workforce Development 2015

JNU employs about 50 people directly, but leaseholder employment adds another 950 jobs. Indirect local jobs account for another 260 workers (ADOT&PF 2011). Table 4-7 depicts employment impacts of JNU. A report evaluating economic and community contributions of airports in Alaska found:

> *"If each direct airport job were held by a unique Alaskan resident worker, then JNU could provide direct employment to almost six percent of the resident workers in the City and Borough of Juneau. Conceptually, almost 1 in every 15 workers in the community could depend directly on the airport." (ADOT&PF 2011)*

Table 4-7: Juneau International Airport's Regional Employment Impact

Type	Jobs*
CBJ Airport Operations/Management	31
Direct Leaseholder Employment (full and part time)	950
Other Indirect Local Jobs	260
Total Local Employment	1,241

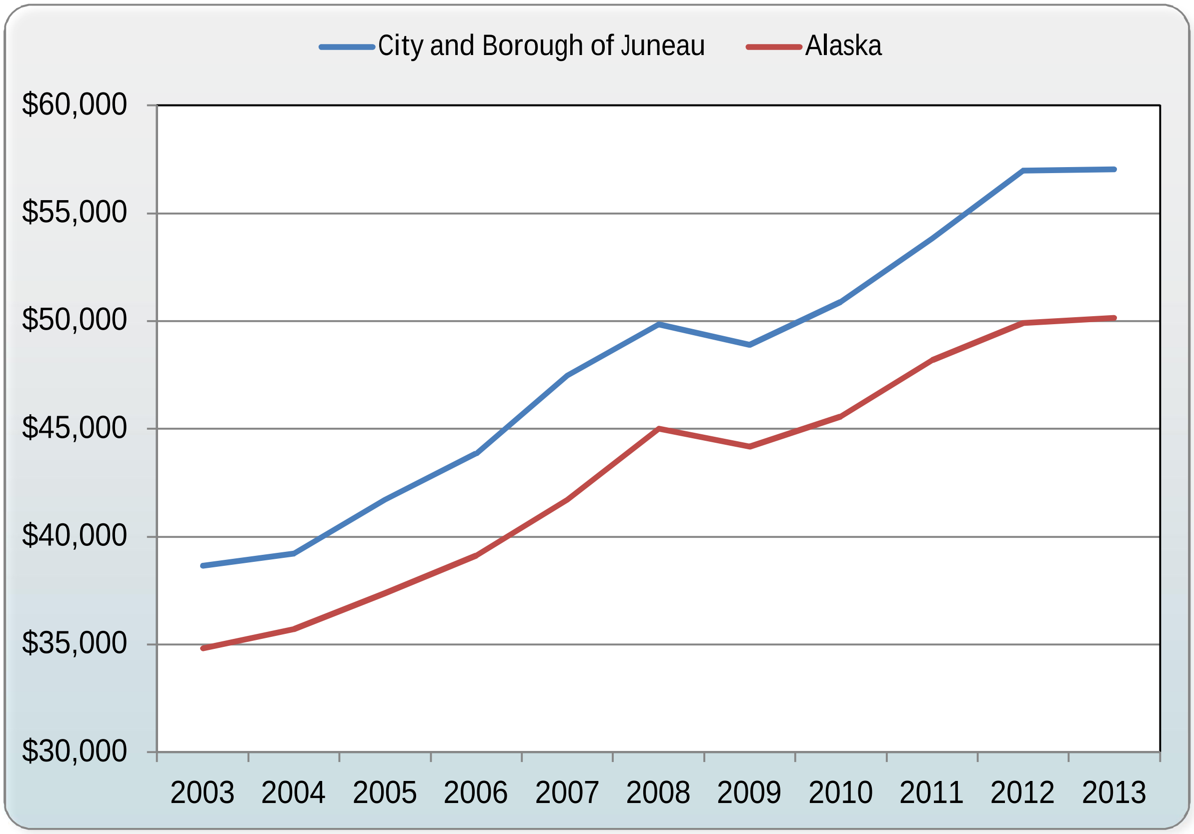
Source: ADOT&PF 2011

**Indicates 2009 employment value. FY2015 approved budget appropriated for approximately 35 full time equivalent employees*

4.13.3 Income

Personal income of residents impacts their frequency of aviation travel. Per capita income in the CBJ has been steadily rising over the past decade, with a small dip during the December 2007 to June 2009 recession. Figure 4-8 graphs per capita income in the CBJ and Alaska. There is more disposable income in the CBJ than in Alaska overall.

Figure 4-8: Per Capita Personal Income for the City and Borough of Juneau and Alaska, 2003–2013



Source: Alaska Department of Labor and Workforce Development 2015

4.13.4 Induced Socioeconomics

Induced socioeconomic impacts are effects to surrounding areas that relate to proposed airport developments. Induced impacts may include changes in tax revenue, patterns of population movement and growth, or infrastructure demands stemming from JNU projects. These changes may be positive or negative. Induced socioeconomic impacts are assessed for large airport development projects, such as terminal improvements.

4.14 SOLID WASTE

The CBJ's only landfill, Capitol Landfill, is located approximately four miles away from JNU. It is privately operated by Capitol Disposal, a local subsidiary of Waste Management. The Juneau Recycle Center is located inside Capitol Landfill. Solid waste sites within 10,000 feet of a turbojet aircraft runway have potential to attract wildlife, and the landfill is more than this distance away from JNU.

Waste in the CBJ not suitable for disposal in the landfill must be moved out by barge as the CBJ has no connection to the road system. In 2007, incinerators at the Capitol Landfill were closed. This raised concerns for landfill capacity in the CBJ. The Capitol Landfill will reach capacity within 20 years according to current projections.

JNU removes solid waste in accordance with state provisions of the ADEC's Solid Waste Program. The CBJ's Solid Waste Management Strategy (CBJ 2008) guides JNU's solid waste management. The CBJ Comprehensive Plan also has several policies pertaining to solid waste and recycling (CBJ 2013a). JNU independently launched a recycling program for public waste generated within the terminal in 2014. The appendix to this document contains a Recycling, Reuse, and Waste Reduction Plan for JNU.

4.15 WATER QUALITY

JNU is located within the Mendenhall Watershed at the south end of the Mendenhall Valley. Much of this area is influenced by tides. The Mendenhall River, Duck Creek, and Jordan Creek are major geographic features on airport property, and JNU is situated where these streams flow into the Gastineau Channel.

JNU strives to ensure the quality of water in water bodies on and near the airport. The Mendenhall Watershed Partnership, founded in 1998 and now known as the Juneau Watershed Partnership, provides watershed stewardship in the CBJ, including monitoring activities within the Mendenhall Watershed.

4.15.1 Surface Water

JNU is within the Mendenhall Watershed, which contains the sub-watersheds of Duck Creek and Jordan Creek. The Mendenhall River flows into Fritz Cove, and Jordan Creek flows through the refuge into the Gastineau Channel. Duck Creek is a major tributary of the Mendenhall River. Surface water and groundwater resources in the vicinity of JNU are influenced by Mendenhall Glacier and isostatic rebound.

The following major water resources are on JNU property or in the immediate vicinity (CBJ 2007):

- Mendenhall River
- Duck Creek
- Jordan Creek
- Miller-Honsinger Pond and adjacent "Miller-Honsinger/East Runway" Slough
- Float Plane Pond
- Tidal influence of the Gastineau Channel and estuarine wetlands

The Mendenhall River flows due west of JNU. A dike protects the Float Plane Pond from the Mendenhall River.

Duck Creek runs northwest to southwest through airport property. It travels through culverts under Berners Avenue and the dike, and has been channelized in several segments. Duck Creek flows into the Mendenhall River. The Duck Creek Watershed Management Plan guides management of the stream. In 1994, Duck Creek was listed as an impaired water body for debris, low dissolved oxygen, metals, fecal coliform bacteria, and turbidity, which led to the development of protection and recovery plans. Culvert maintenance and upgrades, streambank revegetation, sediment removal, wetlands restoration, and cleanup events have helped to improve water quality in Duck Creek, but it remains an impaired water body.

Jordan Creek is east of Duck Creek on airport property. It crosses Yandukin Drive and passes underneath Crest Street through a culvert. Jordan Creek is also channelized, and travels through culverts under the taxiway and runway before entering the refuge. Jordan Creek management activities are guided by watershed protection and recovery plans and a management plan. In 1998, Jordan Creek was listed as impaired for debris, low dissolved oxygen, and sediments. While still an impaired water body, restoration efforts include stormwater best management practices (BMPs) at demonstration sites, water quality monitoring, and stream cleanup events.

The Float Plane Pond has an average depth of 4 to 5 feet and is about 5,200 feet long by 430 feet wide. There is a deep pocket (30 feet in depth) of water at the south end of the pond. Sloughs and side channels branch from the pond into a wooded area to the south. A tide gate at the west end of the Float Plane Pond controls its water levels. High tide brings brackish water into the pond.

Miller-Honsinger Pond is a privately owned pond north of the east end of the runway. It was created from dredging for gravel fill. It is about 450 feet wide by 2,500 feet long and has several small tributaries from Thunder Mountain. Brackish water enters the pond at high tide through a flapgate valve.

The estuarine wetland system of the refuge has strong influence from tides, and wide tidal fluctuations. There is a system of sloughs east of Runway 26.

4.15.2 Groundwater

There are two aquifers in the Mendenhall Valley—an upper aquifer and a lower aquifer. The upper aquifer is at a depth of 3 to 15 feet below the ground surface in unconfined silt, sand, and gravel sediments. It is about 0 to 300 feet in thickness. Groundwater and surface water interactions all occur in the upper aquifer. The lower aquifer is confined and separated by a layer of bedrock below the upper aquifer (CBJ 2007). The water table flows southwesterly towards the Mendenhall River.

Mendenhall Lake recharges the upper aquifer, and it contributes groundwater for Duck Creek and Jordan Creek. These conditions reflect local geological interactions. In general, the upper Mendenhall Valley gains groundwater flows and the lower reaches lose water to the ground (CBJ 2007). High tides also recharge groundwater in Duck and Jordan creeks, and brackish tidal waters interact with groundwater. Groundwater near the Wings of Alaska facility and the Alaska Airlines ground support facility has been degraded by organic compounds such as diesel and gasoline (CBJ 2007).

4.15.3 Wastewater

Wastewater from JNU is treated at the Mendenhall Valley Wastewater Treatment Plant. The airport maintains a Spill Prevention, Control, and Countermeasure Plan, which has response measures and preventative techniques for oil spills and hazardous chemical discharges.

4.15.4 Stormwater and Drainage

Stormwater runoff from JNU drains into Duck Creek, Jordan Creek, the Float Plane Pond, and the Refuge/Miller-Honsinger Slough. The CBJ maintains three culverts for Duck Creek, four culverts for Jordan Creek, and one culvert from the Float Plane Pond to the Mendenhall River on airport property. All culverts allow fish passage except for the Float Plane Pond culvert. High tides sometimes reduce downstream conveyance through culverts.

The Stormwater Pollution Prevention Plan (SWPPP) guides stormwater management at JNU. The SWPPP includes BMPs and information on potential pollutant sources (Carson Dorn, Inc. 2011). The plan was last updated in March 2011. JNU has a National Pollution Discharge

Elimination System (NPDES) multi-sector group permit, and the SWPPP fulfills requirements of this permit. There are 11 outfalls on airport properties. De-icing operations for aircraft use glycol and urea, making regular stormwater monitoring an important task at JNU.

4.16 WETLANDS

The CBJ adopted the Juneau Wetlands Management Plan in 1992 following wetlands mapping done in the 1980s. The plan classified wetlands within developing borough areas into high and low value categories. A small 2006 study updated some of this information. A comprehensive update of the Juneau Wetlands Management Plan is in progress, with a draft plan set for release in early 2016. The updated plan will use information collected through the Habitat Mapping Project, and will serve to protect critical high value wetlands while allowing development in lower value areas.

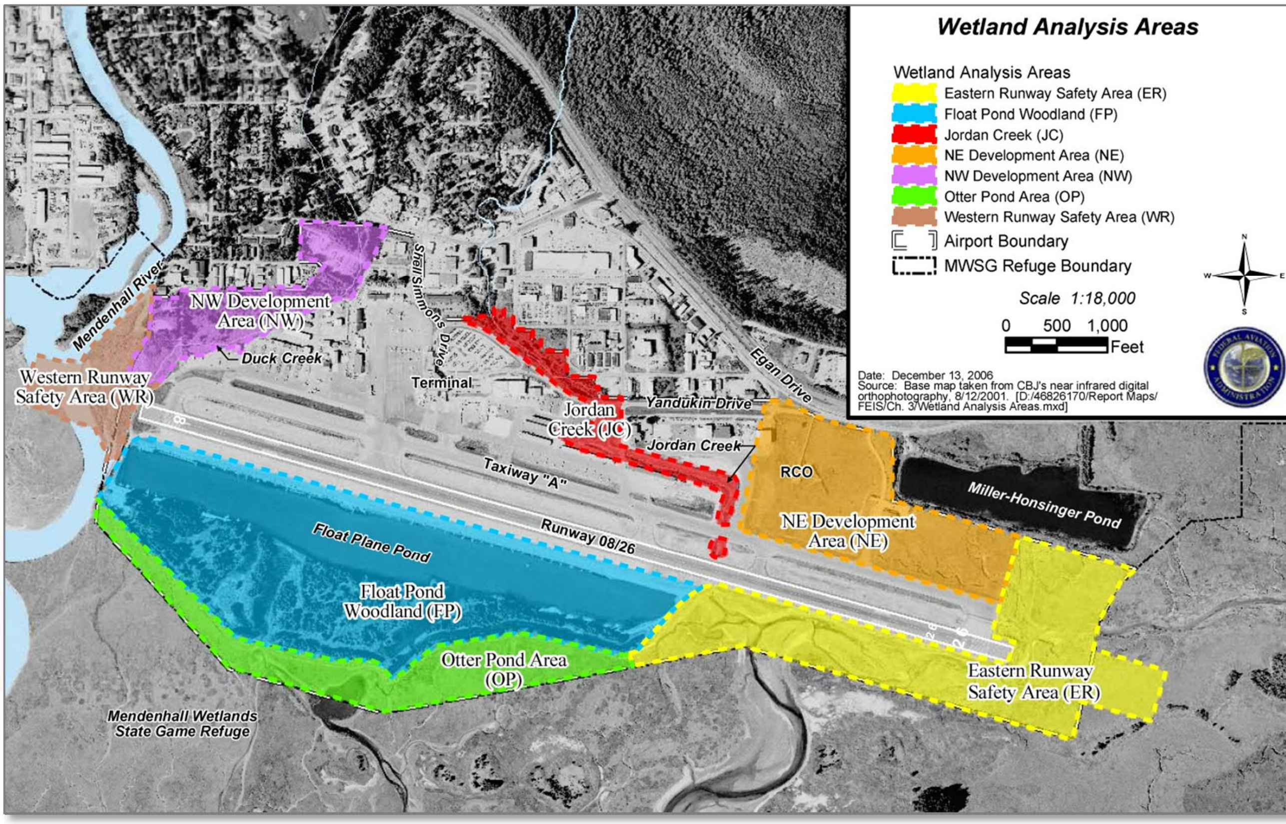
The CBJ Wetlands Review Board was created in 1992 and is tasked with implementing the Juneau Wetlands Management Plan. Board members have formally reviewed activities at JNU involving wetlands, such as the 2007 expansion, as part of the permitting process. The nine members of the CBJ Wetlands Review Board are appointed by the CBJ Assembly to provide technical advisement on wetland and riparian issues for the CBJ Assembly, Planning Commission, and Community Development Department.

Wetland delineation may be required for projects that could impact jurisdictional wetlands. The U.S. Army Corps of Engineers (USACE) has jurisdiction under the Clean Water Act to regulate activities in wetlands. Until 2006, USACE had a special agreement with the CBJ that gave the CBJ permitting authority over low value Category C and D wetlands to encourage development in those areas. Future projects at JNU that have potential for impact to wetlands may require a wetland delineation, USACE jurisdictional determination, and/or a Clean Water Act Section 404 permit.

Wetlands within or adjacent to JNU include palustrine, estuarine, lacustrine, and riverine systems. Most wetlands are estuarine and influenced by both freshwater and marine tides. These wetlands offer fish and wildlife habitat, groundwater recharge, surface hydrologic control, sediment retention, and nutrient transformation. Refer to Figure 4-1 for some of the marsh vegetation in the vicinity of JNU. The 2007 JNU EIS and Section 4(f) Evaluation included wetland delineations from a 2002 wetland delineation report (CBJ 2007) and organized wetlands into the analysis areas shown in Figure 4-9. The wetland analysis areas had the following geographies:

- Jordan Creek, extending from the Aspen Hotel to the north side of Runway 8/26
(5.96 acres of wetlands)
- Northeast Development Area, north of the northeastern side of Runway 8/26
(39.2 acres of wetlands)
- Eastern Runway Safety Area, east and south of Runway 8/26
(85.9 acres of wetlands)
- Otter Pond Area, south of the Float Plane Pond Woodland and dike
(41.20 acres of wetlands)
- Float Pond Woodland, directly south of the Float Plane Pond and within dike
(97.4 acres of wetlands)
- Western Runway Safety Area, west of the west end of Runway 8/26 to the Mendenhall River
(19.6 acres of wetlands)
- Northwest Development Area, Duck Creek and north of the northwest portion of Runway 8/26
(6.1 acres of wetlands)

Figure 4-9: Juneau International Airport Wetland Analysis Areas



Source: CBJ 2007

The ground surface in the Mendenhall Valley and surrounding area is slowly being raised through isostatic rebound and tectonic uplift. It is expected that some estuarine wetlands will be lifted out of a marine environment and become palustrine marshes or coastal forb meadows. Regional uplift is likely to change wetlands types within and adjacent to JNU over time.

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5

5 SUSTAINABILITY BASELINE

5.1 INTRODUCTION

A primary purpose of the Juneau International Airport Sustainability Master Plan (SMP) is to integrate sustainability into the airport master plan process, identify areas of sustainability impact, assess baseline sustainability performance, and identify opportunities for performance improvement. The SMP will contain all of the aspects expected by the Federal Aviation Administration (FAA) for projects of this type, including:

- A written sustainability vision, mission, or policy statement along with a description of how it is communicated to stakeholders.
- Identification of sustainability categories, or focus areas.
- A baseline inventory for each sustainability focus area.
- Establishment of goals or targets to minimize the airport's footprint and improve overall sustainability performance.
- Identification of specific initiatives to improve the airport's sustainability performance and achieve the established goals or targets.
- A public participation and community outreach program.

This chapter presents the results of the collection and compilation of data and information to generate a baseline of the airport across the 12 selected Focus Areas (see Chapter 2, Vision/Mission, Focus Areas, and Goals). Information was collected from the airport, the City and Borough of Juneau (CBJ) and other public sources. Additionally, current rates (and historic rates, where available) of resource consumption were calculated and compiled, and the information was summarized in terms relevant to the airport and the SMP. A baseline year was identified to serve as a reference point for evaluating current and projected sustainability impacts and initiatives. The baseline year is 2014, unless noted otherwise. The sustainability baseline is organized by Focus Area under four sustainability components—Economic Viability, Operational Efficiency, Environmental (Natural Resource Conservation), and Social Responsibility (i.e., the four functional parts of EONS, defining airport sustainability).

5.2 LOCAL/REGIONAL SUSTAINABILITY CONTEXT

The baseline is also informed by the CBJ's sustainability actions and plans. These efforts are underpinned by the City's commitment to sustainability, under Resolution 2528 and found in Chapter 2 of the Comprehensive Plan Update[1]. The adopted resolution states that the CBJ is committed to:

> *…a sustainable future that meets today's needs without compromising the ability of future generations to meet their needs and accepted its responsibility to:*
>
> - *Support a stable, diverse, and equitable economy;*
> - *Protect the quality of the air, water, land, and other natural resources;*
> - *Conserve native vegetation, fish and wildlife habitats, and ecosystems;*
> - *Minimize human impacts on ecosystems; and*
> - *Minimize energy usage and the release of greenhouse gases.*

Further, the Comprehensive Plan noted that the airport is "essential to many of the policies and implementing actions of the Comprehensive Plan" and, since Juneau is only accessible by marine and aviation transportation modes there is a "higher value and greater responsibility on the airport's operation and development."

CBJ's relevant commitments, policies, guidance and initiatives, such as those referenced in the Comprehensive Plan and Climate Action Plan, are presented in Appendix B and discussed in applicable Focus Areas. This information will provide the overall context within which JNU will continue to implement sustainability actions.

5.3 ECONOMIC VIABILITY

The Economic component of sustainability plays a critical role for JNU, since the airport is municipally funded and operated and plays a vital role in the local and regional economy. The airport provides jobs and stimulates economic growth in the community while serving as a primary mode of transportation for passengers and as a hub for goods and tourism in the Southeast Alaska region. The Focus Areas discussed in this section are Economic Performance and Procurement Practices.

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[1] City & Borough of Juneau Community Development Department, *Comprehensive Plan of the City and Borough of Juneau* (2013, November 1). Retrieved July 14, 2015, from http://www.juneau.org/cddftp/documents/Comp.Plan2013UpdateBook_Web121913.pdf

5.3.1 Economic Performance

Economic Performance is included in the baseline to present the airport's impact in the regional economy and to underpin its role as critical infrastructure for transportation, commerce, and tourism in the region. This section relies on the work completed by others for economic impact studies.

The direct economic value generated by the airport is reflected in indicators such as airport revenues, operating costs, number of jobs, and employee compensation. Indirect economic impact can also be considered (such as local jobs of those who supply goods and services to the airport).

In 2017 Sheinberg Associates prepared an airport economic impact study. This study indicated that the total annual economic impact of the direct jobs and direct expenditures of JNU was approximately 1,082 direct and indirect jobs and $173.7 million in economic output[2].

For the 2015 fiscal year, the airport's budget included total airport revenue of $5.97 million with total airport operating costs of $6.10 million. The airport is heavily reliant on service charges and rental fees, and receives limited federal and state funding for operations (federal and state revenues are 2% and 1%, respectively). Figure 5-1 and Figure 5-2 summarize the airport's funding sources and expenditures for core services.

[2] Northern Economics, Inc., *Economic and Community Contributions of Selected Alaska Airports: 12 Case Studies*. (2011) Prepared for Alaska Department of Transportation and Public Facilities.

Figure 5-1: Funding Sources for JNU, FY15 Adopted Budget

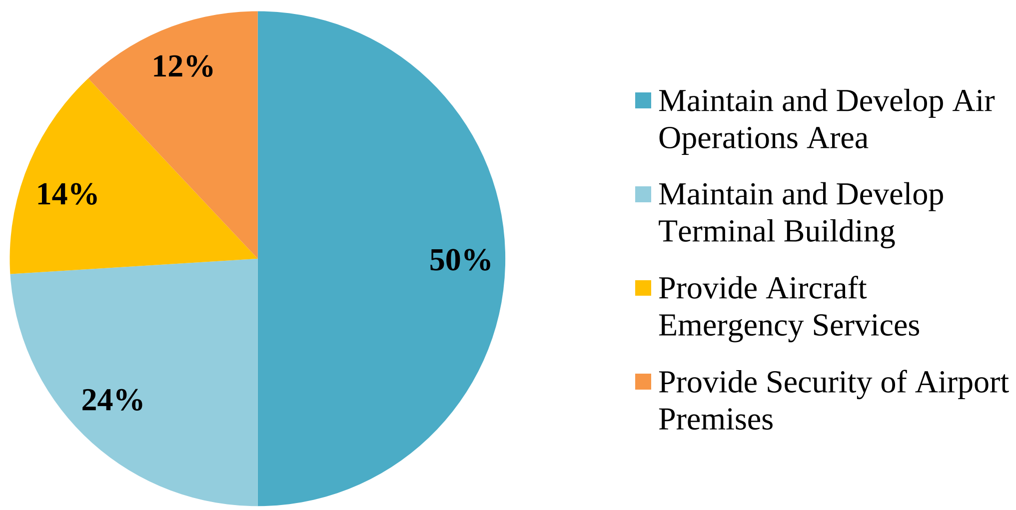
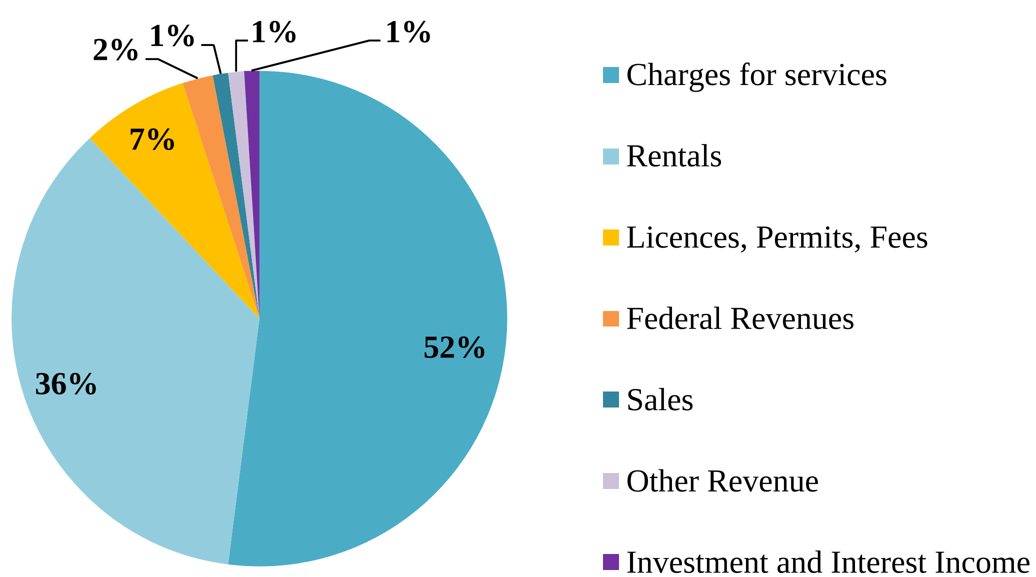


Figure 5-2: Expenditures on Core Services for JNU, FY15 Adopted Budget



The airport is also a major source of both direct and indirect jobs in Juneau. The airport directly employs about 35 full time equivalent (FTE) employees, based on the FY 2015 adopted budget. However, the impact of the airport's leaseholders and overall indirect employment is much larger. In the same 2011 economic study, it was estimated that airport leaseholders provided roughly 950 direct jobs to the community (based on 2009 data). Close to 60 percent of those jobs were full-time, non-contract jobs held by Alaskans.

Table 5-1: JNU's Regional Employment Contributions

Type	Jobs
CBJ Airport Operations / Management*	31
Direct Leaseholder Employment (full and part time)	950
Other Indirect Local Jobs	260
Total Local Employment	**1241**

**Indicates 2009 employment value*
Source: Economic and Community Contributions of Selected Alaska Airports, based on 2009 data. Prepared by Northern Economics

The Northern Economics study estimated that in 2009, 891 of the 981 jobs at the airport were held by Alaskan residents, concluding that "[i]f each direct airport job were held by a unique Alaskan resident worker, then JNU could provide direct employment to almost six percent of the resident workers in the City and Borough of Juneau. Conceptually, almost 1 in every 15 workers in the community could depend directly on the airport."

Finally, and perhaps most importantly, JNU serves as a hub for passengers, mail, and cargo in Southeast Alaska. More than 700,000 passengers use the airport each year. Table 5-2 summarizes the destination cities for arriving passengers, based on 2014 passenger arrival activity.

Table 5-2: Destination Cities for JNU Arriving Passengers, 2014

Destination City	% of Total
Anchorage, AK	23.42
Gustavus, AK	2.66
Haines, AK	2.22
Hoonah, AK	12.66
Ketchikan, AK	5.20
Petersburg, AK	3.23
Seattle, WA	47.33
Sitka, AK	6.70
Skagway, AK	1.90
Wrangell, AK	1
Yakutat, AK	1.23
Other Alaskan Cities (Angoon, Chatham, Cordova, Elfin Cove, Excursion Inlet, Fairbanks, Funter Bay Alaska, Juneau, Kake, Klawock, Kodiak, Pelican, Tenakee)	< 1

Source: Bureau of Transportation Statistics

5.3.2 Procurement Practices

Procurement practices play an important role in sustainability due to the amount and range of purchases made by airports for materials, supplies, and services.

At JNU contracting and procurement of airport supplies and services is centralized within the CBJ Finance Department and stipulated by the Juneau Code of Ordinances[3]. This ordinance does not include any specific environmental or sustainable procurement clauses. Currently JNU does not have an established environmental or sustainability procurement policy, nor a 'buy local' requirement, with the exception of contracting for professional services.

In accordance with Section 53.50.060, the CBJ purchasing ordinance has some preferential contract selection clauses for local firms and firms with disabilities (i.e., those firms that are

[3] City & Borough of Juneau, Alaska, Municipal Code of Ordinances, Title 53 Chapter 53.50, Purchasing of Supplies and Services. Retrieved from https://www.municode.com/library/ak/juneau/codes/code_of_ordinances?nodeId=PTIICOOR_PTIIOTPR_CH53.50PUSUSE

certified as disabled by a state or federal procurement program or use a work force comprised at least 75 percent with persons having significant physical or mental disabilities). In addition, all contracts greater than $5,000 allocate five percent of the total points possible for the proposal if the proposal is submitted by a local firm. Also, as a recipient of financial assistance from the U.S. Department of Transportation (DOT), CBJ has established a Disadvantaged Business Enterprise (DBE) program and goals for DBE participation on FAA funded projects. The program's aim is to ensure that DBEs "have an equal opportunity to receive and participate in DOT-assisted contracts." The goal CBJ has established for projects at the airport through FY 2015 for DBE participation in FAA-assisted contracts is 5.92 percent of the Federal financial assistance.

In addition, while not a procurement policy, CBJ did enact a green building standard for all public facilities and buildings costing over $5 million that are paid for by municipal funds, including facilities and buildings for the airport[4]. The ordinance adopted the Leadership in Energy and Environmental Design (LEED) Rating System and requires applicable buildings to achieve a minimum level of LEED Certified. As a result, any new facilities or buildings at the airport that exceed $5 million are required to pursue LEED Certification, which will require the airport to adopt additional contractual and procurement requirements to achieve the certification.

5.4 OPERATIONAL EFFICIENCY

The Operational component of sustainability emphasizes the operation, management, and maintenance of the airport and focuses on the role sustainability can play in this context. Operational efficiency can further be thought of as the ability and means by which the airport runs the operation in the most effective and efficient manner while providing the same, or improved, level of service and function, both in the short and long term. Operational efficiency is of critical importance to airports, hence the industry has expanded the traditional triple bottom line definition of sustainability (i.e., people, planet, profit) to include operations. The Focus Areas discussed in this section include Cost Control and Business Continuity and Emergency Preparedness.

[4] City & Borough of Juneau, Alaska, Municipal Code of Ordinances, Title 49 Chapter 49.35.800, Sustainable Building Standards for Construction and Renovation of Buildings. Retrieved from https://www.municode.com/library/ak/juneau/codes/code_of_ordinances?nodeId=PTIICOOR_TIT49LAUS_CH49.35PUIM_ARTVIIIBUST

5.4.1 Cost Control

Cost Control is a primary concern in airport operations and is a primary driver for sustainability. Cost savings measures can be both operational, such as implementing various energy efficiency and conservation measures, and capital, such as using a renewable energy system or integrating green building design and construction strategies into building projects.

The airport has implemented the following cost savings measures that have measureable sustainability benefits:

- Geothermal/ground source heat pump system
- Energy efficiency and conservation measures
- Waste recycling program

These cost savings measures can directly and proportionally impact the airport's expenditures on utilities and waste disposal. Like most operations, utilities represent a sizeable component of the airport's overall expenditures but they are also manageable costs that can benefit from sustainability initiatives. Figure 5-3 shows the airport's expenditure on utilities for FY 2014. Total FY 2014 expenditures for the airport were $5,867,700, with utilities accounting for approximately 10 percent of the airport's annual budget. Utility spend and trends from 2009 through 2014 are shown in Figure 5-4. Note that the variation in electrical and diesel expenditures is discussed more fully in Section 5.5.2, Energy.

Figure 5-3: Expenditures on Utilities, FY14

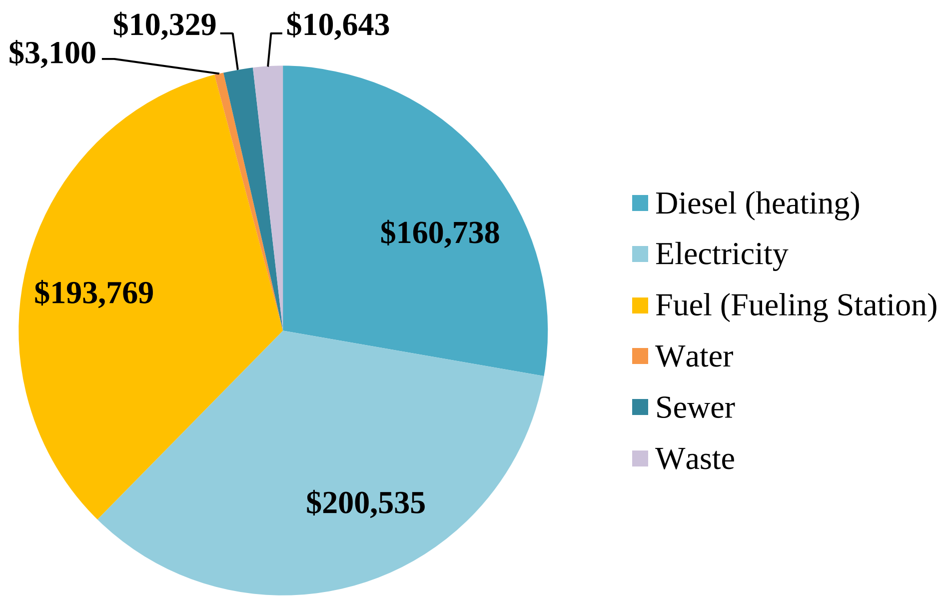
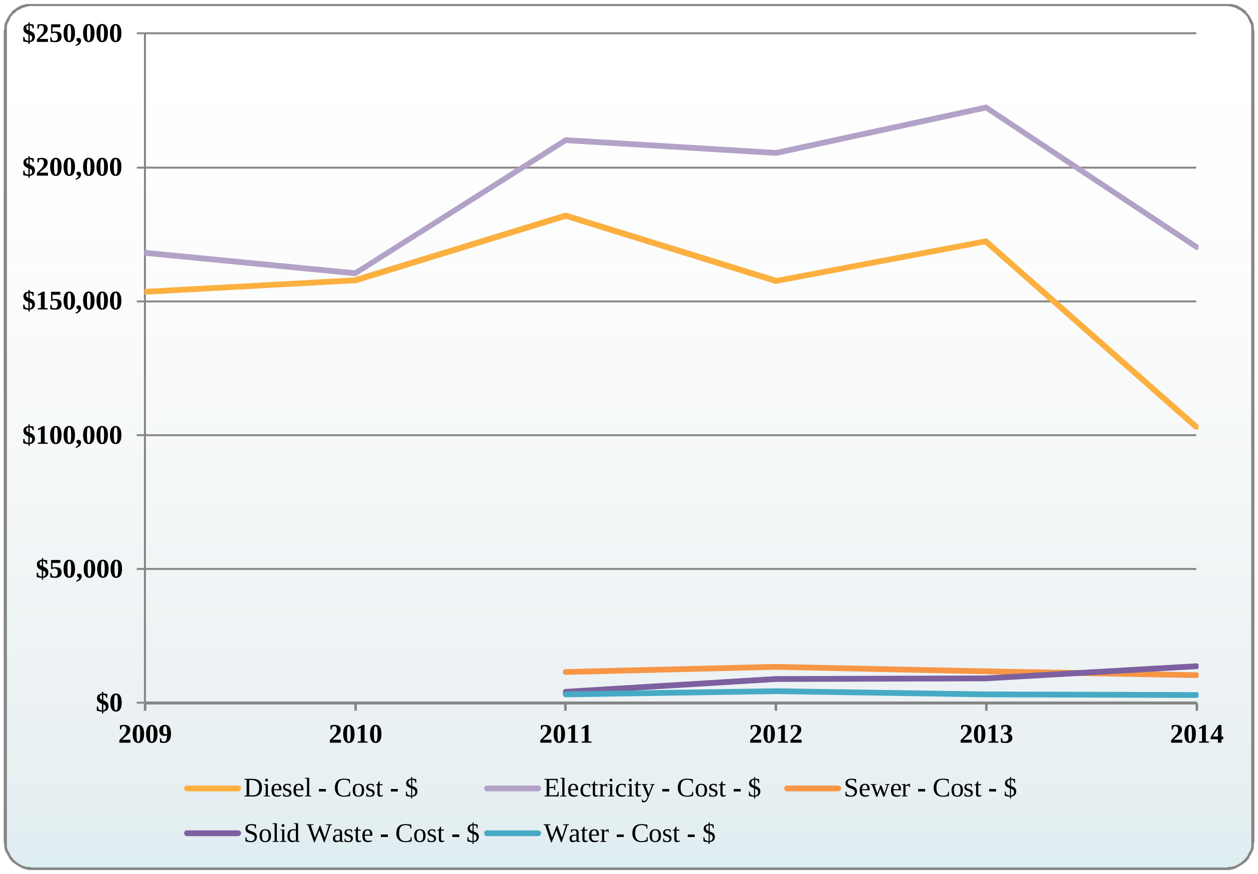


Figure 5-4: Expenditures on Utilities, Historical



Source: City and Borough of Juneau, Financing/Procurement Records

5.4.1.1 Geothermal/Ground Source Heat Pump System

A geothermal, or ground source heat pump (GSHP), system was installed at the airport with construction completed in May 2011 (initial construction began in summer 2009). The GSHP system provides heating, cooling, and ventilation for the commercial carrier wing of the passenger terminal (the portion of terminal that was completed in the first phase of the Terminal Renovation Project). The cost savings and environmental benefits from this system are substantial. A 2014 analysis of the GSHP system indicated that it is providing a direct savings of approximately $130,000 annually, primarily resulting from reduced spending for diesel fuel heating. These cost savings account for the increased spending on electricity that is used to power the 34 heat pumps that are part of the system. The change in diesel and electricity expenditures can be seen in the trends shown in Figure 5-4. As a result, a simple payback of less than 8 years was calculated which includes the grants from the Alaska Energy Authority and FAA, defraying initial capital costs to the airport[5].

In addition to the direct savings in diesel fuel, the system also provides air conditioning and cooling for the commercial carrier wing and provides an ice-melt system for the airport including 7,000 square feet of heated sidewalks at the passenger terminal.

The use of the GSHP system for an ice-melt system has allowed for approximately $11,000 in additional annual avoided costs and associated benefits[6] by:

- Avoided purchase of snow blowers, fuel, and ice-melt chemicals
- Avoided labor for sidewalk snow clearing
- Improved safety for airport maintenance staff and public access to the terminal

The geothermal well field was installed with capacity for the full north terminal expansion (additional heat pumps would need to be installed), providing the airport an opportunity to achieve additional cost savings and reduced fossil fuel use. Further discussion of the GSHP system, including environmental benefits and associated reductions in greenhouse gas (GHG) emissions can be found in Section 5.4.2.

5.4.1.2 Energy Efficiency

The airport has been able to achieve measurable cost savings over the past several years as a result of implementing energy efficiency projects. An energy audit study was completed in 2011 for the commuter wing area of the terminal which identified 24 energy efficiency measures (EEMs) ranging from low cost/no cost to higher capital projects[7]. The audit addressed all of the energy systems but had a heavier focus on the building envelope and less emphasis on mechanical and lighting systems.

The study ranked the EEMs and included a 25-year cost analysis. The cost analysis provided values for the up-front investment as well as operating expenses and projected energy savings. A summary of the completed or in-progress EEMs and associated 25-year cost savings is included in Table 5-3. The full EEM summary sheet is provided as Appendix C.

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[5] Murray & Associates, P.C., *Juneau International Airport - Energy Analysis, 2014*, (2014).
[6] ibid
[7] Alaska Energy Engineering LLC, *Energy Audit, Juneau Airport Terminal Pre-1984*, (2011).

Table 5-3: Commuter Wing Energy Efficiency Measures

EEM Description	EEM #	Annual Energy Savings	25-Year Cost Savings	Status
Weather-strip Doors	EEM-1	N/A	N/A	In progress
Lower Temperature Set Point	EEM-2	N/A	N/A	Work completed (1/4/12)
Replace Outdoor Freezer Unit	EEM-5	N/A	N/A	Completed
Seal Unnecessary Roof Penetrations	EEM-6	N/A	N/A	Partial completion
Perform Boiler Combustion Test	EEM-8	862 gal (diesel)	$80,700	Completed and annual maintenance program in place
Replace Lavatory Aerators	EEM-9	149 gal (diesel)	$19,100	Partial completion
Install Light Switch	EEM-12	3,224 kWh	$3,400	Work completed (3/9/12)
Install Automatic Valve	EEM-17	72 gal (diesel)	$3,300	In progress
Replace Wood Doors	EEM-22	92 gal (diesel)	$1,100	In progress

These EEMs contribute to a reduction in energy consumption and expenditures in the airport terminal relative to the airport terminal renovation and expansion and increase in enplaned passengers. For example, the overall terminal footprint increased from approximately 79,700 square feet (sf.) to approximately 94,300 sf. (an increase of 14,600 sf.), as a result of the 2011 terminal expansion, and there were approximately 30,000 more enplanements in 2013 than in 2009. Even with the increased building footprint and enplanement levels, energy expenditures did not increase substantially. Electricity costs in 2014 were approximately 13.8% lower than the average electricity costs over the previous 5 years (2009 through 2014).

Further discussion of the energy efficiency measures, including the improved lighting features found in the commercial carrier wing of the terminal and overall environmental benefits and associated reductions in greenhouse gas (GHG) emissions, can be found in Section 5.4.2

5.4.1.3 Recycling Program

For its size, the airport has a relatively complex solid waste and recycling program. The airport launched a program in 2014 for recyclable materials generated within the public areas of the terminal. The costs to start up the program were approximately $2,900 in facilities and materials. In addition, airport staff transports the recyclable materials to the CBJ Recycling Center, at an estimated annual cost of $600 per year (inclusive of labor and vehicle costs). In addition to the public areas of the terminal, the CBJ maintains a contract through the CBJ Waste Management Program to pick up recyclable materials generated by CBJ offices and operations, including the airport offices, once a week. The airport incurs an additional cost for this service which was budgeted as $2,080 for calendar year 2015. Currently the recycling program does not include tenant operations; recycling is inconsistent among the tenants. Because tenants are not eligible to participate in the airport's recycling programs, Both Alaska Airlines and Delta run separate recycling programs for their deplaned and office waste, which they collect and transport to the CBJ Recycling Center independently.

While no written records are kept by JNU staff regarding the quantity of recycled materials, building maintenance staff estimated that in the first nine months of the recycling program for the public areas of the terminal, the airport had diverted approximately 5.5 cubic yards of recyclable materials from the landfill. No data is available on the quantities of material recycled for the CBJ airport offices.

The cost savings from the recycling program will be generated by reduced solid waste fees. The current tipping fees for solid waste disposal are $180 per ton. This does not include hauling fees of approximately $150 per pickup and regulatory charges which are currently 0.75% of the total transportation and disposal charges. The airport currently has two concurrent recycling programs – one for the airport offices which is managed under a third party contract with CBJ and the other for the public areas of the terminal which is managed by airport maintenance staff. Cost savings can only be evaluated for the public areas at this time, since the volume of recycled or diverted material is not available for the airport offices. Based on the first nine months of the program, approximately 5.5 cubic yards of materials were recycled. This volume is relatively low; however, this time period occurred in the fall/winter season, which has lower airport activity, and also reflects typical slower uptake of a new waste diversion program. If the diverted material from the public areas of the terminal is counted in terms of solid waste that previously would be disposed in landfill, the program generated a minor savings of $90 over the nine month time period (based on tipping fee and converting 5.5 cubic yards to 0.5 tons using information provided in the Recycling, Reuse, and Waste Reduction Plan).

While the airport is saving some money by not disposing of recyclables, based on the current cost profile for the airports combined recycling program (i.e., both the airport offices and public areas), the airport is likely losing money overall. In addition to the costs summarized above for the public areas, CBJ spends $2,080 annually to cover the recycling program for the airport offices. With the current cost profile of the combined recycling program, the savings from the combined recycling program would need to exceed $2,700 a year to cover the current annual operational costs (i.e., CBJ contract for airport offices and airport labor for public areas) and begin to recoup the initial incremental investment in start-up costs. Going forward, if the volume of recyclable materials is increased and staff time is kept the same or additional cost savings measures can be implemented, such as combining and simplifying the airport recycling programs, the recycling program could generate positive annual cost savings and generate a payback for the airport.

An extensive discussion of the solid waste and recycling program is provided in the Recycling, Reuse, and Waste Reduction Plan referenced in Section 5.4.1 and submitted separately.

5.4.2 Business Continuity and Emergency Preparedness

Business continuity and emergency preparedness is one of the most important Focus Areas for JNU since it includes a variety of topics that provide insight into the airport's footprint, consumption patterns, and overall opportunities for energy reduction and use of alternative or non-fossil fuel energy sources. The following topics will be discussed under business continuity and emergency preparedness.

- Climate Change Vulnerability/Adaptation
- Emergency Preparedness
- Green Building/Infrastructure Resiliency

5.4.2.1 Climate Change Vulnerability/Adaptation

Several studies and plans have been produced by and for the CBJ as well as by outside organizations, documenting climate change trends and impacts relevant to Juneau. These include Juneau Commission on Sustainability's *Juneau Climate Action and Implementation Plan* (2011), and the *Climate Change: Predicted Impacts on Juneau* Report (2007) prepared by the Scientific Panel on Climate Change of the City and Borough of Juneau. The State of Alaska has also created several reports, panels, and positions focusing on the impacts of climate change on Alaska, including mitigation and adaptation strategies (as found on http://climatechange.alaska.gov/).

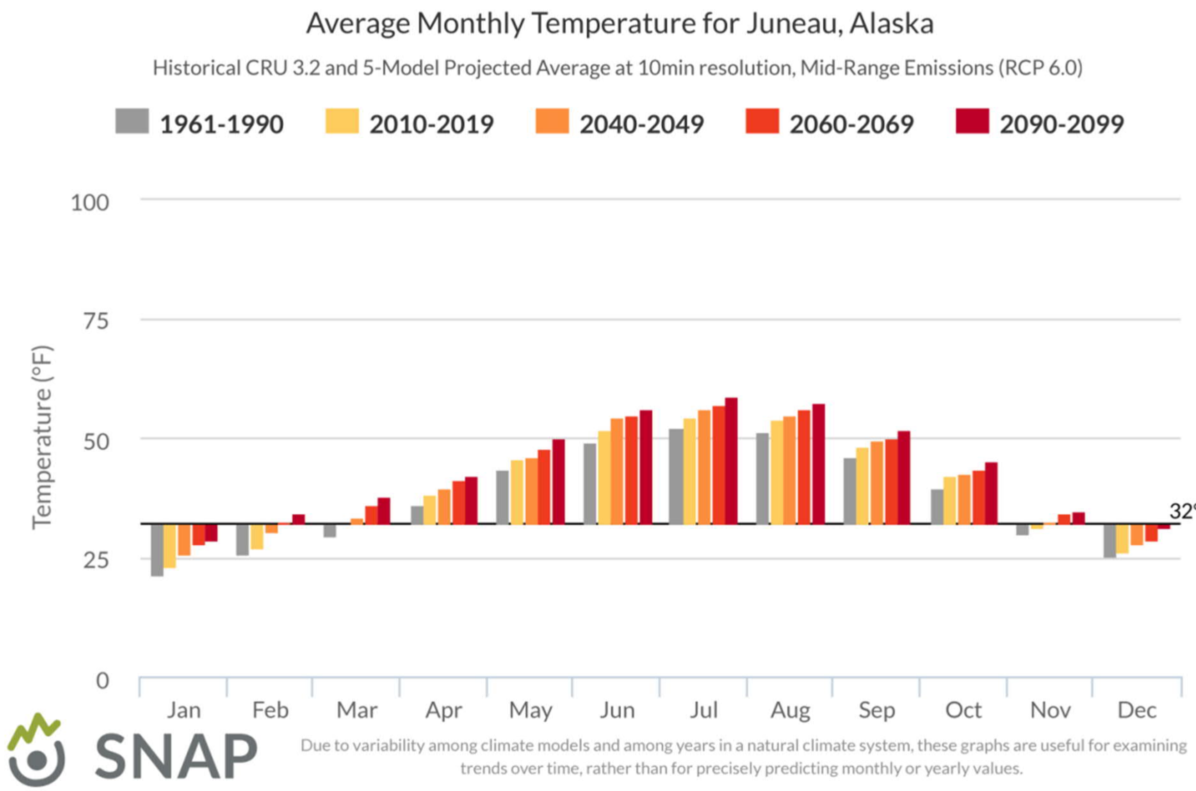
In Southeast Alaska, annual and seasonal temperatures and precipitation have been increasing[8]. Data from climate change models made available by the Scenarios Network for Alaska and Arctic Planning (SNAP) at the University of Alaska Fairbanks also projects a continuing

[8] EcoAdapt, *Summary of Expected Climate-Related Change in Southeast Alaska*: http://ecoadapt.org/data/documents/SoutheastAlaskaClimateSynopsisTable.pdf

increase for both temperature and precipitation[9]. Likewise, trends for Juneau show warming annual temperatures and increasing fall and winter precipitation; future projections are that warming will continue, and annual and seasonal precipitation will increase. Downscaled climate data (i.e., data from climate change models, such as temperature or precipitation, that have been adjusted to a higher resolution based on detailed local information including terrain, weather patterns, drainage networks, and land cover) made available through SNAP provide historical observations (time period 1961–1990) of average monthly temperature and average monthly precipitation for Juneau, while also producing projected average monthly temperature and precipitation for four future scenarios (2010–2019, 2040–2049, 2060–2069, and 2090–2099) based on climate change models. Figure 5-5 and Figure 5-6 below show projected scenarios compared with historical data for average monthly temperatures and precipitation in Juneau, Alaska, from the period of 1961–1990 through 2090–2099. Figure 5-5 projects increases in average monthly temperature per month over that time period, and indicates that warming temperatures are projected in each month, with temperatures increasing with each future time period. Figure 5-6 projects trends in average monthly precipitation, in which anticipated increases are less evident over similar time periods, except during the months of August, September, and October.[10] At the Juneau airport, average winter snowfall decreased by nearly 1.5 feet from 1943 to 2005, while average winter temperatures have risen by almost 2° Fahrenheit (°F) and average precipitation (including rain and snow) has increased by approximately 2.6 inches[11].

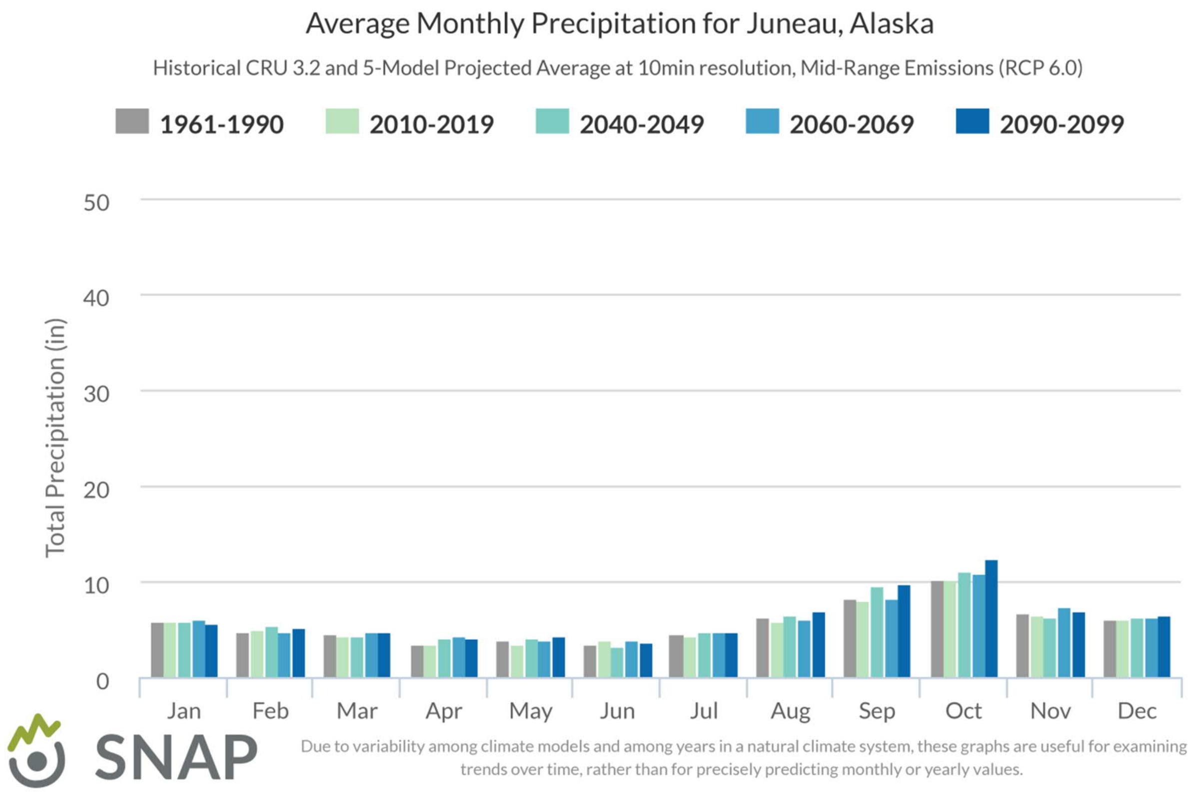
[9] Scenarios Network for Alaska and Arctic Planning (SNAP), University of Alaska Fairbanks, Online analysis tool. Retrieved from https://www.snap.uaf.edu/tools-and-data/all-analysis-tools
[10] Ibid.
[11] Kelly, Brendan P., Ainsworth, Thomas, et al. "Climate Change: Predicted Impacts on Juneau" (2007). Retrieved from http://www.juneau.org/clerk/boards/Climate_Change/CBJ%20_Climate_Report_Final.pdf

Figure 5-5: **Average Monthly Temperature (Projected Scenarios) for Juneau, Alaska**



Source: Scenarios Network for Alaska and Arctic Planning,
[www.snap.uaf.edu/sites/all/modules/snap_community_charts/charts.php. 2015](www.snap.uaf.edu/sites/all/modules/snap_community_charts/charts.php)

Figure 5-6: Average Monthly Precipitation (Projected Scenarios) for Juneau, Alaska[12].



Source: Scenarios Network for Alaska and Arctic Planning,
www.snap.uaf.edu/sites/all/modules/snap_community_charts/charts.php. 2015

The continued retreat of the Mendenhall Glacier, which contributes to Mendenhall Lake and Mendenhall River, has been documented by many sources[13]. Increased melting will add water to the river and the risk of glacial outburst floods poses a serious concern for developed areas along the Mendenhall River below the glacier. A glacial outburst flood occurs as glaciers release lakes dammed behind glacier ice. Glacial outbursts have occurred several times in and around Juneau since 2011, including the most recent in July 2014[14]. Portions of JNU airport property sit in the 100 year floodplain of the Mendenhall River, as determined by the Federal Emergency

[12] Changes in precipitation are less evident than temperature, though increases in precipitation during months of August, September and October are more pronounced.
[13] Braasch, G., *Mendenhall Glacier, Now and Then*, Retrieved from http://voices.nationalgeographic.com/2011/09/15/mendenhall-glacier-now-and-then/
Mendenhall Glacier has retreated 2,800 meters since 1910:
[14] Forgey, P., Juneau's "Mendenhall River crests after glacial outburst: flooding considered minor," Alaska Dispatch News (July 11, 2014). Retrieved from http://www.adn.com/article/20140711/juneaus-mendenhall-river-crests-after-glacial-outburst-flooding-considered-minor

Management Agency's Flood Insurance Rate Maps[15]. A 100-year storm event, such as a glacial outburst event coupled by a high tide and storm surge, could threaten airport property.

The 2007 climate change report predicts that coastal storms may increase in frequency and intensity[16]. These storms may increase the risk to assets and infrastructure within Juneau, and pose delays and cancellations to flights in and out of JNU.

Despite a trend of global rising sea levels, sea level relative to the coast in Juneau is decreasing, and at a potentially significant rate (1.0 to 3.6 feet over the next century), due to local land rising as a result of reduced glacial ice; a process called isostatic rebound[17,18]. As such, sea level rise or land accretion will not be addressed further in this document.

Vulnerability and Risk

As mentioned, an increase in severe weather could lead to delays and cancellations of flights in and out of Juneau. Based on the 2013 FEMA Flood Overlay Map (Mendenhall Valley 2)[19], the elevations of JNU runways are above the one percent annual chance flood event levels (100-year flood event) or base flood event (BFE); however other areas on the airport are within the floodplain and potentially vulnerable to riverine flooding. These areas include the float plane pond and much of the Emergency Vehicle Access Road along the southwestern boundary of the airport. The flood boundary associated with the BFE abuts the entire length of the runway. The maps also indicate that the BFE may overtop the bank channels of both Jordan and Duck Creeks and come onto or close to airport property. The flood maps do not show conditions for a more severe event, such as a 0.2% annual chance event (500-year flood event) or for flood events where the frequency or severity of the flood is influenced by changing future conditions.

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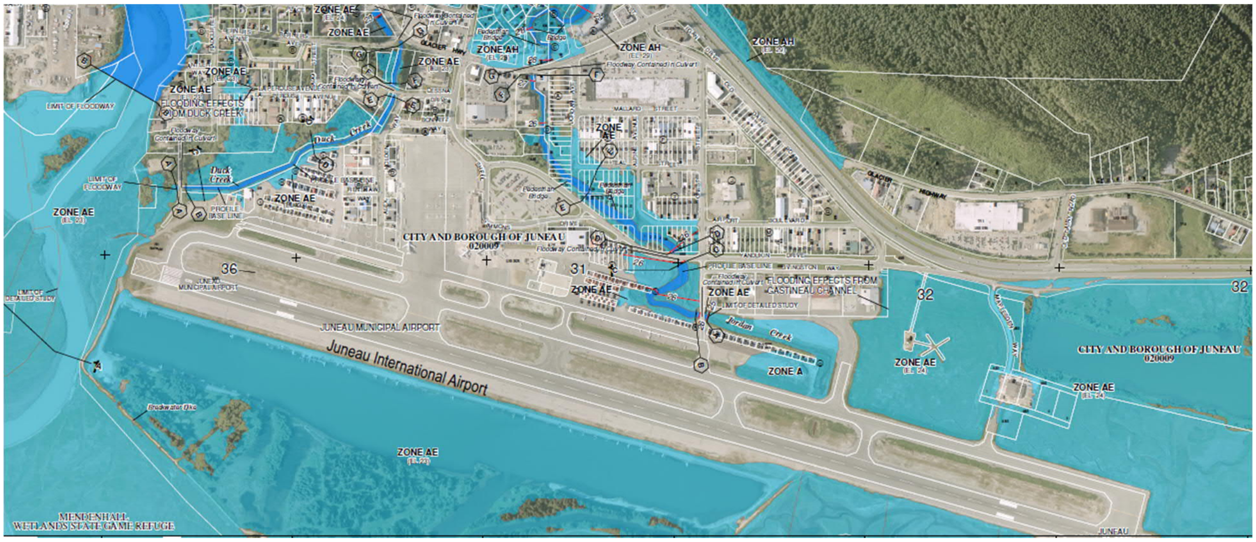
[15] Adopted by the City and Borough of Juneau in 2013.
[16] Kelly, Brendan P., Ainsworth, Thomas, et al. "Climate Change: Predicted Impacts on Juneau" (2007). Retrieved from http://www.juneau.org/clerk/boards/Climate_Change/CBJ%20_Climate_Report_Final.pdf
[17] Ibid.
[18] NOAA Center for Operational Oceanographic Products and Services, Mean Sea Level Trends. Retrieved from http://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=9452210
[19] City & Borough of Juneau Community Development Department, *Flood Map Set and Study* (2013). Retrieved from http://www.juneau.org/cddftp/documents/mendenhall_valley2.pdf



Source: FEMA Flood Zone Map

Warming temperatures may exacerbate glacial melt, and precipitation may increase especially in certain months, both potentially leading to an increase in frequency and/or severity of flood events and erosion. With the increasing potential for glacial outburst floods and other extreme weather events, additional studies may help the airport to understand and address vulnerable assets and infrastructure on airport property as well as access roads and access points to the airport.

Flood problems in Juneau are caused and/or exacerbated by inadequate culverts and bridges[20]. Additional studies may indicate whether several culverts and bridges on airport property and surrounding areas can handle future flood events, including the potential for ice and glacial till loads to clog or reduce culvert capacities. Existing infrastructure must be assessed to determine if it is adequate or could lead to additional flood vulnerability.

Erosion studies have been done along the Mendenhall River, including a U.S. Army Corps of Engineers study completed in 2007 that identified potential vulnerabilities at the west end of the airport and floatplane pond, noting that "portions of the airport runway fill and floatplane pond dike have been lost" due to erosion[21]. While some projects have been completed that improve or strengthen infrastructure, such as the runway safety project, the impact of climate change and

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[20] "The City and Borough of Juneau, *All-Hazards Mitigation Plan* (2012). Retrieved from https://www.commerce.alaska.gov/web/portals/4/repository/plans/juneau,%20city%20&%20borough%20-%202012.pdf

[21] USACE, Alaska District, *Alaska Baseline Erosion Assessment, Erosion Information Paper – Juneau-Douglas, Alaska* (Current as of October 26, 2007). Retrieved from http://www.poa.usace.army.mil/Portals/34/docs/civilworks/BEA/Juneau-Douglas_Final%20Report.pdf

extreme weather events on river flooding should be a consideration when determining future risk of erosion along airport property. Additionally, any future development of airport property in the 100 year floodplain must take into consideration the engineering requirements needed to withstand flood events, as required by CBJ code.

Climate Adaptation

While many sources mention the threat of climate change to Southeast Alaska and Juneau (as noted earlier), little has been proposed to address the impact of climate change to Juneau and/or the airport. The majority of action items related to climate change have focused on reducing emissions and improving energy savings. A broader awareness and understanding of potential climate change impacts to Juneau and the airport and the vulnerability and risk the CBJ and airport face as a result may support the development of specific adaptation strategies to enhance resilience. As stated in a 2007 report on predicted impacts of climate change on Juneau, "economic costs of community responses to climate change are likely to increase over time, and proactive responses will minimize negative impacts."[22] Additional studies as to how future flooding of the Mendenhall River, Duck and Jordan Creeks will be affected given projected climate change conditions may better inform the airport as to its vulnerability to future flood events. This could consider events more severe than the current BFE, such as the 500-year flood event, for the three drainages. Such an approach may also shed light on outlier events such as glacial outburst floods.

Additional research into climate change impacts in Juneau may also lead to increased understanding of the risk of extreme weather and hazards such as the increase of wildfires due to changing conditions[23], which could impact operations and flight schedules at JNU.

5.4.2.2 Emergency Preparedness

Emergency preparedness is critical for all airports to address increasing security requirements and other issues such as the potential for extreme weather and impacts from climate change. Emergency preparedness and response is important at JNU since the airport serves as a critical infrastructure component for CBJ and Southeast Alaska. In addition to commercial air travel, local commuter/charter air service and serving as a hub for Southeast Alaska traveling residents, the airport also provides the following critical community services:

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[22] Kelly, Brendan P., Ainsworth, Thomas, et al. "Climate Change: Predicted Impacts on Juneau" (2007). Retrieved from http://www.juneau.org/clerk/boards/Climate_Change/CBJ%20_Climate_Report_Final.pdf
[23] Ibid

- Medivac
- National Guard
- Search and Rescue
- US Fish and Wildlife Service
- US Forest Service
- Alaska State Troopers
- Alaska Department of Public Safety
- Civil Air Patrol Mission Aircraft
- U.S. Coast Guard Helicopters

The airport has an Emergency Plan, which is updated as necessary to include security updates, FAA requirements, and other aspects of emergency planning. In addition, the CBJ has emergency response/preparedness plans in place to cover a variety of hazards and emergency scenarios[24] including;

- An All-Hazard Mitigation Plan. (A recent 2012 update of this plan is available on the Alaska Department of Commerce, Community, and Economic Development website[25].)
- An Avalanche Response Plan
- An Emergency Operations Plan

5.4.2.3 Green Building/Infrastructure Resiliency

A green building program can play a vital part in airport capital improvement programs, infrastructure development projects and sustainable asset management. The programs can directly require or stipulate green building standards and rating systems available today or incorporate green building requirements on a project or program basis. The green building

[24] City and Borough of Juneau, Emergency Management, (n.d.). Retrieved July 14, 2015, from http://www.juneau.org/emergency/DocumentsandPlans.php

[25] The City and Borough of Juneau, *All-Hazards Mitigation Plan* (2012). Retrieved July 14, 2015, from https://www.commerce.alaska.gov/web/portals/4/repository/plans/juneau,%20city%20&%20borough%20-%202012.pdf

standards and rating systems currently being considered and used in the airport industry[26] include:

- Leadership in Energy and Environmental Design, (LEED). LEED is a green building certification program that is administered by the United States Green Building Council (USGBC). The LEED system includes multiple green building rating systems that can be used for different building types at different stages of construction or operation of the building. The green building rating systems that could be applicable for airport projects include Building Design and Construction (for new buildings and major renovation projects), Interior Design and Construction (for interior projects not involving a building core and shell) and Building Operations and Maintenance (for existing building focusing on sustainable operations).
- Sustainable Airport Manual. The Sustainable Airport Manual was developed by the Chicago Department of Aviation with the first full version (Version 1.0) released in August 2009. The Sustainable Airport Manual builds on the structure of the LEED certification program and rating systems but was specifically developed for airports, to have an airport-specific green building rating system. Like LEED, airports can implement various design and construction strategies identified in the Sustainable Airport Manual.
- Envision Sustainable Infrastructure Rating System. The Envision Sustainable Infrastructure Rating System (Envision) is a relatively new program that was developed by the Institute for Sustainable Infrastructure (ISI), founding member organizations American Council of Engineering Companies (ACEC), American Public Works Association (APWA), and American Society of Civil Engineers (ASCE), and the Zofnass Program for Sustainable Infrastructure at Harvard University. The Envision system was developed for the purpose of integrating sustainability into more traditional infrastructure projects, such as roads, bridges, pipelines, water/wastewater infrastructure, and other civil infrastructure projects. The Envision System has seen increasing interest from the airport industry, but no airport projects to date have achieved Envision certification.

In addition to the CBJ's green building ordinance that requires airport buildings costing over $5 million (paid for by municipal funds) to be designed and constructed to LEED standards and achieve a minimum level of LEED Certified, the airport can opt to integrate other green building standards or features into applicable operational and capital projects.

[26] Other green building programs are available, such as the Living Building Challenge or Green Globes, but have either not been used in an airport setting or not at significant scale. In addition, custom or airport-specific programs and guidelines are frequently developed.

Currently, the airport does not have a separate green building policy or green building design or construction standards for operational or capital projects. The planned terminal renovation of the commuter wing is not required to achieve LEED certification; however green building design and construction strategies will be incorporated into the design and construction program. During the terminal renovation for the commercial wing, green building design and construction strategies were implemented, including building mechanical and electrical efficiency, lighting and other features. These accomplishments are further discussed in Section 5.5.2.

Green building programs are also seen as a way to integrate infrastructure resiliency into design and construction projects and 'harden' infrastructure against increasingly unpredictable external impacts. In terms of airport infrastructure, hardening and resiliency can be described as follows (definitions modified from various sources):

- Hardening means to physically alter airport infrastructure to protect it from damage from extreme wind, flooding, debris and other unplanned events. Overall this makes infrastructure more durable or stable and able to withstand impacts of natural events without sustaining major damage.
- Resiliency, or resilience, is the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, and processes. For airports, resiliency means the ability of airport infrastructure and operations to absorb disturbances from various impacts or events and continue, or retain, airport processes and operations.

Strategies to harden and increase the resiliency of airport infrastructure and operations can vary depending on the asset or process being considered. Currently, the airport does not have a policy or design or construction guidance that distinctly includes resiliency. Similar to green building, the airport can expand consideration of infrastructure resiliency for applicable operational and capital projects and integrate those considerations into design and construction contracts, as warranted.

5.5 ENVIRONMENTAL (NATURAL RESOURCE CONSERVATION)

The Environmental component of sustainability addresses a variety of aspects of traditional environmental management and compliance as well as the management and use of natural resources and implementation of conservation programs. The purpose of the environmental section is to understand the airport's environmental impact as well as opportunities in the context of local and regional environmental issues. The Focus Areas discussed in this section include Materials Management, Energy, Water, Effluents & Waste, and Transport.

5.5.1 Materials Management

Materials Management was selected as a Focus Area to develop a better understanding of solid waste and recycling at the airport and to develop a plan in accordance with the recent guidance from the FAA *Guidance on Airport Recycling, Reuse and Waste Reduction Plans*, dated September 30, 2014[27].

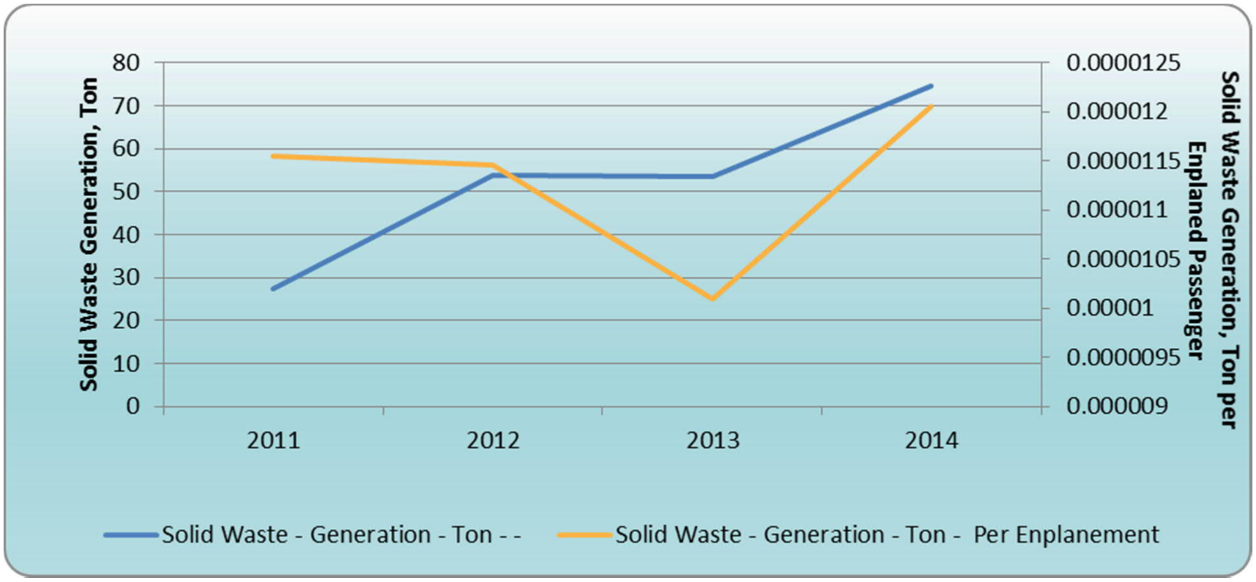
A Recycling, Reuse, and Waste Reduction (RRWR) Plan was developed for JNU and is included as an Appendix to the Sustainability Master Plan. This document addresses the baseline information that is included in the Materials Management Focus Area. The RRWR plan:

- Documented existing recycling, waste reduction and reuse policies, facilities, and contracts at the Juneau International Airport;
- Analyzed the opportunities, costs, and benefits to expanding these efforts at the airport;
- Reviewed existing contracts and leases; and
- Recommended Goals and Initiatives (actions) to establish, operate, and maintain airport recycling and waste reduction programs over the 20-year planning horizon.

While the RRWR Plan also summarized and discussed solid waste generation and recycling, this information is provided below to capture all baseline resource use and consumption data. The baseline year for solid waste generation and recycling is 2014. Total solid waste disposed in 2014 was 74.71 tons. The total amount of recycled materials was 5.5 cubic yards or approximately 0.5 tons. Since the recycling program was started in 2014, the recycling weight accounts for the first 9 months of the program (Aug 2014 through May 2015).

[27] U.S. Department of Transportation, Federal Aviation Administration, *Guidance on Airport Recycling, Reuse, and Waste Reductions Plans*, (September 30, 2014). Retrieved from https://www.faa.gov/airports/environmental/media/airport-recycling-reuse-waste-reduction-plans-guidance.pdf

Figure 5-7: Solid Wastes to Landfill, Historical



Note: Evident in the above trend is the relative increase in solid waste generation in 2014. As discussed in the RRWR Plan, this was the result of closing the airport's restaurant concessionaire and a new concessionaire getting established in the terminal (on both sides of security). The disposal of waste from the closure of the restaurant and the expansion of the concessionaire operation was included in CBJ roll-off containers. Normally construction and demolition (C&D) debris is the responsibility of the contractor, and is not counted in the airport's waste disposal tonnage. Also, Delta Air Lines began flight service to Juneau in May 2014. Initially, Delta used the airport's roll-off for deplaned solid waste before contracting with a separate waste management operator.

5.5.2 Energy

Energy represents another important Focus Area for JNU, since it includes a variety of topics that provide insight into the airports environmental footprint, consumption patterns, and overall opportunities for energy reduction and shift towards alternative or non-fossil fuel energy sources. Within Energy the following topics will be discussed:

- Energy Consumption
- Greenhouse Gas Inventory
- Energy Efficiency
- Renewable Energy

5.5.2.1 Energy Consumption

The airport consumes energy for a variety of uses in both airside and landside operations. The airport's energy consumption comes from the following uses and sources[28]:

- Electricity (purchased from Alaska Electric Light and Power) provides electrical power throughout the airport's airside and landside operations.
- Diesel/No. 2 Fuel Oil (purchased through CBJ Procurement from fuel suppliers) provides fuel for the diesel boilers which provide heat for the commuter wing of the terminal and maintenance shop.
- Diesel and unleaded gasoline (purchases through CBJ Procurement from fuel suppliers) provides fuel for airport vehicles and ground support equipment. Diesel is also used as fuel for the airport's on-site emergency generators; however these are only for occasional use and no specific consumption data is available.
- Heating and cooling of the commercial wing of the terminal is provided by the GSHP system which is not separately metered so actual 'consumption' from this renewable energy source is not available.

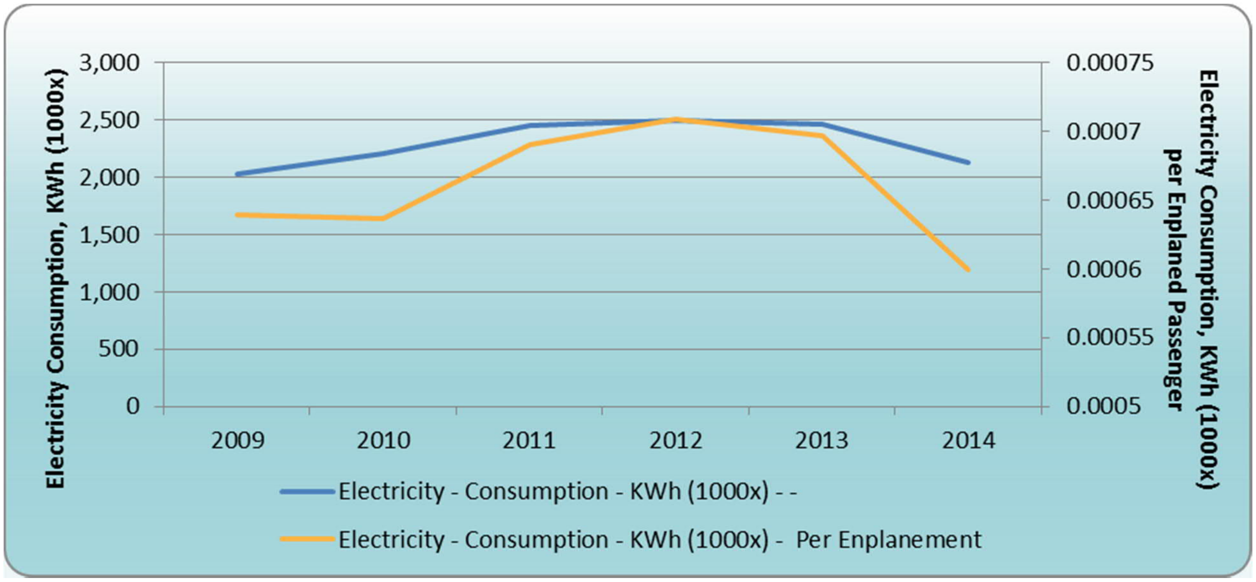
The baseline year for energy is 2014. The baseline energy values for 2014 were as follows:

- Electricity – 2,123,586 kWh
- Diesel / No.2 Fuel Oil (for heating) – 39,604 gallons
- Diesel (for vehicle/equipment Fuel) – 18,263 gallons
- Gasoline (unleaded, for vehicle/equipment Fuel) – 8,014 gallons

The following figures show the energy consumption for the airport energy uses referenced above. All available data is shown; however, not all energy consumption was available for all sources for all years. Calendar year (CY) 2012 was the first year data was available for all sources.

[28] Aircraft fuel consumption was not included in this baseline inventory.

Figure 5-8: Electricity Consumption, Historical



Note: Evident in the electrical consumption trend is the relative increase in electricity consumption in 2012 and 2013. This was the result of an airport capital project for a new front entry to the terminal. This was a one-year construction project with heavy construction and open envelope activities (i.e., airport was open to the outside) for six months (spring 2012 to fall 2012), leading to the higher than normal electrical loads shown.

Figure 5-9: Diesel (Heating/Boilers) Consumption, Historical

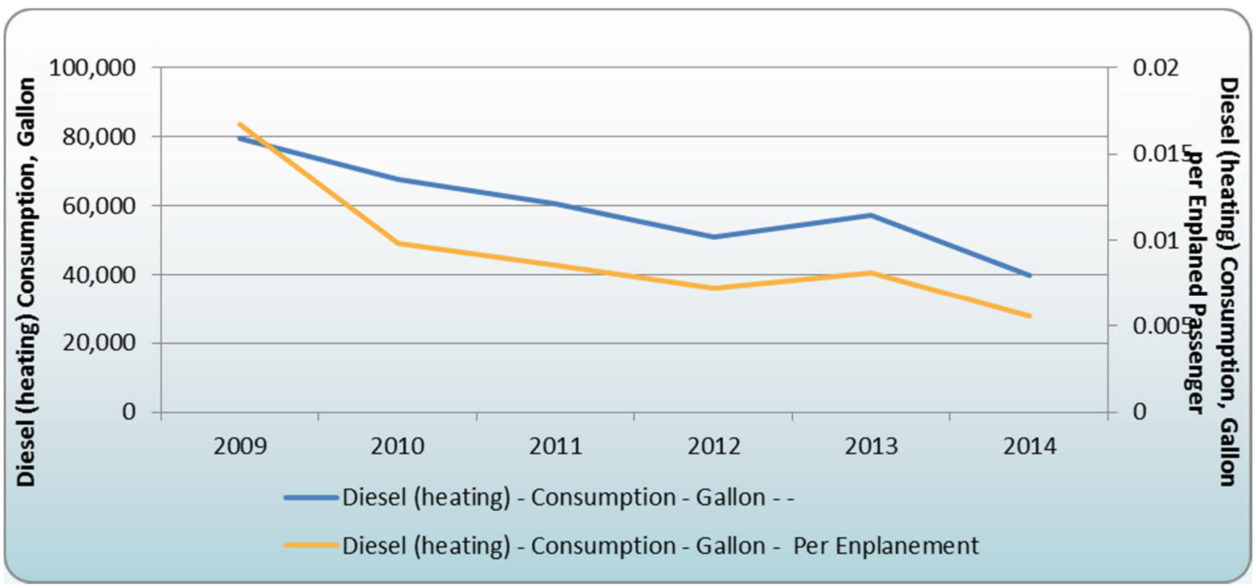


Figure 5-10: Diesel (Vehicle/Equipment Fuel) Consumption, Historical

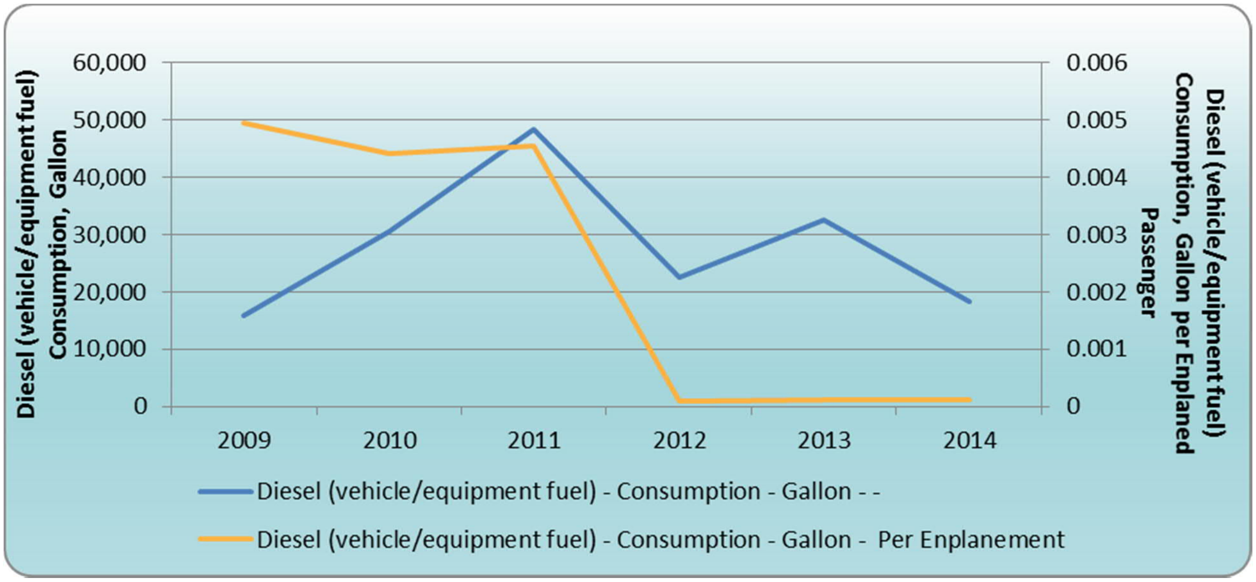
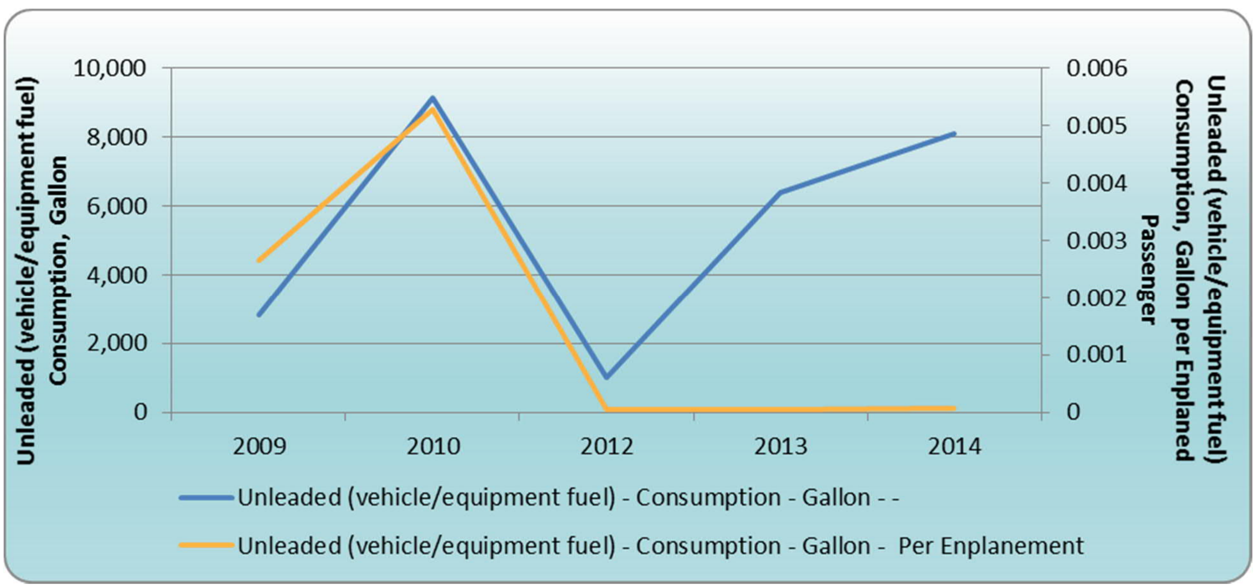


Figure 5-11: Gasoline (Vehicle/Equipment Fuel) Consumption, Historical



5.5.2.2 Greenhouse Gas Inventory

This section focuses on airport energy use and associated GHG emissions. A baseline GHG emissions inventory was prepared for the year 2014, and addresses the following emission categories[29]:

- Scope 1 Direct Emissions
    - Ground Support Equipment (GSE) Fuel Usage
    - Terminal Facility Stationary Sources
    - Maintenance Shop Stationary Sources
    - Airport Emergency Generators
- Scope 2 Indirect Energy Emissions
    - Purchased Facility Power

Estimates of GHG emissions were developed for carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Mass emissions (metric tons of emissions) of each GHG were calculated, as well as CO_2-equivalent (CO_2e) emissions, the common measurement used for reporting GHG emissions. Conversion to CO_2e is done by multiplying the mass of emissions of a given GHG by its Global Warming Potential (GWP). CO_2e is a measurement used to account for the fact that different GHGs have different potential to contribute to the greenhouse effect. This potential, known as the GWP of a GHG, is dependent on the lifetime of the gas molecule in the atmosphere. For example, 1 metric ton of methane has the same contribution to the greenhouse effect as approximately 25 metric tons of carbon dioxide, so its GWP is 25 (Intergovernmental Panel on Climate Change [IPCC] 2007). Therefore, methane is a much more potent GHG than carbon dioxide. Expressing emissions in CO_2e takes the contributions of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only carbon dioxide were being emitted. The GWP for nitrous oxide is 298, making it an even more potent GHG than methane (IPCC 2007).

[29] Scope 1 refers to direct emissions, which include airport operator emissions associated with fuel necessary to power airport-owned on- and off-road vehicles and direct energy necessary to power airport facilities (i.e., natural gas, fuel oil). Scope 2 refers to indirect emissions, which include purchased electricity. Scope 3 emissions, which include aircraft, tenant, and public GHG emissions, were not included in the GHG inventory.

Methodology

The airport GHG emissions inventory was prepared in accordance with the methodologies and approaches described in the Airports Council International's (ACI) Airport Carbon and Emission Reporting Tool (ACERT)[30] and the Airport Cooperative Research Program's (ACRP) Guidebook on Preparing Airport Greenhouse Gas Emissions Inventories[31].

Emissions from GSE, terminal facilities stationary sources, and maintenance shop stationary sources were calculated based on diesel and gasoline fuel usage and fuel tank records provided by CBJ. There are several emergency generators located throughout the airport. The generators are tested and are used for backup power during power outages; however, no fuel usage data was available for any of the emergency generators for 2014. Fuel consumption for the emergency generators is likely nominal and is not expected to contribute substantial emissions to the GHG inventory.

The GHG emissions from purchased facility power often account for a substantial, if not the majority, component of a GHG inventory. In the case of the airport, the Scope 2 inventory was calculated using two different values, or emission factors, for the associated power generation.

- **e-GRID Emission Factor:** Emissions from purchased facility power were calculated using JNU electricity usage and electricity emission factors for the Alaskan Grid (AKGD) from EPA's Emissions & Generation Resource Integrated Database (e-GRID) 9th edition (2014).
- **Custom AELP Emission Factor:** Emissions from purchased facility power were calculated using a custom emission factor. JNU's electricity is purchased from Alaska Electric Light & Power (AELP), which generates the majority of supplied electricity using hydropower, a power supply with no associated GHG emissions. In the case of intermittent power or other supply/transmission issues, AELP uses diesel generators for backup power to the hydroelectric sources. The use of this backup diesel power varies by year. A custom emission factor was calculated based on information provided by AELP regarding the diesel/hydropower mix for 2014 and previous years. It should be noted that the calculated emission factors for years 2008 and 2009 are substantially higher than other years due to an increased use of diesel backup power by AELP. Most of this

[30] Airports Council International, Airport Carbon and Emissions Reporting Tool (ACERT). Retrieved from http://www.aci.aero/About-ACI/Priorities/Environment/ACERT
[31] Airport Cooperative Research Program, *ACRP Report 11, Guidebook on Preparing Airport Greenhouse Gas Emissions Inventories*, (2009 Transportation Research Board). Retrieved from http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_011.pdf

increased diesel backup power occurred during discrete short-term events when transmission lines from AELP's hydropower sources were damaged during avalanche events.

As a result of the substantial use of hydropower, the AELP electricity emission factors are much lower than the AKGD factors. Based on the custom GHG emission factors calculated for AELP, JNU facility power purchased from AELP results in emissions of less than one metric ton of CO_2e in 2014. While ultimately limited, hydropower is projected to have substantial hydroelectric generation potential in the Juneau area[32], ensuring that JNU can maintain a stable, low carbon intensity power source for the foreseeable future.

GHGs may also be emitted through the use of certain chemicals during the de-icing process. The ACERT tool includes a GHG emission factor for the use of glycol in de-icing. Glycol is used at the airport for aircraft de-icing only by the commercial airline carriers and servicing fixed base operator (FBO), Aero Services, which do not fall under Scope 1 and 2 GHG emissions inventory calculations. The airport operations under JNU's control do not use glycol in its deicing applications, and instead use a urea-based de-icing agent for airfield de-icing and other needs. Therefore, GHG emissions from deicing operations were not included in the JNU emissions inventory.

Results

GHG emissions generated by JNU operations in 2014 are shown in Figure 5-12 and Table 5-4. The figure and table both present results using the e-GRID electricity emission factor and results using the custom AELP electricity emission factor. Using the e-GRID electricity emission factor, total JNU GHG emissions were estimated to be approximately 1,872 metric tons of CO_2e. Using the custom AELP electricity emission factor, total JNU GHG emissions were estimated to be approximately 659 metric tons of CO_2e.

For regional context, the 2014 JNU emissions inventory can be compared to the latest emissions inventory prepared by the City and Borough of Juneau (CBJ 2011)[33]. The City and Borough of Juneau's most recent inventory, prepared for the year 2010, showed that Juneau generated a total of 396,747 metric tons of CO_2e in 2010. The 2014 JNU GHG emissions (and 2010 GHG emissions) account for less than one percent of this regional total.

