EXECUTIVE SUMMARY
Draft "Aviation Activity & Facility Requirements" Technical Memorandum

The draft "Aviation Activity & Facility Requirements" technical memorandum is a foundational planning document for the Seward Airport Improvements Project. It reports current and expected future aviation activity at the Seward Airport (SWD) in terms of type of aircraft and number of flights (operations). A design aircraft is selected by comparing this information with federal airport design guidance. The design aircraft corresponds to a runway design code, which determines the airport's dimensional requirements (runway width, length, offset from parked aircraft, etc.).

The draft technical memorandum reports that existing SWD air traffic activity includes single and twin-engine general aviation (GA) aircraft, medevac aircraft, military aircraft, and helicopters. The most demanding aircraft in steady use (largest wingspan and longest required runway length) is the King Air B200, which is used for medical evacuations. Existing airport facilities include two runways: Runway 13/31 (the main runway) is 4,533 feet long by 100 feet wide. Runway 16/34 (the crosswind runway) is 2,289 feet long by 75 feet wide.

The technical memorandum also reports expected future aircraft operations. In estimating the number of operations for each aircraft type, the technical memorandum considers many factors influencing Seward's future. The technical memorandum reports that there will be a modest increase to aviation activity at SWD as a result of the factors considered. This projection of a "modest increase" results in the following conclusions that are reported in the technical memorandum:

- The aircraft based at Seward are similar in design characteristics and could be served by an airport designed to the standards for Aircraft Design Group (ADG) I, Approach Category A, with a runway length of 3,300 feet (see table below, Scenario 1).

- Seward has a demonstrated special need for the medevac aircraft (Beech B-200) used by three of the air ambulance companies serving Seward. If the Beech 200 is used as the critical design aircraft, the airport design standards increase to ADG II. See Scenario 2 in the table below.

- Pilots and local officials expressed the desire for a runway that can accommodate small charter jets for tourism, emergency preparedness, and search and rescue aircraft such as the Coast Guard C-130, and for potential scheduled air service. Scenario 3 in the table represents the facility dimensions required to meet this desire.

Runway Dimensional Standards for Various Scenarios

Feature	Current Based Aircraft Group (Scenario 1)	Current Demand & Medevac (Beech 200) (Scenario 2)	Growth Scenario & Emergency Preparedness (Beech 1900) (Scenario 3)	Existing (R/W 13/31)
Approach Category	A	B	B	B
ADG	I	II	II	II
Runway Length	3,300 feet	3,300 feet	4,000/4,700 feet *	4,533 feet
Runway Width	60 feet	75 feet	75 feet	100 feet

* The FAA runway length guidance is changing. If the design aircraft is over 12,500 pounds but less than 60,000 pounds, the current guidance calls for a 4,700' runway length to meet the needs of a group of aircraft in that weight range. The new guidance (draft) calls for runway lengths to be determined using the airplane manufacturer's airport planning manuals. The runway length of 4000' is sufficient for the Beech 1900, if it is selected as the design aircraft.

Because project funding is being provided predominately (93.75%) by the federal government through the Federal Aviation Administration (FAA), the key to the viability of any of these scenarios is the adherence with federal guidance and the availability of federal funding. Federally funded projects require that the critical design aircraft (the most demanding aircraft) have at least 500 or more annual operations at the airport during the established planning period. According to the technical memorandum, this stipulation could affect SWD in the following ways:

- The C-130 and small charter jets are not anticipated to meet the federal threshold of regular use. These aircraft, however, have used Seward in the past and owners continue to desire the ability to land. Anecdotal information indicates that up to 20 small charter jets per year have landed at Seward in the past.

- Although medevac aircraft provide a critical service to the community, they also do not meet the FAA threshold of 500. Medevac aircraft can and do operate on runways throughout Alaska that have been designed for smaller aircraft.

Additional data or information (beyond what is reported in this technical memorandum) is needed to consider use of federal funds for any scenario involving a runway length greater than 3,300 feet.