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[32] City & Borough of Juneau Community Development Department, *Comprehensive Plan of the City and Borough of Juneau* (2013, November 1). Retrieved July 14, 2015, from http://www.juneau.org/cddftp/documents/Comp.Plan2013UpdateBook_Web121913.pdf

[33] City and Borough of Juneau, *2010 Greenhouse Gas Emissions Inventory*, (2011, November)

Figure 5-12: JNU 2014 Greenhouse Gas Contributions by Emissions Category

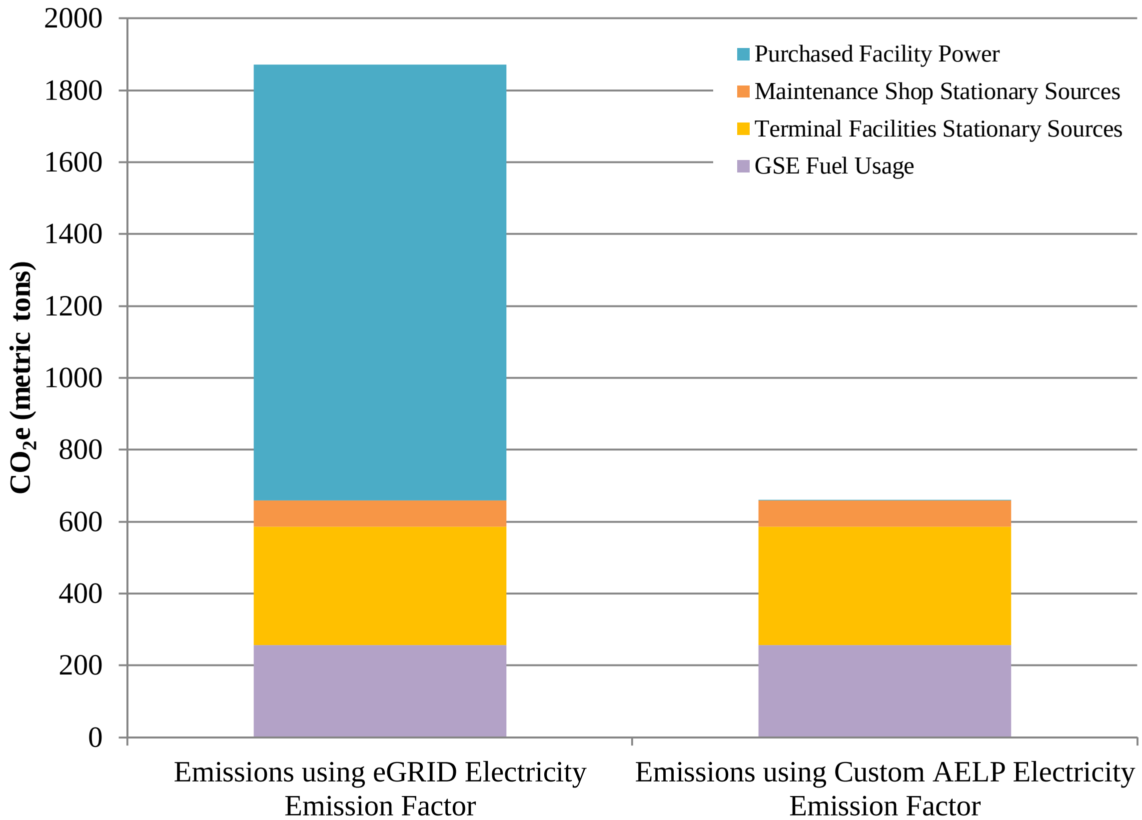


Table 5-4: JNU 2014 Greenhouse Gas Mass Emissions by Category

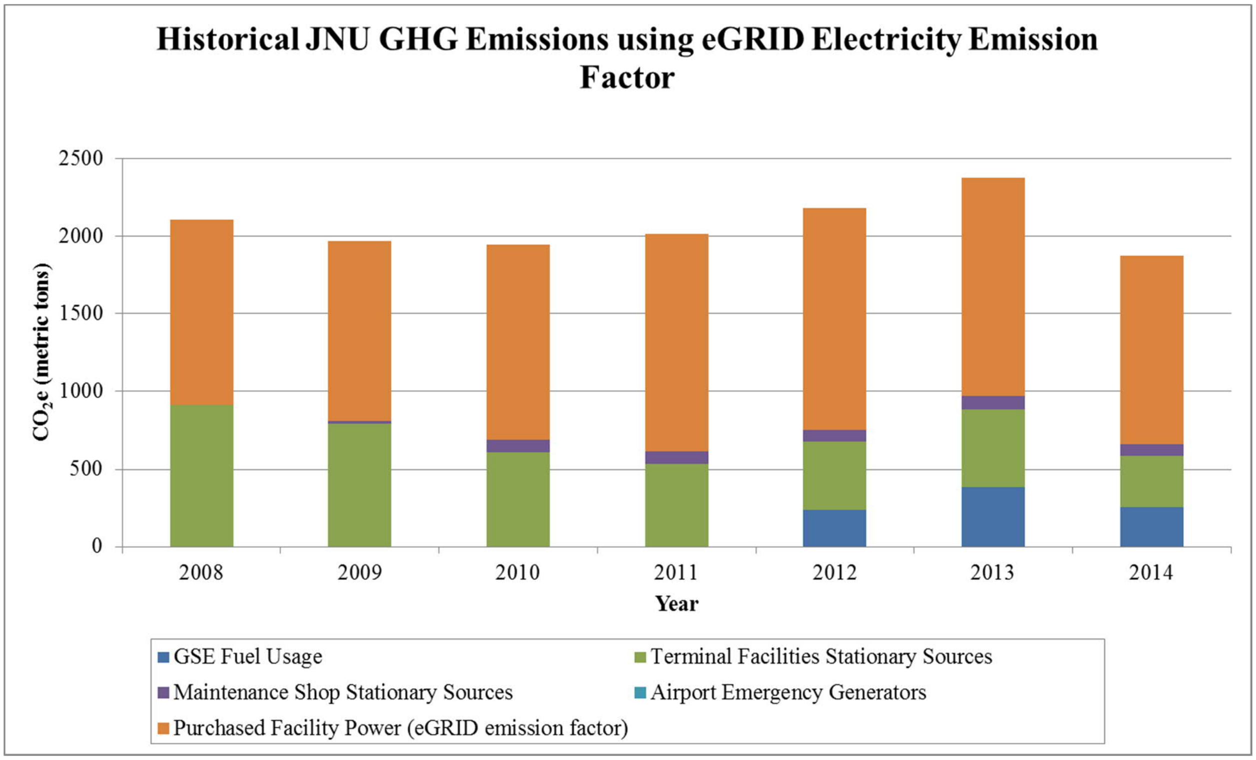
Emission Category	Scope	CO_2e (metric tons), using e-GRID Electricity Emission Factor	CO_2e (metric tons), using Custom AELP Electricity Emission Factor
GSE Fuel Usage[1]	1	257	257
Terminal Facilities Stationary Sources[2]	1	330	330
Maintenance Shop Stationary Sources	1	73	73
Airport Emergency Generators[3]	1	0	0
Purchased Facility Power[4]	2	1,213	0.04
JNU Total		**1,872**	**659**

Notes:

1. Airport GSE includes emissions from diesel and gasoline usage by airport users only. Fire Department and runway safety area project totals were not included in calculations.
2. Terminal Facilities Stationary Source fuel usage information was missing for September 2014 and October 2014.
3. No fuel usage was recorded for any of the emergency generators in 2014. The generators may be tested on some regular basis, but the fuel consumption is likely nominal.
4. Purchased facility power emissions were calculated using two different sets of GHG emission factors:
   a. e-GRID electricity emission factors of 1,257 lb. CO_2/MWh, 26 lb. CH_4/GWh, and 7 lb. N_2O/GWh.
   b. Custom 2014 AELP electricity emission factors of 0.05 lb. CO_2/MWh, 0.002 lb. CH_4/GWh, and 0.0004 lb. N_2O/GWh.

GHG emissions from previous years were also estimated to examine emissions trends and put current emissions in historical context. GHG emissions were calculated for the period from 2008 through 2014 for all available emissions sources, starting when data was made available. Data was not available for all emissions categories during this entire period; however, all data is included so that historical emission trends are visible for individual GHG sources. Figure 5-13 shows the estimated GHG emissions from all sources based on available data from 2008 to 2014 using E-GRID electricity emission factors and custom AELP electricity emission factors. Figure 5-14 shows the estimated GHG emissions from terminal stationary sources and purchased power from 2008 to 2014 using e-GRID electricity emission factors and custom AELP electricity emission factors (these are the only sources with consistent available data from 2008 through 2014). As shown in the figures, facility/stationary source GHG emissions typically decreased during this period, from a high of 911 metric tons of CO_2e in 2008, to a low of 330 metric tons of CO_2e in 2014. During this same period, GHG emissions from purchased facility power increased slightly from 2011 through 2013 (as discussed in Section 5.5.2.1, under Energy Consumption), but remained at relatively consistent levels overall. The full GHG emission inventory summary is provided in Appendix D.

Figure 5-13: JNU 2008-2014 Greenhouse Gas Emissions, All Sources based on available data



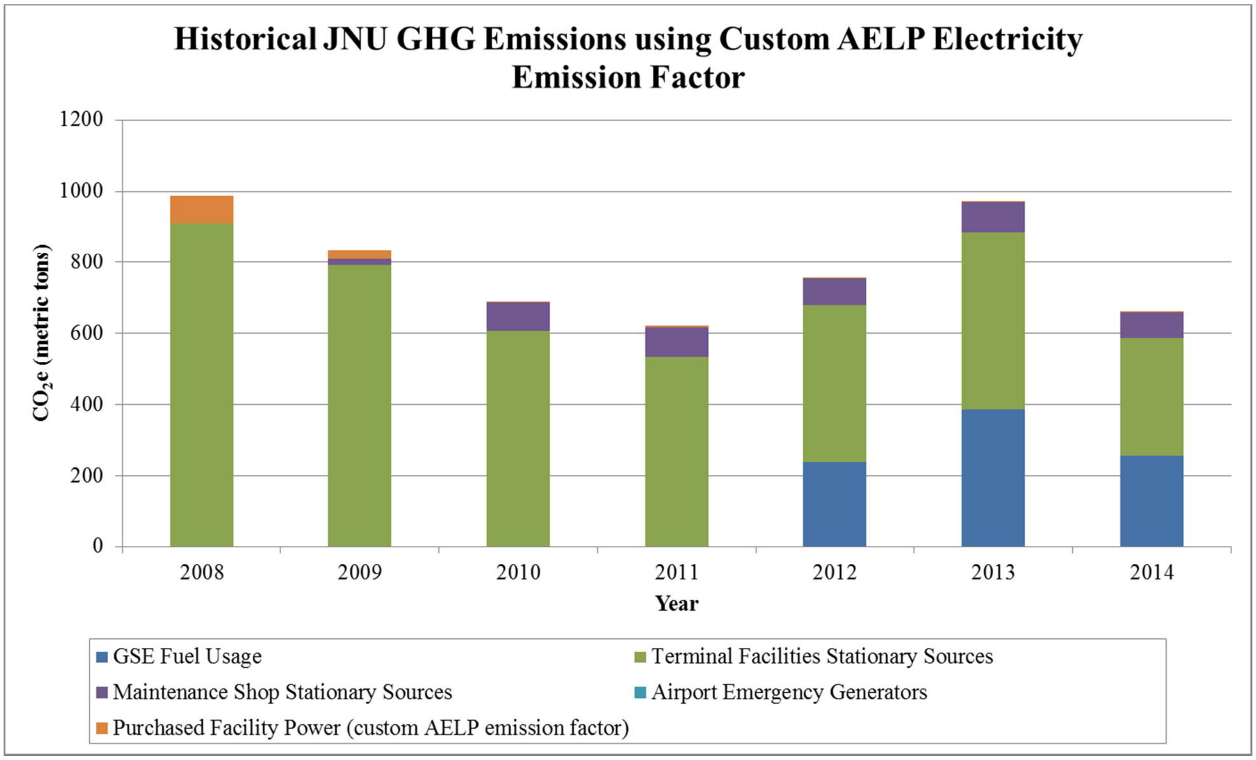
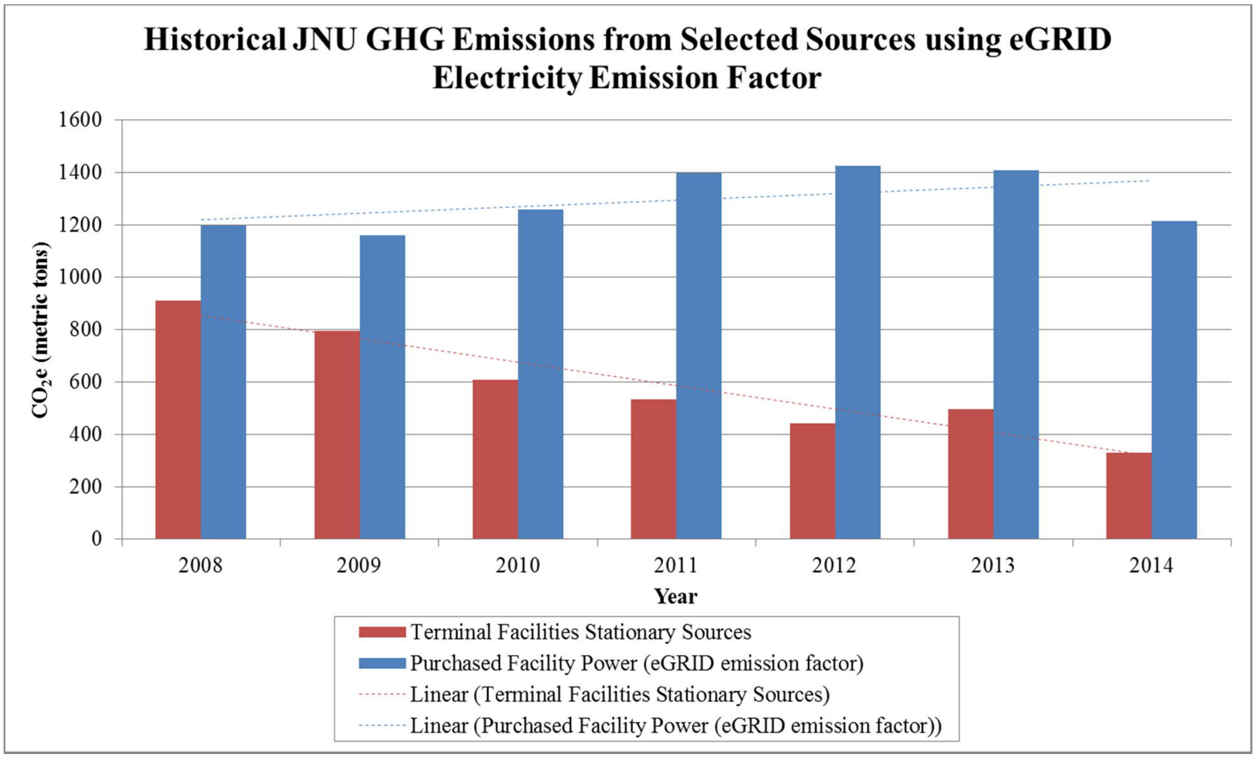
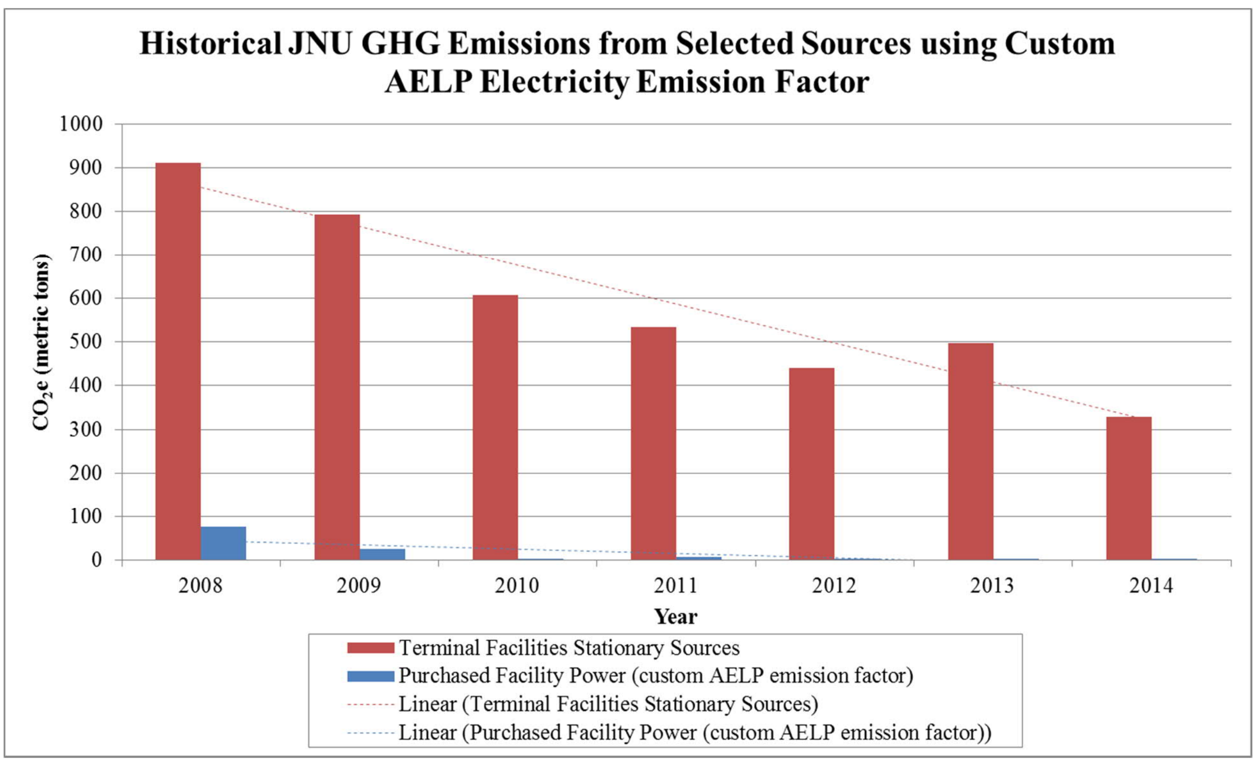


Figure 5-14: JNU 2008-2014 Greenhouse Gas Emissions, Select Sources





The reduction in GHG emissions overall is worth noting, given the expansion of the terminal in 2011 as well as the increase in enplaned passengers (there were approximately 29,500 more enplanements in 2013 than in 2009). For comparison, the following summary presents the change in GHG emissions from diesel (terminal heating only) and electricity consumption from 2009 (prior to the commercial wing terminal renovation) and 2014 including an assumed increase of 30,000 enplanements over 2009[34]. GHG emissions from 2014 are presented in Table 5-4 and GHG emission values for 2009 can be found in Appendix D.

- There was roughly a 4 percent increase in overall electricity consumption. However, with the assumed increase in enplaned passengers this amounts to a relative *reduction* of approximately 6 percent of electricity consumption per enplaned passenger.
- There was roughly a 58 percent reduction in overall diesel consumption for the terminal. This corresponds to a relative reduction of 63 percent based on diesel consumption per enplaned passenger.
- In terms of airport generated GHG emissions from these changes, there was a decrease of 464 metric tons CO_2e from diesel consumption. Using the AKGD emission factors, there was an increase of 52 metric tons CO_2e from electricity consumption. Using the custom AELP emission factors, there was a decrease of 24.6 metric tons CO_2e from electricity consumption, although this decrease is mainly due to the high AELP emission factor in 2009.
- Using the AKGD emission factors, this leads to an associated reduction in GHG emissions of 412 metric tons CO_2e. This is the equivalent of removing 86.7 passenger vehicles from the road or the equivalent carbon sequestered by 338 acres of U.S. forests in one year.
- Using the custom AELP emission factors, this leads to an associated reduction in GHG emissions of 488 metric tons CO_2e. This is the equivalent of removing 103 passenger vehicles from the road or the equivalent carbon sequestered by 400 acres of U.S. forests in one year.

5.5.2.3 Energy Efficiency

The airport has implemented energy efficiency measures (EEMs) or strategies in multiples areas. The following section summarizes the energy efficiency and conservation measures implemented

[34] Assumption of 30,000 more enplanement in 2014 over 2009 is a conservative assumption based on increase in enplaned passengers from 2011 through 2013.

in the commuter wing of the terminal and the energy efficient design strategies deployed in the commercial wing. The cost saving benefits of energy efficiency measures is discussed in Section 5.4.1.2. No separate energy audit was completed for the baseline effort for the Juneau SMP project

The energy audit completed in 2011 for the commuter wing of the terminal identified 24 EEMs[35]. As shown in the EEM summary sheet in Appendix C, many of these measures are no longer needed or are not necessary given the pending North Wing Replacement project.

Several of the EEMs were completed in the commuter wing or are in progress. Based on the information provided in the 2011 Energy Audit Report, the projected energy savings from the completed projects (EEM-8 and EEM-12) are approximately 862 gallons of diesel and 3,224 kWh per year. The savings from partially completed EEMs or EEMs where no cost/energy analysis was completed cannot be provided. Nonetheless, these initiatives also contributed towards reduced energy consumption in the airport overall. Table 5-3 (Section 5.4.1.2) summarizes the EEMs that were completed or in-progress along with the annual energy savings and 25-year cost savings.

Energy efficiency is also a primary component of high performing green buildings. High efficiency design and construction strategies were implemented for the commercial carrier wing. Some of these energy efficiency features are summarized in a 2014 energy analysis report[36] and are highlighted below:

- All of the lighting within the departure lounge was converted from fluorescent to light-emitting diode (LED) lighting with dimmable control. This feature has resulted in an approximately 50 percent reduction in electricity consumption over the original system.
- Other lighting within the east terminal was converted from T-12 type fluorescent tubes to T-5 type tubes. These changes have resulted in an estimated 12 to15 percent energy savings over the original lighting.
- External flood lighting was converted from metal halide to LED, resulting in significant decreases in electrical costs.
- Important improvements and upgrades were made to the building's thermal envelope (e.g., increased insulation and air/moisture barrier as shown in the photos), which provided significant improvements in energy efficiency.

[35] Alaska Energy Engineering LLC, *Stormwater Pollution Prevention Plan, Juneau Airport Terminal*. (2011)
[36] Murray & Associates, P.C., *Juneau International Airport - Energy Analysis, 2014,* (2014).

5.5.2.4 Renewable Energy

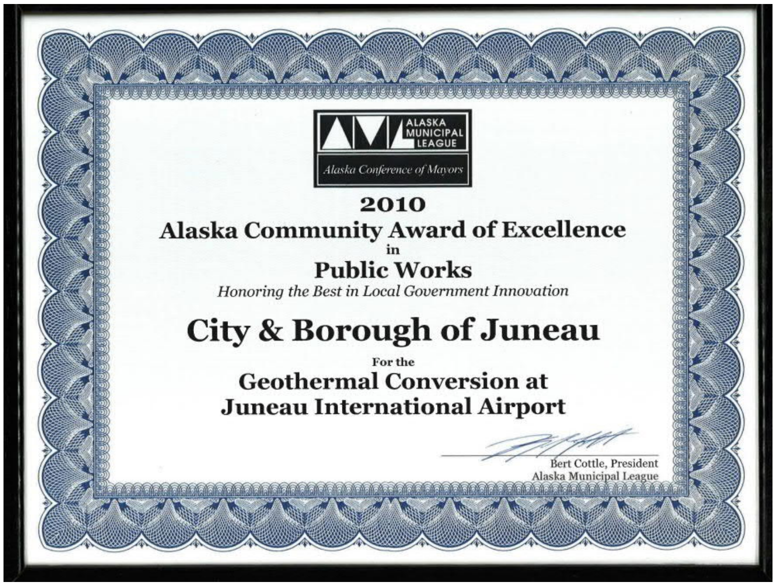
The airport made a significant achievement with the installation of the geothermal/ground source heat pump (GSHP) system, which was completed in May 2011. A GSHP system uses the relatively constant temperature of the ground and heat pump system to provide heating and cooling year round. The GSHP system provides heating, cooling, and ventilation for the commercial carrier wing of the terminal while the commuter area of the terminal, airport traffic control tower, jet ways, and baggage handling areas continue to be heated by the diesel boiler system. The GSHP system also supplies an ice-melt system that supplies the heated refrigerant fluid for 7,000 square feet of sidewalks outside the passenger terminal, provided an ice-free walkway during winter months. The cost savings from the GSHP system are substantial, as discussed in Section 5.4.1.1, however the environmental and operational benefits of the system are equally important, including reduction in diesel fuel consumption for heating and associated GHG reductions, improved air quality and ventilation in the terminal, and reduced operations and maintenance for the walkway areas.

The following provides specific details about the GSHP system:

- The geothermal field loop consists of 108 borings, each approximately 350 feet deep.
- A total of 16 miles of HDPE piping loops through the ground absorbing the relatively constant ground temperature of approximately 42 °F and transferring this to the airports heat pumps. An additional 1.8 miles of piping is included for the sidewalk ice melt system.
- The refrigerant fluid is approximately 88 percent water and 12 percent methanol.
- Thirty-one water-to-air heat pumps are located in ceilings throughout the terminal providing heating, cooling, and ventilation.
- Three water-to-water heat pumps feed the ice melt piping system used for the 7,000 s.f. of heated sidewalks.
- The geothermal well field was installed with capacity for the full North Wing terminal replacement; however, additional heat pumps will need to be installed.
- The system can condition the building 4 to 5 months of the year through balance of heating and cooling in different parts of the building.

The airport has received much positive publicity for the GSHP system, although many community members are still not aware of the system's use and impact. The GSHP system will be included as a case study in an upcoming report from the Airport Cooperative Research Program (ACRP). The report and guidebook, titled Renewable Energy as an Airport Revenue Source, is anticipated to be published in summer of 2015[37].

[37] Transportation Research Board, ACRP 01-24 [Final], *Renewable Energy as an Airport Revenue Source*. (n.d.). Retrieved July 7, 2015, from http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=3436



5.5.3 Water

Water is included in the baseline to address both water use and consumption and other aspects of water including storm water and surface water. Like energy, the airport also has a water footprint that can be managed and evaluated for water reduction opportunities. The following topics will be discussed in this section:

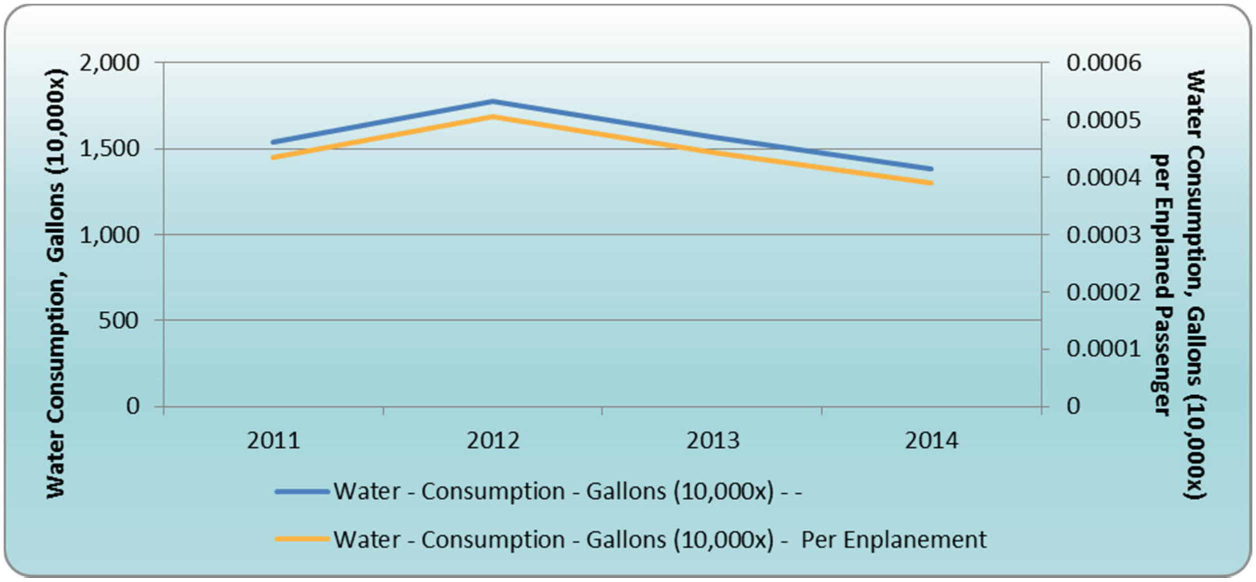
- Water Consumption
- Water Efficiency
- Stormwater Management and Surface Water

5.5.3.1 Water Consumption

Consumption of water at the airport includes a variety of activities ranging from passenger use and terminal activity and operations to airfield operations and maintenance to special uses like construction projects. Water is purchased through CBJ Procurement from the CBJ Public Works Water Utility.

The following figure shows the water consumption for the airport from 2011 through 2014. The baseline year for water is 2014. Potable water consumption for 2014 was 13,850,000 gallons.

Figure 5-15: Potable Water Consumption, Historical



Note: Evident in the water consumption trend is the relative increase in water consumption in 2012. This was the result of the Runway Safety Area Project which began construction in the summer of 2012 leading to increased water consumption during construction activities. The project expanded the runway safety areas on the west end and east end of the runway as well as expanded the shoulder surrounding the tarmac on both the north and south sides.

The CBJ is in the process of completing a water study that examines how and where water is being used in Juneau and develop a better management program. The CBJ, through CBJ Public Works Water Utility, is currently in the study phase and at the end of the two-year study a report will be generated discussing water use in the City of Juneau and what factors impact use[38].

5.5.3.2 Water Efficiency

The airport has implemented some water efficiency projects, such as the installation of lavatory aerators (EEM-9 in the 2011 energy audit report) and replacing flush and flow fixtures with more efficient versions when replacements are needed. However, there is no separate water efficiency program or initiative. The airport is also not currently considering any water reclamation/harvesting programs.

[38] City & Borough of Juneau, Juneau's Water Use Study. (n.d.). Retrieved July 6, 2015, from http://www.juneau.org/water/Waterstudy.php

5.5.3.3 *Stormwater Management and Surface Water*

Stormwater management at the airport is guided by the Stormwater Pollution Prevention Plan (SWPPP). The SWPPP discusses the stormwater discharge network at the airport and includes information on potential pollutant sources, inspection areas, and best management practices. The plan is updated as needed with the latest update completed in March 2011[39]. The airport maintains a National Pollution Discharge Elimination System (NPDES) permit under the Multi-Sector Group Permit (2008 MSGP). The SWPPP fulfills the requirements of the 2008 MSGP for "industrial activities" at the airport.

There are a total of 11 outfalls located on airport property. Stormwater is directed through these outfalls to three primary discharge areas across the airport. Those are:

- Discharge from the west end of the airfield is directed to the float pond and Mendenhall River
- Discharge from other areas of the airfield are directed to Jordan Creek
- Discharge from the east runway/taxi area flows to the Mendenhall Wetlands. There have been historical exceedances of the airport's stormwater discharge permit in this area.

The stormwater compliance monitoring program consists of routine facility inspections, quarterly visual assessments, and benchmark monitoring. Benchmark monitoring involves taking stormwater samples from select outfalls and analyzing the samples for biochemical oxygen demand (BOD), chemical oxygen demand (COD), ammonia, and pH. Benchmark monitoring is required if the airport uses 100,000 gallons or more of glycol-based deicing/anti-icing chemicals and/or 100 tons or more of urea. The airport uses approximately 250 tons of urea annually so maintains a stormwater benchmark monitoring program (the airport is phasing out the use of Urea). Glycol is also used by commercial airline carriers for de-icing aircraft.

Stormwater management plays an important role at JNU since the airport is adjacent to several surface water bodies including wetlands, rivers, and creeks. Jordan Creek, located along the east end of the runway, is a major salmon creek, providing river habitat and runs for four types of Alaska salmon. The Mendenhall River is located along the west and south sides of the airport and the Mendenhall Wetlands State Game Refuge is located on the south side of the airport. Duck Creek is located immediately adjacent to the airport on the west side, between the airport

[39] Carson Dorn, Inc., *Stormwater Pollution Prevention Plan for Juneau International Airport* (2011, March). Retrieved July 7, 2015 from. http://www.juneau.org/airport/documents/2011updatedSWPPPcompletereportwithEPAAnnualReport3-8-11.pdf

and the Mendenhall River. Duck Creek was developed as part of an airport mitigation project and is regularly monitored by the Alaska Department of Fish & Game.

5.5.4 Effluents and Waste

This section discusses the airport's handling of waste and regulated materials, including de-icing fluids, the status of spills, and contaminated sites. The following topics will be discussed under Effluents and Waste, as applicable.

- De-icing Operations
- Fuel and Hazardous Materials Management
- Environmental Spill/Cleanup Sites

5.5.4.1 De-icing Operations

Juneau has a maritime climate, identified by frequent, and often heavy, precipitation events. While rain is the predominant form of precipitation, heavy snowfall can occur, making de-icing operations critical for safe and consistent aircraft arrivals and departures. The de-icing 'season' is approximately November through March.

While glycol is the most conventional chemical used for de-icing activities, urea is also commonly used. Both glycol and urea are used at JNU. The airport operation (i.e., airfield maintenance) solely uses urea for airfield de-icing and anti-icing operations. This includes two forms of urea: a liquid urea mixture, which is stored in aboveground storage tanks (ASTs) and dry, pelletized urea, which is stored in the east ramp complex. According to the SWPPP document, the airport uses approximately 250 tons of urea annually, primarily in the liquid form. The airport is phasing out the use of Urea with replacement by an EPA Approved de-icing agent. The commercial airline carriers, Alaska Airlines and Delta Air Lines, Empire Air and Aero Services use glycol for aircraft de-icing. These de-icing operations and facilities are separate from those under control of the airport.

Both urea and glycol (as well as other de-icing chemicals) have environmental impacts. Urea breaks down into ammonia and nitrates and glycol increases BOD, both of which can be toxic when they discharge into natural waterways. For this reason, stormwater monitoring is conducted regularly at the airport, as discussed in the previous section. GHG emissions are also another consideration with de-icing activities. However urea, unlike glycol, is not considered to contribute to airport GHG emissions. As discussed in Section 5.5.2.2, since glycol use is not under the direct control of the airport, it was not included in the GHG emission inventory.

5.5.4.2 Fuel and Hazardous Materials Management

The airport maintains a Spill Prevention, Control, and Countermeasure (SPCC) Plan which covers airport fuel and hazardous materials management and identifies measures for the airport to respond to spill events in a safe, effective, and timely manner to mitigate the impacts of the discharge. The plan includes preventative and response measures for oil spills and discharges at the airport. The plan was implemented in February 2011, updated in October 2014 and is reviewed annually.

The airport is considered to have “industrial” activities related to environmental compliance reporting. These activities include airport property, runway, ramp, and apron maintenance; aircraft maintenance and fueling; aircraft and vehicle washing; building maintenance; vehicle maintenance and fueling; cargo shipping and receiving; and fuel storage and delivery. The airport currently has ten fuel or oil storage tanks, both ASTs and underground storage tanks (USTs), as well as fuel tanks on various equipment and vehicles such as snow removal equipment. The fuel and oil storage containers are shown in Table 5-5. Note that SPCC tank numbers and CBJ Tank numbers (used for billing purposes) could not be reconciled for all tanks (marked ‘N/A’ in below table).

Table 5-5: Fuel/Oil Storage Containers

Tank Number	Associated CBJ Tank #	Type	Capacity (gal)	Contents
1	N/A	AST	250	No. 2 fuel oil
2	N/A	AST	250	No. 2 fuel oil
3	8904	AST	5000	Unleaded gas
4	8903	AST	6000	Diesel
5	8906	AST	200	Diesel
6	N/A	AST	275	Diesel
7	N/A	AST	500	Waste Oil
8	8801	UST	10000	No. 2 fuel oil
9	8901	UST	1200	No. 2 fuel oil
10-20	-	Equipment	100 to 200	Diesel
21-23	-	Equipment	100 to 200	Diesel
24	N/A	AST	150	Diesel

N/A – Not Available.

5.5.4.3 Environmental Spill/Cleanup Sites

There have been no recent spills or releases of fuels or hazardous materials at the airport. The most recent documented spill occurred in November 2001 and involved 15 gallons of jet fuel spilled on the west ramp, according to the SWPPP. The airport has two historical environmental spill/cleanup sites on airport property.

- Alaska Airlines - Juneau Cargo Facility (Hazard ID 22996 / File ID 1513.26.054)
- Delta Western Juneau Airport Fuel Storage (Hazard ID 23308 / 1513.26.046)

Both sites are currently found on the Department of Environmental Conservation Contaminated Site Program[40]. However, only the Alaska Airlines - Juneau Cargo Facility site involves active cleanup and monitoring activities. The cleanup involves historical leakage of gasoline and some

[40] State of Alaska, Division of Spill Prevention and Response, Contaminated Sites Program, Contaminated Sites Search (n.d.). Retrieved July 20, 2015, from http://dec.alaska.gov/Applications/SPAR/PublicMVC/CSP/Search

diesel into the subsurface in the proximity of former USTs located in this area. The Delta Western Fuel Storage site is listed as having completed long-term monitoring but site closure has not yet been achieved.

5.5.5 Transport

The airport parking lot directly in front of the terminal provides 65 short-term and 217 long-term spaces.

In addition to being a hub for air traffic, the airport is also a surface transportation destination for travelers, employees, and community members that access the facility for employment, air travel, community events, or recreation. Airport users access the airport in a number of ways, including by personal vehicle, bus, bike, foot, taxi, and rental vehicle. Accessibility and ease of access to the airport is directly influenced by these various transport modes. The airport generates a significant amount of traffic in and around the terminal, including daily commuting by airport employees as well as approximately 950 leaseholder full- and part-time employees[41], and arrivals and departures by an average of 984 enplaned passengers per day[42]. The airport also utilizes a fleet of 43 vehicles at the airport for business transportation, maintenance, and daily operations.

5.5.5.1 Personal Vehicle Access to JNU

The airport is connected to the greater Juneau road system via Shell Simmons Drive, which connects to Glacier Highway and Egan Drive to the north, and via Yandukin Drive to the south. Traffic counts in 2013 by the Alaska Department of Transportation and Public Facilities recorded average annual daily traffic counts of 4,135 cars per day along Shell Simmons Drive in front of the terminal. Personal vehicles accessing the terminal may use the curb at the front of the terminal to pick up and drop off passengers or park in the long-term or short-term parking lot. Public parking at the airport is managed by Republic Parking System, Inc. The public parking

[41] Source: Economic and Community Contributions of Selected Alaska Airports, based on 2009 data
[42] Based on approximately 359,291 annual enplaned passengers in 2013, as reported by FAA

lots, which are located directly in front of the main terminal entrance, provide 65 short-term spaces (of which 3 are ADA designated) and 217 long-term spaces (of which 7 are ADA designated). Parking fees are waived for visitors for airport events. To avoid congestion in the loading area, the airport owns a small strip of land off Shell Simmons Road for use as a cell phone waiting lot.

5.5.5.2 Airport Vehicle Fleet/Ground Support Equipment

The airport manages a fleet of vehicles for on-site operations, snow removal, ground maintenance and transportation within the airfield. In 2015, the airport owned and maintained 43 vehicles. Of these, 13 are trucks and SUVs used for transportation in and around the airfield. The remaining 30 vehicles are used for airfield maintenance and snow removal, including sweepers, snow blowers, plow trucks, and de-icing tankers.

5.5.5.3 Taxi and Rental Cars

There are five taxi operators in Juneau: Juneau Taxi and Tours LLC, Evergreen Taxi, Taku Taxi, Capital Taxi, and Glacier Taxi and Tours. All offer trips to and from the airport, with connections to all other destinations on the Juneau road system. The City and Borough of Juneau sets the rates for cab service, which in the summer of 2015 is a base fare of $3.40, and $2.20 for each additional mile.

There are five rental car service concessionaires located at the airport including Avis, Budget, Hertz, National, and Alamo. These vendors all have counter space at the terminal and parking spaces for rental cars on airport grounds.

5.5.5.4 Capital Transit Connection to JNU

Capital Transit offers Express Bus service to the airport on weekdays. During a typical weekday, the airport bus stop serves approximately 110 trips to or from JNU.[43] Bus fare is $2.00, with free transfers onto the Mendenhall Valley or Douglas routes. The express bus route stops at the airport terminal every half hour from 7:11 am to 6:46 pm, with southbound service to the Nugget Mall Transit Center, the Federal Building, and northbound service to Auke Bay and the University of Alaska Southeast Campus. No express transit service is available on holidays or weekends.

[43] Nelson Nygaard, *City and Borough of Juneau Comprehensive Operations Analysis*, (August 2013). Retrieved July 17, 2015, from http://juneautransitplan.org/wp-content/uploads/2014/01/Juneau-COA-FINAL.pdf

5.5.5.5 Nonmotorized Transportation Access to JNU

Because of the relatively small size of JNU's terminal and parking area, and the terminal's proximity to the local road system, the airport is within easy walking distance (0.5 miles or less) of multiple hotels, and in biking distance (2 miles or less) of a variety of services, including hotels, two shopping malls, and a multi-use path extending to the Mendenhall Valley and downtown. The airport also allows the public to have nonmotorized access to the Emergency Vehicle Access Road (EVAR) to the southwest of the airfield for recreational use. (See Section 5.6.3 for more information about the EVAR).

A sidewalk extends along the full length of the terminal and continues along the west side of Shell Simmons Drive. The sidewalk in front of the terminal includes a subgrade ice-melt system that is heated using the airport's geothermal/ground source heat pumps, providing snow and ice-free sidewalks and crosswalks to the parking lot year-round. While pedestrian facilities at the terminal itself are well developed, pedestrian access to areas immediately beyond the airport is limited. The nearest hotel is located only a tenth of a mile from the terminal, but the nearest crosswalk across Shell Simmons Drive to access it is at the intersection of Shell Simmons Drive and Glacier Highway, a quarter of a mile away.

Both travelers and employees may choose to access the airport by bicycle. Bike maps of Juneau are available at the visitor information booth in the airport, operated by the Juneau Convention and Visitor's Bureau. For individuals arriving by bike at JNU, bike racks are available at the east end of the terminal, although the racks are uncovered and unsecured, and therefore suitable only for short-term parking.

5.5.5.6 Electric Vehicle (EV) Action Initiative

The Juneau Economic Development Council, with the support of Alaska Electric Light and Power, has spearheaded an EV Action Initiative to encourage the adoption of electric vehicles in Juneau by installing charging stations throughout the city. The initiative seeks to capitalize on Juneau's abundant hydropower and limited road system, which equate to driving ranges appropriate for EVs. Six charging stations are currently in place throughout the city, paid for by grants and private matching funds. Two more charging stations are planned for the new Mendenhall Valley Public Library, scheduled to open in the fall of 2015. The number of privately owned electric vehicles on the road in Juneau doubled from 15 in 2014 to 30 in 2015, according to AELP. On March 16, 2015, the CBJ adopted resolution 2722, expressing support for "JEDC EV Action Initiative efforts to improve community access to electrified transportation and charging infrastructure as a means to enable economic opportunity for local businesses, reduce greenhouse gas emissions, improve the quality of the local economy, and promote the City and Borough of Juneau as a national leader in electric vehicle adoption."

5.6 SOCIAL RESPONSIBILITY

The Social component of sustainability considers how the airport operates as a socially responsible business and considers stakeholders that are critical to airport activities, such as employees and the local community. The Focus Areas discussed in this section include Employment, Training and Education, and Local Communities.

5.6.1 Employment

The airport directly employs about 31 FTE employees, including seasonal and on-call positions, as shown in Table 5-6. This includes a combined 33 full-time positions across Airport Administration, Terminal Operations, and Airfield Maintenance.

Table 5-6: Airport Staffing, FY15 Adopted Budget

Year	FTE
Airport Administration	
Airport Manager	1
Deputy Airport Manager	1
Engineer/Architect II	2
Airport Business Manager	1
Accounting Technician II	1
Administrative Assistant II	1
Office Assistant II	.5
Eng./Architect Assistant II	1.5
Intern IV	0.42
Construction Inspector	0.5
Terminal Operations	
Maintenance Mechanic III	1
Building Maint. Technician II	1
Building Maint. Technician I	1
Building Custodian	4.5
Airfield Maintenance	
Airport M&O Superintendent	1
Sr. Equipment Operator	2
Airfield Safety Coordinator I & II	2
Automotive Mechanic III	1.33
Equipment Operator I & II	8.33
Laborer	2

Source: CBJ, FY15 Adopted Budget

The CBJ has a health and wellness program to support the health and well-being of its employees[44]. The program is called Health Yourself and encourages employees towards healthy lifestyles through education, competitions, and special promotions such as low-cost blood screenings, disease and lifestyle management, flu shot, and other health and wellness activities and programs. Employees also have access to a staff Wellness Coordinator to assist them and their families. An example of events and activities includes:

- Functional Fitness Challenge
- Cooking Classes
- Back to Basics
- Skate Your Way Across Alaska
- Fitness Journal
- Monthly Healthy Habit Challenges
- Nutrition Challenges
- Monthly Health Yourself Newsletters
- Family Fun Days

Health Yourself also includes a Rewards Program that gives employees a $50.00 per pay period discount off their health insurance premium rate if they participate and meet the requirements of the program.

Other components of the Health Yourself program include:

- Employee Assistance Program/Guidance Resources
- Tobacco Cessation Program
- Lifestyle Management Program

[44] City and Borough of Juneau, Human Resources & Risk Management, Wellness Program. Retrieved from http://www.juneau.org/personnel/wellnessprogram.php

5.6.2 Training and Education

Similar to health and wellness programs, airport employees have access to CBJ employee training and skills management opportunities[45]. Current training programs include:

- New Employee Orientation
- Supervisory Academy
- Coaching for Commitment

Airport employees also receive annual health and safety (H&S) training. This training is managed by the CBJ Safety Officer and is based on the CBJ Safety Plan[46].

The airport does not provide any additional regular training or skills management programs outside of those offered by CBJ.

5.6.3 Local Communities

The airport is located in the City and Borough of Juneau, the capital of the State of Alaska and is approximately seven miles from the downtown business district. As of 2014, the population of Juneau was 33,026[47]. Together, state, local, and federal agencies provide 39 percent of the community's employment (Alaska Department of Labor and Workforce Development

[45] City and Borough of Juneau, Human Resources & Risk Management, Employee Training Opportunities. Retrieved from http://www.juneau.org/personnel/Training.php

[46] Westphal, M., *City and Borough of Juneau Safety Plan*, (October 2012) Retrieved from http://www.juneau.org/personnel/documents/CBJSafetyPlanRev10-12.pdf

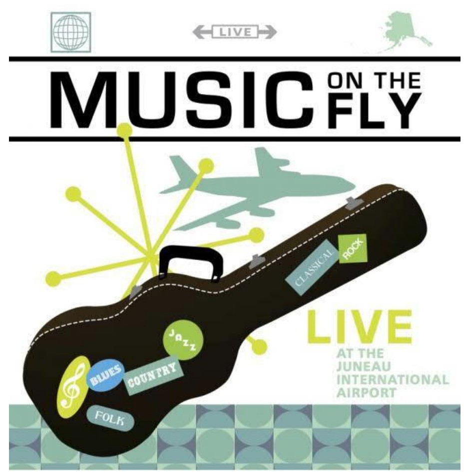
[47] State of Alaska Department of Labor and Workforce Development (ADOLWD), Research and Analysis, Population Estimates for July 2014

[ADOLWD], May 2015). The largest private sector employment is in trade, transportation and utilities; tourism; and health services. The highest private wage payers are found in mining and construction.[48]

Airports engage communities in a variety of ways, such as community and civic events and programs, projects, donations, and sponsored activities. JNU interacts with the local community by allowing use of airport property for purposes other than air travel, providing meeting space, and supporting local arts and music.

Access to the airport is not limited to the terminal. One of the most popular aspects of the airport in the community is the emergency vehicle access road (EVAR), or Dike Trail, and the airport's support and maintenance of the trail, such as providing parking and installation of an improved bridge to access the area. The EVAR trail provides a scenic walk around the perimeter of the airport and float pond, including interpretive signage, and provides access and views of the Mendenhall Wetlands State Game Refuge. This area is also accessed by hunters during the waterfowl hunting season. The parking lot used by the public to access the EVAR trail is maintained by the airport.

The airport also serves as a community resource, with residents and visitors able to use the airport terminal for non-air travel purposes. For example, non-airport meetings are held in the Alaska Room. This room is available for rent directly from airport administration.



One of the primary ways the airport has engaged the community is through visual and performing art in the terminal. The airport knows that "artwork adds beauty to the Airport, reflects the culture and character of the community and helps create an inviting atmosphere for the enjoyment of passengers, workers, and visitors."[49]

Current art programs include:

- Music on the Fly, a live music series held weekly at the airport.

[48] ADOLWD, Quarterly Census of Employment and Wages (QCEW) data for CBJ, published May 2015.
[49] City and Borough of Juneau, Juneau International Airport, Public Art. Retrieved from http://www.juneau.org/airport/PublicArt.php

- Rotating art exhibits, such as international-themed exhibits through CBJ Sister Cities Committee and student art through the CBJ Arts and Humanities Council.
- One percent for Art program, where at least one percent of expenditures on facilities from Capital Improvement Project (CIP) funds is devoted to the acquisition of works of art.
- Special projects such as the Rain Forest Garden Eagle Scout project, which is located on the north side of the terminal's main entrance.

Forecast of Aviation Demand

6

6 FORECAST OF AVIATION DEMAND

6.1 FORECASTING BACKGROUND

This chapter of the Juneau International Airport (JNU) Sustainability Master Plan (SMP) presents forecasts of future aviation demand. These forecasts are a key step in the airport planning process and provide the basis for determining:

- The airport's role in the aviation system;
- Improvements needed on the airfield, terminal facilities, apron areas, and landside facilities now and in the future to accommodate growth in demand;
- Potential environmental effects, such as noise, of the airport's operation on the surrounding community; and
- The financial feasibility of alternative airport development proposals.

Forecasts were developed using historical data as recorded by Airport Management and the Federal Aviation Administration (FAA). In most cases the data were reliable up to 2012, which is used as the forecast base year. Where possible the 2013 and 2014 data were incorporated to assure that the forecasts are as up-to-date as possible.

Forecast years reflect three timeframes: short-term through 2020, mid-term through 2025, and long-term through 2035. Forecasts for 2030 are also presented to provide an interim check during the long-term period.

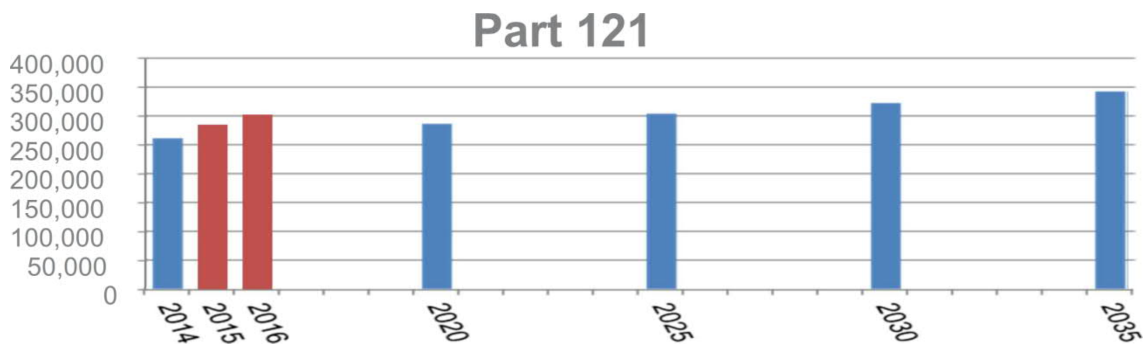
Subsequent to the development and approval of these forecasts, the number of enplaned passengers at JNU grew at a much higher rate than envisioned. Table 6-1 shows the actual passenger levels that were recorded in relation to those forecast herein. Unexpected growth was registered by Part 121 carriers while on-demand passenger levels dropped from the base year levels and commuter passenger levels performed as forecast. Part 121 passenger level growth is primarily attributable to two factors;

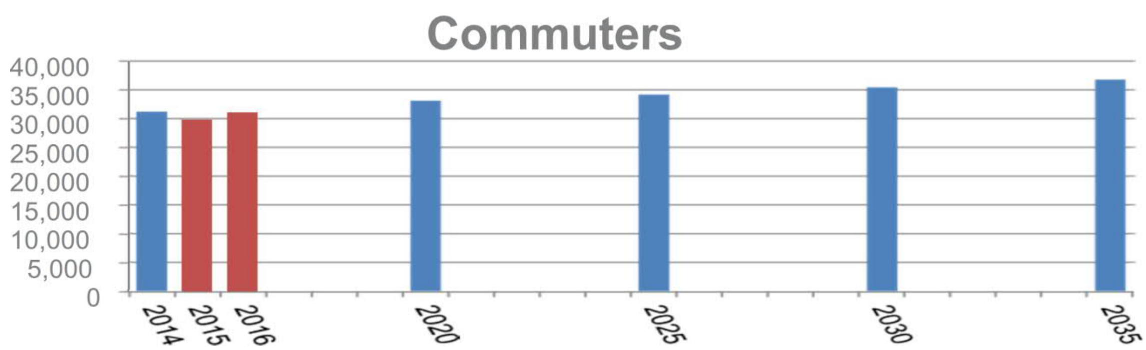
1. *The introduction of new service by Delta Air Lines created a new passenger market by linking JNU to their national market.*

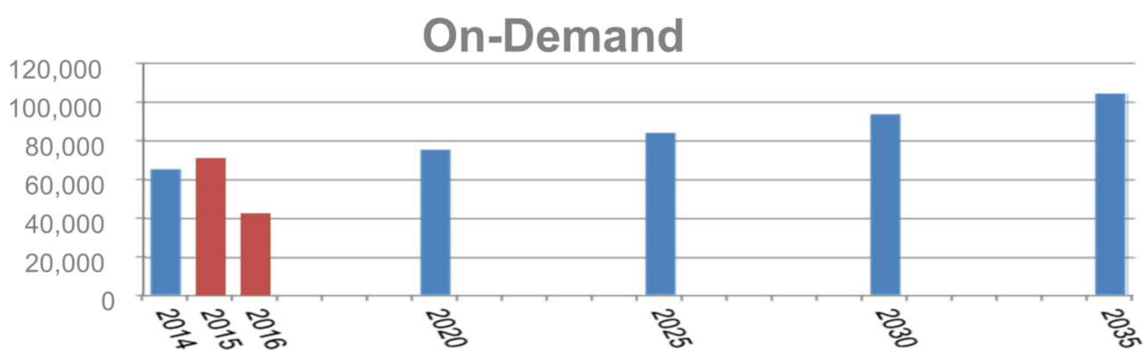
2. *The continued health of the US economy has led to growth in the airline industry.*

Table 6-1: Changes to Enplaned Passenger Levels since Forecast

Year	On-Demand	Commuters	Part 121	Total
2014	64,965	31,262	262,252	358,479
2015	**71,095**	**29,895**	**285,422**	**386,412**
2016	**42,737**	**31,151**	**302,546**	**376,434**
2020	75,162	33,132	287,289	395,583
2025	83,764	34,212	304,616	422,592
2030	93,374	35,467	323,231	452,072
2035	104,043	36,814	343,272	484,129







Although this unanticipated growth has not been reflected in these forecasts, they have been considered in the recommendations contained herein. Since the majority of the improvements are safety or maintenance related, and therefore not tied to passenger growth, they are unaffected by this. The timing of the need for terminal related projects is affected and this is considered in the ACIP.

6.2 SUMMARY OF FORECASTS

Development of forecasts for JNU followed a process described in FAA Advisory Circular (AC) 150/5070-6B, Airport Master Plans. The following is a summary of the forecasting results.

- Historical records show that the number of enplaned passengers at JNU fluctuated over the past ten years at about the same rate as did passenger levels nationally. The indication is that much of the passenger activity at JNU is tied to tourism. This is certainly true with the On-Demand passengers where records show it to be seasonal. The Part 121 and 135 passengers also peak during the summer months, which suggests this activity is tied to the tourist market. In the future, enplaned passengers are expected to continue to increase at about the same rate as the national forecast prepared by the FAA. The forecast used herein tempered the national growth trends with the growth expected in the regional population to reflect that part of the market that includes connections to other destinations within Southeast Alaska.
- Operationally it is anticipated that the Part 121 carrier traffic will continue to be offered using narrow body jet aircraft having 124 to 181 seats represented by the Boeing 737-series aircraft with the combi aircraft used by Alaska Airlines have 72 passenger seats. Flights will continue to include nonstop service to Seattle and Anchorage as well as flights that make multiple stops out of Juneau. Overall levels of growth in this category will be driven by the growth in enplaned passengers.
- Air taxi and commuter flights include the Part 135 carriers, the on-demand carriers, air cargo flights, and other for hire air taxi activity. Historically this category has comprised the majority of operations at JNU. This is expected to continue in the future with growth rates tied to both passenger growth in the commuter market, growth in the regional population, Tourism, and forecast increases in the amount of freight and mail.
- General aviation activity makes up a small portion of the total operations. The growth in this category is expected to be moderate over the 20-year forecast period and driven primarily by local population growth and economic conditions.
- Military activity at JNU has fluctuated in the past but is a minimal portion of overall activity and the future is not expected to see any growth in this category.

Table 6-2 shows a summary of the forecasts prepared for JNU that will be used in the remainder of this master plan. Details of historical information, assumptions, and decisions regarding these forecasts are contained in this chapter.

Table 6-2: Summary of Forecasts

Category	Base 2014	2020	2025	2030	2035
Annual Enplaned Passengers					
Air Carrier	262,252	287,289	304,616	323,231	343,272
Commuter	31,262	33,132	34,212	35,467	36,814
On Demand	64,965	71,970	77,128	83,000	89,694
Total Passengers	358,479	392,391	415,956	441,698	469,780
Annual Operations					
Air Carrier	8,319	8,453	8,586	8,720	8,853
Air Taxi & Commuter	70,540	80,531	89,682	99,226	109,992
General Aviation	16,287	16,954	17,625	18,352	19,118
Military	440	775	775	775	775
Total Operations	95,586	106,713	116,668	127,073	138,738
Based Aircraft	332	346	364	383	403

Note: Forecast base year is 2014 the most recent year where comprehensive records where available for all activity categories.

Figure 6-1: Forecast of Annual Enplaned Passengers

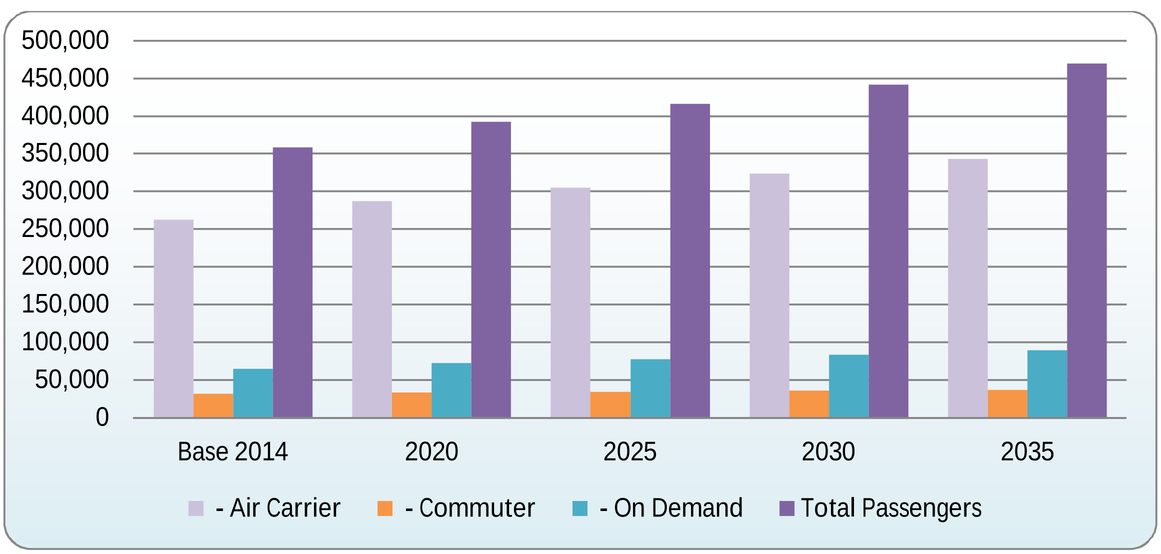
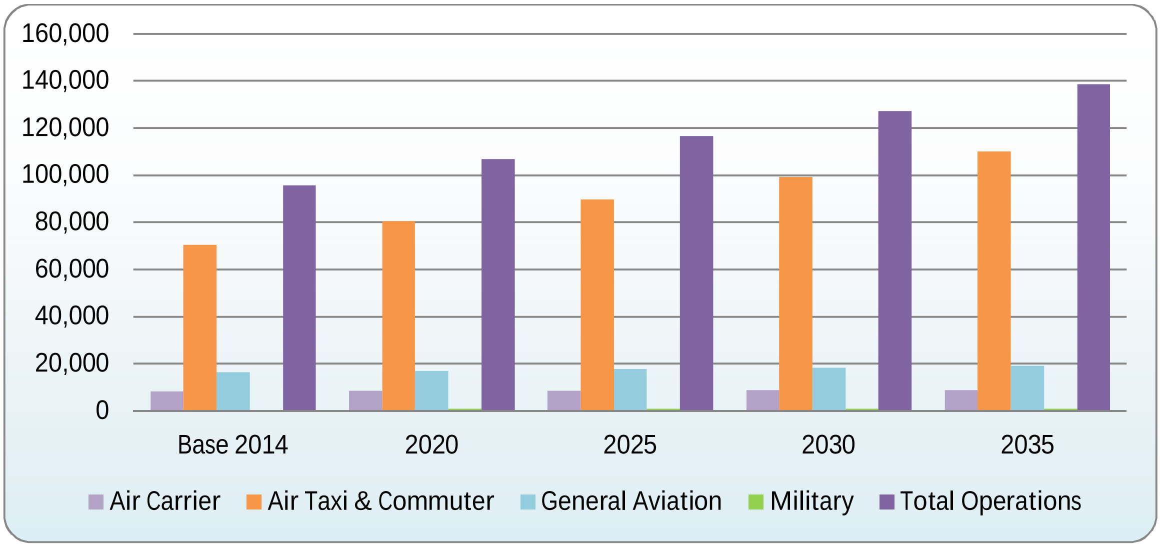


Figure 6-2: Forecast of Annual Operations



6.3 FORECASTING PROCESS

Although the factors that influence airport activity differ from airport to airport, developing demand forecasts follows the same process. Key steps defined in Advisory Circular 150/5070-6B, Airport Master Plans, include the following:

1. Identify the key aviation activity parameters and measures to forecast
2. Collect and review previous forecasts, such as the 1999 Juneau International Airport Master Plan and FAA Terminal Area Forecast (TAF)
3. Gather additional national market data and local and regional data on factors such as population and employment that are known to impact aviation activity.
4. Select the forecast methods to be used
5. Apply the forecast methods and evaluate the results
6. Compare the results with the FAA TAF to obtain FAA approval of the new forecasts

Subsequent sections of this chapter provide the background information on how the forecasts were developed. Forecasts have been prepared for periods ending 5, 10, and 20 years from the base year of the forecast. Forecasts were also prepared for the peak month, design day, and peak hour of each period.

6.4 KEY ACTIVITY PARAMETERS

For JNU, forecasts will be prepared to address the following elements:

Enplaned Passengers

- Part 121 air carriers
- Part 135 commuter/air taxis
- On-demand carriers
- Total enplaned passengers

Part 121 Air Carrier Operations

- Commercial aircraft fleet
- Annual load factors
- Total annual commercial operations

Air Taxi and Commuter Activity

- Part 135 operations
- On-demand operations
- Other air taxi operations

Air Mail and Air Cargo

- Enplaned pounds
- Annual operations

General Aviation Activity

- Total number of based aircraft
- Based aircraft fleet mix
- Annual general aviation operations
- Local and itinerant operations

Military Activity

Peak Period Activity

- Peak month
- Average day peak month
- Peak hour

Critical Aircraft

6.5 REVIEW OF PREVIOUS FORECASTS

To begin the forecast process it is valuable to examine the forecasts that were prepared during previous planning efforts. For JNU there are two previous forecasts that are applicable, those contained in the previous airport master plan adopted in 1999 and those prepared as part of the FAA's TAF in 2014.

6.5.1 1999 Master Plan Forecasts

The forecasts created as part of the 1999 Juneau International Airport Master Plan are shown in Table 6-3. These forecasts were based on a set of assumptions regarding local and national economic conditions that were expected to occur over time. Subsequent events have tempered these expectations to a large degree:

1. The terrorist attacks that occurred on September 11, 2001, drastically changed the commercial aviation marketplace resulting in reduced air travel over the subsequent years.
2. The economic downturn of 2007 suppressed the aviation market nationwide, and it is only now recovering.
3. Oil prices have risen over the past decade, increasing the cost of passenger tickets and the cost of owning and operating aircraft. This has impacted the Juneau market, decreasing the number of annual operations at the airport.
4. The population of Juneau has been relatively static with less than one percent growth and the population for Southeast Alaska, the destination for many of the Part 135 passengers has been decreasing.

Table 6-3 shows the forecast of enplaned passengers from the 1999 master plan compared with the levels that have occurred. The forecasted passenger levels from the 1999 plan have proved to be higher than the actuals by more than 50 percent in 2005 and 98 percent in 2015.

Table 6-3: Forecast of Enplaned Passengers from the 1999 Master Plan Compared with Actual Recorded Activity Levels

	Air Carrier			Air Taxi			Total		
	Forecast	**Actual**	**Difference**	**Forecast**	**Actual**	**Difference**	**Forecast**	**Actual**	**Difference**
1992	234,502	229,944	**-1.98%**	96,041	32,657	**-194.09%**	330,543	262,601	**-25.87%**
1993	199,424	201,675	**1.12%**	116,364	39,398	**-195.36%**	315,788	241,073	**-30.99%**
1994	227,954	220,030	**-3.60%**	117,551	43,455	**-170.51%**	345,505	263,485	**-31.13%**
1995	244,954	245,139	**0.08%**	123,441	49,825	**-147.75%**	368,395	294,964	**-24.89%**
2000	277,503	251,933	**-10.15%**	136,681	35,967	**-280.02%**	414,184	287,900	**-43.86%**
2005	317,831	266,288	**-19.36%**	156,544	32,521	**-381.36%**	474,375	298,809	**-58.76%**
2015	415,811	278,308	**-49.41%**	204,802	34,151	**-499.70%**	620,613	312,459	**-98.62%**

Source: Forecasts from Juneau International Airport Master Plan – March 1999
Actuals from Airport Records

Table 6-4 shows a comparison of the operations forecasts from the 1999 plan and the actual operations that have occurred. As shown, the forecasts made in the master plan were fairly close for air carrier activity through the 2005 to 2015 period but off by a factor of 30 percent by 2015. Similarly air taxi forecasts were fairly close to actuals in the short term but the intermediate and long-term forecasts were overestimated. General aviation activity was over forecast for all years.

Table 6-4: Forecast of Operations from the 1999 Master Plan Compared with Actual Recorded Activity Levels

	Air Carrier			Air Taxi			General Aviation			Military			Total		
Year	**Forecast**	**Actual**	**Difference**	**Forecast**	**Actual**	**Difference**	**Forecast**	**Actual**	**Difference**	**Forecast**	**Actual**	**Difference**	**Forecast**	**Actual**	**Difference**
1992	8,782	8,771	**-0.13%**	95,645	82,818	**-15.49%**	35,000	8,771	**-299.04%**	978	990	**1.21%**	140,405	101,350	**-38.53%**
1993	6,838	6,869	**0.45%**	98,336	86,723	**-13.39%**	39,937	6,869	**-481.41%**	1,074	1,061	**-1.23%**	146,185	101,522	**-43.99%**
1994	8,325	8,164	**-1.97%**	113,615	99,658	**-14.00%**	43,226	8,164	**-429.47%**	1,151	1,108	**-3.88%**	166,317	117,094	**-42.04%**
1995	7,814	7,972	**1.98%**	127,371	112,798	**-12.92%**	34,774	7,972	**-336.20%**	1,103	1,222	**9.74%**	171,062	129,964	**-31.62%**
2000	8,545	8,391	**-1.84%**	115,331	103,418	**-11.52%**	36,835	8,391	**-338.98%**	1,000	906	**-10.38%**	161,711	121,106	**-33.53%**
2005	9,306	9,277	**-0.31%**	116,224	73,507	**-58.11%**	37,954	9,277	**-309.12%**	1,000	1,187	**15.75%**	164,484	93,248	**-76.39%**
2015	11,602	8,915	**-30.14%**	123,186	76,545	**-60.93%**	39,836	8,915	**-346.84%**	1,000	582	**-71.82%**	175,624	94,957	**-84.95%**

Source: Forecasts from Juneau International Airport Master Plan – March 1999
Actuals from Airport Records

6.5.2 Federal Aviation Administration Terminal Area Forecasts (TAF) FY 2013 to 2040

The Terminal Area Forecast (TAF) is the official FAA forecast of aviation activity for U.S. airports. It includes forecasts for all airports included in the National Plan of Integrated Airport Systems (NPIAS). Forecasts are prepared for air carrier, air taxi/commuter, general aviation, and military. The forecasts are prepared to meet the budget and planning needs of FAA and provide information for use by state and local authorities, the aviation industry, and the public. Generally the TAF relies on a "top down" forecast where the national forecast is distributed to the individual airports based on past percentages.

The most recent TAF was prepared in 2014 and contains forecasts based on historical data through the year 2012. Forecasts are made for the period from 2013 through 2040. The TAF forecast for JNU is shown in the following tables.

Table 6-5: TAF Forecast of Enplaned Passengers for JNU

Fiscal Year	Air Carrier	Commuter	Total
2010	250,228	32,669	282,897
2011	258,126	38,562	296,688
2012	261,843	32,272	294,115
2013*	260,762	30,161	290,923
2014*	267,282	31,065	298,347
2015*	273,965	31,996	305,961
2016*	280,814	32,955	313,769
2017*	287,835	33,944	321,779
2018*	295,032	34,962	329,994
2019*	302,406	36,012	338,418
2020*	309,966	37,093	347,059
2021*	317,715	38,204	355,919
2022*	325,658	39,349	365,007
2023*	333,799	40,530	374,329
2024*	342,144	41,745	383,889
2025*	350,696	42,997	393,693
2026*	359,465	44,288	403,753
2027*	368,451	45,616	414,067
2028*	377,664	46,984	424,648
2029*	387,105	48,394	435,499
2030*	396,784	49,847	446,631
2031*	406,703	51,342	458,045
2032*	416,871	52,882	469,753
2033*	427,293	54,469	481,762
2034*	437,976	56,102	494,078
2035*	448,927	57,785	506,712
2036*	460,150	59,519	519,669
2037*	471,654	61,304	532,958
2038*	483,445	63,143	546,588
2039*	495,532	65,037	560,569
2040*	507,920	66,989	574,909

Source: FAA Terminal Area Forecast
**Years marked by an asterisk are forecast.*

Table 6-6: TAF Forecasts of Annual Operations for JNU

	Itinerant Operations					Local Operations			
Fiscal Year	Air Carrier	Air Taxi Commuter	GA	Military	Total	GA	Military	Total	Total Ops
2010	8,127	64,118	11,090	497	83,832	5,607	287	5,894	89,726
2011	8,217	70,738	12,057	487	91,499	5,191	378	5,569	97,068
2012	8,319	64,313	8,747	433	81,812	4,357	362	4,719	86,531
2013*	8,748	69,703	9,573	376	88,400	4,762	64	4,826	93,226
2014*	8,966	70,540	9,851	376	89,733	5,055	64	5,119	94,852
2015*	9,190	71,385	9,938	376	90,889	5,080	64	5,144	96,033
2016*	9,419	72,242	10,026	376	92,063	5,105	64	5,169	97,232
2017*	9,653	73,108	10,116	376	93,253	5,130	64	5,194	98,447
2018*	9,894	73,985	10,206	376	94,461	5,156	64	5,220	99,681
2019*	10,142	74,873	10,297	376	95,688	5,182	64	5,246	100,934
2020*	10,397	75,771	10,389	376	96,933	5,208	64	5,272	102,205
2021*	10,656	76,681	10,481	376	98,194	5,234	64	5,298	103,492
2022*	10,924	77,603	10,574	376	99,477	5,260	64	5,324	104,801
2023*	11,198	78,534	10,668	376	100,776	5,286	64	5,350	106,126
2024*	11,476	79,473	10,762	376	102,087	5,312	64	5,376	107,463
2025*	11,762	80,428	10,858	376	103,424	5,338	64	5,402	108,826
2026*	12,055	81,392	10,955	376	104,778	5,365	64	5,429	110,207
2027*	12,356	82,370	11,052	376	106,154	5,392	64	5,456	111,610
2028*	12,664	83,359	11,150	376	107,549	5,419	64	5,483	113,032
2029*	12,980	84,359	11,249	376	108,964	5,446	64	5,510	114,474
2030*	13,303	85,372	11,348	376	110,399	5,473	64	5,537	115,936
2031*	13,635	86,397	11,448	376	111,856	5,500	64	5,564	117,420
2032*	13,974	87,435	11,550	376	113,335	5,527	64	5,591	118,926
2033*	14,324	88,485	11,653	376	114,838	5,554	64	5,618	120,456
2034*	14,680	89,549	11,756	376	116,361	5,581	64	5,645	122,006
2035*	15,046	90,624	11,860	376	117,906	5,609	64	5,673	123,579
2036*	15,422	91,712	11,965	376	119,475	5,637	64	5,701	125,176
2037*	15,806	92,814	12,071	376	121,067	5,665	64	5,729	126,796
2038*	16,200	93,929	12,177	376	122,682	5,693	64	5,757	128,439
2039*	16,605	95,058	12,285	376	124,324	5,721	64	5,785	130,109
2040*	17,019	96,199	12,394	376	125,988	5,749	64	5,813	131,801

**Years marked by an asterisk are forecast.*

6.6 ENPLANED PASSENGERS

The number of enplaned passengers at an airport is commonly used in the airport planning process to calculate the need for terminal facilities as well as being important in financial planning over the course of a master plan. Enplaned passengers, or enplanements, are used rather than total passengers since they provide the best indicators of need. Naturally, it is assumed that the number of enplaned passengers is roughly duplicated by the number of deplaned passengers.

6.6.1 Historical Enplaned Passengers

The Juneau International Airport is the primary commercial service airport in Southeast Alaska. Two commercial airlines, certified under FAR Part 121, offer service to and from JNU. Alaska Airlines offers year-round service to Seattle, Anchorage, Ketchikan, Petersburg, Wrangell, Sitka, Yakutat, and Cordova. Delta Air Lines offers service to Seattle and Anchorage.

Three Part 135 scheduled commuter carriers—Wings Airways, Wings of Alaska, and Alaska Seaplanes—offer scheduled air taxi service to and from JNU using both land-based aircraft and floatplanes. Ward Air operates using floatplanes. These airlines serve Angoon, Hoonah, Haines, Sitka, Gustavus, Kake, and Skagway.

Figure 6-3 shows the communities served by scheduled commercial airlines or air taxis from Juneau.

Figure 6-3: Communities Served From Juneau

In addition to these scheduled carriers, there are others that offer on-demand passenger services using both conventional fixed-wing aircraft (both land-based and floatplanes) and helicopters. These on-demand carriers serve a multitude of customers including the tourist market, mining camps, and others.

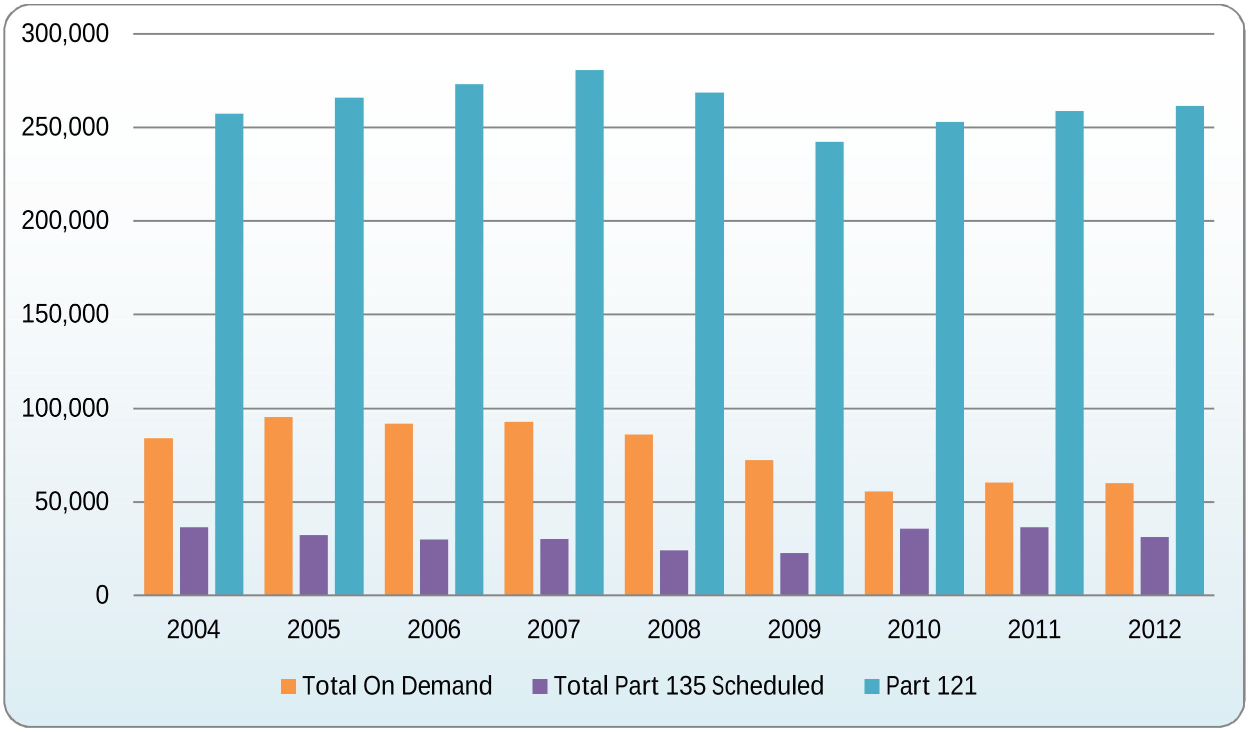
The total number of passengers at JNU has generally grown over the past 10 years but there was a peak in 2007 followed by a decline with a slow recovery period over the next 4 years. This coincides with the national economic set back that occurred in 2007 that impacted passenger levels at all airports. These decreases are consistent with decreased passenger levels at airports across the country so are not seen as specific reactions to local economic conditions. Table 6-7 shows the recorded passenger levels by type for JNU from 2004 through 2012.

Table 6-7: JNU Historical Recorded Passenger Levels

	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
On-Demand Carriers									
Land Based	998	10,231	2,143	844	799	931	914	826	269
Floatplanes	21,610	6,177	14,545	15,628	18,484	14,063	8,224	7,372	8,829
Helicopters	61,181	78,871	75,244	76,271	66,724	57,195	46,406	51,996	51,028
Total On Demand	83,789	95,279	91,932	92,743	86,007	72,189	55,544	60,194	60,126
Part 135 - Scheduled									
Land Based	35,011	30,167	27,495	26,645	20,950	19,751	23,044	22,656	18,212
Floatplanes	1,458	1,975	2,482	3,729	3,120	2,961	12,580	13,897	13,050
Total Part 135 Scheduled	36,469	32,142	29,977	30,374	24,070	22,712	35,624	36,553	31,262
Part 121	257,247	266,032	273,020	280,708	268,664	242,137	252,869	258,655	261,441
Total Enplaned Passengers	**377,505**	**393,453**	**394,929**	**403,825**	**378,741**	**337,038**	**344,037**	**355,402**	**352,829**

Source: Juneau International Airport Records

Figure 6-4: Historical Enplaned Passengers



6.7 ENPLANED PASSENGER FORECAST

A variety of methods are available for forecasting air carrier passengers. The three most commonly used are market share analyses, regression analysis, and time-series analysis. These share the shortcoming that they assume that relationships that existed in the past will continue unchanged into the future. Consequently, they do not allow for the effects of more aggressive marketing, airline decisions, increased service levels, or other changes independent of past indicators.

Similarly, these methods do not permit the analysis of the impact of point-in-time activity changes such as shown by the introduction of seasonal service by Delta in 2014. To counter this weakness, the second phase of forecasting involves a judgmental analysis. During this phase, decisions are made regarding the growth projections resulting from the analyses. These decisions require that a number of factors, such as potential service increases, airport or airline policy, and regional factors such as the legislative session, ticket prices, weather, and the amount of the annual Permanent Fund Dividend (PFD) checks be considered. The forecast team adds these elements to the process using experience from other airports, industry trends, knowledge of the aviation community, and information gathered from airlines, airport users, and passengers.

In this section forecasts are prepared for three distinct types of enplaned passengers including the Part 121 scheduled carriers, the Part 135 scheduled commuter carriers, and the on-demand carriers. Since growth in each of these categories is likely to be driven by different factors, the needs for each of these categories may vary considerably.

6.7.1 Forecast of Enplaned Passengers on FAR Part 121 Air Carriers

Passengers using the FAR Part 121 carriers make up more than 70 percent of all passengers at JNU. The airport is served by both Alaska Airlines and Delta Air Lines. In forecasting future growth of passengers, several forecasting methods were used to produce a range of projections:

Market share analyses techniques involve a review of historical activity levels at the individual airport (JNU) and a comparison of these to those recorded for a larger area (the U.S. and the State of Alaska). This comparison is used to determine what share of the larger market has used JNU. This share can then be applied to forecasts of passengers prepared for the larger market by the FAA in the TAF to project future activity levels at JNU. Two market share models were used for these forecasts as follows:

- JNU enplanements as a percentage of total U.S. enplanement levels as forecast by FAA in the TAF.
- JNU enplanements as a percentage of total enplanements for the FAA Alaska Region.

The underlying assumption in this forecast technique is that the FAA's overall passenger market projections reflect realistic national and regional growth rates and that, based on historical trends, JNU can be expected to retain its demonstrated historical share of that market into the future.

Regression analyses base projections of passenger demand (the dependent variable) on one or more outside indicators, such as population (the independent variables). Historical values for both the dependent and the independent variables are tested using correlation analyses to determine whether a relationship exists between them. If it is determined there is a relationship, projections of the independent variable can be used to project future aviation activity, assuming a continuation of the past relationship. This method requires the use of forecasts of the independent variables prepared by others including the State of Alaska, CBJ, and others.

For this analysis a regression model was prepared comparing the historical annual enplanements at JNU as recorded by the airport to the population of Juneau. The analysis showed that there was not a strong relationship between the growth in population in the region and enplaned passenger levels at the airport.

However, to assure that local and regional population was fully considered in the forecast, we used the growth rates that were developed in the projections of population for both Juneau and Southeast Alaska and presented in "Alaska Population Projections, 2012 – 2042" prepared by the Alaska Department of Labor and Workforce Development, as well as the rates for high, medium, and low population growth projections prepared by the CBJ. Developing forecasts of passengers for future years applied these growth rates to the recorded number of passengers and projected them into the future.

The time-series analysis is a simple and widely used forecasting technique. The time-series analysis is a basic regression that fits growth curves to historical data and uses these past growth rates to forecast future activity levels. This type of analysis assumes that, although short-term perturbations may occur from time to time, a consistent overall trend can be identified over an extended period. The time-series analysis for JNU was rejected from consideration as the correlation between time and passenger growth was not strong enough to justify further consideration.

6.7.1.1 Summary of Part 121 Enplaned Passenger Projections and Preferred Forecast

The projections prepared for this forecast all reflect continued growth over the next 20 years. The growth ranges from a low of 291,000 in 2035 based on the low projection of population growth in Juneau as forecast by the State of Alaska to a high of 402,534 based on projections for airline growth nationally.

In analyzing this range of projections, the preferred forecast of enplaned passengers was adopted to include relevant elements of all of the forecasting methods.

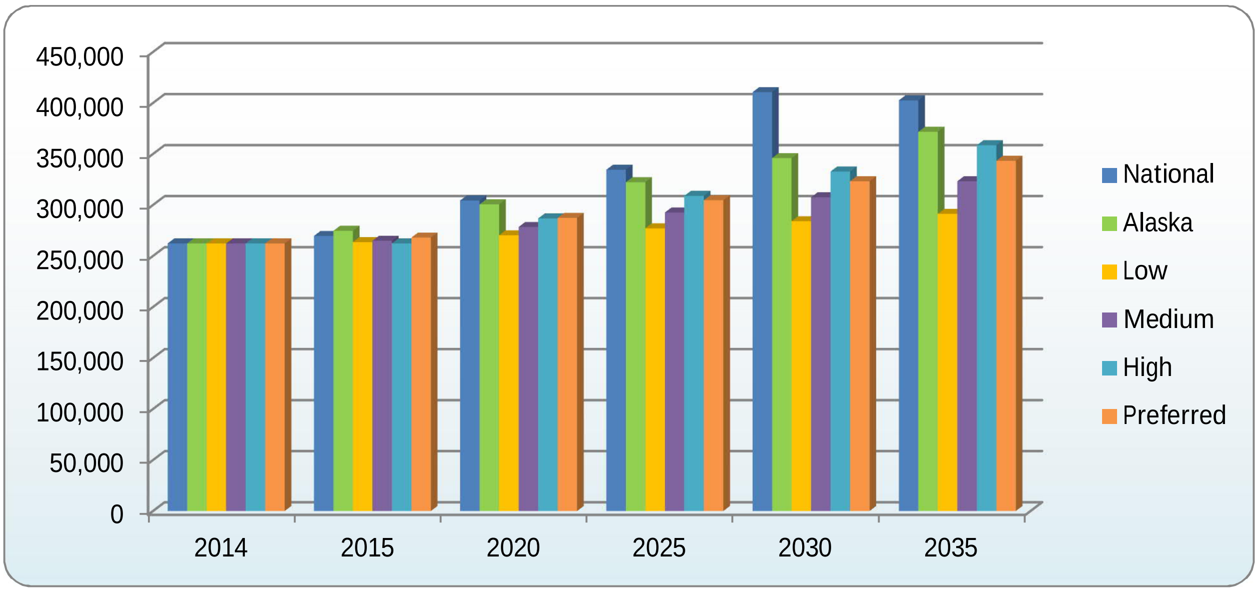
- The market share analyses reflect the fact that the primary factor in historical passenger growth has been the change in national passenger levels. This can be attributed to the increasing importance of tourism on the regional economy.
- The population based projections for JNU have been factored into the forecast to recognize the impact that regional growth has on passenger levels, particularly in the winter months.

Table 6-8 and Figure 6-5 show the full range of projections as well as the preferred forecast.

Table 6-8: Forecast of Enplaned Passengers on Part 121 Carriers

	Market Share		Population Based			
Year	**National**	**Alaska**	**Low**	**Medium**	**High**	**Preferred**
2013	290,923	290,923	290,923	290,923	290,923	290,923
2014	262,252	262,252	262,252	262,252	262,252	262,252
2015	269,580	274,646	263,563	264,875	262,252	267,996
2020	304,364	300,542	270,219	278,386	286,758	287,289
2025	334,523	322,266	277,042	292,586	308,919	304,616
2030	410,609	345,906	284,038	307,511	332,794	323,231
2035	402,534	371,720	291,210	323,197	358,514	343,272

Figure 6-5: Forecast of Enplaned Passengers on Part 121 Carriers



6.7.2 Forecast of Enplaned Passengers on Part 135 Commuter Carriers

The FAR Part 135 commuter carriers offer service from Juneau to other cities in Southeast Alaska including Angoon, Hoonah, Haines, Sitka, Tenakee, Gustavus, Kake and Skagway. Airlines providing service include Alaska Seaplane Service, Harris Air, Wings of Alaska, SeaPort Airlines, and Ward Air. In 2013 these airlines carried more than 31,000 passengers using both wheeled aircraft and floatplanes. Passengers using these airlines include tourists during the busy summer months but in the other months they are generally regional residents and therefore growth is less influenced by the national economy and more driven by local and regional factors. However, during summer months the passengers include tourists. In making forecasts for this segment two methods were employed as follows.

National Growth Rates: This method increased the number of passengers at the same rate as was forecast for passengers nationwide by FAA.

Local Growth Rates: The forecasts using this method looked at the projected growth in population of Southeast Alaska as projected in the publication “Alaska Population Projections 2012 – 2042,” prepared by the State of Alaska Department of Labor and Workforce Development, April 2014.

Table 6-9 shows the result of applying these growth rates to the base year number of passengers. Also shown in the table is the preferred forecast of passengers. The forecast relies primarily on the Part 135 commuters increasing at the same rate as the national passenger levels while including consideration of the State of Alaska’s projection of a gradual decrease in population throughout the southeast region through 2030. The forecast shown is based on the assumption that other regional transportation options, such as the Alaska Ferry System and regional roads, remain at the levels of service that exist at the time these forecasts were prepared.

Table 6-9: Forecast of Part 135 Commuter Airline Enplaned Passengers

	Base	2020	2025	2030	2035
National	31,262	36,587	40,038	43,803	47,844
Local	31,262	31,405	31,299	31,299	31,299
Preferred	**31,262**	**33,132**	**34,212**	**35,467**	**36,814**

Source: AECOM

6.7.3 Forecast of Enplaned Passengers on the On-Demand Carriers

The airlines that offer on-demand service include Coastal Helicopters, Fjord Flying Services (dba Wings of Alaska), Harris Aircraft Services, Harold Laughlin, Northstar Trekking, Tal Air, Temsco Helicopters, and Ward Air. These operate on a seasonal basis since the majority of their passengers are related to the tourist industry. More than 90 percent of all passengers in this category are carried by floatplanes and helicopters. In forecasting future activity it is recognized that future growth will be highly dependent of national economic trends rather than local factors since most are currently tourist or mining related. Other following other factors were considered:

3. National Park Service (NPS) regulations limit the number of landings that the on-demand helicopter operators are permitted on the Mendenhall Glacier.

4. Projections for future economic and population growth in Juneau and Southeast Alaska show moderate growth for Juneau and population loss for the region. This will influence that portion of the on-demand traffic that is not tourism based.
5. Review of the historic number of on-demand passengers (2004 through 2012) shows an inconsistent pattern with gains in some years and losses in others. Significantly, between 2007 and 2010 the overall number decreased by 25 percent.

The forecast of enplaned on-demand passengers gave consideration to each of these factors and produced forecasts that are based on the following:

- The Federal Aviation Administration projections for commuter passengers for JNU as published in the Terminal Area Forecasts (TAF) for the years through 2040. These numbers showed an annual growth rate of approximately 3.8 percent per year. This forecast represents the potential for growth from tourism, as the growth is based on national rates.
- Recognizing that some of the growth in the number of on-demand passengers will not be associated with factors typical for aviation related activities, the anticipated growth in the cruise industry was explored and used to project on-demand passenger levels. Projections for cruise passenger growth were taken from “Cruise Market Watch” website www.cruisemarketwatch.com. This organization projects growth of ½ of one percent per year through 2019 for the North American market. Our projection extended this rate through the period covered by the sustainability master plan.
- A final factor was used to reflect the expectations for the local and regional economies. For this projection, the projected rate of growth for the population of the CBJ was applied to the base year numbers to reflect the impact that the local economy would exert over the final passenger levels

The forecast is shown in the following table. The table shows projections using the three indicators, as well as a “preferred forecast” that was derived as an average of the three projections. As shown, the forecast indicates an overall 20-year growth of 38%. It should also be noted that the projected passenger level of 89,694 is less than the number of on-demand passengers recorded for the years 2004, 2005, and 2006.