###

Prepared for	Barbara Beaton, Aviation Project Manager Alaska Department of Transportation and Public Facilities	**Date**	July 14, 2015
Client #/PDC #	54857/14075FB	**Prepared by**	Ken Risse, PE; Patrick Cotter, AICP; Royce Conlon, PE
Project Name	Seward Airport Improvements	**Reviewed by**	Royce Conlon, PE
Subject	***Final Aviation Activity & Facility Requirements***		

This technical memorandum presents the aviation demand forecast effort and resulting facility requirements. The facility requirements set the stage for development of design alternatives by establishing the runway design code, which determines the airport's dimensional requirements (runway width, length, offset from parked aircraft, etc.).

This technical memo represents an interim review document. Once reviewed and coordinated with DOT&PF, it will be incorporated into the scoping report.

In this memorandum we translate the aviation forecasts into facility requirements by comparing future facility needs to the airport's existing inventory of facilities, reviewing Federal Aviation Administration (FAA) design criteria to ensure the airport meets safety and operational standards, and considering the need to maintain and improve aviation service for the community of Seward.

This document is focused on key elements of the airport that will drive the alternative development and evaluation process, with brief discussion of other secondary facility elements. A more comprehensive analysis will be presented in the scoping report.

Forecast of Aviation Activity

Forecasts of future levels of aviation activity are the basis for making decisions in airport planning and development. A comprehensive forecast includes elements of socioeconomics, demographics, geography, and external factors. Recent interest in Seward by the fishing and marine industries has sparked anticipation of growing industrial development in the community.

The FAA is providing the majority of the funding for the improvements and as such FAA regulations and guidance are used as the basis of this report. The methodology used in this forecast is based on the process recommended in FAA AC 150/5070-6B, *Airport Master Plans*, and in the supplemental FAA publication, *Forecasting Aviation Activity by Airport*. These documents provide national guidance for the development of airport master plans and have been used since enactment of the Airport and Airway Development Act of 1970.

Recommended steps include:

- Step 1 – Identify aviation activity measures
- Step 2 – Collect and review previous airport forecasts
- Step 3 – Gather data
- Step 4 – Select forecast methods
- Step 5 – Apply forecast methods and evaluate results
- Step 6 – Compare forecast with Terminal Area Forecast (TAF)

Step 1 – Identify Aviation Activity Parameters and Measures to Forecast

The level and type of aviation activity anticipated at an airport, as well as the nature of the planning to be done, determine the factors to be forecasted. Generally, the most important activities for airfield planning are **aircraft operations** and the **fleet mix**, since these define the runway and taxiway requirements. Plans for general aviation (GA) airports require forecasts of aircraft operations and based aircraft to define runway, taxiway, and aircraft parking requirements.

Practical considerations dictate the level of detail and effort that should go into an airport planning forecast. Air traffic activity at Seward comprises single and twin-engine GA aircraft, medevac aircraft, military aircraft, and helicopters. Because this project centers on runway improvements, the forecast for Seward Airport (SWD) will focus on:

- Aircraft operations – an aircraft landing or takeoff; one flight to and from the same location counts as two operations.
- Based aircraft – the total number of active general aviation aircraft that use an airport as a home base.
- Fleet mix – describes the makeup of the different aircraft in use at an airport.

Step 2 – Collect and Review Previous Airport Forecasts

Relevant forecasts of aviation activity at Seward are summarized below.

Seward Airport Master Plan (2008)

In 2008, the DOT&PF updated the Seward Airport Master Plan. This update forecasted aircraft operations and passenger enplanements as summarized in the following table. An annual growth rate of 1.2% was used to forecast future operations, enplanements, and cargo. An enplanement is defined as a passenger boarding.