Table 6-10: Forecast of On-Demand Enplaned Passengers

	Base Year	2020	2025	2030	2035
Juneau Market Growth (TAF)	64,965	82,289	95,394	110,588	128,200
Cruise Industry Growth	64,965	66,012	66,675	67,344	68,020
JNU Population Growth	64,965	67,610	69,317	71,067	72,862
Preferred Forecast	**64,965**	**71,970**	**77,128**	**83,000**	**89,694**

6.7.4 Forecast of Enplaned Passengers – Combined

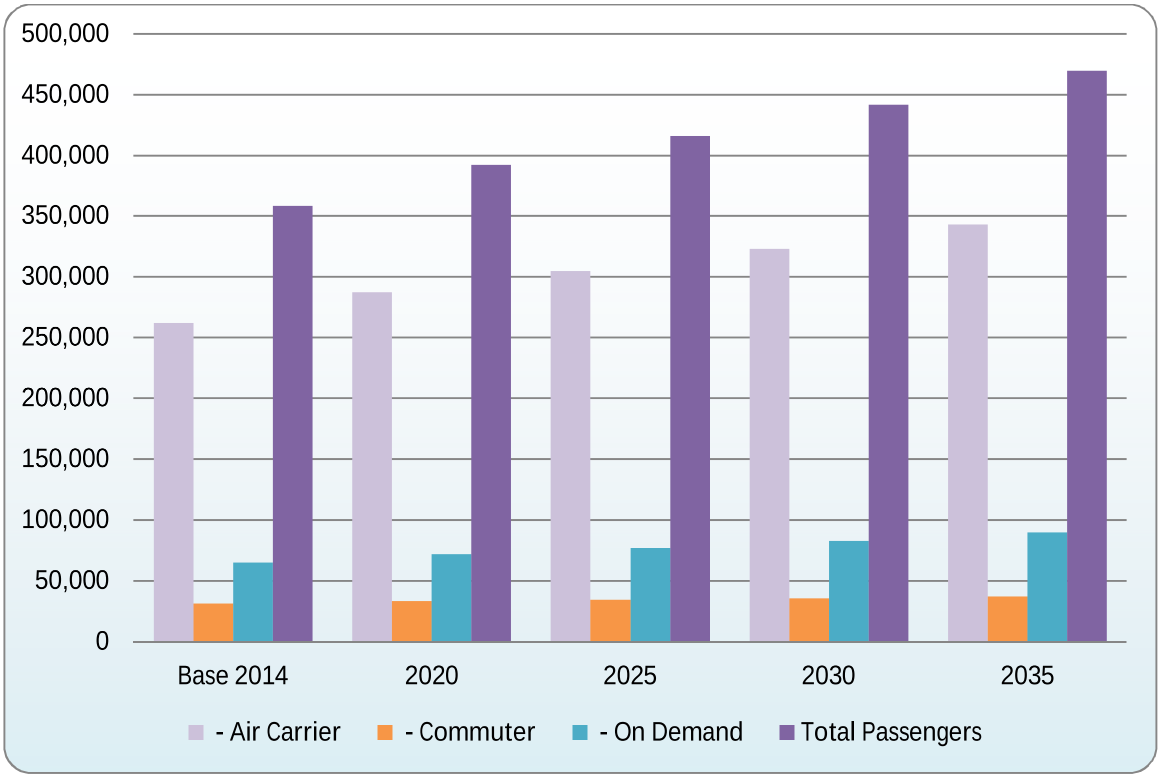
Combining the forecasts for the three classes of passenger service offered at JNU results in a total number of enplaned passengers exceeding 469,000 by the year 2035. The forecasts are shown in Table 6-11 below.

Table 6-11: Total Enplaned Passenger Forecast

Year	On-Demand	Commuters	Part 121	Total
2014	64,965	31,262	262,252	358,479
2020	71,970	33,132	287,289	392,392
2025	77,128	34,212	304,616	415,956
2030	83,000	35,467	323,231	441,698
2035	89,694	36,814	343,272	469,780

Source: AECOM

Figure 6-6: Forecast of Enplaned Passengers



6.8 AIR CARRIER OPERATIONS (PART 121 CARRIERS)

An aircraft operation is defined as a take-off or a landing, thus each individual flight consists of two operations. Forecasting the number of commercial operations uses a process that considers the historical average number of enplaned passengers per airline departure and applies these changes to the preferred forecast of enplaned passengers. The forecast of air carrier operations is based on the derived ratio of passenger enplanements per operation using the following process:

1. Determine the ratio of enplaned passengers to airline departures
2. Project changes in the enplaned passenger to departure ratio (passenger load factor)
3. Apply the projected ratios to the enplaned passenger forecast to determine the number of annual departures
4. Double the number of departures by two to determine the total operations

A direct relationship exists between the number of air carrier operations and the number of passenger enplanements. The average number of passengers on a departing airplane helps the airlines determine the frequency of flights and/or the size of the aircraft being used. This relationship is measured using a load factor, which is expressed as a percentage of seats filled on each departing aircraft. If a carrier has a high load factor it will choose to either increase the number of flights or use an aircraft with greater seating capacity. In the situation at Juneau the use of a load factor is complicated because several daily flights are not direct so the average load factor from JNU appears to be low.

To determine the future of airline service at Juneau, it is necessary to separate the Part 135 commuter carriers from the Part 121 commercial carriers. The on-demand carriers included in the forecast of enplaned passengers are classified as air taxi operations and forecasts for these will be included in a later section.

6.8.1 Part 121 Commercial Aircraft Fleet and Load Factors

The following assessment of the aircraft fleet being operated by the commercial airlines serving Juneau can be made.

- Alaska Airlines has a fleet of Boeing 737 aircraft that includes the 737-400, -400C, -400F, -700, -800, and -900. In the future Alaska is expected to phase out the use of the 737-400C combi aircraft and continue to use an all-Boeing fleet with similar seating capacities. Gradual evolution to a more modern, quieter, and fuel-efficient aircraft such as the 737-900 or the 737-Max will occur over the next 20 years.
- Delta Air Lines currently offers service using the Boeing 737-800. It is likely that this is the aircraft that they will use on this route for the future.

Table 6-12 shows the projected percentages for the daily fleet serving JNU and the resultant number of seats per departure (calculated as a weighted average) expected throughout the forecast period.

Table 6-12: Average Seats per Commercial Airline Departure

		Base Year		2020		2025		2030		2035	
Aircraft Type	Seats	%	Seats	%	Seats	%	Seats	%	Seats	%	Seats
Boeing 737-200	135	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0
Boeing 737-40C	72	12.48%	9	0.00%	0	0.00%	0	0.00%	0	0.00%	0
Boeing 737-400	144	76.71%	110	0.00%	0	0.00%	0	0.00%	0	0.00%	0
Boeing 737-700	124	2.61%	3	2.50%	3	5.30%	7	2.10%	2	2.00%	2
Boeing 737-800	150	4.22%	6	4.36%	7	8.54%	13	4.62%	7	4.68%	7
Boeing 737-900	158	2.01%	3	90.14%	142	82.16%	130	88.28%	139	87.32%	138
Boeing 757-200	180	1.97%	4	3.00%	5	4.00%	7	5.00%	9	6.00%	11
Total		100.00%	136	100.00%	157	100.00%	156	100.00%	157	100.00%	158

Source: AECOM

Using the average seats per departure calculated above, the historical passenger load factors and assumptions regarding changes to be experienced in the future, and the forecast of annual enplaned passengers, the forecast of annual air carrier operations has been developed, as shown in Table 6-13. In reviewing the forecast shown in the above it needs to be recognized that the operations forecasts are derived through a mathematical process that considers the airline fleet as well as probable future passenger load factors. The results of these calculations, as shown on the table, can be misleading if judged in their original form. We have applied a "smoothing" process to the raw calculated forecast. The final smoothed forecast is also shown in the table.

Table 6-13: Forecast of Part 121 Air Carrier Operations

Year	Enplaned Passengers	Seats/ Departure	Load Factor	Annual Departures	Annual Operations	Operations Forecast
2014	262,252	136	47%	4,160	8,319	8,319
2020	287,289	157	47%	3,882	7,764	8,453
2025	304,616	156	47%	4,144	8,288	8,586
2030	323,231	157	48%	4,281	8,561	8,720
2035	343,272	158	49%	4,426	8,853	8,853

Source: AECOM

6.9 AIR TAXI AND COMMUTER

FAR Part 135 includes all "for hire" services, whether scheduled or non-scheduled that occur at an airport. These are classified by FAA Air Traffic Control as Air Taxi and Commuter Operations. At

JNU this category includes all the Part 135 carriers, the on-demand carriers, the all-cargo activity, and other activity that is performed on a for hire basis.

6.9.1 Part 135 Commuter and On-Demand Operations

Forecasting Part 135 Commuter and On-Demand operations follows the same method that was employed for the Part 121 carriers. The forecast is based on the derived ratio of passenger enplanements per operation using the following process:

1. Determine the ratio of enplaned passengers to airline departures
2. Project changes in the enplaned passenger to departure ratio
3. Apply the projected ratios to the enplaned passenger forecast to determine the number of annual departures
4. Double the number of departures by two to determine the total operations

At JNU the commuter carriers, Wings Airways, Alaska Seaplane Service, ERA Aviation, Wings of Alaska, and Ward Air offer scheduled commuter service using aircraft with fewer than nine seats. These aircraft are either wheeled or floatplanes. Table 6-14 shows the forecast of future seats per aircraft for these carriers.

Table 6-14: Average Seats per Departure – Part 135 Airlines

		Base Year		2020		2025		2030		2035	
	Seats	%	Seats	%	Seats	%	Seats	%	Seats	%	Seats
Part 135 Scheduled											
Land	9	58%	5	58%	5	58%	5	58%	5	58%	5
Floatplanes	9	42%	4	42%	4	42%	4	42%	4	42%	4
Total		100%	9	100%	9	100%	9	100%	9	100%	9
On Demand											
Land Based	9	0.5%	0	0.5%	0	0.5%	0	0.5%	0	0.5%	0
Floatplanes	9	14.7%	1	14.7%	1	14.7%	1	14.7%	1	14.7%	1
Helicopters	9	84.9%	8	84.9%	8	84.9%	8	84.9%	8	84.9%	8
Total		100.0%	9	100.0%	9	100.0%	9	100.0%	9	100.0%	9

Source: AECOM

Using the average seats per departure calculated above, the historical passenger load factors and assumptions regarding changes in the future, and the forecast of annual enplaned passengers, the forecast of annual air taxi operations has been developed, as shown in Table 6-15.

Table 6-15: Forecast of Part 135 Commuter and On-Demand Airline Operations

Part 135 Scheduled					
Year	**Enplaned Passengers**	**Seats/ Departure**	**Load Factor**	**Annual Departures**	**Annual Operations**
2014	31,262	9	25%	868	1,737
2020	35,641	9	28%	1,109	2,218
2025	38,708	9	32%	1,376	2,753
2030	42,034	9	35%	1,635	3,269
2035	45,611	9	38%	1,926	3,852
On Demand					
Year	**Enplaned Passengers**	**Seats/ Departure**	**Load Factor**	**Annual Departures**	**Annual Operations**
2014	64,965	9	55%	3,970	7,940
2020	71,970	9	58%	4,638	9,276
2025	77,128	9	62%	5,313	10,627
2030	83,000	9	65%	5,994	11,989
2035	89,694	9	68%	6,777	13,554

Source: AECOM

6.9.2 Air Mail and Cargo

At JNU both Air Mail and Air Cargo are carried by the scheduled airlines in the planes used for passenger service (referred to as belly cargo). This includes the cargo that is currently hauled by Alaska Airlines in their Combi Aircraft. Additional cargo is brought in and flown out by all-cargo carriers, Alaska Central Express, and Empire Airlines or by Alaska Airlines on an all-cargo flight. As shown in Table 6-16, the majority of the cargo at JNU is handled by the airlines and there is more freight and mail shipped into Juneau than shipped out.

Table 6-16: Historical Air Mail and Air Cargo (in Pounds)

	2011	2012	2013	2014
Total Cargo and Mail				
Mail On	2,361,501	2,175,887	2,027,305	2,057,715
Mail Off	4,401,771	4,084,208	4,062,231	4,123,164
Freight On	5,462,916	4,838,752	6,328,746	6,423,677
Freight Off	7,973,643	7,802,486	9,098,314	9,234,789
Belly Cargo				
Mail On	1,610,367	1,297,308	1,175,881	1,193,519
Mail Off	3,533,524	3,103,109	3,055,539	3,101,372
Freight On	4,494,534	2,872,990	2,872,990	2,916,085
Freight Off	5,889,072	4,995,849	4,337,510	4,402,573
All-Cargo Carriers				
Mail On	751,134	878,579	851,424	864,195
Mail Off	868,247	981,099	1,006,692	1,021,792
Freight On	521,106	783,765	1,752,867	1,779,160
Freight Off	1,091,985	1,454,143	2,427,216	2,463,624

Source: Airport Records – Year 2014 estimated based on partial airport records

6.9.3 Forecasts of Air Mail and Cargo Volumes

Forecasts of the volume of mail and cargo being processed in Juneau are the first step in determining the air cargo needs. In forecasting future demand the following factors have been considered.

- The cargo being shipped from Juneau includes products from the local fisheries that is time sensitive and is generally shipped to Seattle as belly cargo.
- The volume of both mail and freight shipped into Juneau exceeds the volume that is shipped out. Discussions with the cargo carriers reveal that much of the recent growth is the result of increased use of on-line shopping services by regional residents.
- The amount of belly cargo being shipped in the future will be influenced by the decreasing lift capacity of the aircraft that are anticipated to be introduced into the Alaska Airlines fleet. This forecast assumes that if the demand for cargo service exists, Alaska or another carrier will provide service sufficient to accommodate it.

With consideration of these factors, forecasts of future volumes of mail and cargo can be made on the basis of the following.

- The growth in mail will be driven primarily by growth in the local population. Since the mail is carried to Juneau on both Alaska Airlines and Alaska Central Express, the population of both the CBJ and the Southeast Region must be considered when making projections.
- Cargo projection will also be based on the growth in population coupled with the increasing use of on-line shopping services that are creating new demand levels.

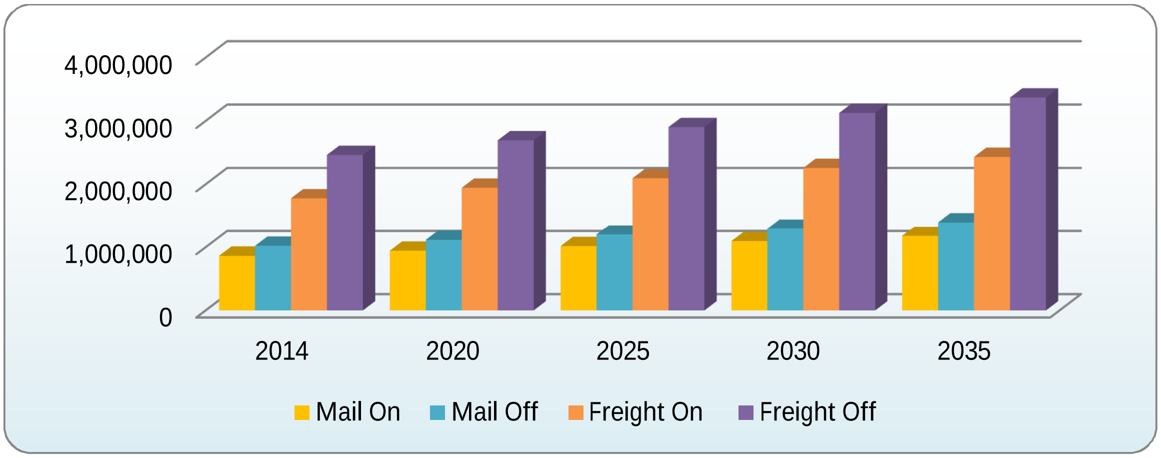
Given these factors, air cargo forecasts were prepared to represent the range of potential future levels. These were compared with the forecast comparing JNU growth at the rate that Boeing has projected for cargo growth in North America. These projections are shown in Table 6-17.

Table 6-17: Forecast of Air Cargo (Mail and Freight) in Pounds

Total All-Cargo Carriers				
	Mail		Freight	
Year	On	Off	On	Off
2014	864,195	1,021,792	1,779,160	2,463,624
2020	944,949	1,117,272	1,945,411	2,693,833
2025	1,017,978	1,203,619	2,095,760	2,902,024
2030	1,096,651	1,296,640	2,257,728	3,126,304
2035	1,181,405	1,396,849	2,432,215	3,367,917
Belly Cargo				
	Mail		Freight	
Year	On	Off	On	Off
2014	1,193,519	3,101,372	2,916,085	4,402,573
2020	1,305,046	3,391,174	3,188,573	4,813,963
2025	1,405,905	3,653,258	3,434,999	5,186,006
2030	1,514,559	3,935,596	3,700,470	5,586,801
2035	1,631,610	4,239,755	3,986,457	6,018,571
All Cargo				
	Mail		Freight	
Year	On	Off	On	Off
2014	2,057,715	4,123,164	6,423,677	9,234,789
2020	2,249,994	4,508,446	7,023,927	10,097,718
2025	2,423,883	4,856,877	7,566,764	10,878,110
2030	2,611,210	5,232,236	8,151,554	11,718,813
2035	2,813,015	5,636,604	8,781,538	12,624,490

Source: AECOM

Figure 6-7: Air Cargo Forecasts



6.9.4 Forecast of Air Cargo Operations

In preparing the air cargo operations forecast the first step is to determine the number of airplane flights needed to move the cargo. For the belly cargo no individual forecasts will be prepared since by definition this is mail and freight that is carried by the commercial airlines. For the all-cargo portion, this is presently hauled on aircraft such as the Beech 1900 and the ATR72. Airport records show that over the past three years Alaska Central Express has enplaned about 1,300 pounds of cargo per departure, or about 20 percent of the lift capacity of the Beech 1900 aircraft. The same records show that Empire Air had loads averaging 2,550 pounds per departure or less than 20 percent of the lift capacity of the ATR 72 aircraft. Table 6-18 shows the forecast of air cargo operations.

In addition, Alaska Airlines presently provides cargo service using combination passenger and cargo "combi" aircraft. In the future these aircraft will be removed from the Alaska Airline's fleet and replaced with all freighter aircraft. Cargo lift capacity will not change with the removal of the combi aircraft.

Table 6-18: Forecast of Air Cargo Operations

Year	Mail (pounds)		Freight (pounds)		Pounds/ Landing	Annual Landings	Annual Operations
	On	Off	On	Off			
2011	751,134	868,247	521,106	1,091,985	1,457	873	1,746
2012	878,579	981,099	783,765	1,454,143	1,674	993	1,986
2013	851,424	1,006,692	1,752,867	2,427,216	2,114	1,232	2,464
2014	864,195	1,021,792	1,779,160	2,463,624	2,534	1,301	2,603
2020	944,949	1,117,272	1,945,411	2,693,833	4,634	1,648	3,295
2025	1,017,978	1,203,619	2,095,760	2,902,024	5,423	1,537	3,074
2030	1,096,651	1,296,640	2,257,728	3,126,304	6,211	1,462	2,924
2035	1,181,405	1,396,849	2,432,215	3,367,917	7,000	1,411	2,822

Source: AECOM
Year 2014 data are based on partial airport records.

6.10 OTHER AIR TAXI

The remainder of the air taxi operations at JNU are conducted by aircraft for hire, and passengers are not reported to the airport as enplanements. These include special deliveries, hunting and fishing expeditions, cargo deliveries, personnel services, or other. Historically much of this activity has been in support of the mining industry. Table 6-19 shows the forecast prepared for these. As shown in the table, future growth was projected using three different rates of growth.

1. The first assumed that these operations will increase at the same rate as regional population.
2. The second rate of growth makes the assumption that this category of operation will grow over time at the same rate as forecast for the Part 135 Commuter operations.
3. The final growth level used was to apply the rate of growth for all commuter/air taxi operations as set forth in the TAF and apply this rate to the historic base numbers to project the future.

Table 6-19 shows the three forecasts as well as the preferred forecast adopted for this report. The preferred forecast was developed to reflect the full range of the future influences on activity, by averaging the three forecasts.

Table 6-19: Forecast of Other Air Taxi Operations

	Population Based	Same Rate as Commuters	TAF Rate	Preferred
2014	58,261	58,261	58,261	58,261
2020	63,705	71,676	61,845	65,742
2025	68,628	86,055	65,000	73,228
2030	73,932	100,885	68,316	81,044
2035	79,646	117,845	71,800	89,764

Source: AECOM

6.11 GENERAL AVIATION

General Aviation (GA) includes all civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire. General aviation covers a large range of activities, both commercial and noncommercial, including flying clubs, flight training, agricultural aviation, light aircraft manufacturing, and maintenance.

General aviation activity at JNU consists of operations by both based and transient aircraft. In forecasting, the number of based aircraft will be considered as will the number of annual operations.

6.11.1 Forecast of Based Aircraft

Historical records of the total number of aircraft based at JNU from 2004 through 2012 as recorded in the FAA's Terminal Area Forecasts (TAF) were examined as part of this master plan. These records only include the total number and do not provide a breakdown by type of aircraft.

To forecast the growth in based aircraft at JNU, various forecast modeling techniques were used. Standard regression analyses were discounted as a viable approach as any model that relies on historical relationships with any independent variable such as population have proven to have low correlation values and therefore are poor forecasting tools. There are, however, several forecasting methods that can be used to generate reliable estimates of future growth in based aircraft.

1. **FAA Terminal Area Forecast (TAF):** The TAF includes based aircraft forecasts for 2013 through 2042. Under the FAA TAF model, based aircraft are expected to continue to increase through 2035 when 416 aircraft can be expected at the airport.

2. **Population Based Growth**: Testing the historical relationship between area population and the number of based aircraft resulted in a finding that the relationship between the two, although not very strong historically, did show evidence that area population is a force behind based aircraft. Therefore, we have produced a forecast of based aircraft using the growth rate for population applied to current based aircraft counts. This projection represents local growth conditions.

3. **Market Share Analyses**: As with previous forecasts, projections were made to represent the number of aircraft at JNU that result from the airport maintaining its current share of the growth in the nation and FAA's Alaska region as forecast in the TAF.

Table 6-20 shows these projections for based aircraft. In reviewing these and considering the factors discussed in the preceding, it was determined the preferred forecast for based aircraft should combine the growth rates for population as well as the national growth rates for aircraft as a whole as represented by the national market share. This combination results in a forecast of continued growth in based aircraft at JNU at a rate sustainable and consistent with the national trends as well as reflecting the local factors discussed by the stakeholders.

Table 6-20: Forecast of JNU Based Aircraft

Year	TAF	Population	Market Shares		Preferred
			USA	AK	
2004	292	292	292	292	292
2005	292	292	292	292	292
2006	341	341	341	341	341
2007	341	341	341	341	341
2008	341	341	341	341	341
2009	339	339	339	339	339
2010	335	335	335	335	335
2011	321	321	321	321	321
2012	325	325	325	325	325
2013	330	330	330	330	330
2014	332	332	332	332	332
2020	354	363	322	345	346
2025	376	391	336	351	364
2030	396	421	351	364	383
2035	416	454	366	376	403

Source: AECOM

6.11.1.1 Based Aircraft Fleet Mix

The current based aircraft fleet at Juneau consists of a mixture of helicopters, wheeled aircraft, and floatplanes. The JNU Airport Form 5010 shows the current fleet mix for the based aircraft. The forecast of the based aircraft fleet is based on the following breakdown:

- Single-Engine Piston (SEP): This category includes both traditional single-engine piston aircraft whether used for commercial or GA purposes.
- Multi-Engine Piston (MEP): The multi-engine category is composed of both twin-engine piston and turboprop aircraft.
- Jet: This category includes both traditional business/corporate jet aircraft.
- Helicopter: The rotor category includes both piston and turbine-powered rotorcraft.

The based aircraft fleet mix forecast uses current data and forecasts changes to the mix based on the overall evolution of general aviation in the United States and the expectations and observations of the airport stakeholders. The fleet mix percentages were applied to the based aircraft forecast for the airport. The recommended fleet mix forecast for the benchmark years is presented in Table 6-21 below.

Table 6-21: Forecast of Based Aircraft Fleet Mix

	Single Engine Piston		Multi Engine Piston		Jet		Helicopter		Military		Other		Total	
Year	**No.**	**Percent**	**No.**	**Percent**	**No.**	**Percent**	**No.**	**Percent**	**No.**	**Percent**	**No.**	**Percent**	**No.**	**Percent**
2014	294	88.62%	3	0.92%	3	0.92%	28	8.31%	3	0.92%	1	0.31%	332	100.00%
2020	305	88.27%	3	1.00%	3	1.00%	29	8.50%	3	0.92%	1	0.31%	346	100.00%
2025	318	87.52%	5	1.25%	5	1.30%	32	8.70%	3	0.92%	1	0.31%	364	100.00%
2030	333	86.82%	6	1.55%	6	1.50%	34	8.90%	4	0.92%	1	0.31%	383	100.00%
2035	348	86.27%	6	1.60%	7	1.70%	37	9.20%	4	0.92%	1	0.31%	403	100.00%

Source: AECOM

6.11.2 General Aviation Operations

As with activity indicators at many airports, the historical records for general aviation operations at JNU exhibit a long-term reduction. From 2004 to the present the number of annual operations has decreased from 22,874 to 13,104. Our forecast needs to rely on techniques that consider this historical record but do not underestimate the potential growth rate based on this same record. The methods used in forecasting include:

Population Based Forecast. This method employs the rate of growth projected for the CBJ population and applies it to the number of general aviation operations to derive future operational levels.

Operations per Based Aircraft (OPBA): This forecasting technique relied on applying a factor for the number of operations per based aircraft to the based aircraft forecast presented in the previous section. This technique is being used as a baseline for comparing the others. Forecasts generated by using operations per based aircraft alone are generally unreliable because the historical patterns are not reliable and the relationship has not proven to be strong. In addition many of the aircraft at JNU are not used for GA operations but are used for air taxi purposes.

Market Share Analyses: For general aviation operations, the share of the market in the State of Alaska, and the United States likely to occur at JNU was reviewed. These shares were calculated using the percentage of the larger market that was experienced at JNU in 2012.

The alternative general aviation operations forecasts for JNU are presented in Table 6-22. Table 6-22 also shows the preferred forecast for general aviation operations. This preferred forecast used an average of all of the projection methodologies.

Table 6-22: Forecast of General Aviation Operations

Year	Population	OPBA	Market Share		Preferred
			USA	AK	
2004	22,874	22,874	22,874	22,874	22,874
2005	18,902	18,902	18,902	18,902	18,902
2006	21,459	21,459	21,459	21,459	21,459
2007	16,312	16,312	16,312	16,312	16,312
2008	14,274	14,274	14,274	14,274	14,274
2009	14,717	14,717	14,717	14,717	14,717
2010	16,697	16,697	16,697	16,697	16,697
2011	17,248	17,248	17,248	17,248	17,248
2012	13,104	13,104	13,104	13,104	13,104
2013	13,301	17,820	17,139	16,309	16,142
2014	13,500	17,928	17,270	16,449	16,287
2020	14,762	18,682	17,691	16,683	16,954
2025	15,902	19,638	18,069	16,890	17,625
2030	17,131	20,692	18,476	17,110	18,352
2035	18,455	21,760	18,916	17,342	19,118

There are two types of general aviation operations, local and itinerant. A local operation is defined as any operation that stays in the local traffic pattern or within sight of the airport or is known to be departing for or arriving from a local practice area. All others are classified as itinerant. Records of general aviation activity at JNU show that, on average, about 55 percent of all operations were itinerant and 45 percent local. Future levels of local and itinerant activity were forecast using this distribution, as shown in Table 6-23.

Table 6-23: Forecast of General Aviation Itinerant and Local Operations

Year	Itinerant	Local	Total
2013	10,654	5,488	16,142
2014	10,749	5,537	16,287
2020	11,190	5,764	16,954
2025	11,632	5,992	17,625
2030	12,112	6,240	18,352
2035	12,618	6,500	19,118

Source: AECOM

6.12 MILITARY OPERATIONS

Between 2004 and 2012, total military operations at JNU averaged 775 per year. In forecasting future military operations levels, it has been assumed that they would remain a low percentage of total airport activity and would continue to average 775 per year.

6.13 PEAK PERIOD ACTIVITY

To calculate facility requirements forecasts of peak future passenger and aircraft activity are needed. Peak levels of activity closely correlate with the need for runways, taxiways, aircraft apron, and passenger terminal facilities. Three primary indicators of peak aviation activity are used.

- **Peak Month**: Defined as the month in the calendar year when the highest overall activity levels occur.
- **Average Day/Peak Month (AD/PM)**: Defined as the average day within the peak month. This indicator is developed by dividing the peak month activity by 30 or 31, depending on which month is the peak.
- **Peak Hour:** Also referred to as the design hour within the average day, typically between 10 and 20 percent of the average day activity. According to FAA Advisory Circular 150/5360-13, design hour operations may reach levels as high as 12 to 20 percent of the average day operations and drop to as low as 6.25 percent.

It is important to note that neither the average day nor the design hour is the absolute peak that occurs within a year. By definition, average day activity will be exceeded at least fifteen days during the peak month. Likewise, design hour activity will likely be exceeded numerous times due to the calculation methodology used.

Peaking forecasts are prepared to determine the maximum number of passengers needing to use the terminal facilities and the hourly operations demand on the runway system. In this regard, we have forecasted peak periods based on the following sections.

6.13.1 Enplaned Passenger Peaking – Part 121 Carriers

Peak month: Records show that 13.4 percent of total annual enplaned passengers on Part 121 carriers occur during the peak month at JNU. Over the past ten years this peak month is August. It should be noted that the month of July historically has similar numbers. This is important because it emphasizes the nature of activity ay JNU that has three busy months each summer.

Average day: The average day calculation divides the peak month by 31 days to yield the average daily operations figure.

Peak hour: The peak hour enplaned passenger forecast is estimated to be 15 percent of average day based on the daily airport flight schedule.

Table 6-24: Forecast Enplaned Passenger Peaking – Part 121 Carriers

	Annual	Peak Month	AD/PM	Peak Hour
2014	262,252	35,142	1,134	170
2020	287,289	38,497	1,242	186
2025	304,616	40,819	1,317	198
2030	323,231	43,313	1,397	210
2035	343,272	45,998	1,484	223

Source: AECOM

6.13.2 Enplaned Passenger Peaking – Part 135 Carriers

Peak month: Approximately 21 percent of total annual enplaned passengers using the Part 135 carriers occur during the peak month of August.

Average day: The average day calculation divides the peak month by 31 days to yield an average daily operations figure.

Peak hour: The peak hour enplaned passenger forecast is estimated to be 33 percent of average day based on the flight schedules.

Table 6-25: Forecast Enplaned Passenger Peaking – Part 135 Carriers

	Annual	Peak Month	AD/PM	Peak Hour
2014	31,262	8,753	282	85
2020	33,132	9,277	299	90
2025	34,212	9,579	309	93
2030	35,467	9,931	320	96
2035	36,814	10,308	333	100

Source: AECOM

6.13.3 Enplaned Passenger Peaking – On-Demand Carriers

Peak month: Approximately 28 percent of total annual enplaned passengers using on-demand carriers occur during the peak month. This peak month is typically August.

Average day: The average day calculation divides the peak month by 31 days to yield an average daily operations figure.

Peak hour: The peak hour enplaned passenger forecast is estimated to be 20 percent of average day.

Table 6-26: Forecast Enplaned Passenger Peaking – On-Demand Carriers

On Demand				
	Annual	**Peak Month**	**AD/PM**	**Peak Hour**
2014	64,965	18,190	587	117
2020	71,970	20,152	650	130
2025	77,128	21,596	697	139
2030	83,000	23,240	750	150
2035	89,694	25,114	810	162

Source: AECOM

6.13.4 Operations Peaking - Part 121 Commercial Carriers

Peak month: This category includes scheduled service by the Part 121 Carriers (Alaska and Delta) where the peak month is about 11.5 percent of the annual and occurs in July.

Average day: The average day calculation divides the peak month by 31 days to yield an average daily operations figure.

Peak hour: The flight schedule shows that the peak hour is equal to approximately 18 percent of the average daily operations.

Table 6-27: Forecast of FAR Part 121 Carrier Operations – Peaking

	Annual	Peak Month	AD/PM	Peak Hour
2014	8,966	1,031	33	6
2020	8,432	970	31	6
2025	8,544	983	32	6
2030	8,657	996	32	6
2035	8,769	1,008	33	6

Source: AECOM

6.13.5 Commuter and Air Taxi Peaking

Peak month: The commuter and Air Taxi category of operations includes all of the Part 135 carriers, the On-Demand Carriers, the air cargo activity and "other air taxi" where the peak month is about 11.5 percent of the annual and occurs in July.

Average day: The average day calculation divides the peak month by 31 days to yield an average daily operations figure.

Peak hour: The flight schedule shows that the peak hour is equal to approximately 18 percent of the average daily operations.

Table 6-28: Commuter and Air Taxi Peaking

Part 135 Operations				
	Annual	Peak Month	AD/PM	Peak Hour
2014	1,737	486	16	5
2020	2,218	621	20	6
2025	2,753	771	25	7
2030	3,269	915	30	9
2035	3,852	1,079	35	10
On-Demand Operations				
	Annual	**Peak Month**	**AD/PM**	**Peak Hour**
2014	7,940	2,223	72	22
2020	9,276	2,597	84	25
2025	10,627	2,976	96	29
2030	11,989	3,357	108	32
2035	13,554	3,795	122	37
Air Cargo Operations				
	Annual	**Peak Month**	**AD/PM**	**Peak Hour**
2014	2,603	312	10	3
2020	3,295	395	13	4
2025	3,074	369	12	4
2030	2,924	351	11	3
2035	2,822	339	11	3

Note: On-Demand Operations include helicopter operations which are counted by FAA as a "flight of five", meaning that five helicopters take off and land as a group but are counted as a single operation by ATCT

Table 6-27: Commuter and Air Taxi Peaking (Continued)

Other Air Taxi				
	Annual	**Peak Month**	**AD/PM**	**Peak Hour**
2014	58,261	6,991	226	68
2020	65,742	7,889	254	76
2025	73,228	8,787	283	85
2030	81,044	9,725	314	94
2035	89,764	10,772	347	104
Total Commuter and Air Taxi				
	Annual	**Peak Month**	**AD/PM**	**Peak Hour**
2014	70,541	10,013	323	97
2020	80,532	11,503	371	111
2025	89,681	12,903	416	125
2030	99,226	14,348	463	139
2035	109,992	15,984	516	155

6.13.6 General Aviation Peaking

Peak month: General aviation activity is assumed to peak during the summertime when the days are longer and the weather suited for training activity. A peaking factor of 11 percent of the total annual operations is used in this analysis.

Average day: The average day calculation divides the peak month levels by 31 days to yield an average daily operations figure.

Peak hour: Peak hour operations are assumed to occur during the early summer evening periods when general aviation pilots are conducting training activity. During this time, levels as high as 25 percent of the average day are expected to occur.

Table 6-29: General Aviation Activity Peaking

	Annual	Peak Month	ADPM	Peak Hour
2014	16,287	1,954	63	13
2020	16,954	2,034	66	13
2025	17,625	2,115	68	14
2030	18,352	2,202	71	14
2035	19,118	2,294	74	15

6.13.7 Total Activity Peaking

Peak month: Since the peak periods for each category are not likely to occur simultaneously, the peaks for total will not consist of the total for the other categories. Total activity levels peak during the summertime with a peaking factor of 11 percent of the total annual operations is used in this analysis.

Average day: The average day calculation divides the peak month levels by 31 days to yield an average daily operations figure.

Peak hour: Like general aviation, total peak hour operations are assumed to occur in early summer evenings. During this time levels as high as 25 percent of the average day are expected to occur.

The forecast peak period operations for are shown in Table 6-30.

Table 6-30: Forecast Total Operations Peaking

Total Operations				
	Annual	Peak Month	ADPM	Peak Hour
2014	95,586	11,470	370	74
2020	106,713	12,806	413	83
2025	116,668	14,000	452	90
2030	127,073	15,249	492	98
2035	138,738	16,649	537	107

6.14 CRITICAL AIRCRAFT

An airport's critical (or design) aircraft reflects the operating requirements of the most demanding aircraft expected to generate 500 or more itinerant operations per year at the facility. The critical aircraft is used to determine which FAA planning and design criteria, as defined by the FAA's Airport Reference Code (ARC), should apply to the airport.

The FAA's Airport Reference Code is a classification system developed to relate airport design criteria to the operational and physical characteristics of the airplanes expected to operate at the airport. The ARC is based on two key characteristics of the designated critical aircraft. The first characteristic, denoted in the ARC by a letter code, is the Aircraft Approach Category as determined by the aircraft's approach speed in the landing configuration. Generally, aircraft approach speed affects runway length, exit taxiway locations, and runway-related facilities. The ARC approach speed 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 166 knots or more

The second ARC component, depicted by a roman numeral, is the Airplane Design Group. The Airplane Design Group is defined by the aircraft's wingspan and determines dimensional standards for the layout of airport facilities, such as separation criteria between runways and taxiways, taxilanes, buildings, or objects potentially hazardous to aircraft movement on the ground. The Airplane Design Group categories include:

- Design Group I: Wingspan up to but not including 49 feet
- Design Group II: Wingspan 49 feet up to but not including 79 feet
- Design Group III: Wingspan 79 feet up to but not including 118 feet
- Design Group IV: Wingspan 118 feet up to but not including 171 feet
- Design Group V: Wingspan 171 feet up to but not including 214 feet
- Design Group VI: Wingspan 214 feet up to but not including 262 feet

Presently the critical aircraft at JNU is the Boeing 737-300, which is a C-III aircraft. Table 6-31 presents a forecast of future airport use by aircraft type. The information presented in this table was derived using the following assumptions:

1. For the Commercial Air Carrier the current and projected fleet mix for Alaska and Delta from Table 6-31 was applied to the commercial operations forecasts.
2. For the air taxi category the Part 135, on-demand, and air cargo fleet mix airport record were used to determine the existing fleet. Future fleet projections were based on a continuation of current fleet characteristics.
3. For the "other" air taxis it was assumed that they will be reflective of the current fleet.
4. General aviation activity was assumed to reflect the composition of the based aircraft fleet.
5. Military operations were split evenly between fixed wing and helicopters.

Table 6-31: Projected Operational Fleet Mix

Category/ Aircraft	ADG	Base		2020		2025		2030		2035	
		%	Ops	%	Ops	%	Ops	%	Ops	%	Ops
Commercial Air Carrier											
Boeing 737 Series	C-III	96%	7,986	10%	845	14%	1,202	7%	610	7%	620
Boeing 737-900/Max	D-III	2%	166	90%	7607	86%	7384	93%	8109	93%	8,233
Boeing 757-200	C-IV	2%	166	0%	0	0%	0	0%	0	0%	0
Subtotal		**100%**	**8,319**	**100%**	**8,453**	**100%**	**8,586**	**100%**	**8,720**	**100%**	**8,853**
Commuter/Air Taxi											
Cessna Caravan-Land	A -II	4%	2,822	4%	3,221	4%	3,587	4%	3,969	4%	4,400
Cessna Caravan - Floatplane	A-II	6%	4,232	6%	4,832	6%	5,381	6%	5,954	6%	6,600
DC2 Beaver - Floatplane	A-I	23%	16,224	23%	18,522	23%	20,627	23%	22,822	23%	25,298
Beech 1900 Cargo	B-II	2%	1,411	2%	1,611	2%	1,794	2%	1,985	2%	2,200
ATR-72 - Cargo	B-III	2%	1,411	2%	1,611	2%	1,794	2%	1,985	2%	2,200
Single Engine Piston - Land	B-I	10%	7,054	10%	8,053	10%	8,968	10%	9,923	10%	10,999
Single Engine Piston - Floatplane	B-I	15%	10,581	15%	12,080	15%	13,452	15%	14,884	15%	16,499
Helicopters	N/A	38%	26,805	38%	30,602	38%	34,079	38%	37,706	38%	41,797
Subtotal		**100%**	**70,540**	**100%**	**80,531**	**100%**	**89,682**	**100%**	**99,226**	**100%**	**109,992**
General Aviation											
Corporate Jets - Heavy	C-II	1%	163	1%	170	1%	176	1%	184	1%	191
Corporate Jets - Light	B-II	3%	489	3%	509	3%	529	3%	551	3%	574
Multi-Engine Piston - Land	B-II	4%	651	4%	678	4%	705	4%	734	4%	765
Multi-Engine Piston - Floatplane	A-I	4%	651	4%	678	4%	705	4%	734	4%	765
Single- Engine Piston - Land	A-I	30%	4886	30%	5086	30%	5287	30%	5506	30%	5736
Single- Engine Piston - Floatplane	A-I	25%	4072	25%	4239	25%	4406	25%	4588	25%	4780
Rotorcraft	N/A	33%	5375	33%	5595	33%	5816	33%	6056	33%	6309
Subtotal		**100%**	**16,287**	**100%**	**16,954**	**100%**	**17,625**	**100%**	**18,352**	**100%**	**19,118**
Military											
Piston	C-II	50%	220	50%	388	50%	388	50%	388	50%	388
Helicopters	B-II	50%	220	50%	388	50%	388	50%	388	50%	388
Subtotal		**100%**	**440**	**100%**	**775**	**100%**	**775**	**100%**	**775**	**100%**	**775**
TOTAL			**95,586**		**106,713**		**116,668**		**127,073**		**138,738**

As shown in these forecasts, future commercial aviation service will continue to be offered using the 737 series aircraft, or their equivalent. With the gradual movement of the airlines to the 737-900/max aircraft, in the future the critical aircraft will be classified as a D-III between the years 2020 and 2025. On the floatpond the critical aircraft is classified as A-II.

The data presented on the above table also show the airport's use by the unique combination of land-based and floatplane aircraft and helicopters. Table 6-32 shows the anticipated use by each of these categories. This information is important to future analyses of airfield capacity as well as assuring that aircraft related noise is adequately considered.

Table 6-32: Projected Airport Use by Aircraft Category

Aircraft	2012	2020	2025	2030	2035
Land	27,259	29,778	31,814	33,942	36,304
Floatplanes	35,761	40,350	44,571	48,982	53,941
Helicopters	32,400	36,584	40,283	44,150	48,494
Total	95,420	106,713	116,668	127,073	138,738

6.15 SUMMARY OF FORECASTS

The following is a summary of the forecasting results.

Table 6-33: Summary of Forecasts

Category	Base 2014	2020	2025	2030	2035
Enplaned Passengers					
Air Carrier	262,252	287,289	304,616	323,231	343,272
Commuter	31,262	33,132	34,212	35,467	36,814
On Demand	64,965	71,970	77,128	83,000	89,694
Total Passengers	358,479	392,391	415,956	441,698	469,780
Operations					
Air Carrier	8,319	8,453	8,586	8,720	8,853
Air Taxi & Commuter	70,540	80,531	89,682	99,226	109,992
General Aviation	16,287	16,954	17,625	18,352	19,118
Military	440	775	775	775	775
Total Operations	95,586	106,713	116,668	127,073	138,738
Based Aircraft	332	346	364	383	403

Figure 6-8: Forecast of Enplaned Passengers

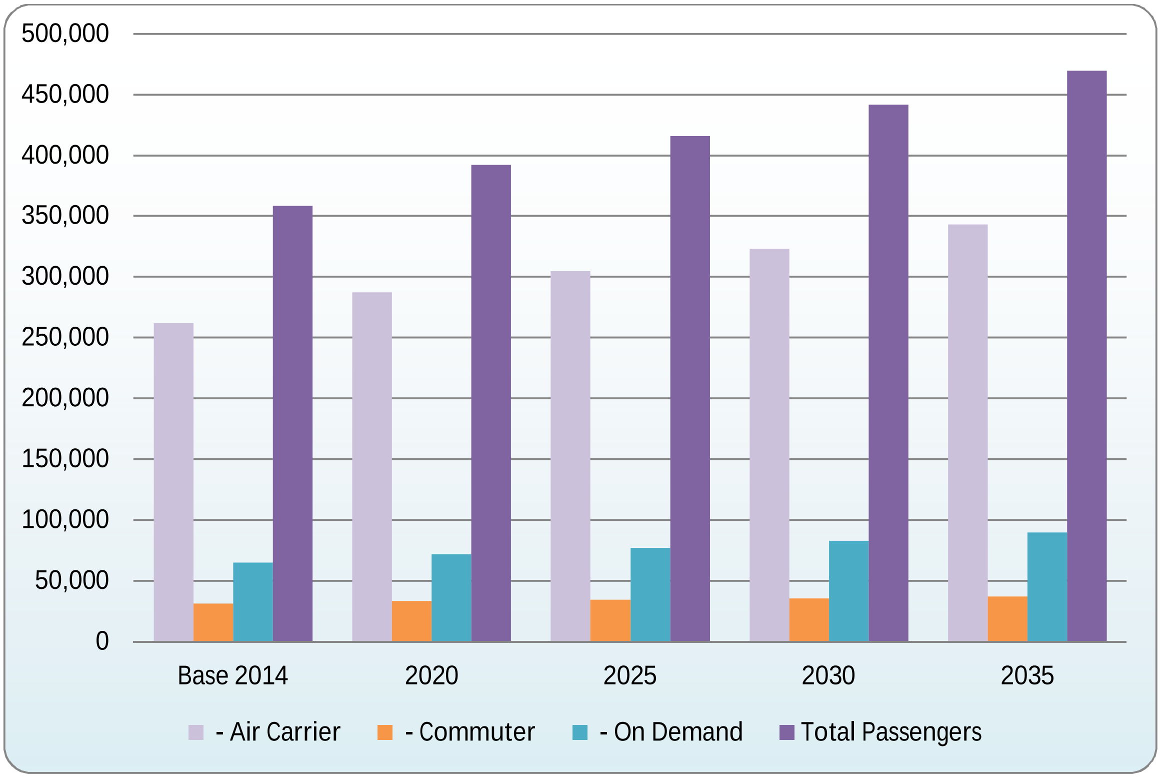
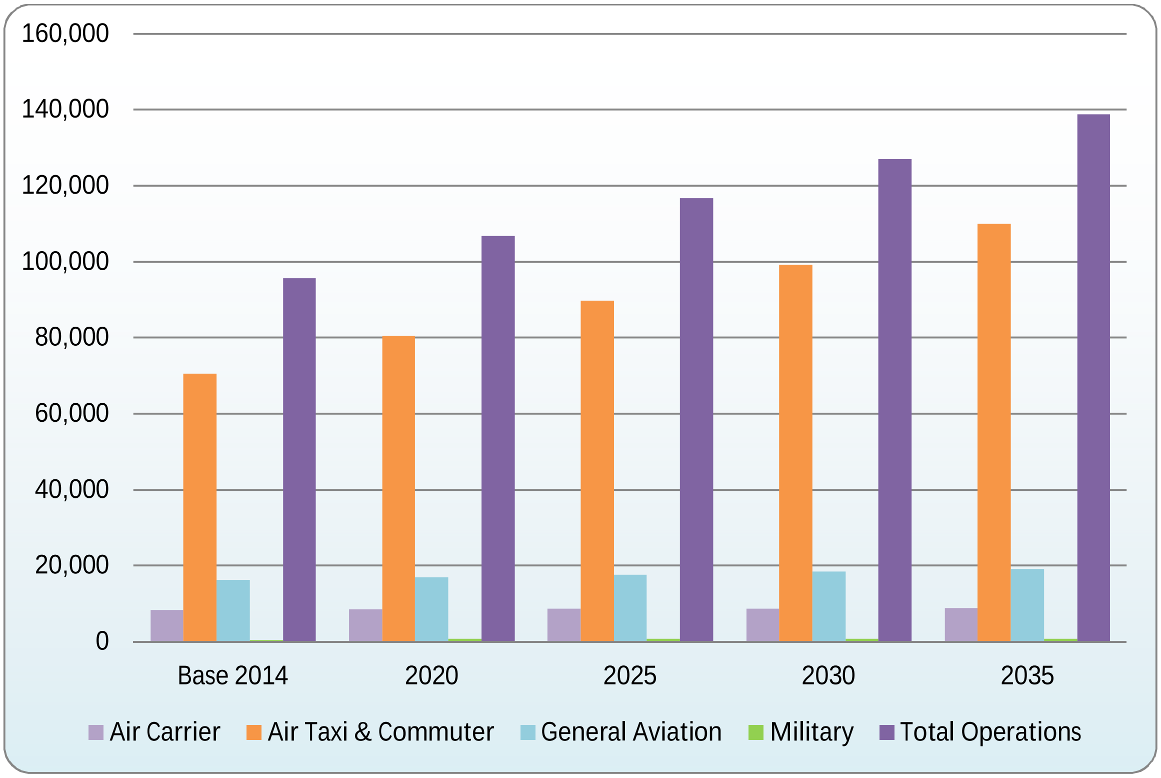


Figure 6-9: Forecast of Annual Operations



6.16 COMPARISON WITH FAA TAF FORECAST

Comparing the forecasts from this Sustainability Master Plan with the official FAA forecast for JNU as presented in the TAF is an important final step. Table 6-34 shows this comparison.

The forecasts of annual passenger enplanements produced in this SMP vary by more than 10 percent from the TAF forecasts for the same years through 2022. The reason for this variance is the inclusion of the on-demand passengers in the airport's records that are not included in the FAA record. In 2012 this resulted in a 20 percent differential in the baseline number. In Table 6-35 we have removed the on-demand passengers from the forecast and, as shown, they are in line with the TAF. Also shown on table 6-35 is that all other forecasts compare favorably with those from the TAF.

Table 6-34: Comparison of Master Plan Forecasts with Terminal Area Forecasts (Passengers)

	Year	Forecast	TAF	% Diff.
Passenger Enplanements				
Base yr.	2012	352,829	294,115	20.0%
Base yr. + 5yrs.	2017	377,773	321,779	17.4%
Base yr. + 10yrs.	2022	406,387	365,007	11.3%
Base yr. + 15yrs.	2027	434,384	414,067	4.9%

Table 6-35: Comparison of Master Plan Forecasts with Terminal Area Forecasts

	Year	Forecast	TAF	% Diff.
Passenger Enplanements				
Base yr.	2012	293,614	294,115	-0.2%
Base yr. + 5yrs.	2017	320,421	321,779	-0.4%
Base yr. + 10yrs.	2022	338,828	365,007	-7.2%
Tables 6-34 and 6-35Base yr. + 15yrs.	2027	358,698	414,067	-13.4%
Commercial Operations				
Base yr.	2012	72,632	72,632	0.0%
Base yr. + 5yrs.	2017	84,752	82,761	2.4%
Base yr. + 10yrs.	2022	93,901	88,527	6.1%
Base yr. + 15yrs.	2027	103,868	94,726	9.7%
Total Operations				
Base yr.	2012	86,531	86,531	0.0%
Base yr. + 5yrs.	2017	101,290	98,447	2.9%
Base yr. + 10yrs.	2022	111,899	104,801	6.8%
Base yr. + 15yrs.	2027	122,559	111,610	9.8%

Facility Requirements

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7

7 FACILITY REQUIREMENTS

7.1 INTRODUCTION

The purpose of this chapter is to present an assessment of existing facilities at Juneau International Airport (JNU) and determine their ability to accommodate the increased activity levels forecast in the Forecast of Aviation Demand (Chapter 6). When demand exceeds capacity, this master plan identifies the additional facilities that are needed. The requirements for new or expanded facilities also consider the following:

1. Capacity shortfalls
2. Enhanced security requirements
3. Updated Federal Aviation Administration (FAA) design standards
4. Actions necessary to achieve the City and Borough of Juneau's (CBJ's) strategic vision for the airport.

This facility requirement analyses will center on the following areas.

Airfield – including the runway and taxiway system, the float pond, navigation aids, instrumentation, security, and air traffic control.

Terminal Area – including the passenger terminal, commercial aircraft parking apron (both terminal gate positions and remain overnight [RON] positions), surface access and parking, and terminal support services.

Air Cargo – including facilities for airline belly-cargo and all-cargo airlines.

General Aviation – including aircraft storage (hangars and tie-downs), fixed-base operators (FBO), floatplane parking, helicopter facilities, auto parking, and access.

Other – including Aircraft Rescue and Fire Fighting (ARFF), airport maintenance facilities and storage areas, snow removal equipment (SRE) storage, sand and chemical storage and mixing fuel storage and distribution, and airport support services.

Table 7-1 summarizes the conclusions of this chapter while Figure 7-1 shows the areas under discussion.

Table 7-1: Existing Facilities Assessment

Facility	Category	Summary of Requirements
Airfield		
Runway 8-26	Design Criteria	The runway should be classified as D-III based on forecast use by the Boeing 737-900 aircraft. With the newly reconstructed runway, most Federal Aviation Administration (FAA) D-III Design Criteria are met. Some exceptions include full compliance with Runway Safety Area (RSA) and Object Free Area (OFA) standards and the separation between the Runway 8-26 centerline and the centerline of 8W-26W. These exceptions have all been reviewed and approved by FAA.
	Runway Length	At 8,857 feet the runway length can accommodate all flights and all aircraft projected to use the airport. In fact the runway length is sufficient to accommodate most aircraft flying today with reasonable weight and stage length assumptions.
	Wind Coverage	Wind rose analyses show that coverage on Runway 8-26 exceeds 99% under all-weather conditions and is near 100% for instrument flight rules (IFR) conditions. FAA standards state that 95% coverage is desired.
	Capacity	The capacity of a single runway is calculated to be approximately 220,000 annual operations, 98 hourly operations under visual flight rules (VFR) conditions and fewer than 59 hourly operations under IFR conditions. Based on the forecasts for 2035, annual operations will be 138,738 VFR demand will be approximately 110, and IFR demand will be 6 to 20. Peaks are experienced during the good weather months (June, July, and August) and the demand includes floatplanes and helicopters that do not use the paved runway. Therefore, runway capacity is not an issue.
Runway 8W-26W	Design Criteria	The water runway is classified as A-II by FAA. It meets all design criteria except for the distance from centerline to the centerline for RW 8-26. Since the float pond is located lower than the paved runway this does not create any operational issues. The close spacing of the runways does not allow independent operations or approach procedures.

Table 7-1: Existing Facilities Assessment (Continued)

Facility	Category	Summary of Requirements
Taxiways	Design Criteria	The design criteri for the taxiway system is TDG-3. All taxiways meet these criteria.
	Safety	The existing taxiway system presents some issues that have been identified by FAA as contributing to the potential for runway incursions. These include wide expanses of pavement, mid-runway access points, and taxiways that provide direct apron to runway access. Taxiway layout decisions will need to be made to increase situational awareness on the taxiways and minimize the potential for safety issues to arise.
Other	Airport Traffic Control Tower (ATCT)	The ATCT is located on the southwest corner of the terminal building and is in need of upgrade or relocation decisions. While future action will be a decision that is made and funded by FAA and any relocation will be conducted by FAA using their procedures, the master plan should identify likely locations for a new tower at a new location.
	Security/Perimeter Fencing	There are "gaps" in the airport's perimeter fencing in the southeast. These have been deemed as acceptable given the natural obstacles that exist.
Terminal Area		
Passenger Terminal	Capacity	The increase in enplaned passengers will require additional space in the terminal building. Particularly problematic are two areas: 1) the passenger holdroom area in the main terminal is currently undersized for peak period operations, and 2) the facilities for the in-terminal Part 135 carriers. The north wing reconstruction project will address the Part 135 areas. Development of the terminal building has been addressed in the terminal master plan and the master plan incorporates the recommendations made therein.
Terminal Apron	Capacity Part 121	The Part 121 apron is adequate for operations through the forecast period. A need for two RON positions has been identified as required for aircraft remaining in Juneau overnight.
	Capacity Part 135	The Part 135 carriers based in the terminal building park aircraft and load passengers on the apron to the west of the terminal. These carriers use ground loading procedures where passenger loading and unloading is done directly onto the apron, and the carriers escort passengers to and from the building. No outside covers exist.
	Other	The terminal area apron to the west of the building also serves the needs of the air cargo carriers including Alaska Airlines, Empire Air, and Alaska Central.
Parking	Capacity	Roughly 100 additional public parking spaces are required prior to 2035 and 50 additional spaces for rental cars. Employee parking should be adequate unless a major change (outside the forecast) occurs.

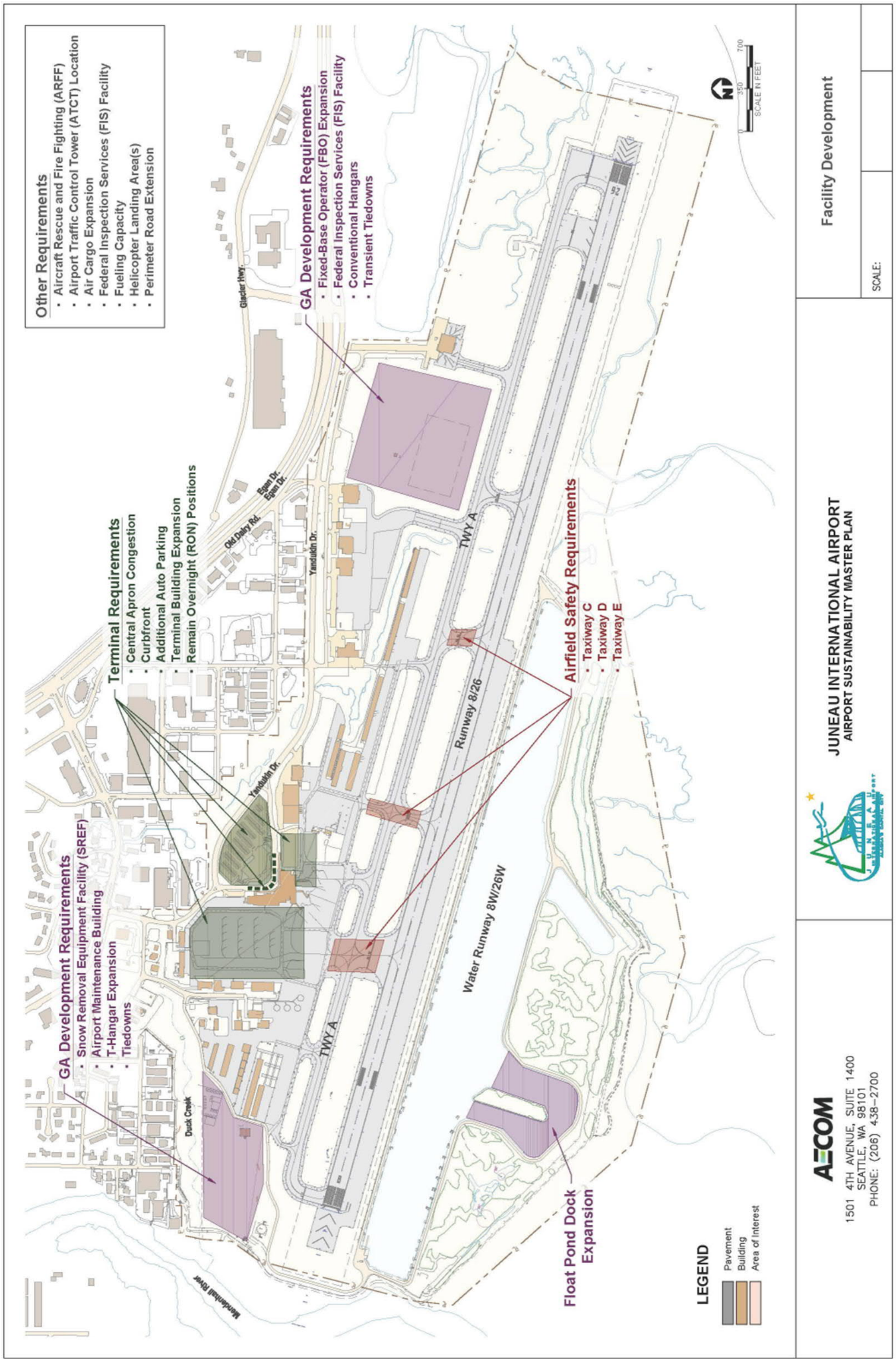
Table 7-1: Existing Facilities Assessment (Continued)

Facility	Category	Summary of Requirements
Roadways/Curb Frontage		The terminal curb front experiences periods of congestion. The congestion is caused by several factors 1) the terminal configuration, which requires a right-angle turn at the main terminal entrance, 2) the mix of private automobiles, taxi/van services, and tour buses that are loading, unloading, or waiting for passengers along the same section of the access road, and 3) the lack of consistent enforcement of the no waiting/parking policies.
	Air Cargo	
Cargo Storage Facilities		The current Alaska Airlines ground facility is the only full service cargo facility on the airport offering refrigeration, secure storage, etc. The size and capacity of the facility is adequate to serve Alaska's needs now and in the future. A second cargo building should be planned to accommodate the other cargo carriers that may operate at JNU in the future.
		The regional cargo carriers (FedEx and Alaska Central) provide cargo transfer facilities on the airport. No increase in size or capacity has been identified for either facility.
Aircraft Parking		A single aircraft position is provided for all-cargo aircraft processing. This is currently used by Alaska Airlines but is available for others. A second position should be constructed in the future.
	General Aviation	
Fixed-Base Operator (FBO)	Capacity	The current FBO (Aero Services) is planning to expand its services to respond to current markets. Aero Services has expressed interest in constructing a new "Jet Service" facility. The site for this facility needs to include a new hangar and office facility, transient aircraft parking apron, and public access and parking.
Corporate Hangars	Capacity	As the number of based aircraft increases, the need for additional corporate hangars will arise. In this case the term corporate hangar relates to any individual hangar facility that is not part of a T-hangar.
T-Hangars	Capacity	The increase in the number of based aircraft will also affect the need for additional T-hangars.
Tie-downs	Capacity	As the number of based aircraft increases, there will be an increase in the demand for additional outdoor tie-downs.
Transient Aircraft Parking	Capacity	Transient aircraft parking positions are expected to be associated with the new FBO facilities where the parked aircraft can also be serviced.
Float Pond Dock Positions	Capacity	The increase in based aircraft will include floatplanes. These will need docking facilities on the float pond during the summer months.

Table 7-1: Existing Facilities Assessment (Continued)

Facility	Category	Summary of Requirements
Helicopter Takeoff and Landing Areas	Capacity/Safety	Given the high level of helicopter activity at JNU There is a need to continue to assure that these operations are conducted safely. In addition, the helicopter operations have an impact on the neighborhoods near the airport. It has been suggested that a single centralized helicopter landing area be established. Currently operations occur in three areas, depending on the location of the operator each of which has an established operational corridor based on letters of agreement between the operators and the FAA's ATCT personnel.
		Other
Snow Removal Equipment Facility (SREF)		Phase 1 of new SREF constructed 2017. Additional components will follow as funding becomes available.
Airport Maintenance and Storage		A new airport maintenance and storage building is needed. The current buildings have serious roof and structural issues; replacements should be constructed in the short term. Facilities should be consolidated within SREF.
Utilities	Capacity and Location	The issue at the present time is utility ownership and administration.
FIS Facility	Capacity	U.S. Customs and Immigration has indicated that they would like to have additional space in the terminal building during recent terminal planning projects. The master plan has not identified any reasons why their demand will change in the future so their needs as expressed in the terminal planning are used here.
Fueling	Capacity and Supply	In most areas it is desirable to maintain at least a 7-day supply of fuel at the airport. In Juneau, since all fuel needs to be barged in, it is suggested that a longer supply be maintained to assure that service is not interrupted. Existing fueling station's equipment is obsolete, fuel storage tanks are aged, and lacks weather protection and modern safety features. Replacement should be constructed in the short term.

Figure 7-1: Summary of Facility Requirements



7.2 AIRFIELD REQUIREMENTS

JNU operates with a single paved runway (8-26) that is 8,857 feet long and 150 feet wide. It has a full parallel taxiway, Taxiway A, that is 75 feet wide. FAA Advisory Circular (AC) 150/5300-13A, Airport Design, requires that the future classification of the airport be used as the basis for airfield design. In the forecast chapter, the critical aircraft at JNU was determined to be the Boeing 737-900 to be operated by Alaska Airlines in the future. The B737-900 has an Airport Reference Code (ARC) of D-III.

The floatplane base has an ARC of A-II.

Table 7-2 shows the standards for these categories compared with the current layout of the airport.

Table 7-2: Existing Conditions on Runway 8-26 Compared with D-III Design Criteria

Design Feature	Existing (ft.)	Standard (ft.)	Difference
Runway			
Width	150	150	Meets Standard
Shoulder Width	25	25	Meets Standard
Blast Pad Width	200	200	Meets Standard
Blast Pad Length	200	200	Meets Standard
Safety Area Width	500	500	Meets Standard
Safety Area Length (beyond runway end)	600	1,000	Uses Declared Distances to Meet Standard
Object Free Area Width	800	800	Meets Standard
Object Free Area Length (beyond runway end)	1,000	1,000	Meets Standard
Obstacle Free Zone Width	400	400	Meets Standard
Obstacle Free Zone Length (beyond runway end)	200	200	Meets Standard
Taxiway			
Width	75	75	Meets Standard
Safety Area Width	118	118	Meets Standard
Object Free Area Width	186	186	Meets Standard
Taxilane Object Free Area Width	162	162	Meets Standard
Runway Centerline to:			
Taxiway Centerline	410	400	+10 feet
Aircraft Parking Area	350	500	Float pond positions within 350 feet. MOS exists.
Taxiway Centerline to Fixed or Movable Object	129.5	129.5	Meets Standard
Taxilane Centerline to Fixed or Movable Object	112.5	112.5	Meets Standard

Source: FAA Advisory Circular 150/5300-13A, Airport Design, Change 1
MOS - Modification of Standards

As seen, the geometry of the airfield meets or exceeds FAA design standards for all but the following areas:

- The Runway Safety Area (RSA) length beyond both runway ends is 600 feet. The FAA and airport have agreed that the RSA requirement will be met through the use of declared distances.
- The distance from the centerline of Runway 8-26 to the floatplane docks to the south is approximately 350 feet. This is less than the 500 feet separation required by the Advisory Circular. It has been determined that given the difference in elevation between the runway and the float pond there is no issue with this. A Modification of Standards (MOS) has been issued by FAA.

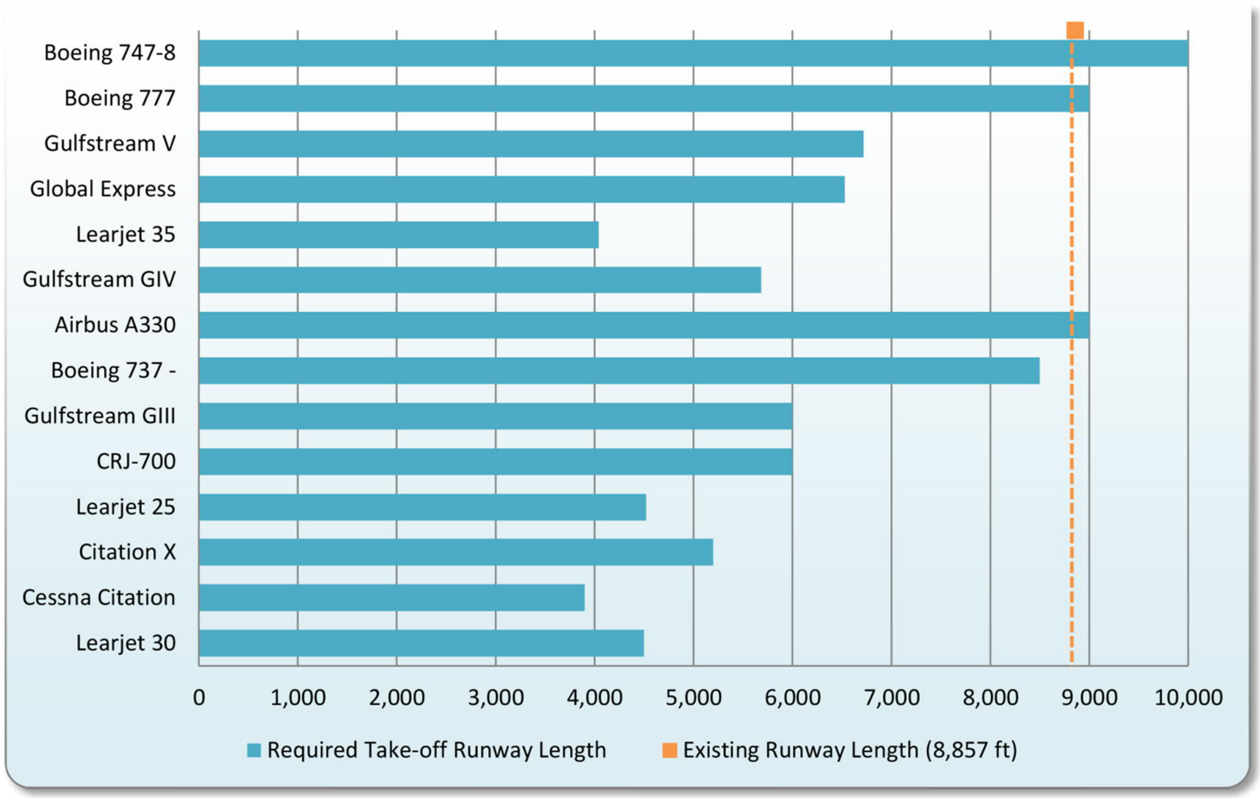
7.2.1 Runway Length Requirements

Determining the ultimate runway length for JNU requires that we identify the types of aircraft forecast to use the airport and their likely destinations. These factors, combined with the airport's elevation, and the mean maximum temperature are then used to calculate the runway length requirements.

For this analysis, JNU's elevation of 23.5 feet and a mean maximum temperature of 65 degrees Fahrenheit were used. The projected flight schedule was used to establish the commercial fleet mix and the stage length of the scheduled commercial flights. Stage lengths for general aviation flights were assumed to be less than 2,000 miles. Take-off lengths were calculated using the aircraft operations manuals for the commercial aircraft, and the website Jetadvisors.com for the general aviation jets.

Figure 7-2 shows the length of runway required at JNU over the next 20 years. For reference, we have included some aircraft that don't currently operate at JNU with regularity but could be attracted in the future or require sporadic use of the airport. The lengths shown were calculated at Maximum Take-Off Weight (MTOW).

Figure 7-2: JNU Runway Length Requirements



As shown, the take-off requirements for the more demanding aircraft vary from 3,900 feet for the Cessna Citation to 10,000 feet for a fully loaded Boeing 747-8. All of the commercial traffic forecast can operate safely and effectively from the current runway given their destinations to Seattle (900 miles) and Anchorage (560 miles). Some large aircraft, such as the Boeing 747 that make occasional use of JNU would require a longer runway if operating fully loaded, but even these can continue to use the existing 8,857-foot length with a reduced take-off weight. Given the projected level of operations and projected fleet, the runway length will be adequate for the 20-year planning period.

7.2.2 Runway Orientation and Wind Coverage

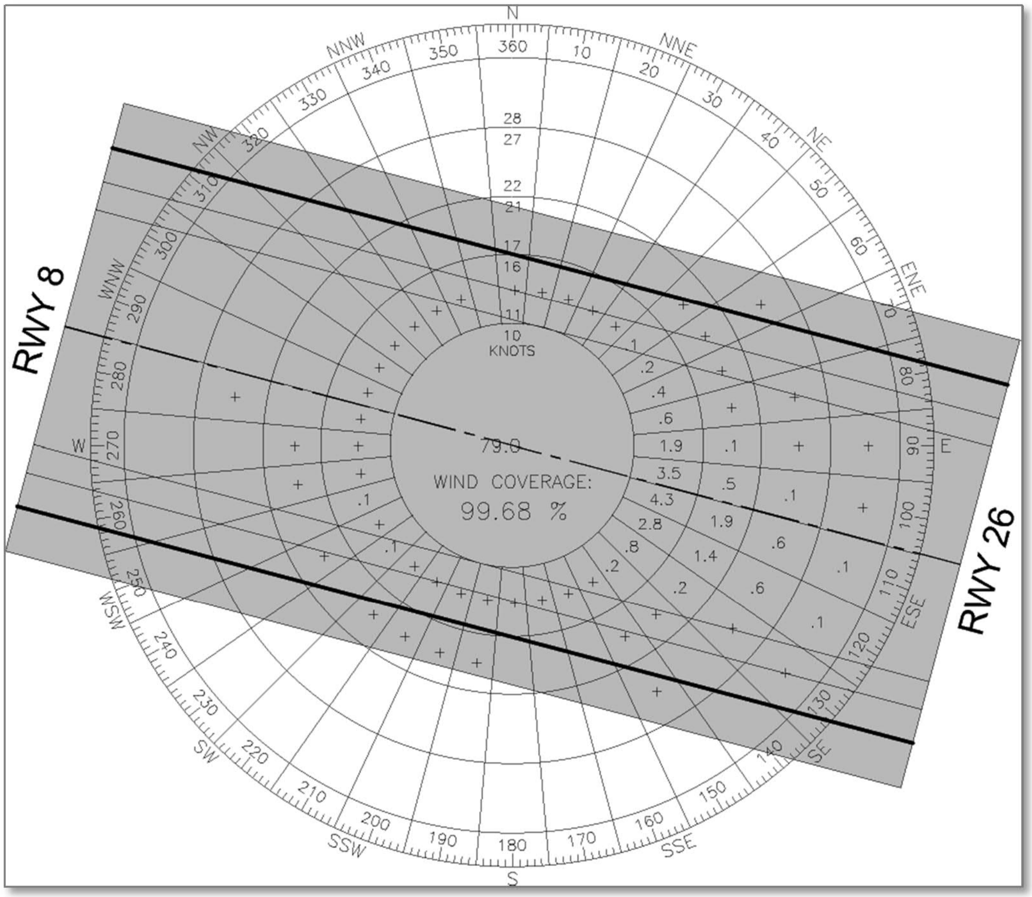
Weather conditions such as ceiling, visibility, and wind speed and direction are significant factors in operations at an airport. Accordingly, a weather condition classification system has been developed. Visual Meteorological Conditions (VMC) occur when visibility is at least three statute miles and the ceiling is a least 1,000 feet. Instrument Meteorological Conditions (IMC) occur when visibility is at least one statute mile but less than three statute miles and/or the ceiling is at least 500 feet but less than 1,000 feet. Poor Visibility and Ceiling (PVC) conditions exist whenever visibility is less than one statute mile and/or the ceiling is less than 500 feet.

At JNU, VMC conditions occur 94.4 percent of the time on average. IMC and PVC conditions occur the remaining 5.6 percent of the time.

Historical wind and weather data for JNU were obtained from the National Climatic Center. The data show that, based on all-weather wind coverage with a 16-knot crosswind, Runway 8-26 provides coverage of 99.99 percent. During all-weather conditions winds are calm (0 to 10 knots) an average of 79.0 percent of the time. These data are presented in Figure 7-3 in the form of an all-weather wind rose. The figure includes calculations for 10.5-, 13-, 16-, and 20-knot crosswind coverage.

Based on the analysis of these wind conditions, Runway 8-26 provides wind coverage exceeding 95 percent under any weather conditions. This is adequate to serve existing as well as future needs.

Figure 7-3: All-Weather Wind Rose



All Weather (82,558 Observations)

Crosswind	Runway 82,558
10.5 knots	96.68%
13 knots	99.92%
16 knots	99.99%
20 knots	100.00%

Source: National Oceanic and Atmospheric Administration,

7.2.3 Runway Capacity

Runway capacity measures the theoretical number of aircraft operations that can operate on the runway system over a specified time. An operation is counted each time an aircraft lands or takes off. A variety of techniques are available for determining airfield capacity ranging from simple calculations to complex airfield modeling programs. Since the airfield at Juneau consists of one land-based runway we have estimated the capacity using the method described in FAA AC 150/5060-5, Airport Capacity and Delay. Airfield capacity at JNU is evaluated in two ways.

- **Annual Service Volume (ASV):** This is an estimate of the airport's annual capacity. The ASV accounts for differences in runway use, aircraft fleet mix, weather conditions, and other factors that occur at the airport over a year's time.

- **Hourly Capacity:** This is an estimate of the number of operations that can take place on the runway system during a one-hour period. Hourly VFR and IFR capacities are based on the runway configuration, percent arrivals, percent touch-and-go, taxiway locations, airspace limitations, and runway instrumentation.

Table 7-3 shows the results of the capacity analysis for JNU compared with the forecast operations levels. The analysis of capacity shows that the runway system at JNU will not exceed the annual capacity within the 20-year planning period. By 2031, hourly demand levels during VFR conditions could equal 80 percent of the capacity of the runway. However, when these hourly demand forecasts are controlled for the number of helicopter operations within the peak hour, the demand on the runway decreases substantially. Without the helicopter traffic hourly demand will be less than 75 percent of capacity.

Under IFR conditions the demand levels will be less than 33 percent of the runway capacity.

Table 7-3: Runway Capacity/Demand Comparison

	2014	2020	2025	2030	2035
Annual Capacity					
Annual Service Volume	230,000	230,000	230,000	230,000	230,000
Annual Demand	62,131	69,618	76,400	83,530	91,534
Percent Capacity	27.0%	30.3%	33.2%	36.3%	39.8%
Hourly Capacity					
VFR Conditions					
Peak Hour Capacity	98	98	98	98	98
Peak Hour Demand	47	53	59	64	71
Percent Capacity	48.4%	53.7%	60.4%	65.7%	72.3%
IFR Conditions					
Peak Hour Capacity	59	59	59	59	59
Peak Hour Demand	11	12	13	15	16
Percent Capacity	18.6%	20.3%	22.0%	25.4%	27.1%

Source: AECOM Corporation
Capacity for ASV and peak hour conditions derived from - AC 150/5060-5
Notes: ASV – Annual Service Volume
VFR – Visual Flight Rules
IFR – Instrument Flight Rules

7.2.4 Runway Safety Areas (RSA)

The RSA is a critical, two-dimensional area surrounding the active runway that must be:

- Cleared, graded, and free of potential hazardous surface variations;
- Properly drained;
- Capable of supporting Aircraft Rescue and Fire Fighting (ARFF) equipment, maintenance equipment, and aircraft under normal weather conditions; and
- Free of objects, except for those mounted using low-impact supports and whose location is fixed by function.

Based on FAA criteria from AC 150/5300-13A for a D-III runway, the RSA should be 500 feet wide and extend 1,000 feet beyond each runway end. At JNU the width of the RSA is 500 feet but the length beyond the runway end is 600 feet. By agreement with FAA, the airport achieves compliance of the RSA through the use of declared distances.

7.2.5 Runway Object Free Areas (OFA)

The OFA is a two-dimensional ground area surrounding each runway. The OFA clearing standard precludes parked aircraft or other objects except navigational aids (NAVAIDS) and facilities whose locations are fixed by function. The current OFA is 800 feet wide and extends 1,000 feet beyond the end of the runway in accordance with standards. The location of the float pond docks violate the OFA to the south. This violation has been permitted to continue through agreement with FAA.

7.2.6 Runway Protection Zones (RPZs)

The function of the RPZ is to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape and centered on the extended runway centerline. It begins 200 feet beyond the permanent runway threshold (at the end of the primary surface). The RPZ dimensions are based on the type of aircraft using the runway, the type of operations (visual or instrument) being conducted, and the visibility minimums associated with the most demanding approach available. Table 7-4 shows the RPZ dimensions for the runways.

Table 7-4: Runway Protection Zone (RPZ)

Runway	Aircraft Served	Approved Approach	Zone Length (feet)	Inner Width feet)	Outer Width (feet)	Acres
8	Large	Nonprecision	1,700	500	1,010	48.9
26	Large	Nonprecision	1,700	500	1,010	48.9
8W	Small	Visual	1,000	250	450	
26W	Small	Visual	1,000	250	450	

At JNU the RPZs are located off airport property but the airport has an easement over all property contained within them that allows the airport to control development on the ground and assure that the RPZ's remain compliant with standards.

7.2.7 Taxiways

The taxiway system at JNU consists of a full parallel taxiway (TW Alpha) and six angled exits (TWs Bravo, Charlie, Delta, Echo, Foxtrot, and Golf). The FAA, using a Runway Safety Action

Team approach, began the process of preparing a Local Runway Safety Action Plan (RSAP) for JNU. The purpose of the RSAP is to review conditions at JNU and identify any issues or concerns that could affect runway operational safety. A preliminary review found that there are several features of the airfield that do not meet current standards and that should be examined to assure that potential issues do not arise. These are shown on Figure 7-4 and described as follows;

Taxiway "C" Charlie

- Wide pavement
- 4-node intersection
- Direct runway access

Taxiway "D" Delta

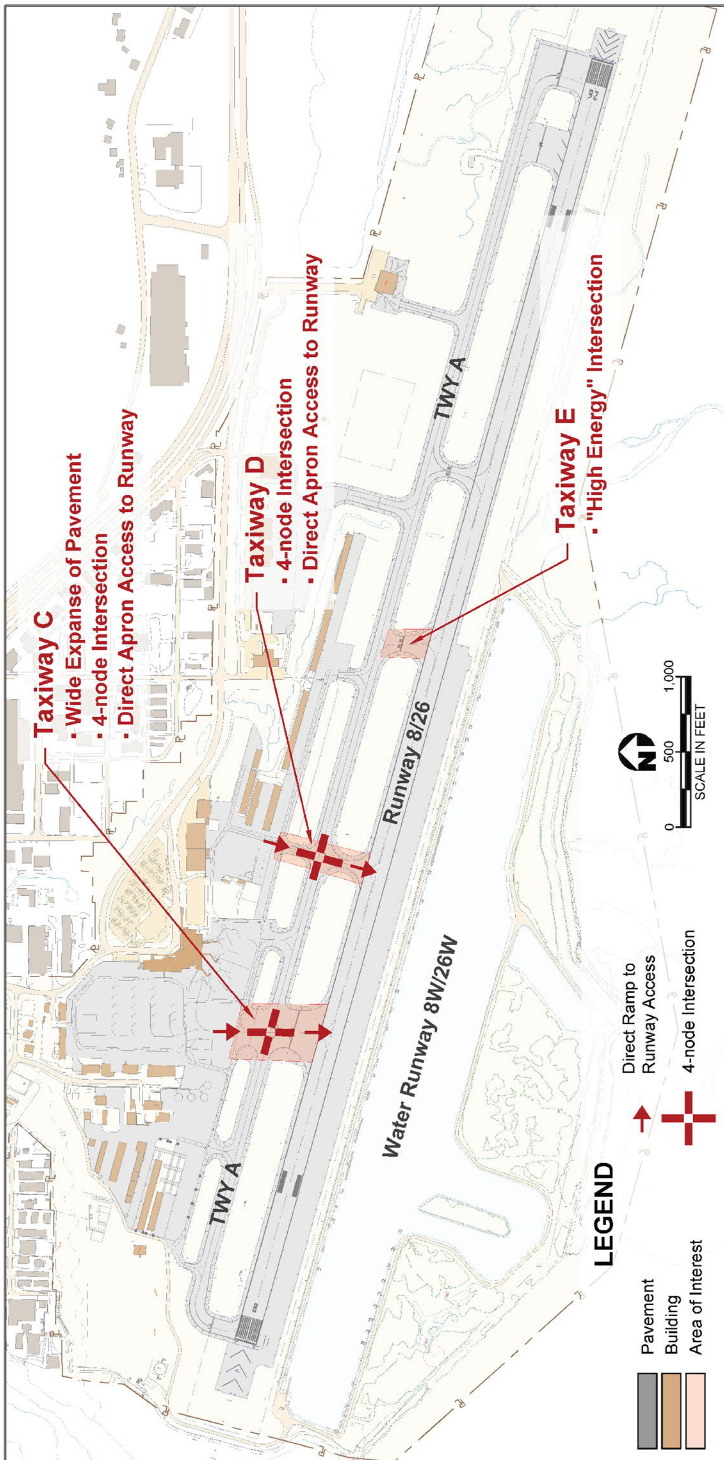
- 4-node intersection
- Direct runway access

Taxiway "E" Echo

- High energy intersection

While the master plan identifies the potential issues, the final decisions on the ultimate taxiway alignment will be made under a separate taxiway study.

Figure 7-4: Runway Safety Action Plan Preliminary Review Findings



7.2.8 Airfield Requirement Recommendation

The preceding analyses show the current runway length of 8,857 feet is sufficient for future operations by all aircraft types. The critical aircraft for the airport, the Boeing 737-900, can operate at JNU at more than 90 percent maximum take-off weight.

Additionally, no wind coverage or airfield capacity constraints have been identified. Therefore, no improvements are recommended for the airport's runway.

For the taxiways, the parallel and exit taxiway system meets all design standards but the current layout needs to be examined to assure that operational safety is maximized.

7.3 TERMINAL REQUIREMENTS

The existing passenger terminal building is an "L-shaped" structure composed of a one- story north wing that primarily accommodates Part 135 air carrier operations and a two-story east wing that accommodates facilities for the Part 121 air carriers. The terminal building totals approximately 94,200 square feet of floor area.

For the most part, the north and east wings of the terminal building function independently due to the differing operating characteristics and security requirements of the Part 121 and Part 135 air carriers. There is minimal common usage of facilities as a result of these differing operating requirements.

The lower levels of both the north and east wings have linear functional areas arranged parallel to the terminal curb and aircraft parking apron along a central access corridor. Building entries, concession spaces, car rental counters, and a variety of support spaces including mechanical rooms and restrooms are located along the front façade of the building adjacent to the terminal curb front. A Part 135 air carrier holdroom/greeter area is located along this façade of the north wing. A U.S. Customs area for clearance of arriving international passengers is also located in this area

7.3.1 Passenger Terminal Building Requirements

Within the passenger terminal building, services are required for processing passengers arriving and departing on commercial flights. Enplaning services include ticketing kiosks, baggage check-in, airline offices and baggage screening. Processing services include passenger screening facilities operated by the Transportation Security Administration (TSA). Deplaning services include baggage claim, and rental car facilities. Other services necessary in a terminal building include concessions (restaurants and gift shops), restrooms, advertising and display areas, mechanical and utility rooms, and janitorial service and storage areas.

7.3.1.1 Passenger Enplaning Facilities

The ticket counters must provide space for each airline to process enplaning passengers and checked baggage.

Each airline also requires office space for administrative staff, employee break/locker areas, air cargo offices and baggage make-up space. This space includes the area to move bags from the counters to the make-up area, where they are loaded onto carts to be transported to the aircraft. Prior to, but adjacent to the bag make-up spaces, bag screening needs to occur. The bag screening facility, operated by TSA, needs to be sufficient to accommodate the equipment and personnel necessary to screen peak-hour baggage for the Part 121 carriers.

The Part 135 carriers conduct their operations in the north terminal area where their needs are similar with the exception of the need for baggage screening facilities. The reconstruction of the north terminal area will provide these carriers with up-to-date facilities.

Passenger Screening Checkpoint Facilities

Once the Part 121 passengers are ticketed, they proceed to a passenger-screening checkpoint. There is currently a single processing line that serves two screening stations. Each station has a theoretical capacity to accommodate 100 to 120 passengers per hour per lane. Based on forecast growth and a processing rate of 100 to 120 passengers per hour, the terminal building should allow additional screening lanes, with Advanced Imaging Technology (AIT) machines and/or magnetometers and one carry-on screening machine per lane. TSA design standards require an average of 1,050 square feet of space per screening lane, including a seating-composure area, response corridor, law enforcement officer, and a private search room. For passengers waiting to access security screening, a queuing area is calculated assuming that no more than 75 percent of the peak-hour enplaning passengers will be in line at any given time and each individual will require roughly 16 square feet of space.

The JNU Terminal Plan has included provisions for relocating and centralizing the TSA checkpoint to make it operate more efficiently and allow for future expansion.

The Part 135 carriers do not require passenger screening at the present time.

Gate Area

Once ticketed and through security, Part 121 passengers proceed to the holdroom/gate area to await aircraft boarding. This area requires sufficient seating for 90 percent of the peak-hour passengers. An estimated 20 square feet is required for each seat within the gate area and includes associated circulation space. In addition to seating, a departure podium, queuing area, and exit corridor add approximately 300 square feet of area total per airline gate.

Space must also be provided for restrooms and concessions, since this area is located behind the security checkpoint and passengers can no longer access nonsecure facilities. At the present time the gate area at JNU is congested during peak periods. The JNU terminal plan has recommended that this area be expanded to allow for additional gates as well as for passenger services such as concessions. The recent addition of a restaurant and lounge in the secure area has been a first step in this expansion. Additional space should be provided as soon as feasible to allow for more waiting space. The current plan is for expansion to the east for the Part 121 carriers.

The Part 135 passengers wait in the north terminal lobby (nonsecure) for their flights. The space available here is adequate for their present and projected needs. The reconstruction of the north terminal will provide these passengers with a more efficient, comfortable and spacious area in which to wait.

7.3.1.2 Passenger Deplaning Services

When Part 121 passengers deplane, they proceed from the aircraft through the holdroom to the baggage claim area. The passengers are met either in the area directly outside the secure area or in the bag claim area.

This area also provides space for rental car agencies with customer service areas, and queuing space.

Deplaning of the Part 135 passengers takes place at ramp level on the central apron. The passengers are then escorted into the northern end of the terminal where their bags are delivered to them. These passengers access the rental car counters and other services in the baggage claim area located on the east end of the terminal.

7.3.1.3 Airport Management Space

Space requirements in the terminal includes an office for Airport Administration. In addition to the standard work area, this also includes a security badging workstation, conference/meeting area, kitchen/support area, circulation space, and restrooms.

7.3.1.4 Terminal Apron

Aircraft parking is arranged along the terminal concourse and currently consists of six active gate positions. The exact size of any future terminal apron will depend on the final footprint and layout of the terminal building. However, an area equal to six aircraft gates should be planned for in the future. In addition, two RON locations should be provided. The RON spaces should be in the terminal area in a location where they do not interfere with aircraft circulation or safety

7.3.1.5 Automobile Parking and Surface Access

Automobile parking is provided in paved surface lots located adjacent to the terminal building. There are 282 spaces available for public parking, 129 for rental cars, and 128 for employees. At present, these lots are being used at approximately 100% of the rental cars and 60 % of the employees percent of capacity, with those closest to the terminal receiving higher use.

Projecting demand for public parking is based on an airport's annual enplaned passengers. According to FAA Advisory Circular 150/5360-13, Planning and Design Guidelines for Airport Terminal Facilities, there is a range from 1,000 to 3,500 public parking spaces required for each million annual enplanements, depending on the type of use at the specific airport. In addition, it is typical to provide for 15 percent more space than the calculated need to minimize the amount of time required to find an available space. Currently at JNU, there are approximately 4,400 spaces per million annual passengers. This reflects the fact that a high percentage of the passengers using JNU during the summer months are traveling for tourism purposes. The projections shown in Table 7-5 support the forecast growth in passengers but apply a factor that accounts for the current use patterns in Juneau.

Table 7-5: Auto Parking Requirements

Year	Annual Enplaned Passengers	Public Parking			RAC Ready/Return Area	Employee
		Short-Term Public	Long-Term Public	Total Public		
2014	262,252	65	217	288	129	128
2020	287,289	79	237	315	144	128
2025	304,616	84	251	335	152	128
2030	323,231	89	266	355	162	128
2035	343,272	94	283	377	172	128

RAC - Rent a Car

Rental car parking projections were made using the assumption that the ready and return lots would continue to be located near the terminal building. Currently there are 129 rental car spaces located in the terminal area. The ratio of rental car spaces to passengers equals roughly one space per 2,000 arriving passengers. This ratio is carried into the future projections.

Employee parking demand depends on the number of employees associated with the airlines, airport administration, and terminal tenants. Currently the airport has 128 spaces reserved for employee parking. Any expansion of the terminal building will also require a revalidation of the area allocated for employee parking. In Table 7-5, employee parking is shown as remaining static. There as a need to add at least one electric vehicle recharging station.

7.3.2 Air Cargo

There are two distinct types of cargo operation at JNU. There is the cargo being processed and shipped by the commercial air carriers using the same planes that they use to transport passengers (commonly referred to as belly cargo) and the cargo carried by the all-cargo operations by the airlines or on carriers such as FedEx and United Parcel Service (UPS). These two types of cargo require different facilities for processing, as explained below.

7.3.2.1 Airline Cargo (Belly Cargo)

The volume of belly cargo being shipped into and out of JNU has been substantial as a result of Alaska Airline’s decision to transport cargo using combi-aircraft. This practice will change in the future as Alaska replaces their fleet with aircraft that have increased passenger capacity but less cargo lift capacity. The airline plans to introduce two all-cargo flights each day to ensure that the lift capacity is maintained (and increased).

All of the cargo being carried by Alaska is currently processed in their dedicated cargo building. The space provided is expected to be adequate for their future needs.

With the introduction of year-round service by Delta Air Lines there is an identified need for an additional cargo building to meet their needs.

7.3.2.2 All-Cargo Carriers

Forecasts of the volume of all-cargo carriers in Juneau have been based on the assumption that carriers, such as FedEx and UPS that move small packages on a time-critical basis, will continue to operate feeder service out of JNU connecting with their hub operations in the Puget Sound Region.

At present, all of this cargo is accommodated in privately owned and operated facilities or processed offsite and loaded onto the aircraft on the apron. Given that the existing cargo processing facilities are not operating at capacity and the rate of growth for air cargo is not projected to be steep, the need for additional facilities at JNU is expected to be limited.

7.4 AIRCRAFT STORAGE REQUIREMENTS

In 2014 there are 332 general aviation aircraft based at JNU. The long-term forecast for based aircraft at JNU anticipated that 403 aircraft would need to be accommodated by 2035. The majority of the based aircraft will desire hangars or some form of indoor storage. The forecast shows that future based aircraft will consist of an increasingly higher percentage of high-performance twin and turbine aircraft whose owners prefer to shelter them indoors. The number and type of aircraft storage facilities needed over the course of the 20-year planning period is detailed in the sections below.

7.4.1 Hangar Storage Requirements

Aircraft hangar storage is in demand at JNU at present but land available for hangar development has been limited. Although current storage rates show that 59 percent of all based aircraft are stored in hangars and 41 percent in tiedowns, this distribution is heavily influenced by the fact that the supply of hangars is limited. Table 7-6 lists the assumed storage preferences for based aircraft if adequate facilities were available.

Table 7-6: Percentage of Based Aircraft Storage

Aircraft Type	T-Hangars	Corporate Hangars	Tiedown	Total
Single Engine Piston	80%	15%	5%	100%
Multi-Engine Piston	50%	50%	0%	100%
Turbine	0%	100%	0%	100%
Rotor	0%	100%	0%	100%

Combining these with the based aircraft forecast produced the requirements for hangar space as shown in Table 7-7. As shown, demand for open-air tiedowns is relatively low and the largest growth in demand is expected to be in corporate hangars.

Table 7-7: Required Hangars for Based Aircraft

Year	T-Hangars	Corporate Hangars	Total
2014	237	76	313
2020	246	80	326
2025	257	86	344
2030	269	93	362
2035	281	99	381

Demand for aircraft hangars is based on forecasts that can change. Consequently, while AECOM recommends that these larger hangar facilities be reflected in the airport's long-term plans, we also recommend that hangars only be constructed as specific demand arises.

7.4.2 Based Aircraft Tiedown Storage Requirements

Based aircraft that do not have hangar space are stored outside on tiedown aprons. Tiedowns are generally used by small single engine piston aircraft. Space planning for these aircraft is based on an area of 360 square yards of apron for each aircraft parking space. This provides space for both aircraft parking and circulation between the rows of aircraft. This space allowance assumes that pilots who are based at JNU have a high degree of familiarity with the aircraft parking situation and, therefore represents a minimum that should be provided.

Table 7-8: Based Aircraft Tiedown Requirements

Year	Tiedown Spaces	Tiedown Area (s.y.)
2011	15	5,296
2016	15	5,497
2021	16	5,734
2026	17	5,985
2031	17	5,985

7.4.3 Transient Aircraft Tiedown Requirements

Tiedown space is also needed for transient aircraft parking. It is best to provide this space at or adjacent to FBO hangars where the aircraft owners can have access to fueling and other services. In calculating the area required for transient tiedowns, an allowance equal to 700 square yards per aircraft is used. This area is larger than that applied to spaces for based aircraft tiedowns for two reasons. First, the user of the transient space may not be as familiar with the airport's ground movement patterns, and thus providing a greater margin of safety is prudent. Second, all types and sizes of aircraft are parked in the transient tiedown area, and a greater apron allowance provides more flexibility in how individual tiedowns can be used. The following method was used to calculate the number of aircraft that will require transient aircraft parking spaces.

- Determine the number of itinerant aircraft operations that occur on the average day.
- Convert the average day itinerant operations to the number of daily arrival aircraft by dividing by two.
- Assume 50 percent of daily arrival aircraft are transient aircraft. (Half of the daily arrivals are assumed to be based aircraft performing itinerant operations.)
- Assume that no more than 50 percent of the resulting daily transient aircraft will require storage at any one period.

Based on the Aviation Demand Forecasts, itinerant operations will be 45 percent of annual operations, or 139 daily operations by 2031. Using the methodology cited above, nine itinerant aircraft tiedown positions will be required as shown in Table 7-9.

Table 7-9: Forecast Itinerant Operations

Year	Itinerant Operations				Transient Tiedowns Required
	Annual	Average day	Daily Arrivals	Transient Arrivals	
2014	10,749	38	19	9	5
2020	11,190	39	10	5	3
2025	11,632	41	10	5	3
2030	12,112	42	11	5	3
2035	12,618	44	11	6	3

7.4.3.1 Fixed Base Operator Requirements

As the number of based aircraft increases and the level of operations continue to rise, the airport needs to ensure that adequate land is set aside for FBO facilities. In this report, the space needed is calculated at 15 percent of the total area designated for based aircraft storage and transient tiedowns. Table 7-10 shows the space that should be dedicated to FBO facilities. The area set aside for the FBO expansion should include the transient aircraft parking spaces discussed previously.

Table 7-10: FBO Facility Need

	2014	2020	2025	2030	2035
GA Needs					
Square feet	943,511	987,301	1,047,987	1,112,008	1,182,146
Acres	21.66	22.67	24.06	25.53	27.14
FBO Needs					
Square feet	141,527	148,095	157,198	166,801	177,322
Acres	3.25	3.40	3.61	3.83	4.07

7.5 GENERAL AVIATION AUTOMOBILE PARKING AND ACCESS

Security regulations for general aviation are under review by both FAA and TSA. It is clear that access to the airfield will become more limited in the future, especially in environments where commercial air carriers are operating, such as JNU. Vehicle access gates at JNU currently limit automobile access to the operations and hangar areas to the owners and operators of aircraft. The aircraft owners commonly park their cars in the hangars.

7.6 SUPPORT FACILITIES

In support of the commercial and general aviation activity and development at JNU the following support facilities should be developed for continued operations.

7.6.1 Federal Inspection Services (FIS) Facilities

At present the U.S. Customs and Immigration Service operates from facilities located in the north section of the terminal building. From these, they are available to process general aviation international flights at the airport. In the future, the FIS facility will need to be expanded as part of the reconstruction of the north terminal building.

7.6.2 Aircraft Rescue and Fire Fighting (ARFF)

JNU is classified as an Index C airport per Federal Aviation Regulations (FAR) 139.315. The ARFF Station is located the north side of the airfield in the eastern GA area. The building is currently being expanded to accommodate the increased size requirements of the ARFF equipment and will be reoriented to better serve the airfield at that time.

7.6.3 Snow Removal Equipment Facility (SREF)

A new SREF is being developed in the western GA Area to serve the needs of the airport. This SREF will be sufficient for the duration of the master plan.

7.6.4 Airport Maintenance and Storage Building and Chemical and Sand Storage

The airport's maintenance and storage needs are currently accommodated in various facilities at the airport. It is recommended that this function be consolidated into a single facility with the new Snow Removal Equipment Facility.

7.6.5 Aircraft Fueling

ulk fuel storage is located north of the airport across Alex Holden Way. In this area there are 4 – 30,000 Jet A tanks, 1 – 30,000 gallon 100LL Avgas tank, and 1- 20,000 gallon 100LL Avgas tank. The storage tanks are above ground. Fuel can be purchased from the Fixed Base Operator.

In calculating the need for additional storage capacity a 2-day supply of Jet-A fuel is preferred to assure an uninterrupted supply to the scheduled carriers. However, our calculation limits storage at the airport to a 2-day supply due to the proximity of higher volume fuel storage tanks located in Juneau less than 15 miles away..

Avgas demand is lower than that for Jet-A and new capacity is expected to be added by the FBO.

Table 7-11 shows the need for fuel storage over the 20-year planning period.

Table 7-11: Jet-A Supply

Year	Annual Turbine Operations	Capacity (gallons)	Days' Supply	Tanks
2014	11,793	50,000	2	2
2020	12,354	52,379	2	2
2025	12,879	54,604	2	2
2030	13,425	56,919	2	2
2035	14,018	59,434	2	2

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8

8 ANALYSIS OF ALTERNATIVES

8.1 INTRODUCTION

The purpose of this chapter is to identify and evaluate alternative strategies for the development of the Juneau International Airport (JNU). Developing alternatives is the best way to ascertain how to meet the facility needs. In this chapter, those facilities that have been determined to require physical improvements are identified; alternative ways to meet those requirements are developed, compared, and ranked; and a preferred development plan is selected to serve as the basis for the development of the Airport Layout Plan (ALP). The following are the areas where facility improvements have been analyzed for the ALP at JNU.

1. The airfield (runways, taxiways, and other facilities)
2. The passenger terminal area (terminal building, aircraft apron, airport access, and vehicle parking)
3. General aviation areas (fixed-base operator [FBO] facilities, aircraft aprons, hangars, and tiedowns)
4. Other projects related to air traffic control and navigational aids.

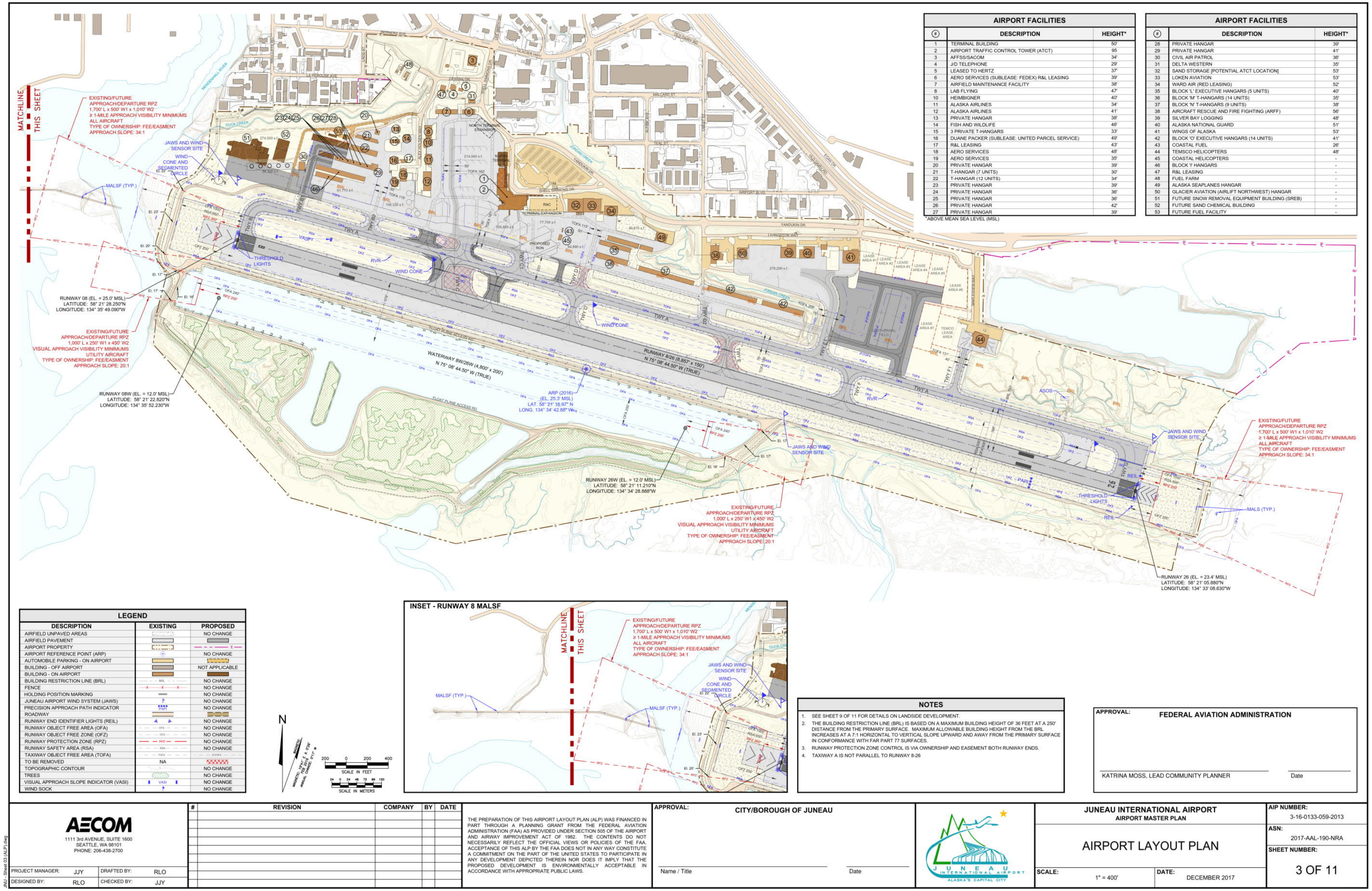
The Table 8-1 shows a summary of the decisions that result from the alternative evaluation process. Details of the methodologies employed, recommendations made, and final analyses are contained in the remainder of this chapter.

Table 8-1: Summary of Findings

Area/Facility	Recommendation	Summary
Airfield		
Runway 8-26	The Runway Safety Area requires grading improvements and ongoing runway maintenance required.	No alternatives to these improvements
Water Runway 8W-26W	New Inlet valves and maintenance	No alternatives to these improvements
Taxiways	Recommend straightening of connector Taxiway E, relocation of D1 and realignment of Taxiway C.	The Juneau Runway Safety Action Team (RSAT) identified potential safety related issues related to the current taxiway layout. This analysis examined four different methods to fix the identified issues including realigning the exit taxiways, realigning the connector taxiways, and closing portions of the existing system. In the end, a hybrid alternative was selected that maximized the existing layout while improving overall system safety.
Remain Overnight (RON) Positions	Two RON positions have been identified as required. After looking at two possible locations it was determined that they should be located east of the terminal at a location that may be converted to gate positions in the future.	An alternative location further to the east was considered, but rejected based on the longer time period required to develop the site as well as the greater distance between the terminal and the RONs.
Airport Traffic Control Tower (ATCT)	Recommend encouraging FAA to relocate the ATCT to a location to the north.	This recommendation will need to be verified and validated by FAA. The need for relocation, the site selected, and the cost of construction are all the responsibility of FAA.

Area/Facility	Recommendation	Summary
Helicopter Landing Areas	No changes in the current use	During public meetings there was a suggestion that the helicopter landing areas should either be consolidated in one location or moved off airport altogether. Analysis of this situation showed that current operational procedures for the helicopters were based at least partially on the flight paths that were available to handle the number of flights, as well as to minimize impacts on the community. The concept of moving the helicopters off airport was the subject of two previous studies, both of which recommended that no action be taken.
Terminal Area		
Terminal Building	The Juneau International Airport Terminal Area Plan recommended that the north wing of the terminal be modernized and expanded to accommodate the Part 135 carriers, the area referred to as the "knuckle be renovated and that the increased demand for Part 121 carriers be accommodated by expanding the main terminal to the east. These recommendations were adopted in the master plan.	No alternatives to the recommendations made in the Terminal Area Plan have been studied in this master plan. The expansion of the terminal will accommodate forecast demand levels.
Auto Parking	The public parking lot at JNU will require expansion in the future. Analyses showed that the best course of action is to maximize the existing surface facility while working with the CBJ to improve public transit connectivity between the airport and downtown Juneau. As a long-term solution a parking structure should be planned.	Other alternatives considered included doing nothing and building a parking structure. Doing nothing would not meet demand while the cost of constructing a parking structure made it infeasible.
Cargo Positions	A single cargo aircraft parking position is available on the central apron at JNU. In the future, a second position should be available.	An alternative location was examined that would require the relocation of some of the existing users of the central apron area. This was rejected since a less obtrusive alternative was available.
Other		
Airport Maintenance Building	Currently the airport's maintenance storage needs are	No alternatives were identified for the maintenance building.

Area/Facility	Recommendation	Summary
	accommodated in a variety of locations and some of the equipment is stored outdoors. It is recommended that when the new Snow Removal Equipment Facility is constructed, that a new maintenance building for both equipment and material storage be built in an adjacent location. The adjacency is important because many of the staff that conducts maintenance and snow removal are the same.	
Aircraft Rescue and Fire Fighting Building (ARFF)	The ARFF facility at JNU needs to be updated to include both larger bays, as well as a realignment of the building to allow for more direct access to the airfield. This revision will be done at the existing location.	No alternatives were considered for the ARFF.
Snow Removal Equipment Facility (SREF)	A new SREF has been planned and located in previous studies and will be constructed in the new western general aviation (GA) area.	No alternative SREF locations were included in this study.
Fueling	Increasing fuel storage capacity will be required over the next 20 years. This will be supplied at the existing locations.	No alternative fuel facilities were considered in this study.
General Aviation		
GA Expansion	General Aviation expansion plans have been approved that include the both eastern and western areas. This analysis consisted on developing potential layouts for these areas.	No alternative GA locations were included in this study.



AIRPORT FACILITIES

#	DESCRIPTION	HEIGHT*
1	TERMINAL BUILDING	50'
2	AIRPORT TRAFFIC CONTROL TOWER (ATCT)	95
3	AFFSS/SACOM	34'
4	J/D TELEPHONE	29'
5	LEASED TO HERTZ	37'
6	AERO SERVICES (SUBLEASE: FEDEX) R&L LEASING	39'
7	AIRFIELD MAINTENANCE FACILITY	38'
8	LAB FLYING	47'
10	HEIMBIGNER	40'
11	ALASKA AIRLINES	34'
12	ALASKA AIRLINES	41'
13	PRIVATE HANGAR	38'
14	FISH AND WILDLIFE	46'
15	3 PRIVATE T-HANGARS	33'
16	DUANE PACKER (SUBLEASE: UNITED PARCEL SERVICE)	49'
17	R&L LEASING	43'
18	AERO SERVICES	48'
19	AERO SERVICES	35'
20	PRIVATE HANGAR	39'
21	T-HANGAR (7 UNITS)	30'
22	T-HANGAR (12 UNITS)	34'
23	PRIVATE HANGAR	39'
24	PRIVATE HANGAR	36'
25	PRIVATE HANGAR	36'
26	PRIVATE HANGAR	42'
27	PRIVATE HANGAR	39'

*ABOVE MEAN SEA LEVEL (MSL)

AIRPORT FACILITIES

#	DESCRIPTION	HEIGHT*
28	PRIVATE HANGAR	39'
29	PRIVATE HANGAR	41'
30	CIVIL AIR PATROL	36'
31	DELTA WESTERN	35'
32	SAND STORAGE [POTENTIAL ATCT LOCATION]	53'
33	LOKEN AVIATION	53'
34	WARD AIR (RED LEASING)	52'
35	BLOCK 'L' EXECUTIVE HANGARS (5 UNITS)	40'
36	BLOCK 'M' T-HANGARS (14 UNITS)	35'
37	BLOCK 'N' T-HANGARS (9 UNITS)	38'
38	AIRCRAFT RESCUE AND FIRE FIGHTING (ARFF)	56'
39	SILVER BAY LOGGING	48'
40	ALASKA NATIONAL GUARD	51'
41	WINGS OF ALASKA	53'
42	BLOCK 'O' EXECUTIVE HANGARS (14 UNITS)	41'
43	COASTAL FUEL	26'
44	TEMSCO HELICOPTERS	48'
45	COASTAL HELICOPTERS	-
46	BLOCK 'I' HANGARS	-
47	R&L LEASING	-
48	FUEL FARM	-
49	ALASKA SEAPLANES HANGAR	-
50	GLACIER AVIATION (AIRLIFT NORTHWEST) HANGAR	-
51	FUTURE SNOW REMOVAL EQUIPMENT BUILDING (SREB)	-
52	FUTURE SAND CHEMICAL BUILDING	-
53	FUTURE FUEL FACILITY	-

LEGEND

DESCRIPTION	EXISTING	PROPOSED
AIRFIELD UNPAVED AREAS		NO CHANGE
AIRFIELD PAVEMENT		
AIRPORT PROPERTY		
AIRPORT REFERENCE POINT (ARP)		NO CHANGE
AUTOMOBILE PARKING - ON AIRPORT		
BUILDING - OFF AIRPORT		NOT APPLICABLE
BUILDING - ON AIRPORT		
BUILDING RESTRICTION LINE (BRL)	BRL	NO CHANGE
FENCE		NO CHANGE
HOLDING POSITION MARKING		NO CHANGE
JUNEAU AIRPORT WIND SYSTEM (JAWS)		NO CHANGE
PRECISION APPROACH PATH INDICATOR	PAPI	NO CHANGE
ROADWAY		
RUNWAY END IDENTIFIER LIGHTS (REIL)		NO CHANGE
RUNWAY OBJECT FREE AREA (OFA)	OFA	NO CHANGE
RUNWAY OBJECT FREE ZONE (OFZ)	OFZ	NO CHANGE
RUNWAY PROTECTION ZONE (RPZ)	RPZ	NO CHANGE
RUNWAY SAFETY AREA (RSA)	RSA	NO CHANGE
TAXIWAY OBJECT FREE AREA (TOFA)	TOFA	(F)TOFA
TO BE REMOVED	NA	
TOPOGRAPHIC CONTOUR		NO CHANGE
TREES		NO CHANGE
VISUAL APPROACH SLOPE INDICATOR (VASI)	VASI	NO CHANGE
WIND SOCK		NO CHANGE

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8.2 AIRFIELD PROJECTS

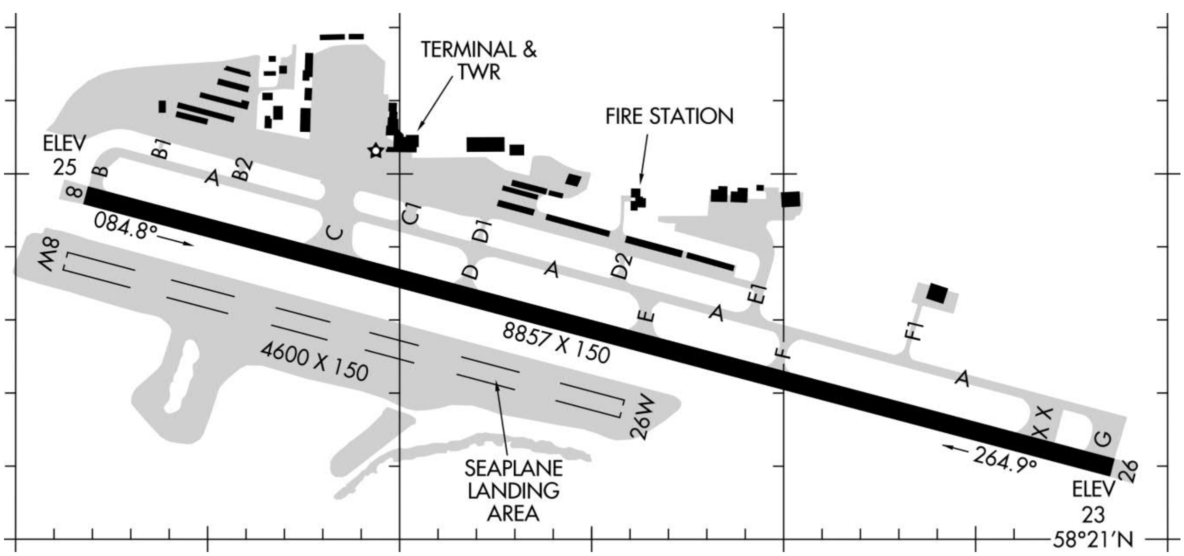
The airfield at Juneau International consists of a single paved runway 8-26, a water runway 8W-26W, the parallel taxiway (Taxiway A) and the connectors (Taxiways B, C, D, E, F, and G), the connector taxiways that link the parallel taxiway to the terminal and general aviation (GA) areas, and the taxilanes that provides access from taxiways to airplane parking positions and other terminal areas. Figure 8-2 shows the JNU airfield layout.

8.2.1 Taxiways

An FAA national initiative known as the Runway Incursion Mitigation (RIM) program is being undertaken to identify airport risk factors that might contribute to a runway incursion and develop strategies to help airport sponsors mitigate those risks.

Runway incursions occur when an aircraft, vehicle, or person enters the protected area of an airport designated for aircraft landings and take offs. Risk factors that contribute to runway incursions may include unclear taxiway markings, airport signage, and more complex issues such as the runway or taxiway layout. Through RIM, the FAA will focus on reducing runway incursions by addressing risks at specific locations at the airport that have a history of runway incursions. From 2003 through 2013 46 such incidents have been reported at JNU. Review of these incident reports shows that not all of them were the result of the runway/taxiway configuration, however indications are that better design of the system would result in a safer operational environment.

Figure 8-2: Juneau International Airport Layout



Advisory Circular 150/5300-13A provides guidance concerning the runway/taxiway layout that helps to minimize the potential for runway incursions as follows:

1. Increase situational awareness. Provide taxiway intersections with no more than three nodes.

2. Avoid wide expanses of pavement.

3. Avoid high energy intersections (avoid mid-runway crossings).

4. Do not allow direct apron-to-runway access.

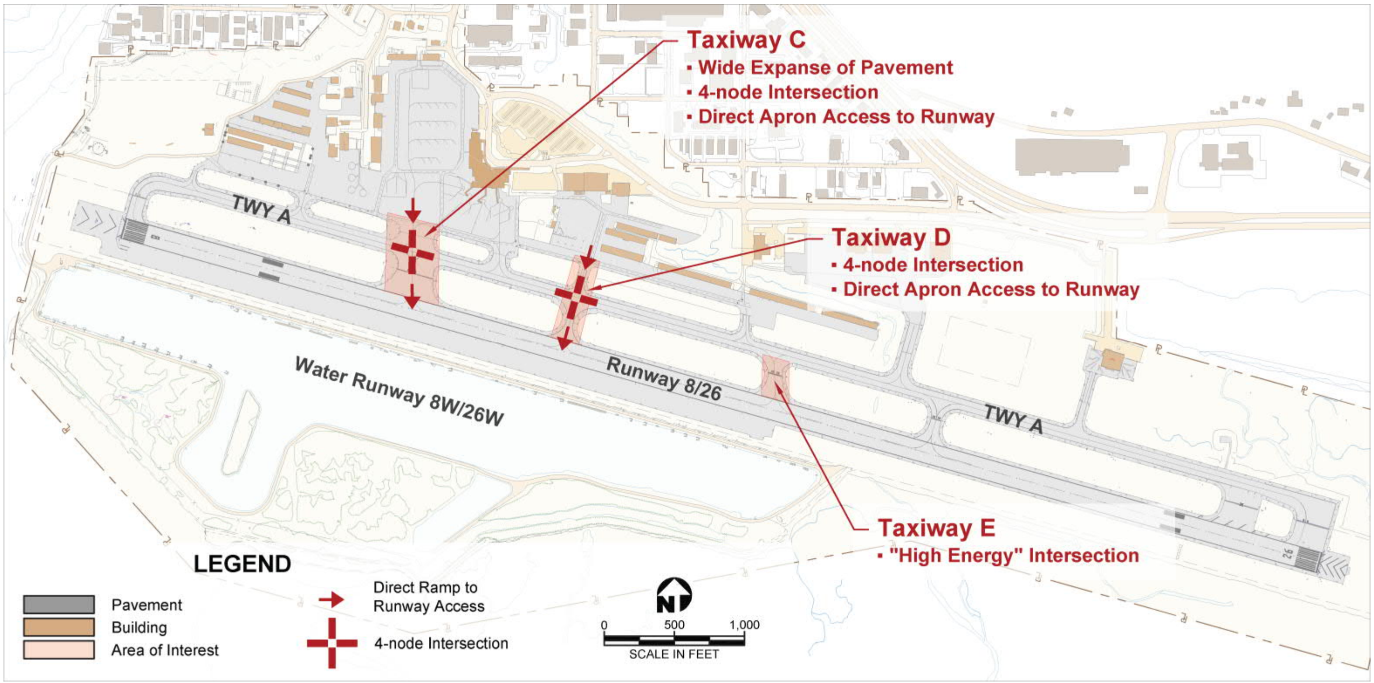
The primary approach to minimizing the incursion potential can be achieved by keeping the process as simple as possible. At JNU the taxiway system needs to be assessed with this in mind. Figure 8-3 shows the existing runway taxiway system with potential problem areas highlighted.

Taxiway C: The taxiway presents a wide expanse of pavement that, even when properly marked, can present a confusing situation, particularly for nonresident pilots. In addition, the intersection presents two separate intersections with four nodes. This exit also provides direct access from the central apron to the runway.

Taxiway D: The layout of this taxiway includes two separate areas where 4-node intersections occur and provides direct access from the apron to the runway. The location of this access point is in the high energy area, defined as the middle third of the runway.

Taxiway E: Although the markings on Taxiway E indicate a right-angle exit, the physical pavement can be confusing as the pavement indicates an angled exit.

Figure 8-3: Taxiway Issues



Looking at these percentages, it is clear that the exit taxiways at JNU provide efficient aircraft coverage and are properly positioned to allow for efficient aircraft exiting. Therefore, addressing the concerns of the RSAT will focus on eliminating the identified issues. Three general alternatives have been identified.

- **Alternative 1 –** Do nothing
- **Alternative 2 –** Revise/relocate the exit taxiways between the runway and Taxiway A
- **Alternative 3 –** Revise/relocate the connector taxiways between Taxiway A and the aprons
- **Alternative 4 –** Close portions of the connector taxiway system

These alternatives are shown in the following.

Figure 8-4: Alternative 2 – Revise/Relocate Exit Taxiways

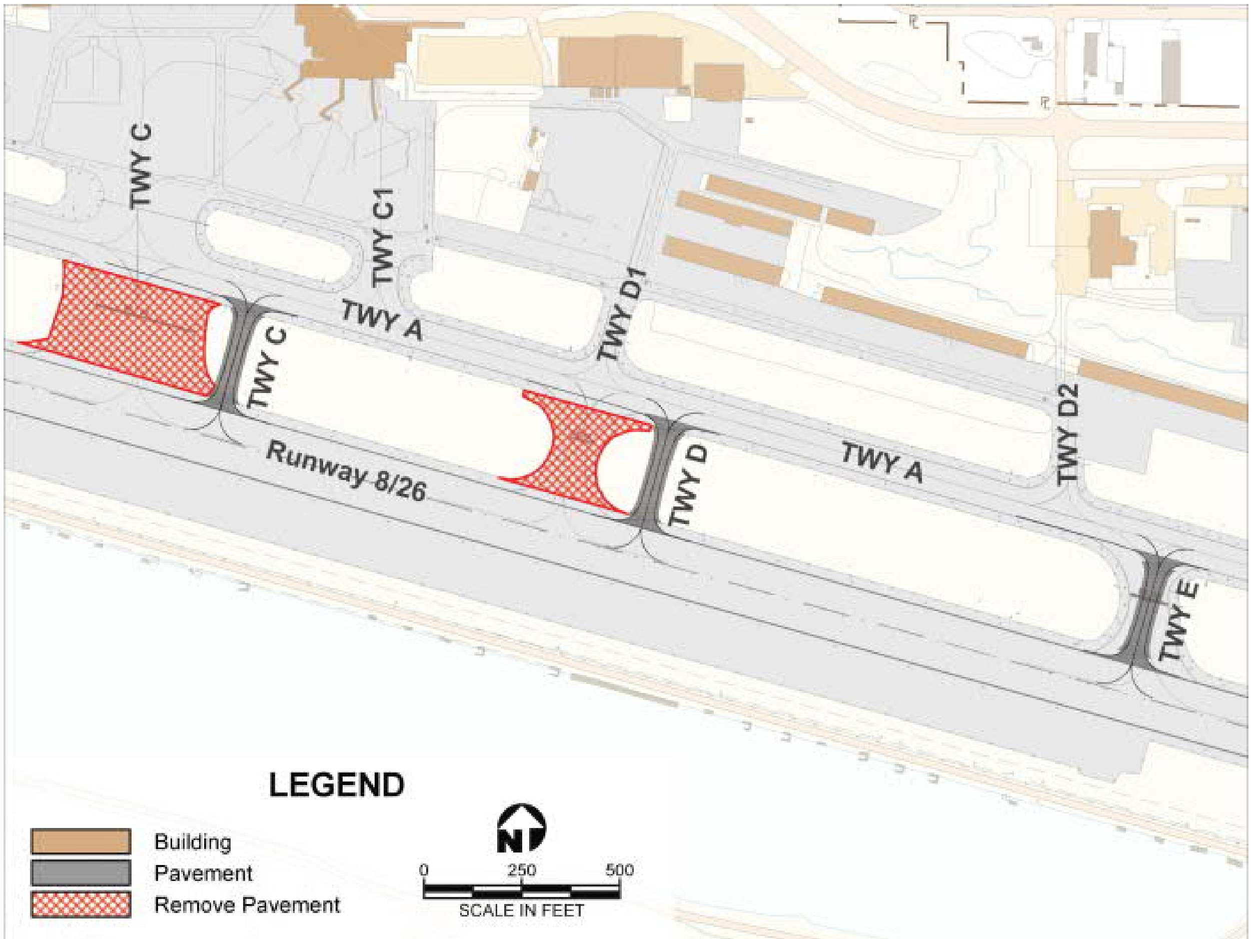


Figure 8-5: Alternative 3 – Revise/Relocate Connector Taxiways

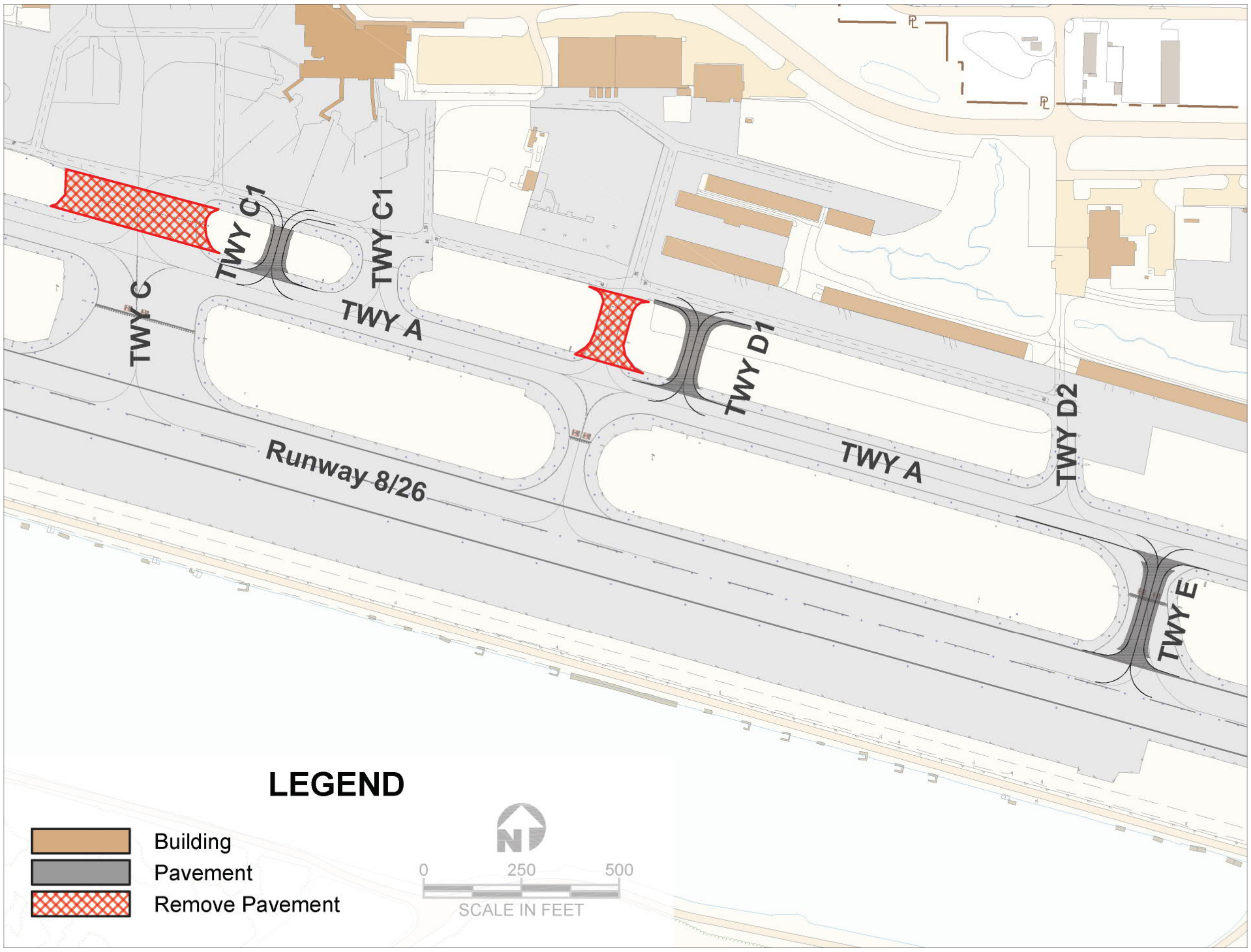
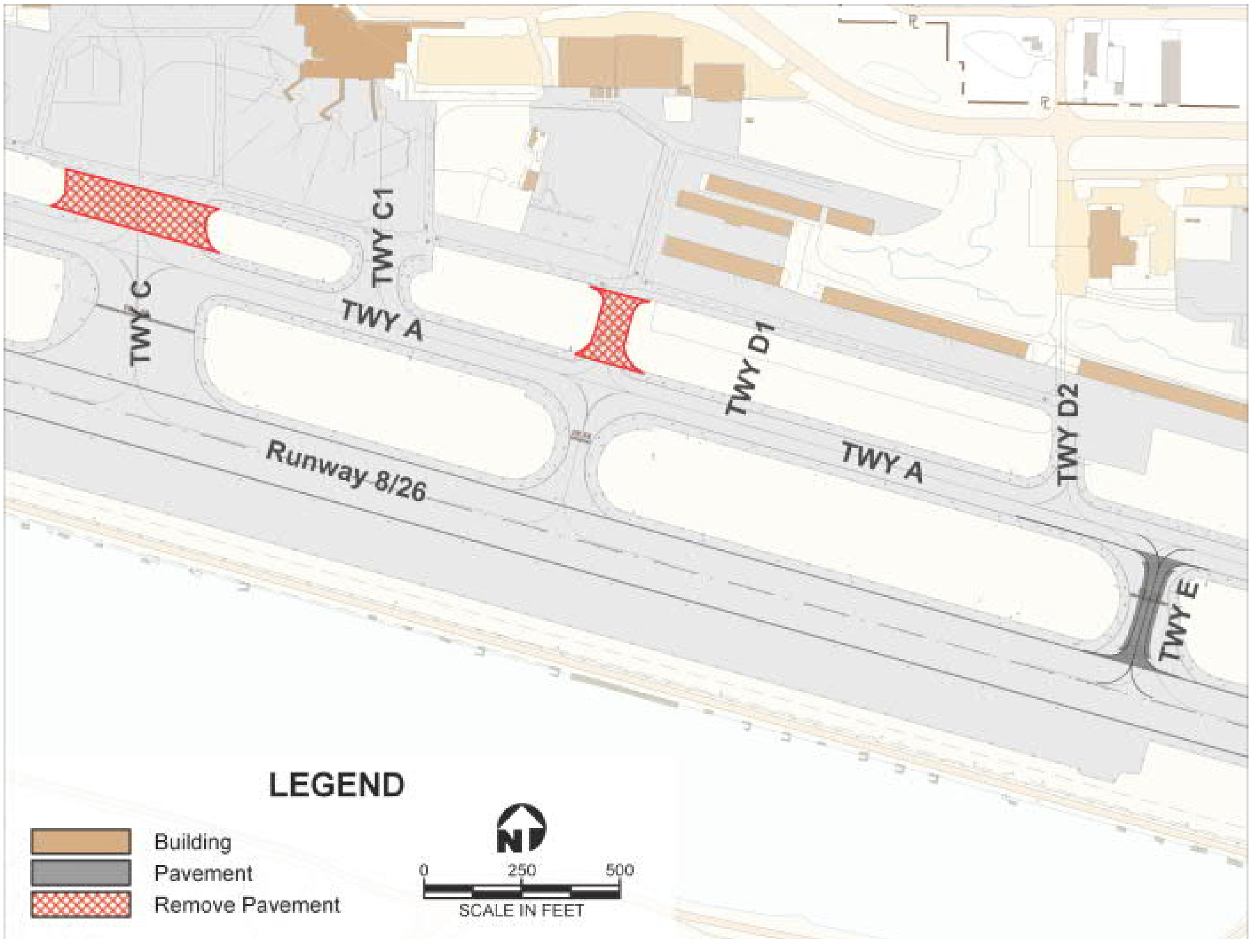


Figure 8-6: Alternative 4 – Close Portions of the Connector Taxiways



8.2.1.1 *Evaluation of Taxiway Alternatives*

The decision on the layout of the taxiway system will be based on these factors:

- Adherence to FAA design criteria for TDG-3 Aircraft and the RSAT action item
- Operational efficiency
- Safety considerations as detailed in AC 150/5300-13A
- Construction cost
- Environmental
- Impact on Sustainability

Adherence to FAA Criteria: The Do-Nothing Alternative maintains the current connecting taxiway system without improvements. The RSAT analyzed this system and identified the potential areas of concern. Therefore, this alternative does not meet FAA criteria.

Alternative 2 contemplates rebuilding the connecting taxiways in a manner that eliminates the issues. Under this alternative, the design criteria for TDG-3 aircraft will be adhered to during the design of all the exits to allow the larger corporate turboprop and jet aircraft to exit, as well as the commercial flights.

The layout in Alternative 3 is similar to Alternative 2 with the primary difference being the revision of the connector taxiways to eliminate the direct apron-to-runway access.

Alternative 4 involves closure of portions of the connector taxiways to meet the criteria.

Operational Considerations: The existing exit taxiway layout (Alternative 1) was developed to respond to aircraft operational patterns observed over the history of the airport. They are spaced in a manner that allows efficient access to the runway for either mid-runway take offs or quick exiting and access to the landside facilities The first step in examining the operational aspect of the exit system is to examine the positioning of the exits. In doing so the following items need to be considered.

1. Taxiways should be placed to allow general aviation traffic with short landing length requirements to exit the runway as soon as possible.
2. A second consideration should be to accommodate the turboprop aircraft such as the Beech 1900 and the ATR 72.

3. Provide exits where the Boeing 737 can exit without necessarily proceeding to the runway ends.

Based on an analysis of the current exit locations, the users of the runway are able to exit the runway efficiently with the current locations. Table 8-2 shows the percentage of aircraft that can utilize each exit at their current locations. Based on this it appears that no changes need be made regarding the exit locations.

Table 8-2: Exit Taxiway Use Availability

Exit	Distance[1] (feet)	Percentage of the Fleet[2]			
		A	B	C	D
Landing on Runway 08 - Wet					
B	0	0	0	0	0
C	2,134	65	1	0	0
D	3,260	98	8	1	0
E	4,850	100	100	29	12
F	5,969	100	100	90	80
G	8,849	100	100	100	100
Landing on Runway 26 - Wet					
G	0	0	0	0	0
F	2,875	90	8	0	0
E	4,045	100	80	1	0
D	5,612	100	100	30	0
C	6,762	100	100	80	47
B	8,849	100	100	100	100
Landing on Runway 8 - Dry					
B	0	0	0	0	0
C	2,134	84	1	0	0
D	3,260	100	42	0	0
E	4,850	100	100	35	5
F	5,969	100	100	92	71
G	8,849	100	100	100	100

Exit	Distance[1] (feet)	Percentage of the Fleet[2]			
		A	B	C	D
Landing on Runway 26 - Dry					
G	0	0	0	0	0
F	2,875	100	39	0	0
E	4,045	100	98	8	0
D	5,612	100	100	76	25
C	6,762	100	100	100	91
B	8,849	100	100	100	100

Source: FAA Advisory Circular 150/5300-13

[1] The distance shown is measured in feet from the Runway Threshold.

[2] The fleet designators are:

A - Small single-engine aircraft 12,500 pounds or less
B - Small twin-engine aircraft 12,500 pounds or less
C - Large aircraft from 12,500 to 300,000 pounds
D - Heavy aircraft weighing more than 300,000 pounds

Alternative 2 suggests moving Taxiways C and D to eliminate direct access from apron to runway. This will change the exit locations somewhat but will not change the efficiency of the system in any measurable way. The design of the exits will meet the criteria established in FAA AC 150/5300-13A.

Alternative 3 suggests that connector Taxiways C and D be relocated to create nondirect pathways to the runway. This relocation will not impact the exit efficiency from the runway but will create new pathways for aircraft accessing the terminal and GA areas.

Alternative 4 suggests that Taxiway C and D1 be removed from service with aircraft using other taxiways. This will affect operational efficiency on the runway.

Cost: The cost of any of the alternatives relates to the amount of new pavement required for construction.

- Alternative 1 – $0
- Alternative 2 – $550,000 for relocating two exits
- Alternative 3 – $300,000 for relocating two connectors
- Alternative 4 – $5,000 for pavement marking.

Table 8-3: Taxiway Alternatives Comparison

	Alternative 1 Do Nothing	Alternative 2 Reposition Exits	Alternative 3 Reposition Connectors	Alternative 4 Close Connectors
Improve Safety	No	Yes	Yes	Yes
FAA Criteria	No	Yes	Yes	Yes
Operational Impacts	No	Yes	Yes	No
Cost	None	$550,000	$300,000	$5,000
Environmental Factors	None	None	None	None
Impact on Sustainability	None	None	None	None

8.2.1.2 Taxiway Layout Recommendation

The recommendation for the layout of the taxiways combines elements of the alternatives as follows:

1. Relocate Taxiway D1 to the east to eliminate the direct runway access. By moving this to the east it moves away from the commercial apron providing separation between the commercial and GA operations.
2. Taxiway C will need to be revised in the future. However, it is recommended that the solution for this taxiway be based on a more detailed analysis and user coordination program to be conducted outside the master plan process. The timing of this study will coincide with the larger taxiway rehabilitation project.
3. Taxiway E will remain in operation but the pavement will need to be strengthened and remarked to eliminate confusion.

8.2.2 Remain Overnight Positions (RON)

Two RON parking positions have been identified as required for commercial service aircraft. Three alternatives are identified for these positions. These are shown in Figure 8-7 and described as follows:

- **Alternative 1** – Do nothing
- **Alternative 2** – Positions to the east, adjacent to the terminal

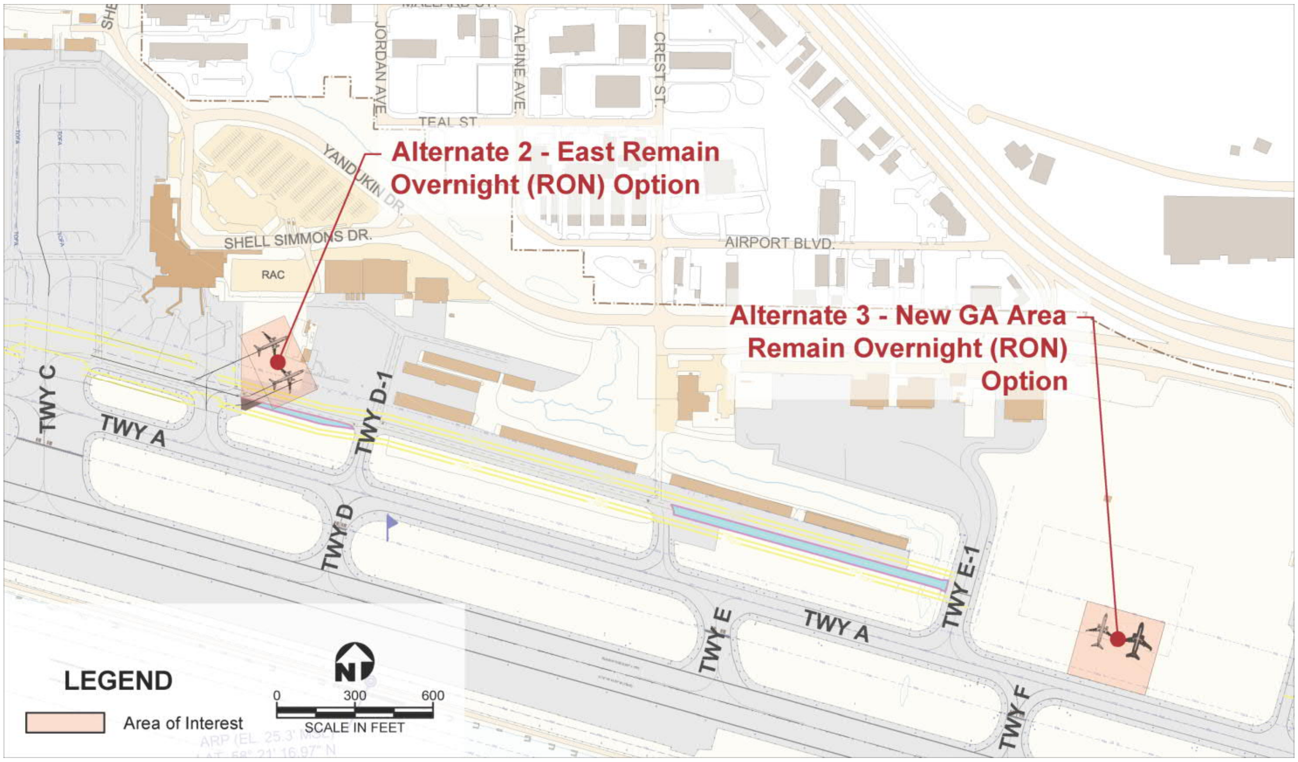
- **Alternative 3 –** Positions to the east, in the new GA Area

8.2.2.1 Evaluation of RON Position Alternatives

In deciding which of these alternatives best serve the airport and the users the following criteria will be used:

- Accommodate demand
- Terminal adjacency
- Compatibility with FAR Part 77 surfaces
- Ability and accessibility for ground service
- Cost
- Environmental
- Sustainability

Figure 8-7: RON Positions Alternatives



Accommodate Demand: Alternative 1 – Do Nothing will not meet the demand for RON positions in either the short or the long term. At the present time, all noncommercial service paved area at JNU is being used for GA or other purposes. The consequences of the Do-Nothing Alternative are that RON positions will not be provided.

Alternative 2 provides space for two required positions on the east side of the terminal building.

Alternative 3 provides for two spaces but requires construction of a new aircraft parking area. Before these positions could be provided there would need to be a project to construct the new apron.

Terminal Adjacency: Alternative 1 represents the do-nothing condition. This does not provide for the required demand for the positions.

Alternative 2 provides for RON positions adjacent to the terminal (tow distance is less than 300 feet)

Alternative 3 also provides the RON positions to the east of the terminal but the RONs will be more than 4,000 feet from the terminal.

FAR Part 77 Surface Penetration: All alternatives have been developed to ensure that all of the aircraft are able to park without having the aircraft tails penetrate the Part 77 transitional surfaces.

FAA Design Criteria: Each alternative location and layout being proposed was developed with consideration of the FAA design criteria regarding taxiway clearance and setback criteria.

Ability to Support Ground Service Operations: To function properly as RON positions, the aircraft will need to be serviced and perhaps fueled at the RON location. This will require that both electricity and water service be available at the site and that there is service vehicle access to shuttle crews and supplies. Both alternatives have utility access and both electricity and water service as well as the ability to provide service vehicle access.

Development Costs: Development of the RON spaces varies from location to location. The total cost of the alternatives is estimated as follows:

Alternative 1: $0

Alternative 2: $4,780,000. This cost estimate includes the cost of hangar demolition and reconstruction in another area. The cost of site preparation for the designated hangar area south of the terminal is not included.

Alternative 3: $4,120,000. The estimate includes the cost of providing the paved RON parking spaces as well as the extension of the electrical lines to the site and provides both ramp lighting and electrical service to each position.

Impacts on Sustainability: Neither location will have any impact on sustainability at JNU.

Table 8-4: RON Position Alternatives Comparison

	Alternative 1 Do Nothing	Alternative 2 Eastern Positions	Alternative 3 Western Positions
Accommodate Demand	No	Yes	Yes
Terminal Adjacency	N/A	250 ft.	4600 ft.
FAR Part 77	Compliant	Compliant	Compliant
Ground Service	Yes	Yes	Yes
Cost	0	$4,630,360	$4,120,000
Sustainability	None	None	None

8.2.2.2 Remain Overnight Positions Recommendation

The recommendation for the RON positions is to construct two spaces to the east of the aircraft gate positions at the terminal building. This location provides the following benefits:

1. The location is adjacent to the terminal, allowing for quick and efficient aircraft positioning activity.
2. The location is currently underutilized and RON positions will not interfere with existing uses.

8.2.3 Airport Traffic Control Tower (ATCT) Location

The current age of the ATCT makes it a candidate for replacement by FAA. The current ATCT location at the "elbow" of the terminal is not considered to be the optimal long-term location. As the airport continues to develop the terminal, the location and height of the tower will continue to be a factor limiting development options. Therefore, the tower will need to be relocated to facilitate operational safety and long-term development opportunities. All decisions for changes to or relocation of an ATCT are ultimately made by FAA and the final analyses and siting studies will be conducted based on their specific criteria.

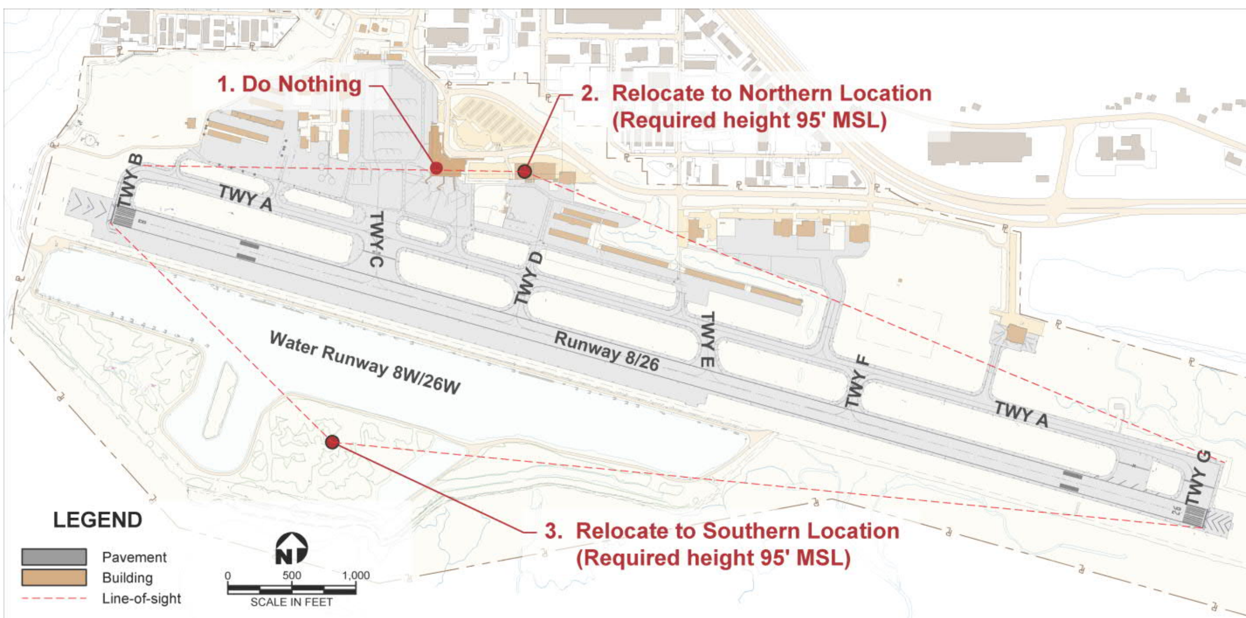
However, because the ultimate height and/or location of the ATCT is a major factor in the development of the master plan, it is necessary to address the issue.

Three alternatives have been identified when considering the ATCT.

- **Alternative 1** – Do nothing.
- **Alternative 2** – Relocate the tower to the north on the site of the sand storage building.
- **Alternative 3** – Relocate to the south side of the airport, south of the water runway.

These locations are shown in the following figure.

Figure 8-8: Potential ATCT Locations



8.2.3.1 Evaluation of ATCT Alternatives

Although FAA will make the final decision regarding the future ATCT, they will base their decision on a range of critical factors. The criteria they will use include the following:

1. **Visibility**: The height of the tower cab must provide controllers with an unobstructed view of the entire controlled movement area as well as of the airspace surrounding the airport and the traffic pattern.

2. **Recognition**: The location and height of the tower need to be such that tower personnel maintain the ability to recognize the class of aircraft conducting an operation on all portions of the airfield.

3. **Airspace**: The ATCT must not be located in a way that creates an obstruction to FAR Part 77 or terminal instrument procedures (TERPS) surfaces.

4. **Utilities**: The ATCT requires access to standard public utilities as well as the ability to link with dedicated FAA utilities.

5. **Public Access**: The tower needs to have access from public roadways.

6. **Environmental Factors**: The environmental effects of construction at each site need to be considered.

7. **Construction Cost**: The cost of site preparation and tower construction must be considered.

8. **Sustainability**. The relative differences between sites need to be assessed.

The following analysis includes a preliminary comparison of the available sites based on these evaluation criteria. The purpose is to select a preferred option to integrate the needs of FAA into the long range planning for the airport as represented by the ALP.

Visibility: Both of the alternative locations can be constructed in a manner that maintains line-of-sight visibility over the airport movement area. For Alternative 3 the traffic from the southwest to the floatplane will not be visible.

Recognition: The ability of tower personnel to maintain recognition of the aircraft type is a function of the distance between the tower and the aircraft operating area. This issue is associated with tower locations at the far end of long runways. All of the sites are adjacent to the runway and this issue will not be a problem.

Airspace: All of the sites can be developed without creating airspace issues.

Utilities: Utilities are readily available at the existing tower site as well as at the Alternative 2 site. Alternative 3 is located on the airport's south side and public utilities are not currently available. These would need to be provided prior to construction and would represent an additional cost.

Public Access: Alternatives 1 and 2 are accessible from the existing public roadway network. Alternative 3 is not currently accessible. A new public access road would need to be constructed. Adequate security can be provided at any of the sites.

Environmental Factors: Constructing a new facility at Alternative 2 could begin immediately, as there are no environmental factors that complicate development. Alternative 3 is near a wetland area so wetland buffers would need to be carefully considered during design.

Construction Costs: The cost of constructing a new ATCT has been estimated to be approximately $5,000,000, depending on ultimate height and site conditions. Although the cost for Alternative 1 are shown as zero, there will be costs associated with a facility upgrade as well as impacts on the cost of terminal improvements. Variation in the cost of the other alternatives is caused by site conditions and other factors directly related to the alternative. For Alternative 3 the cost differential is associated with the need to extend utility lines to the site as well as the cost of obtaining environmental approvals

The costs for all alternatives were based on a standard tower construction cost with variations being the result of known site conditions such as utility extensions, roadway construction, or environmental issues that need to be addressed.

Table 8-5: ATCT Alternatives Comparison

	Alternative 1 Do Nothing	Alternative 2 Northern Relocation	Alternative 3 Southern Relocation
Line of Sight	Yes	Yes	Yes
Aircraft Recognition	Good	Good	Good
Airspace	Yes	Yes	Yes
Utilities	Yes	Yes	No
Access	Yes	Yes	No
Cost	$0	$5,024,500	$7,024,500
Environmental Factors	None	Yes	Numerous
Impacts on Sustainability	None	None	None

8.2.3.2 ATCT Recommendation

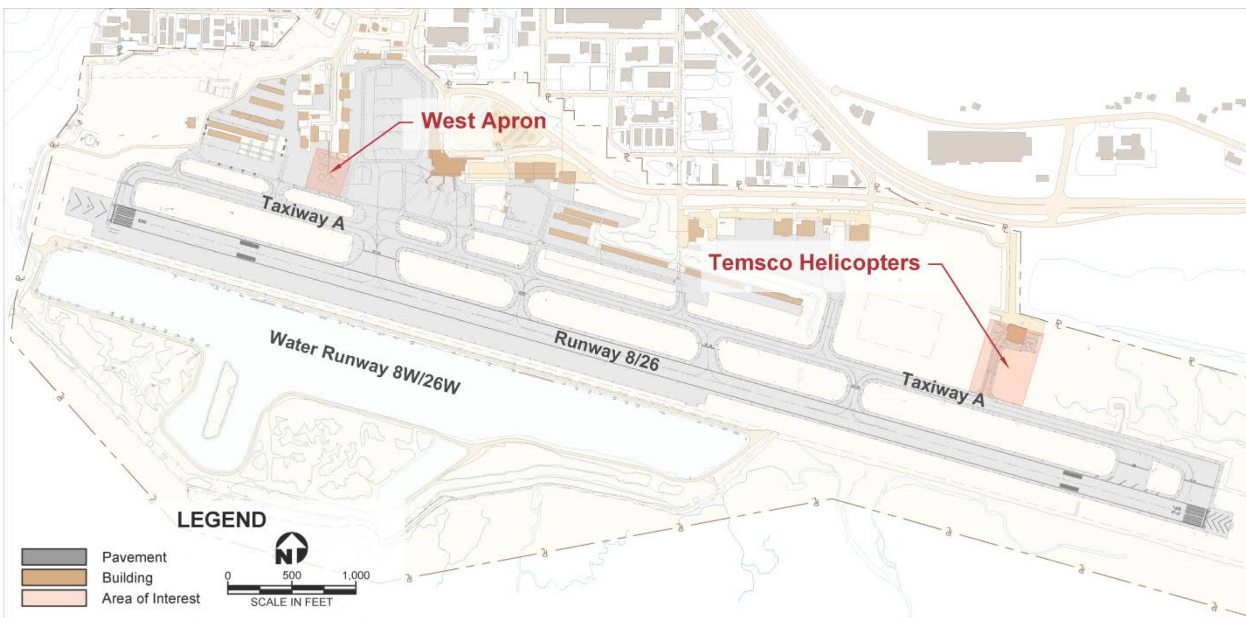
Based on this comparison, it is recommended that the master plan include the relocation of the ATCT to the Alternative 2 site, pending validation by FAA. This location offers good lines of sight with distances that will not create recognition difficulties. In addition the site has utility and public roadway connections and should not pose any environmental issues.

8.2.4 Helicopter Landing Area

JNU has a very high number of helicopter operations for both tourism and support for businesses such as mining and fishing. These operations occur in three areas as shown in the accompanying Figure 8-9:

1. West of the central apron area
2. At the Temsco Helicopters location

Figure 8-9: Existing Helicopter Operations Areas



In response to input from the public during the master planning process to examine the possibility of moving operations to a single area or to a new off-site facility we looked at several alternatives including.

- Alternative 1 – Do nothing
- Alternative 2 – Locate a consolidated facility close to users

- Alternative 3 – Centralize a location in new GA area
- Alternative 4 – Encourage off-site locations

In the end it is recommended that helicopter operations continue to occur in several areas so they can operate safely and efficiently using the flight paths that have been created for them. Consolidation of operations will create congestion on both the ground and in the airspace that will reduce the overall operational efficiency.

Moving helicopter operations offsite was not considered as two previous analyses have shown that this concept would not adequately serve the needs of the users.

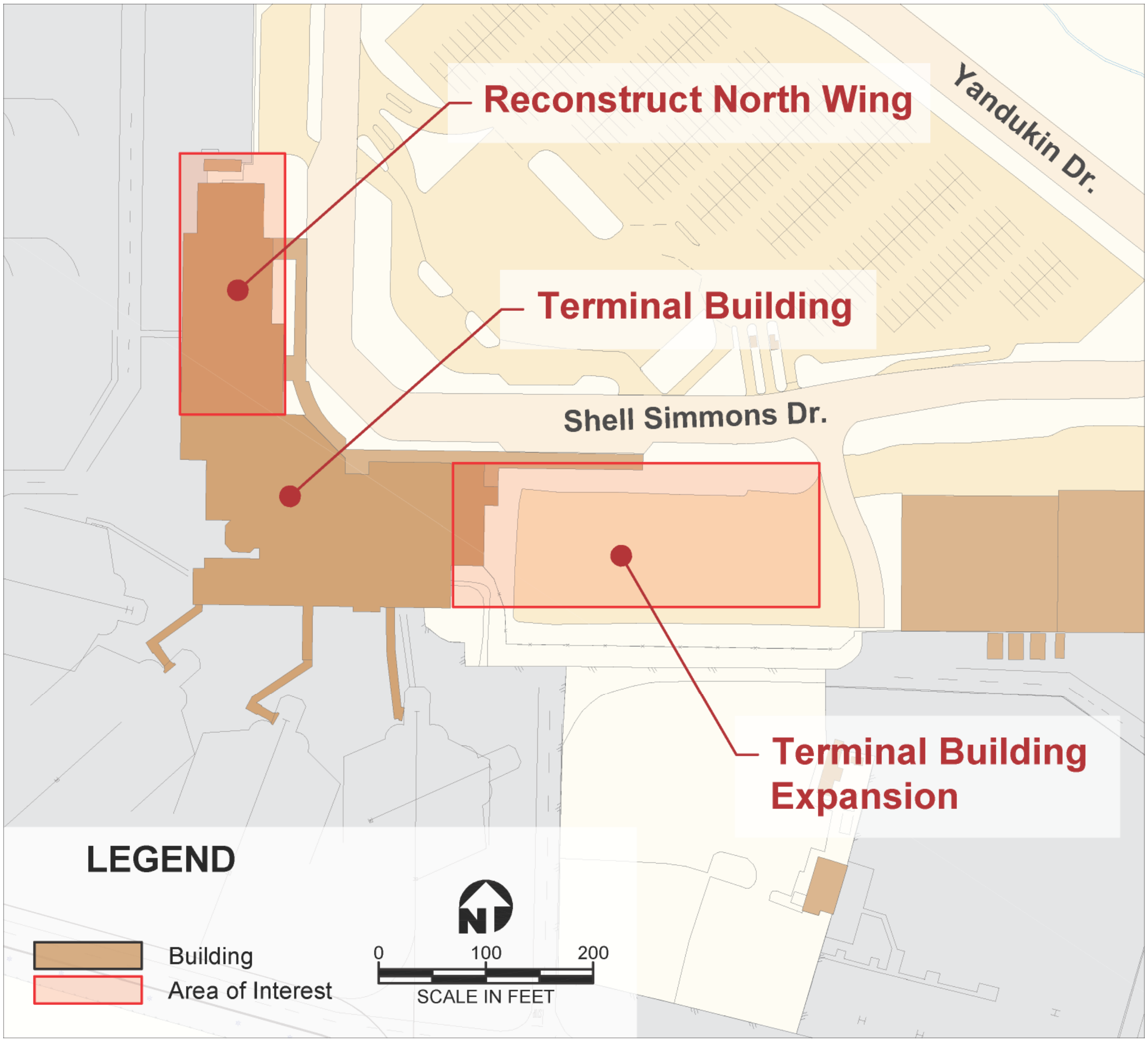
8.3 TERMINAL ALTERNATIVES

The Juneau International Airport Terminal Study completed in 2005 provided direction for terminal improvements necessary to accommodate passenger increases of 2 percent per year through 2025. Recommendations for terminal development are summarized as follows:

- Expand the building façade to provide additional space within the building for circulation and other components.
- Reconstruct the northern portion of the terminal to include Part 135 ticketing and office space, passenger seating area, and bag staging facilities.
- Extend the terminal to the east to provide additional passenger waiting area and retail space on the second level and expanded bag claim and tour group staging areas on the first level.

Figure 8-10 shows the basic layout for the terminal building expansion from this plan.

Figure 8-10: Terminal Building Expansion



8.3.1 Auto Parking

The facility requirements chapter shows that the public parking area will need to be expanded by approximately 100 spaces, given current passenger to vehicle ratios. The current area set aside for auto parking is approximately 5.7 acres bordered by Shell Simmons Drive to the west and south and Yandukin Drive forming a diagonal boundary to the north. There are four potential ways to meet future demand for parking in this area including:

- **Alternative 1** – Do nothing
- **Alternative 2** – Expand surface parking lot
- **Alternative 3** – Build a parking structure
- **Alternative 4** – Mitigate demand by encouraging increased use of alternative transportation modes

8.3.1.1 Evaluation of Auto Parking Alternatives

The decision on the auto parking alternatives will be based on the following factors:

Meet Demand: Alternative 1 will not meet future demand as it does not add any additional parking to the existing lot. Alternative 2 can meet part of the demand on the existing site but in doing so will displace the taxi and van waiting lot, creating a need to relocate them to another area. Alternative 3 can provide for structured parking sufficient to meet the demand levels. Alternative 4 presumes to reduce demand while relying on other CBJ agencies to provide adequate service to meet the access needs of the community.

Cost: The cost of doing nothing is low due to the lack of any construction activity. However, the cost to the airport would manifest itself in lost revenue and potentially lost passengers. Alternative 3 will provide the required spaces but the cost of constructing a parking structure will be approximately $15,000,000. Alternative 4 also has no cost to the airport but would represent a net revenue loss to the airport from lost parking fees.

Environmental: Alternatives 1, 2, and 3 will be accomplished on the existing parking lot site and no environmental impacts are expected. Alternative 4 would have positive environmental impacts stemming from the reduction in car trips to and from the airport resulting from passengers using alternative transportation modes.

Sustainability: None of the alternatives have impact on sustainability at the airport.

Table 8-6: Auto Parking Alternatives Comparison

	Alternative 1 - Do Nothing	Alternative 2 - Maximize Existing Space	Alternative 3- Structured Parking	Alternative 4 - Other Transportation Modes
Accommodate Demand	No	Partial	Yes	Yes
Cost	None, but lost airport revenue	$75,000	$15,000,000	None, but lost airport revenue
Environmental	No likely impacts	No likely impacts	No likely impacts	Possible positive impacts resulting from reduced car trips
Impact on Sustainability	None	None	None	Possible reduction in the number of automobile trips to the airport.

8.3.1.2 Auto Parking Recommendation

Based on this analysis, it is recommended that the additional parking spaces be provided through a combination of Alternatives 2 and 4. Should parking demand outstrip the current projections, a parking structure should be considered as a long-term solution.

8.4 GENERAL AVIATION

The airport's general aviation expansion plans for both the eastern and western areas have been approved. This analysis consisted of developing potential layouts for these areas. Potential layouts are shown below.

Figure 8-11: Potential Eastern GA Development

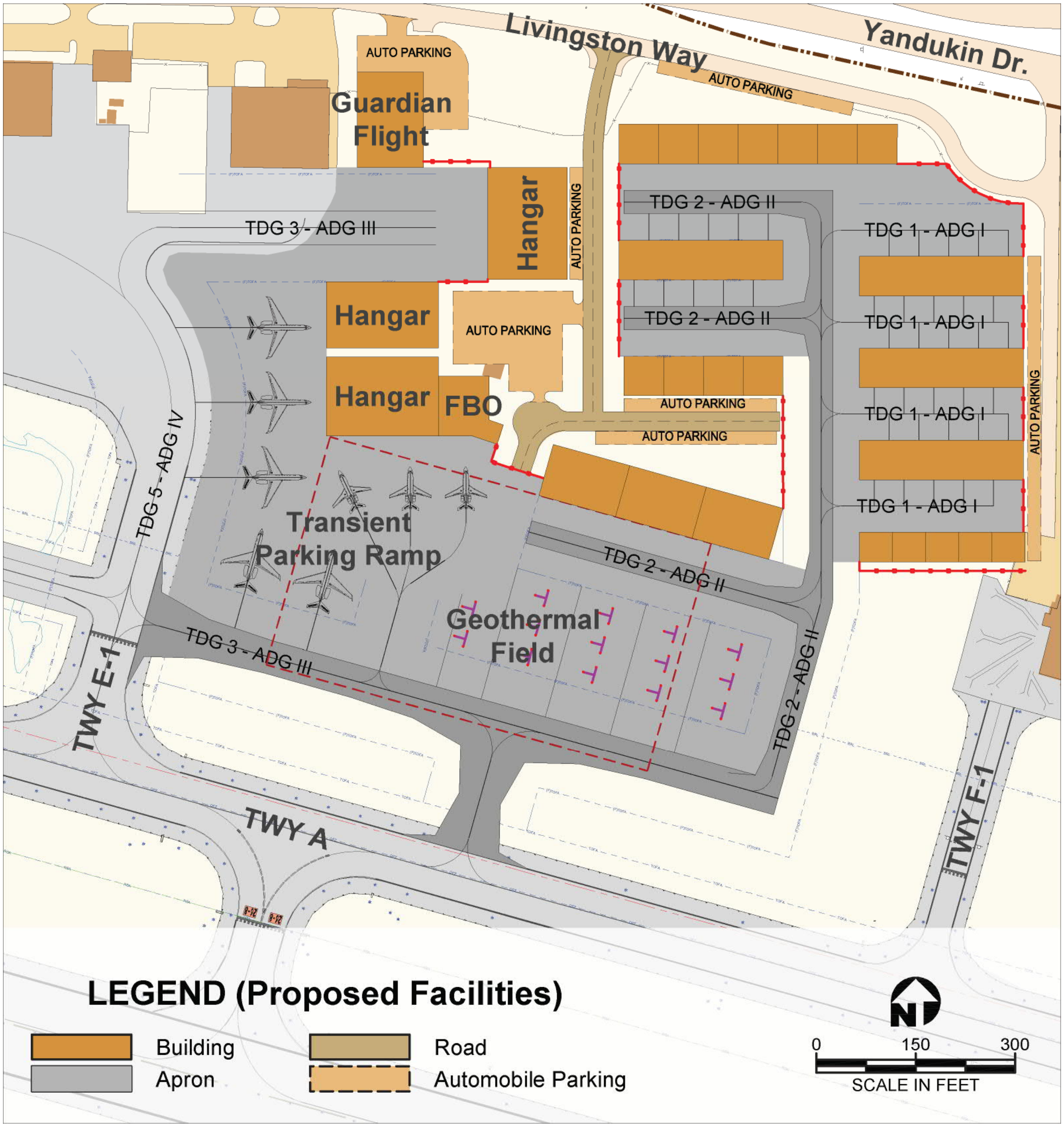
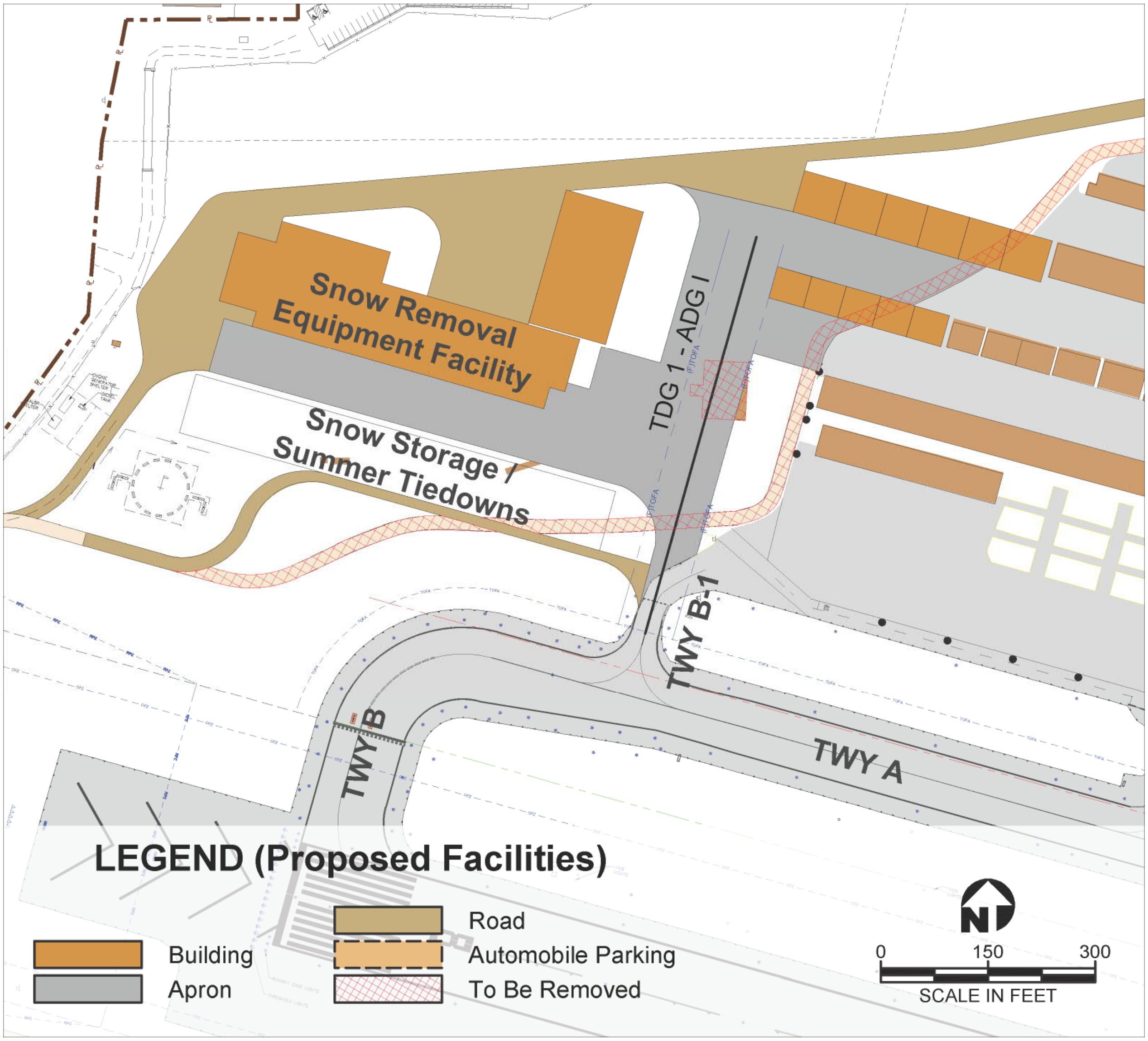


Figure 8-12: Potential Western GA Development



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9

9 AIRPORT LAYOUT PLAN

9.1 INTRODUCTION

The material contained in this chapter describes and graphically depicts existing conditions and the recommended Capital Improvement Plan for Juneau International Airport. The plan covers a period of 20 years (2015 through 2035). Future development recommendations reflect input received over the course of the planning process from the airport staff, Federal Aviation Administration (FAA), and stakeholders concerned with the operation and development of the airport and from the community at large. Analyses and findings from the other chapters of the plan are reflected in the recommendations described herein.

The five primary functions of the Airport Layout Plan (ALP) set are:

1. An approved ALP is necessary for the airport to receive financial assistance under the terms of the Airport and Airway Improvement Act of 1982 (AAIA), as amended, and to be able to receive specific Airport Improvement Program (AIP) Funds and Passenger Facility Charge (PFC) funding. An airport must keep its ALP current and follow that plan, since this is one of the grant assurance requirements of the AAIA and previous airport development programs, including the 1970 Airport Development Aid Program (ADAP) and Federal Aid Airports Program (FAAP) of 1946, as amended.

2. The ALP is the blueprint for airport development. The ALP provides the guideline by which the Juneau International Airport can ensure that future development projects maintain airport design standards, meet all safety requirements, and are consistent with airport and community land use plans.

3. The ALP is a public document that serves as a record of aeronautical requirements, both present and future, and as a reference for community deliberations on land use proposals and budget resource planning.

4. The approved ALP enables the airport sponsor and the FAA to plan for facility improvements at the airport. It also allows the FAA to anticipate budgetary and procedural needs. The approved ALP allows the FAA and the community to protect the airspace required for facility or approach procedure improvements.

5. The ALP is intended to be a working tool for the Airport staff and the CBJ.

The ALP drawing set for JNU contains a series of inter-related drawings providing details on development recommendations. These drawings are not intended to provide design engineering accuracy. The following eleven plans make up the ALP set:

Sheet 1 of 11: Title Sheet

Sheet 2 0f 11: Airport Data Sheet

Sheet 3 of 11: Airport Layout Plan

Sheet 4 of 11: Airspace Plan

Sheet 5 of 11: Inner Approach Surface, Runway 8-26

Sheet 6 of 11: Inner Approach Surface, Runway 8W-26W

Sheet 7 of 11: Runway Departure Surface

Sheet 8 of 11: Terminal Area Drawing – Northwest

Sheet 9 of 11: Terminal Area Drawing – Southeast

Sheet 10 of 11: Land Use Drawing

Sheet 11 of 11: Airport Property Map (Exhibit 'A')

These plan sheets are found at the end of this chapter, their content is summarized in the following subsections.

9.2 TITLE SHEET

The Title Sheet, Sheet 1, serves as an introduction to the Airport Layout Plan (ALP) drawing set, providing an index of the drawings.

9.3 AIRPORT DATA SHEET

The Airport Data Sheet is a companion drawing to the Airport Layout Plan providing the Airport and Runway Data information that are important in determining and assessing the airport's design category and the appropriateness of the development recommendations. Other information on the data sheet includes wind data, airport location and vicinity maps, a list of non-standard conditions at the airport, a list of agreed upon Modifications to Standards and a declared distance table for operations on Runway 8-26.

9.4 AIRPORT LAYOUT PLAN

The Airport Layout Plan, Sheet 3 graphically depicts both existing airport facilities and the airside and landside projects that have been recommended for the 20-year planning period.

9.4.1 Airfield

Airfield improvements are in support of continued safe and efficient operations including;

1. Rehabilitation of Taxiway A and rehabilitation and reconfiguration of taxiway E-1
2. Address geometry issues on Taxiways C, and D
3. Float Pond Improvements including the South Road, replacement of the inlet valve and stabilization of the banks.

9.4.2 FAA ATO Recommendations

Two projects were identified as required in the master plan but decisions regarding need, timing, location and funding are the responsibility of FAA and outside the Master Planning Process. These projects have been included in the master plan with recognition that they are not part of the airport's Capital Improvement Program (CIP). These include

1. Install a MALSR on Runway 26
2. Relocate the FAA ATCT outside the passenger terminal building

9.4.3 Terminal Area

Projects for the terminal area are driven by the needs of the commercial passengers, airlines and other terminal users. These include;

1. Replace the north wing (Part 135 area) of the terminal building
2. Renovate the terminal building – knuckle area
3. Expand the terminal to provide additional passenger waiting space in the secure area
4. Passenger terminal parking lot rehabilitation
5. Relocate rental car ready/return area
6. Rehabilitate the Part 135 parking apron

7. Rehabilitate the Part 121 parking apron
8. Add two overflow aircraft parking spaces (RON Positions)
9. Add a second air cargo parking position
10. Improve and expand public and employee parking area
11. Construct a Parking Garage

9.4.4 General Aviation

The master plan includes provisions for the growth of general aviation facilities in two major areas, as well as redevelopment of facilities and opportunities along Alex Holden Way. A summary of the recommendations includes;

1. Northeast development area
    a. Development area infrastructure
    b. Joint use apron/tiedown construction
    c. Fencing and security improvements
2. Northwest development area
    a. Development area infrastructure
    b. Joint use apron/tiedown construction
    c. Fencing and security improvements
    d. Install a Geo Loop field
3. Design & Reconstruct Alex Holden Way and Utilities
    a. Civil Air Patrol Hangar Relocation
    b. Fish & Wildlife Service Hangar Relocation

9.4.5 Other Projects

Several other projects have been identified as required but which do not fall into the primary categories listed. These projects include;

1. Construct the Snow Removal Equipment Facility (SREF)
2. Design and construct a new sand and chemical storage facility
3. Rehabilitate and reconstruct the Aircraft Rescue and Firefighting (ARFF) Facility
4. Extend the Emergency Vehicle Access Road (EVAR)
5. Acquire a Wetlands Access Vehicle

9.5 FAR PART 77 AIRSPACE PLAN

JNU is located in the mountainous region of Southeast Alaska and the terrain makes approach and departure procedures into JNU unique. There are specific approach and departure routes at JNU for visual flights that are driven by the terrain.

The FAA has published two nonprecision instrument procedures and one departure procedure for JNU. The airspace requirements for these are depicted on Sheets 4, 5, 6, and 7. These illustrate the imaginary surfaces defined in Federal Aviation Regulations as described in the following.

9.5.1 Primary Surface

The primary surface is longitudinally centered on the runway and extends 200 feet beyond each runway end. The elevation of any point of the primary surface is equal to the elevation of the nearest point on the runway centerline. The width varies, depending on the type of approach available to the runway. For JNU, Runways 8 and 26 have a nonprecision instrument approach. As a result, the primary surface is 500 feet wide centered on the runway centerline.

For Runway 8W/26W the primary surface is 250 feet wide, reflecting the runway's visual nature.

9.5.2 Approach Surface

The approach surface is an inclined slope extending outward and upward from each end of the primary surface, centered on the extended runway centerline. The inner width of the surface is the same as that of the primary surface. The approach surface is applied to each end of the runway based on the type of approach available.

Runway 8/26 is designated as a nonprecision instrument runway. The approach surface for both ends is 500 feet wide where it intersects with the primary surface and expands uniformly for a distance of 10,000 feet at a slope of 34:1.

Runway 8W/26W is a visual runway with approach surfaces that are 2,560 feet wide where they intersect with the primary surface and extend upward and outward at a slope of 20:1 for a distance of 5,000 feet, at which point it is 750 feet wide.

9.5.3 Transitional Surface

The transitional surface is an inclined plane with a slope of 7:1, extending upward and outward at right angles to the runway centerline from the primary surface and the sides of the approach surfaces.

These surfaces terminate where they intersect with the horizontal surface or another surface with more critical restrictions.

9.5.4 Horizontal Surface

The horizontal surface is a horizontal plane 150 feet above the established airport elevation. JNU has an established elevation of 25.3 feet MSL (above Mean Sea Level) so the horizontal surface is 175.3 feet MSL. The perimeter of the surface is determined by arcs extending from the centerline of the runway and its intersection with the primary surface. The radii of these arcs correspond with the approach surface lengths for each of the runway ends.

9.5.5 Conical Surface

The conical surface is an inclined plane at a slope of 20:1, extending upward and outward from the periphery of the horizontal surface for a distance of 4,000 feet.

9.5.6 JNU Part 77 Summary

As seen the only surfaces that are clear of penetration at present are the primary and transitional surfaces. The topography of the airport's vicinity creates one of the more complex airspace environments in the United States. Special approach and departure procedures at JNU have been developed by the airlines allowing aircraft to operate using an RNP approach.

9.6 INNER APPROACH AND DEPARTURE SURFACES

Sheets 5, 6, and 7 present the inner approach surfaces for the runways (5 and 6) and the close in departure surfaces for Runway 8-26 (Sheet 7). Reference to these sheets shows that the airport staff has successfully eliminated obstructions to these areas. The sole obstructions identified are roads with controlled access.

9.7 TERMINAL AREA PLANS

The Terminal Area Plan is presented on two sheets (Sheets 8 and 9). The focus of Sheet 8 is the passenger terminal and aircraft parking positions, terminal access roadways and curb frontage, and the automobile parking areas associated with the commercial terminal. Sheet 9 is concentrated on the Southeast area where development in primarily general aviation related.

Several improvements and additions are recommended for the terminal facilities including;

1. Completion of the north terminal redevelopment project which will modernize the facilities for Part 135 carriers as well as improve the energy efficiency and level of service in that portion of the terminal.
2. Expand the Part 121 Departure Lounge Capacity to the east.
3. Add two positions to the terminal apron for aircraft needing overflow parking during peak periods. (RON Positions).
4. Renovate the terminal in the “knuckle”. At this same time work with FAA to facilitate the relocation of the Airport Traffic Control Tower (ATCT).
5. Rehabilitate the Part 121 and Part 135 Aprons
6. Add a Passenger Boarding Bridge to Gate 2
7. Expanding the terminal will dislocate the rental car ready/return area and the growth of overall passenger traffic will require that additional public parking be provided. At this time a parking structure should be constructed on the site of the existing parking lot. In the meantime, in order to decrease the need for private vehicle parking, the airport should work to improve bus connections or other modes of transportation to downtown and other areas within the community.

Sheet 8 included the Northwest GA Development Area. Several projects are recommended for this area including;

1. Development of the Snow Removal Equipment Building (SREB). This includes the development and implementation of a geothermal loop field.
2. Develop the airport maintenance and sand/chemical storage buildings
3. Prepare additional land for general aviation hangars and tiedowns.
4. Redesign and Reconstruct Alex Holden Way
5. Realign Hangars on Alex Holden Way
6. Add Floatplane Docks

Sheet 9 depicts development recommendations for the Northeast GA Area. Although much of this area is presently undeveloped, the plan depicts a land lease arrangement that could result in increased revenue for the airport. The sheet shows the following;

1. Prepare NE Area for Development of Hangars
2. Geothermal Loop in NE Area

9.8 AIRPORT LAND USE PLAN

The historical development of the airport defines the current land uses. The pattern of development has not been random, but has occurred in accordance with a general land use strategy managed by the airport over the years. The land uses shown on Sheet 10 are general in character and broad in definition in order to provide flexibility in development opportunities for the airport and potential tenants while maintaining the primary mission of the airport to continue to function as a safe and efficient air transportation facility. Four general land use classifications have been developed. These are identified and described in the sections below.

Designator	Definition	Explanation
A	Aviation	Includes runways, taxiways, and all other elements required for safe operation of the airport (navaids, Runway Protection Zones, etc.) This category also includes areas on the airport that required for maintenance and/or operations.
TA	Terminal Area (Airfield)	This designator is applied to the aircraft apron adjacent to the terminal building. Including both the Part 135 and 121 aprons.
TL	Terminal Area (Landside)	Includes the passenger terminal building and the access and public parking areas.
C	Commercial Aviation	The area set aside for RON positions, a relocated ATCT and other facilities needed to support commercial aviation, including FBO facilities and aircraft oriented businesses.
GA	General Aviation	Area reserved for general aviation hangars and tiedowns
AC	Air Cargo	Cargo processing buildings and aircraft load/unload positions are included.
A-R	Airport Reserve	Areas under airport ownership that are reserved for potential development in the future.
A - RH	Airport Reserve - Helicopter	Area reserved for helicopter operations
G	General	Areas of non-aviation use
A-G	Government - Aviation	Reserved for the activity of governmental agencies
O	Open Space	Reserved as open space
I	CBJ Industrial	
RR	Rural Reserve	Area that will remain undeveloped unless as allowed under City Code.

Sheet 10 also shows the noise contours generated `using the Integrated Noise Model (INM) for the year 2035. As shown, the aircraft generated noise above 65 DNL is fully contained on airport property.

9.9 AIRPORT PROPERTY MAP

The Airport Property Map is shown on Sheet 11. The information on the map details the property acquisition history at the airport. The tabular information shows the parcel numbers, type of acquisition (fee simple or avigation easement), and the Federal program under which the property was purchased.