Table 1 - 2008 Seward Airport Master Plan Aviation Forecast, Moderate Growth Scenario

	2003 (Base)	2008	2013	2018	2023
Enplanements	3,746	3,976	4,221	4,480	4,755
Commercial Operations	2,912	3,091	3,281	3,483	3,697
GA Operations	2,475	2,627	2,789	2,960	3,142
Military Operations	75	—	—	—	—
Cargo (lbs)	4,000	4,416	4,876	5,383	5,944

Alaska Aviation System Plan (2008)

The Alaska Aviation System Plan (AASP) is a component of DOT&PF's Statewide Transportation Plan. Most recently updated in 2008, the AASP contains forecasts of enplanements, cargo, operations, and based aircraft for 2015, 2020, and 2030. The AASP has a complex forecasting methodology that combines historical data with population projections, expendable income, and other economic considerations, as well as gradual transformation in the aircraft fleet. The equations for forecasting enplanements, cargo, and operations differ, and growth factors are also different for each period. The forecast for the 2008 update was completed and published in 2011 using 2008 as the base year. Details of the methodology are documented in the AASP.

Table 2 - Alaska Aviation System Plan Forecast, Seward Airport

Seward	2008 (Base)	2015	2020	2030
Enplanements	22	23	25	29
Cargo	None	None	None	None
Critical Aircraft		Cessna 185		
Aircraft Operations				
Commercial	4,500	4,136	4,318	4,576
GA	6,000	5,932	6,211	7,133
Military	10	10	10	10
Total Operations	**10,510**	**10,178**	**10,539**	**11,719**
Based Aircraft				
Single engine	28	29	29	31
Multi-engine	0	0	0	0
Helicopter	0	0	0	0

FAA Terminal Area Forecast

The FAA Terminal Area Forecast (TAF) is the official FAA forecast for aviation activity for U.S. airports. The TAF for Seward Airport is summarized in Table 3. The TAF includes passenger enplanements, aircraft operations, and based aircraft. A local operation is performed by a based aircraft, whereas an itinerant operation is performed by an aircraft not based at the airport; another term often used for itinerant operations is transient operations.

Table 3 - FAA Terminal Area Forecast (2013) Seward Airport

Passenger Enplanements			Itinerant Aircraft Operations				Local GA Ops	Total Ops
Air Carrier	Commuter/ Air Taxi	Total	Air Carrier	Commuter/ Air Taxi	GA	Military		
0	9	9	0	4,500	4,000	10	2,000	10,510

The U.S. Department of Transportation (DOT) is the main source of airport statistics. U.S. scheduled and non-scheduled certified air carriers, commuter air carriers, and small certified air carriers submit data to DOT on Form 41 Schedule T-100 (simply referred to as T-100 data). The unusually low number of commuter/air taxi enplanements compared to the number of operations is likely due to the lack of scheduled commercial service to SWD. This means enplanements are not recorded in the T-100 database, which may account for the low number.

National Plan of Integrated Airport Systems (NPIAS)

The NPIAS presents a five-year forecast of enplaned passengers and based aircraft. The current NPIAS forecast for Seward (for the years 2013-2017, using 2011 as the base year) is presented in Table 4.

Table 4 - NPIAS Forecast Year 2017

Enplanements	8
Based Aircraft	25

Step 3 – Gather Data

The FAA requires master plan forecasts to incorporate the number of aircraft operations for various categories of aircraft. Passenger enplanement, cargo, mail, and freight data are also recommended, and the governing Advisory Circular (AC) specifies that population, employment rates, and socio-economic factors be included, as any of these can also affect the forecast.

Historical air traffic data for Seward were collected from FAA's Airport Master Record Form 5010, the FAA TAF, the NPIAS, the USDOT Bureau of Transportation Statistics, the AASP, and the 2008 Airport Master Plan. Data also came from interviews with airport users, potential airport users, medevac providers, and Seward-based industry. Air traffic operations at Seward Airport are not recorded on site because there is no air traffic control tower. Because of this, GA activity is likely underreported. Also, local residents have reported that after the recent airport flooding events, aviation activity has slowed. The magnitude of this would be difficult to define given the airport is not towered and there are no reporting requirements. Aviation activity at Seward is predominantly unscheduled GA and air taxi flights, with consistent medevac and occasional military use.