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JUNEAU
INTERNATIONAL AIRPORT
ALASKA'S CAPITAL CITY

JUNEAU INTERNATIONAL AIRPORT

2017 Airport Layout Plan Drawing Set

AIP NUMBER: 3-16-0133-059-2013
AERONAUTICAL STUDY NUMBER: 2017-AAL-190-NRA

SHEET INDEX

AECOM
1111 3rd AVENUE, SUITE 1600
SEATTLE, WA 98101
PHONE: 206-438-2700

PROJECT MANAGER:	JJY	DRAFTED BY:	RLO
DESIGNED BY:	RLO	CHECKED BY:	JJY

#	REVISION	COMPANY	BY	DATE

APPROVAL: CITY/BOROUGH OF JUNEAU

Name / Title Date

JUNEAU INTERNATIONAL AIRPORT
AIRPORT MASTER PLAN

TITLE SHEET

SCALE:
DATE: DECEMBER 2017

AIP NUMBER: 3-16-0133-059-2013
ASN: 2017-AAL-190-NRA
SHEET NUMBER: 1 OF 11

JNU - Sheet 01 (Title).dwg

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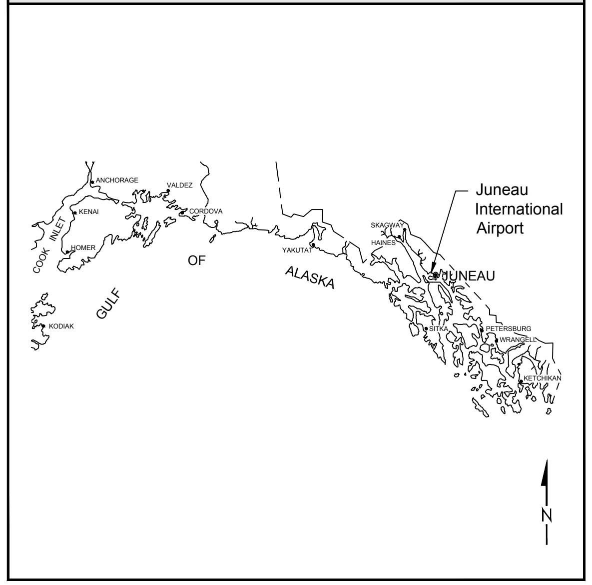
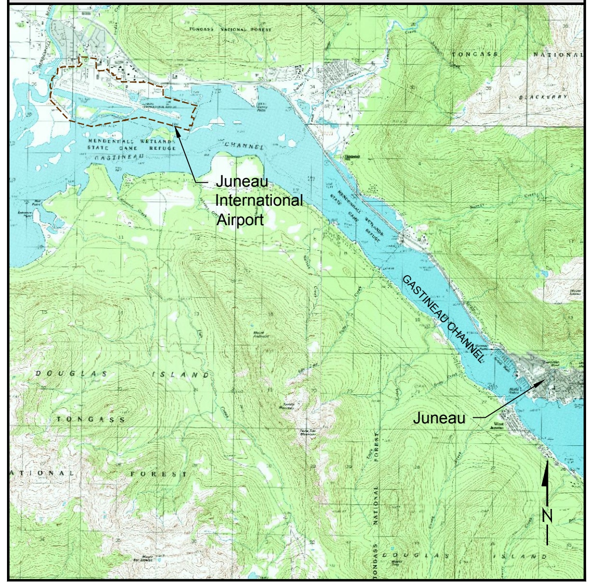
AIRPORT VICINITY



AIRPORT LOCATION



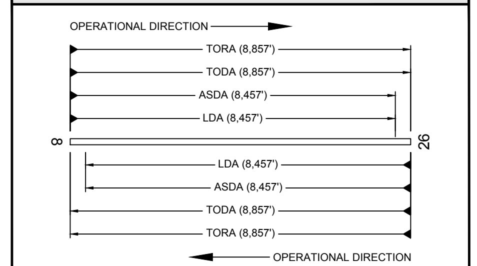
AIRPORT DATA TABLE

ITEM		EXISTING	PROPOSED
AIRPORT TERMINAL CODE		JNU	NO CHANGE
AIRPORT ELEVATION (MSL)		25.3'	NO CHANGE
AIRPORT REFERENCE POINT (ARP)	LAT.	58° 21' 16.9625" N	NO CHANGE
(NAD83)	LON.	134° 34' 42.4939" W	NO CHANGE
MEAN MAX. TEMP. OF HOTTEST MONTH		65°F (JULY)	NO CHANGE
COMBINED WIND COVERAGE (ALL WEATHER)		100.00% (16 KNOTS)	NO CHANGE
MAGNETIC DECLINATION & YEAR		20° 02' E (2015)	-0.19° W / YEAR
AIRPORT REFERENCE CODE (ARC)		C-III	D-III
CRITICAL AIRCRAFT 1,000 MILE STAGE LENGTH		BOEING 737-400	BOEING 737-900W
NPIAS SERVICE LEVEL		COMMERCIAL SERVICE, PRIMARY	NO CHANGE
TAXIWAY LIGHTING		MITL	NO CHANGE
TAXIWAY MARKING		STANDARD	NO CHANGE
AIRPORT & TERMINAL NAVAIDS		BEACON, NDB, LDA, LDIN, RVR	BEACON, NDB, LDA, LDIN, RVR, ADS-B

MODIFICATION TO STANDARDS

DATE	AIRSPACE CASE NO.	STANDARD MODIFIED	DESCRIPTION
-	NO STANDARDS MODIFIED	NO STANDARDS MODIFIED	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

DECLARED DISTANCES



RUNWAY	TORA	TODA	ASDA	LDA
8	8,857'	8,857'	8,457'	8,457'
26	8,857'	8,857'	8,457'	8,457'
8W	4,600'	4,600'	4,600'	4,600'
26W	4,600'	4,600'	4,600'	4,600'

RUNWAY DATA TABLE

ITEM		RUNWAY 8-26 EXISTING		RUNWAY 8-26 PROPOSED		WATERWAY 8W-26W EXISTING		WATERWAY 8W-26W PROPOSED	
RUNWAY IDENTIFICATION		OTHER THAN UTILITY		NO CHANGE		UTILITY		NO CHANGE	
RUNWAY DESIGN CODE (RDC)		C-III		D-III		A-II		NO CHANGE	
RUNWAY REFERENCE CODE (RRC)		C/III/4000		D/III/4000		A/II/4000		NO CHANGE	
PAVEMENT TYPE/TREATMENT		ASPHALT (GROOVED)		NO CHANGE		WATER		NO CHANGE	
PAVEMENT DESIGN STRENGTH (x1,000 LBS)	SINGLE GEAR:	120		NO CHANGE		N/A		NO CHANGE	
	DUAL GEAR:	250		NO CHANGE		N/A		NO CHANGE	
	DUAL TANDEM GEAR:	550		NO CHANGE		N/A		NO CHANGE	
PAVEMENT DESIGN STRENGTH (PCN)		89/F/C/X/T		NO CHANGE		N/A		NO CHANGE	
EFFECTIVE RUNWAY GRADIENT		0.02%		NO CHANGE		0.00%		NO CHANGE	
LINE-OF-SITE		NO ISSUES		NO CHANGE		NO ISSUES		NO CHANGE	
PERCENT WIND COVEREAGE (16 KNOT)		100.00%		NO CHANGE		100.00%		NO CHANGE	
RUNWAY DIMENSIONS		STANDARD	ACTUAL			STANDARD	ACTUAL		
	WIDTH:	150'	150'	NO CHANGE		200'	200'	NO CHANGE	
	LENGTH:	8,857'		NO CHANGE		2,500'	4,600'	NO CHANGE	
DISPLACED THRESHOLD (DISTANCE/ELEVATION)		NONE		NO CHANGE		NONE		NO CHANGE	
RUNWAY SAFETY AREA (RSA)		STANDARD	ACTUAL			STANDARD	ACTUAL		
	LENGTH BEYOND DEPARTURE END:	1,000'	600'	NO CHANGE		300'	300'	NO CHANGE	
	LENGTH PRIOR TO THRESHOLD:	600'	600'	NO CHANGE		300'	300'	NO CHANGE	
	WIDTH:	500'	500'	NO CHANGE		150'	150'	NO CHANGE	
END COORDINATES (NAD 83): [2]		RW 8	RW 26	RW 8	RW 26	RW 8W	RW 26W	RW 8W	RW 26W
	LATITUDE:	58°21'28.25" N	58°21'05.88" N	NO CHANGE	NO CHANGE	58°21'22.82" N	58°21'11.21" N	NO CHANGE	NO CHANGE
	LONGITUDE:	134°35'49.09" W	134°33'08.63" W	NO CHANGE	NO CHANGE	134°35'52.23" W	134°34'28.89" W	NO CHANGE	NO CHANGE
RUNWAY ORIENTATION		N 75°08'44.50" W		NO CHANGE		N 75°08'44.50" W		NO CHANGE	
RUNWAY LIGHTING		HIRL		NO CHANGE		NONE		NO CHANGE	
RUNWAY PROTECTION ZONE (RPZ)		RW 8	RW 26	RW 8	RW 26	RW 8W	RW 26W	RW 8W	RW 26W
	LENGTH:	1,700'	1,700'	NO CHANGE	NO CHANGE	1,000'	1,000'	NO CHANGE	NO CHANGE
	INNER WIDTH:	500'	500'	NO CHANGE	NO CHANGE	250'	250'	NO CHANGE	NO CHANGE
	OUTER WIDTH:	1,010'	1,010'	NO CHANGE	NO CHANGE	450'	450'	NO CHANGE	NO CHANGE
MARKING		NON PRECISION	NON PRECISION	NO CHANGE	NO CHANGE	N/A	N/A	NO CHANGE	NO CHANGE
14 CFR PART 77 APPROACH SLOPE		34:1	34:1	NO CHANGE	NO CHANGE	20:1	20:1	NO CHANGE	NO CHANGE
APPROACH TYPE		NPI	NPI	NO CHANGE	NO CHANGE	VISUAL	VISUAL	NO CHANGE	NO CHANGE
VISIBILITY MINIMUMS		≥1 NM	≥ 1 NM	NO CHANGE	NO CHANGE	VISUAL	VISUAL	NO CHANGE	NO CHANGE
TYPE OF AERONAUTICAL SURVEY REQUIRED		NVG	NVG	NO CHANGE	NO CHANGE	NVG	NVG	NO CHANGE	NO CHANGE
RUNWAY DEPARTURE SURFACE		40:1	40:1	NO CHANGE	NO CHANGE	20:1	20:1	NO CHANGE	NO CHANGE
OBJECT FREE AREA (OFA)		STANDARD	ACTUAL			STANDARD	ACTUAL		
	LENGTH BEYOND DEPARTURE END:	600'	600'	NO CHANGE		240'	240'	NO CHANGE	
	LENGTH PRIOR TO THRESHOLD:	1,000'	600'	NO CHANGE		240'	240'	NO CHANGE	
	WIDTH:	800'	730'	NO CHANGE		250'	250'	NO CHANGE	
OBSTACLE FREE ZONE (OFZ)		(NO OFZ OBJECT PENETRATIONS)		(NO OFZ OBJECT PENETRATIONS)		(NO OFZ OBJECT PENETRATIONS)		(NO OFZ OBJECT PENETRATIONS)	
	WIDTH:	400'	400'	NO CHANGE		400'	400'	NO CHANGE	
	LENGTH BEYOND RW END:	200'	200'	NO CHANGE		200'	200'	NO CHANGE	
THRESHOLD SITING SURFACE (TSS)		RW 8	RW 26	RW 8	RW 26	RW 8W	RW 26W	RW 8W	RW 26W
		(NO TSS PENETRATIONS)		(NO TSS PENETRATIONS)		(NO TSS PENETRATIONS)		(NO TSS PENETRATIONS)	
		APRCH 34:1	APRCH 34:1	NO CHANGE	NO CHANGE	APRCH 20:1	APRCH 20:1	NO CHANGE	NO CHANGE
NAVAIDS	VISUAL:	MALSF, LDIN VASI	MALS, PAPI, REILS	MALSF, LDIN VASI	NO CHANGE	NONE	NONE	NO CHANGE	NO CHANGE
	INSTRUMENT:	GPS, ILS, LDA/DME	GPS	NO CHANGE	NO CHANGE	NONE	NONE	NO CHANGE	NO CHANGE
TOUCHDOWN ZONE ELEVATION		25.0'	23.4'	NO CHANGE	NO CHANGE	12'	12'	NO CHANGE	NO CHANGE

TAXIWAY DATA TABLE

ITEM	TAXIWAY A *		TAXIWAY B *		TAXIWAY B-1		TAXIWAY B-2		TAXIWAY C	
AIRPLANE DESIGN GROUP (ADG)	III		III		II		II		III	
TAXIWAY DESIGN GROUP (TDG)	3		3		2		2		3	
	STANDARD	ACTUAL	STANDARD	ACTUAL	STANDARD	ACTUAL	STANDARD	ACTUAL	STANDARD	ACTUAL
TAXIWAY/TAXILANE WIDTH	50'	75'	50'	102.5'	35'	35'	35'	75'	50'	260'
TAXIWAY/TAXILANE SAFETY AREA (TSA) WIDTH	118'	118'	118'	118'	79'	79'	79'	118'	118'	118'
TAXIWAY/TAXILANE OBJECT FREE AREA (TOFA)	186'/162'	186'	186'/162'	186'	131'/115'	131'	131'/115'	186'	186'/162'	186'/162'
TAXIWAY/TAXILANE SEPARATION	160'	233'	160'	-	70'	-	70'	-	160'	-
TAXIWAY/TAXILANE LIGHTING	MITL	-	MITL	-	MITL	-	MITL	-	MITL	-
ITEM	**TAXIWAY C-1**		**TAXIWAY D**		**TAXIWAY D-1**		**TAXIWAY D-2**		**TAXIWAY E**	
AIRPLANE DESIGN GROUP (ADG)	III		III		II		II		III	
TAXIWAY DESIGN GROUP (TDG)	3		3		2		2		3	
	STANDARD	ACTUAL	STANDARD	ACTUAL	STANDARD	ACTUAL	STANDARD	ACTUAL	STANDARD	ACTUAL
TAXIWAY/TAXILANE WIDTH	50'	92'	50'	50'	35'	35'	35'	40'	50'	100'
TAXIWAY/TAXILANE SAFETY AREA (TSA) WIDTH	118'	118'	118'	118'	79'	79'	79'	79'	118'	118'
TAXIWAY/TAXILANE OBJECT FREE AREA (TOFA)	186'/162'	186'	186'/162'	186'	131'/115'	131'/115'	131'/115'	131'	186'/162'	186'
TAXIWAY/TAXILANE SEPARATION	160'	-	160'	-	70'	-	70'	-	160'	-
TAXIWAY/TAXILANE LIGHTING	MITL	-	MITL	-	MITL	-	MITL	-	MITL	-
ITEM	**TAXIWAY E-1**		**TAXIWAY F**		**TAXIWAY F-1**		**TAXIWAY G ***			
AIRPLANE DESIGN GROUP (ADG)	III		III		II		III			
TAXIWAY DESIGN GROUP (TDG)	3		3		2		3			
	STANDARD	ACTUAL	STANDARD	ACTUAL	STANDARD	ACTUAL	STANDARD	ACTUAL		
TAXIWAY/TAXILANE WIDTH	50'	75'	50'	75'	35'	40'	50'	242'		
TAXIWAY/TAXILANE SAFETY AREA (TSA) WIDTH	118'	171'	118'	118'	79'	79'	118'	118'		
TAXIWAY/TAXILANE OBJECT FREE AREA (TOFA)	186'/162'	259'	186'/162'	186'	131'/115'	131'	186'/162'	186'		
TAXIWAY/TAXILANE SEPARATION	160'	-	160'	-	70'	-	160'	-		
TAXIWAY/TAXILANE LIGHTING	MITL	-	MITL	-	MITL	-	MITL	-		

*** Taxiway Pavement Design Strength (PCN)**
Taxiway A: 79/F/C/W/T
Taxiway B: 79/F/C/W/T
Taxiway G: 79/F/C/W/T

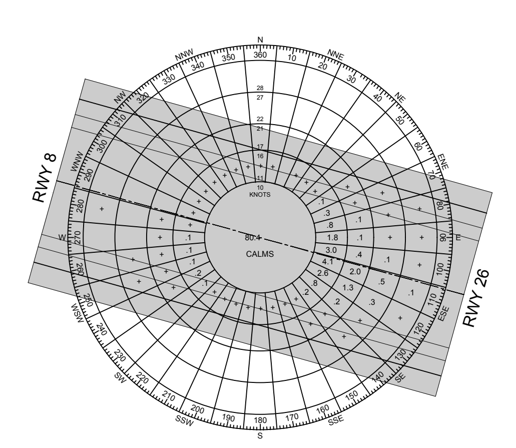
ABBREVIATIONS

ITEM	DEFINITION
ARFF	AIRCRAFT RESCUE FIRE FIGHTING
ARP	AIRPORT REFERENCE POINT
ASD-B	AUTOMATIC DEPENDENT SUVEILLANCE-BROADCAST
ASDA	ACCELERATE STOP DISTANCE AVAILABLE
ASOS	AUTOMATED SURFACE OBSERVING SYSTEM
ASR	AIRPORT SURVEILLANCE RADAR
ATCT	AIRPORT TRAFFIC CONTROL TOWER
BRL	BUILDING RESTRICTION LINE
HIRL	HIGH INTENSITY RUNWAY LIGHTS
IFR	INSTRUMENT FLIGHT RULES
ILS	INSTRUMENT LANDING SYSTEM
LDA	LOCALIZER DIRECTIONAL AID
	LANDING DISTANCE AVAILABLE
LDIN	LEAD-IN LIGHTS
MALS	MEDIUM INTENSITY APPROACH LIGHTING SYSTEM
MALSF	MEDIUM INTENSITY APPROACH LIGHTING SYSTEM WITH SEQUENCED FLASHING LIGHTS
MITL	MEDIUM INTENSITY TAXIWAY LIGHTS
MSL	MEAN SEA LEVEL
NDB	NON-DIRECTIONAL BEACON

ABBREVIATIONS

ITEM	DEFINITION
NPI	NON-PRECISION INSTRUMENT APPROACH
NPIAS	NATL. PLAN OF INTEGRATED AIRPORT SYSTEMS
NVG	NOT VERTICALLY GUIDED
OFA	RUNWAY OBJECT FREE AREA
OFZ	RUNWAY OBJECT FREE ZONE
PAPI	PRECISION APPROACH PATH INDICATOR
PIR	PRECISION INSTRUMENT APPROACH
RAC	RENT-A-CAR
REIL	RUNWAY END IDENTIFIER LIGHTS
RNAV	AREA NAVIGATION
RPZ	RUNWAY PROTECTION ZONE
RSA	RUNWAY SAFETY AREA
RVR	RUNWAY VISUAL RANGE
RVZ	RUNWAY VISIBILITY ZONE
SRE	SNOW REMOVAL EQUIPMENT
TODA	TAKE OFF DISTANCE AVAILABLE
TOFA	TAXIWAY OBJECT FREE AREA
TORA	TAKE OFF RUN AVAILABLE
VASI	VISUAL APPROACH SLOPE INDICATOR
VFR	VISUAL FLIGHT RULES

ALL-WEATHER WIND ROSE

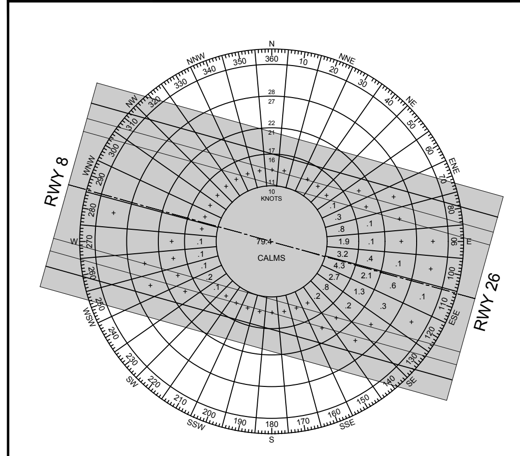


ALL-WEATHER (121,830 OBSERVATIONS)

CROSSWIND	RWY 8-26
10.5 KNOTS	96.65%
13 KNOTS	99.92%
16 KNOTS	100.0%
20 KNOTS	100.0%

NOAA WEATHER REPORTING STATION: 703810 JUNEAU, AK
OBSERVATION PERIOD: 2006-2015

VISUAL FLIGHT RULES WIND ROSE

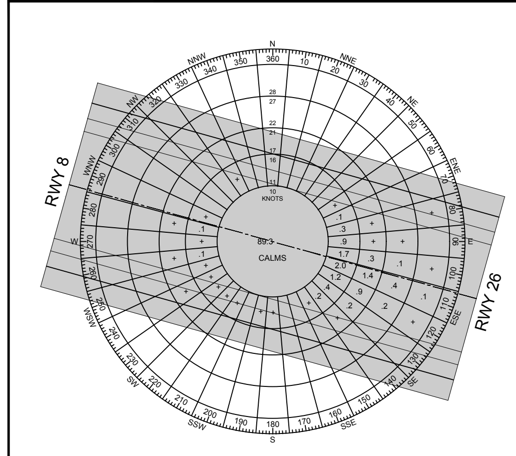


VFR (95,830 OBSERVATIONS)

CROSSWIND	RWY 8-26
10.5 KNOTS	99.62%
13 KNOTS	99.91%
16 KNOTS	100.0%
20 KNOTS	100.0%

NOAA WEATHER REPORTING STATION: 703810 JUNEAU, AK
OBSERVATION PERIOD: 2006-2015

INSTRUMENT FLIGHT RULES WIND ROSE



IFR (14,295 OBSERVATIONS)

CROSSWIND	RWY 8-26
10.5 KNOTS	99.89%
13 KNOTS	99.97%
16 KNOTS	100.0%
20 KNOTS	100.0%

NOAA WEATHER REPORTING STATION: 703810 JUNEAU, AK
OBSERVATION PERIOD: 2006-2015

NOTES

1. THE HORIZONTAL DATUM IS NAD83(CORS96) (EPOCH:2010.00).
2. THE VERTICAL DATUM IS NAV88 ORTHOMETRIC HEIGHTS. THE BASIS OF ELEVATIONS IS THE NATIONAL GEODETIC SURVEY (NGS) PRIMARY AIRPORT CONTROL STATION (PACS) "JNU C", PIS AI4906, HAVING A NAVD 88 ORTHOMETRIC HEIGHT OF 21,526 FEET. THE NAVD99 ORTHOMETRIC HEIGHT FOR THIS POINT WAS DETERMINED BY UTILIZING THE NGS PUBLISHED ELLIPSOID HEIGHT AND A HIGH-RESOLUTION GEOID MODEL (GEOID-09).
3. TO CONVERT FROM NAVD88 HEIGHT TO MEAN LOWER LOW WATER (MLLW) ADD 3.72' TO THE NAVD88 HEIGHT. FOR EXAMPLE, JNUC AS LISTED IN THE SURVEY CONTROL SHEET HAS A MLLW ELEVATION OF 25.23' AND A NAVD88 HEIGHT OF 21.51'.

APPROVAL: **FEDERAL AVIATION ADMINISTRATION**

KATRINA MOSS, LEAD COMMUNITY PLANNER — Date

AECOM
1111 3rd AVENUE, SUITE 1600
SEATTLE, WA 98101
PHONE: 206-438-2700

PROJECT MANAGER:	JJY	DRAFTED BY:	RLO
DESIGNED BY:	RLO	CHECKED BY:	JJY

#	REVISION	COMPANY	BY	DATE

THE PREPARATION OF THIS AIRPORT LAYOUT PLAN (ALP) WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION (FAA) AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICIES OF THE FAA. ACCEPTANCE OF THIS ALP BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED THEREIN NOR DOES IT IMPLY THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS.

APPROVAL: **CITY/BOROUGH OF JUNEAU**

Name / Title — Date

JUNEAU INTERNATIONAL AIRPORT
ALASKA'S CAPITAL CITY

JUNEAU INTERNATIONAL AIRPORT
AIRPORT MASTER PLAN

AIRPORT DATA SHEET

SCALE:
DATE: DECEMBER 2017

AIP NUMBER: 3-16-0133-059-2013
ASN: 2017-AAL-190-NRA
SHEET NUMBER: 2 OF 11

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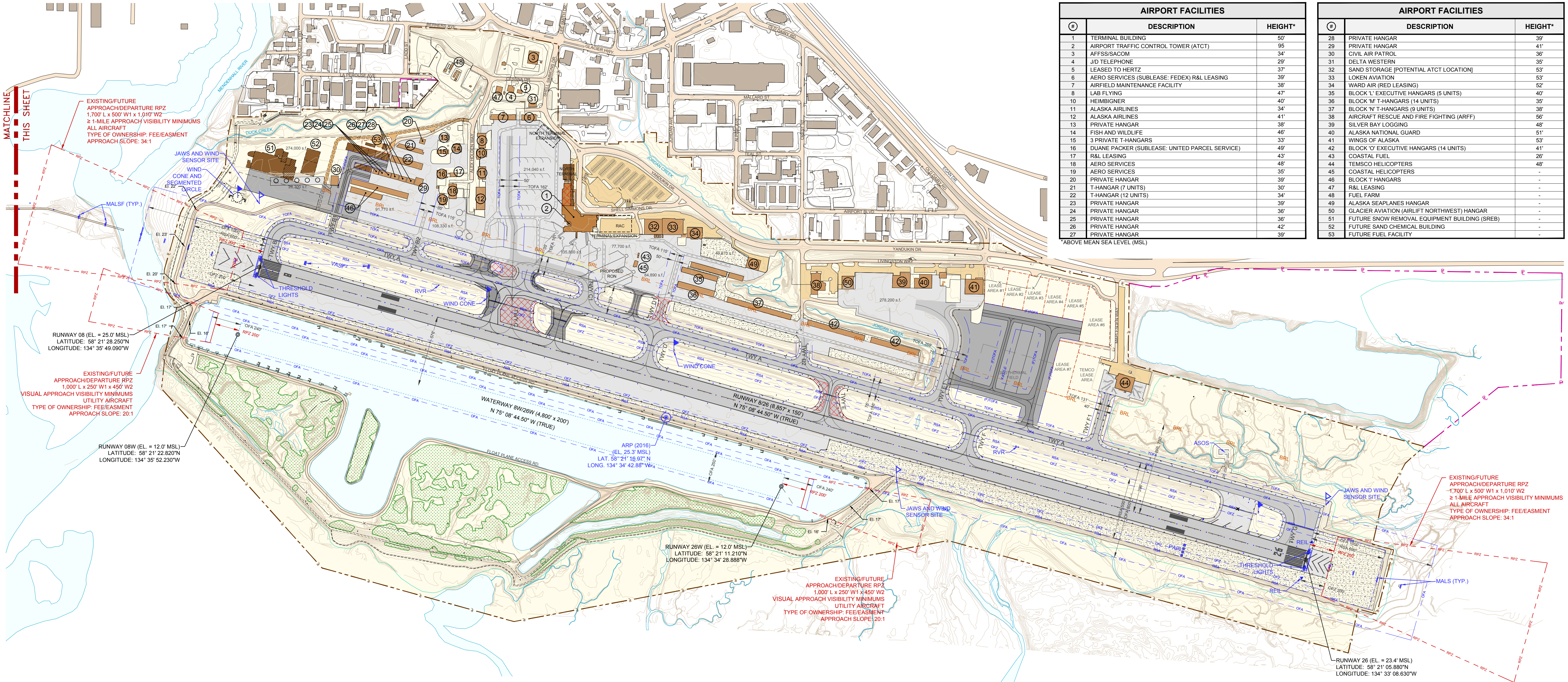


AIRPORT FACILITIES

#	DESCRIPTION	HEIGHT*
1	TERMINAL BUILDING	50'
2	AIRPORT TRAFFIC CONTROL TOWER (ATCT)	95
3	AFFSS/SACOM	34'
4	J/D TELEPHONE	29'
5	LEASED TO HERTZ	37'
6	AERO SERVICES (SUBLEASE: FEDEX) R&L LEASING	39'
7	AIRFIELD MAINTENANCE FACILITY	38'
8	LAB FLYING	47'
10	HEIMBIGNER	40'
11	ALASKA AIRLINES	34'
12	ALASKA AIRLINES	41'
13	PRIVATE HANGAR	38'
14	FISH AND WILDLIFE	46'
15	3 PRIVATE T-HANGARS	33'
16	DUANE PACKER (SUBLEASE: UNITED PARCEL SERVICE)	49'
17	R&L LEASING	43'
18	AERO SERVICES	48'
19	AERO SERVICES	35'
20	PRIVATE HANGAR	39'
21	T-HANGAR (7 UNITS)	30'
22	T-HANGAR (12 UNITS)	34'
23	PRIVATE HANGAR	39'
24	PRIVATE HANGAR	36'
25	PRIVATE HANGAR	36'
26	PRIVATE HANGAR	42'
27	PRIVATE HANGAR	39'

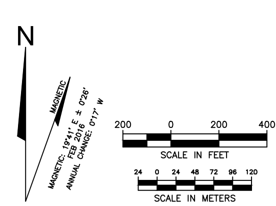
*ABOVE MEAN SEA LEVEL (MSL)

AIRPORT FACILITIES

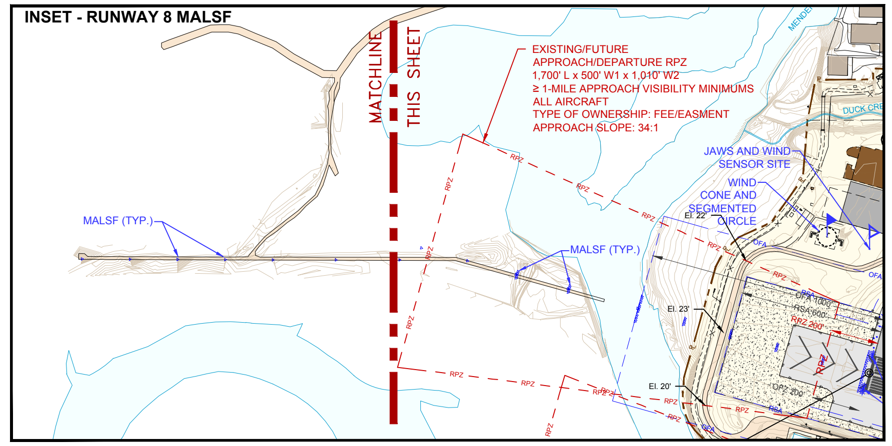
#	DESCRIPTION	HEIGHT*
28	PRIVATE HANGAR	39'
29	PRIVATE HANGAR	41'
30	CIVIL AIR PATROL	36'
31	DELTA WESTERN	35'
32	SAND STORAGE [POTENTIAL ATCT LOCATION]	53'
33	LOKEN AVIATION	53'
34	WARD AIR (RED LEASING)	52'
35	BLOCK 'L' EXECUTIVE HANGARS (5 UNITS)	40'
36	BLOCK 'M' T-HANGARS (14 UNITS)	35'
37	BLOCK 'N' T-HANGARS (9 UNITS)	38'
38	AIRCRAFT RESCUE AND FIRE FIGHTING (ARFF)	56'
39	SILVER BAY LOGGING	48'
40	ALASKA NATIONAL GUARD	51'
41	WINGS OF ALASKA	53'
42	BLOCK 'O' EXECUTIVE HANGARS (14 UNITS)	41'
43	COASTAL FUEL	26'
44	TEMSCO HELICOPTERS	48'
45	COASTAL HELICOPTERS	-
46	BLOCK 'I' HANGARS	-
47	R&L LEASING	-
48	FUEL FARM	-
49	ALASKA SEAPLANES HANGAR	-
50	GLACIER AVIATION (AIRLIFT NORTHWEST) HANGAR	-
51	FUTURE SNOW REMOVAL EQUIPMENT BUILDING (SREB)	-
52	FUTURE SAND CHEMICAL BUILDING	-
53	FUTURE FUEL FACILITY	-

LEGEND

DESCRIPTION	EXISTING	PROPOSED
AIRFIELD UNPAVED AREAS		NO CHANGE
AIRFIELD PAVEMENT		
AIRPORT PROPERTY		℄
AIRPORT REFERENCE POINT (ARP)		NO CHANGE
AUTOMOBILE PARKING - ON AIRPORT		
BUILDING - OFF AIRPORT		NOT APPLICABLE
BUILDING - ON AIRPORT		
BUILDING RESTRICTION LINE (BRL)	BRL	NO CHANGE
FENCE	X X X	NO CHANGE
HOLDING POSITION MARKING		NO CHANGE
JUNEAU AIRPORT WIND SYSTEM (JAWS)		NO CHANGE
PRECISION APPROACH PATH INDICATOR	PAPI	NO CHANGE
ROADWAY		
RUNWAY END IDENTIFIER LIGHTS (REIL)		NO CHANGE
RUNWAY OBJECT FREE AREA (OFA)	OFA	NO CHANGE
RUNWAY OBJECT FREE ZONE (OFZ)	OFZ	NO CHANGE
RUNWAY PROTECTION ZONE (RPZ)	RPZ	NO CHANGE
RUNWAY SAFETY AREA (RSA)	RSA	NO CHANGE
TAXIWAY OBJECT FREE AREA (TOFA)	TOFA	(F)TOFA
TO BE REMOVED	NA	
TOPOGRAPHIC CONTOUR	10	NO CHANGE
TREES		NO CHANGE
VISUAL APPROACH SLOPE INDICATOR (VASI)	VASI	NO CHANGE
WIND SOCK		NO CHANGE



INSET - RUNWAY 8 MALSF



NOTES

1. SEE SHEET 9 OF 11 FOR DETAILS ON LANDSIDE DEVELOPMENT.
2. THE BUILDING RESTRICTION LINE (BRL) IS BASED ON A MAXIMUM BUILDING HEIGHT OF 36 FEET AT A 250' DISTANCE FROM THE PRIMARY SURFACE. MAXIMUM ALLOWABLE BUILDING HEIGHT FROM THE BRL INCREASES AT A 7:1 HORIZONTAL TO VERTICAL SLOPE UPWARD AND AWAY FROM THE PRIMARY SURFACE IN CONFORMANCE WITH FAR PART 77 SURFACES.
3. RUNWAY PROTECTION ZONE CONTROL IS VIA OWNERSHIP AND EASEMENT BOTH RUNWAY ENDS.
4. TAXIWAY A IS NOT PARALLEL TO RUNWAY 8-26

APPROVAL: **FEDERAL AVIATION ADMINISTRATION**

KATRINA MOSS, LEAD COMMUNITY PLANNER　　Date

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1111 3rd AVENUE, SUITE 1600
SEATTLE, WA 98101
PHONE: 206-438-2700

PROJECT MANAGER:	JJY	DRAFTED BY:	RLO
DESIGNED BY:	RLO	CHECKED BY:	JJY

#	REVISION	COMPANY	BY	DATE

THE PREPARATION OF THIS AIRPORT LAYOUT PLAN (ALP) WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION (FAA) AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICIES OF THE FAA. ACCEPTANCE OF THIS ALP BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED THEREIN NOR DOES IT IMPLY THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS.

APPROVAL: **CITY/BOROUGH OF JUNEAU**

Name / Title　　Date

JUNEAU INTERNATIONAL AIRPORT
ALASKA'S CAPITAL CITY

JUNEAU INTERNATIONAL AIRPORT
AIRPORT MASTER PLAN

AIRPORT LAYOUT PLAN

SCALE: 1" = 400'
DATE: DECEMBER 2017

AIP NUMBER: 3-16-0133-059-2013
ASN: 2017-AAL-190-NRA
SHEET NUMBER: 3 OF 11

JNU - Sheet 03 (ALP).dwg

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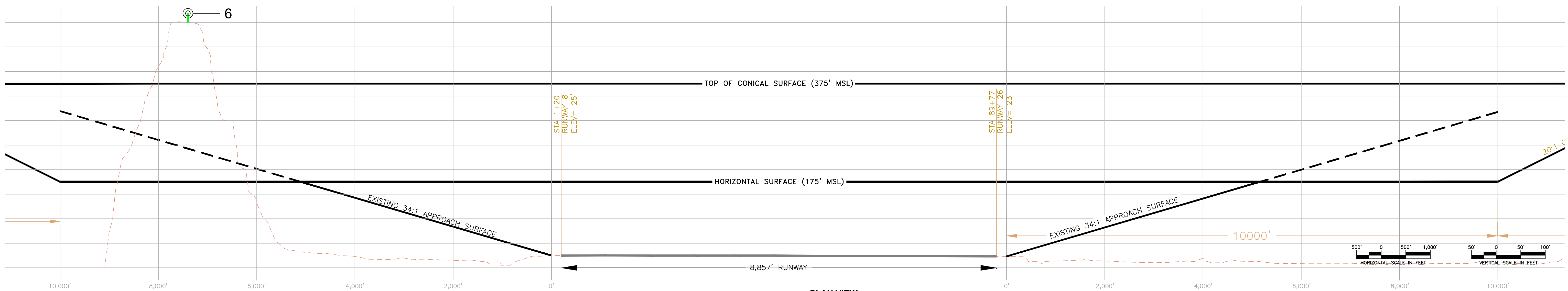
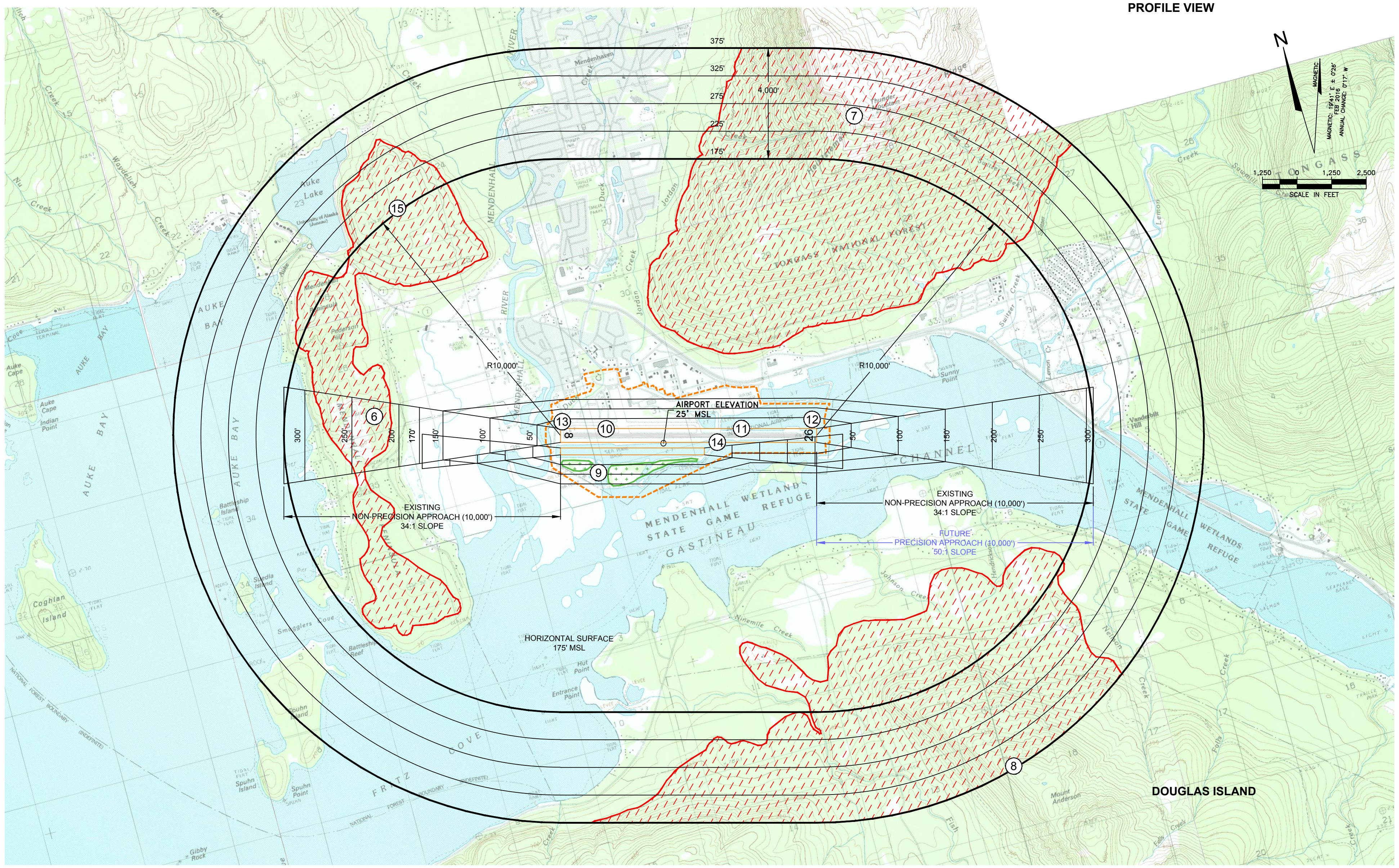


PLAN VIEW

PROFILE VIEW



OBSTRUCTION DATA TABLE								
#	DESCRIPTION	SURVEY DATE	GROUND ELEV.	OBJECT ELEV.	SURFACE	SURFACE ELEV.	PNTR.	CORRECTIVE ACTION
1-5	SEE SHEETS 6 & 7 FOR DETAILS							
6	TERRAIN	-	500'	500'	34:1 APPROACH	255'	245'	NONE
7	TERRAIN	-	2,900'	2,900'	CONICAL	280'	2,620'	NONE
8	TERRAIN	-	2,100'	2,100'	CONICAL	383'	1,717'	NONE
9	TREES	-	25'	70'	TRANSITIONAL	55'	15'	NONE
10	RVR	-	-	37'	PRIMARY	29'	8'	NONE
11	RVR	-	-	28'	PRIMARY	23'	5'	NONE
12	JAWS	-	-	48'	PRIMARY	23'	25'	NONE
13	JAWS	-	-	50'	PRIMARY	24'	26'	NONE
14	JAWS	-	-	51'	PRIMARY	25'	26'	NONE
15	TERRAIN	-	560'	560'	CONICAL	212'	348'	NONE
	TERRAIN	-	VARIES	VARIES	34:1 APPROACH, TRANSITIONAL, HORIZONTAL, CONICAL	VARIES	VARIES	NONE
	TREES	-	VARIES	VARIES	34:1 APPROACH, TRANSITIONAL, HORIZONTAL, CONICAL	VARIES	VARIES	REMOVE AS NECESSARY

FAR PART 77 DIMENSIONAL STANDARDS		
ITEM	RUNWAY 8	RUNWAY 26
RUNWAY TYPE	NON-PRECISION INSTRUMENT OTHER THAN UTILITY, VISIBILITY MINIMUMS NOT LESS THAN 1-MILE	NON-PRECISION INSTRUMENT OTHER THAN UTILITY, VISIBILITY MINIMUMS NOT LESS THAN 1-MILE
APPROACH SLOPE	34:1	34:1
APPROACH SURFACE - INNER WIDTH	500'	500'
APPROACH SURFACE - OUTER WIDTH	3,500'	3,500'
APPROACH SURFACE - LENGTH	10,000'	10,000'
PRIMARY SURFACE - WIDTH	500'	
RADIUS OF HORIZONTAL SURFACE	10,000'	
	RUNWAY 8W	RUNWAY 26W
RUNWAY TYPE	UTILITY, VISUAL APPROACH	UTILITY, VISUAL APPROACH
APPROACH SLOPE	20:1	20:1
APPROACH SURFACE - INNER WIDTH	250'	250'
APPROACH SURFACE - OUTER WIDTH	1,125'	1,125'
APPROACH SURFACE - LENGTH	5,000'	5,000'
PRIMARY SURFACE - WIDTH	250'	
RADIUS OF HORIZONTAL SURFACE	5,000'	

LEGEND	
DESCRIPTION	SYMBOL
ELEVATION ABOVE MEAN SEA LEVEL (MSL)	EL.
AMOUNT OF OBJECT PENETRATION INTO PART 77 SURFACE	PNTR.
AREAS IN WHICH TERRAIN PENETRATES INTO PART 77 SURFACE	
AREAS IN WHICH TREES PENETRATE INTO PART 77 SURFACE	
AIRPORT PROPERTY	

NOTES

1. ELEVATION IN FEET ABOVE MEAN SEA LEVEL (MSL) AT TOP OF OBJECT. THIS VALUE INCLUDES 15 FEET ADDED TO NON-INTERSTATE ROADWAYS AND 23 FEET ADDED TO RAILROADS.
2. OBSTRUCTION DATA SOURCE: 2014 AIRPORT LAYOUT PLAN
3. SEE INNER APPROACH SURFACES DRAWINGS, SHEETS 5 AND 6 FOR CLOSE-IN DETAILS.
4. US GEOLOGICAL SURVEY (USGS) DIGITAL RASTER GRAPHIC (DRG) 7.5 MINUTE QUAD PROJECTED IN UNIVERSAL TRANSVERSE MERCATOR (UTM) ZONE 8. USGS MAPS DATED 1986. HORIZONTAL DATUM: NORTH AMERICAN DATUM (NAD) 1927, VERTICAL DATUM: NATIONAL GEODETIC VERTICAL DATUM 1929.

ONE INCH

AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

JNU - Sheet 04 (Airport Airspace Plan).dwg

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PROJECT MANAGER:	JJY	DRAFTED BY:	RLO
DESIGNED BY:	RLO	CHECKED BY:	JJY

#	REVISION	COMPANY	BY	DATE

JUNEAU INTERNATIONAL AIRPORT
AIRPORT MASTER PLAN

AIRSPACE PLAN

SCALE: VARIES
DATE: DECEMBER 2017

AIP NUMBER: 3-16-0133-059-2013

ASN: 2017-AAL-190-NRA

SHEET NUMBER: 4 OF 11

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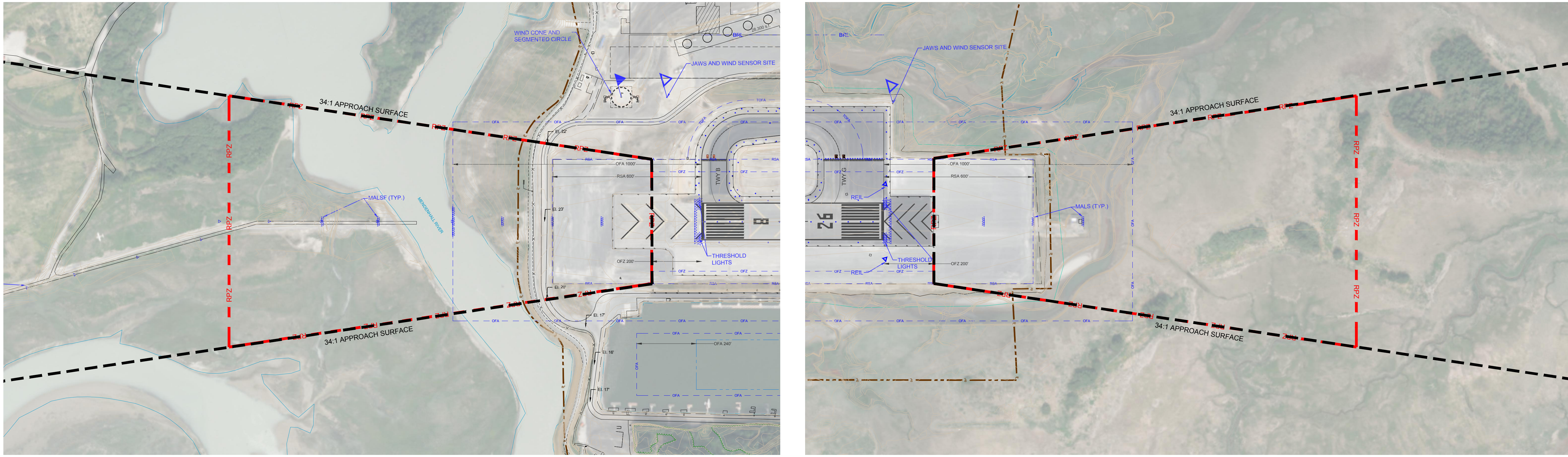
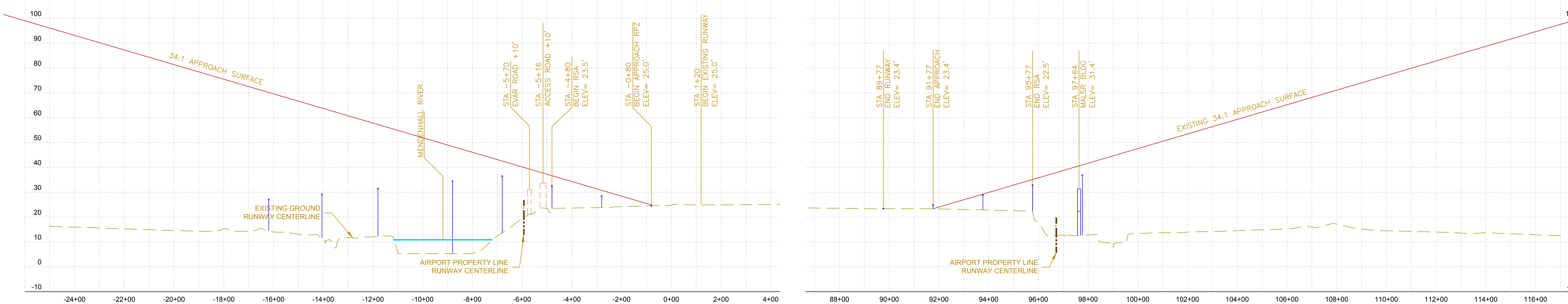
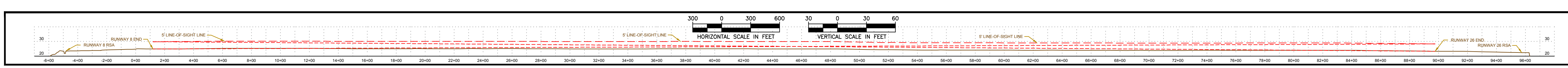


PLAN VIEW

PROFILE VIEW





NOTES

1. ELEVATION IN FEET ABOVE MEAN SEA LEVEL (MSL) AT TOP OF OBJECT.
2. TO CONVERT FROM NAVD88 HEIGHT TO MEAN LOWER LOW WATER (MLLW) ADD 3.72' TO THE NAVD88 HEIGHT. FOR EXAMPLE, JNUC AS LISTED IN THE SURVEY CONTROL SHEET HAS A MLLW ELEVATION OF 25.23' AND A NAVD88 HEIGHT OF 21.51'.

RUNWAY 8 - 34:1 INNER APPROACH SURFACE OBSTRUCTIONS

#	DESCRIPTION	SURVEY DATE	GROUND ELEV.	OBJECT ELEV.	SURFACE	SURFACE ELEV.	PNTR.	CORRECTIVE ACTION
-	NONE	-	-	-	-	-	-	-

RUNWAY 26 - 34:1 INNER APPROACH SURFACE OBSTRUCTIONS

#	DESCRIPTION	SURVEY DATE	GROUND ELEV.	OBJECT ELEV.	SURFACE	SURFACE ELEV.	PNTR.	CORRECTIVE ACTION
-	NONE	-	-	-	-	-	-	-

DECLARED DISTANCES

RUNWAY	TORA	TODA	ASDA	LDA
8	8,857'	8,857'	8,457'	8,457'
26	8,857'	8,857'	8,457'	8,457'

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PROJECT MANAGER:	JJY	DRAFTED BY:	RLO
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#	REVISION	COMPANY	BY	DATE

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N
MAGNETIC
MAGNETIC: 19°41' E ± 0°26'
FEB 2016
ANNUAL CHANGE: 0°17' W

100 0 100 200
HORIZONTAL SCALE IN FEET

10 0 10 20
VERTICAL SCALE IN FEET

JUNEAU INTERNATIONAL AIRPORT
ALASKA'S CAPITAL CITY

JUNEAU INTERNATIONAL AIRPORT
AIRPORT MASTER PLAN

INNER APPROACH SURFACE RUNWAY 8-26

SCALE: VARIES
DATE: DECEMBER 2017

AIP NUMBER: 3-16-0133-059-2013
ASN: 2017-AAL-190-NRA
SHEET NUMBER: 5 OF 11

JNU - Sheet 05 (Inner Approach Surface - 8-26).dwg

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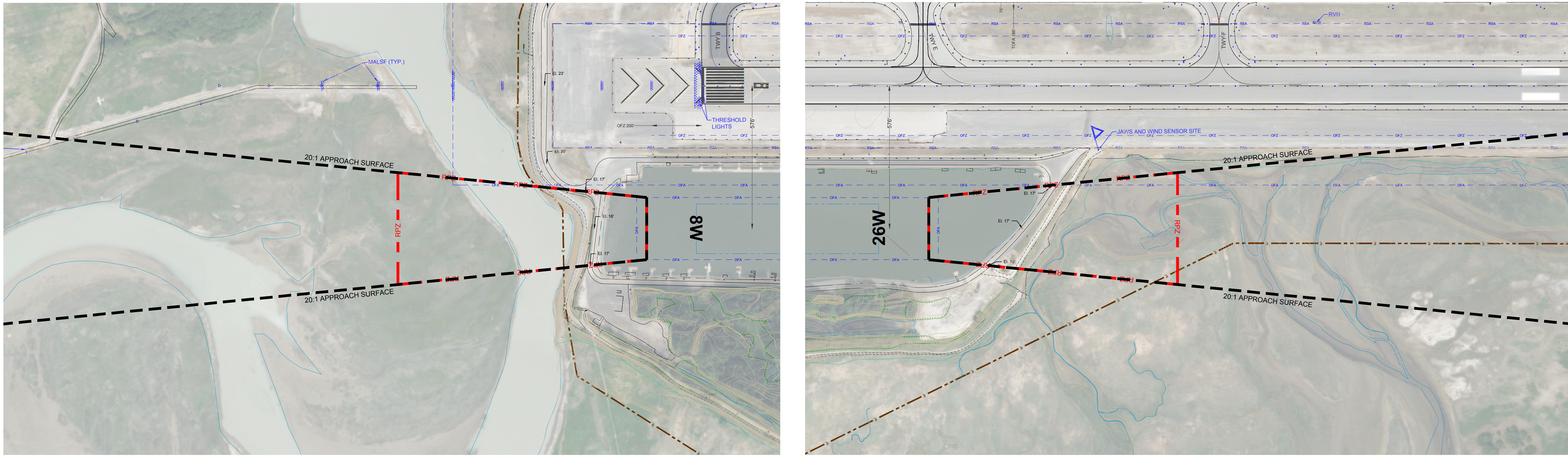
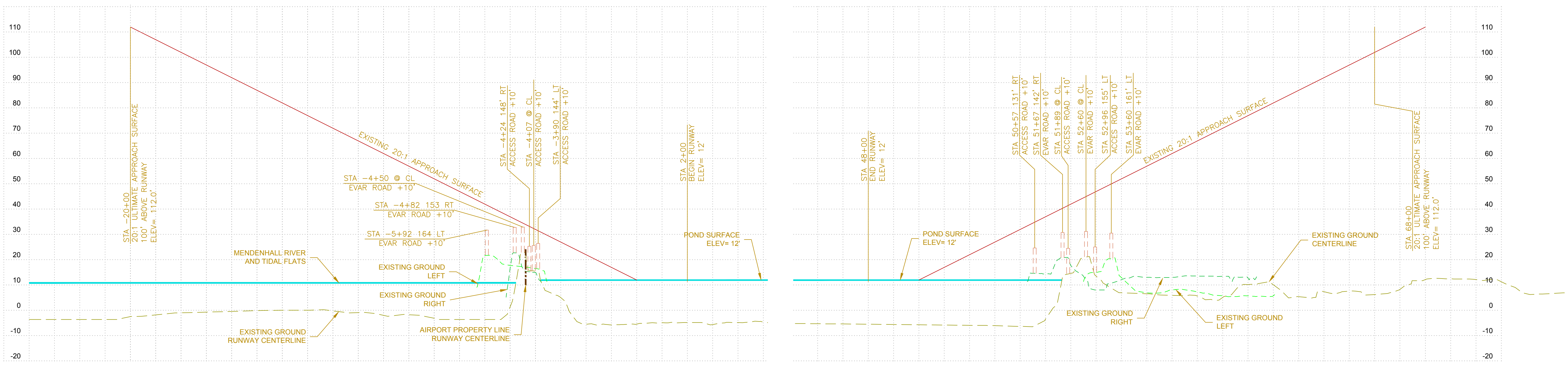


PLAN VIEW

PROFILE VIEW



NOTES

1. ELEVATION IN FEET ABOVE MEAN SEA LEVEL (MSL) AT TOP OF OBJECT.
2. TO CONVERT FROM NAVD88 HEIGHT TO MEAN LOWER LOW WATER (MLLW) ADD 3.72' TO THE NAVD88 HEIGHT. FOR EXAMPLE, JNUC AS LISTED IN THE SURVEY CONTROL SHEET HAS A MLLW ELEVATION OF 25.23' AND A NAVD88 HEIGHT OF 21.51'.

RUNWAY 8W - 20:1 INNER APPROACH SURFACE OBSTRUCTIONS

#	DESCRIPTION	SURVEY DATE	GROUND ELEV.	OBJECT ELEV.	SURFACE	SURFACE ELEV.	PNTR.	CORRECTIVE ACTION
-	NONE	-	-	-	-	-	-	-

RUNWAY 26W - 20:1 INNER APPROACH SURFACE OBSTRUCTIONS

#	DESCRIPTION	SURVEY DATE	GROUND ELEV.	OBJECT ELEV.	SURFACE	SURFACE ELEV.	PNTR.	CORRECTIVE ACTION
-	NONE	-	-	-	-	-	-	-

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PROJECT MANAGER:	JJY	DRAFTED BY:	RLO
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#	REVISION	COMPANY	BY	DATE

THE PREPARATION OF THIS AIRPORT LAYOUT PLAN (ALP) WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION (FAA) AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICIES OF THE FAA. ACCEPTANCE OF THIS ALP BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED THEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS.

N

HORIZONTAL SCALE IN FEET: 100 0 100 200

VERTICAL SCALE IN FEET: 10 0 10 20

JUNEAU INTERNATIONAL AIRPORT — ALASKA'S CAPITAL CITY

JUNEAU INTERNATIONAL AIRPORT
AIRPORT MASTER PLAN

INNER APPROACH SURFACE RUNWAY 8W-26W

SCALE: VARIES

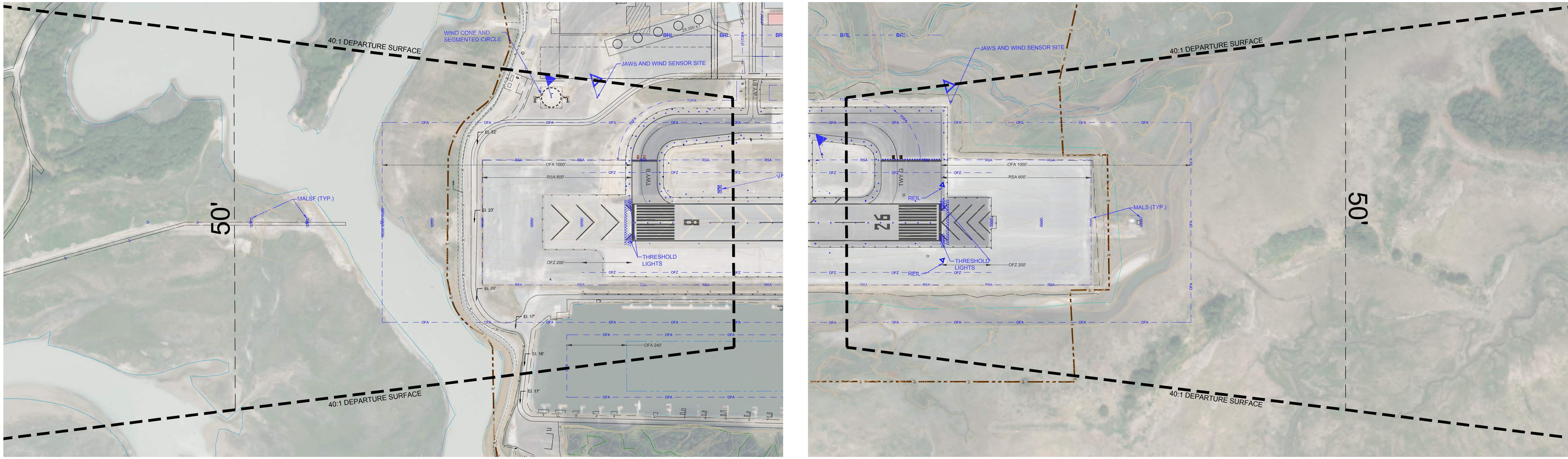
DATE: DECEMBER 2017

AIP NUMBER: 3-16-0133-059-2013

ASN: 2017-AAL-190-NRA

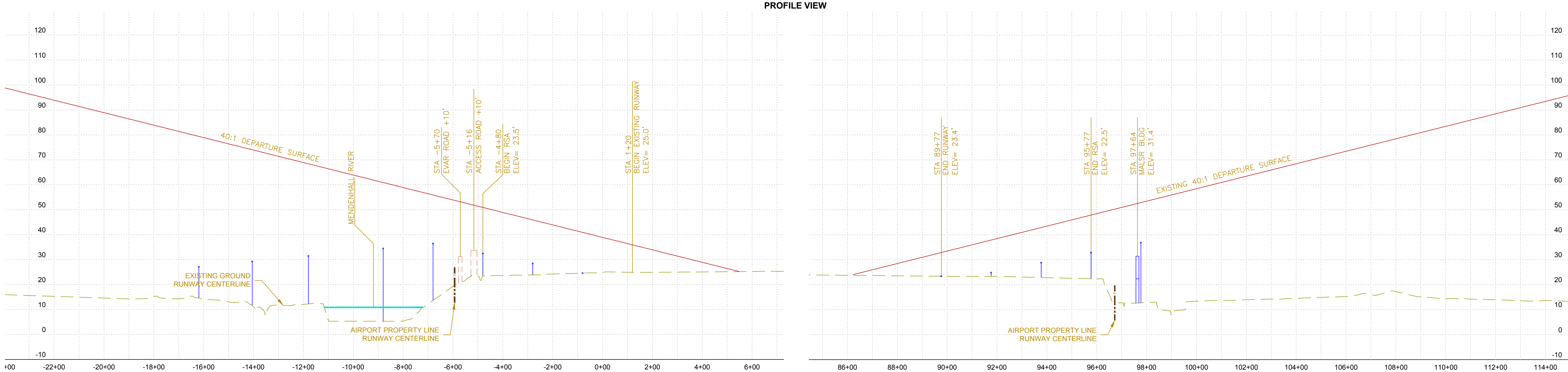
SHEET NUMBER: 6 OF 11

JNU - Sheet 06 (Inner Approach Surface - 8W-26W).dwg



PLAN VIEW

PROFILE VIEW



NOTES

1. ELEVATION IN FEET ABOVE MEAN SEA LEVEL (MSL) AT TOP OF OBJECT.
2. TO CONVERT FROM NAVD88 HEIGHT TO MEAN LOWER LOW WATER (MLLW) ADD 3.72' TO THE NAVD88 HEIGHT. FOR EXAMPLE, JNUC AS LISTED IN THE SURVEY CONTROL SHEET HAS A MLLW ELEVATION OF 25.23' AND A NAVD88 HEIGHT OF 21.51'.

RUNWAY 8 - 40:1 DEPARTURE SURFACE OBSTRUCTIONS

#	DESCRIPTION	SURVEY DATE	GROUND ELEV.	OBJECT ELEV.	SURFACE	SURFACE ELEV.	PNTR.	CORRECTIVE ACTION
	NONE	-	-	-	-	-	-	-

RUNWAY 26 - 62.5:1 DEPARTURE SURFACE OBSTRUCTIONS

#	DESCRIPTION	SURVEY DATE	GROUND ELEV.	OBJECT ELEV.	SURFACE	SURFACE ELEV.	PNTR.	CORRECTIVE ACTION
-	NONE	-	-	-	-	-	-	-

DECLARED DISTANCES

RUNWAY	TORA	TODA	ASDA	LDA
8	8,857'	8,857'	8,457'	8,457'
26	8,857'	8,857'	8,457'	8,457'

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PROJECT MANAGER:	JJY	DRAFTED BY:	RLO
DESIGNED BY:	RLO	CHECKED BY:	JJY

#	REVISION	COMPANY	BY	DATE

THE PREPARATION OF THIS AIRPORT LAYOUT PLAN (ALP) WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION (FAA) AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICIES OF THE FAA. ACCEPTANCE OF THIS ALP BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED THEREIN NOR DOES IT IMPLY THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS.

N
MAGNETIC
MAGNETIC: 19°41' E ± 0°26'
FEB 2016
ANNUAL CHANGE: 0°17' W

100 0 100 200
HORIZONTAL SCALE IN FEET

10 0 10 20
VERTICAL SCALE IN FEET

JUNEAU INTERNATIONAL AIRPORT
ALASKA'S CAPITAL CITY

JUNEAU INTERNATIONAL AIRPORT
AIRPORT MASTER PLAN

RUNWAY DEPARTURE SURFACE RUNWAY 8-26

SCALE: VARIES

DATE: DECEMBER 2017

AIP NUMBER: 3-16-0133-059-2013

ASN: 2017-AAL-190-NRA

SHEET NUMBER: 7 OF 11

JNU - Sheet 07 (Runway Departure Surface).dwg

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AIRPORT FACILITIES

#	DESCRIPTION	HEIGHT*
1	TERMINAL BUILDING	50'
2	FAA AIRPORT TRAFFIC CONTROL TOWER (ATCT)	95
3	AFFSS/SACOM	34'
4	J/D TELEPHONE	29'
5	LEASED TO HERTZ	37'
6	AERO SERVICES (SUBLEASE: FEDEX) R&L LEASING	39'
7	AIRFIELD MAINTENANCE FACILITY	38'
8	LAB FLYING	47'
10	HEIMBIGNER	40'
11	ALASKA AIRLINES	34'
12	ALASKA AIRLINES	41'
13	PRIVATE HANGAR	38'
14	FISH AND WILDLIFE	46'
15	3 PRIVATE T-HANGARS	33'
16	DUANE PACKER (SUBLEASE: UNITED PARCEL SERVICE)	49'
17	R&L LEASING	43'
18	AERO SERVICES	48'
19	AERO SERVICES	35'
20	PRIVATE HANGAR	39'
21	T-HANGAR (7 UNITS)	30'

AIRPORT FACILITIES

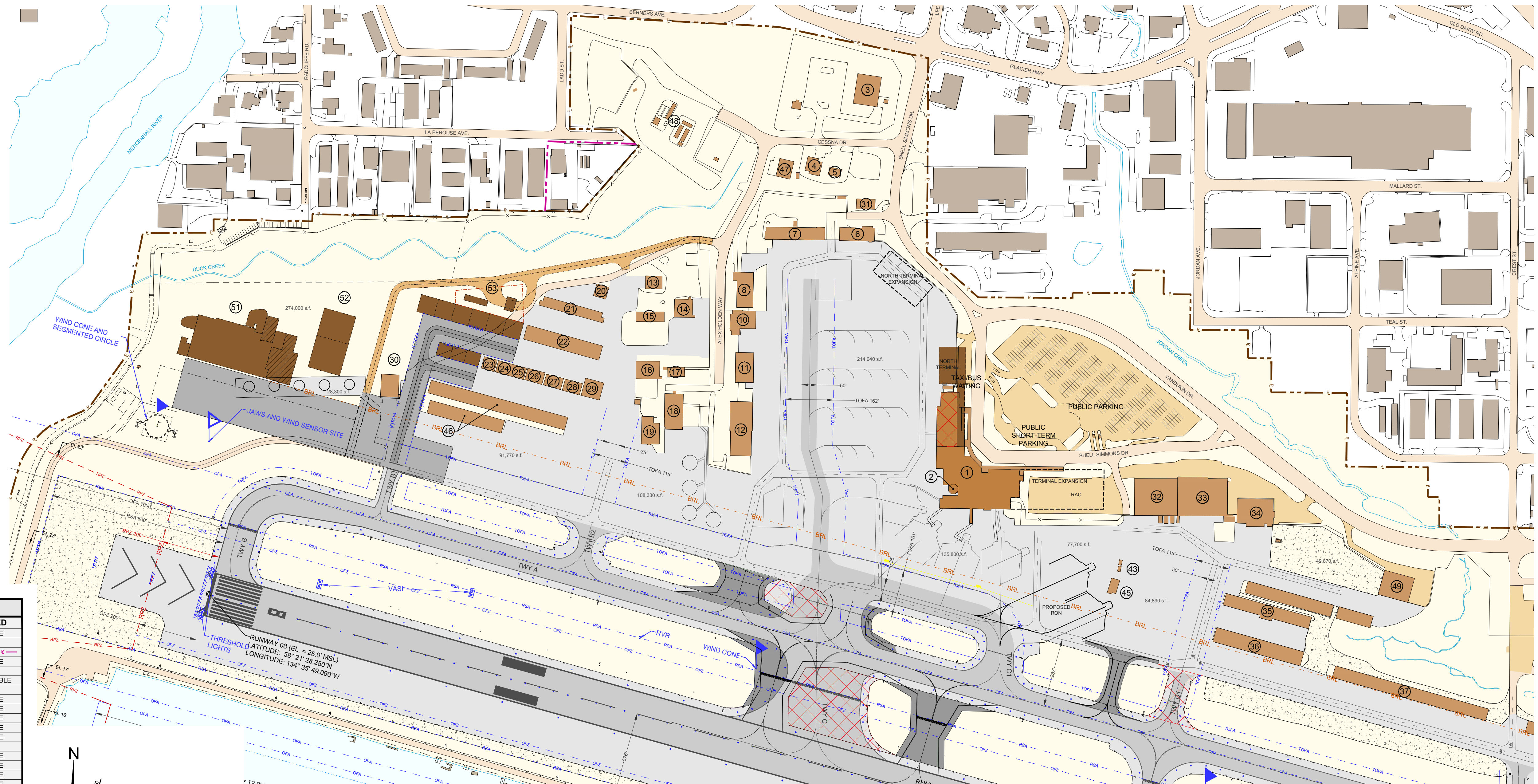
#	DESCRIPTION	HEIGHT*
22	T-HANGAR (12 UNITS)	34'
23	PRIVATE HANGAR	39'
24	PRIVATE HANGAR	36'
25	PRIVATE HANGAR	36'
26	PRIVATE HANGAR	42'
27	PRIVATE HANGAR	39'
28	PRIVATE HANGAR	39'
29	PRIVATE HANGAR	41'
30	CIVIL AIR PATROL	36'
31	DELTA WESTERN	35'
32	SAND STORAGE [POTENTIAL ATCT LOCATION]	53'
33	LOKEN AVIATION	53'
34	WARD AIR (RED LEASING)	52'
35	BLOCK 'L' EXECUTIVE HANGARS (5 UNITS)	40'
36	BLOCK 'M' T-HANGARS (14 UNITS)	35'
43	COASTAL FUEL	26'
45	COASTAL HELICOPTERS	-
46	BLOCK 'I' HANGARS	-
47	R&L LEASING	-
48	FUEL FARM	-

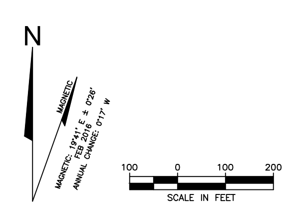
AIRPORT FACILITIES

#	DESCRIPTION	HEIGHT*
49	ALASKA SEAPLANES HANGAR	-
51	FUTURE SNOW REMOVAL EQUIPMENT BUILDING (SREB)	-
52	FUTURE SAND STORAGE	-
53	FUTURE FUEL FACILITY	-

NOTES

1. THE BUILDING RESTRICTION LINE (BRL) IS BASED ON A MAXIMUM BUILDING HEIGHT OF 36 FEET AT A 250' DISTANCE FROM THE PRIMARY SURFACE. MAXIMUM ALLOWABLE BUILDING HEIGHT FROM THE BRL INCREASES AT A 7:1 HORIZONTAL TO VERTICAL SLOPE UPWARD AND AWAY FROM THE PRIMARY SURFACE IN CONFORMANCE WITH FAR PART 77 SURFACES.





LEGEND

DESCRIPTION	EXISTING	PROPOSED
AIRFIELD UNPAVED AREAS		NO CHANGE
AIRFIELD PAVEMENT		
AIRPORT PROPERTY		
AIRPORT REFERENCE POINT (ARP)		NO CHANGE
AUTOMOBILE PARKING - ON AIRPORT		
BUILDING - OFF AIRPORT		NOT APPLICABLE
BUILDING - ON AIRPORT		
BUILDING RESTRICTION LINE (BRL)	BRL	NO CHANGE
FENCE		NO CHANGE
HOLDING POSITION MARKING		NO CHANGE
JUNEAU AIRPORT WIND SYSTEM (JAWS)		NO CHANGE
PRECISION APPROACH PATH INDICATOR	PAPI	NO CHANGE
ROADWAY		
RUNWAY END IDENTIFIER LIGHTS (REIL)		NO CHANGE
RUNWAY OBJECT FREE AREA (OFA)	OFA	NO CHANGE
RUNWAY OBJECT FREE ZONE (OFZ)	OFZ	NO CHANGE
RUNWAY PROTECTION ZONE (RPZ)	RPZ	NO CHANGE
RUNWAY SAFETY AREA (RSA)	RSA	NO CHANGE
TAXIWAY OBJECT FREE AREA (TOFA)	TOFA	(F)TOFA
TO BE REMOVED	NA	
TOPOGRAPHIC CONTOUR	10	NO CHANGE
TREES		NO CHANGE
VISUAL APPROACH SLOPE INDICATOR (VASI)	VASI	NO CHANGE
WIND SOCK		NO CHANGE

ONE INCH

AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

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PROJECT MANAGER:	JJY	DRAFTED BY:	RLO
DESIGNED BY:	RLO	CHECKED BY:	JJY

#	REVISION	COMPANY	BY	DATE

THE PREPARATION OF THIS AIRPORT LAYOUT PLAN (ALP) WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION (FAA) AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICIES OF THE FAA. ACCEPTANCE OF THIS ALP BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED THEREIN NOR DOES IT IMPLY THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS.

JUNEAU INTERNATIONAL AIRPORT
ALASKA'S CAPITAL CITY

JUNEAU INTERNATIONAL AIRPORT
AIRPORT MASTER PLAN

TERMINAL AREA DRAWING NORTHWEST

SCALE: 1" = 200'
DATE: DECEMBER 2017

AIP NUMBER: 3-16-0133-059-2013
ASN: 2017-AAL-190-NRA
SHEET NUMBER: 8 OF 11

JNU - Sheet 08 (Terminal Area Drawing - Northwest).dwg

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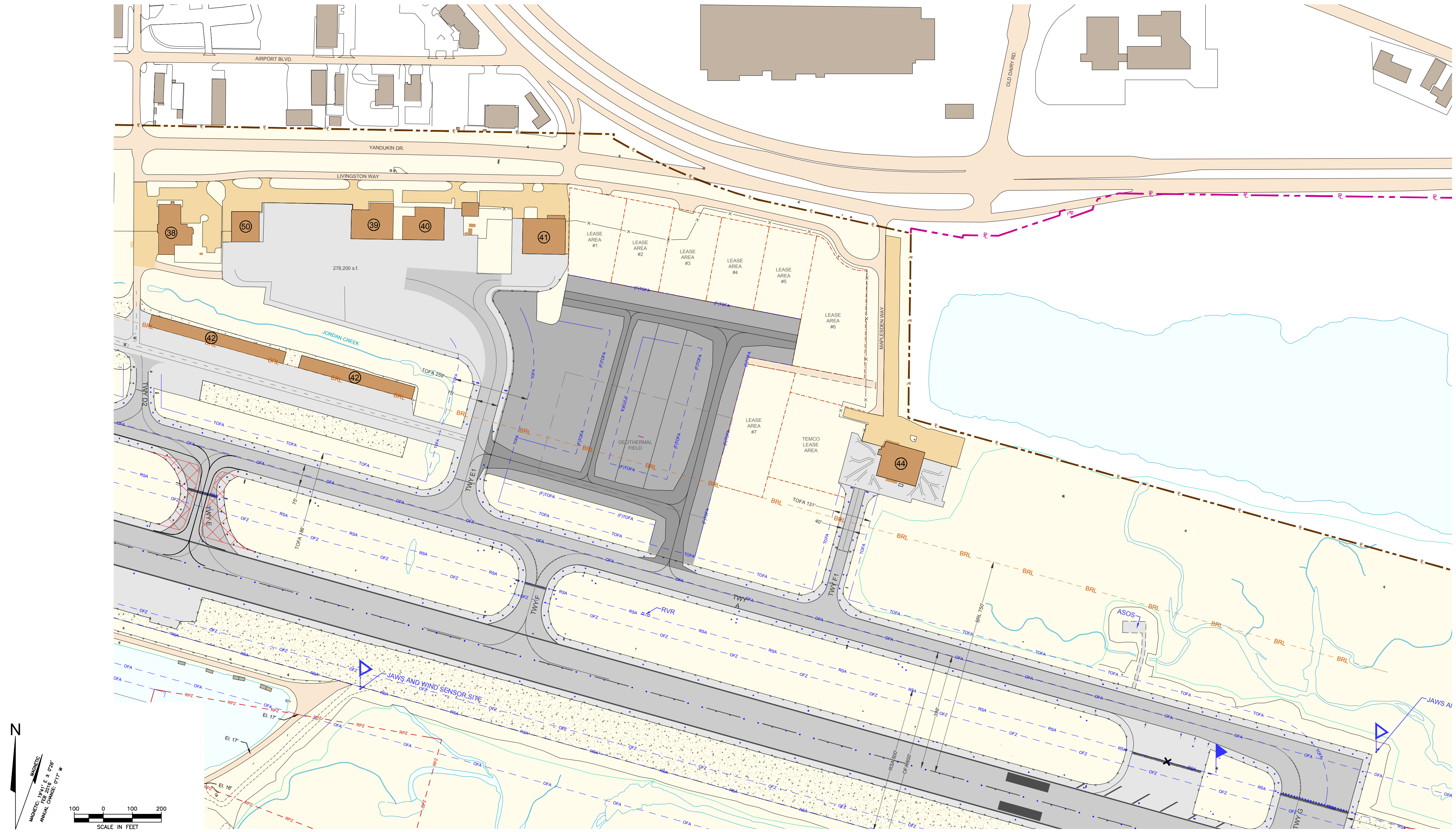
AIRPORT FACILITIES

#	DESCRIPTION	HEIGHT*
38	AIRCRAFT RESCUE AND FIRE FIGHTING (ARFF)	56'
39	SILVER BAY LOGGING	48'
40	ALASKA NATIONAL GUARD	51'
41	WINGS OF ALASKA	53'
42	BLOCK 'O' EXECUTIVE HANGARS (14 UNITS)	41'
44	TEMSCO HELICOPTERS	48'
50	GLACIER AVIATION (AIRLIFT NORTHWEST) HANGAR	-

NOTES

1. THE BUILDING RESTRICTION LINE (BRL) IS BASED ON A MAXIMUM BUILDING HEIGHT OF 36 FEET AT A 250' DISTANCE FROM THE PRIMARY SURFACE. MAXIMUM ALLOWABLE BUILDING HEIGHT FROM THE BRL INCREASES AT A 7:1 HORIZONTAL TO VERTICAL SLOPE UPWARD AND AWAY FROM THE PRIMARY SURFACE IN CONFORMANCE WITH FAR PART 77 SURFACES.



LEGEND

DESCRIPTION	EXISTING	PROPOSED
AIRFIELD UNPAVED AREAS		NO CHANGE
AIRFIELD PAVEMENT		
AIRPORT PROPERTY		
AIRPORT REFERENCE POINT (ARP)		NO CHANGE
AUTOMOBILE PARKING - ON AIRPORT		
BUILDING - OFF AIRPORT		NOT APPLICABLE
BUILDING - ON AIRPORT		
BUILDING RESTRICTION LINE (BRL)	BRL	NO CHANGE
FENCE		NO CHANGE
HOLDING POSITION MARKING		NO CHANGE
JUNEAU AIRPORT WIND SYSTEM (JAWS)		NO CHANGE
PRECISION APPROACH PATH INDICATOR	PAPI	NO CHANGE
ROADWAY		
RUNWAY END IDENTIFIER LIGHTS (REIL)		NO CHANGE
RUNWAY OBJECT FREE AREA (OFA)	OFA	NO CHANGE
RUNWAY OBJECT FREE ZONE (OFZ)	OFZ	NO CHANGE
RUNWAY PROTECTION ZONE (RPZ)	RPZ	NO CHANGE
RUNWAY SAFETY AREA (RSA)	RSA	NO CHANGE
TAXIWAY OBJECT FREE AREA (TOFA)	TOFA	(F)TOFA
TO BE REMOVED	NA	
TOPOGRAPHIC CONTOUR		NO CHANGE
TREES		NO CHANGE
VISUAL APPROACH SLOPE INDICATOR (VASI)	VASI	NO CHANGE
WIND SOCK		NO CHANGE

ONE INCH

AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

#	REVISION	COMPANY	BY	DATE

AECOM
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SEATTLE, WA 98101
PHONE: 206-438-2700

PROJECT MANAGER: JJY | DRAFTED BY: RLO
DESIGNED BY: RLO | CHECKED BY: JJY

THE PREPARATION OF THIS AIRPORT LAYOUT PLAN (ALP) WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION (FAA) AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICIES OF THE FAA. ACCEPTANCE OF THIS ALP BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED THEREIN NOR DOES IT IMPLY THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS.

JUNEAU INTERNATIONAL AIRPORT
ALASKA'S CAPITAL CITY

JUNEAU INTERNATIONAL AIRPORT
AIRPORT MASTER PLAN

TERMINAL AREA DRAWING NORTHEAST

SCALE: 1" = 200'
DATE: DECEMBER 2017

AIP NUMBER: 3-16-0133-059-2013
ASN: 2017-AAL-190-NRA
SHEET NUMBER: 9 OF 11

JNU - Sheet 09 (Terminal Area Drawing - Northeast).dwg

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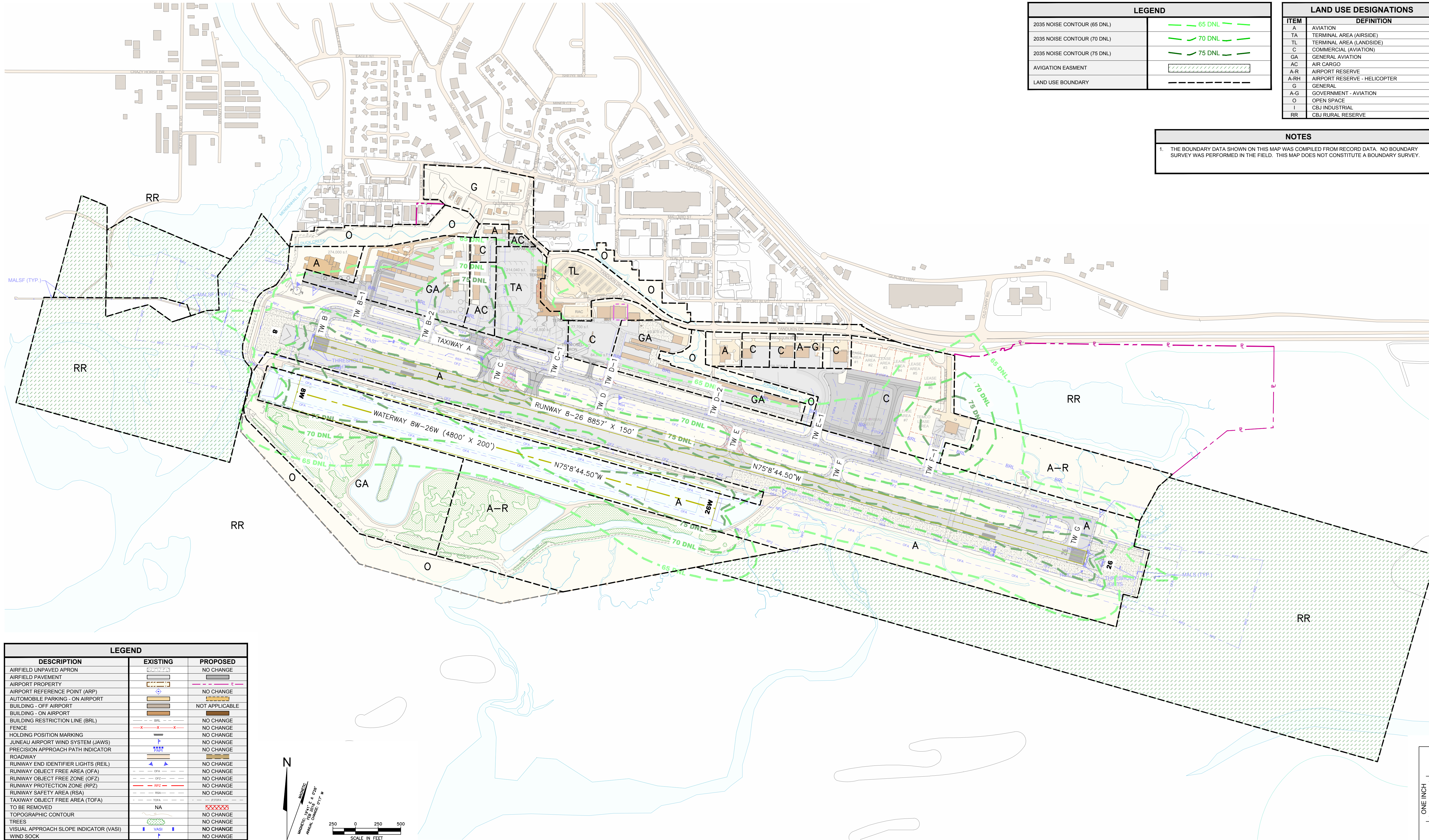

LEGEND

DESCRIPTION	EXISTING	PROPOSED
AIRFIELD UNPAVED APRON		NO CHANGE
AIRFIELD PAVEMENT		
AIRPORT PROPERTY		
AIRPORT REFERENCE POINT (ARP)		NO CHANGE
AUTOMOBILE PARKING - ON AIRPORT		
BUILDING - OFF AIRPORT		NOT APPLICABLE
BUILDING - ON AIRPORT		
BUILDING RESTRICTION LINE (BRL)	BRL	NO CHANGE
FENCE		NO CHANGE
HOLDING POSITION MARKING		NO CHANGE
JUNEAU AIRPORT WIND SYSTEM (JAWS)		NO CHANGE
PRECISION APPROACH PATH INDICATOR	PAPI	NO CHANGE
ROADWAY		
RUNWAY END IDENTIFIER LIGHTS (REIL)		NO CHANGE
RUNWAY OBJECT FREE AREA (OFA)	OFA	NO CHANGE
RUNWAY OBJECT FREE ZONE (OFZ)	OFZ	NO CHANGE
RUNWAY PROTECTION ZONE (RPZ)	RPZ	NO CHANGE
RUNWAY SAFETY AREA (RSA)	RSA	NO CHANGE
TAXIWAY OBJECT FREE AREA (TOFA)	TOFA	(F)TOFA
TO BE REMOVED	NA	
TOPOGRAPHIC CONTOUR		NO CHANGE
TREES		NO CHANGE
VISUAL APPROACH SLOPE INDICATOR (VASI)	VASI	NO CHANGE
WIND SOCK		NO CHANGE

LEGEND

2035 NOISE CONTOUR (65 DNL)	65 DNL
2035 NOISE CONTOUR (70 DNL)	70 DNL
2035 NOISE CONTOUR (75 DNL)	75 DNL
AVIGATION EASMENT	
LAND USE BOUNDARY	

LAND USE DESIGNATIONS

ITEM	DEFINITION
A	AVIATION
TA	TERMINAL AREA (AIRSIDE)
TL	TERMINAL AREA (LANDSIDE)
C	COMMERCIAL (AVIATION)
GA	GENERAL AVIATION
AC	AIR CARGO
A-R	AIRPORT RESERVE
A-RH	AIRPORT RESERVE - HELICOPTER
G	GENERAL
A-G	GOVERNMENT - AVIATION
O	OPEN SPACE
I	CBJ INDUSTRIAL
RR	CBJ RURAL RESERVE

NOTES

1. THE BOUNDARY DATA SHOWN ON THIS MAP WAS COMPILED FROM RECORD DATA. NO BOUNDARY SURVEY WAS PERFORMED IN THE FIELD. THIS MAP DOES NOT CONSTITUTE A BOUNDARY SURVEY.

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PROJECT MANAGER:	JJY	DRAFTED BY:	RLO
DESIGNED BY:	RLO	CHECKED BY:	JJY

#	REVISION	COMPANY	BY	DATE

THE PREPARATION OF THIS AIRPORT LAYOUT PLAN (ALP) WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION (FAA) AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICIES OF THE FAA. ACCEPTANCE OF THIS ALP BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED THEREIN NOR DOES IT IMPLY THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS.

JUNEAU INTERNATIONAL AIRPORT
ALASKA'S CAPITAL CITY

JUNEAU INTERNATIONAL AIRPORT
AIRPORT MASTER PLAN

LAND USE DRAWING

SCALE: 1" = 500'
DATE: DECEMBER 2017

AIP NUMBER: 3-16-0133-059-2013
ASN: 2017-AAL-190-NRA
SHEET NUMBER: 10 OF 11

JNU - Sheet 10 (Land Use Drawing).dwg

NOTES

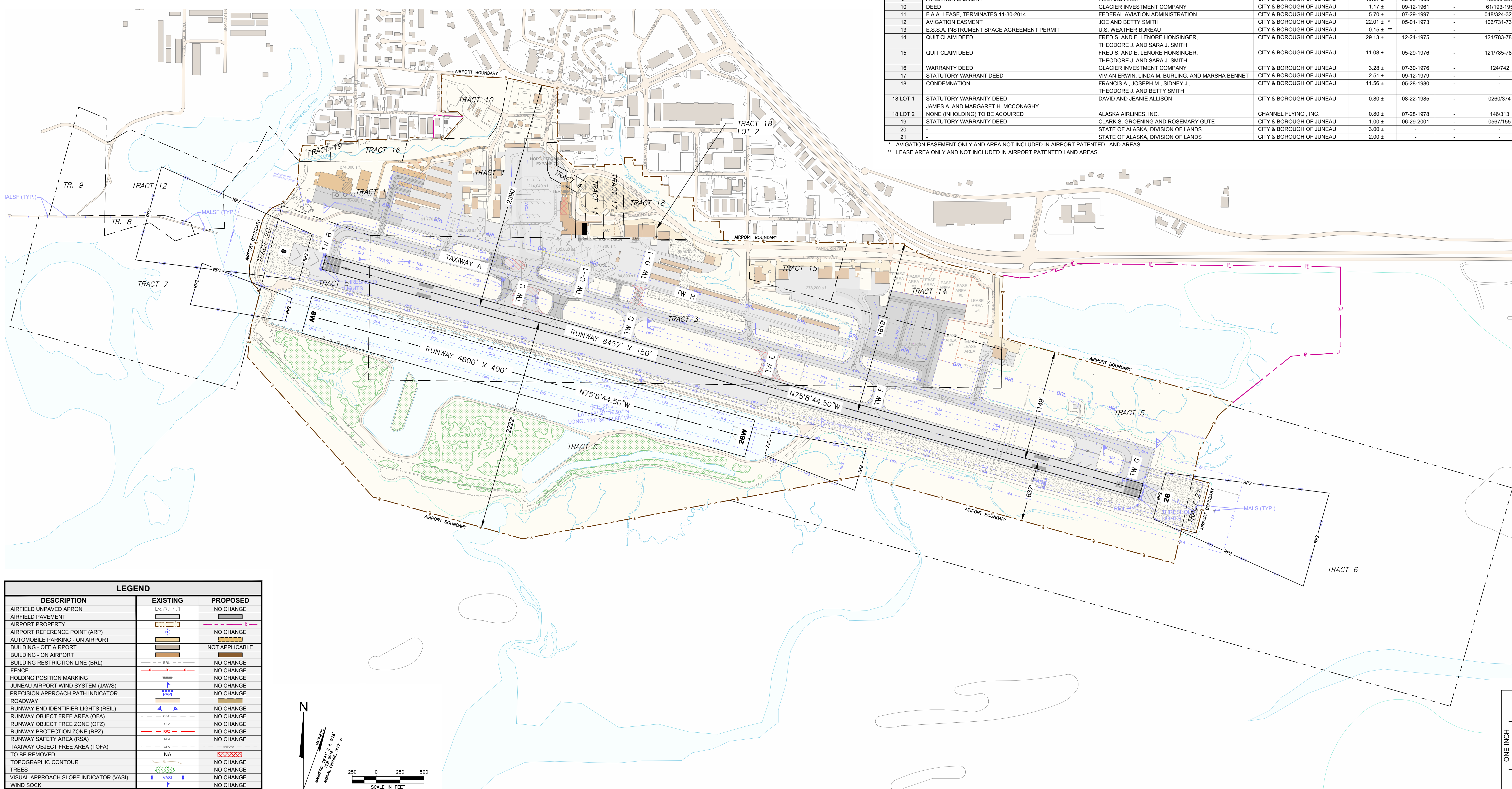
1. THE BOUNDARY DATA SHOWN ON THIS MAP WAS COMPILED FROM RECORD DATA. NO BOUNDARY SURVEY WAS PERFORMED IN THE FIELD. THIS MAP DOES NOT CONSTITUTE A BOUNDARY SURVEY. ALL ACREAGE SHOWN ARE BASED ON THE RECORD DATA.

PROPERTY STATUS

TRACT #	INTEREST	GRANTOR	GRANTEE	PARCEL SIZE (ACRES)	DATE ACQUIRED	AIP FUNDED	RECORDED BOOK/PAGE
1	QUIT CLAIM DEED	CIVIL AERONAUTICS ADMINISTRATION	CITY & BOROUGH OF JUNEAU	64.80 ±	10-28-1953	-	46/359-360
2	QUIT CLAIM DEED	CIVIL AERONAUTICS ADMINISTRATION	CITY & BOROUGH OF JUNEAU	7.28 ±	10-28-1953	-	38/509-510
3	QUIT CLAIM DEED	CIVIL AERONAUTICS ADMINISTRATION	CITY & BOROUGH OF JUNEAU	182.90 ±	10-28-1953	-	38/509-510
4	QUIT CLAIM DEED	FEDERAL AVIATION ADMINISTRATION	CITY & BOROUGH OF JUNEAU	2.61 ±	04-26-1967	-	36/210-214
5	PATENT	STATE OF ALASKA	CITY & BOROUGH OF JUNEAU	338.73 ±	11-30-1972	-	104/5
6	AVIGATION EASEMENT	STATE OF ALASKA, DIVISION OF LANDS	CITY & BOROUGH OF JUNEAU	22.15 ± *	11-31-1972	-	-
7	AVIGATION EASEMENT	STATE OF ALASKA, DIVISION OF LANDS	CITY & BOROUGH OF JUNEAU	91.88 ± *	11-31-1972	-	-
8	WARRANTY DEED	WILDE, GIBSON AND MAIER	CITY & BOROUGH OF JUNEAU	2.94 ± *	05-30-1967	-	89/75-80
9	AVIGATION EASMENT	FILE AND AASA	CITY & BOROUGH OF JUNEAU	10.07 ± *	02-05-1965	-	75/293-297
10	DEED	GLACIER INVESTMENT COMPANY	CITY & BOROUGH OF JUNEAU	1.17 ±	09-12-1961	-	61/193-195
11	F.A.A. LEASE, TERMINATES 11-30-2014	FEDERAL AVIATION ADMINISTRATION	CITY & BOROUGH OF JUNEAU	5.70 ±	07-29-1997	-	048/324-328
12	AVIGATION EASMENT	JOE AND BETTY SMITH	CITY & BOROUGH OF JUNEAU	22.01 ± *	05-01-1973	-	106/731-735
13	E.S.S.A. INSTRUMENT SPACE AGREEMENT PERMIT	U.S. WEATHER BUREAU	CITY & BOROUGH OF JUNEAU	0.15 ± **	-	-	-
14	QUIT CLAIM DEED	FRED S. AND E. LENORE HONSINGER, THEODORE J. AND SARA J. SMITH	CITY & BOROUGH OF JUNEAU	29.13 ±	12-24-1975	-	121/783-784
15	QUIT CLAIM DEED	FRED S. AND E. LENORE HONSINGER, THEODORE J. AND SARA J. SMITH	CITY & BOROUGH OF JUNEAU	11.08 ±	05-29-1976	-	121/785-786
16	WARRANTY DEED	GLACIER INVESTMENT COMPANY	CITY & BOROUGH OF JUNEAU	3.28 ±	07-30-1976	-	124/742
17	STATUTORY WARRANT DEED	VIVIAN ERWIN, LINDA M. BURLING, AND MARSHA BENNET	CITY & BOROUGH OF JUNEAU	2.51 ±	09-12-1979	-	-
18	CONDEMNATION	FRANCIS A., JOSEPH M., SIDNEY J., THEODORE J. AND BETTY SMITH	CITY & BOROUGH OF JUNEAU	11.56 ±	05-28-1980	-	-
18 LOT 1	STATUTORY WARRANTY DEED JAMES A. AND MARGARET H. MCCONAGHY	DAVID AND JEANIE ALLISON	CITY & BOROUGH OF JUNEAU	0.80 ±	08-22-1985	-	0260/374
18 LOT 2	NONE (INHOLDING) TO BE ACQUIRED	ALASKA AIRLINES, INC.	CHANNEL FLYING , INC.	0.80 ±	07-28-1978	-	146/313
19	STATUTORY WARRANTY DEED	CLARK S. GROENING AND ROSEMARY GUTE	CITY & BOROUGH OF JUNEAU	1.00 ±	06-29-2001	-	0567/155
20	-	STATE OF ALASKA, DIVISION OF LANDS	CITY & BOROUGH OF JUNEAU	3.00 ±	-	-	-
21	-	STATE OF ALASKA, DIVISION OF LANDS	CITY & BOROUGH OF JUNEAU	2.00 ±	-	-	-

* AVIGATION EASEMENT ONLY AND AREA NOT INCLUDED IN AIRPORT PATENTED LAND AREAS.

** LEASE AREA ONLY AND NOT INCLUDED IN AIRPORT PATENTED LAND AREAS.



LEGEND

DESCRIPTION	EXISTING	PROPOSED
AIRFIELD UNPAVED APRON		NO CHANGE
AIRFIELD PAVEMENT		
AIRPORT PROPERTY		
AIRPORT REFERENCE POINT (ARP)		NO CHANGE
AUTOMOBILE PARKING - ON AIRPORT		
BUILDING - OFF AIRPORT		NOT APPLICABLE
BUILDING - ON AIRPORT		
BUILDING RESTRICTION LINE (BRL)	BRL	NO CHANGE
FENCE		NO CHANGE
HOLDING POSITION MARKING		NO CHANGE
JUNEAU AIRPORT WIND SYSTEM (JAWS)		NO CHANGE
PRECISION APPROACH PATH INDICATOR	PAPI	NO CHANGE
ROADWAY		
RUNWAY END IDENTIFIER LIGHTS (REIL)		NO CHANGE
RUNWAY OBJECT FREE AREA (OFA)	OFA	NO CHANGE
RUNWAY OBJECT FREE ZONE (OFZ)	OFZ	NO CHANGE
RUNWAY PROTECTION ZONE (RPZ)	RPZ	NO CHANGE
RUNWAY SAFETY AREA (RSA)	RSA	NO CHANGE
TAXIWAY OBJECT FREE AREA (TOFA)	TOFA	(F)TOFA
TO BE REMOVED	NA	
TOPOGRAPHIC CONTOUR	10	NO CHANGE
TREES		NO CHANGE
VISUAL APPROACH SLOPE INDICATOR (VASI)	VASI	NO CHANGE
WIND SOCK		NO CHANGE

ONE INCH

AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

AECOM
1111 3rd AVENUE, SUITE 1600
SEATTLE, WA 98101
PHONE: 206-438-2700

PROJECT MANAGER:	JJY	DRAFTED BY:	RLO
DESIGNED BY:	RLO	CHECKED BY:	JJY

#	REVISION	COMPANY	BY	DATE

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APPROVAL: CITY/BOROUGH OF JUNEAU

Name / Title

Date

JUNEAU INTERNATIONAL AIRPORT
ALASKA'S CAPITAL CITY

JUNEAU INTERNATIONAL AIRPORT
AIRPORT MASTER PLAN

AIRPORT PROPERTY MAP EXHIBIT 'A'

SCALE: 1" = 500'

DATE: DECEMBER 2017

AIP NUMBER: 3-16-0133-059-2013

ASN: 2017-AAL-190-NRA

SHEET NUMBER: 11 OF 11

JNU - Sheet 11 (Airport Property Map-Exhibit A).dwg

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Financial Implementation Plan

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10

FINANCIAL IMPLEMENTATION ANALYSIS

10.1 FINANCIAL ANALYSIS OBJECTIVES

The primary objective of the Financial Implementation Analysis for the Juneau International Airport (JNU) Master Plan is to evaluate the Airport's capability to fund the Capital Improvement Program and to finance Airport operations. The program is planned for implementation through three phases of development including a six-year Short Term Phase I period (2017-2022), a five-year Mid Term Phase II period (2023-2027) and a ten-year Long Term Phase III period (2028-2037). This analysis includes development of a detailed Financial Implementation Plan. Objectives for developing the Financial Implementation Plan include presenting the results of the implementation evaluation and providing practical guidelines for matching an appropriate amount of financial resources based on a phased 20-year schedule.

10.2 OVERALL APPROACH

The overall approach for conducting the Financial Implementation Analysis included the following steps:

- Gathering and reviewing key Airport documents related to historical financial results, capital improvement plans, operating budgets, regulatory requirements, City and Borough policies, airline agreements and operating agreements with other Airport users
- Interviewing key Airport officials to gain an understanding of the existing operating and financial environment, relationships with the airlines and overall management philosophy
- Reviewing the Forecast of Aviation Demand previously developed in the Master Plan
- Reviewing the Capital Improvement Program project cost estimates and development schedules anticipated for the planning period and projecting the overall financial requirements for the program

- Determining and analyzing the sources and timing of capital funds available to meet the financial requirements for operating the Airport and financing the Capital Improvement Program

- Analyzing historical operations and maintenance expenses, developing operations and maintenance expense growth assumptions, reviewing assumptions with Airport management and projecting future operations and maintenance expenses for the planning period

- Analyzing historical revenue sources, developing revenue growth assumptions, reviewing assumptions with Airport management and projecting future airline and non-airline revenues for the planning period

- Completing results of the review in a Financial Analysis Summary that evaluates the financial reasonableness of the Capital Improvement Program.

10.3 CAPITAL FUNDING SOURCES

In the past, the Airport has used a combination of FAA Airport Improvement Program (AIP) entitlement and discretionary grants, state and local funds, Passenger Facility Charges (PFCs) and cash reserves/net operating revenues to fund capital improvements. These funding sources, as well as additional sources of capital funding, will continue to be important to finance the Airport's Master Plan Capital Improvement Program (CIP) during the future twenty-one-year planning period.

10.3.1 Airport Improvement Program Grants

The Airport receives grants from the Federal Aviation Administration (FAA) to finance the eligible costs of certain capital improvements. These federal grants are allocated to commercial passenger service airports through the Airport Improvement Program (AIP). AIP grants include passenger entitlement grants, which are allocated among airports by a formula that is based on passenger enplanements and discretionary grants which are awarded in accordance with FAA guidelines.

In February 2012, after several years of continuing budget resolutions in Congress, the FAA Modernization and Reform Act of 2012 was enacted and authorized funding for the AIP through September 30, 2015. Authorization was extended through H.R.636, the FAA Extension, Safety, and Security Act of 2016 which extended the agency's authority and provided funding at current levels through September 30, 2017. On September 29, 2017, an additional extension was approved under the 2017 Disaster Tax Relief and Airport and Airway Extension Act (H.R. 3823) through March 31, 2018. Under current AIP authorization legislation, eligible projects in the State of Alaska are funded on a 93.75% AIP grant/6.25% local match basis for small and non-hub airports. Under this authorization, the Airport is projected to receive current entitlements of about $2.9 million in 2018 and future annual grants which are projected to grow to $3.0 million by 2027. Small Hub airports (those with annual enplanements between approximately 415,000 passengers and 2,075,000 passengers) can accumulate and carryover up to three years of unspent entitlements plus the current year before the awards are revoked. In 2016, the Airport had no unspent entitlements to carry over for use in 2017. The implementation analysis assumes the application of annual AIP passenger entitlement funds will be about $17.3 million during the Phase I planning period and $14.9 million during Phase II.

The approval of AIP discretionary funding is based on a project eligibility ranking method the FAA uses to award grants, at their discretion, based on a project's priority and importance to the national air transportation system. The Airport has previously received AIP discretionary funding for runways and Runway Safety Areas (RSAs) and in 2017 received discretionary funding for apron construction and the purchase of snow removal equipment. It is reasonable to assume that the Airport will receive additional discretionary funding during the planning period for high priority, eligible projects. The implementation analysis assumes that $52.2 million of AIP discretionary funds will be required during Phase I for taxiway and apron pavement rehabilitation and construction, purchase of additional snow removal equipment and to construct Phase 2 of the Snow Removal Equipment Facility. The implementation analysis also assumes that AIP discretionary grants of about $22.3 million will be available during Phase II for various pavement projects, snow removal equipment and the acquisition of an Aircraft Rescue and Fire Fighting (ARFF) truck. Since the future availability of AIP discretionary grants is not certain until an actual grant is awarded, it should be noted that any CIP projects which have discretionary funds indicated as a funding source in the implementation plan may need to be delayed until such funds actually become available.

The implementation analysis further assumes that the current AIP program will continue to be extended through 2037 and that future program authorizations will provide substantially similar funding levels as it currently does and as it has historically provided since the program was established in 1982.

10.3.2 Other Federal/State Funding

Airports may receive funding for capital development projects from other federal and state grant programs. Examples of other federal grants include grants from the FAA's Facilities and Equipment (F&E) Program, Transportation Security Administration(TSA)/Department of Homeland Security (DHS) grants or economic development programs. State funding from the Alaska Department of Transportation and Public Facilities (DOT&PF) has provided limited funding for capital development at the Airport in the past. The implementation analysis assumes that approximately $4.0 million in other federal/state funding will be required in Phase I to fund the 26 MALSR project as well as a new terminal camera surveillance system. The MALSR project is anticipated to be funded through the FAA F&E Program. During Phase II, approximately $58 million is also assumed to be provided from the FAA F&E Program to fund the relocation and construction a new FAA Airport Traffic Control Tower (ATCT). There are no state funds assumed to fund the capital program during the planning period.

10.3.3 Passenger Facility Charges

The Aviation Safety and Capacity Expansion Act of 1990 established the authority for commercial service airports to apply to the FAA for imposing and using a Passenger Facility Charge (PFC) of up to $3.00 per eligible enplaned passenger. With the passage of AIR-21 in June 2000, airports could apply for an increase in the PFC collection amount from $3.00 per eligible enplaned passenger to $4.50. The proceeds from PFCs are eligible to be used for AIP eligible projects and for certain additional projects that preserve or enhance capacity, safety or security; mitigate the effects of aircraft noise; or enhance airline competition. PFCs may also be used to pay debt service on bonds (including principal, interest and issue costs) and other indebtedness incurred to carry out eligible projects. In addition to funding future planned projects, the legislation permits airports to collect PFCs to reimburse the eligible costs of projects that began on or after November 5, 1990.

JNU currently collects PFC revenues in an approved open application at the $4.50 collection level. The Airport has submitted a new PFC application (#9) for additional PFC eligible capital projects identified in the Master Plan and to continue collection without interruption of its collection authority. PFC Collections at the $4.50 level are estimated to yield approximately $900,000 to $1 million a year in the short term. The implementation analysis assumes that the Airport will submit additional PFC applications and amendments, as required, to ensure approval for projects identified for PFC funding and to continue collection without interruption. The implementation analysis further assumes that PFCs will be used on a pay-as-you-go basis to fund approximately $6.5 million in eligible project costs during Phase I and $2.1 million in Phase II.

10.3.4 City/Borough Capital and General Obligation Bond Proceeds

JNU is a municipally owned facility. The airport is an enterprise of the City and Borough of Juneau (CBJ). The CBJ periodically provides funding to the airport for capital projects from its local capital budget as well as from proceeds of General Obligation (GO) Bond issues. The implementation analysis assumes the CBJ will provide approximately $13.4 million in Phase I and approximately $700 thousand in Phase II for a total of $14.1 million during the planning period. The majority of these funds are anticipated to be used for terminal renovation projects with the remainder programmed to fund Snow Removal Equipment Facilities and the reconstruction of certain airport roadways.

10.3.5 Ballot Measure Sales Tax

In 2012, Juneau voters approved a 5-year 1% sales tax that was due to expire on September 30, 2018. The proceeds from this tax were used for capital projects, capital project bond debt service, budget reserve and nonprofit capital project grants. In 2017, Juneau voters approved a continuation of the 1% temporary sales tax from October 1, 2018 through September 30, 2023. A portion of the temporary sales tax is identified to provide matching funds for federally funded projects. The implementation analysis assumes about $3.2 million ($3 million from 2017 and $233 thousand from 2012) in local matching funds will be provided through this sales tax, almost entirely in the six-year Phase I period.

10.3.6 Other Unidentified Funding

The traditional funding sources described in the previous paragraphs are insufficient to fund a number of the capital improvement projects identified in the Master Plan. The majority of the funding shortfall, approximately $67.9 million, relates to Terminal Expansion and other terminal related development projects. Another $2.5 million is related roadway projects and $2.3 million of the shortfall relates to local matches required for AIP grants after the expiration of the temporary 1% sales tax. The remaining shortfall relates to projects which are not eligible for AIP funding or for which there are no AIP funds available. Consequently, non-traditional funding sources will be needed to implement project costs of about $74.6 million. If other funding sources cannot be identified and obtained in the time frame needed, the associated projects will have to be modified, delayed or cancelled until such funding can be identified.

10.3.7 Cash Reserves/Airport Net Operating Revenue

At the beginning of 2017, the Airport had accumulated about $2.9 million in unrestricted cash reserves available for operations and capital project funding. The implementation analysis assumes that Airport cash reserves/net operating cash flow will be used throughout the planning period to fund about $106,121 in project costs. The operating budget of the Airport, discussed later in this chapter, is estimated to be at breakeven and therefore does not generate additional funds available to fund the capital program.

10.4 FINANCIAL ANALYSIS AND IMPLEMENTATION PLAN FOR THE MASTER PLAN CAPITAL IMPROVEMENT PROGRAM

This analysis, along with the schedules presented at the end of the chapter, provide the results of evaluating the financial reasonableness of implementing the Master Plan Capital Improvement Program during the planning period from 2017 through 2037.

10.4.1 Estimated Project Costs and Development Schedule

The Capital Improvement Program (CIP) including the Estimated Project Costs and Development Schedule was developed as part of the Implementation Plan of the Master Plan study. The CIP for capital expansion and improvement projects is projected on an annual basis for the Phase I planning period from 2017 through 2022, in total for the Phase II planning period from 2023 through 2027 and in total for the Phase III planning period from 2028 through 2037. For each of these planning periods, **Schedule 10-1** (provided at the end of Chapter 10) presents the Capital Improvement Program including estimated costs and anticipated development schedule for the identified projects.

As shown in **Schedule 10-1**, the total estimated cost of projects is $241,103,122 in 2017 dollars. The estimated costs for projects scheduled during the period 2017 through 2037 are adjusted by an assumed 2% rate of annual inflation. The resulting total project costs escalated for inflation are $269,507,892. **Table 10-1** presents a summary of the Schedule and provides a comparison of 2017 base year costs with escalated costs adjusted for inflation for each of the planning periods.

Table 10-1. Summary of 2017 Base Year and Total Escalated Costs for the Master Plan Capital Improvement Program

Planning Periods	2017 Base Year Costs	Total Escalated Costs
Phase I Projects (2017-2022)	$96,303,122	$101,523,145
Phase II Projects (2023-2027)	144,800,000	167,984,747
Phase III Projects (2028-2037)	0	0
Total Project Costs	$241,103,122	$269,507,892

Note: Addition errors are due to rounding of calculated amounts.
Source: Leibowitz & Horton AMC analysis

10.4.2 Sources and Uses of Capital Funding

Funding sources for the CIP depend on many factors, including AIP and PFC project eligibility, the ultimate type and use of facilities to be developed, management's current and desired levels of the Airport's airline cost per enplaned passenger, the availability of other financing sources and the priorities for scheduling project completion. For master planning purposes, assumptions were made related to the funding source of each capital improvement.

Schedule 10-2 (provided at the end of this chapter) lists each of the CIP projects, their estimated costs (escalated annually for inflation) and the assumed funding sources and required amounts. During the twenty-one-year planning period, it was assumed that AIP entitlement grants would partially fund taxiway and apron pavement rehabilitation and construction, float pond improvements, terminal building renovations and improvements, snow removal equipment and facilities and safety area improvements. It was assumed that AIP discretionary grants would partially fund taxiway and apron pavement rehabilitation and construction, snow removal equipment and facilities and an ARFF truck. It was assumed that other federal/state funds would fund the installation of an FAA MALSR, construction of a new FAA Airport Traffic Control Tower (ATCT) and fund a new terminal camera surveillance system. PFC pay-as-you-go revenues were assumed to fund a portion of the AIP eligible projects and eligible terminal renovations and expansion. City/Borough Capital and General Obligation Bond Proceeds are assumed to fund terminal renovation projects and snow removal equipment facilities. Additionally, the Ballot Measure Sales Tax is anticipated to be available to fund part of the local match for AIP eligible projects. Finally, available cash reserves were assumed to fund the replacement of trash compactors and pads. Other unidentified funding will be needed to fund terminal expansion and other terminal related development projects, reconstruction of certain airport roadways, local matches required for AIP grants after the expiration of the temporary 1% sales tax, and projects which are not eligible for AIP funding or for which there are not AIP funds available.

A summary of the sources of capital funding by type and uses of capital funding by planning period for the CIP is presented in **Table 10-2**.

Table 10-2. Summary of Sources and Uses of Capital Funding for the Master Plan Capital Improvement Program

Sources of Capital Funding	Phase I (2017-2022)	Phase II (2023-2027)	Phase III (2028-2037)	Totals
AIP Entitlement Grants	$17,345,632	$14,940,903	$0	$32,286,534
AIP Discretionary Grants	52,155,598	22,318,763	0	74,474,361
Other Federal/State Funding	4,029,000	58,005,783	0	62,034,783
Passenger Facility Charges	6,543,613	2,095,178	0	8,638,791
City/Borough Capital/GOB Proceeds	13,457,798	696,069	0	14,153,868
Ballot Measure Sales Tax	3,197,204	25,796	0	3,223,000
Other Unidentified Funding	4,688,179	69,902,255	0	74,590,435
Cash Reserves/Net Ops Cash Flow	106,121	0	0	106,121
Total Sources of Capital Funding	$101,523,145	$167,984,747	$0	$269,507,892
Uses of Capital Funding				
Runway/Taxiway Improvements	$27,560,000	$9,860,983	$0	$37,420,983
Aircraft Apron Improvements	21,544,768	6,380,636	0	27,925,404
Terminal & Related Landside Improvements	22,915,362	69,142,893	0	92,058,256
GA Facility Improvements	110,408	12,181,214	0	12,291,622
SRE Facilities & Equipment	28,193,022	6,148,613	0	34,341,635
ARFF Facilities & Equipment	0	2,320,231	0	2,320,231

Other Improvements	1,199,585	61,950,176	0	63,149,762
Total Uses of Capital Funding	$101,523,145	$167,984,747	$0	$269,507,892

Note: Addition errors are due to rounding of calculated amounts.

Source: Leibowitz & Horton AMC analysis

10.4.3 Projected Operations and Maintenance Expenses

Operations and maintenance expense projections for the Phase I (2017 to 2022), the Phase II (2023 to 2027) and the Phase III (2028 to 2037) planning periods are based on the Airport's 2018 budget, the anticipated impacts of inflation, aviation traffic increases, facility improvements and the recent experience of other airports with similar levels of aviation activity.

10.4.3.1 Operations and Maintenance Expense Projection Assumptions

Operations and maintenance expense growth assumptions, as reflected in **Schedule 10-3**, were developed to project the Airport's operating expenses during the planning period. Actual amounts for 2014 through 2016, and budgeted amounts for 2017 and 2018 provide a comparison with expenses that are projected for the period 2019 through 2037. Operations and maintenance expenses are reported for the Airport's following cost centers:

- Airport Administration
- Terminal Operations
- Airfield Maintenance
- Aircraft Rescue and Fire Fighting
- Airport Security
- Airport Landside

For each of the following expense categories listed below, projections are based on 2018 budgeted amounts with an assumed 2% annual rate of inflation beginning in 2019.

- Personnel

- Travel & Training
- Services & Charges
- Supplies

10.4.3.2 Projection of Operations and Maintenance Expenses and Operating Expenses Per Enplaned Passenger

The projection of operations and maintenance expenses is provided in **Schedule 10-3** (provided at the end of the chapter). As shown in the Schedule, total expenses are expected to grow from $6,866,000 budgeted in 2017 to $7,430,139 projected for 2022 reflecting an overall growth rate of 2.1% per year and a total of $42,787,793 during the six-year Phase I planning period. Phase II expenses are projected to total $39,440,077 reflecting a 2% annual growth rate for the five-year period 2023-2027 and Phase III expenses are projected to total $91,622,266 reflecting a 2% annual growth rate for the ten-year period 2028-2037.

Schedule 10-3 also provides a comparison of Juneau's total operating expenses per enplaned passenger versus other small hub airports with similar levels of aviation activity. Juneau's operating expenses per enplaned passenger are projected to increase from $17.00 budgeted for 2017 to an average of $19.62 during the Phase III planning period. Over the same period of time, the overall small hub industry average is expected to grow from $20.36 in 2017 to $31.36 during Phase III (Source: Small Hub airports, FAA Operating and Financial Summary Report #127 and FAA Air Carrier Activity Information System enplanement database). These comparisons show that budgeted and projected operating expenses at Juneau are substantially lower than other small hub airports of similar size during all three phases of the twenty-one-year planning period. This implies that the Airport currently manages operations and controls expenses in a manner that is more cost efficient than other comparable small hub airports.

10.4.4 Projected Operating Revenues

Operating revenue projections for the Phase I (2017 to 2022), the Phase II (2023 to 2027) and the Phase III (2028 to 2037) planning periods are based on the Airport's 2018 budget, current rates and charges methodology, current leasing practices, the anticipated impacts of inflation, aviation traffic increases, facility expansions and the recent experience of other airports with similar levels of aviation activity.

10.4.4.1 Operating Revenue Projection Assumptions

Operating revenue growth assumptions, as reflected in **Schedule 10-4** (provided at the end of Chapter 10), were developed to project the Airport's operating revenues during the planning period. Actual amounts for 2014 through 2016, and budgeted amounts for 2017 and 2018 provide a comparison with revenues that are projected for the period 2019 through 2037. This analysis organizes revenues into categories for airline revenues and non-airline revenues. Annual revenue growth assumptions for the period 2019 through 2037 are provided in the following sections.

- Airline Revenues

  Airline revenues consist of the following:

  - Air Carrier Terminal Lease
  - Fuel Flowage Air Carrier
  - Air Carrier Landing Fees
  - Air Carrier Security Fees

The projections for these revenues beginning in 2019 are based on the Airport's 2018 budget with growth at a 2% annual inflation rate thereafter.

- Non-Airline Revenues

Non-Airline Revenues fall into the following cost center categories:

  - Administrative
  - Terminal
  - Airfield
  - Security
  - Non-Operational

The projections for these revenues beginning in 2019 are based on the Airport's 2018 budget with growth at a 2% annual inflation rate thereafter.

The detailed revenues included in these various cost categories are provided on pages 2 and 3 of **Schedule 10-4.**

10.4.4.2 Projection of Operating Revenues, Airline Cost Per Enplaned Passenger and Operating Revenues Per Enplaned Passenger

The projection of operating revenues is provided in **Schedule 10-4** at the end of Chapter 10. As shown in the Schedule, airline revenues are expected to grow from $3,546,100 budgeted for 2017 to $3,862,443 projected for 2022 for a total of $22,115,677 during the six-year Phase I planning period. During the five-year Phase II period, airline revenues are projected to total $20,502,313 and during the ten-year Phase III period, revenues are projected to total $47,628,415. The overall annual growth rate for airline revenues is 2.0% during the twenty-one-year planning period.

Non-Airline revenues are expected to increase from $3,079,900 budgeted for 2017 to $3,397,105 projected for 2022 for a total of $19,331,560 during the Phase I period. During the Phase II period, non-airline revenues are projected to total $18,032,245 and during the Phase III period, non-airline revenues are projected to total $41,890,261. The overall annual growth rate for non-airline revenues is 2.0%. Total Airport revenues (including non-operating revenues) are expected to increase from $6,626,000 budgeted for 2017 to $7,259,548 projected for 2022 for a total of $41,447,236 during the Phase I period. During the Phase II period, revenues are projected to total $38,534,558 and during the Phase III period, revenues are projected to total $89,518,676. The overall annual growth rate for total Airport revenues is 2.0%.

Schedule 10-4 also provides a comparison of the Airport's airline cost per enplaned passenger (CPEP) versus small hub airports with similar levels of aviation activity. The airline CPEP (all airline fees and rentals divided by enplaned passengers) is a measure airlines use to compare their cost of operations among the airports they serve. Juneau's airline CPEP is projected to grow from $8.78 to $10.20 throughout the twenty-one-year planning period. Over the same period, the overall small hub industry average grows from $8.47 in 2017 to $13.44 during Phase III (Source: Small Hub airports, FAA Operating and Financial Summary Report #127 and FAA Air Carrier Activity Information System enplanement database). These comparisons show that airline rates and charges at Juneau are, in the Short Term Phase I period, in line with other small hub airports of similar size and operation. In the Mid Term Phase II and Long Term Phase III, the small hub average CPEP begins to grow faster than Juneau's projected CPEP suggesting that the rate structure could be reviewed to enable the Airport to recover a greater portion of its operating costs from the airlines while remaining competitive with its peers.

Schedule 10-4 also provides a comparison of Juneau's total operating revenue per enplaned passenger versus an average for other small hub airports. The Airport's total operating revenue per enplaned passenger is projected to grow from $16.40 budgeted for 2017 to an average of $19.17 during the Phase III planning period. Over the same period, the overall small hub industry average grows from $28.73 in 2017 to $45.59 during Phase III (Source: Small Hub airports, FAA Operating and Financial Summary Report #127 and FAA Air Carrier Activity Information System enplanement database). These comparisons show that non-airline revenues are much lower than small hub industry averages throughout the planning period. This indicates that the Airport's overall policies for setting/negotiating non-airline user fees and rental rates could be reviewed and adjusted over time in order to establish rates that are more comparable with other airports having similar levels of aviation activity. It should be noted, however, that the operating and competitive environment in Juneau has some unique aspects such as low use public parking and rental car activity that result in total revenue statistics that may not be comparable to small airports not located in Alaska.

10.4.5 Financial Plan Summary for the Master Plan Capital Improvement Program

The Financial Plan Summary presented in **Schedule 10-5** includes a Capital Cash Flow section that presents a summary of projected capital funding (from **Schedule 10-2**) and scheduled capital expenditures (from **Schedule 10-1**) with the cash flow that results from implementing the Master Plan Capital Improvement Program with the addition of beginning cash reserve balances to provide the cash flow that results from these activities. **Schedule 10-5** also includes an Operating Cash Flow section that summarizes totals for operating revenues (from **Schedule 10-4**) and operating expenses (from **Schedule 10-3**).

It should be noted that the 2017 and 2018 operating budgets reflect operating expenses in excess of operating revenues resulting in negative net operating cash flow. The analysis assumes that this budget deficit in 2019 and future years will be balanced through revenue rate adjustments in order to fund the operating deficit without requiring the use of fund balance.

In **Schedule 10-1** of the Financial Implementation Analysis, practical approaches were provided for scheduling capital expenditures to match the availability of capital funding. **Schedule 10-2** provided practical approaches for matching specific capital funding sources with each of the identified projects. As shown in **Schedule 10-5**, positive year end cash reserves are projected throughout the twenty-one-year planning period 2017 to 2037.

Based on the assumptions underlying the Financial Implementation Analysis summarized in the Capital Cash Flow section of **Schedule 10-5**, implementation of projects in the Master Plan CIP that are scheduled throughout the twenty-one-year planning period are projected to be financially reasonable if the CBJ can identify approximately $74.6 million in funding for the terminal renovations and expansion projects and other projects for which the funding source is currently unidentified. If a funding source is not available for these projects and other alternative sources cannot be identified, then development of these projects will not be feasible during the implementation period that is currently planned.

Implementation of other capital projects during the 2017-2037 planning period that have AIP discretionary grants indicated as a funding source are subject to the availability of those grants which are provided at the sole discretion of the FAA. If the identified portion of discretionary funding is not awarded by the FAA, then these projects will need to be delayed until funding is available.

Additionally, the Financial Implementation Analysis relies on achievement of the aviation activity and passenger enplanement forecast. Actual aviation traffic may temporarily vary from the projected levels of activity without a significant adverse impact on the capital program. If decreased traffic levels occur and persist, implementation of all the proposed projects may not be financially feasible. It should also be noted, however, that if the forecast activity levels are not met, then a number of the planned capital improvements may not be necessary.

10.5 FINANCIAL ANALYSIS SCHEDULES

Financial analysis Schedules 10-1 through 10-5 are presented on the following pages.

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Juneau, Alaska

Master Plan - Financial Implementation Analysis
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Capital Improvement Program	Funding Schedule									
	Short Term							Mid Term	Long Term	Total
	2017	2018	2019	2020	2021	2022	Total	2023-2027	2028-2037	Funding
Funds Used for Capital Improvement Projects										
AIP Entitlement Grants	$2,878,398	$2,880,800	$2,880,800	$2,880,800	$2,901,808	$2,923,026	$17,345,632	$14,940,903	$0	$32,286,534
AIP Entitlements carryover from the prior years	0	0	(62,375)	0	0	0	0	0	(0)	0
AIP Entitlement unspent current year + carryover	0	62,375	0	0	0	0	0	0	0	0
AIP Discretionary Grants	15,054,217	0	16,689,075	0	7,550,428	12,861,879	52,155,598	22,318,763	0	74,474,361
Other Federal/State Funding	0	4,029,000	0	0	0	0	4,029,000	58,005,783	0	62,034,783
Passenger Facility Charges	928,174	928,174	937,456	946,830	956,299	965,862	5,662,795	1,047,589	0	6,710,384
PFC beginning year unliquidated balance	1,928,407	2,741,581	3,414,755	3,701,961	(0)	607,891	1,928,407	1,047,589	(0)	1,928,407
PFC unspent current year + carryover	(2,741,581)	(3,414,755)	(3,701,961)	0	(607,891)	(1,047,589)	(1,047,589)	0	0	0
City/Borough Capital/GOB Proceeds	0	474,950	10,404	6,900,000	0	6,072,444	13,457,798	696,069	0	14,153,868
Ballot Measure Sales Tax	1,195,508	253,875	650,250	223,000	348,408	526,164	3,197,204	25,796	0	3,223,000
Other Unidentified Funding	0	0	0	1,265,529	0	3,422,650	4,688,179	69,902,255	0	74,590,435
Net Operating Cash Flow	(240,000)	(438,000)	0	(0)	(0)	(0)	(678,001)	(0)	(0)	(678,001)
Funds Available Current Year	19,003,122	7,518,000	20,818,404	15,918,120	11,149,051	26,332,327	100,739,024	167,984,747	(0)	268,723,770
Beginning Cash Balance/Funds Carried Over from Prior Year	2,923,400	2,683,400	2,245,400	2,245,400	2,139,279	2,139,279	2,923,400	2,139,278	2,139,278	2,923,400
Funds Used Current Year	(19,243,122)	(7,956,000)	(20,818,404)	(16,024,241)	(11,149,051)	(26,332,327)	(101,523,145)	(167,984,747)	0	(269,507,892)
Funds Carried Over to Next Year	$2,683,400	$2,245,400	$2,245,400	$2,139,279	$2,139,279	$2,139,278	$2,139,278	$2,139,278	$2,139,278	$2,139,278

Capital Project Description	2017 Base Year Costs	Estimated Project Costs and Development Schedule									
		Short Term							Mid Term	Long Term	Total Escalated
		2017	2018	2019	2020	2021	2022	Total	2023-2027	2028-2037	Costs
Short Term Projects (2017-2022)											
Capital Projects 2017											
1 RSA NE/NW (Ph 12) Construct Aprons, Fencing	$10,800,000	$10,800,000						$10,800,000			$10,800,000
2 Design Taxiway A, Realign T/W E & Relocate D-1 (RIM)	2,111,000	2,111,000						2,111,000			2,111,000
3 Float Pond Improvements (Flow Control Valve)	816,000	816,000						816,000			816,000
4 Replace Snow Removal Equipment	5,145,122	5,145,122						5,145,122			5,145,122
5 Ramp Lighting Energy Grant	256,000	256,000						256,000			256,000
6 First Floor Men's Restroom Renovation	40,000	40,000						40,000			40,000
7 Terminal East End Doors/Vestibule	75,000	75,000						75,000			75,000
Total Capital Projects 2017	$19,243,122	$19,243,122	$0	$0	$0	$0	$0	$19,243,122	$0	$0	$19,243,122
Capital Projects 2018											
8 Design/Construct Pax Boarding Bridge Gate 2	$2,000,000		$2,040,000					$2,040,000			$2,040,000
9 Design/Construct Terminal Reno Ph 2 Including Departure Lounge Exit Lane	1,300,000		1,326,000					1,326,000			1,326,000
10 Design SREF Phase 2 Sand/Chemical/Storage/Fuel	300,000		306,000					306,000			306,000
11 Space Reconfig (old dining room/kitchen) Tenants/Admin	250,000		255,000					255,000			255,000
12 Design & Install Terminal Camera Surveillance System	200,000		204,000					204,000			204,000
13 MALSR (FAA F&E Project)	3,750,000		3,825,000					3,825,000			3,825,000
Total Capital Projects 2018	$7,800,000	$0	$7,956,000	$0	$0	$0	$0	$7,956,000	$0	$0	$7,956,000

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Capital Improvement Program	Funding Schedule: Short Term 2017	2018	2019	2020	2021	2022	Total	Mid Term 2023-2027	Long Term 2028-2037	Total Funding
Funds Used for Capital Improvement Projects										
AIP Entitlement Grants	$2,878,398	$2,880,800	$2,880,800	$2,880,800	$2,901,808	$2,923,026	$17,345,632	$14,940,903	$0	$32,286,534
AIP Entitlements carryover from the prior years	0	0	(62,375)	0	0	0	0	0	(0)	0
AIP Entitlement unspent current year + carryover	0	62,375	0	0	0	0	0	0	0	0
AIP Discretionary Grants	15,054,217	0	16,689,075	0	7,550,428	12,861,879	52,155,598	22,318,763	0	74,474,361
Other Federal/State Funding	0	4,029,000	0	0	0	0	4,029,000	58,005,783	0	62,034,783
Passenger Facility Charges	928,174	928,174	937,456	946,830	956,299	965,862	5,662,795	1,047,589	0	6,710,384
PFC beginning year unliquidated balance	1,928,407	2,741,581	3,414,755	3,701,961	(0)	607,891	1,928,407	1,047,589	(0)	1,928,407
PFC unspent current year + carryover	(2,741,581)	(3,414,755)	(3,701,961)	0	(607,891)	(1,047,589)	(1,047,589)	0	0	0
City/Borough Capital/GOB Proceeds	0	474,950	10,404	6,900,000	0	6,072,444	13,457,798	696,069	0	14,153,868
Ballot Measure Sales Tax	1,195,508	253,875	650,250	223,000	348,408	526,164	3,197,204	25,796	0	3,223,000
Other Unidentified Funding	0	0	0	1,265,529	0	3,422,650	4,688,179	69,902,255	0	74,590,435
Net Operating Cash Flow	(240,000)	(438,000)	0	(0)	(0)	(0)	(678,001)	(0)	(0)	(678,001)
Funds Available Current Year	19,003,122	7,518,000	20,818,404	15,918,120	11,149,051	26,332,327	100,739,024	167,984,747	(0)	268,723,770
Beginning Cash Balance/Funds Carried Over from Prior Year	2,923,400	2,683,400	2,245,400	2,245,400	2,139,279	2,139,279	2,923,400	2,139,278	2,139,278	2,923,400
Funds Used Current Year	(19,243,122)	(7,956,000)	(20,818,404)	(16,024,241)	(11,149,051)	(26,332,327)	(101,523,145)	(167,984,747)	0	(269,507,892)
Funds Carried Over to Next Year	$2,683,400	$2,245,400	$2,245,400	$2,139,279	$2,139,279	$2,139,278	$2,139,278	$2,139,278	$2,139,278	$2,139,278

Capital Project Description	2017 Base Year Costs	Estimated Project Costs and Development Schedule: Short Term 2017	2018	2019	2020	2021	2022	Total	Mid Term 2023-2027	Long Term 2028-2037	Total Escalated Costs
Capital Projects 2019											
14 Construct Taxiway A Rehab	$17,000,000			$17,686,800				$17,686,800			$17,686,800
15 Construct Taxiway E Realignment (Geometry)	2,000,000			2,080,800				2,080,800			2,080,800
16 Construct Taxiway D-1 Relocation (RIM)	1,000,000			1,040,400				1,040,400			1,040,400
17 Multi-Modal Feasibility Planning	10,000			10,404				10,404			10,404
Total Capital Projects 2019	$20,010,000	$0	$0	$20,818,404	$0	$0	$0	$20,818,404	$0	$0	$20,818,404
Capital Projects 2020											
18 Construct Terminal Renovation Ph 2	$15,000,000				$15,918,120			$15,918,120			$15,918,120
19 Replace Trash Compactors & Pads	100,000				106,121			106,121			106,121
Total Capital Projects 2020	$15,100,000	$0	$0	$0	$16,024,241	$0	$0	$16,024,241	$0	$0	$16,024,241

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Capital Improvement Program	Funding Schedule: Short Term 2017	2018	2019	2020	2021	2022	Total	Mid Term 2023-2027	Long Term 2028-2037	Total Funding
Funds Used for Capital Improvement Projects										
AIP Entitlement Grants	$2,878,398	$2,880,800	$2,880,800	$2,880,800	$2,901,808	$2,923,026	$17,345,632	$14,940,903	$0	$32,286,534
AIP Entitlements carryover from the prior years	0	0	(62,375)	0	0	0	0	0	(0)	0
AIP Entitlement unspent current year + carryover	0	62,375	0	0	0	0	0	0	0	0
AIP Discretionary Grants	15,054,217	0	16,689,075	0	7,550,428	12,861,879	52,155,598	22,318,763	0	74,474,361
Other Federal/State Funding	0	4,029,000	0	0	0	0	4,029,000	58,005,783	0	62,034,783
Passenger Facility Charges	928,174	928,174	937,456	946,830	956,299	965,862	5,662,795	1,047,589	0	6,710,384
PFC beginning year unliquidated balance	1,928,407	2,741,581	3,414,755	3,701,961	(0)	607,891	1,928,407	1,047,589	(0)	1,928,407
PFC unspent current year + carryover	(2,741,581)	(3,414,755)	(3,701,961)	0	(607,891)	(1,047,589)	(1,047,589)	0	0	0
City/Borough Capital/GOB Proceeds	0	474,950	10,404	6,900,000	0	6,072,444	13,457,798	696,069	0	14,153,868
Ballot Measure Sales Tax	1,195,508	253,875	650,250	223,000	348,408	526,164	3,197,204	25,796	0	3,223,000
Other Unidentified Funding	0	0	0	1,265,529	0	3,422,650	4,688,179	69,902,255	0	74,590,435
Net Operating Cash Flow	(240,000)	(438,000)	0	(0)	(0)	(0)	(678,001)	(0)	(0)	(678,001)
Funds Available Current Year	19,003,122	7,518,000	20,818,404	15,918,120	11,149,051	26,332,327	100,739,024	167,984,747	(0)	268,723,770
Beginning Cash Balance/Funds Carried Over from Prior Year	2,923,400	2,683,400	2,245,400	2,245,400	2,139,279	2,139,279	2,923,400	2,139,278	2,139,278	2,923,400
Funds Used Current Year	(19,243,122)	(7,956,000)	(20,818,404)	(16,024,241)	(11,149,051)	(26,332,327)	(101,523,145)	(167,984,747)	0	(269,507,892)
Funds Carried Over to Next Year	$2,683,400	$2,245,400	$2,245,400	$2,139,279	$2,139,279	$2,139,278	$2,139,278	$2,139,278	$2,139,278	$2,139,278

Capital Project Description	2017 Base Year Costs	Estimated Project Costs and Development Schedule: Short Term 2017	2018	2019	2020	2021	2022	Total	Mid Term 2023-2027	Long Term 2028-2037	Total Escalated Costs
Capital Projects 2021											
20 Construct SREF Phase 2 Sand/Chemical/Storage/Fuel	$10,300,000					$11,149,051		$11,149,051			$11,149,051
- -	0					0		0			0
Total Capital Projects 2021	$10,300,000	$0	$0	$0	$0	$11,149,051	$0	$11,149,051	$0	$0	$11,149,051
Capital Projects 2022											
21 Passenger Terminal Parking Lot Rehab	$3,000,000						$3,312,242	$3,312,242			$3,312,242
22 Terminal Area (Part 121) Apron Rehab	3,500,000						3,864,283	3,864,283			3,864,283
23 Terminal Area (Part 135) Apron Rehab	6,000,000						6,624,485	6,624,485			6,624,485
24 Design/Construct Emergency Vehicle Access Road (EVAR) Extend	500,000						552,040	552,040			552,040
25 Acquire Wetlands Access Vehicle (w/CCFR)	250,000						276,020	276,020			276,020
26 Replace Snow Removal Equipment	5,000,000						5,520,404	5,520,404			5,520,404
27 NE Development Area Sewer Infrastructure	100,000						110,408	110,408			110,408
28 Phase IC SREF (remainder of maintenance shop) non-FAA eligible	5,500,000						6,072,444	6,072,444			6,072,444
Total Capital Projects 2022	$23,850,000	$0	$0	$0	$0	$0	$26,332,327	$26,332,327	$0	$0	$26,332,327
Total Short Term Project Costs	$96,303,122	$19,243,122	$7,956,000	$20,818,404	$16,024,241	$11,149,051	$26,332,327	$101,523,145	$0	$0	$101,523,145

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Capital Improvement Program	Funding Schedule: Short Term 2017	2018	2019	2020	2021	2022	Total	Mid Term 2023-2027	Long Term 2028-2037	Total Funding
Funds Used for Capital Improvement Projects										
AIP Entitlement Grants	$2,878,398	$2,880,800	$2,880,800	$2,880,800	$2,901,808	$2,923,026	$17,345,632	$14,940,903	$0	$32,286,534
AIP Entitlements carryover from the prior years	0	0	(62,375)	0	0	0	0	0	(0)	0
AIP Entitlement unspent current year + carryover	0	62,375	0	0	0	0	0	0	0	0
AIP Discretionary Grants	15,054,217	0	16,689,075	0	7,550,428	12,861,879	52,155,598	22,318,763	0	74,474,361
Other Federal/State Funding	0	4,029,000	0	0	0	0	4,029,000	58,005,783	0	62,034,783
Passenger Facility Charges	928,174	928,174	937,456	946,830	956,299	965,862	5,662,795	1,047,589	0	6,710,384
PFC beginning year unliquidated balance	1,928,407	2,741,581	3,414,755	3,701,961	(0)	607,891	1,928,407	1,047,589	(0)	1,928,407
PFC unspent current year + carryover	(2,741,581)	(3,414,755)	(3,701,961)	0	(607,891)	(1,047,589)	(1,047,589)	0	0	0
City/Borough Capital/GOB Proceeds	0	474,950	10,404	6,900,000	0	6,072,444	13,457,798	696,069	0	14,153,868
Ballot Measure Sales Tax	1,195,508	253,875	650,250	223,000	348,408	526,164	3,197,204	25,796	0	3,223,000
Other Unidentified Funding	0	0	0	1,265,529	0	3,422,650	4,688,179	69,902,255	0	74,590,435
Net Operating Cash Flow	(240,000)	(438,000)	0	(0)	(0)	(0)	(678,001)	(0)	(0)	(678,001)
Funds Available Current Year	19,003,122	7,518,000	20,818,404	15,918,120	11,149,051	26,332,327	100,739,024	167,984,747	(0)	268,723,770
Beginning Cash Balance/Funds Carried Over from Prior Year	2,923,400	2,683,400	2,245,400	2,245,400	2,139,279	2,139,279	2,923,400	2,139,278	2,139,278	2,923,400
Funds Used Current Year	(19,243,122)	(7,956,000)	(20,818,404)	(16,024,241)	(11,149,051)	(26,332,327)	(101,523,145)	(167,984,747)	0	(269,507,892)
Funds Carried Over to Next Year	$2,683,400	$2,245,400	$2,245,400	$2,139,279	$2,139,279	$2,139,278	$2,139,278	$2,139,278	$2,139,278	$2,139,278

	Capital Project Description	2017 Base Year Costs	Estimated Project Costs and Development Schedule: Short Term 2017	2018	2019	2020	2021	2022	Total	Mid Term 2023-2027	Long Term 2028-2037	Total Escalated Costs
	Mid Term Projects (2023-2027)											
29	Design/Reconstruct Alex Holden Way, Cessna & Renshaw	$2,200,000							$0	$2,552,254		$2,552,254
30	Design/Construct Terminal Renovation Ph 3 (Knuckle)	24,000,000							0	27,842,776		27,842,776
31	Design/Construct Taxiway C Reconfig	5,000,000							0	5,800,578		5,800,578
32	Design/Construct Safety Area Grading at R/W Shoulder & NAVAIDS	3,300,000							0	3,828,382		3,828,382
33	MAGVAR	200,000							0	232,023		232,023
34	Reconstruct West GA Taxilanes	2,500,000							0	2,900,289		2,900,289
35	Reconstruct West Tiedown Apron	3,000,000							0	3,480,347		3,480,347
36	Replace ARFF Truck	1,000,000							0	1,160,116		1,160,116
37	Reconstruct East GA Taxilanes	2,000,000							0	2,320,231		2,320,231
38	Reconstruct East Tiedown Apron	3,000,000							0	3,480,347		3,480,347
39	Reconstruct E-1 Ramp	5,500,000							0	6,380,636		6,380,636
40	Terminal Expansion Planning-Baggage, Departure Lounge	600,000							0	696,069		696,069
41	Parking Garage	20,000,000							0	23,202,313		23,202,313
42	Acquire Snow Removal Equipment	5,000,000							0	5,800,578		5,800,578
43	Replace ARFF Truck	1,000,000							0	1,160,116		1,160,116
44	Demolish (Old) Sand/Chem Facility	300,000							0	348,035		348,035
45	Terminal Infrastructure Replacement	5,000,000							0	5,800,578		5,800,578
46	Airport Master Plan Update	1,200,000							0	1,392,139		1,392,139
47	Relocate/Construct FAA ATCT	50,000,000							0	58,005,783		58,005,783
48	Terminal Expansion Construction	10,000,000							0	11,601,157		11,601,157
49	Landside Access Roads Pavement Rehab	TBD							0	0		0
50	Airfield Pavement Rehab	TBD							0	0		0
51	Civil Air Patrol Hangar Relocation	TBD							0	0		0
52	Fish & Wildlife Service Hangar Relocation	TBD							0	0		0
	Total Mid Term Project Costs	$144,800,000	$0	$0	$0	$0	$0	$0	$0	$167,984,747	$0	$167,984,747

JUNEAU INTERNATIONAL AIRPORT (JNU)
Juneau, Alaska

Master Plan - Financial Implementation Analysis
Estimated Project Costs and Development Schedule

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	Funding Schedule									
	Short Term							Mid Term	Long Term	Total
Capital Improvement Program	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Total**	**2023-2027**	**2028-2037**	**Funding**
Funds Used for Capital Improvement Projects										
AIP Entitlement Grants	$2,878,398	$2,880,800	$2,880,800	$2,880,800	$2,901,808	$2,923,026	$17,345,632	$14,940,903	$0	$32,286,534
AIP Entitlements carryover from the prior years	0	0	(62,375)	0	0	0	0	0	(0)	0
AIP Entitlement unspent current year + carryover	0	62,375	0	0	0	0	0	0	0	0
AIP Discretionary Grants	15,054,217	0	16,689,075	0	7,550,428	12,861,879	52,155,598	22,318,763	0	74,474,361
Other Federal/State Funding	0	4,029,000	0	0	0	0	4,029,000	58,005,783	0	62,034,783
Passenger Facility Charges	928,174	928,174	937,456	946,830	956,299	965,862	5,662,795	1,047,589	0	6,710,384
PFC beginning year unliquidated balance	1,928,407	2,741,581	3,414,755	3,701,961	(0)	607,891	1,928,407	1,047,589	(0)	1,928,407
PFC unspent current year + carryover	(2,741,581)	(3,414,755)	(3,701,961)	0	(607,891)	(1,047,589)	(1,047,589)	0	0	0
City/Borough Capital/GOB Proceeds	0	474,950	10,404	6,900,000	0	6,072,444	13,457,798	696,069	0	14,153,868
Ballot Measure Sales Tax	1,195,508	253,875	650,250	223,000	348,408	526,164	3,197,204	25,796	0	3,223,000
Other Unidentified Funding	0	0	0	1,265,529	0	3,422,650	4,688,179	69,902,255	0	74,590,435
Net Operating Cash Flow	(240,000)	(438,000)	0	(0)	(0)	(0)	(678,001)	(0)	(0)	(678,001)
Funds Available Current Year	19,003,122	7,518,000	20,818,404	15,918,120	11,149,051	26,332,327	100,739,024	167,984,747	(0)	268,723,770
Beginning Cash Balance/Funds Carried Over from Prior Year	2,923,400	2,683,400	2,245,400	2,245,400	2,139,279	2,139,279	2,923,400	2,139,278	2,139,278	2,923,400
Funds Used Current Year	(19,243,122)	(7,956,000)	(20,818,404)	(16,024,241)	(11,149,051)	(26,332,327)	(101,523,145)	(167,984,747)	0	(269,507,892)
Funds Carried Over to Next Year	$2,683,400	$2,245,400	$2,245,400	$2,139,279	$2,139,279	$2,139,278	$2,139,278	$2,139,278	$2,139,278	$2,139,278

		Estimated Project Costs and Development Schedule									
	2017 Base Year	Short Term							Mid Term	Long Term	Total Escalated
Capital Project Description	**Costs**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Total**	**2023-2027**	**2028-2037**	**Costs**
Long Term Projects (2028-2037)											
- -	$0							$0		$0	$0
- -	0							0		0	0
- -	0							0		0	0
Total Long Term Project Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Project Costs	$241,103,122	$19,243,122	$7,956,000	$20,818,404	$16,024,241	$11,149,051	$26,332,327	$101,523,145	$167,984,747	$0	$269,507,892

JUNEAU INTERNATIONAL AIRPORT (JNU)
Juneau, Alaska

Master Plan - Financial Implementation Analysis
Projected Capital Funding Sources

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	Capital Improvement Projects	Total Escalated Costs	AIP Entitlement Funding	AIP Discretionary Funding	Total AIP Funding	Other Federal/ State Funding	Passenger Facility Charges (PAYG)	City/ Borough Capital/GOB Proceeds	Ballot Measure Sales Tax	Other Unidentified Funding	Cash Reserves/ Net Revs	Total Funding
	Short Term Projects (2017-2022)											
	Capital Projects 2017											
1	RSA NE/NW (Ph 12) Construct Aprons, Fencing	$10,800,000	$134,335	$9,990,665	$10,125,000				$675,000		$0	$10,800,000
2	Design Taxiway A, Realign T/W E & Relocate D-1 (RIM)	2,111,000	1,979,063		1,979,063				131,938		0	2,111,000
3	Float Pond Improvements (Flow Control Valve)	816,000	765,000		765,000				51,000		0	816,000
4	Replace Snow Removal Equipment	5,145,122		4,823,552	4,823,552				321,570		0	5,145,122
5	Ramp Lighting Energy Grant	256,000		240,000	240,000				16,000		0	256,000
6	First Floor Men's Restroom Renovation	40,000			0		40,000				0	40,000
7	Terminal East End Doors/Vestibule	75,000			0		75,000				0	75,000
	Totals for 2017	$19,243,122	$2,878,398	$15,054,217	$17,932,614	$0	$115,000	$0	$1,195,508	$0	$0	$19,243,122
	Capital Projects 2018											
8	Design/Construct Pax Boarding Bridge Gate 2	$2,040,000	$1,912,500		$1,912,500				$127,500		$0	$2,040,000
9	Design/Construct Terminal Reno Ph 2 Including Departure Lounge Exit Lane	1,326,000	743,800		743,800			474,950	107,250		0	1,326,000
10	Design SREF Phase 2 Sand/Chemical/Storage/Fuel	306,000	286,875		286,875				19,125		0	306,000
11	Space Reconfig (old dining room/kitchen) Tenants/Admin	255,000			0		255,000				0	255,000
12	Design & Install Terminal Camera Surveillance System	204,000			0	204,000					0	204,000
13	MALSR (FAA F&E Project)	3,825,000			0	3,825,000					0	3,825,000
	Totals for 2018	$7,956,000	$2,943,175	$0	$2,943,175	$4,029,000	$255,000	$474,950	$253,875	$0	$0	$7,956,000
	Capital Projects 2019											
14	Construct Taxiway A Rehab	$17,686,800	$2,818,425	$13,762,950	$16,581,375		$552,713		$552,713		$0	$17,686,800
15	Construct Taxiway E Realignment (Geometry)	2,080,800		1,950,750	1,950,750		65,025		65,025		0	2,080,800
16	Construct Taxiway D-1 Relocation (RIM)	1,040,400	0	975,375	975,375		32,513		32,513		0	1,040,400
17	Multi-Modal Feasibility Planning	10,404			0			10,404			0	10,404
	Totals for 2019	$20,818,404	$2,818,425	$16,689,075	$19,507,500	$0	$650,250	$10,404	$650,250	$0	$0	$20,818,404
	Capital Projects 2020							GOB 2012				
18	Construct Terminal Renovation Ph 2	$15,918,120	$2,880,800		$2,880,800		$4,648,791	$6,900,000	$223,000	$1,265,529	$0	$15,918,120
19	Replace Trash Compactors & Pads	106,121			0						106,121	106,121
	Totals for 2020	$16,024,241	$2,880,800	$0	$2,880,800	$0	$4,648,791	$6,900,000	$223,000	$1,265,529	$106,121	$16,024,241
	Capital Projects 2021											
20	Construct SREF Phase 2 Sand/Chemical/Storage/Fuel	$11,149,051	$2,901,808	$7,550,428	$10,452,236		$348,408		$348,408		$0	$11,149,051
-	-	0		0	0		0				0	0
	Totals for 2021	$11,149,051	$2,901,808	$7,550,428	$10,452,236	$0	$348,408	$0	$348,408	$0	$0	$11,149,051
	Capital Projects 2022											
21	Passenger Terminal Parking Lot Rehab	$3,312,242			$0					$3,312,242	$0	$3,312,242
22	Terminal Area (Part 121) Apron Rehab	3,864,283	2,923,026	699,739	3,622,765		120,759		120,759		0	3,864,283
23	Terminal Area (Part 135) Apron Rehab	6,624,485		6,210,455	6,210,455		207,015		207,015		0	6,624,485
24	Design/Construct Emergency Vehicle Access Road (EVAR) Extend	552,040		517,538	517,538		17,251		17,251		0	552,040
25	Acquire Wetlands Access Vehicle (w/CCFR)	276,020		258,769	258,769		8,626		8,626		0	276,020
26	Replace Snow Removal Equipment	5,520,404		5,175,379	5,175,379		172,513		172,513		0	5,520,404
27	NE Development Area Sewer Infrastructure	110,408			0					110,408	0	110,408
28	Phase IC SREF (remainder of maintenance shop) non-FAA eligible	6,072,444			0			6,072,444			0	6,072,444
	Totals for 2022	$26,332,327	$2,923,026	$12,861,879	$15,784,905	$0	$526,164	$6,072,444	$526,164	$3,422,650	$0	$26,332,327
	Total Short Term Project Funding	$101,523,145	$17,345,632	$52,155,598	$69,501,230	$4,029,000	$6,543,613	$13,457,798	$3,197,204	$4,688,179	$106,121	$101,523,145

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Schedule 10-2

Master Plan - Financial Implementation Analysis
Projected Capital Funding Sources

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	Capital Improvement Projects	Total Escalated Costs	AIP Entitlement Funding	AIP Discretionary Funding	Total AIP Funding	Other Federal/ State Funding	Passenger Facility Charges (PAYG)	City/ Borough Capital/GOB Proceeds	Ballot Measure Sales Tax	Other Unidentified Funding	Cash Reserves/ Net Revs	Total Funding
Mid Term Projects (2023-2027)												
29	Design/Reconstruct Alex Holden Way, Cessna & Renshaw	$2,552,254			$0					$2,552,254	$0	$2,552,254
30	Design/Construct Terminal Renovation Ph 3 (Knuckle)	27,842,776	3,000,000		3,000,000		2,095,178		25,796	22,721,802	0	27,842,776
31	Design/Construct Taxiway C Reconfig	5,800,578	3,000,000	2,438,042	5,438,042					362,536	0	5,800,578
32	Design/Construct Safety Area Grading at R/W Shoulder & NAVAIDS	3,828,382	3,000,000	589,108	3,589,108					239,274	0	3,828,382
33	MAGVAR	232,023		217,522	217,522					14,501	0	232,023
34	Reconstruct West GA Taxilanes	2,900,289	187,500	2,531,521	2,719,021					181,268	0	2,900,289
35	Reconstruct West Tiedown Apron	3,480,347	3,262,825		3,262,825					217,522	0	3,480,347
36	Replace ARFF Truck	1,160,116		1,087,608	1,087,608					72,507	0	1,160,116
37	Reconstruct East GA Taxilanes	2,320,231		2,175,217	2,175,217					145,014	0	2,320,231
38	Reconstruct East Tiedown Apron	3,480,347		3,262,825	3,262,825					217,522	0	3,480,347
39	Reconstruct E-1 Ramp	6,380,636	2,490,577	3,491,269	5,981,846					398,790	0	6,380,636
40	Terminal Expansion Planning-Baggage, Departure Lounge	696,069			0			696,069			0	696,069
41	Parking Garage	23,202,313			0					23,202,313	0	23,202,313
42	Acquire Snow Removal Equipment	5,800,578		5,438,042	5,438,042					362,536	0	5,800,578
43	Replace ARFF Truck	1,160,116		1,087,608	1,087,608					72,507	0	1,160,116
44	Demolish (Old) Sand/Chem Facility	348,035			0					348,035	0	348,035
45	Terminal Infrastructure Replacement	5,800,578			0					5,800,578	0	5,800,578
46	Airport Master Plan Update	1,392,139			0					1,392,139	0	1,392,139
47	Relocate/Construct FAA ATCT	58,005,783			0	58,005,783					0	58,005,783
48	Terminal Expansion Construction	11,601,157			0					11,601,157	0	11,601,157
49	Landside Access Roads Pavement Rehab	0			0						0	0
50	Airfield Pavement Rehab	0			0						0	0
51	Civil Air Patrol Hangar Relocation	0			0					0	0	0
52	Fish & Wildlife Service Hangar Relocation	0			0					0	0	0
	Total Mid Term Project Funding	$167,984,747	$14,940,903	$22,318,763	$37,259,666	$58,005,783	$2,095,178	$696,069	$25,796	$69,902,255	$0	$167,984,747
Long Term Projects (2028-2037)												
-	-	$0			$0						$0	$0
-	-	0			0						0	0
-	-	0			0						0	0
	Total Long Term Project Funding	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Project Funding		$269,507,892	$32,286,534	$74,474,361	$106,760,896	$62,034,783	$8,638,791	$14,153,868	$3,223,000	$74,590,435	$106,121	$269,507,892

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JUNEAU INTERNATIONAL AIRPORT (JNU)
Juneau, Alaska

Schedule 10-3

Master Plan - Financial Implementation Analysis
Actual, Budgeted and Projected Operations & Maintenance Expenses

06-Jun-18

				Short Term								
	Actual	Actual	Actual	Budget	Budget	Projected					Mid Term	Long Term
Operations & Maintenance Expenses	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Total**	**2023-2027**	**2028-2037**
SUMMARY OF RATE BASE COST CENTERS												
Airfield Rate Base:												
Direct Expenses	$2,253,877	$2,471,472	$2,044,593	$2,715,600	$2,758,000	$2,813,160	$2,869,423	$2,926,812	$2,985,348	$17,068,343	$15,846,588	$36,812,815
Administration Allocation (50%)	432,004	495,330	515,155	518,700	516,400	526,728	537,263	548,008	558,968	3,206,066	2,967,070	6,892,726
Landside Allocation (50%)	13,406	13,178	13,133	13,900	13,900	14,178	14,462	14,751	15,046	86,236	79,865	185,532
Security Allocation (50%)	281,407	278,665	350,153	383,000	383,450	391,119	398,941	406,920	415,059	2,378,489	2,203,181	5,118,156
Capital Outlay Allocation (90%)	0	0	827,670	39,510	179,730	0	0	0	0	219,240	0	0
Emergency Reserves Allocation (60%)	0	0	0	0	0	0	0	0	0	0	0	0
Total Airfield Rate Base	$2,980,693	$3,258,644	$3,750,703	$3,670,710	$3,851,480	$3,745,185	$3,820,089	$3,896,490	$3,974,420	$22,958,374	$21,096,704	$49,009,229
Terminal Rate Base:												
Direct Expenses	$1,210,671	$1,154,841	$1,130,778	$1,242,100	$1,247,300	$1,272,246	$1,297,691	$1,323,645	$1,350,118	$7,733,099	$7,166,588	$16,648,522
Administration Allocation (50%)	432,004	495,330	515,155	518,700	516,400	526,728	537,263	548,008	558,968	3,206,066	2,967,070	6,892,726
Landside Allocation (50%)	13,406	13,178	13,133	13,900	13,900	14,178	14,462	14,751	15,046	86,236	79,865	185,532
Security Allocation (50%)	281,407	278,665	350,153	383,000	383,450	391,119	398,941	406,920	415,059	2,378,489	2,203,181	5,118,156
Capital Outlay Allocation (10%)	0	0	91,963	4,390	19,970	0	0	0	0	24,360	0	0
Emergency Reserves Allocation (40%)	0	0	0	0	0	0	0	0	0	0	0	0
Total Terminal Rate Base	$1,937,487	$1,942,013	$2,101,181	$2,162,090	$2,181,020	$2,204,271	$2,248,356	$2,293,324	$2,339,190	$13,428,251	$12,416,704	$28,844,936
ARFF Rate Base:												
Direct Expenses	$653,367	$666,184	$691,235	$1,033,200	$1,031,500	$1,052,130	$1,073,173	$1,094,636	$1,116,529	$6,401,167	$5,926,670	$13,768,100
Administration Allocation (0%)	0	0	0	0	0	0	0	0	0	0	0	0
Landside Allocation (0%)	0	0	0	0	0	0	0	0	0	0	0	0
Security Allocation (0%)	0	0	0	0	0	0	0	0	0	0	0	0
Capital Outlay Allocation (0%)	0	0	0	0	0	0	0	0	0	0	0	0
Emergency Reserves Allocation (0%)	0	0	0	0	0	0	0	0	0	0	0	0
Total ARFF Rate Base	$653,367	$666,184	$691,235	$1,033,200	$1,031,500	$1,052,130	$1,073,173	$1,094,636	$1,116,529	$6,401,167	$5,926,670	$13,768,100
TOTAL OPERATIONS AND MAINTENANCE EXPENSES	$5,571,547	$5,866,841	$6,543,119	$6,866,000	$7,064,000	$7,001,586	$7,141,618	$7,284,450	$7,430,139	$42,787,793	$39,440,077	$91,622,266

Master Plan - Financial Implementation Analysis
Actual, Budgeted and Projected Operations & Maintenance Expenses

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				Short Term								
	Actual	Actual	Actual	Budget	Budget	Projected					Mid Term	Long Term
Operations & Maintenance Expenses	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total	2023-2027	2028-2037
AIRPORT ADMINISTRATION												
Personnel:												
Salaries	$284,794	$339,369	$366,306	$830,500	$846,300	$863,226	$880,491	$898,100	$916,062	$5,234,679	$4,862,570	$11,296,115
Overtime	65	2,178	(2,094)	5,000	0	0	0	0	0	5,000	0	0
Accrued Leave	92,821	63,738	71,732	0	0	0	0	0	0	0	0	0
Benefits	161,444	191,623	203,480	401,300	404,600	412,692	420,946	429,365	437,952	2,506,855	2,324,702	5,400,459
Workers Compensation	3,200	7,104	7,100	9,100	9,100	9,282	9,468	9,657	9,850	56,457	52,286	121,464
Engineering Workforce	0	0	0	(571,400)	(590,100)	(601,902)	(613,940)	(626,219)	(638,743)	(3,642,304)	(3,390,526)	(7,876,448)
Total Personnel	$542,324	$604,012	$646,524	$674,500	$669,900	$683,298	$696,964	$710,903	$725,121	$4,160,687	$3,849,032	$8,941,590
Annual Growth Rate	-	11.4%	7.0%	4.3%	-0.7%	2.0%	2.0%	2.0%	2.0%	1.9%	2.0%	2.0%
Travel & Training:												
Travel	$4,122	$3,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Mileage	12	0	0	0	0	0	0	0	0	0	0	0
Training	2,176	0	0	500	500	510	520	531	541	3,102	2,873	6,674
Total Travel & Training	$6,310	$3,000	$0	$500	$500	$510	$520	$531	$541	$3,102	$2,873	$6,674
Annual Growth Rate	-	-52.5%	-100.0%	-	0.0%	2.0%	2.0%	2.0%	2.0%	-	2.0%	2.0%
Services & Charges:												
Telephone	$9,943	$10,279	$10,601	$11,000	$11,000	$11,220	$11,444	$11,673	$11,907	$68,244	$63,202	$146,824
Printing/Advertising	2,976	1,798	1,736	3,000	3,000	3,060	3,121	3,184	3,247	18,612	17,237	40,043
Electricity	2,358	975	928	1,000	1,000	1,020	1,040	1,061	1,082	6,204	5,746	13,348
Fuel Oil	0	0	0	0	0	0	0	0	0	0	0	0
Disposal Service	0	0	0	0	0	0	0	0	0	0	0	0
Water Service	0	0	0	11,100	11,100	11,322	11,548	11,779	12,015	68,865	63,777	148,159
Sewer Service	0	0	0	20,200	20,200	20,604	21,016	21,436	21,865	125,322	116,063	269,623
Repairs	220	0	526	0	0	0	0	0	0	0	0	0
Equipment Maintenance Contract	0	0	0	0	0	0	0	0	0	0	0	0
Maintenance Contracts	0	0	0	0	0	0	0	0	0	0	0	0
Maintenance Buildings	0	0	0	0	0	0	0	0	0	0	0	0
Equipment Rentals	0	640	1,940	0	0	0	0	0	0	0	0	0
Fleet Reserve	0	0	0	0	0	0	0	0	0	0	0	0
Insurance & Bonding	0	0	0	0	0	0	0	0	0	0	0	0
General Liability	2,100	2,196	2,200	2,300	2,300	2,346	2,393	2,441	2,490	14,269	13,215	30,700
Dues & Subscriptions	11,958	3,333	11,822	12,000	12,000	12,240	12,485	12,734	12,989	74,448	68,948	160,172
Contractual Services	7,906	13,726	1,827	4,000	4,000	4,080	4,162	4,245	4,330	24,816	22,983	53,391
Management/Contracts/Professional	0	0	0	0	0	0	0	0	0	0	0	0
Full Cost Allocation (Interdepartmental)	269,600	342,804	342,800	291,300	291,300	297,126	303,069	309,130	315,312	1,807,237	1,673,717	3,888,170
Stormwater Pollution Prevention	0	0	0	0	0	0	0	0	0	0	0	0
Bank Fees	60	70	60	100	100	102	104	106	108	620	575	1,335
Postage	431	544	572	700	700	714	728	743	758	4,343	4,022	9,343
Accident Contingency (Loss)	1,000	0	0	1,000	1,000	1,020	1,040	1,061	1,082	6,204	5,746	13,348
Software	523	0	0	0	0	0	0	0	0	0	0	0
Total Services & Charges	$309,075	$376,365	$375,012	$357,700	$357,700	$364,854	$372,151	$379,594	$387,186	$2,219,185	$2,055,230	$4,774,454
Annual Growth Rate	-	21.8%	-0.4%	-4.6%	0.0%	2.0%	2.0%	2.0%	2.0%	0.5%	2.0%	2.0%

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				Short Term								
	Actual	Actual	Actual	Budget	Budget	Projected					Mid Term	Long Term
Operations & Maintenance Expenses	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Total**	**2023-2027**	**2028-2037**
Supplies:												
Office Supplies	$652	$1,505	$615	$700	$700	$714	$728	$743	$758	$4,343	$4,022	$9,343
Material & Commodities	5,606	1,509	7,496	2,000	2,000	2,040	2,081	2,122	2,165	12,408	11,491	26,695
Gasoline & Oil	0	0	0	0	0	0	0	0	0	0	0	0
Minor Equipment	40	4,269	662	2,000	2,000	2,040	2,081	2,122	2,165	12,408	11,491	26,695
Total Supplies	$6,298	$7,283	$8,773	$4,700	$4,700	$4,794	$4,890	$4,988	$5,087	$29,159	$27,005	$62,734
Annual Growth Rate	-	15.6%	20.5%	-46.4%	0.0%	2.0%	2.0%	2.0%	2.0%	-8.7%	2.0%	2.0%
Total Airport Administration	$864,007	$990,660	$1,030,309	$1,037,400	$1,032,800	$1,053,456	$1,074,525	$1,096,016	$1,117,936	$6,412,133	$5,934,139	$13,785,452
Annual Growth Rate	-	14.7%	4.0%	0.7%	-0.4%	2.0%	2.0%	2.0%	2.0%	1.4%	2.0%	2.0%

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				Short Term								
	Actual	Actual	Actual	Budget	Budget	Projected					Mid Term	Long Term
Operations & Maintenance Expenses	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Total**	**2023-2027**	**2028-2037**
TERMINAL OPERATIONS												
Personnel:												
Salaries	$315,701	$294,276	$310,358	$398,500	$401,700	$409,734	$417,929	$426,287	$434,813	$2,488,963	$2,308,040	$5,361,751
Overtime	13,387	11,465	5,239	10,000	10,000	10,200	10,404	10,612	10,824	62,040	57,457	133,476
Accrued Leave	43,486	50,538	55,130	0	0	0	0	0	0	0	0	0
Benefits	228,501	211,735	218,485	234,000	235,000	239,700	244,494	249,384	254,372	1,456,949	1,350,235	3,136,697
Workers Compensation	4,200	9,696	9,700	12,300	12,300	12,546	12,797	13,053	13,314	76,310	70,672	164,176
Engineering Workforce	0	0	0	0	0	0	0	0	0	0	0	0
Total Personnel	$605,275	$577,710	$598,912	$654,800	$659,000	$672,180	$685,624	$699,336	$713,323	$4,084,262	$3,786,404	$8,796,101
Annual Growth Rate	-	-4.6%	3.7%	9.3%	0.6%	2.0%	2.0%	2.0%	2.0%	3.0%	2.0%	2.0%
Travel & Training:												
Travel	$0	$1,891	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Mileage	0	0	0	0	0	0	0	0	0	0	0	0
Training	0	0	0	500	500	510	520	531	541	3,102	2,873	6,674
Total Travel & Training	$0	$1,891	$0	$500	$500	$510	$520	$531	$541	$3,102	$2,873	$6,674
Annual Growth Rate	-	-	-100.0%	-	0.0%	2.0%	2.0%	2.0%	2.0%	-	2.0%	2.0%
Services & Charges:												
Telephone	$8,331	$3,317	$2,527	$5,000	$5,000	$5,100	$5,202	$5,306	$5,412	$31,020	$28,728	$66,738
Printing/Advertising	0	0	0	0	0	0	0	0	0	0	0	0
Electricity	194,598	157,644	163,983	170,000	170,000	173,400	176,868	180,405	184,013	1,054,687	976,766	2,269,100
Fuel Oil	144,600	69,567	56,618	100,000	110,000	112,200	114,444	116,733	119,068	672,444	632,025	1,468,241
Disposal Service	12,255	12,995	18,292	19,000	19,000	19,380	19,768	20,163	20,566	117,877	109,168	253,605
Water Service	3,142	3,072	4,126	5,000	5,000	5,100	5,202	5,306	5,412	31,020	28,728	66,738
Sewer Service	11,449	11,069	14,867	17,000	17,000	17,340	17,687	18,041	18,401	105,469	97,677	226,910
Repairs	28,013	37,095	54,491	27,500	26,000	26,520	27,050	27,591	28,143	162,805	149,388	347,039
Equipment Maintenance Contract	0	0	0	0	0	0	0	0	0	0	0	0
Maintenance Contracts	0	0	0	0	0	0	0	0	0	0	0	0
Maintenance Buildings	0	0	0	0	0	0	0	0	0	0	0	0
Equipment Rentals	0	0	0	0	0	0	0	0	0	0	0	0
Fleet Reserve	0	0	0	0	0	0	0	0	0	0	0	0
Insurance & Bonding (Spec & Prop)	20,370	29,655	38,059	44,000	44,000	44,880	45,778	46,693	47,627	272,978	252,810	587,297
General Liability	0	0	0	0	0	0	0	0	0	0	0	0
Dues & Subscriptions	0	249	0	0	0	0	0	0	0	0	0	0
Contractual Services	47,455	123,602	81,895	93,000	93,000	94,860	96,757	98,692	100,666	576,976	534,348	1,241,331
Management/Contracts/Professional	0	0	0	0	0	0	0	0	0	0	0	0
Full Cost Allocation (Interdepartmental)	0	0	0	0	0	0	0	0	0	0	0	0
Stormwater Pollution Prevention	0	0	0	0	0	0	0	0	0	0	0	0
Bank Fees	0	0	0	0	0	0	0	0	0	0	0	0
Postage	0	0	0	0	0	0	0	0	0	0	0	0
Accident Contingency (Loss)	0	1,461	0	1,000	1,000	1,020	1,040	1,061	1,082	6,204	5,746	13,348
Software	0	105	0	0	0	0	0	0	0	0	0	0
Total Services & Charges	$470,213	$449,831	$434,858	$481,500	$490,000	$499,800	$509,796	$519,992	$530,392	$3,031,480	$2,815,384	$6,540,348
Annual Growth Rate	-	-4.3%	-3.3%	10.7%	1.8%	2.0%	2.0%	2.0%	2.0%	3.4%	2.0%	2.0%

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				Short Term								
	Actual	Actual	Actual	Budget	Budget	Projected					Mid Term	Long Term
Operations & Maintenance Expenses	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total	2023-2027	2028-2037
Supplies:												
Office Supplies	$97	$701	$4	$0	$0	$0	$0	$0	$0	$0	$0	$0
Material & Commodities	135,086	124,708	90,619	97,300	87,300	89,046	90,827	92,643	94,496	551,613	501,598	1,165,250
Gasoline & Oil	0	0	0	0	0	0	0	0	0	0	0	0
Minor Equipment	0	0	6,385	8,000	10,500	10,710	10,924	11,143	11,366	62,642	60,330	140,150
Total Supplies	$135,183	$125,409	$97,008	$105,300	$97,800	$99,756	$101,751	$103,786	$105,862	$614,255	$561,928	$1,305,400
Annual Growth Rate	-	-7.2%	-22.6%	8.5%	-7.1%	2.0%	2.0%	2.0%	2.0%	1.5%	2.0%	2.0%
Total Terminal Operations	$1,210,671	$1,154,841	$1,130,778	$1,242,100	$1,247,300	$1,272,246	$1,297,691	$1,323,645	$1,350,118	$7,733,099	$7,166,588	$16,648,522
Annual Growth Rate	-	-4.6%	-2.1%	9.8%	0.4%	2.0%	2.0%	2.0%	2.0%	3.0%	2.0%	2.0%

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Operations & Maintenance Expenses	Actual 2014	Actual 2015	Actual 2016	Short Term: Budget 2017	Short Term: Budget 2018	Short Term: Projected 2019	Short Term: Projected 2020	Short Term: Projected 2021	Short Term: Projected 2022	Short Term: Total	Mid Term 2023-2027	Long Term 2028-2037
AIRFIELD MAINTENANCE												
Personnel:												
Salaries	$622,976	$655,501	$628,035	$1,035,700	$1,060,300	$1,081,506	$1,103,136	$1,125,199	$1,147,703	$6,553,544	$6,092,145	$14,152,512
Overtime	129,682	97,965	66,918	120,000	130,000	132,600	135,252	137,957	140,716	796,525	746,939	1,735,194
Accrued Leave	87,500	86,191	83,964	0	0	0	0	0	0	0	0	0
Benefits	409,411	401,462	395,909	559,800	570,200	581,604	593,236	605,101	617,203	3,527,144	3,276,187	7,610,829
Workers Compensation	6,300	14,400	14,400	18,300	18,300	18,666	19,039	19,420	19,809	113,534	105,146	244,262
Engineering Workforce	0	583	77	(309,100)	(318,200)	(324,564)	(331,055)	(337,676)	(344,430)	(1,965,026)	(1,828,276)	(4,247,222)
Total Personnel	$1,255,869	$1,256,102	$1,189,303	$1,424,700	$1,460,600	$1,489,812	$1,519,608	$1,550,000	$1,581,000	$9,025,721	$8,392,141	$19,495,576
Annual Growth Rate	-	0.0%	-5.3%	19.8%	2.5%	2.0%	2.0%	2.0%	2.0%	4.9%	2.0%	2.0%
Travel & Training:												
Travel	$3,761	$0	$5,886	$3,000	$3,000	$3,060	$3,121	$3,184	$3,247	$18,612	$17,237	$40,043
Mileage	0	0	0	0	0	0	0	0	0	0	0	0
Training	0	0	0	500	500	510	520	531	541	3,102	2,873	6,674
Total Travel & Training	$3,761	$0	$5,886	$3,500	$3,500	$3,570	$3,641	$3,714	$3,789	$21,714	$20,110	$46,717
Annual Growth Rate	-	-100.0%	-	-40.5%	0.0%	2.0%	2.0%	2.0%	2.0%	-7.1%	2.0%	2.0%
Services & Charges:												
Telephone	$4,816	$4,949	$4,713	$5,000	$5,000	$5,100	$5,202	$5,306	$5,412	$31,020	$28,728	$66,738
Printing/Advertising	25	947	0	0	0	0	0	0	0	0	0	0
Electricity	73,232	64,521	61,568	70,000	75,000	76,500	78,030	79,591	81,182	460,303	430,926	1,001,074
Fuel Oil	25,306	15,731	7,775	15,000	15,000	15,300	15,606	15,918	16,236	93,061	86,185	200,215
Disposal Service	589	795	(415)	1,500	1,500	1,530	1,561	1,592	1,624	9,306	8,619	20,021
Water Service	8,844	9,135	9,966	11,000	11,000	11,220	11,444	11,673	11,907	68,244	63,202	146,824
Sewer Service	40,839	39,348	46,406	42,000	42,000	42,840	43,697	44,571	45,462	260,570	241,319	560,601
Repairs	1,095	11,521	2,791	50,000	43,500	44,370	45,257	46,163	47,086	276,376	249,937	580,623
Equipment Maintenance Contract	0	0	0	0	0	0	0	0	0	0	0	0
Maintenance Contracts	0	1,280	0	0	0	0	0	0	0	0	0	0
Maintenance Buildings	5,562	2,004	769	2,000	2,000	2,040	2,081	2,122	2,165	12,408	11,491	26,695
Equipment Rentals	8,960	7,280	14,578	10,000	10,000	10,200	10,404	10,612	10,824	62,040	57,457	133,476
Fleet Reserve	30,000	30,000	30,000	30,000	30,000	30,600	31,212	31,836	32,473	186,121	172,370	400,429
Insurance & Bonding (Spec & Prop)	78,700	76,296	76,300	87,900	87,900	89,658	91,451	93,280	95,146	545,335	505,045	1,173,258
General Liability	0	0	0	2,700	2,700	2,754	2,809	2,865	2,923	16,751	15,513	36,039
Dues & Subscriptions	25	0	0	0	0	0	0	0	0	0	0	0
Contractual Services	69,656	110,900	108,565	172,000	190,000	193,800	197,676	201,630	205,662	1,160,768	1,091,679	2,536,053
Management/Contracts/Professional	182,011	9,353	91,225	180,600	182,600	186,252	189,977	193,777	197,652	1,130,858	1,049,161	2,437,281
Full Cost Allocation (Interdepartmental)	0	0	0	0	0	0	0	0	0	0	0	0
Stormwater Pollution Prevention	0	0	0	0	0	0	0	0	0	0	0	0
Bank Fees	30	610	90	100	100	102	104	106	108	620	575	1,335
Postage	0	0	0	0	0	0	0	0	0	0	0	0
Accident Contingency (Loss)	0	0	0	0	0	0	0	0	0	0	0	0
Software	0	0	0	0	0	0	0	0	0	0	0	0
Total Services & Charges	$529,690	$384,670	$454,331	$679,800	$698,300	$712,266	$726,511	$741,042	$755,862	$4,313,781	$4,012,209	$9,320,663
Annual Growth Rate	-	-27.4%	18.1%	49.6%	2.7%	2.0%	2.0%	2.0%	2.0%	8.9%	2.0%	2.0%

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				Short Term								
	Actual	Actual	Actual	Budget	Budget	Projected					Mid Term	Long Term
Operations & Maintenance Expenses	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Total**	**2023-2027**	**2028-2037**
Supplies:												
Office Supplies	$364	$1,117	$566	$2,000	$500	$510	$520	$531	$541	$4,602	$2,873	$6,674
Material & Commodities	269,601	621,567	257,459	455,600	445,100	454,002	463,082	472,344	481,791	2,771,918	2,557,403	5,941,038
Gasoline & Oil	187,222	(11,651)	78,089	150,000	150,000	153,000	156,060	159,181	162,365	930,606	861,852	2,002,147
Minor Equipment	7,370	5,546	0	0	0	0	0	0	0	0	0	0
Total Supplies	$464,557	$616,579	$336,114	$607,600	$595,600	$607,512	$619,662	$632,055	$644,697	$3,707,126	$3,422,128	$7,949,860
Annual Growth Rate	-	32.7%	-45.5%	80.8%	-2.0%	2.0%	2.0%	2.0%	2.0%	11.5%	2.0%	2.0%
Capital Outlay:												
Vehicles and Equipment	$0	$140,616	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Constructions	0	64,611	0	0	0	0	0	0	0	0	0	0
Shop Roof Repair	0	8,894	58,959	0	0	0	0	0	0	0	0	0
Total Capital Outlay	$0	$214,121	$58,959	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Growth Rate	-	-	-72.5%	-100.0%	-	-	-	-	-	-100.0%	-	-
Total Airfield Maintenance	$2,253,877	$2,471,472	$2,044,593	$2,715,600	$2,758,000	$2,813,160	$2,869,423	$2,926,812	$2,985,348	$17,068,343	$15,846,588	$36,812,815
Annual Growth Rate	-	9.7%	-17.3%	32.8%	1.6%	2.0%	2.0%	2.0%	2.0%	6.5%	2.0%	2.0%

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Operations & Maintenance Expenses	Actual 2014	Actual 2015	Actual 2016	Short Term Budget 2017	Budget 2018	Projected 2019	2020	2021	2022	Total	Mid Term 2023-2027	Long Term 2028-2037
AIRCRAFT RESCUE & FIRE FIGHTING												
Personnel:												
Salaries	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Overtime	0	0	0	0	0	0	0	0	0	0	0	0
Accrued Leave	0	0	0	0	0	0	0	0	0	0	0	0
Benefits	0	0	0	0	0	0	0	0	0	0	0	0
Workers Compensation	0	0	0	0	0	0	0	0	0	0	0	0
Engineering Workforce	0	0	0	0	0	0	0	0	0	0	0	0
Total Personnel	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Growth Rate	-	-	-	-	-	-	-	-	-	-	-	-
Travel & Training:												
Travel	$900	$9,858	$8,458	$0	$0	$0	$0	$0	$0	$0	$0	$0
Mileage	0	0	0	0	0	0	0	0	0	0	0	0
Training	2,324	245	3,859	28,300	25,800	26,316	26,842	27,379	27,927	162,564	148,239	344,369
Total Travel & Training	$3,224	$10,103	$12,317	$28,300	$25,800	$26,316	$26,842	$27,379	$27,927	$162,564	$148,239	$344,369
Annual Growth Rate	-	213.4%	21.9%	129.8%	-8.8%	2.0%	2.0%	2.0%	2.0%	14.6%	2.0%	2.0%
Services & Charges:												
Telephone	$1,444	$1,600	$1,629	$1,600	$1,600	$1,632	$1,665	$1,698	$1,732	$9,926	$9,193	$21,356
Printing/Advertising	0	0	0	0	0	0	0	0	0	0	0	0
Electricity	9,586	8,376	8,366	9,300	9,300	9,486	9,676	9,869	10,067	57,698	53,435	124,133
Fuel Oil	20,436	12,939	9,369	6,200	6,200	6,324	6,450	6,579	6,711	38,465	35,623	82,755
Disposal Service	1,977	1,992	2,410	2,300	2,300	2,346	2,393	2,441	2,490	14,269	13,215	30,700
Water Service	293	272	378	500	600	612	624	637	649	3,622	3,447	8,009
Sewer Service	1,033	964	1,368	1,800	1,800	1,836	1,873	1,910	1,948	11,167	10,342	24,026
Repairs	2,590	23,458	4,872	3,800	3,800	3,876	3,954	4,033	4,113	23,575	21,834	50,721
Equipment Maintenance Contract	0	0	0	0	0	0	0	0	0	0	0	0
Maintenance Contracts	0	0	0	0	0	0	0	0	0	0	0	0
Maintenance Buildings	13,615	12,592	13,426	14,400	14,400	14,688	14,982	15,281	15,587	89,338	82,738	192,206
Equipment Rentals	0	0	0	0	0	0	0	0	0	0	0	0
Fleet Reserve	0	0	0	0	0	0	0	0	0	0	0	0
Insurance & Bonding	0	0	0	0	0	0	0	0	0	0	0	0
General Liability	0	0	0	0	0	0	0	0	0	0	0	0
Dues & Subscriptions	30	10	195	200	200	204	208	212	216	1,241	1,149	2,670
Contractual Services	577,490	573,195	628,560	928,500	944,300	963,186	982,450	1,002,099	1,022,141	5,842,675	5,425,646	12,604,185
Management/Contracts/Professional	0	0	0	0	0	0	0	0	0	0	0	0
Full Cost Allocation (Interdepartmental)	0	0	0	0	0	0	0	0	0	0	0	0
Stormwater Pollution Prevention	0	0	0	0	0	0	0	0	0	0	0	0
Bank Fees	0	0	0	0	0	0	0	0	0	0	0	0
Postage	0	0	0	0	0	0	0	0	0	0	0	0
Accident Contingency (Loss)	0	0	0	0	0	0	0	0	0	0	0	0
Software	0	0	0	0	0	0	0	0	0	0	0	0
Total Services & Charges	$628,494	$635,398	$670,573	$968,600	$984,500	$1,004,190	$1,024,274	$1,044,759	$1,065,654	$6,091,978	$5,656,623	$13,140,760
Annual Growth Rate	-	1.1%	5.5%	44.4%	1.6%	2.0%	2.0%	2.0%	2.0%	8.0%	2.0%	2.0%

Master Plan - Financial Implementation Analysis
Actual, Budgeted and Projected Operations & Maintenance Expenses