Passengers

Passenger traffic at Seward Airport (SWD) has remained low over the past decade. The T-100 database shows fewer than 30 passengers per year since 2004 (see Table 5).

It should be noted that scheduled passenger service was discontinued in 2002.

Table 5 – Historic SWD Commuter Passenger Enplanements, 1990-2013

Year	Passengers	Year	Passengers
1990	2218	2002	15
1991	598	2003	0
1992	1073	2004	20
1993	127	2005	1
1994	1073	2006	7
1995	587	2007	26
1996	846	2008	22
1997	1373	2009	18
1998	1331	2010	9
1999	583	2011	22
2000	512	2012	8
2001	338	2013	0

Freight and Mail

The USDOT T-100 data show no history of freight or mail passing through SWD. Mail and cargo are most frequently transported via highway or rail. With the proposed expansion of the shipyard by Vigor Alaska, air cargo may increase in the future; see the Economic Activity discussion below.

Based Aircraft

The FAA Airport Master Record Form 5010 lists 25 single-engine aircraft based at SWD. This number concurs with previous forecasting efforts and interviews with airport users.

Aircraft Operations

There are two primary sources of aircraft operations for Seward Airport: the FAA's Form 5010, *Airport Master Record*, and the FAA TAF. These data are presented in the table below. The FAA TAF for SWD dating back to 1980 has not changed (see attachment). The list has reported 10,510 operations for each year, broken down as shown in Table 6.

Table 6 - Aircraft Operations

Source	Air Carrier	Air Taxi	GA Local	GA Itinerant	Military
Form 5010	0	4,500	2,000	4,000	10
TAF	0	4,500	2,000	4,000	10

Fleet Mix Table 7 lists the types and Aircraft Design Group (ADG) of aircraft that landed at SWD at least once during the period from 2007 through 2013.

Table 7 - Current (2013) Fleet Mix Using Seward Airport

Operator	Aircraft	ADG	Use
LifeMed	A-Star helicopter King Air B200	N/A II	Medevac
LifeFlight	King Air B200	II	Medevac
Guardian	King Air B200	II	Medevac
Scenic Mountain Air	Cessna 172	I	Flight seeing/air taxi
Seward Air	Super Cub PA-18	I	Personal
Private	Cessna 172 Super Cub PA-18	I I	Personal
Private	Cessna 170	I	Personal
Grant Aviation	B200	II	Air Taxi/Charter
Homer Air	Cessna C206/207/209/210 Stationair	I	Air Taxi/Charter
Smokey Bay Air	Cessna C206/207/209/210 Stationair	I	Air Taxi/Charter
Iliamna Air Taxi	Pilatus PC-12	II	Air Taxi/Charter
Island Air Service	Cherokee 6	I	Air Taxi/Charter
Alaska Central Express	Beech 1900	II	Air Taxi/Charter
Era Aviation	Beech 1900	II	Air Taxi/Charter
Frontier Flying Service	Beech 1900	II	Air Taxi/Charter
Warbelow	Cessna 172	I	Air Taxi/Charter
Wright Air Service	Cessna 208 Caravan	II	Air Taxi/Charter

US DOT T-100 data were acquired and reviewed (see attachment). No flights for Seward were listed in the 2013 data, potentially due to the runway flooding and subsequent weight restrictions- of 12,500 lbs placed on the main runway.

The Kenai Peninsula Aviation Superintendent provided a list of large aircraft, either meeting or exceeding the weight restrictions, that requested permission to land at Seward in 2013.

- Lear 35 (ADG C-I): 11 requests
- King Air B200 (ADG B-II): 16 requests
- Gulfstream 5 (ADG C-III): 4 requests
- DC-6 (ADG B-III): As needed

The King Air B200 maximum landing and takeoff weight is 12,500 lbs., so this aircraft was unaffected by the weight restrictions.