06-Jun-18

Operations & Maintenance Expenses	Actual 2014	Actual 2015	Actual 2016	Short Term Budget 2017	Budget 2018	Projected 2019	2020	2021	2022	Total	Mid Term 2023-2027	Long Term 2028-2037
Supplies:												
Office Supplies	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Material & Commodities	0	2,006	6,302	2,000	2,000	2,040	2,081	2,122	2,165	12,408	11,491	26,695
Gasoline & Oil	4,102	5,818	4,436	3,900	3,900	3,978	4,058	4,139	4,221	24,196	22,408	52,056
Chemicals	8,483	7,628	(16,656)	7,500	7,500	7,650	7,803	7,959	8,118	46,530	43,093	100,107
Minor Equipment	9,064	5,231	14,263	22,900	7,800	7,956	8,115	8,277	8,443	63,492	44,816	104,112
Total Supplies	$21,649	$20,683	$8,345	$36,300	$21,200	$21,624	$22,056	$22,498	$22,948	$146,626	$121,808	$282,970
Annual Growth Rate	-	-4.5%	-59.7%	335.0%	-41.6%	2.0%	2.0%	2.0%	2.0%	18.4%	2.0%	2.0%
Total ARFF	$653,367	$666,184	$691,235	$1,033,200	$1,031,500	$1,052,130	$1,073,173	$1,094,636	$1,116,529	$6,401,167	$5,926,670	$13,768,100
Annual Growth Rate	-	2.0%	3.8%	49.5%	-0.2%	2.0%	2.0%	2.0%	2.0%	8.3%	2.0%	2.0%

Master Plan - Financial Implementation Analysis
Actual, Budgeted and Projected Operations & Maintenance Expenses

06-Jun-18

Operations & Maintenance Expenses	Actual 2014	Actual 2015	Actual 2016	Short Term: Budget 2017	Short Term: Budget 2018	Short Term: Projected 2019	Short Term: Projected 2020	Short Term: Projected 2021	Short Term: Projected 2022	Short Term: Total	Mid Term 2023-2027	Long Term 2028-2037
AIRPORT SECURITY												
Personnel:												
Salaries	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Overtime	0	0	0	0	0	0	0	0	0	0	0	0
Accrued Leave	0	0	0	0	0	0	0	0	0	0	0	0
Benefits	0	0	0	0	0	0	0	0	0	0	0	0
Workers Compensation	0	0	0	0	0	0	0	0	0	0	0	0
Engineering Workforce	0	0	0	0	0	0	0	0	0	0	0	0
Total Personnel	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Growth Rate	-	-	-	-	-	-	-	-	-	-	-	-
Travel & Training:												
Travel	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Mileage	0	0	0	0	0	0	0	0	0	0	0	0
Training	0	0	0	0	0	0	0	0	0	0	0	0
Total Travel & Training	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Growth Rate	-	-	-	-	-	-	-	-	-	-	-	-
Services & Charges:												
Telephone	$5,599	$2,751	$1,787	$3,000	$3,000	$3,060	$3,121	$3,184	$3,247	$18,612	$17,237	$40,043
Printing/Advertising	0	0	0	0	0	0	0	0	0	0	0	0
Electricity	0	0	0	0	0	0	0	0	0	0	0	0
Fuel Oil	0	0	0	0	0	0	0	0	0	0	0	0
Disposal Service	0	0	0	0	0	0	0	0	0	0	0	0
Water Service	0	0	0	0	0	0	0	0	0	0	0	0
Sewer Service	0	0	0	0	0	0	0	0	0	0	0	0
Repairs	0	0	120	0	0	0	0	0	0	0	0	0
Equipment Maintenance Contract	0	0	0	0	0	0	0	0	0	0	0	0
Maintenance Contracts	0	0	0	0	0	0	0	0	0	0	0	0
Maintenance Buildings	0	0	0	0	0	0	0	0	0	0	0	0
Equipment Rentals	0	0	0	0	0	0	0	0	0	0	0	0
Fleet Reserve	0	0	0	0	0	0	0	0	0	0	0	0
Insurance & Bonding (Spec & Prop)	13,100	12,696	12,700	14,700	14,700	14,994	15,294	15,600	15,912	91,199	84,462	196,210
General Liability	0	0	0	0	0	0	0	0	0	0	0	0
Dues & Subscriptions	0	0	0	0	0	0	0	0	0	0	0	0
Contractual Services	537,971	527,958	655,615	737,800	738,700	753,474	768,543	783,914	799,593	4,582,024	4,244,334	9,859,908
Management/Contracts/Professional	0	4,000	14,000	6,000	6,000	6,120	6,242	6,367	6,495	37,224	34,474	80,086
Full Cost Allocation (Interdepartmental)	0	0	0	0	0	0	0	0	0	0	0	0
Stormwater Pollution Prevention	0	0	0	0	0	0	0	0	0	0	0	0
Bank Fees	0	0	0	0	0	0	0	0	0	0	0	0
Postage	0	6	0	0	0	0	0	0	0	0	0	0
Accident Contingency (Loss)	0	0	0	0	0	0	0	0	0	0	0	0
Software	0	0	0	0	0	0	0	0	0	0	0	0
Total Services & Charges	$556,670	$547,411	$684,222	$761,500	$762,400	$777,648	$793,201	$809,065	$825,246	$4,729,060	$4,380,507	$10,176,247
Annual Growth Rate	-	-1.7%	25.0%	11.3%	0.1%	2.0%	2.0%	2.0%	2.0%	3.2%	2.0%	2.0%

Master Plan - Financial Implementation Analysis
Actual, Budgeted and Projected Operations & Maintenance Expenses

06-Jun-18

Operations & Maintenance Expenses	Actual 2014	Actual 2015	Actual 2016	Short Term Budget 2017	Budget 2018	Projected 2019	2020	2021	2022	Total	Mid Term 2023-2027	Long Term 2028-2037
Supplies:												
Office Supplies	$523	$1,184	$518	$500	$500	$510	$520	$531	$541	$3,102	$2,873	$6,674
Material & Commodities	5,022	7,919	15,566	4,000	4,000	4,080	4,162	4,245	4,330	24,816	22,983	53,391
Gasoline & Oil	0	0	0	0	0	0	0	0	0	0	0	0
Minor Equipment	599	815	0	0	0	0	0	0	0	0	0	0
Total Supplies	$6,144	$9,918	$16,084	$4,500	$4,500	$4,590	$4,682	$4,775	$4,871	$27,918	$25,856	$60,064
Annual Growth Rate	-	61.4%	62.2%	-72.0%	0.0%	2.0%	2.0%	2.0%	2.0%	-18.1%	2.0%	2.0%
Total Airport Security	$562,814	$557,329	$700,306	$766,000	$766,900	$782,238	$797,883	$813,840	$830,117	$4,756,978	$4,406,363	$10,236,312
Annual Growth Rate	-	-1.0%	25.7%	9.4%	0.1%	2.0%	2.0%	2.0%	2.0%	2.9%	2.0%	2.0%

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Master Plan - Financial Implementation Analysis
Actual, Budgeted and Projected Operations & Maintenance Expenses

06-Jun-18

Operations & Maintenance Expenses	Actual 2014	Actual 2015	Actual 2016	Budget 2017	Budget 2018	Short Term Projected 2019	2020	2021	2022	Total	Mid Term 2023-2027	Long Term 2028-2037
AIRPORT LANDSIDE												
Personnel:												
Salaries	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Overtime	0	0	0	0	0	0	0	0	0	0	0	0
Accrued Leave	0	0	0	0	0	0	0	0	0	0	0	0
Benefits	0	0	0	0	0	0	0	0	0	0	0	0
Workers Compensation	0	0	0	0	0	0	0	0	0	0	0	0
Engineering Workforce	0	0	0	0	0	0	0	0	0	0	0	0
Total Personnel	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Growth Rate	-	-	-	-	-	-	-	-	-	-	-	-
Travel & Training:												
Travel	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Mileage	0	0	0	0	0	0	0	0	0	0	0	0
Training	0	0	0	0	0	0	0	0	0	0	0	0
Total Travel & Training	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Growth Rate	-	-	-	-	-	-	-	-	-	-	-	-
Services & Charges:												
Telephone	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Printing/Advertising	0	0	0	0	0	0	0	0	0	0	0	0
Electricity	3,811	1,359	1,265	2,800	2,800	2,856	2,913	2,971	3,031	17,371	16,088	37,373
Fuel Oil	0	0	0	0	0	0	0	0	0	0	0	0
Disposal Service	0	0	0	0	0	0	0	0	0	0	0	0
Water Service	0	0	0	0	0	0	0	0	0	0	0	0
Sewer Service	0	0	0	0	0	0	0	0	0	0	0	0
Repairs	0	0	0	0	0	0	0	0	0	0	0	0
Equipment Maintenance Contract	0	0	0	0	0	0	0	0	0	0	0	0
Maintenance Contracts	23,000	24,996	25,000	25,000	25,000	25,500	26,010	26,530	27,061	155,101	143,642	333,691
Maintenance Buildings	0	0	0	0	0	0	0	0	0	0	0	0
Equipment Rentals	0	0	0	0	0	0	0	0	0	0	0	0
Fleet Reserve	0	0	0	0	0	0	0	0	0	0	0	0
Insurance & Bonding	0	0	0	0	0	0	0	0	0	0	0	0
General Liability	0	0	0	0	0	0	0	0	0	0	0	0
Dues & Subscriptions	0	0	0	0	0	0	0	0	0	0	0	0
Contractual Services	0	0	0	0	0	0	0	0	0	0	0	0
Management/Contracts/Professional	0	0	0	0	0	0	0	0	0	0	0	0
Full Cost Allocation (Interdepartmental)	0	0	0	0	0	0	0	0	0	0	0	0
Stormwater Pollution Prevention	0	0	0	0	0	0	0	0	0	0	0	0
Bank Fees	0	0	0	0	0	0	0	0	0	0	0	0
Postage	0	0	0	0	0	0	0	0	0	0	0	0
Accident Contingency (Loss)	0	0	0	0	0	0	0	0	0	0	0	0
Software	0	0	0	0	0	0	0	0	0	0	0	0
Total Services & Charges	$26,811	$26,355	$26,265	$27,800	$27,800	$28,356	$28,923	$29,502	$30,092	$172,472	$159,730	$371,065
Annual Growth Rate	-	-1.7%	-0.3%	5.8%	0.0%	2.0%	2.0%	2.0%	2.0%	2.3%	2.0%	2.0%

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Master Plan - Financial Implementation Analysis
Actual, Budgeted and Projected Operations & Maintenance Expenses

06-Jun-18

Operations & Maintenance Expenses	Actual 2014	Actual 2015	Actual 2016	Budget 2017	Budget 2018	Short Term Projected 2019	Short Term Projected 2020	Short Term Projected 2021	Short Term Projected 2022	Short Term Total	Mid Term 2023-2027	Long Term 2028-2037
Supplies:												
Office Supplies	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Material & Commodities	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline & Oil	0	0	0	0	0	0	0	0	0	0	0	0
Minor Equipment	0	0	0	0	0	0	0	0	0	0	0	0
Total Supplies	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Growth Rate	-	-	-	-	-	-	-	-	-	-	-	-
Total Airport Landside	$26,811	$26,355	$26,265	$27,800	$27,800	$28,356	$28,923	$29,502	$30,092	$172,472	$159,730	$371,065
Annual Growth Rate	-	-1.7%	-0.3%	5.8%	0.0%	2.0%	2.0%	2.0%	2.0%	2.3%	2.0%	2.0%
AIRPORT NON-OPERATIONAL												
Non-Operational:												
Material & Commodities	$0	$0	$517	$0	$0	$0	$0	$0	$0	$0	$0	$0
Budget Adjustment	0	0	0	43,900	199,700	0	0	0	0	243,600	0	0
Airport Projects (Capital Outlay)	0	0	919,116	0	0	0	0	0	0	0	0	0
Total Airport Non-Operational	$0	$0	$919,633	$43,900	$199,700	$0	$0	$0	$0	$243,600	$0	$0
Annual Growth Rate	-	-	-	-95.2%	354.9%	-100.0%	-	-	-	-100.0%	-	-
EMERGENCY RESERVES												
Emergency reserves	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
-	0	0	0	0	0	0	0	0	0	0	0	0
Total Emergency Reserves	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Growth Rate	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL OPERATIONS AND MAINTENANCE EXPENSES	$5,571,547	$5,866,841	$6,543,119	$6,866,000	$7,064,000	$7,001,586	$7,141,618	$7,284,450	$7,430,139	$42,787,793	$39,440,077	$91,622,266
Annual Growth Rate	-	5.3%	11.5%	4.9%	2.9%	-0.9%	2.0%	2.0%	2.0%	2.1%	2.0%	2.0%
Operating Expenses Per Enplaned Passenger:												
Juneau International Airport	$14.82	$14.54	$16.20	$17.00	$17.49	$17.16	$17.33	$17.50	$17.67	$17.36	$18.21	$19.62
Small Hub Industry Average	$19.37	$18.70	$19.19	$19.76	$20.36	$20.97	$21.60	$22.25	$22.91	$21.31	$25.06	$31.36

JUNEAU INTERNATIONAL AIRPORT (JNU)
Juneau, Alaska

JNUMP6.123

Schedule 10-4

Master Plan - Financial Implementation Analysis
Actual, Budgeted and Projected Operating Revenues

06-Jun-18

Revenues	Actual 2014	Actual 2015	Actual 2016	Short Term: Budget 2017	Short Term: Budget 2018	Short Term: Projected 2019	Short Term: Projected 2020	Short Term: Projected 2021	Short Term: Projected 2022	Short Term: Total	Mid Term 2023-2027	Long Term 2028-2037
AIRLINE REVENUES												
Air Carrier Terminal Lease	$601,389	$641,860	$626,322	$656,600	$656,600	$669,732	$683,127	$696,789	$710,725	$4,073,573	$3,772,614	$8,764,066
Fuel Flowage Air Carrier	597,289	680,251	693,586	594,400	594,400	606,288	618,414	630,782	643,398	3,687,681	3,415,233	7,933,842
Air Carrier Landing Fees	1,702,115	1,773,774	1,872,506	1,866,300	1,884,900	1,922,598	1,961,050	2,000,271	2,040,276	11,675,395	10,830,034	25,158,983
Air Carrier Security Fees	282,756	317,177	319,241	428,800	432,400	441,048	449,869	458,866	468,044	2,679,027	2,484,432	5,771,523
Total Airline Revenues	$3,183,549	$3,413,062	$3,511,655	$3,546,100	$3,568,300	$3,639,666	$3,712,459	$3,786,709	$3,862,443	$22,115,677	$20,502,313	$47,628,415
Annual Growth Rate	-	7.2%	2.9%	1.0%	0.6%	2.0%	2.0%	2.0%	2.0%	1.6%	2.0%	2.0%
Airline Cost Per Enplaned Passenger:												
Juneau International Airport	$8.47	$8.46	$8.69	$8.78	$8.83	$8.92	$9.01	$9.10	$9.19	$8.97	$9.47	$10.20
Small Hub Industry Average	$8.19	$7.78	$8.22	$8.47	$8.72	$8.98	$9.25	$9.53	$9.81	$9.13	$10.73	$13.44
NON-AIRLINE REVENUES												
ADMINISTRATIVE	$199,214	$212,547	$222,198	$199,800	$199,800	$203,796	$207,872	$212,029	$216,270	$1,239,567	$1,147,987	$2,666,860
TERMINAL	1,519,506	1,519,131	1,695,047	1,619,900	1,619,900	1,652,298	1,685,344	1,719,051	1,753,432	10,049,925	9,307,428	21,621,856
AIRFIELD	920,221	1,048,231	1,117,181	1,161,200	1,161,200	1,184,424	1,208,112	1,232,275	1,256,920	7,204,131	6,671,885	15,499,290
SECURITY	102,200	88,040	106,100	131,400	131,400	134,028	136,709	139,443	142,232	815,211	754,982	1,753,881
NON-OPERATIONAL	39,410	39,197	80,724	(32,400)	(54,600)	26,622	27,154	27,698	28,251	22,725	149,962	348,374
Total Non-Airline Revenues	$2,780,551	$2,907,146	$3,221,250	$3,079,900	$3,057,700	$3,201,168	$3,265,191	$3,330,495	$3,397,105	$19,331,560	$18,032,245	$41,890,261
Annual Growth Rate	-	4.6%	10.8%	-4.4%	-0.7%	4.7%	2.0%	2.0%	2.0%	0.9%	2.0%	2.0%
TOTAL REVENUES	$5,964,100	$6,320,208	$6,732,905	$6,626,000	$6,626,000	$6,840,834	$6,977,651	$7,117,204	$7,259,548	$41,447,236	$38,534,558	$89,518,676
Annual Growth Rate	-	6.0%	6.5%	-1.6%	0.0%	3.2%	2.0%	2.0%	2.0%	1.3%	2.0%	2.0%
Operating Revenues Per Enplaned Passenger:												
Juneau International Airport	$15.87	$15.66	$16.67	$16.40	$16.40	$16.77	$16.93	$17.10	$17.27	$16.82	$17.79	$19.17
Small Hub Industry Average	$27.74	$26.30	$27.89	$28.73	$29.59	$30.48	$31.39	$32.33	$33.30	$30.97	$36.42	$45.59

JUNEAU INTERNATIONAL AIRPORT (JNU)
Juneau, Alaska

Master Plan - Financial Implementation Analysis
Actual, Budgeted and Projected Operating Revenues

06-Jun-18

Revenues	Actual 2014	Actual 2015	Actual 2016	Short Term: Budget 2017	Budget 2018	Projected 2019	2020	2021	2022	Total	Mid Term 2023-2027	Long Term 2028-2037
ADMINISTRATIVE												
State Shared Revenues	$89,246	$76,047	$84,672	$76,000	$76,000	$77,520	$79,070	$80,652	$82,265	$471,507	$436,672	$1,014,421
Fingerprinting Fees	7,230	11,350	18,680	12,000	12,000	12,240	12,485	12,734	12,989	74,448	68,948	160,172
Badging Fees	35,930	41,930	44,114	40,000	40,000	40,800	41,616	42,448	43,297	248,162	229,827	533,906
Taxi,Bus Access Fees	30,345	32,177	33,470	32,000	32,000	32,640	33,293	33,959	34,638	198,529	183,862	427,125
Water Services	9,829	12,039	15,072	12,000	12,000	12,240	12,485	12,734	12,989	74,448	68,948	160,172
Sewer Services	17,344	22,180	30,282	22,000	22,000	22,440	22,889	23,347	23,814	136,489	126,405	293,648
Cash Over/Short	0	(6)	(11)	0	0	0	0	0	0	0	0	0
Bad Debt	(823)	4,395	(8,878)	0	0	0	0	0	0	0	0	0
Miscellaneous Revenues	10,113	12,435	4,797	5,800	5,800	5,916	6,034	6,155	6,278	35,983	33,325	77,416
Total Administrative	$199,214	$212,547	$222,198	$199,800	$199,800	$203,796	$207,872	$212,029	$216,270	$1,239,567	$1,147,987	$2,666,860
Annual Growth Rate	-	6.7%	4.5%	-10.1%	0.0%	2.0%	2.0%	2.0%	2.0%	-0.4%	2.0%	2.0%
TERMINAL												
Jetway Use	$6,000	$49,000	$72,000	$72,000	$72,000	$73,440	$74,909	$76,407	$77,935	$446,691	$413,689	$961,031
FAA Tower/Equipment Room	80,692	80,540	80,692	80,600	80,600	82,212	83,856	85,533	87,244	500,046	463,102	1,075,820
Advertising Display	40,812	56,451	47,017	56,000	56,000	57,120	58,262	59,428	60,616	347,426	321,758	747,468
Customs Fees/User Fees	116	0	28	100	100	102	104	106	108	620	575	1,335
Fee Revenues (RAC concession)	441,208	419,593	465,889	420,000	420,000	428,400	436,968	445,707	454,622	2,605,697	2,413,186	5,606,012
Vending Revenues	48,624	21,044	23,363	21,000	21,000	21,420	21,848	22,285	22,731	130,285	120,659	280,301
Minor Violations	1,325	921	2,265	2,800	2,800	2,856	2,913	2,971	3,031	17,371	16,088	37,373
Facility Rental Revenue/Meeting Room	14,309	11,367	8,576	1,200	1,200	1,224	1,248	1,273	1,299	7,445	6,895	16,017
Federal Terminal Lease (TSA LA)	58,861	72,644	81,505	81,300	81,300	82,926	84,585	86,276	88,002	504,388	467,124	1,085,164
Parking Lot Lease	383,121	410,988	437,435	415,000	415,000	423,300	431,766	440,401	449,209	2,574,677	2,384,458	5,539,274
Air Carrier Terminal Lease	601,389	641,860	626,322	656,600	656,600	669,732	683,127	696,789	710,725	4,073,573	3,772,614	8,764,066
Rental Car Storage	109,800	109,800	109,800	109,800	109,800	111,996	114,236	116,521	118,851	681,204	630,876	1,465,572
Other Terminal Leases	179,529	205,003	196,844	208,600	208,600	212,772	217,027	221,368	225,795	1,294,163	1,198,549	2,784,320
Restaurant, Bar, Flight Kitchen	74,425	24,000	106,886	84,000	84,000	85,680	87,394	89,141	90,924	521,139	482,637	1,121,202
Gift Shop	40,912	40,912	36,221	41,000	41,000	41,820	42,656	43,510	44,380	254,366	235,573	547,254
Staff Parking Fees	38,981	25,860	25,878	26,000	26,000	26,520	27,050	27,591	28,143	161,305	149,388	347,039
Miscellaneous Revenues	791	(8,992)	648	500	500	510	520	531	541	3,102	2,873	6,674
Total Terminal	$2,120,895	$2,160,991	$2,321,369	$2,276,500	$2,276,500	$2,322,030	$2,368,471	$2,415,840	$2,464,157	$14,123,497	$13,080,042	$30,385,922
Annual Growth Rate	-	1.9%	7.4%	-1.9%	0.0%	2.0%	2.0%	2.0%	2.0%	1.0%	2.0%	2.0%

JUNEAU INTERNATIONAL AIRPORT (JNU)
Juneau, Alaska

JNUMP6.123

Schedule 10-4

Master Plan - Financial Implementation Analysis
Actual, Budgeted and Projected Operating Revenues

06-Jun-18

				Short Term								
	Actual	Actual	Actual	Budget	Budget	Projected					Mid Term	Long Term
Revenues	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Total**	**2023-2027**	**2028-2037**
AIRFIELD												
Fuel Flowage Air Carrier	$597,289	$680,251	$693,586	$594,400	$594,400	$606,288	$618,414	$630,782	$643,398	$3,687,681	$3,415,233	$7,933,842
Air Carrier Landing Fees	1,702,115	1,773,774	1,872,506	1,866,300	1,884,900	1,922,598	1,961,050	2,000,271	2,040,276	11,675,395	10,830,034	25,158,983
Commercial Aircraft Parking	93,271	87,960	87,049	90,500	90,500	92,310	94,156	96,039	97,960	561,466	519,984	1,207,962
Transient Fees	0	19	0	0	0	0	0	0	0	0	0	0
Small Aircraft Parking	29,977	33,393	39,426	40,300	40,300	41,106	41,928	42,767	43,622	250,023	231,551	537,910
Fuel Flowage GA & Taxi	22,228	66,591	156,392	157,000	157,000	160,140	163,343	166,610	169,942	974,034	902,072	2,095,581
Fuel Flowage Non-Signatory	55,597	75,822	72,882	97,700	97,700	99,654	101,647	103,680	105,754	606,135	561,353	1,304,065
Landing Fees Non-Signatory	81,711	91,351	83,701	92,400	92,400	94,248	96,133	98,056	100,017	573,253	530,901	1,233,323
Air Carrier Security Fees	282,756	317,177	319,241	428,800	432,400	441,048	449,869	458,866	468,044	2,679,027	2,484,432	5,771,523
Fuel Sales	39,361	51,251	25,443	35,000	35,000	35,700	36,414	37,142	37,885	217,141	201,099	467,168
Facility Rental Revenue	1,875	1,250	1,250	11,300	11,300	11,526	11,757	11,992	12,231	70,106	64,926	150,828
FAA - CWO Leases	12,000	12,000	12,000	12,000	12,000	12,240	12,485	12,734	12,989	74,448	68,948	160,172
Airfield Ground Leases	583,466	618,083	631,230	623,000	623,000	635,460	648,169	661,133	674,355	3,865,117	3,579,559	8,315,585
Miscellaneous Revenue	735	10,511	7,808	2,000	2,000	2,040	2,081	2,122	2,165	12,408	11,491	26,695
Total Airfield	$3,502,381	$3,819,433	$4,002,514	$4,050,700	$4,072,900	$4,154,358	$4,237,445	$4,322,194	$4,408,638	$25,246,235	$23,401,583	$54,363,639
Annual Growth Rate	-	9.1%	4.8%	1.2%	0.5%	2.0%	2.0%	2.0%	2.0%	1.6%	2.0%	2.0%
SECURITY												
Miscellaneous Federal Grants	$83,960	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TSA LEA RA (LEO Reimburse)	18,240	88,040	106,100	131,400	131,400	134,028	136,709	139,443	142,232	815,211	754,982	1,753,881
Facility Rental Revenue	0	0	0	0	0	0	0	0	0	0	0	0
Total Security	$102,200	$88,040	$106,100	$131,400	$131,400	$134,028	$136,709	$139,443	$142,232	$815,211	$754,982	$1,753,881
Annual Growth Rate	-	-13.9%	20.5%	23.8%	0.0%	2.0%	2.0%	2.0%	2.0%	5.0%	2.0%	2.0%
NON-OPERATIONAL												
Interest Income in Lawson	$37,875	$10,465	$41,856	$26,100	$26,100	$26,622	$27,154	$27,698	$28,251	$161,925	$149,962	$348,374
AR Interest and Fines	1,235	1,948	3,997	0	0	0	0	0	0	0	0	0
Budget Adjustment	0	0	0	(58,500)	(80,700)	0	0	0	0	(139,200)	0	0
Proceeds from Disposal of Assets	300	26,784	34,871	0	0	0	0	0	0	0	0	0
Total Non-Operational	$39,410	$39,197	$80,724	($32,400)	($54,600)	$26,622	$27,154	$27,698	$28,251	$22,725	$149,962	$348,374
Annual Growth Rate	-	-0.5%	105.9%	-140.1%	-	-	2.0%	2.0%	2.0%	-16.1%	2.0%	2.0%
TOTAL REVENUES	$5,964,100	$6,320,208	$6,732,905	$6,626,000	$6,626,000	$6,840,834	$6,977,651	$7,117,204	$7,259,548	$41,447,236	$38,534,558	$89,518,676
Annual Growth Rate	-	6.0%	6.5%	-1.6%	0.0%	3.2%	2.0%	2.0%	2.0%	1.3%	2.0%	2.0%

JUNEAU INTERNATIONAL AIRPORT (JNU)
Juneau, Alaska

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Schedule 10-5

Master Plan - Financial Implementation Analysis
Financial Plan Summary
Budgeted and Projected Net Revenues, Capital Funding and Capital Expenditures

06-Jun-18

Operating/Capital Cash Flow	Short Term							Mid Term	Long Term
	Budget 2017	Budget 2018	Projected 2019	Projected 2020	Projected 2021	Projected 2022	Total	2023-2027	2028-2037
Passenger Enplanements	404,000	404,000	408,040	412,120	416,242	420,404	2,464,806	2,165,928	4,668,944
Annual Growth Rates	-	0.00%	1.00%	1.00%	1.00%	1.00%	0.80%	1.00%	1.00%
Operating Cash Flow									
Revenues:									
Airline Revenues	$3,546,100	$3,568,300	$3,639,666	$3,712,459	$3,786,709	$3,862,443	$22,115,677	$20,502,313	$47,628,415
Non-Airline Revenues	3,079,900	3,057,700	3,201,168	3,265,191	3,330,495	3,397,105	19,331,560	18,032,245	41,890,261
Revenue Rate Adjustment Required to Fund Operating Deficit without Use of Fund Balance	0	0	160,752	163,967	167,246	170,591	662,556	905,519	2,103,589
Total Revenues	$6,626,000	$6,626,000	$7,001,586	$7,141,618	$7,284,450	$7,430,139	$42,109,792	$39,440,077	$91,622,265
Operations & Maintenance Expenses	(6,866,000)	(7,064,000)	(7,001,586)	(7,141,618)	(7,284,450)	(7,430,139)	(42,787,793)	(39,440,077)	(91,622,266)
Total Net Operating Cash Flow Available For Capital Expenditures	($240,000)	($438,000)	$0	($0)	($0)	($0)	($678,001)	($0)	($0)
Capital Cash Flow									
Beginning Cash Balance	$2,923,400	$2,683,400	$2,245,400	$2,245,400	$2,139,279	$2,139,279	$2,923,400	$2,139,278	$2,139,278
Other Capital Funding Sources:									
AIP Entitlement Grants	$2,878,398	$2,880,800	$2,880,800	$2,880,800	$2,901,808	$2,923,026	$17,345,632	$14,940,903	$0
AIP Entitlement unspent current year + carryover	0	62,375	0	0	0	0	0	0	0
AIP Entitlements carryover from the prior years	0	0	(62,375)	0	0	0	0	0	(0)
AIP Discretionary Grants	15,054,217	0	16,689,075	0	7,550,428	12,861,879	52,155,598	22,318,763	0
Other Federal/State Funding	0	4,029,000	0	0	0	0	4,029,000	58,005,783	0
Passenger Facility Charges	928,174	928,174	937,456	946,830	956,299	965,862	5,662,795	1,047,589	0
PFC beginning year unliquidated balance	1,928,407	2,741,581	3,414,755	3,701,961	(0)	607,891	1,928,407	1,047,589	(0)
PFC unspent current year + carryover	(2,741,581)	(3,414,755)	(3,701,961)	0	(607,891)	(1,047,589)	(1,047,589)	0	0
City/Borough Capital/GOB Proceeds	0	474,950	10,404	6,900,000	0	6,072,444	13,457,798	696,069	0
Ballot Measure Sales Tax	1,195,508	253,875	650,250	223,000	348,408	526,164	3,197,204	25,796	0
Other Unidentified Funding	0	0	0	1,265,529	0	3,422,650	4,688,179	69,902,255	0
Total Other Capital Funding Sources	$19,243,122	$7,956,000	$20,818,404	$15,918,120	$11,149,051	$26,332,327	$101,417,024	$167,984,747	$0
Total Funds Available for Capital Expenditures	$21,926,522	$10,201,400	$23,063,804	$18,163,520	$13,288,330	$28,471,606	$103,662,424	$170,124,025	$2,139,278
Capital Improvement Program Expenditures	19,243,122	7,956,000	20,818,404	16,024,241	11,149,051	26,332,327	101,523,145	167,984,747	0
Ending Cash Balance	$2,683,400	$2,245,400	$2,245,400	$2,139,279	$2,139,279	$2,139,278	$2,139,278	$2,139,278	$2,139,278

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Appendix A: Glossary

A

GLOSSARY

A.1 ABBREVIATIONS/ACRONYMS

AC - Advisory Circular

ADF - Automatic Direction Finder

ADPM - Average Day of the Peak Month

AGL - Above Ground Level

AIP - Airport Improvement Program

ALP - Airport Layout Plan

ALS - Approach Lighting System

ALSF-1 - Approach Light System with Sequence Flasher Lights

ARC - Airport Reference Code

ARFF - Airport Rescue and Fire Fighting

ARP - Airport Reference Point

ARTCC - Air Route Traffic Control Center

ASDA - Accelerate-Stop Distance Available

ASO - Airport Safety Overlay Zone

ASR - Airport Surveillance Radar

ASV - Annual Service Volume

ATC - Air Traffic Control

ATCT - Airport Traffic Control Tower

AVGAS - Aviation Gasoline

CBP - Customs and Border Patrol

CIP - Capital Improvement Program

CL - Centerline

dBA	- A-weighted Decibels
DH	- Decision Height
DME	- Distance Measuring Equipment
DNL	- Day-Night Sound Levels
EA	- Environmental Assessment
EIS	- Environmental Impact Statement
EPA	- United States Environmental Protection Agency
FAA	- Federal Aviation Administration
FAR	- Federal Aviation Regulation
FBO	- Fixed Based Operator
FIS	- Federal Inspection Service
FSS	- Flight Service Station
GA	- General Aviation
GPS	- Global Positioning System
IFR	- Instrument Flight Rules
ILS	- Instrument Landing System
INM	- Integrated Noise Model
JNU	- Juneau International Airport
LDA	- Landing Distance Available
LIRL	- Low-Intensity Runway Lights
MALS	- Medium-Intensity Approach Light System
MALSF	- Medium-Intensity Approach Light System with sequence flashing Lights
MALSR	- Medium-Intensity Approach Lighting System with Runway Alignment Indicators
MGW	- Maximum Gross Weight
MIRL	- Medium-Intensity Runway Lights
MSL	- Mean Sea Level
NAVAID	- Air Navigation Facility/Aid
NDB	- Non-Directional Beacon

NPIAS - National Plan of Integrated Airport Systems

OFA - Object-Free Area

OFZ - Obstacle-Free Zone

PAPI - Precision Approach Path Indicator

RAIL - Runway Alignment Indicator Lights

REIL - Runway End Identifier Lights

RSA - Runway Safety Area

RPZ - Runway Protection Zone

TAF - FAA Terminal Area Forecasts

TODA - Take-Off Distance Available

TORA - Take-Off Run Available

UHF - Ultra High Frequency

VASI - Visual Approach Slope Indicator

VFR - Visual Flight Rules

VHF - Very High Frequency

A.2 DEFINITIONS

Active Aircraft - Aircraft registered with the FAA and reported to have flown during the preceding calendar year.

Activity - Used in aviation to refer to any kind of movement; e.g., cargo flights, passenger flights, or passenger enplanements. Without clarification, it has no particular meaning.

ADF - Automatic Direction Finder.

Advisory Circular (AC) - A series of Federal Aviation Administration (FAA) publications providing guidance and standards for the design, operation, and performance of aircraft and airport facilities.

AGL - Above Ground Level.

Airport Improvement Program (AIP) - A congressionally mandated program through which the FAA provides funding assistance for the development and enhancement of airport facilities.

Air Cargo - Commercial freight, including express packages and mail, transported by passenger or all-cargo airlines.

Air Carrier - An airline providing scheduled air service for the commercial transport of passengers or cargo.

Air Navigation Facility (NAVAID) - Although generally referring to electronic radio wave transmitters (VOR, NDB, and ILS), it also includes any structure or mechanism designed to guide or control aircraft involved in flight operations.

Air Route Traffic Control Center (ARTCC) - FAA-manned facility established to provide air traffic control services to aircraft operating in controlled airspace, en route between terminal areas. Although designed to handle aircraft operating under IFR conditions, some advisory services are provided to participating VFR aircraft when controller work loads permit.

Air Taxi - An air carrier certificated in accordance with FAR Part 135 and authorized to provide, on demand, public transportation of persons and property by aircraft. Air taxi operators generally operate small aircraft "for hire" for specific trips.

Aircraft Approach Category - A grouping of aircraft based on a speed of 1.3 times the stall speed in the landing configuration at maximum gross landing weight. The aircraft approach categories are:

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; and

Category E - Speed 166 knots or more.

Aircraft Mix - The classification of aircraft into groups that are similar in size, noise, and operational characteristics.

Aircraft Operations - The airborne movement of aircraft. There are two types of operations, local and itinerant, defined as follows:

1. Local Operations are performed by aircraft that:

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

    (b) Are known to be departing for or arriving from a local practice area.

2. Itinerant operations are all others.

Airfield - A defined area on land or water including any buildings, installations, and equipment intended to be used either wholly or in part for the arrival, departure, or movement of aircraft.

Airplane Design Group - A grouping of airplanes based on wingspan. The groups are:

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 up to, but not including, 262 feet

Airport Layout Plan (ALP) - An FAA required map of an airport depicting existing and proposed facilities and uses, with clearance and dimensional information showing compliance with applicable standards.

Airport Reference Code (ARC) - A coding system used to relate airport design criteria to the operational and physical characteristics of the airplanes intended to operate at the airport. It is a combination of the aircraft approach category and the airplane design group.

Airport Reference Point (ARP) - The location at which the designated latitude and longitude for an airport are measured.

Airport Service Area - The geographic area that generates demand for aviation services at an airport.

Airport Surveillance Radar (ASR) - Radar providing position of aircraft by azimuth and range data without elevation data. It is designed for a range of approximately 50 miles.

Airport Traffic Area - Unless otherwise specifically designated, that airspace with a horizontal radius of five statute miles from the geographic center of any airport at which a control tower is operating, extending from the surface up to, but not including, 3,000 feet above the surface.

Airside - That portion of the airport facility where aircraft movements take place, airline operations areas, and areas that directly serve the aircraft (taxiway, runway, maintenance, and fueling areas). Also called the airport operations area.

Airspace - The area above the ground in which aircraft travel. It is divided into corridors, routes, and restricted zones for the control and safety of aircraft.

All-Cargo Carrier - An air carrier certificated in accordance with FAR Part 121 to provide scheduled air freight, express, and mail transportation over specific routes, as well as the conduct of nonscheduled operations that may include passengers.

Ambient Noise Level - Background noise level, exclusive of the contribution made by aircraft.

Annual Service Volume (ASV) - A reasonable estimate of an airport's annual capacity. It accounts for differences in runway use, aircraft mix, weather conditions, etc., that would be encountered over a year's time.

Approach End of Runway - The near end of the runway as viewed from the cockpit of a landing aircraft.

Approach Surface - An imaginary surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of the primary surface. An approach surface is applied to each end of the runway based upon the planned approach. The inner edge of the approach surface is the same width as the primary surface and expands uniformly depending upon the planned approach.

Approved Instrument Approach - Instrument approach meeting the design requirements, equipment specifications, and accuracies, as determined by periodic FAA flight checks, and which are approved for general use and publication by the FAA.

Apron - A defined area where aircraft are maneuvered and parked and where activities associated with the handling of flights can be carried out.

ARFF - Aircraft Rescue and Fire Fighting.

ATC - Air Traffic Control.

ATCT - Airport Traffic Control Tower.

AVGAS - Aviation gasoline. Fuel used in reciprocating (piston) aircraft engines. Avgas is manufactured in the following grades; 80/87, 100LL, 100/130, and 115/145.

Avigation Easement - A form of limited property right purchase that establishes legal land-use control prohibiting incompatible development of areas required for airports or aviation-related purposes.

Based Aircraft - Aircraft stationed at an airport on an annual basis.

BRL - Building Restriction Line.

Capacity - (Throughput capacity). A measure of the maximum number of aircraft operations that can be accommodated on the airport component in an hour.

Capital Improvement Program (CIP) - A scheduled of planned projects and costs, often prepared and adopted by public agencies.

CAT I (one) - Category I Instrument Landing System that provides for approach to a height above touchdown of not less than 200 feet and with Runway Visual Range of not less than 1,800 feet.

CAT II (two) - Category II ILS approach procedure that provides for approach to a height above touchdown of not less than 100 feet and a RVR of not less than 1,200 feet.

CAT III (three) - Category III ILS approach that provides for an approach with no decision height and a RVR of not less than 700 feet.

Ceiling - The height above the ground of the base of the lowest layer of clouds or obscuring phenomena aloft that is reported as broken or overcast and not classified as scattered, thin, or partial. Ceiling figures in aviation weather reports may be determined as measured, estimated, or indefinite.

Charter Airline- A nonscheduled flight offered by either a supplemental or certificated air carrier.

Circling Approach - An instrument approach procedure in which an aircraft executes the published instrument approach to one runway, the maneuvers visually to land on a different runway. Circling approaches are also used at airports that have published instrument approaches with a final approach course that is not aligned within 30 degrees of any runway.

Clear Zone - See Runway Protection Zone

Clearway - A clearway is an area available for the continuation of the take-off operation that is above a clearly defined area connected to and extending beyond the end of the runway. The area over which the clearway lies need not be suitable for stopping aircraft in the event of an aborted take-off. Clearways are applicable only in the take-off operations of turbine-engined aircraft.

Commuter Air Carrier - An air carrier certificated in accordance with FAR Part 135, which operates aircraft with a maximum of 60 seats and provides at least five scheduled round trips per week between two or more points, or carries mail.

Commuter/Air Taxi Operations - Those arrivals and departures performed by air carriers certificated in accordance with FAR Part 135.

Conical Surface - An imaginary surface extending outward and upward from the periphery of the horizontal surface at a slope of 20:1 for a horizontal distance of 4,000 feet.

Control Areas - These consist of the airspace designated as Federal Airways, additional Control Areas, and Control Area Extensions, but do not include the Continental Control Areas.

Control Tower - A central operations facility in the terminal air traffic control system consisting of a tower cab structure using air/ground communications and/or radar, visual signaling, and other devices to provide safe and expeditious movement of air traffic.

Control Zones - Areas of controlled airspace that extend upward from the surface and terminate at the base of the continental control area. Control zones that do not underlie the continental control area have no upper limit. A control zone may include one or more airports and is normally a circular area with a radius of five statute miles and any extensions necessary to include instrument departure and arrival paths.

Controlled Airspace - Airspace designated as continental control area, control area, control zone, or transition area within which some or all aircraft may be subject to air traffic control.

Critical Aircraft - The aircraft which controls one or more design items based on wingspan, approach speed, and/or maximum certificated takeoff weight. The same aircraft may not be critical to all design items.

Crosswind - When used concerning wind conditions, the word means a wind not parallel to the runway or the path of an aircraft.

dBA - Decibels measured on the A-weighted scale to factor out anomalies.

Decision Height (DH) - During a precision approach, the height (or altitude) at which a decision must be made to either continue the approach or execute a missed approach.

Declared Distances - The distances the airport owner declares available and suitable for satisfying an airplane's take-off distance, accelerated-stop distance, and landing distance requirements. The distances are:

- **Take-off run available (TORA)** - The runway length declared available and suitable for the ground run of an airplane taking off.
- **Take-off distance available (TODA)** - The TORA plus the length of any remaining runway and/or clearway (CWY) beyond the far end of the TORA.

- **Accelerate-stop distance available (ASDA)** - The runway plus stopway (SWY) length declared available and suitable for the acceleration and deceleration of an airplane aborting take-off.
- **Landing distance available (LDA)** - The runway length declared available and suitable for a landing airplane.

Design Hour - The design hour is an hour close to the peak but not the absolute peak, which is used for airport planning and design purposes. It is usually the peak hour of the average day of the peak month.

Displaced Threshold - Actual touchdown point on specific runways designated due to obstructions that make it impossible to use the actual physical runway end.

Distance Measuring Equipment (DME) - An airborne instrument that indicates the distance the aircraft is from a fixed point, usually a VOR station.

DOT – U. S. Department of Transportation.

Effective Runway Gradient - The maximum difference between runway centerline elevations divided by the runway length, expressed as a percentage.

Eminent Domain - Right of the government to take property from the owner, upon compensation, for public facilities or other purposes in the public interest.

Environmental Assessment (EA) - A report prepared under the National Environmental Policy Act (NEPA), analyzing the potential environmental impacts of a federally funded project.

Environmental Impact Statement (EIS) - A report prepared under NEPA, fully analyzing the potential significant environmental impacts of a federally funded project.

EPA - The United States Environmental Protection Agency.

FAR Part 77 - Federal Aviation Regulations that establish standards for determining obstructions in navigable airspace.

Federal Aviation Administration (FAA) - A branch of the U.S. Department of Transportation responsible for the regulation of all civil aviation activities.

Fixed Base Operator (FBO) - An individual or company located at an airport providing commercial general aviation services.

Final Approach - The flight path of an aircraft that is inbound to the airport on an approved final instrument approach course, beginning at the point of interception of that course and extending to the airport or the point where circling for landing or missed approach is executed.

Fixed Wing - For the purposes of this report, any aircraft not considered rotorcraft.

Flight Plan - A description or outline of a planned flight that a pilot submits to the FAA, usually through a Flight Service Station.

Flight Service Station (FSS) - Air traffic facility operated by the FAA to provide flight service assistance such as pilot briefing, en route communications, search and rescue assistance, and weather information.

General Aviation - All civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire.

Global Positioning System (GPS) - GPS uses a group of many satellites orbiting the earth to determine the position of users on or above the earth's surface. This system will provide at least non-precision approach capability to any airport having published instrument approach procedures.

HIRL – High-Intensity Runway Lights.

Horizontal Surface - A horizontal plane 150 feet above the established airport elevation, the perimeter of which is constructed by swinging arcs with a radius of 5,000 feet for all runways designated as utility or general; and 10,000 feet for all other runways from the center of each end of the primary surface and connecting the adjacent arc by tangent lines.

Instrument Flight Rules (IFR) - These rules govern the procedures for conducting instrument flight. Pilots are required to follow these rules when operating in controlled airspace with visibility of less than three miles and/or ceiling lower than 1,000 feet.

Instrument Landing System (ILS) - ILS is designed to provide an exact approach path for alignment and descent of aircraft. Generally consists of a localizer, glide slope, outer marker, middle marker, and approach lights. This type of precision instrument system is being replaced by Microwave Landing Systems (MLS).

Instrument Runway - A runway equipped with electronic and visual navigation aids for which a precision or non-precision approach procedure having straight-in landing minimums has been approved.

Itinerant Operation - All aircraft operations at an airport other than local.

Local Operation - Aircraft operation in the traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from flight in local practice areas, or aircraft executing practice instrument approaches at the airport.

LIRL – Low-Intensity Runway Lights.

Mean Sea Level (MSL) - Elevation above Mean Sea Level.

Medium-Intensity Approach Lighting (MALSR) - This system includes runway alignment indicator lights. An airport lighting facility that provides visual guidance to landing aircraft.

Minimums - Weather condition requirements established for a particular operation or type of operation.

MIRL - Medium-Intensity Runway Lights.

Movement Area - The runways, taxiways, and other areas of the airport used for taxiing, takeoff and landing of aircraft, exclusive of loading ramps and parking areas.

Navigational Aid (NAVAID) - Any visual or electronic device, airborne or on the surface that provides point-to-point guidance information or position data to aircraft in flight.

Non-Directional Beacon (NDB) - Transmits a signal on which a pilot may "home" using equipment installed in the aircraft.

Non-Precision Instrument Approach - An instrument approach procedure with only horizontal guidance or area-type navigational guidance for straight-in approaches.

Object Free Area (OFA) - A two-dimensional ground area surrounding runways, taxiways, and taxilanes that is clear of objects except those whose location is fixed by function.

Object Free Zone (OFZ) - The airspace defined by the runway OFZ and, as appropriate, the inner-approach OFZ and the inner-transitional OFZ, which is clear of object penetrations other than frangible NAVAIDS.

- **Runway OFZ** - The airspace above a surface centered runway centerline.
- **Inner-approach OFZ** - The airspace above a surface centered on the extended runway centerline. It applies to runways with an approach lighting system.
- **Inner-transitional OFZ** - The airspace above the surfaces located on the outer edges of the runway OFZ and the inner-approach OFZ. It applies to precision instrument runways.

Obstruction - An object that penetrates an imaginary surface described in FAR Part 77.

Peaking Factor - The factor applied to the annual operations to determine the peak-hour activity.

Precision Approach Path Indicator (PAPI) - Provides visual approach slope guidance to aircraft during approach to landing by radiating a directional pattern of high intensity focused light beams.

Precision Instrument Approach - An instrument approach procedure in which electronic vertical and horizontal guidance is provided; e.g. ILS.

Primary Surface - A surface longitudinally centered on the runway, extending 200 feet beyond each end of the runway. The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline.

Rotorcraft (e.g. Helicopter) - A heavier-than-air aircraft supported in flight by the reactions of the air on one or more power-driven rotors on substantially vertical axis.

Runway End Identifier Lights (REIL) - These lights aid in early identification of the approach end of the runway.

Runway Protection Zone (RPZ) - The ground area under the approach surface which extends from the primary surface to a point where the approach surface is fifty feet above the ground. This was formerly known as the clear zone.

Runway Safety Area (RSA) - A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.

Segmented Circle - A system of visual indicators designed to provide traffic pattern information at airports without operating control towers.

Touch and Go Operation - Practice flight performed by a landing touch down and continuous take off without stopping or exiting the runway.

Transitional Surfaces - These surfaces extend outward and upward at right angles to the runway centerline and the extended runway centerline at a slope of 7:1 from the sides of the primary surface and from the sides of the approach surfaces. Transitional surfaces for those portions of a precision approach surface which project through and beyond the limits of the conical surface extend a distance of 5,000 feet measured horizontally from the edge of the approach surface and at right angles to the runway centerline.

VASI - Visual Approach Slope Indicator. See definition of PAPI.

Visual Flight Rules (VFR) - Flight rules by which aircraft are operated by visual reference to the ground. Weather conditions for flying under these rules must include a ceiling greater than 1,000 feet, three-miles visibility, and standard cloud clearance.

Wind Coverage - Wind coverage is the percent of time for which aeronautical operations are considered safe due to acceptable crosswind components.

Wind Rose - A scaled graphical presentation of wind information.

Appendix B: Recycling, Reuse, and Waste Reduction Plan

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Appendix B

RECYCLING, REUSE, AND WASTE REDUCTION PLAN

B.1 INTRODUCTION

Solid waste management is an issue of importance to both the Juneau International Airport (JNU) and the City and Borough of Juneau (CBJ). Material Management and Effluents and Waste were identified as two of the Focus Areas for the Juneau Airport Sustainability Master Plan (SMP).

This Recycling, Reuse, and Waste Reduction (RRWR) Plan addresses the Materials Management Focus Area and has been prepared in accordance with the Federal Aviation Administration (FAA) *Guidance on Airport Recycling, Reuse and Waste Reduction Plans*, dated September 30, 2014[1]. This plan:

1. Documents existing recycling, waste reduction and reuse policies, facilities, and contracts at the Juneau International Airport;
2. Analyzes the opportunities, costs and benefits to expanding these efforts at the airport;
3. Reviews existing contracts and leases; and
4. Recommends Goals and Initiatives (actions) to establish, operate and maintain airport recycling and waste reduction programs over the 20-year planning horizon.

B.2 JNU WASTE MANAGEMENT IN CONTEXT

Waste disposal and recycling at the airport is best understood within the context of waste management throughout the Juneau community. JNU generates a relatively small portion of waste compared to the overall community. In Fiscal Year (FY) 2014, the airport generated 61 tons of municipal solid waste (MSW) and construction and demolition (C&D) waste. In comparison, the Juneau landfill records a community-wide average intake of 27,000 tons of MSW per year as well as 3,500 to 5,500 tons of C&D waste.[2] While waste generated at the

[1] https://www.faa.gov/airports/environmental/media/airport-recycling-reuse-waste-reduction-plans-guidance.pdf
[2] Source: City and Borough of Juneau Billing and Purchasing Department, Capitol Disposal

airport is a minor component of the community's solid waste generation, the collection systems in place at the airport are similar to waste disposal at all city facilities. The limitations and opportunities within the airport's current waste management system reflect Juneau's challenges and possibilities for waste reduction and recycling city-wide.

Several unique challenges and constraints affect the availability of disposal services in Juneau. Since Juneau is only accessible by air and sea travel and is isolated from the road system, waste that cannot be disposed of locally must be barged out. Local capacity for waste disposal is limited. Juneau's only landfill is privately operated by Capitol Disposal, a local subsidiary of Waste Management Inc., and is projected to reach capacity within 20 years. The potential sites identified for development of a new landfill all have environmental and land use impacts and are subject to extensive permitting requirements and regulatory review. The alternative of shipping baled solid waste to incinerators or landfills out of state is also a costly proposition. Given these considerations and the financial implications of relatively near-term landfill capacity issues, it is a strong incentive for the CBJ to reduce the rate of solid waste generation and divert as much waste as possible through recycling and reuse.

B.3 LOCAL, STATE, AND FEDERAL PLANS AND POLICIES

Although the airport has not documented formal solid waste management or waste reduction goals to date, the CBJ, which owns and operates the airport, has adopted city-wide plans and internal policies aimed at reducing the amount of solid waste that goes into the landfill. Additionally, there is robust support at the federal level for the development of recycling and waste reduction plans at airports.

B.3.1 2008 City and Borough of Juneau Solid Waste Strategy

In 2007, the closure of the incinerators at Juneau's privately operated landfill led to increasing visibility and public awareness of the landfill as it began to rise in height immediately adjacent to the most traveled road in town. The CBJ adopted a *Solid Waste Management Strategy* to guide the city's approach to managing waste. Implementing one of the 12 recommendations in that document, the CBJ hired a Solid Waste Manager in 2010, and continued to use the landfill as the primary means of solid waste disposal. The adopted Strategy also recommended the development of a commingled residential and commercial recycling collection service. The Strategy did not include any targets or waste reduction goals.

B.3.2 2013 City and Borough of Juneau Comprehensive Plan

Juneau's Comprehensive Plan, updated in 2013, includes several policies supporting efforts to minimize waste generation and encourage efforts at recycling and reuse.

- Policy 12.4: To facilitate the reduction of waste materials generated and disposed by households and businesses through promotion of an aggressive solid waste diversion program including activities facilitating waste prevention, reuse and recycling. (pg. 203)

- Policy 12.5: To promote efficient, safe, convenient, cost-effective and environmentally-sound methods for the disposal of solid and hazardous waste. (pg. 204)

- Policy 12.6: To encourage waste reduction, reuse and recycling activities that have positive economic and/or environmental benefits. (pg. 204)

B.3.3 Title 49: Sustainable Building Standards for Construction and Renovation of Buildings (49.35.800)

As adopted by ordinance in the CBJ Land Use Code (Title 49), all CBJ building construction and renovation projects costing over $5 million must be constructed to sustainable building standards utilizing the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Rating System. The LEED Rating system awards points (i.e., credits) based on sustainable design and construction elements, such as the inclusion of design elements that increase a building's energy efficiency or use of construction materials with recycled content. While planned reconstruction of the north wing of the airport was permitted prior to the adoption of the ordinance and will not be held to the LEED standard, the construction is nonetheless an opportunity to increase building efficiency and look for ways to reduce both construction and operational waste.

B.3.4 Statewide and Federal Waste Reduction Policies

Waste reduction and recycling efforts in the State of Alaska are supported by Alaska Statute 46.06.021: Solid and Hazardous Waste Management Practices, which prioritizes the promotion of source reduction and recycling above waste disposal. However, no state grants or incentives are available to build recycling or waste reduction programs, and the state does not track rates of recycling or waste diversion.

At the federal level, however, there is a strong emphasis on including recycling and waste reduction in airport planning. The FAA Modernization and Reform Act of 2012 requires airports to complete RRWR plans as part of all airport master plans, in order to be eligible for Airport Improvement Program funds. FAA guidance released in 2014 stipulates that RRWR plans should document, at a minimum, the airport's programs to recycle paper, plastic, and aluminum, and develop objectives and targets for waste diversion from landfills.

B.4 FACILITY DESCRIPTION AND BACKGROUND

B.4.1 The Juneau International Airport

JNU is owned and operated by the CBJ, and is located 7 miles north of downtown Juneau, at the mouth of the Mendenhall River and adjacent to the Mendenhall Wetlands State Game Refuge. Because Juneau is not connected to the road system, and is accessible only by plane or Alaska Marine Highway Ferry, JNU plays a critical role as a regional hub for passengers, freight, and mail for the Southeast Alaska region. Two large commercial Part 121 air carriers, eight regional Part 135 air carriers, three helicopter operators, four freight companies, and two air ambulance services operate out of JNU. The airport served close to 360,000 enplaned (boarding) passengers and completed over 105,000 air operations in calendar year 2014.

Part 121 commercial airline service makes up about 10 percent of takeoffs and landings, while 78 percent of airfield operations are performed by Part 135, cargo, charter and on-demand services. Juneau's air traffic is highly seasonal, with travel peaking in the summer months and slowing from September to April. JNU aviation operations, as well as 20-year demand forecasts are discussed in more depth in the Juneau Airport Sustainability Master Plan (see Chapter 3), which forecasts a 35 percent increase in enplaned passengers over next 20 years to just over 484,000.

B.4.2 Airport Facilities

Solid waste disposal and recycling practices at airports are complicated by the many players involved, and the varied systems employed to collect and dispose of waste. The airport manages many facilities, and leases space to many private and commercial entities, both in the terminal, on the airfield, and in commercial non-aviation related spaces. For the purposes of this plan, it was important to clarify where the airport has control or influence over waste management and disposal, and where it does not.

On November 12, 2014, members of the SMP project team met with airport staff to review the airport's solid waste management systems and tour solid waste collection facilities. During the site visit, the AECOM Team worked with the building maintenance supervisor to identify and map all waste and recycling collection sites controlled by the airport (see Figures 1 and 2: Waste

Figure 1: Draft Waste Management Site Inventory (1st floor)

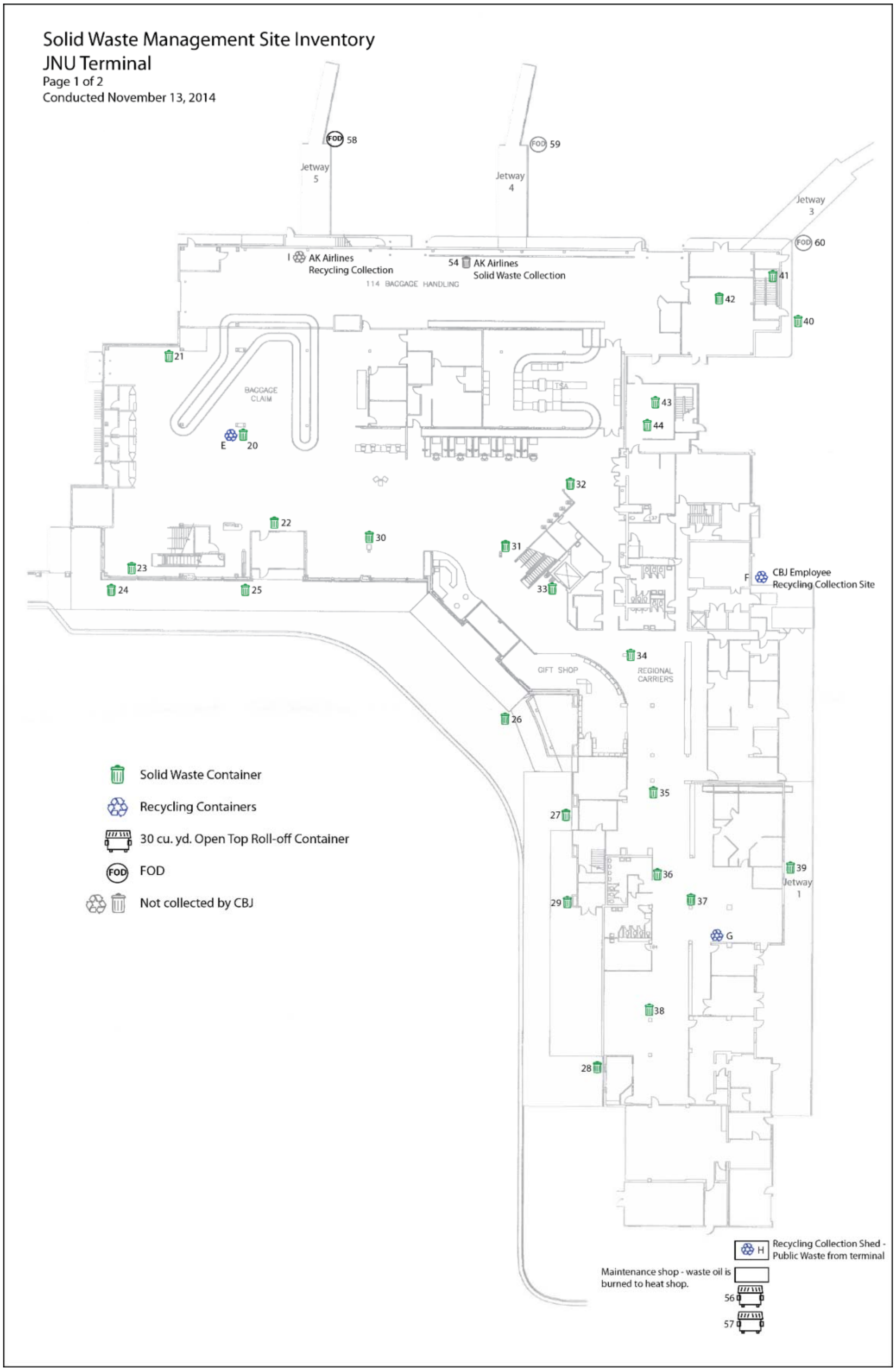
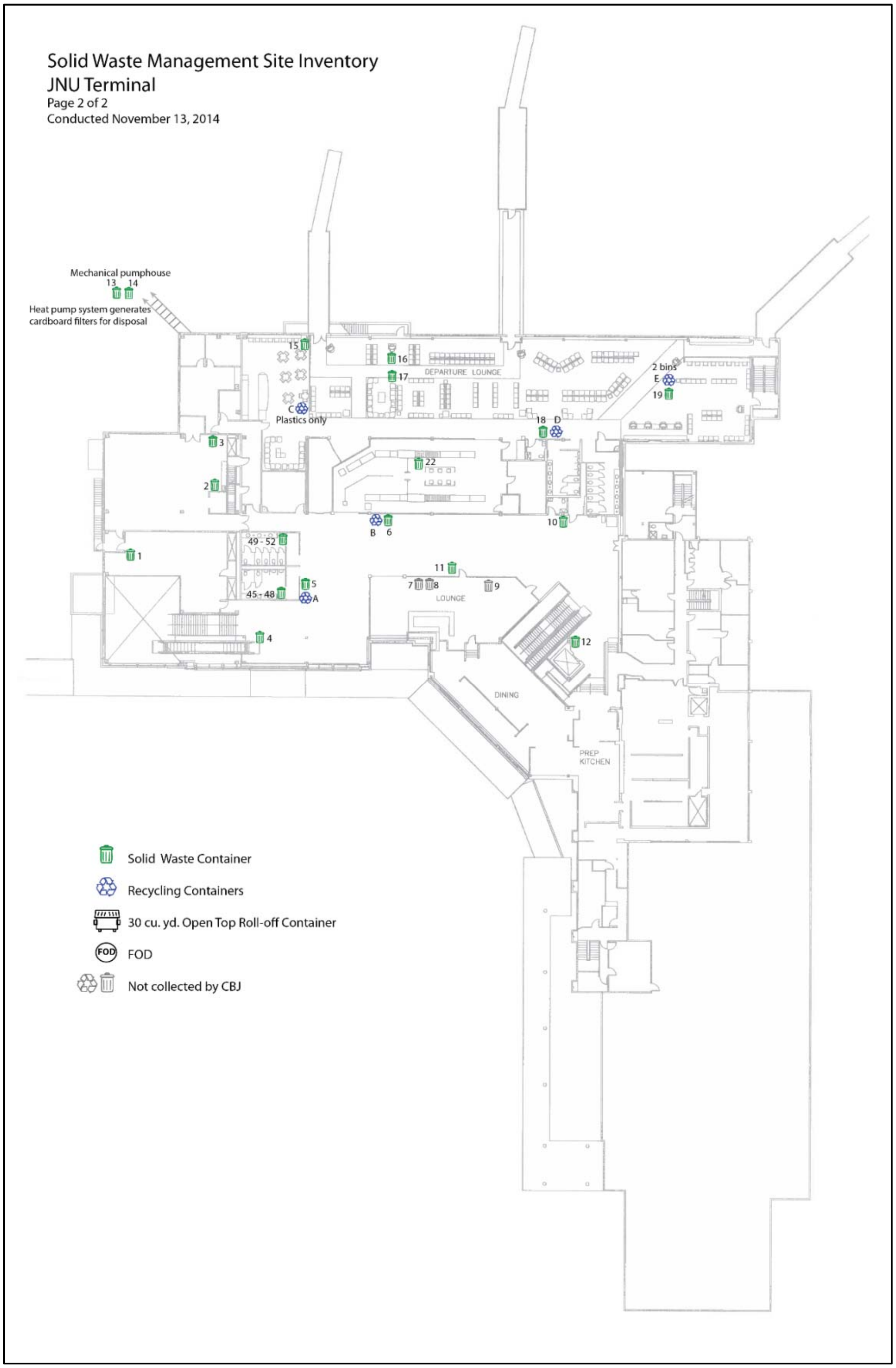


Figure 2: Draft Waste Management Site Inventory (2nd floor)



Management Site Inventory). Areas within airport property were divided into three broad categories:

- Areas under direct control of the airport management,
- Areas where the airport management had influence, but no direct control, and
- Areas where the airport management had neither control nor influence.

B.4.2.1 Direct Control

Table 1 lists areas where the airport has direct control over how waste is generated and collected.

Table 1. JNU Direct Control (review of waste generated in progress with tenants)

	Map Code (see Figures 1 & 2)	Waste Generated	Current Solid Waste Collection	Current Waste Reduction/Recycling
Airfield				
a. Foreign Object Debris/Damage (FOD) and Jetways 1, 3, and 5	39-40, FOD 58	Debris found on airfield, including loose hardware, building materials, plant debris, etc.	See terminal solid waste collection (below)	None
b. Municipal Solid Waste collection areas	56-57, H, F			
Terminal				
c. Heat pump room, maintenance shop	13-14, 41-44	Scrap metal, motor oil, glass, paper cups, cardboard, misc. plastics, paint containers, cleaning fluid containers, air filters	Solid waste collected by airport maintenance staff with carts, compacted in one open top roll-off container; emptied as needed by Alaska Pacific Environmental Services (dba Arrow Refuse)	Scrap metal collected for recycling, waste oil burned to heat shop; paper, aluminum, cardboard, #1&2 plastics collected by Rock Dog for recycling
d. CBJ offices	Not mapped	Mixed paper, plastic and paper food containers, cardboard, glass containers, electronic waste		
e. Public restrooms	45-52	Paper towels, misc. waste (soiled diapers, feminine hygiene products, toilet paper rolls, plastic bottles)		None
f. Heat pump rooms	Not mapped	Used filters, plastic wrap		
g. Alaska Room and Juneau Room	1-3	Mixed paper, misc. plastics, glass, paper cups, food waste		
h. Commercial airline ticket counter queuing area	30-33	Mixed paper, misc. plastics		

	Map Code (see Figures 1 & 2)	Waste Generated	Current Solid Waste Collection	Current Waste Reduction/Recycling
i. Regional airline waiting areas	34-38, G	Mixed paper, misc. plastics, glass, paper cups, aluminum, food waste		Recycling bins throughout public areas for paper, aluminum, plastic. Collected in airport-owned storage shed and hauled to landfill by airport maintenance staff.
j. Departure lounge (inside security)	15-19, C, D and E			
k. Security queuing area and waiting area (outside security)	4-6, A and B			
l. Baggage claim area	20-23			
m. Exterior public walkways	24-29			None
n. Regional airline offices and ticketing counters	Not mapped	Mixed paper, misc. plastic, aluminum, paper cups, glass, electronic waste		Independent and varied recycling efforts – no formal policy or coordination. Some individuals use recycling containers throughout public terminal areas
o. Customs office	Not mapped			
p. Car rental counters	Not mapped			
q. Baggage handling area	I, 54			
r. TSA offices	Not mapped			

B.4.2.2 Influence, but No Direct Control

Table 2 lists areas of influence, but no direct control. Although the airport does not directly control the many tenants operating on airport grounds, in most cases the airport could have influence, as the lessor, over their waste disposal and recycling practices. This is particularly true where tenants occupy space within the terminal itself, such as the concessionaire, or the air carrier offices, since the majority of waste and recycling containers are located in the terminal.

B.4.2.3 Neither Control nor Influence

There are no areas on airport property where the airport has neither control nor influence. Currently, private and commercial airfield tenants and landside non-aviation tenants conduct their own individual waste collection efforts independent of the airport. However, all are influenced in small part by the leases and fees negotiated by the airport. Furthermore, any consolidated recycling collection and disposal program implemented by the airport could be made available to all tenants on a voluntary basis.

Table 2. JNU Influence, but no Direct Control

	Map Code see (Figures 1 & 2)	Waste Generated	Current Solid Waste Collection	Current Waste Reduction/Recycling
Terminal				
a. Alaska Airlines break room, offices, Jetways 3 and 4, baggage handling	54, FOD 59-60, I	Mixed paper, misc. plastics, glass, paper and plastic food and beverage containers, FOD from airfield (includes loose hardware, building materials, plant debris, etc.)	Contracts with Aero Services for collection in Alaska Airlines roll-off container. Arrow Refuse hauls to landfill as needed.	Operates separate recycling collection area for paper, aluminum, cardboard, #1& #2 plastics collected by Aero Services. Alaska Airlines employees haul to CBJ Recycling Center.
b. Delta Airlines offices	Not mapped	Mixed paper, misc. plastics, glass, paper cups	Aero Services collects office and deplaned waste, deposits in Aero Services' 1.5 yard roll-off. Arrow Refuse hauls to landfill as needed.	None
c. Food Concessionaire (pre & post security)	7-9	Cardboard, glass, metal containers, paper and plastic food and beverage containers, paper napkins, plastic utensils, expired food, gloves, coffee grounds and filters	Exclusive use of one open top roll-off owned by the airport. Arrow Refuse hauls to landfill as needed.	None
Airfield				
d. Alaska Airlines hangers	Not mapped	Unknown	Contracts with Aero Services for collection. Solid Waste is deposited in Alaska Airlines-owned dumpster, hauled to landfill by Aero Refuse.	Operates separate recycling collection area for paper, aluminum, cardboard, #1&2 plastics collected by Aero Services. Alaska Airlines employees haul to Recycling Center.
e. Fixed Base Operator (FBO): Aero Services	Not mapped	Mixed paper, misc. plastics, catering waste (food waste, soiled paper), glass, deplaned waste, cardboard, wood pallets	All Aero Services waste disposed of in Aero Services-owned dumpster, hauled to landfill as needed by Arrow Refuse. Delta office and deplaned waste also deposited in Aero Services' dumpster.	Collects and sorts Alaska Airlines recyclable materials at sorting facility at airport owned and maintained by Alaska Airlines. Aero Services does not recycle waste the FBO's own waste generated internally.
f. Other commercial	Not mapped	Unknown; varies by	Independent waste	Independent and varied

	Map Code see (Figures 1 & 2)	Waste Generated	Current Solid Waste Collection	Current Waste Reduction/Recycling
tenants (includes helicopter operators, Part 135 hangars, U.S. Fish and Wildlife, FAA and National Guard)		tenant	collection and disposal. Larger tenants/hangers maintain open-top roll-off containers. Smaller tenants have no formal waste collection service.	recycling efforts – no formal policy, shared facility, or coordination
a. Private airfield hangar tenants	Not mapped		Independent waste collection and disposal.	Independent and varied recycling efforts
Landside Commercial (Non-aviation)				
b. Car rental sites	Not mapped	Unknown	Independent waste collection and disposal.	Independent and varied recycling efforts
c. Parking vendor booths				
d. ACS (Telephone Utilities of Alaska)				

B.4.3 Airport Tenants

JNU currently has 175 leases within the terminal, on the airfield, and landside (non-airport related), and rents space to commercial flight operators, freight and cargo operators, fuel vendors, Fixed Base Operators (FBOs), concessionaires, and other businesses and individuals. While most tenants on the airfield operate waste collection independently of the airport, the airport maintains some control over these tenants through their lease arrangements. Lease negotiations provide an opportunity for JNU to implement new solid waste management and recycling policies or services to tenants. Table 3 summarizes lease expiration dates.

While some leases are set to expire within FY 2015, most expire in five or more years. Given this, any strategy that relies upon terms included in renewed leases would be able to be implemented for about 30 percent of tenants within five years, and the other 70 percent would be implemented in the longer term.

New recycling facilities for tenants may also be implemented in ways that do not involve lease renewals, either through fee increases or through free voluntary programs. If the airport were to implement a consolidated recycling collection area for plastic, paper and cardboard, that facility and hauling service could be made available to all commercial and residential tenants on a voluntary basis. Participation in such a program would not need to be obligated through leases.

TABLE 3. SUMMARY OF JNU TENANT LEASES AND EXPIRATION DATES (FY 15)

	Total # Tenant Leases	Lease expires in…					
		Awaiting renewal	**2015**	**2016-2020**	**2021-2030**	**Beyond 2030**	**Unknown or other**
Airfield Tenants	117	6	10	14	78	8	1
Landside Tenants	10	2		3	4		1
Terminal Tenants	48	11	4				33
TOTAL	**175**	**19**	**14**	**17**	**82**	**8**	**35**

Source: Juneau International Airport; List of Tenant Leases

B 5 EXISTING SOLID WASTE MANAGEMENT PROGRAMS

B 5.1 Solid Waste Collection at JNU

B 5.1.1Solid Waste Collection Systems

The airport has an established system for solid waste collection within the terminal, which serves all offices except those of Alaska Airlines and Delta Airlines, as well as all public areas. Waste from all tenant and airport offices (except Alaska Airlines and Delta Airlines) within the terminal, building and airfield maintenance, public areas within the terminal, and some airfield Foreign Object Debris/Damage (FOD) containers are collected by JNU building maintenance staff, deposited in a JNU-owned 5-yard compactor to the north of the terminal. The compactor is emptied by Arrow Refuse on an as needed basis. Arrow Refuse delivers the waste to the landfill, which is owned and operated by Waste Management, located approximately 3.5 miles east of the airport at 5600 Tonsgaard Blvd. JNU pays for solid waste disposal approximately twice a month, with less frequent pick-ups in the winter (from September to April).

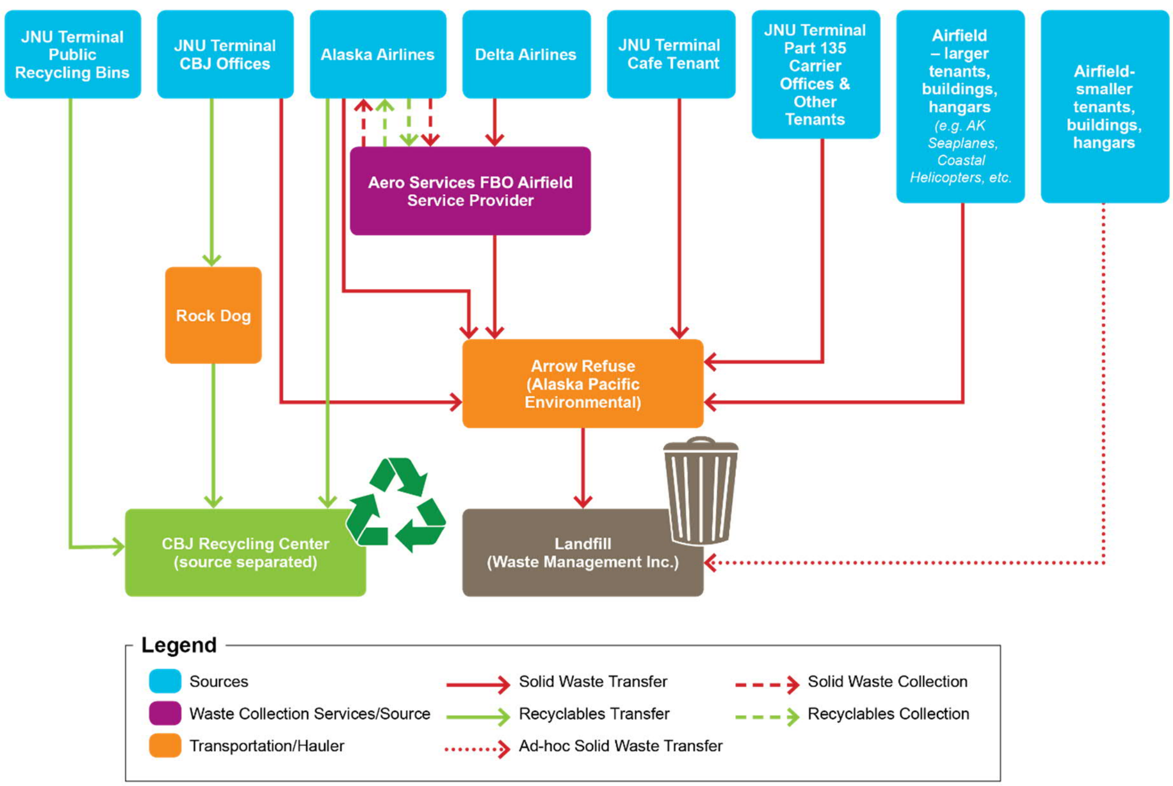
Alaska Airlines and Delta Airlines manage separate systems for waste. Both contract with Aero Services, the Fixed Base Operator (FBO) at JNU, for janitorial services to collect deplaned and office waste. Alaska Airlines maintains a solid waste roll-off container and a recycling sorting area at their maintenance and equipment building on the airfield. Aero Services deposits solid waste collected from Alaska Airlines into the roll-off container. Aero Services also collects deplaned waste and office waste from Delta Airlines, which is deposited in Aero Service's own dumpster, located at the Aero Services building on the airfield.

Alaska Airlines, Aero Services, the food concessionaire, and all other tenants large enough to maintain their own roll-off containers pay Arrow Refuse to empty them and haul the contents to the landfill on an as-needed basis. Smaller tenants who do not generate enough waste to warrant a roll-off container, such as the 116 private t-hangar and executive hangar tenants, individually collect and haul their solid waste to the landfill for disposal.

Part 135 carriers commented during a November 2014 Juneau Airport Master Plan meeting that there is a need for improved disposal methods for shipping pallets, which have begun to accumulate on the airfield. In the past, JNU operated a burn pile to dispose of woody debris from landscape maintenance, as well as wood shipping pallets and related wood waste from tenant cargo operations. Safety issues and other concerns led to prohibition of open burning starting in December 2013. JNU maintenance staff subsequently purchased a wood chipper, with the intent to distribute woody debris on airport grounds as mulch. This could include the chipping of wood shipping pallets as well, although sometimes wood pallets are given to community groups for reuse.

Current solid waste and recycling practices in JNU are depicted on Figure 3.

Figure 3: JNU Terminal Solid Waste Generation

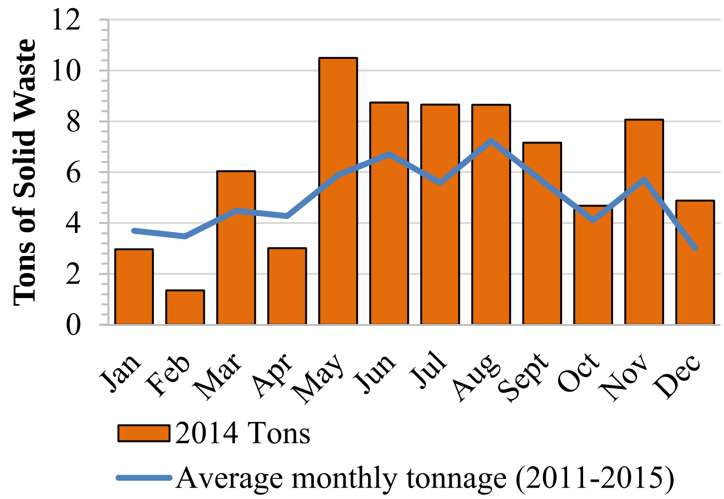


B.5.1.2 Solid Waste Volume and Costs

JNU's solid waste disposal is funded through the CBJ's Waste Management Program, which also covers the costs for the collection of employee-generated recyclable materials. As shown in Figure 4, the airport's waste disposal volumes were consistent in FY 2012 and FY 2013, but increased 40 percent in calendar year 2014, from 53 tons to 75 tons. That in turn led to a 50 percent increase in the cost of disposal (Figure 4). Several changes at the airport likely contributed to this increase in solid waste generation.

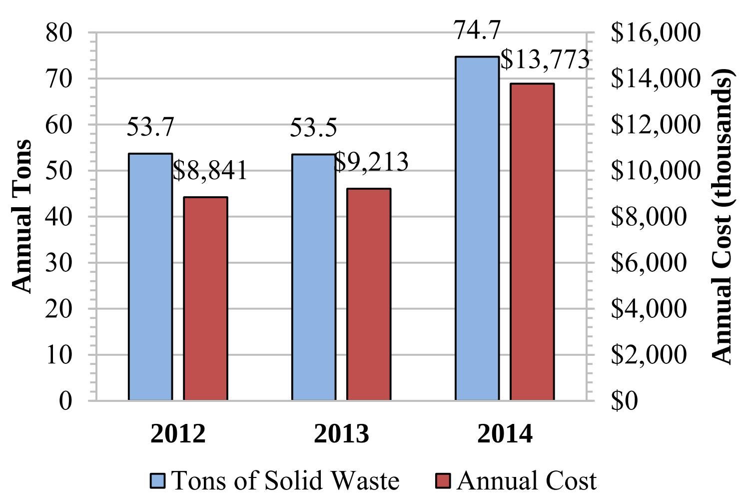
Figure 4 shows that the increase in solid waste disposal in 2014 occurred during the summer months. In May 2014, JNU disposed of over 10 tons of solid waste, a 40 percent increase over the three year May average. In spring 2014, the airport's restaurant concessionaire closed its operations. Following a remodel, a new concessionaire established a new café both inside and outside of security. Typically, disposal of C&D waste from airport development projects is the responsibility of the contractor, and is not therefore counted in the airport's waste disposal tonnage and costs. However, waste from the closure of the restaurant and the expansion of the cafe was disposed entirely in the JNU roll-off container, contributing to the increase in the airport's annual solid waste tonnage (Figure 5). Additionally, Delta Airlines began flying to Juneau in April 2014. Although Delta now contracts with Aero Services for the collection and disposal of all of their

Figure 4: JNU Terminal Solid Waste Generation, 2014 vs. 4 yr Avg.



Source: City and Borough of Juneau, Accounts Payable

Figure 5: JNU Terminal Annual Solid Waste Tonnage and Costs, 2012-2014



Source: City and Borough of Juneau, Accounts Payable waste, the air carrier initially used the airport's roll-off for solid waste removed from its planes upon arrival (also called deplaned waste).

The increasing costs of solid waste disposal at JNU are not all attributable to increased volumes of waste: Alaska Pacific Environmental Services (dba Arrow Refuse) rates for hauling and disposing of solid waste have also increased over the last 5 years. The current rates for pickup and disposal of commercial roll-offs at JNU in 2014 are itemized in Table 4.

Table 4. 2014 JNU Solid Waste Disposal Cost

Fee Type	Cost/Units
Hauling fee *(AK Pacific Environmental)*	\$150.90/pickup
Tipping fee *(Waste Management)*	\$180/ton (\$0.09/lb for ≥ 500 lb loads)
Regulatory cost charge *(AK Pacific Environmental)*	0.75% of Billing

Source: Alaska Pacific Environmental Services Juneau LLC, and Waste Management, Inc.

B.5.2 Current Recycling and Waste Reduction at JNU

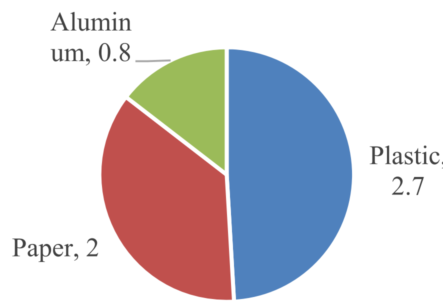
B.5.2.1 Recycling Programs

Recycling within the airport is limited to some extent by the recycling services and facilities that are available in Juneau and managed by the CBJ for city facility use. The CBJ Public Works Department operates a Recycling Center co-located at the Capital Disposal landfill. The Recycling Center is funded through a \$4/month waste management fee charged to utility rate payers, as well as a \$20 vehicle registration fee. Commercial entities and institutions may pay a \$100/year fee for unlimited disposal access at the CBJ Recycling Center. Corrugated cardboard, mixed paper, #1 and #2 plastics, aluminum and tin cans are baled on site and sold to buyers domestically or abroad, depending on demand. While glass is also collected at the center, shipping costs prohibit sales to buyers outside of Juneau. Instead, it is crushed and spread on roads within the landfill as a substitute for gravel.

A local private contractor, Rock Dog, collects source separated recyclable materials from businesses and institutions. The CBJ contracts with Rock Dog to pick up paper, cardboard, #1 and #2 plastics, and aluminum cans from city facilities, including the airport. Materials are collected in three 32-gallon bins at the back of the Airport Terminal between Jetways 1 and 3 (Site F on Figure 1: Waste Management Inventory Site Map). The CBJ's contract with Rock Dog only covers recycled material generated by city staff, so neither public nor tenant materials are included in this service. These source separated materials are taken to the CBJ Recycling Center.

Rock Dog picks up recyclable materials from the airport once a week throughout the year. No data is available on the quantities of material recycled through this program, as the materials are not currently weighed by Rock Dog or city employees. Rock Dog's contract specifies that they will pick up of a maximum of ten 32-gallon bags of material at JNU per week.

Figure 6: JNU Recyclable Materials Generated by the Public, Aug. 2014 - May 2015 (cubic yards)



Source: JNU Building Maintenance Staff

In August 2014, the airport independently launched a recycling program for recyclable materials generated within the public areas of the terminal. The airport purchased and distributed seven, 32-gallon recycling bins for mixed paper, aluminum, and plastic, along with a shed. Airport building maintenance staff collects recyclable materials from the bins and takes them to the shed for interim storage. The shed's contents are delivered by airport employees to the Recycling Center on an as-needed basis. Through these public recycling containers in the terminal, the airport collects approximately one pick-up truck load (32 cubic feet/1.1 cubic yards) of recyclable material every other month. While no written records are kept by JNU staff regarding the quantity of recycled materials, building maintenance staff estimated that in the first nine months, the program had diverted approximately 5.5 cubic yards of recyclable materials from the landfill. Just under 50 percent of the recyclable materials collected have been plastic containers, while 15 percent is composed of aluminum cans, and the remaining 36 percent is mixed paper (Figure 6). Additionally, staff estimated that in the summer months, plastics make up closer to 75-80 percent of material collected, while paper makes up 10-20 percent, and aluminum, 5-10 percent. The basis for the increase in plastics is assumed to be increased consumption of cold beverages in warmer weather.

In addition to office and public terminal recycling efforts, the airport maintenance crew collects scrap metal in a pile near the airfield maintenance shop. Once a year the scrap is sold to Skookum Sales and Recycling, a local metal recycler. Waste oil generated by airfield maintenance is stored in an above ground storage tank (AST) and used in a waste oil furnace for heating the maintenance shop in the winter.

Alaska Airlines is the only tenant known to operate its own recycling program at the airport. Recyclable materials are collected by Aero Services for transport to a sorting facility in the Alaska Airlines maintenance building. From there, recyclables are hauled to the CBJ Recycling Center by Alaska Airlines employees. All other airfield tenants manage recyclable materials independently. Efforts vary widely depending on the inclination of the individual or company. There are no incentives or coordinated recycling efforts among tenants.

B.5.2.2 Recycling Costs

The airport has made initial investments to begin a public recycling program at the terminal. In 2014, the airport invested almost $3,000 to start up recycling in the public areas within the terminal, and continues to devote approximately $600/year in staff time to transport recyclable materials to the Recycling Center. Staff time and start-up costs are all funded by the Airport Building Maintenance budget. Additionally, for calendar year 2015, the city will pay $2,080 for Rock Dog to pick up recyclable materials generated by the CBJ offices once a week. Rock Dog's services are funded through the CBJ Waste Management Program, a division of the Public Works Department.

Table 5. Recycling Program Start-up and Operational Costs

CAPITAL COSTS	Cost
Storage shed	$1,496
Deck	$300
7 Recycling bins	$880
10 Cases bags (clear)	$260
Total Capital Costs	**$2,936**

OPERATIONAL COSTS	
Hauling public generated recyclable materials *(estimate based on: $100/hr., 0.5 hrs./mo., includes staff time and vehicle costs)*	$600
Rock Dog services *(hauling office recyclable materials)*	$2,080
Total Operational Costs	**$2,680/year**

Source: JNU Building Maintenance Staff

B.5.2.3 Waste Reduction and Re-use at JNU

Although JNU does not have specific policies in place that explicitly address waste reduction, the airport has invested in some infrastructure to reduce waste generation, and more upgrades are planned. The airport has installed a water bottle refilling station in the departure lounge area inside security, which may reduce the generation of plastic bottle waste. Additionally, the food concessionaire, which currently serves only bottled beverages and pre-packaged food, is undergoing a remodeling effort to prepare food on site and serve fountain sodas and beer on tap. While this change may increase the volume of food waste generated by the café, it will decrease the quantity of plastic and glass bottles and plastic packaging.

Airport staff expressed concern that the current written CBJ surplus policy, which manages the disposal of city-owned items including all tools and vehicles, furniture, electronics and re-useable C&D waste, encourages the landfilling of items rather than their reuse. The CBJ Procurement policy, Administrative Policy No. 14-02, dictates that any useable "spare" item be made available to other CBJ departments for 14 days prior to disposal, and then marked "excess" and sold at online auction to the highest bidder. Items broken beyond repair are declared "obsolete" and may be immediately disposed of at the landfill, recycling center or salvage yard. While the policy requires the re-use by the city of all useable materials, JNU staff noted that departments have an incentive to declare items as obsolete because of the time and energy required to properly dispose of useable spare items. There is no differentiation in the policy between reusable building supplies (windows, salvaged lumber, light or plumbing fixtures, etc.), and office furniture or vehicles.

B.6 CHALLENGES AND OPPORTUNITIES

The airport faces a number of challenges to expanding recycling activities; however, there are also significant opportunities for increased efficiency and improved service for tenants and the public.

B.6.1 Challenges

B.6.1.1 High Shipping Costs

Because of the added expense of barging recycled materials out of Juneau, only higher valued materials are marketable and generate revenue if recycled. For this reason, there is no glass recycling in Juneau, although glass is re-purposed by crushing it and using it as a road base at the landfill, thereby avoiding solid waste disposal costs and reducing gravel purchasing costs.

B.6.1.2 Volatile markets for recyclable materials

In the wake of increased standards for uncontaminated recyclable materials in China, the value of comingled recyclable materials has plummeted. When the private residential recycling collection service was initiated in Juneau in 2012, baled commingled recyclables sold for $80/ton. The company providing this service now pays $16.50/ton to ship these materials out of Juneau. To increase revenue, recyclable materials must be source separated and uncontaminated.

B.6.1.3 Lack of recycling efforts

There are many tenants that are not served by any recycling program.

B.6.1.4 Lack of coordinated recycling efforts

Currently there are three separate recycling programs in operation at the airport, all serving different groups.

B.6.2 Opportunities

B.6.2.1 Potential Recycling Center expansion

The airport stands to gain from the expansion of recycling programs for the public and tenants by avoiding disposal costs (i.e., tipping and hauling fees) for solid waste; however, the city as a whole stands to gain from increased diversion of source separated recyclable materials from the landfill, which will extend the landfill's useable life. While the existing Recycling Center is operating at capacity, the city has ordered a new higher capacity baler to handle additional recyclable materials. This means increased revenue from the sale of paper, aluminum, cardboard, and #1-2 plastics. Currently the Recycling Center generates $80,000/year from the sale of these materials, which covers one-third of the Center's annual operating costs.[3] This city has additional plans to relocate the recycling center onto CBJ-owned property adjacent to the Household Hazardous Waste Collection site in Lemon Creek. The City-owned site would allow for more extended hours and increased space.

B.6.2.2 CBJ Solid Waste Action Plan and Pilot Program

The CBJ's Solid Waste Manager, in partnership with the engineering department, is currently developing an action plan to expand recycling at CBJ facilities to collect public recyclable materials. Currently no public waste is recycled at CBJ facilities. The pilot program would invest in source-separated containers to collect paper, plastic, and aluminum at public areas such as schools, swimming pools, docks and harbors, and CBJ outdoor recreation areas. The airport could participate in this program during the pilot phase or in subsequent implementation phases.

B.7 RECOMMENDATIONS

The following recommendations and goals have been developed based on the findings presented in the RRWR Plan and challenges and opportunities identified for JNU.

[3] *Source: City and Borough of Juneau Solid Waste Management Program*

GOAL 1: Expand and improve recycling services provided by the Juneau International Airport to cover employees, tenants and the public.	
Initiatives	**Metrics**
• Participate in pilot program or future phased implementation of new CBJ Solid Waste Action Plan, now under development. • Solidify JNU's two current recycling facilities into one collection and hauling program that covers airport tenants, members of the public, and airport employees. Through this unified program, collect and recycle #1 and #2 plastics, mixed paper, corrugated cardboard, and aluminum. • Maintain a dedicated recycling storage / staging area of sufficient size, usability, and accessibility.	• Weight of solid waste per enplaned passenger • Weight of materials recycled by JNU • Percentage of annual JNU solid waste diverted • Weight of paper, cardboard, plastic, and aluminum recycled
About	
In 2016, CBJ will begin implementation of a new Solid Waste Action Plan, which will include the installation of 3-sectioned collection bins for source separated paper, aluminum and plastic at high-profile CBJ-operated public locations. If the program is successful, additional CBJ facilities may be included in future years. The airport should work with the CBJ Public Works Department to establish a unified collection system to serve JNU employees, passengers, and tenants within the terminal. This should include collection and recycling of mixed paper, #1-#2 plastics, cardboard, and aluminum. Pilot program development should include evaluation of commercial versus city employee hauling and management of source-separated materials at the CBJ Recycling Center.	
Cost and Benefit Information	
Each collection bin will cost the CBJ $300. Once implemented, the CBJ will save as much as $600 annually on staff time for delivery of publicly generated recyclable materials to the landfill. Additionally, any recyclable materials diverted from the landfill will result in avoided disposal costs and may generate revenue for the CBJ Waste Management Program. A ton of solid waste costs the CBJ $180 to dispose of at the landfill, as well as a $150 hauling fee for each load picked up by Arrow Refuse. A ton of recyclable materials diverted from the landfill may be sold on the open market, depending on current commodity and recyclable material values.	

GOAL 2: Integrate waste reduction efforts into planned renovation efforts and daily operations at the airport.	
Initiatives	**Metrics**
• Install air hand dryers in all JNU bathroom facilities. • Work with CBJ purchasing division to facilitate the sale or salvage of reusable materials such as C&D waste, or old supplies/equipment. • For capital and construction projects, require suppliers and contractors to develop construction waste management plans and establish and meet recycling/diversion targets for C&D waste. • Continue to encourage elimination of food packaging waste from food concessionaire through a shift towards preparing food on site and serving beverages on draft or well drinks in washable/reusable glasses. • At such time as municipal composting should become available in Juneau, encourage the composting of food waste, napkins, and paper towels generated by airport food concessionaires and their customers.	• Weight of hand towel waste avoided annually • Weight of C&D waste diverted from landfill
About	
As the airport launches the renovation of the northern wing of the terminal, there will be many opportunities to implement waste reduction efforts, including salvaging used building materials, as well as implementing new waste saving measures such as installing air hand dryers in bathrooms instead of paper towel dispensers. To facilitate salvaging C&D waste, airport staff will work with the CBJ purchasing office to review current procurement policy. This review may include the development of additional elements that deal directly with C&D waste, and allow for donation of useable materials to salvage businesses.	
Cost and Benefit Information	
In 2014, JNU's solid waste disposal costs increased by 50 percent, due in large part to an increase in C&D waste associated with the renovations for the new café and closure of the restaurant. If policies and contracts are changed to simplify and encourage the airport and contractors to salvage useable windows, doors, light and plumbing fixtures, the cost of waste disposal could be reduced. Additionally, any salvaged items sold rather than disposed of in the landfill will become a revenue source. Disposal costs can be avoided if contracts specify that the contractor is responsible for waste and that use of airport solid waste containers is prohibited. Waste reduction strategies such as the installation of hand dryers in the bathrooms would save money through eliminating ongoing costs for paper towels, as well as reducing disposal costs. In a study at the University at Buffalo, students found that an air dryer such as the Dyson Airblade paid itself back in 4.5 years despite a high upfront cost (approximately $4,000 in 2015), and harbored 6 times less bacteria than paper towel dispensers.[4]	

[4] University at Buffalo, the State University of New York, News Center, "Paper towels fold in study versus hand dryers," https://www.buffalo.edu/news/releases/2014/06/010.html, accessed July 1, 2015.

<table>
<tr><td colspan="2">GOAL 3: Improve the information and data about solid waste and recycling and services available to both the airport and the public.</td></tr>
<tr><td>Initiatives</td><td>Metrics</td></tr>
<tr><td>

Prominently display signs in the terminal describing what can be recycled, where to recycle, and how the airport’s recycling and waste reduction efforts are doing, Express appreciation of the public’s participation.
Consistently co-locate recycling bins adjacent to solid waste bins, with consistent informational signage to increase proper use.
Complete a full waste audit to develop a baseline of quantity and composition of the airport’s waste stream. The baseline audit will reveal the weight percent of solid waste audited that is recyclable.
Conduct periodic visual observations of solid waste and recycling containers to monitor performance.
Monitor annual quantity and percentage of waste diverted from landfill disposal.
Work with CBJ Solid Waste Coordinator to develop a set of baseline criteria and ongoing metrics to track impact of Solid Waste Management Plan.

</td><td>

Weight of solid waste per enplaned passenger
Weight of materials recycled by JNU
Percentage of annual JNU solid waste diverted
Weight of paper, cardboard, plastic, and aluminum recycled

</td></tr>
<tr><td colspan="2">About</td></tr>
<tr><td colspan="2">Once the airport begins participation in the Juneau Solid Waste Management Plan, steps must be taken to ensure that tracking efforts are consistent with other participating facilities in the program. Airport staff should work with the CBJ Solid Waste Coordinator to ensure that consistent information is gathered and tracked. Agreed upon data should be reported to the Solid Waste Coordinator quarterly.</td></tr>
<tr><td colspan="2">Cost and Benefit Information</td></tr>
<tr><td colspan="2">Publicity about recycling programs is relatively low cost and will encourage increased participation in the public recycling program. Some staff time would be required to track and report recycled quantities.

Waste stream audits can be conducted by airport staff or suppliers but may also be conducted by waste/recycling vendors as part of CBJ contracts or could conceivably be done in cooperation with the university as a research project. The cost of an audit is relatively minor (i.e., can be completed over a few hours) but ensures the ongoing reduction of disposed waste by supporting continual improvement of the waste and recycling.</td></tr>
</table>

B.8 SOURCES

Sherry Patterson, CBJ Accounts Payable
Cynthia Johnson, CBJ Accounts payable
Jim Penor, CBJ Solid Waste Manager
Robert Dilg, CBJ Airport Building Maintenance Supervisor
Marc Cheatham, CBJ Deputy Airport Manager
Catherine Fritz, CBJ Airport Architect
Michele Elfers, CBJ Architectural Assistant II
Carl Ramseth, General Manager, Alaska Seaplanes
Brooke Walker, Aero Services Manager

Appendix C: Local/Regional Sustainability Policy

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Appendix C

LOCAL/REGIONAL SUSTAINABILITY POLICY

C.1 INTRODUCTION

Attachment 1 to the Sustainability Baseline documents the relevant policies, guidance, and initiatives that have been developed by the CBJ. These guiding statements are largely found in the CBJ Comprehensive Plan 2013 Update and the 2011 Juneau Climate Action and Implementation Plan and provide the local and regional context within which JNU will identify, evaluate, and implement sustainability actions. The statements that are relevant for the Sustainability Master Plan (SMP) project are included in this document and categories by the airport's selected Focus Areas.

C.2 ECONOMIC VIABILITY

The CBJ incorporated economic development and purchasing into its sustainability commitments. Relevant policies and initiatives from the CBJ Comprehensive Plan 2013 Update:

- Policy 5.4: To encourage and support regional economic development in other cities and locations in Southeast Alaska to create a local environment of services and offerings attractive to commerce originating from outside the CBJ, and to actively participate in development and implementation of regional sustainable development goals.
- 5.4 - SOP2 (Policy 5.4, Standard Operating Procedure 2): Encourage regional marketing for locally-made goods and locally-provided services and encourage partnerships in producing and marketing regionally-made goods and services.
- 5.4 - SOP5 (Policy 5.4, Standard Operating Procedure 5): Encourage economic development; in particular, industries that represent regional economic strengths and that support the production and distribution of renewable energy sources.
- 5.4 - SOP7 (Policy 5.4, Standard Operating Procedure 7): Strengthen Juneau's role as a regional services hub for such things as fisheries research, medical, retail, tourism, transportation, and education.
- Policy 5.20: To encourage residents and businesses to "look local first" for purchases of goods and services.

- 5.20 – SOP1 (Policy 6.20, Standard Operating Procedure 1):Support and/or lead efforts to educate residents and businesses regarding the impacts of spending money locally and how money spent within Juneau remains within Juneau's economy longer.
- 5.20 – IA1 (Policy 5.20, Implementing Action 1): Review the CBJ purchasing code and amend as necessary to promote local purchase to the greatest degree practical and legal.

C.3 OPERATIONAL EFFICIENCY

C.3.1 Cost Control

The CBJ incorporated cost control considerations into its sustainability commitments. Relevant policies and initiatives from the CBJ Comprehensive Plan 2013 Update include:

- Policy 6.8: To include the full costs (direct and indirect) of energy use in its economic analyses.
- 6.8 - SOP1 (Policy 6.8, Standard Operating Procedure 1): Use quantifiable external and indirect costs in establishing the cost of energy when conducting life-cycle cost analyses of CBJ-owned facilities, projects, and operations.
- 6.8 - IA1 (Policy 6.8, Implementing Action 1): Incorporate energy costs, fuel cost volatility, and inflation into scenario analyses conducted as part of long-term energy planning.
- Policy 6.10: To encourage cost effective energy efficient building and remodeling practices.
- 6.10 – IA6 (Policy 6.10, Implementing Action 6): Encourage consideration of "life cycle" costs, the use of energy efficient construction techniques, materials, and equipment that are consistent with acceptable health and safety standards and that are appropriate for local climatic conditions, while keeping project costs low.

C.3.2 Business Continuity and Emergency Preparedness

The CBJ made a commitment to climate protection in 2007, under Resolution 2397, by signing on to the Cities for Climate Protection Campaign[1]. Additionally, climate change is addressed in the CBJ Comprehensive Plan.

[1] http://www.juneau.org/assembly/agendas/2007/2007-03-05/Resolution_2397.pdf

Relevant policies and initiatives from the CBJ Comprehensive Plan 2013 Update:

- Policy 2.1: To build a sustainable community that endures over generations and is sufficiently far-seeing and flexible to maintain the vital and robust nature of its economic, social, and environmental support systems.
- 2.1 - IA2 (Policy 2.1, Implementing Action 2): Incorporate the adopted sustainability indicators into the process of scoping, funding, and carrying out all proposed CBJ Capital Improvements including buildings, facilities, equipment, and components.
- 2.1 - IA3 (Policy 2.1, Implementing Action 3): Lead a community-wide discussion on the inevitable high costs of importing fossil fuel to the community and the impact of future fossil fuel scarcity. To help the community prepare for and adapt to this future scenario, develop community awareness, actions, and programs that will contribute to energy self-sufficiency.
- 2.1 – IA5 (Policy 2.1, Implementing Action 5): Provide ongoing information on the need to adapt to climate change with the goal of developing a community response to negative local impacts.
- 2.1 – IA13 (Policy 2.1, Implementing Action 13): Adopt energy-efficiency guidelines and/or standards to encourage LEED or similar certification eligible construction by the public and private sectors.
- Policy 2.2: To model sustainability through its operations practices, and projects.
- 2.2 - SOP1 (Policy 2.1, Standard Operating Procedure 1): Perform ongoing analyzes and evaluation of the sustainable implications of CBJ government operations, practices, and projects.
- 2.2 - IA5 (Policy 2.2, Implementing Action 5): Maintain and enhance performance standards for the design of all new or renovated CBJ government buildings and provide funding incentives for higher levels of performance.

C.4 ENVIRONMENTAL (NATURAL RESOURCE CONSERVATION)

C.4.1 Materials Management

Juneau’s Comprehensive Plan, updated in 2013, includes several policies supporting efforts to minimize waste generation and encourage efforts at recycling and reuse. Relevant policies and initiatives from the CBJ Comprehensive Plan 2013 Update include:

- Policy 12.4: To facilitate the reduction of waste materials generated and disposed by households and businesses through promotion of an aggressive solid waste diversion program including activities facilitating waste prevention, reuse and recycling.
- 12.4 – IA6 (Policy 12.4, Implementing Action 6): Work with the cruise industry and other industries creating large amounts of solid waste to reduce the amount of waste entering Juneau’s landfill and to increase the amount of solid waste that is recycled.
- Policy 12.5: To promote efficient, safe, convenient, cost-effective and environmentally-sound methods for the disposal of solid and hazardous waste.
- 12.5 - IA1 (Policy 12.5, Implementing Action 1): Implement the *Final Solid Waste Management Strategy for the City and Borough of Juneau*, as adopted on November 29, 2007 and amended January 7, 2008.
- 12.5 - IA3 (Policy 12.5, Implementing Action 3): Work with regional organizations to develop a regional solid waste authority to deal with solid waste issues region-wide.
- Policy 12.6: To encourage waste reduction, reuse and recycling activities that have positive economic and/or environmental benefits.
- 12.6 - IA1 (Policy 12.6, Implementing Action 1): Implement the *Final Solid Waste Management Strategy for the City and Borough of Juneau*, as adopted on November 29, 2007 and amended January 7, 2008.
- 12.6 - IA2 (Policy 12.6, Implementing Action 2): Coordinate/cooperate with villages, towns, municipalities, private companies and non-profit organizations within the region on solid waste management programs.

C.4.2 Energy

Energy has been discussed extensively in several plans regarding the CBJ and region, particularly the CBJ Comprehensive Plan and Juneau Climate Action & Implementation Plan. The CBJ adopted the Juneau Climate Action & Implementation Plan, under Resolution 2593, in November 2011[2]. The Climate Action Plan established a 25% community-wide GHG emissions reduction target – this target sets a 25% reduction in GHG emissions by 2032, based on a 2007 GHG emission baseline.

Relevant policies initiatives from the CBJ Comprehensive Plan 2013 Update:

- Policy 2.1: To build a sustainable community that endures over generations and is sufficiently far-seeing and flexible to maintain the vital and robust nature of its economic, social, and environmental support systems.
- 2.1 - IA4 (Policy 2.1, Implementing Action 4): Maintain the greenhouse gas emissions inventory updates annually as recommended by the 2011 Juneau Climate Action and Implementation Plan (JCAP), as well as other recommendations of the JCAP to reduce Juneau’s energy consumption and carbon footprint, and community education. Communicate the findings to the community in a variety of forums with the goal of identifying ways to reduce Juneau’s energy consumption and carbon footprint.
- Policy 2.2: To model sustainability through its operations practices, and projects.
- 2.2 - IA1 (Policy 2.2, Implementing Action 1): Complete energy and carbon audits for all CBJ government buildings, facilities, and transportation components (public transit, fleet vehicles, etc).
- 2.2 - IA2 (Policy 2.2, Implementing Action 2): Identify opportunities throughout the CBJ government to conserve energy, use alternative fuels and renewable energy sources, and reduce the community’s carbon footprint.
- Policy 6.1: To work with utility and energy providers to analyze the local energy system, potential renewable energy sources, and emerging technologies; to establish a long-term energy plan; and to implement that plan for the affordable and sustainable use of energy in the community.
- 6.1 - IA3 (Policy 6.1, Implementing Action 3): Host research projects that identify energy sources that use renewable resources such as hydro, tidal, solar, wind, and energy from

[2] http://www.juneau.org/manager/documents/Res2593-Final_Adopt_Climate_Action_Implementation_Plan.pdf

organic waste (e.g., cellulosic ethanol) that can be used by households, businesses, and the public sector.

- Policy 6.2: To support the development of renewable energy resources in Juneau and in the Southeast Alaska region.
- 6.2 – IA2 (Policy 6.2, Implementing Action 2): Promote conversion from fossil fuel heating systems to geothermal, thermal, heat pump, biomass, or biofuel systems.
- 6.2 – IA3 (Policy 6.2, Implementing Action 3): Promote the development and use of renewable energy sources to help meet the goals, strategies, and objectives of the Juneau Climate Action and Implementation Plan of 2011.
- Policy 6.5: To incorporate technologies and operating practices that will promote efficient and cost effective energy use into all of its new and existing building and energy-using projects.
- 6.5 - SOP1 (Policy 6.5, Standard Operating Procedure 1): Replace inefficient street lighting and lighting in CBJ-owned buildings and facilities with efficient fixtures upon replacement cycle.
- 6.5 - IA1 (Policy 6.5, Implementing Action 1): Establish and fund a revolving energy conservation investment fund to invest in energy-saving public projects that meet CBJ government return-on-investment criteria.
- 6.5 - IA2 (Policy 6.5, Implementing Action 2): Invest in necessary metering equipment to produce monthly project energy reports.
- 6.5 - IA3 (Policy 6.5, Implementing Action 3): Conduct energy audits and establish energy management goals for CBJ-owned buildings.
- 6.5 - IA4 (Policy 6.5, Implementing Action 4): Develop and implement a system for rewarding CBJ employee initiative and responsibility in good energy management.
- 6.5 - IA5 (Policy 6.5, Implementing Action 5): Continue to incorporate LEED-Juneau principles and standards when designing public structures and facilities, with appropriate fuel cost sensitivity analyses over the long term life of the Project.
- 6.5 - IA6 (Policy 6.5, Implementing Action 6): When designing new facilities or major renovation of CBJ-owned facilities, analyze life-cycle costs of energy applications, and use that analysis to guide future development. Also see 6.7 – IA2.

- Policy 6.6: To maximize the ratio of local, renewable-source energy to imported fossil-source energy in Juneau's internal energy economy
- 6.6 - SOP1 (Policy 6.6, Standard Operating Procedure 1): Encourage energy conservation to reduce the amount of money leaving the community to pay for fuels.
- 6.6 - IA1 (Policy 6.6, Implementing Action 1): Seek federal and state funding to convert the CBJ fleet and, particularly, public transit vehicles, to dual-fuel, hybrid, or other fuel technologies with reduced carbon footprints and enhanced sustainability over fossil-fuel burning vehicles.
- 6.6 - IA3 (Policy 6.6, Implementing Action 3): Where practicable and where there are no significant adverse impacts to marine or other ecosystems, encourage the use of tidal, geothermal, wind, heat pump technologies and other renewable energy sources to generate energy for adjacent uses or for transmission to the electrical grid.
- 6.6 - IA5 (Policy 6.6, Implementing Action 5): Coordinate with the University of Alaska, other research organizations, and companies to identify potential renewable energy sources to power vehicles, vessels, aircraft, and structures. Analyze both the short- and long-term costs and environmental impacts of energy production and distribution systems giving preference to dependable, cost-competitive, and renewable sources that do not adversely affect natural resources and wildlife habitat when choosing a source of energy. Also see 6.7 – IA1.
- Policy 6.10: To encourage cost effective energy efficient building and remodeling practices.
- 6.10 – IA1 (Policy 6.10, Implementing Action 1): Encourage the installation of energy-efficient heating systems in new construction.
- 6.10 - IA4 (Policy 6.10, Implementing Action 4): Encourage the conversion of existing heating systems from fossil fuel to renewable sources of energy.
- 6.10 – IA5 (Policy 6.10, Implementing Action 5): Consider enacting water conservation ordinances that lead to significant energy savings for the CBJ government, and in turn to utility customers, in pumping water and in treating wastewater.

Relevant Goals and Strategies from the 2011 Juneau Climate Action and Implementation Plan:

- Goal B-1: Reduce energy consumed in, and emissions produced by, Borough government buildings.

- Strategy B1-A. Set energy efficiency standards for all new local government buildings, leased space, and equipment.
- Strategy B1-B. Reduce energy consumed in and GHG emissions produced by local government buildings.
- Goal T-7: Reduce emissions associated with air transportation.
- Strategy T7-A. Work with the aviation industry to reduce emissions and energy use.
- Goal U-5: Reduce GHG emissions and energy use from solid waste processing.
- Strategy U5-B. Reduce waste associated with local government facilities and operations.
- Strategy U5-C. Increase the rate of recycling in Juneau and expand capacity to process recycled material.
- Goal RE-2: Develop district heating projects in Juneau.
- Strategy RE2-A. Develop district heating pilot projects.
- Goal RE-3: Increase Juneau's supply of renewable energy
- Strategy RE3-A. Develop an energy plan for Juneau to ensure sufficient renewable energy resources for future growth that reduce/eliminate GHG emissions.

C.4.3 Water

The CBJ incorporated water issues into its sustainability commitments, in both the CBJ Comprehensive Plan and Juneau Climate Action & Implementation Plan.

Relevant policies and initiatives from the CBJ Comprehensive Plan 2013 Update:

- Policy 7.7: To protect, maintain and improve surface water, groundwater and marine water quality in its jurisdiction so that all waters are in compliance with federal and state water quality standards and continue to allow aquatic life to thrive.
- 7.7 - SOP2 (Policy 7.7, Standard Operating Procedure 1): Participate with the State of Alaska Department of Environmental Conservation (DEC), the federal Environmental Protection Agency (EPA), and other relevant regulatory organizations in the development and implementation of water body management and recovery plans for the listed impaired water bodies within the City and Borough of Juneau, including use of Best Management Practices for protection and improvement of water quality.

- 7.7 - SOP5 (Policy 7.7, Standard Operating Procedure 5): Incorporate the goal of protecting and improving water quality into the planning, site selection, budgeting, design, and construction of CBJ government- and state-sponsored capital projects with consideration of watershed management plans when available.

Relevant Goals and Strategies from the 2011 Juneau Climate Action and Implementation Plan:

- Goal U-3: Reduce overall water use in Juneau.
- Strategy U3-B: Carry out ongoing maintenance and repairs to minimize leaks in the water system.

C.4.4 Transport

The CBJ has multiple adopted transportation plans in place which include initiatives or policies directly related to transportation connections to the airport, commuting behavior by airport (CBJ) employees, and the efficiency of the airport (CBJ) vehicle fleet.

Relevant policies and initiatives from the CBJ Comprehensive Plan 2013 Update:

- 5.2 - IA6 (Policy 5.2, Implementing Action 6): Assume a leadership role in the encouragement of transportation links into and out of the borough. Consider all affordable energy-efficient transport alternatives to improve transportation links between the Juneau and other areas of Southeast Alaska, including improved air passenger and cargo service, roadways, ferries, and fixed-guideway systems.
- Policy 8.1: To promote and support aviation safety; to develop and maintain airport facilities meeting the aviation transportation needs for Juneau, its residents, visitors and commerce; and to work with the public and private sectors to facilitate commerce, economic development, and access to Alaska's Capital City.
- 8.1 – IA2 (Policy 8.1, Implementing Action 2): Improve motor vehicle and pedestrian access and circulation to and through the Juneau International Airport including ingress, egress, parking, and non-airport traffic flow.
- Policy 8.6: To promote and facilitate transportation alternatives to private vehicles as a means of reducing traffic congestion, air pollution and the consumption of fossil fuels, and to provide safe and healthy means of transportation to all people.

- 8.6 – DG4 (Policy 8.6, Development Guideline 4): Provide secure, weatherproof bike parking and storage facilities at public buildings and in private developments, particularly developments located along transit corridors.
- Policy 8.7: To encourage the transportation of Juneau residents, visitors, freight and mail by renewable energy sources on both private and public transportation.
- 8.7 – IA4 (Policy 8.7, Implementing Action 4): Provide metered electric energy sources at public parking lots and garages to re-charge public and private electric automobiles, and provide preferential parking spaces for those vehicles. The metered electrical sources should have the functionality of being turned off automatically or manually by AEL&P and/or CBJ staff during periods of peak loading of the electrical system or emergency situations.

Relevant Goals and Strategies from the 2011 Juneau Climate Action and Implementation Plan:

- Goal T-1: Reduce municipal fleet-related emissions (Estimate: 25% reduction in emissions from CBJ fleet).
- Strategy T1-A. Expand local government fleet with the most energy efficient vehicles practicable.
- Strategy T1-B: Reduce emissions associated with existing CBJ Fleet.
- Strategy T2-B. Increase public education and provide incentives to increase transit ridership.
- Strategy T4-B. Use Public education and incentives to encourage residents to walk and bike.
- Strategy T5-A Develop car sharing and ride sharing programs.

C.5 SOCIAL RESPONSIBILITY

The CBJ incorporated employee, local community, business and diversity concerns into its sustainability commitments. Relevant policies and initiatives from the CBJ Comprehensive Plan 2013 Update:

- Policy 2.1: To build a sustainable community that endures over generations and is sufficiently far-seeing and flexible to maintain the vital and robust nature of its economic, social, and environmental support systems.

- 2.1 - IA7 (Policy 2.1, Implementing Action 7): Initiate community development programs to attract sustainable businesses to Juneau and the Southeast Alaska region.
- 2.1 - IA8 (Policy 2.1, Implementing Action 8): Support socio-economic and cultural diversity with the goal of creating and maintaining a community where individuals can live and thrive for the duration of their lives.
- Policy 2.2: To model sustainability through its operations practices, and projects .
- 2.2 - IA3 (Policy 2.2, Implementing Action 3): Develop administrative policies and procedures, create employee incentive programs, and reward new sustainability promotion ideas that can be practically implemented by CBJ government. Such programs might encourage ride-sharing, more efficient ways to use the city's vehicle fleet, and active participation in recycling.
- 2.2 - IA6 (Policy 2.2, Implementing Action 6): Identify and develop the sustainability expertise of CBJ staff and develop strategies for using the expertise collaboratively throughout CBJ government.
- Policy 5.4: To encourage and support regional economic development in other cities and locations in Southeast Alaska to create a local environment of services and offerings attractive to commerce originating from outside the CBJ, and to actively participate in development and implementation of regional sustainable development goals.
- 5.4 - SOP2 (Policy 5.4, Standard Operating Procedure 2): Encourage regional marketing for locally-made goods and locally-provided services and encourage partnerships in producing and marketing regionally-made goods and services.
- Policy 5.6: To encourage tourism, convention and other visitor-related activities through the development of appropriate facilities and services, while protecting Juneau's natural, cultural and economic attractions for local residents and visitors alike, and to participate in the accommodation of the future growth of tourism in a manner that addresses both community and industry concerns.
- 5.6 - SOP1 (Policy 5.6, Standard Operating Procedure 1): Strengthen the local economy by enhancing and marketing Juneau as a year-round visitor destination.
- Policy 5.20: To encourage residents and businesses to "look local first" for purchases of goods and services.

- 5.20 – SOP1 (Policy 6.20, Standard Operating Procedure 1):Support and/or lead efforts to educate residents and businesses regarding the impacts of spending money locally and how money spent within Juneau remains within Juneau's economy longer.

Appendix D: Energy Audit Repair List

Commuter Wing/Pre-1984 Terminal Areas Energy Audit Repair Task List

Item	Description	Location	Detail	Investment	Operating	Energy	Total	SIR	Status (as of May 2015)
Behavioral and Operational EEMs									
EEM-1	Weather-strip Doors	Multiple	Weather strip doors	N/A	N/A	N/A	N/A	N/A	In progress
EEM-2	Lower Temperature Setpoint	Gen. room	UH-3 turned down to 55 degree F	N/A	N/A	N/A	N/A	N/A	Work completed (1/4/12)
EEM-3	Replace Exhaust Thimble	Gen. room	Replace generator exhaust thimble with solid thimble	N/A	N/A	N/A	N/A	N/A	N/A. Space no longer heated
EEM-4	Repair Outside Air Dampers	Gen. room	Adjust outside air dampers in Gen. room so they seal properly	N/A	N/A	N/A	N/A	N/A	N/A. This space is no longer heated. Fresh air needed from dampers.
EEM-5	Replace Outdoor Freezer Unit	Customs/Air Ex	Replace outdoor refrigerator/freezer. Take inventory of units and find out owners.	N/A	N/A	N/A	N/A	N/A	Completed.
EEM-6	Seal Unnecessary Roof Penetrations	ESS Kitchen	Remove two unused exaust fans. Seal and insulate roof penetrations. This area does not have ventilation should fans be installed.	N/A	N/A	N/A	N/A	N/A	Partial completion. Some wall penetrations sealed. Windows closed since kitchen no longer operating.
EEM-7	Replace Oversized Bathroom Exhaust Fan	ESS Kitchen	Replace bathroom exaust fan with properly sized unit	N/A	N/A	N/A	N/A	N/A	N/A. Kitchen closed 5/1/14
High Priority EEMs									
EEM-8	Perform Boiler Combustion Test	Boiler	Annually clean and perform boiler combustion test.	$700	$2,300	($83,700)	($80,700)	116.3	Completed and annual maintenance program in place
EEM-9	Replace Lavatory Aerators		Replace lav. aerators with water conserving fixtures	$400	$0	($19,500)	($19,100)	48.8	Partial completion. Fixtures will be upgraded during renovation.One bathroom scheduled for renovation Fall 2015; other scheduled for replacement.
EEM-10	Reduce Control Air Pressure	Air compressor	Reduce air compressor pressure setpoints to 40-60 psi	$200	$0	($5,200)	($5,000)	26.0	Not completed. Condition of existing system requires set points to be high. This will be addressed in Phase II terminal renovation when compressor is removed.
EEM-11	Install Dishwasher Fan Controls	ESS Kitchen	Install dishwasher fan controls that interlock with dishwasher; incorporate timer to operate fan for 5 min after dishwasher turns off.	$5,300	$0	($59,200)	($53,900)	11.2	N/A. Kitchen closed 5/1/14
EEM-12	Install Light Switch	Air Ex Office	Install lighting controls	$800	($700)	($3,500)	($3,400)	5.3	Work completed (3/9/12)
EEM-13	Upgrade Motors to Premium Efficiency	Motors	Upgrade motors	$4,500	$0	($17,700)	($13,200)	3.9	Not completed. Motors will be replaced as equipment is replaced during terminal renovation phases.
Medium Priority EEMs									
EEM-14	Boiler Room Heat Recovery	Boiler room/AS bagwell space	Install a propeller fan to circulate air to adjacent space.	$4,400	$0	($13,300)	($8,900)	3.0	N/A. There is already an air exchange to the AS storage room.
EEM-15	Security Office Heat Recovery		Install heat recover unit in security space.	$5,700	$1,000	($17,400)	($10,700)	2.9	Not completed. Area will be demolished in Phase II terminal renovation.
EEM-16	Install Wall Insulation	Aurora Room Storage Space	Install insulation and gypsum board	$700	$0	($1,700)	($1,000)	2.4	Not completed. Area will be demolished in Phase II terminal renovation.
EEM-17	Install Automatic Valve	Old tower	Install automatic valve in the heating supply to the old tower air handling unit.	$3,600	$0	($6,900)	($3,300)	1.9	In progress
EEM-18	Replace Uninsulated Overhead Door	NW Corner of building	Replace overhead door with an insulated unit and replace weather stripping.	$6,200	$0	($10,800)	($4,600)	1.7	Not completed. Area will be demolished in Phase II terminal renovation.
EEM-19	Increase Wall Insulation	Perimeter of building	Install minimum of 4" exterior with new siding.	$177,700	$0	($289,100)	($111,400)	1.6	Not completed. Portion of exterior siding will be demolished with Phase II terminal renovation.
EEM-20	Upgrade Exterior Lighting to LED	Exterior lighting - determine locations	Replace exisitng exterior lights with LED lights	$5,000	($1,700)	($4,200)	($900)	1.2	Not completed. Portion of exterior lighting will be replaced in Phase II terminal renovation.
EEM-21	Increase Roof Insulation	Roof	Increase roof insulation to current constuction standards	$47,200	$0	($56,300)	($9,100)	1.2	Not completed. Area will be demolished in Phase II terminal renovation.
EEM-22	Replace Wood Doors	2 west wall/1 south wall	Replace wood doors with insulated doors with termally broken frames and double pane glazing	$7,800	$0	($8,900)	($1,100)	1.1	In progress. Some doors will be demolished in Phase II terminal renovation; other door replacements in progress.
EEM-23	Replace Single Pane Windows	West wall	Replace single pane glazing	$16,800	$0	($17,400)	($600)	1.0	Not completed. Will be replaced in Phase II terminal renovation.
EEM-24	Replace Transformers	Kitchen, Gen room, front of building	Replace old transformers with energy effiient with NEMA Standard TP1-2001 compliant models.	$44,900	$0	($46,000)	($1,100)	1.0	Not completed. Will be replaced in Phase II terminal renovation.

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Appendix E: Economic Impact

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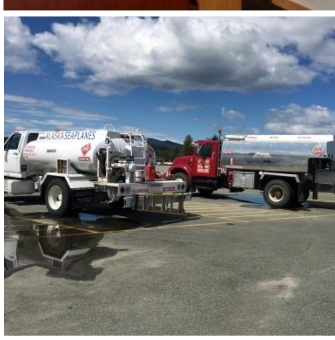
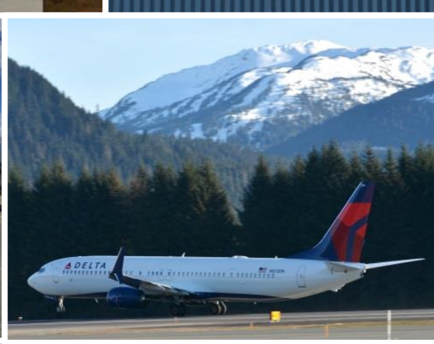
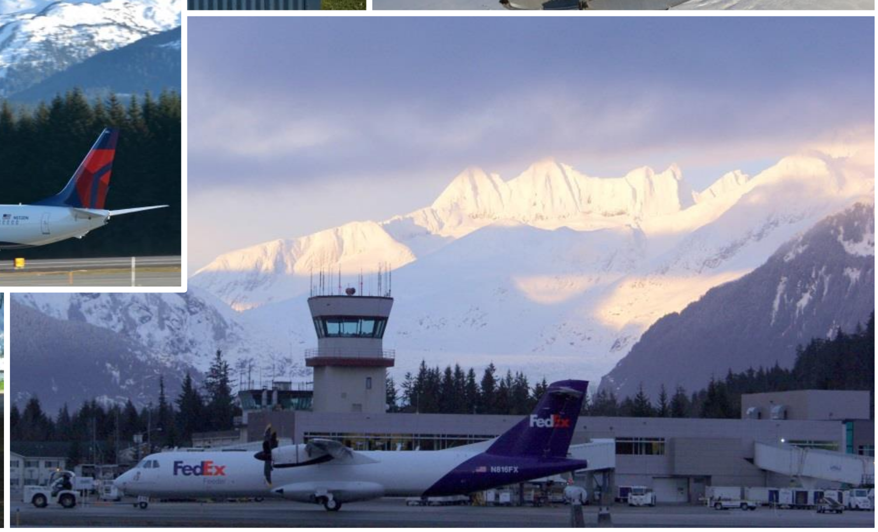
Economic Impact of the Juneau International Airport

An appendix prepared by Sheinberg Associates, to the
2017 Juneau International Airport Sustainability Master Plan, AECOM




January 2017

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Executive Summary

A current look at the role that the Juneau International Airport plays in Juneau's economy is part of the 2017 Juneau International Airport Sustainability Master Plan[1]. This Economic Impact Analysis identifies volumes of passengers, freight, and mail moving to and from Juneau by air, and estimates the direct, indirect, and induced employment, income, and spending that results.

The airport is critically important to the Juneau economy.

Juneau residents, businesses, and neighboring Southeast Alaskans depend on the Juneau International Airport to bring people, freight, and mail to and from the region.

Given its isolation, the airport in combination with Juneau's ports, plays a critical role ensuring security, public health and safety, unimpeded economic trade, and public confidence.

Key industries and activities depending on the Juneau International Airport include:

- Medical – medevac flights for accidents and seriously ill residents and visitors
- Tourism – travel of visitors and workforce
- Commercial Fishing and Seafood Processors - shipment of fresh seafood
- The State and Federal Government, State Legislature - conduct of business in the Alaska Capital
- Multiple Industries - time-sensitive shipment of inventory, supplies and equipment
- Mail, documents, and packages handled by the US mail and private couriers

It is the movement of people, freight, and mail that creates the commerce, jobs, payroll, and spending at the Juneau International Airport and for onsite businesses. This activity provides a market for services and goods that rely upon air transportation.

Passenger Travel

The number of air passengers travelling through the Juneau airport is growing. In 2014, Juneau airport records show there were 685,740 travelers through the airport including 620,837 on aircraft and 64,837 on helicopters. Data from 2015 shows growth is continuing.

- The earlier passenger travel peak was in 2007, which was followed by a decline linked to the national recession. In particular, the recession affected discretionary income and tourism related travel. Since 2009, passenger travel to and from Juneau has been growing.

[1] This Economic Assessment primarily uses 2014 data because a project survey of businesses at the airport gathered 2014 employment, salary, and spending data. Year 2014 is the dataset used by the Master Plan.

- Data for 2015 verifies that the addition of Delta Air Lines jet service to and from Juneau is not cutting into Alaska Airlines travel, rather it is bringing new passengers to town and overall traveler numbers for both carriers have increased.

In 2014, almost one-third (29%) of passenger travel was between Juneau and one of several other communities in Southeast Alaska.

Nearly half (47%) of all passenger travel is to or from Seattle.

US Bureau of Transportation Statistics (BTS) segment data shows that in 2014 there were an additional 155,000 passengers who "flowed" through Juneau onboard a plane but not getting off because they were bound for another destination along the route. (For example people who get on in Yakutat bound for Seattle though the plane stops in Juneau along the way.)

The Juneau International Airport Sustainability Master Plan (AECOM, 2017) forecasts the number of departing (enplaned) passengers from Juneau will increase at an average annual rate of 1.4% through 2035. In 2014, the number of enplaned airline passengers was 310,945 (does not include helicopter passengers); by 2035 the number is forecast to be 469,780.

The average fare in 2014 for a passenger departing Juneau on a scheduled flight (to all destinations, not including helicopter travel) was $260, yielding approximately $81 million in spending just on departing passenger airfares.

Air Freight

Depending on the year, up to 27% more air freight arrives in Juneau than is shipped out. Most arriving air freight comes from Anchorage, followed by Seattle, then Sitka. While more overall air freight arrives in Juneau than leaves, it is not surprising that this pattern reverses where Juneau's Southeast Alaska neighbors are concerned. Juneau typically ships more freight out to these places than it receives. Discussions with the cargo carriers reveal recent growth in air freight linked to online shopping by regional residents.

Air freight departing Juneau is primarily heading to Seattle, followed by Anchorage, then Sitka. Seafood is a primary product shipped from Juneau.

In 2014, Juneau Airport records show that 15.7 million pounds of freight arrived in or departed from JNU on an Alaska Airlines, Delta Air Lines, Empire Airlines, or Alaska Central Express jet. An additional 1.1 million pounds was transported between Juneau and neighboring communities in 2014 by Alaska Seaplanes, Wings of Alaska, Air Excursions, and Ward Air according to BTS records.

Alaska Airlines transported 65% of all freight; in addition to its own cargo, Alaska Airlines carries UPS and most US mail. Alaska Central Express moves UPS freight from Juneau to other regional communities. Empire Airlines (contractor for FedEx) moved 26% of Juneau's air freight. Freight moved between Juneau and neighboring Southeast Alaska communities accounted for 7% of the total.

BTS segment data shows that in 2014, over 100% more freight "flowed" through Juneau onboard a plane but was not offloaded, than was enplaned or deplaned in town. This is freight that was already on an aircraft from another city, but not removed in Juneau, because the cargo was bound for another destination along the route. For example, this is seafood loaded on a jet in Anchorage or Yakutat that is bound for Seattle, but the plane stops in Juneau along the way. This means that when a jet lands in Juneau, on average half the cargo hold is full.

Economic Effects

The airport and the businesses there are major employers and generate significant commerce:

- Together, their combined payroll, capital, and operations and maintenance spending created 1,082 average annual jobs in Juneau in 2014 including 687 direct and 395 indirect and induced jobs.
- Total labor income for airport workers (private, CBJ, federal) was $63.6 million, which includes $50.4 million direct income and another $13.2 million in indirect and induced labor income.
- The operational and maintenance spending and purchases by the airport and businesses there totaled $51.7 million in 2014. Capital spending that year was $17.5 million.
- When the effect of this economic activity works through the local economy, input-output modelling shows that the demand for air transportation services and goods at the Juneau International Airport generated $174 million in income and spending in 2014 when direct, indirect, and induced labor income and spending are totaled.

Major businesses in Juneau affected by this indirect and induced output include:

- Maintenance, repair, and construction of commercial/industrial structures
- Couriers and messengers
- Retail - general merchandise stores, food and beverage stores
- Physician's offices
- US Postal Service
- Full and limited service restaurants
- Real estate

If the airport was an economic sector, its 2014 average annual employment (private, federal, CBJ) of 687 and wages of $50.4 million would make it the same size as Juneau's Construction sector, twice as big as Juneau's Manufacturing sector, larger than Retail Trade's Food and Beverage sector, and about 80% the size of the Mining sector.

Airport Capital Improvement Projects (CIPs) create a significant Return on Investment (ROI) for the CBJ, varying from a ROI of 3:1 to 28:1. This means that every $1 of CBJ funding brings in from $3 to $28 of federal/state funding. The large ROI is due to the fact that airport CIPs are primarily funded by the federal government, with a CBJ match.

The last two large airport CIPs ($85 million Runway Safety Area construction and $26 million Runway Rehab Project construction) were 93% funded by federal sources, with the state and local government each providing 3.5%. Each dollar of local funding thus leveraged 28 dollars of federal (primarily) funds. The ROI for the CBJ was 28:1.

The economic impact of the Juneau International Airport is summarized on Figure 1.

Figure 1 - Economic Snapshot - Juneau International Airport, 2014

ECONOMIC ENGINE

includes Private, Federal, and CBJ	Direct	Indirect + Induced	Total Output
Jobs *(estm. number)*	687	395	**1,082**
Labor Income *(estm. wages & benefits, $ millions)*	$50.4	$13.2	**$63.6**
Operations and Maintenance *($ millions)*	$51.7	$40.1	**$109.3**
Capital Improvement Projects *($ millions)*	$17.5		
Sales + Property Tax Airport Businesses Paid *($ millions)*	$0.76	**-**	**$0.76**
totals	$120.5	$53.3	**$173.7**
Return on Investment for CBJ CIP Spending			**3:1 to 28:1**

COMING + GOING

Airline Passengers *(does not include medivacs)*	**620,837**
Helicopter Passengers *(departing)*	**64,903**
Freight and Mail	**21.7 million pounds**
Aircraft Operations *(helicopters traveling together are one operation)*	**99,460**
Air Carriers Serving Juneau *(in order of airplane passenger volume)* Alaska Airlines, Alaska Seaplanes, Wings of Alaska, Delta Air Lines, Air Excursions, Ward Air, Era Aviation, Island Air Express, Avjet Corporation. Freight only carriers are Empire Airlines and Alaska Central Express. Helicopter operators are Temsco Helicopters, Coastal Helicopters, and North Star Trekking.	

BUSINESS

Active Airport Leases *(66% on airfield, 27% in terminal, 6% are landside)*	**176**
Rentals, Leases, User Fees to Airport	**$3.0 million**
Fuel Flowage Fees	**$619,518**
Landing Fees	**$1.7 million**
Active Businesses and Agencies on Airport Property *(approx.)*	**50**
General Aviation (Hangar) Leases	**73**

Sources and details in body of this report, 2017 Juneau International Airport Sustainability Master Plan, AECOM

Introduction

A current look at the role the Juneau International Airport plays in Juneau's economy is part of the 2017 Juneau Airport Sustainability Master Plan[2].

The Juneau International Airport ("the Airport" or "JNU," the 3-letter Airport code) is owned by the City and Borough of Juneau (CBJ) and operated by a professional manager and staff, with oversight provided by a 7-member Airport Board of Directors and ultimately by the CBJ Assembly. It is one of only a few airports in Alaska not owned by the State.

JNU is the primary commercial service airport in Southeast Alaska. Juneau residents, businesses, and neighboring Southeast Alaskans depend on the Juneau International Airport to transport people, freight, and mail to and from the region. In combination with Juneau's ports, the Airport is critical to ensuring security, public health and safety, unimpeded economic trade, and public confidence.

The Airport boundary encompasses over 650 acres of land, upon which are located all airport and infrastructure, an airport Fixed Base Operator (FBO), multiple businesses linked to air transportation, and dozens of private and commercial airplane hangars.

The analysis in this study provides current data on the number of passengers and pounds of freight and mail moving through the Juneau International Airport, and on the local jobs, labor income, capital and operational spending that this commerce generates.

This work would not have been possible without the assistance provided by Patty Wahto, Airport Manager; Ken Nichols, Airport Engineer; John Coleman, Airport Business Manager; Catherine Fritz, consulting Airport architect; Bob Bartholomew, CBJ Finance Director; Quinn Tracey, CBJ GIS Specialist; the AECOM Juneau International Airport Sustainability Master Plan team; and the many airport business owners and managers that provided information about their businesses.

[2] This Economic Assessment primarily uses 2014 data because a project survey of businesses at the airport gathered 2014 employment, salary, and spending data. Year 2014 is the dataset used by the Master Plan.

Analytical Methods

This study gathered existing transportation data from both the Juneau International Airport and the US Bureau of Transportation Statistics, employed a tenant and business survey to obtain employment and spending data from airport-based businesses, conducted interviews with many business owners and airport staff, reviewed CBJ Airport budgets and CBJ Finance Department data on sales and property taxes, and used IMPLAN™ economic input-output modelling software to estimate direct, indirect, and induced economic output.

Each method used is now reviewed.

Transportation Data

The methods for capturing activity at the Juneau International Airport were to obtain and analyze data collected by the US Bureau of Transportation Statistics (BTS) and by the Juneau International Airport (JNU). Each set of data has pros and cons that dictated its use.

The Juneau International Airport records data on the number of aircraft operations, number of arriving and departing passengers, and pounds of arriving and departing freight and mail, from each air carrier on a monthly basis. These are the most accurate records for JNU.

The national offices (generally) of all air carriers report the data listed in the paragraph above and additional information to the Office of Airline Information, Bureau of Transportation Statistics (BTS), Research and Innovation Technology Administration. This BTS database is frequently used by the aviation industry, the media, and researchers to produce reports and analyses on air traffic patterns, carrier market share, and air passenger, freight, and mail cargo flow.

Use of BTS data for JNU is complicated by the fact that some carriers contract with one another. For example, Empire Airlines provides the planes and pilots for Federal Express Corporation in and out of Juneau. Data reported to JNU includes only Empire Airlines. However, BTS data shows both Empire Airlines and Federal Express Corporation totals. Knowing details of how operations in Juneau work allowed Sheinberg Associates to understand that BTS data double-counts this freight volume.

Another difference for freight volumes is that data tracked by the Juneau Airport covers the four large freight carriers in and out of Juneau: Alaska Airlines, Delta Air Lines, Alaska Central Express, and Empire Airlines. The BTS data includes these four as well as the smaller carriers that transport between Juneau and neighboring communities which in 2014 were Air Excursions, Alaska Seaplanes, Island Air Express, Wings of Alaska, and Ward Air. Therefore reported BTS freight volumes are higher than Juneau Airport volumes.

An advantage of BTS data is that it shows airport-city pairs. This allows a review of the most important Juneau-city market pairs for passengers, freight, and mail, as long as freight volumes are accounted for accurately. Certain BTS data also analyzes segment flows, not just market data. Segment data records how many passengers, and pounds of freight and mail were on aircraft that landed in Juneau but did not disembark because the destination was elsewhere along the route.

Given the differences among data sets, this study is careful to document data sources throughout the report.

For this analysis, passenger volumes and pounds of freight and mail were determined using several years of the BTS All Carriers: T-100 Domestic Market Data and several years of Juneau International Airport data. Both identify the number of passengers and weight of freight and mail that is enplaned (departing from, or "on") in Juneau or deplaned (arriving from, or "off") in Juneau. BTS T-100 Market Data uses records of flights provided by every carrier of every commercial route, whether it is cargo, scheduled, or chartered passenger service.

Data on the number of helicopter flights was provided by the Juneau International Airport. Information that was not able to be obtained, due to the competiveness of the industry, was the number of medivac flights from Juneau. In addition, this study does not include information on private (non-commercial) airplane flights.

Leaseholder and Business Economic Activity Survey

An Economic Impact Survey and accompanying letter from Juneau International Airport Manager Patricia Wahto was initially sent to 176 leaseholders including business owners or managers on airport property and General Aviation (hangar) lessors. Several businesses sublease space from few lessors on the airport property, which expanded the number who eventually received a survey. In some cases a single lessor and business has multiple, related leases on different parts of the airport. Close work with the JNU Business Manager was needed to understand these tenant/lessor/business situations.

Businesses could complete the survey and mail or fax it back or complete it online. Follow-up phone calls were made with many business owners to confirm or discuss information provided. The survey instrument can be seen in Appendix 1.

A total of 60 survey responses were received. Full or partial surveys were returned by 35 businesses or agencies, which allowed reasonable estimates for similar businesses. Estimates were not made for five non-respondents. Full or partial surveys were also returned by 25 hangar owners, allowing a reasonable estimate for the 51 who did not reply. The JNU airport also provided information on its employees, payroll, operational, and Capital Improvement Project spending. Having payroll, employment and spending data from an estimated 79% of the businesses onsite, including all major businesses and air carriers, provides high confidence in the information and aggregated survey results.

Alaska Department of Labor and Workforce Development (ADOLWD) Quarterly Census of Employment and Wages (QCEW) data was used to fill-in any reporting gaps for federal employment at the airport.

Using survey responses, reasonable estimates, and data provided during interviews or from ADOLWD, information was in this study came from the businesses and agencies listed on Figure 3 at JNU in 2014 (the base year for the analysis).

Figure 3 - Businesses Included in Economic Assessment Analysis

Business	Type
Alaska Central Express	Cargo
ACS (Telephone Utilities of Alaska)	Concessionaire
Admiralty Air Service	On-demand
Aero Services (Trajen)	Airfield & Related
Air National Guard	Fed/State
Airlift Northwest	On-demand
Alaska Airlines	Part 121
Alaska Promotions	Concessionaire
Alaska Seaplane Services	Part 135
Avis Rental Car	Concessionaire
Budget Rental Car	Concessionaire
Civil Air Patrol	On-demand
Coastal Fuel	Airfield & Related
Coastal Helicopters	On-demand
Delta Airlines	Part 121
Empire Air (Fed Ex)	Cargo
FAA (Flight Standards, Tech Ops, Other)	Fed/State
Fine Touch Repair	Airfield & Related
Fjord Flying Service	On-demand
Guardian Air	On-demand
Hertz Rental Car	Concessionaire
Hummingbird	Concessionaire
Jacobsen Daniels Associates	Concessionaire
National-Alamo Rental Car	Concessionaire
Northstar Trekking	On-demand
R&D Rentals	Airfield & Related
Republic Parking System Inc.	Concessionaire
Seaport Aviation Inc./Wings of Alaska	Part 135
Smartecarte	Concessionaire
Temsco Helicopters	On-demand
TSA (Transportation Security Administration)	Fed/State
UPS	Cargo
US Customs & Border Protection	Fed/State
USGS	Fed/State
Ward Air/Fairweather Leasing	On-demand
Wingnut	Airfield & Related

Information on 2014 operations and maintenance (O&M) spending and Capital Projects spending was provided by the airport, businesses, and hangar owners. Information on property taxes paid and sales taxes generated within the airport boundary was provided by the CBJ Finance Department and CBJ Community Development Department (GIS assistance).

The total gallons of fuel that were sold at JNU were available from the airport's monthly fuel flowage reports. The 2014 per gallon fuel price was estimated using information provided by select air carriers at JNU as well as information reported for Alaska or Juneau by Oil Price Information System (OPIS), AirNav.com, and GlobalAir.com[3].

Determining Direct, Indirect, and Induced Effects

Information provided on completed JNU Economic Impact Surveys, from interviews, and from ADOLWD was used to identify the airport and onsite businesses' direct employment, payroll, and spending in 2014.

IMPLAN™ economic input-output software, which has become an industry standard, was used to estimate the indirect and induced jobs and spending created by direct employment and spending as money flowed through the Juneau economy.

Indirect and induced effects are commonly called the multiplier effect or ripple effect; they are the economic effects of subsequent rounds of re-spending of airport-related jobs and dollars.

- Indirect effects are changes in sales, income, or employment in Juneau that are due to businesses and workers who supply goods and services to the airport and onsite businesses.
- Induced effects are the increased sales within Juneau from household spending of the income earned in airport and supporting industries.

Indirect and induced effects calculated in this report are for Juneau only. Non-local purchases (leakage) are not included in this report's multiplier analysis.

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[3] http://www.opisnet.com/products/worldwide-jet-prices.aspx
https://www.globalair.com/airport/fuelpricetable.aspx?reg=aal&page=2
https://www.airnav.com/fuel/local.html
http://www.alaskajournal.com/2015-10-28/alaska-air-group-inc-reports-another-record-third-quarter#.Vv7jdHpWJc5
Personal Communications, Sheinberg Associates with Air Carriers, February 2016

Movement of Passengers, Freight, and Mail Creates Demand for Services and Goods

The movement of people, freight, and mail creates commerce, jobs, payroll, and spending at the Juneau International Airport providing a market for the businesses located there.

Passengers

The Juneau International Airport is the primary commercial service airport in Southeast Alaska. Alaska Airlines offered year-round non-stop service to Seattle, Anchorage, Ketchikan, Petersburg, Sitka, and Yakutat in 2014. Delta Air Lines offered summer non-stop service to Seattle[4].

In 2014, two commuter carriers, Alaska Seaplanes and Seaport /Wings of Alaska offered scheduled air service to and from Juneau using both land based aircraft and floatplanes[5]. These airlines served Angoon, Elfin Cove, Excursion Inlet, Gustavus, Haines, Hoonah, Kake, Pelican, Sitka, Skagway, and Tenakee Springs. Air carriers Ward Air, Fjord Flying Service, Wings Airways, Harris Air as well as a number of smaller outfits offer charter or on-demand service to these locations as well as to mining camps and, in the summer, to fishing and wildlife destinations. In addition, two air ambulance services, Airlift Northwest and Guardian Air, provided regular medevac flights from Juneau to Seattle, Anchorage, and Sitka.

Helicopter carriers, including Temsco Helicopters, Coastal Helicopters, and North Star Trekking, offered on-demand trips in the summer for tourists as well as year-round support for mining and other business operations.

In Juneau in 2014, 620,837 passengers departed or arrived by airline (not including medevacs), and another 64,903 departed from Juneau by helicopter for work or pleasure (Figure 4). Data for 2015 verifies that the addition of Delta Air Lines jet service to and from Juneau is not cutting into Alaska Airlines passengers, rather it is bringing new passengers to town and overall traveler numbers for both carriers have increased.

Almost one-third (29%) of JNU passenger travel was between Juneau and another Southeast Alaskan community (Figure 5). Nearly half (47%) of all JNU passenger travel is to or from Seattle with another 24% going to or from Anchorage.

[4] In 2015, Delta Air Line offered year-round service to and from Juneau, but in 2016 cut back to seasonal only service.
[5] Seaport subsequently went out of business; in 2016 there were still two Part 135 carriers – Alaska Seaplanes and Fjord Flying/Wings of Alaska.

BTS segment data showed that in 2014 there were 155,000 passengers who additionally "flowed" through Juneau onboard a plane but not getting off because they were bound for another destination along the route. For example, these were people who got on in Yakutat but were bound for Seattle though the plane stopped in Juneau along the way. This is on average, an estimated additional 20% passenger load - people who are on a plane landing in Juneau but do not get off as they are travelling on to other destinations.

The Juneau International Airport Sustainability Master Plan (AECOM, 2017) forecasts the number of departing (enplaned) passengers from Juneau will increase at an average annual rate of 1.4% through 2035. In 2014, the number of enplaned passengers was 310,945 (does not include helicopter passengers); by 2035 the number is forecast to grow to 469,780.

The previous passenger travel peak was in 2007, which was followed by decline linked to the national recession (Figure 6). In particular, the recession affected discretionary income and tourism related travel. Since 2009, passenger travel to and from Juneau has been growing.

The average fare in 2014 for a passenger departing Juneau on a scheduled flight (to all destinations) was $260, yielding approximately $81 million in spending just on departing passenger airfares.

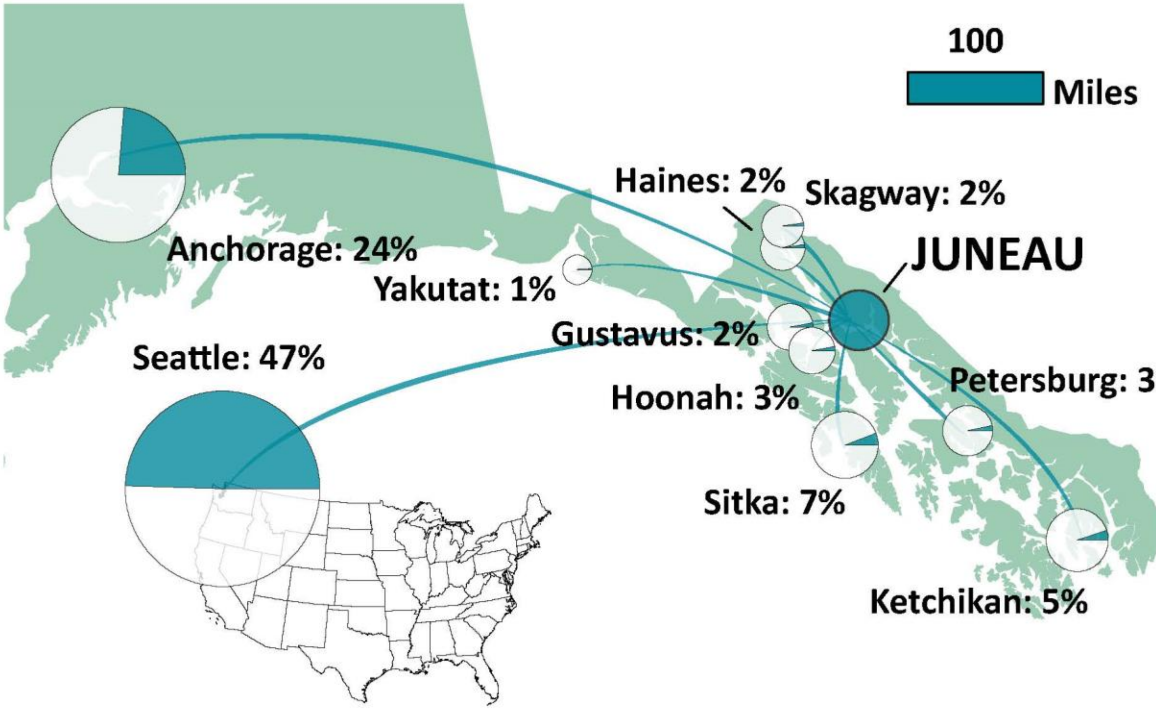
Figure 4 - Airport Passenger Travel by Juneau - City Pair, 2014

AIRLINE PASSENGERS (all)*				
City	Arriving Passengers	Departing Passengers	Total	% of total
Seattle, WA	146,341	144,849	291,190	47%
Anchorage, AK	73,221	76,423	149,644	24%
Sitka, AK	21,266	20,769	42,035	7%
Ketchikan, AK	16,171	17,452	33,623	5%
Petersburg, AK	9,964	8,691	18,655	3%
Hoonah, AK	8,194	8,693	16,887	3%
Gustavus, AK	7,948	6,744	14,692	2%
Haines, AK	6,757	7,461	14,218	2%
Skagway, AK	5,647	6,300	11,947	2%
Yakutat, AK	3,796	3,750	7,546	1%
Wrangell, AK	3,115	2,745	5,860	1%
Kake, AK	1,826	1,928	3,754	1%
Other Areas	5,646	5,140	10,786	2%
Grand Total	309,892	310,945	620,837	100%
HELICOPTER PASSENGERS				
Departing Juneau:	64,903			
ALL TRAVELERS*				
Grand Total:	685,740			

**does not include medevacs*
Sources: BTS T-100 Market Data; Juneau International Airport

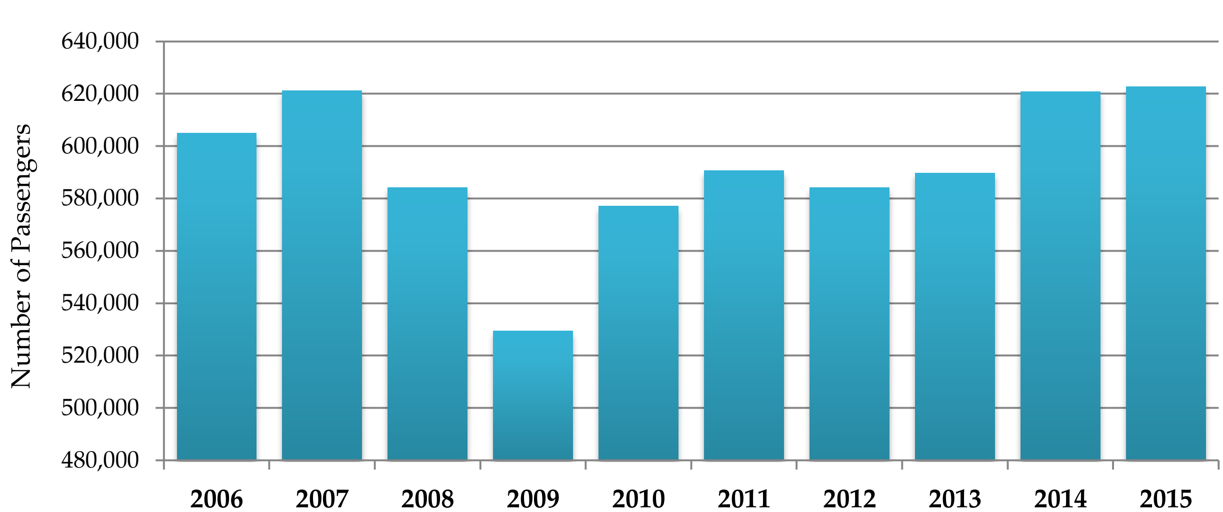
Figure 5

Juneau Passenger Travel by Airport-City Pair, 2014



Source: BTS T-100 Market Data

Figure 6 - Juneau Airport - Total Arriving and Departing Aircraft Passengers*, by Year



* *Does not include medevacs or helicopters. Source: US BTS T-100 Market Data*

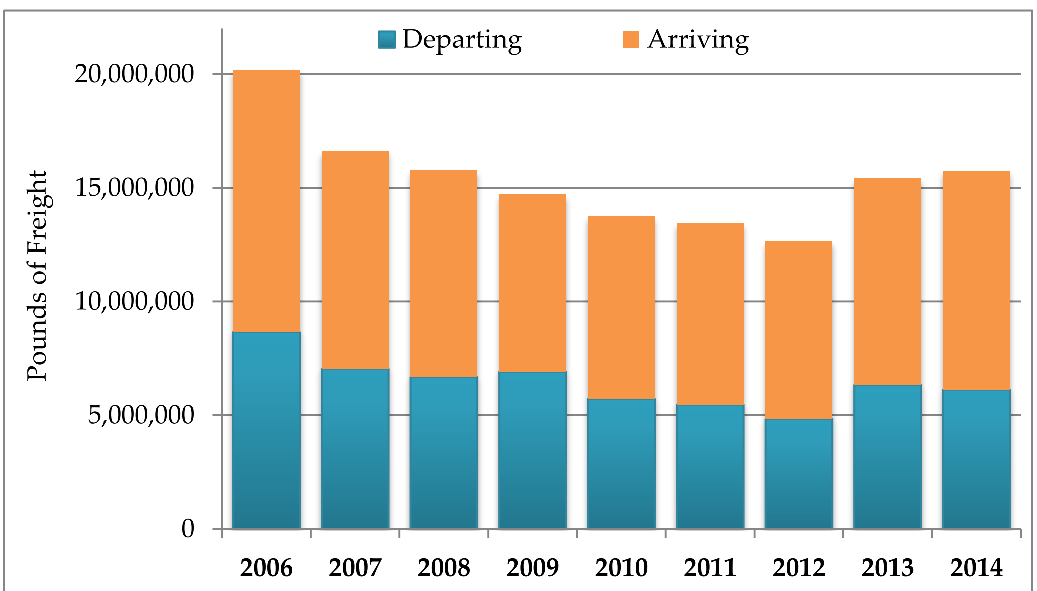
Air Freight

In 2014, Juneau Airport records show that 15.7 million pounds of freight arrived in or departed from JNU on an Alaska Airlines, Delta Air Lines, Empire Airlines, or Alaska Central Express flight (Figure 7). An additional 1.1 million pounds was transported between Juneau and neighboring communities in 2014 by Alaska Seaplanes, Wings of Alaska, Air Excursions, and Ward Air, according to BTS records.

Alaska Airlines transported 65% of all freight; in addition to its own cargo, Alaska Airlines carries UPS and most US mail. Empire Airlines (contractor for FedEx) moved 26% of Juneau's air freight. Freight moved between Juneau and neighboring Southeast Alaska communities accounted for 7% of the total.

More air freight arrives in Juneau than is shipped out (Figure 9). Depending on the year, up to 27% more freight arrives than departs. Most arriving air freight comes from Anchorage, followed by Seattle, then Sitka. While more overall air freight arrives from other places into Juneau than leaves, it is not surprising that this pattern reverses where Southeast Alaska neighboring communities are concerned. Juneau typically ships more freight out to these places than it receives. Discussions with the cargo carriers reveal recent growth in air freight is linked to an increase in online shopping by regional residents.

Figure 7 - Air Freight - Total Pounds Arriving and Departing in JNU, by Year



Source: JNU Airport Records

Air freight departing Juneau is primarily heading to Seattle (42%), followed by Anchorage, then Sitka (Figures 8 and 9). Seafood is a primary product shipped from Juneau.

According to BTS segment data, in 2014 an additional 19.3 million pounds "flowed" through the Juneau Airport; this is freight that was already on an aircraft from another city that was not offloaded in Juneau as it was bound for another destination along the airplane's route. An example is seafood loaded on a plane in Anchorage or Yakutat and bound for Seattle, but the plane stopped in Juneau on the way. This means that when a jet lands in Juneau, on average half the cargo hold is full.

Figure 8 - Airport Air Freight Volume by Juneau-City Pair, 2014**

City	Arriving Freight (lbs)	Departing Freight (lbs)	Total Freight (lbs)	% of total
Anchorage	5,873,245	1,514,033	7,387,278	42%
Seattle	2,134,123	2,698,337	4,832,460	27%
Sitka	931,264	1,518,040	2,449,304	14%
Ketchikan	599,395	300,363	899,758	5%
Petersburg	157,798	50,684	208,482	1%
Cordova	104,833	83,891	188,724	1%
Yakutat	88,091	152,226	240,317	1%
Hoonah	84,719	197,796	282,515	2%
Wrangell	63,165	36,607	99,772	1%
Haines	39,828	207,835	247,663	1%
Pelican	39,766	58,157	97,923	1%
Kake	29,332	106,711	136,043	1%
Gustavus	22,434	166,759	189,193	1%
Skagway	15,564	199,879	215,443	1%
Other Areas	52,561	159,080	211,641	1%
Grand Total	10,236,118	7,450,398	17,686,516**	100%

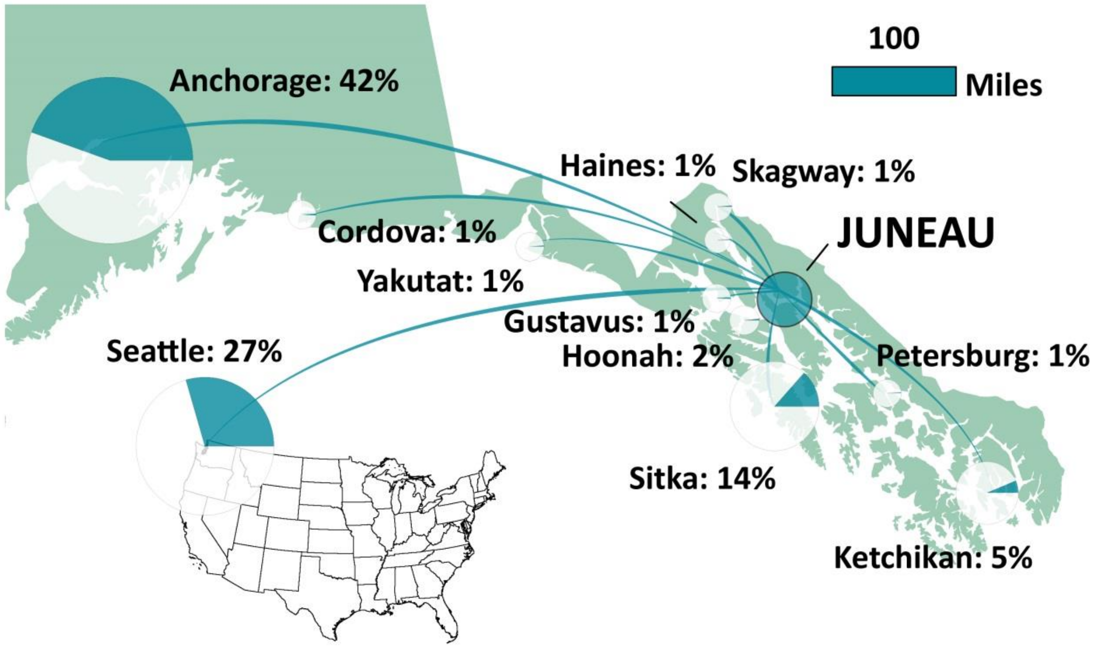
Source: BTS T-100 Domestic Market Data, excluding FedEx as this data is duplicated in BTS dataset (see page 7 of report for explanation).

** Juneau airport records show 15.7 million pounds of freight transported in or out of Juneau by four large carriers (Figure 7), the additional 1.9 million pounds of freight reported on Figure 8 using the BTS data includes freight shipped by smaller carriers between Juneau and neighboring Southeast Alaska communities. It is also likely that is includes a small volume of additional "double counting," even after FedEx freight totals were removed (see page 6, 3rd paragraph from bottom, for explanation).

Nonetheless, BTS data is the only source for Juneau-City pair trends and the percentages are good indicators of freight movement between places.

Figure 9

Juneau Air Freight by Airport-City Pair, 2014



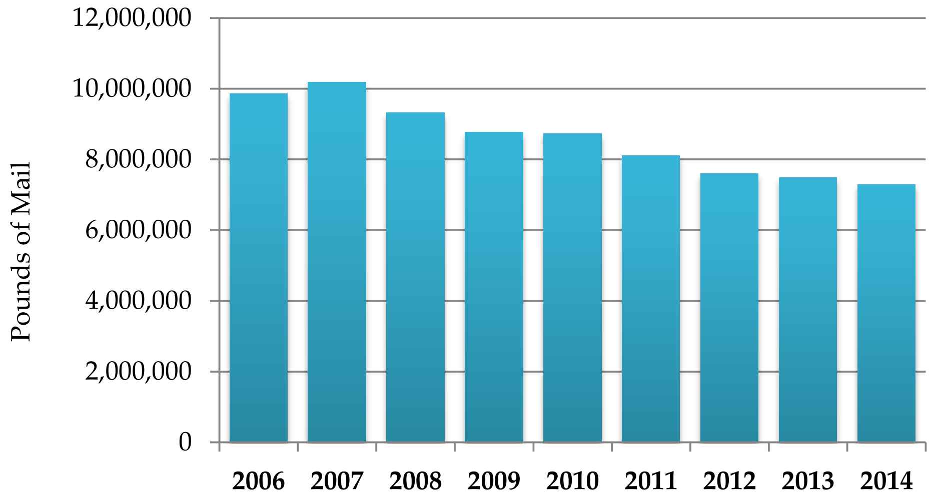
Source: BTS T-100 Market Data

Mail

Like freight, more mail arrives in Juneau than departs. Similar to national trends, mail volume is steadily declining in Juneau as more communication happens electronically and online commerce delivery is often via private service (e.g. FedEx, UPS) rather than US mail (Figure 10).

In 2014, mail volume was less than half that of freight, at 6.0 million pounds either arriving in or departing from Juneau by large air carrier, according to Juneau Airport records. BTS data showed that an additional 1.3 million pounds of mail was transported in 2014 between Juneau and neighboring communities by Alaska Seaplanes, Wings of Alaska, Air Excursions, Ward Air, and Taquan Air Service. Similar to freight, mail volume in 2014 was greatest between Juneau and Seattle, followed by Juneau and Anchorage. After that, most outgoing mail was to Ketchikan and Haines, while incoming mail hailed from Sitka and Ketchikan (Figures 11 and 12).

Figure 10 - Juneau Airport - Total Arriving and Departing Mail, by Year



Source: BTS T-100 Market Data

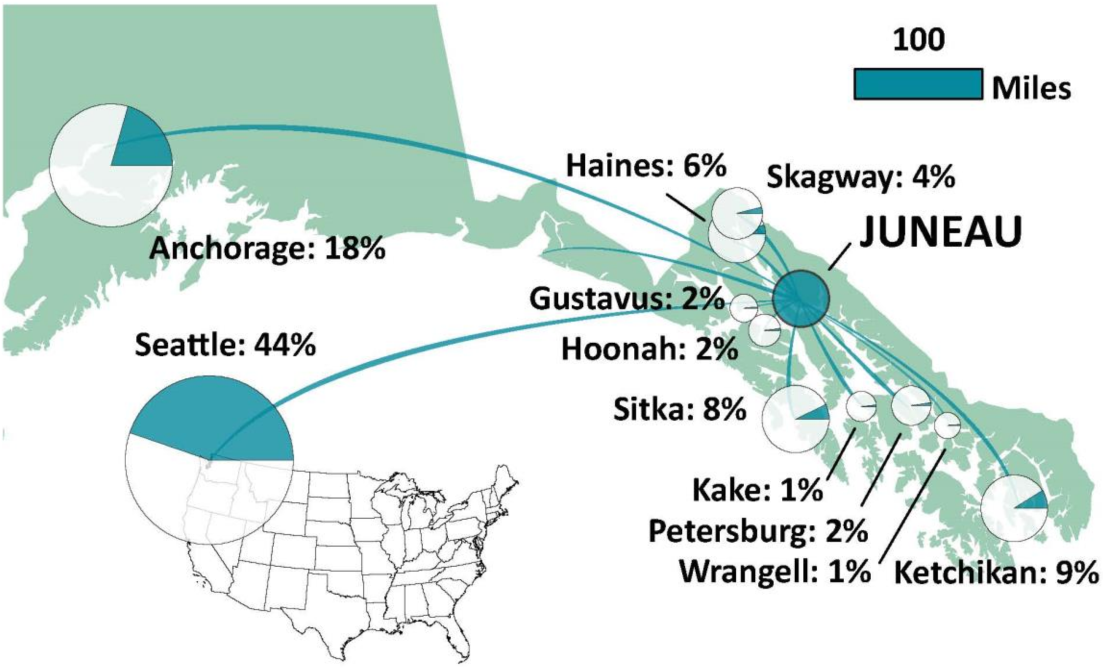
Figure 11 - Juneau Mail Volume, by Airport-City Pair, 2014

City	Arriving Mail (lbs)	Departing Mail (lbs)	Total Mail (lbs)	% of total
Seattle	757,134	2,470,184	3,227,318	44%
Anchorage	562,327	734,866	1,297,193	18%
Ketchikan	343,609	307,910	651,519	9%
Sitka	257,128	344,429	601,557	8%
Haines	333,710	63,686	397,396	5%
Skagway	262,022	53,758	315,780	4%
Petersburg	88,124	73,883	162,007	2%
Hoonah	116,318	27,755	144,073	2%
Gustavus	107,944	20,711	128,655	2%
Kake	83,029	14,204	97,233	1%
Wrangell	46,515	33,920	80,435	1%
Other Areas	151,585	35,125	186,710	3%
Grand Total	3,109,445	4,180,431	7,289,876	100%

Source: BTS T-100 Domestic Market Data. Does not include helicopters

Figure 12

Juneau Mail by Airport-City Pair, 2014



Source: BTS T-100 Market Data

Jobs, Payroll, and Spending

The Juneau International Airport and the businesses there are major employers that generate significant commerce (Figures 1 and 13):

- Together, the combined payroll, capital, and operations and maintenance spending created 1,082 average annual jobs in Juneau in 2014 including 687 direct and 395 indirect and induced jobs.
- Total labor income for airport workers (private, CBJ, federal) was $63.6 million, which included $50.4 million direct income and another $13.2 million in indirect and induced labor income.
- The operational and maintenance spending and purchases by the airport and businesses there totaled $51.7 million in 2014. Capital spending that year was $17.5 million.
- When the effect of this economic activity worked through the local economy, input-output modelling showed that the demand for air transportation services and goods at the Juneau International Airport generated $174 million in income and spending in 2014 when direct, indirect, and induced labor income and spending were totaled.

If the airport were an economic sector, its 2014 direct employment (private, CBJ, federal) and wages would make it the same size as Juneau's Construction sector, twice as big as Juneau's Manufacturing sector, larger than Retail Trade's Food and Beverage sector, and about 80% the size of the Mining sector.

Defining Direct, Indirect, and Induced Effects

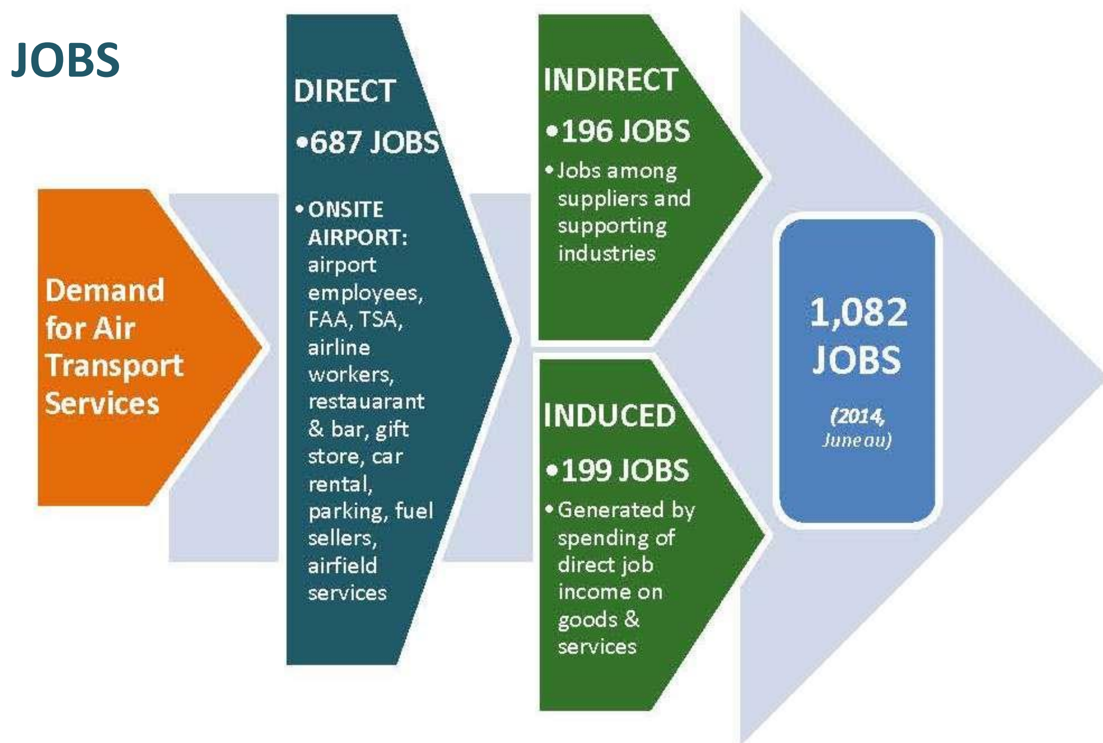
Direct effects are the jobs, payroll, proprietor's income, and operational spending by the airport and onsite businesses. Indirect and induced effects are the multiplier or ripple effect; they show the economic effects of subsequent rounds of re-spending of airport-related jobs and dollars.

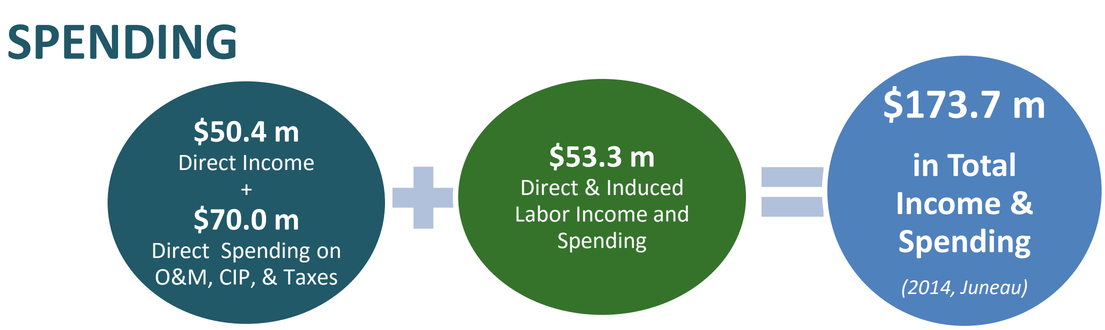
Indirect effects are changes in sales, income, or employment in Juneau that are due to businesses and workers who supply goods and services to the airport and onsite businesses. For example, the increased purchase of products by Juneau grocers and wholesale businesses so they can prepare the goods that airport concessionaire's and airfield service providers purchase and sell.

Induced effects are the increased sales within Juneau from household spending of the income earned in airport and supporting industries. For example, local Alaska Airlines employees spend the income they earn on housing, utilities, groceries, and other consumer goods and services. This generates sales, income, and employment throughout Juneau's economy.

Indirect and induced effects calculated in this report are for Juneau only. Estimates of non-local purchases (leakage) are not included.

Figure 13 - The Juneau International Airport Plays a Major Role in the Economy





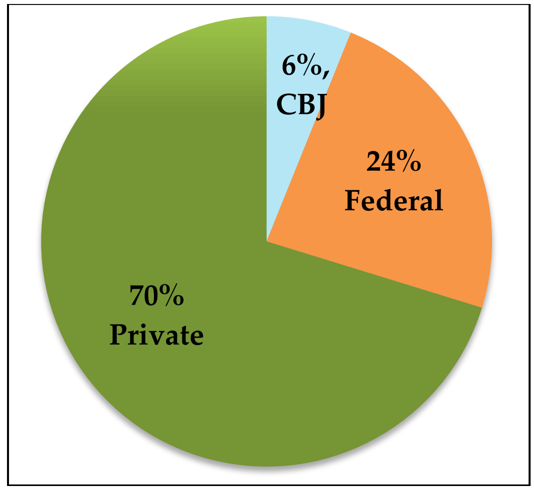
Employment and Labor Income

In 2014, responses to the Airport Economic Impact Survey documented an estimated 687 direct jobs (private, CBJ, federal/state) at the Juneau International Airport (weighted average annual employment). This weighted average annual employment figure includes:

- 532 year-round full-time employees, and another 60 year-round part-time employees
- In the summer, employment increased by an additional 108 full-time and 120 part-time employees

Most employees are private sector (Figure 14).

Figure 14 - Year-Round Workforce at the Juneau Airport, 2014



A conservative estimate of 2014 direct labor income at the Juneau International Airport is $50.4 million. This includes wages and the benefits, contract employee salaries, and business proprietor's income. This is a conservative figure because several survey respondents did not include proprietor's income.

When indirect and induced labor income of $13.2 million is added, total labor income linked to the Juneau International Airport in 2014 was $63.6 million[6].

Purchases and Spending at JNU

According to information provided on the Economic Activity Survey, in follow-up interviews, and by airport staff, direct operations and maintenance (O&M) spending in 2014 at JNU totaled $51.7 million. This included:

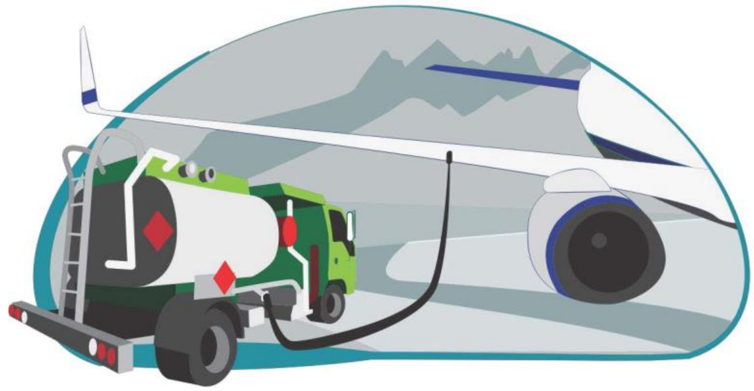
- $33.5 million in O&M spending by the airport and all businesses onsite (this included lease payments and rentals to the airport), and
- An estimated $18.2 million in fuel purchases

The same sources all provided direct Capital Improvement spending for 2014 which totaled $17.5 million. Of this, 80% were Juneau International Airport expenditures.

Businesses located within the airport boundary paid an additional $761,646 to the City and Borough of Juneau in 2014 in property ($262,037) and sales ($449,609) taxes.

[6] Arguably another $6.5 million in labor income linked to capital improvement project spending could be included in this total, but the input-output model includes that as part of total economic output.

Input-output modelling showed that together this spending created an additional $40.1 million of indirect and induced economic activity in Juneau.



The major businesses in Juneau affected by the airports' indirect and induced employment, income, and spending are:

- Maintenance, repair, and construction of commercial/industrial structures
- Couriers and messengers
- Retail - general merchandise stores, food and beverage stores
- Physician's offices
- US Postal Service
- Full and limited service restaurants
- Real estate

Airport Capital Project's Return on Investment for the CBJ

Airport Capital Improvement Projects (CIPs) create a significant Return on Investment (ROI) for the CBJ, varying from a ROI of 3:1 to 28:1.

- This means that every $1 of CBJ funding brings in from $3 to $28 of federal/state funding.
- The large ROI is due to the fact that airport CIPs are primarily funded by the federal government, with a CBJ match.

The last two large airport CIPs ($85 million Runway Safety Area construction and $26 million Runway Rehab Project construction) were 93% funded by federal sources, with the state and local government each providing 3.5%. Each dollar of local funding thus leveraged 28 dollars of federal (primarily) funds. The ROI for the CBJ was 28:1.

The largest near-term planned project is the approximately $22 million Snow Removal Equipment Facility (SREF); this is proposed to be paid with $17 million federal, $3.5 million state, and $2 million local funding. (Local funds include repaying close to $2 million to the FAA.) SREF construction would thus yield a 7:1 ROI for the CBJ; every $1 of local funding will generate $7 from federal or state sources. JNU airport staff estimate that for CIPs, 50-70% typically is spent purchasing services from Southeast Alaska businesses. (Of note: state funding for these purposes to local airports has been eliminated, beginning next year.)

Appendix 1 - Economic Activity Survey/ Cover Letter and Instrument

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Juneau International Airport Economic Survey

December 16, 2015

Dear Airport Lease Holder or Concessionaire,

The purpose of this letter is to request your assistance. Please complete the attached short survey and return it no later than January 11.

You know the importance of the Juneau Airport to your business; however, the Juneau Airport Economic Impact Assessment will allow the Airport to demonstrate the Economic Contribution it makes to Juneau and the region. This will underscore the importance of the Airport with elected and appointed officials, policy and budget-makers, and the community.

The information you provide on the survey is critical to allow completion of this economic assessment, which is part of the Juneau Airport Sustainability Master Plan now underway.

Your Help Is Needed

The Juneau Airport Economic Impact Assessment will demonstrate the economic contribution of the Airport to Juneau and the region.

Your completed survey form and your responses will be kept completely confidential and will only be reported in aggregate for the entire airport. No City and Borough of Juneau or Airport staff will see your responses - only Sheinberg Associates data processing personnel will see the survey responses. They are required to maintain complete confidentiality. Your survey form will be destroyed at the end of the project. You can also confidentially complete the survey online at: http://bit.ly/JNUAirportEconomicStudy

If you have any questions about this, please feel free to call me directly at (907) 789-7821 or call our contractor Barbara Sheinberg at (907) 586-3141 or email her at Barbara@SheinbergAssociates.com Thank you in advance for your time and help.

Sincerely,

Patricia deLaBruere
Airport Manager

Economic Impact Survey – Juneau International Airport

This survey form and all your responses will be kept completely confidential and will only be reported in aggregate for the entire airport. Only the contractor's data processing personnel will see this form and they must maintain complete confidentiality. Your survey form will be destroyed at the end of the project. Please answer every question.

CONTACT INFORMATION

Business or Individual Name :

Contact Person:

Phone Number:

Email:

ACTIVITY TYPE

1. Check the box that best describes the primary business type associated with your lease(s) at the Juneau Airport (if you have multiple airport businesses or leases that are not related, complete a separate survey for each)**:**

☐ Commercial Airline Passenger Carrier	☐ Air Taxi , Charter, On-Demand Air Carrier	☐ Helicopter Operator/Operations	☐ Aircraft Services (fueling, cleaning, maintenance, etc.)	☐ Air Ambulance Service
☐ Air Cargo or Freight Service	☐ Concession: Retail	☐ Concession: Food or Drink	☐ Concession: Rental Car	☐ Utility (e.g. ACS, AEL&P)
☐ FAA (Air Traffic Control, Flight Service Station, Tech Ops, Flight Standards)	☐ TSA	☐ Other Federal Government (USFWS, Customs, National Guard, etc)	Aircraft Storage ☐ Tie-down ☐ Hangar	☐ Other: (Please Describe)

EMPLOYMENT

2. In the table at the top of the next page, please enter the average monthly number of direct and contract employees that you employed in 2014 at the Juneau Airport and the percent that you believe were not Alaska residents. (Please note that all information requested by this survey is for calendar year 2014.)

Definitions:

- **Direct employees** are persons employed directly by your airport business in either full-time or part-time positions.
- **Contract employees** are persons directly employed by another firm but working at your on-airport business/lease operations through a contract arrangement.
- **Percent Non-Alaska residents** is the percentage of your employees that you believe were not Alaska residents.

Category	For 2014, please enter your average employment…					
	Summer (May-Sept)		Remainder (Jan-April, and Oct-Dec)		Percent Non-Alaska Resident	
	Full Time	Part Time	Full Time	Part Time	Full time	Part time
A. Direct Employees						
B. Contract Employees* **						

*** If you had contract employees in 2014, please list the businesses they worked for so we can ensure we do not double-count any employment. Thank you! Business(es) the contract employees worked for: ____________________

____

GROSS EXPENDITURES

For the following questions please tell us about the 2014 expenditures for the airport business for which you are reporting. Remember, all of your responses will be held in complete confidence and will only be reported in aggregate for the entire airport. This form will be destroyed at the end of this study.

3. Approximately how much money did your business at the Juneau Airport spend in each of the following categories in 2014?

A. Direct Employment Salaries and Benefits	$
B. Contract Employment Salaries and Benefits	$
C. Capital Project Expenditures	$
D. Proprietors Income (if you are a self-employed business owner, this is the income reported on federal taxes for your airport business)	$
E. CBJ Sales Tax, Property Tax, and any CBJ License Fees	$
F. All Other Operating Expenditures (rent, etc.) Related to Your Airport Lease(s)	$

4. Approximately what percentage of your 2014 Juneau Airport business expenditures were purchased from vendors located in Juneau, or in other places in Alaska, for the following categories?

Category	Approximate Percentage Spent on Vendors in Juneau	Approximate Percentage Spent on Vendors in Other Places in Alaska
A. Capital Project Expenditures	%	%
B. All Other Operating Expenditures	%	%

THANK YOU FOR COMPLETING THIS SURVEY

THERE ARE FOUR WAYS TO RETURN THE SURVEY TO US (by January 11):

1. **Complete the survey online** – to do this go to http://bit.ly/JNUAirportEconomicStudy
2. **Mail the completed paper survey back in the enclosed self-addressed and stamped envelope** (mail to: Sheinberg Associates / 1107 West 8th Street, Suite 4 / Juneau AK 99801)
3. **Fax the completed paper survey back** (both sides) to 907-586-2331
4. Provide the information over the phone by calling Sheinberg Associates at 907-586-3141

If you have any questions about the survey, please call Barbara at 907-586-3141. If you would like to receive the results of this Juneau International Airport Economic Impact Assessment, please check here ☐

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