In addition to the above fleet mix, the U.S. Coast Guard uses SWD for search and rescue activities and also for pilot training for short field landings with the C-130 (an ADG IV aircraft). Helicopters used include the H-60 and H-65.

Step 4 – Select Forecast Methods

While there are several acceptable techniques and procedures for forecasting aviation activity at a specific airport, most forecasts utilize basic statistical techniques such as linear regression, exponential smoothing, or share analysis. To determine which method is most appropriate, it is important to look at factors affecting aviation demand. The following discussion is an overview of the factors affecting aviation demand at Seward and the forecast method applied.

Economic Activity

An analysis of socioeconomic activity is usually helpful in developing a forecast of aviation demand. Projected increases in population or economic activity can lead to increased use of an airport.

The following section highlights major factors anticipated to contribute to socioeconomic growth in Seward. These include:

- Population forecasts
- Possible relocation of Coastal Villages Region Fund (CVRF) Community Development Quota (CDQ) Fleet to Seward
- Use of Seward as the homeport for *R/V Sikuliaq*, a marine research vessel
- Vigor Alaska's purchase and planned expansion of Seward Drydock
- Tourism

Population

The population of Seward has grown steadily over the past 14 years to a current population of 2,754 (see Figure 1). The compound annual growth rate over this time period is 1.23%, which is higher than the Alaska Department of Labor and Workforce Development's projected growth rate of 0.5% for the Kenai Peninsula Borough as a whole (Alaska Department of Labor and Workforce Development, 2014).

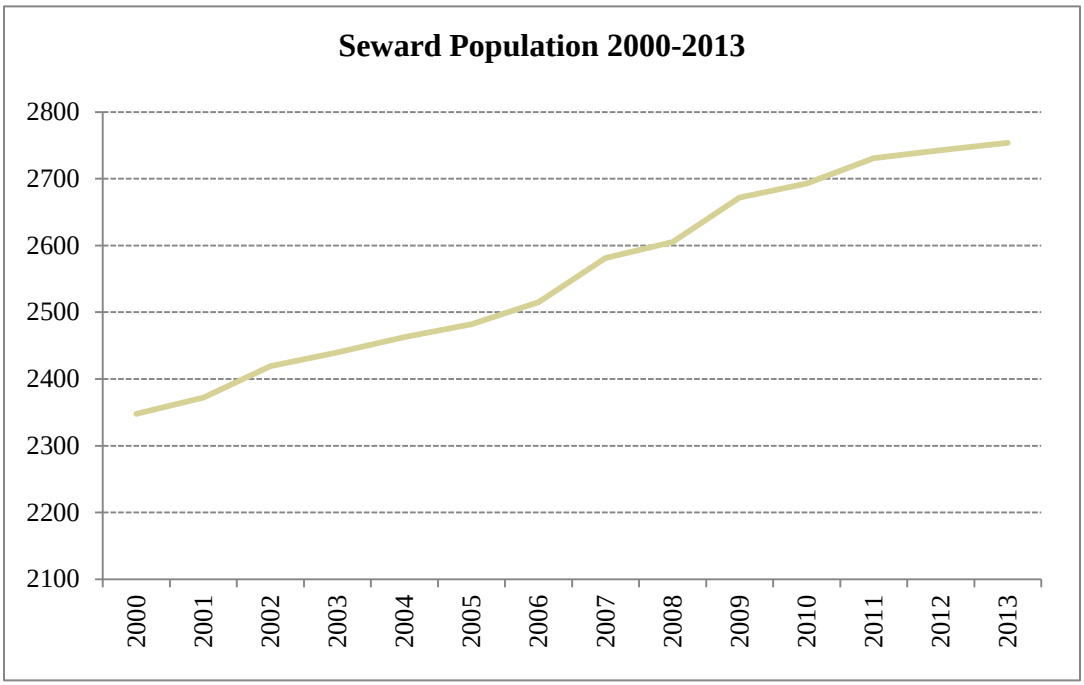

Figure 1 - Historic Seward Population, 2000-2013

Coastal Villages Region Fund CDQ Fleet

The CVRF represents 20 western Alaska communities in the CDQ fishery. The CDQ's purpose is to:

- Provide eligible western Alaska villages with the opportunity to participate and invest in fisheries in the Bering Sea and Aleutian Islands Management Area
- Support economic development in western Alaska
- Alleviate poverty and provide economic and social benefits for residents of western Alaska
- Achieve sustainable and diversified local economies in western Alaska

The City of Seward has been actively trying to homeport the CDQ fleet in Seward rather than Seattle. The CVRF has partnered with Seward to develop the Seward Marine Industrial Center (SMIC) support facilities. The SMIC will increase the available moorage, warehousing space, and upland areas to accommodate the CDQ fleet.

If the CVRF decides to homeport in Seward, the airport could see increased activity during spring deployment of the CDQ fleet when crews return to Seward. Based on the number of ships in the CDQ fleet, the number of potential crew members, and an assumed percentage that might fly into/out of Seward, this could result in approximately 500 enplanements twice a year.

R/V Sikuliaq

The City of Seward reported that the SMIC is the homeport for the 260-foot *R/V Sikuliaq*. This Alaska Region Research Vessel, commissioned in March 2014, is one of the most advanced university research vessels in the world. The *Sikuliaq* is owned by the National Science Foundation (NSF) and operated by the University of Alaska Fairbanks (UAF) as a part of the University-National Oceanographic Laboratory System's academic research fleet. The *Sikuliaq* is the first vessel in the U.S. academic research fleet capable of breaking ice up to 2.5 feet thick, making it uniquely equipped for polar and sub-polar research.

According to the City of Seward, an increase in aircraft operations between Anchorage and Seward could occur to equip, supply, and man this vessel for its voyages.

Vigor Alaska

In early 2014, Vigor Alaska announced the purchase of Seward Ship's Drydock. According to the press release, "the purchase will bring the strength of Vigor's physical, financial and human capital to bear on the yard, which will empower the yard to land more projects and larger-scale projects, translating to more work and sustainable employment for Alaska residents. In addition, Vigor will leverage its existing strong public/private partnerships in Alaska to maximize opportunities for the Seward yard."

Vigor Alaska has provided a letter of support for airport rehabilitation and improvements, stating that "Shipyards rely on timely and affordable transportation and logistics to be competitive in today's economics." Further, the letter says that Vigor's operations depend on specialized production personnel who travel between their six other shipyards, as well as an array of support contractors, vendor technicians, and inspectors. Time is money. Vigor indicates the five-hour round-trip drive from Anchorage is problematic and poses dangerous winter driving conditions as well as closures due to avalanche. (See attachment for copy of the letter of support, dated January 2015).

It is conceivable that this industry buildup would increase demand for more frequent chartered air service or even scheduled service between Seward and Anchorage. The aircraft type that may be charted would depend upon whether the charter was to be cargo or passengers and the number of passengers.

Tourism

Tourism is a major component of Seward's economy. Cruise ships, the railroad, and personal vehicles all bring tourists to the community. Attractions include Kenai Fjords National Park, the Alaska Sealife Center, the Mount Marathon Race, and Exit Glacier. Tourist activities include flightseeing, sportfishing, hiking, wildlife cruises, and sled dog demonstrations.

Seven main cruise lines will serve Seward in 2015: Holland America, Norwegian, Silver Sea, Celebrity, Regent, Crystal, and Royal Caribbean. Cruise ships in port can nearly double the population of the community. Many cruisers embark or disembark in Seward with connections to/from Anchorage, Denali, and Fairbanks via buses or the Alaska Railroad. The number of scheduled dockings is up from 53 in 2014 to 63 in 2015, with an increase in passenger capacity from 67,912 to 91,230. The 34% increase in passengers appears to come not only from the 10 additional dockings, but also through a shift towards larger ships.

Flightseeing activities generally consist of small fixed-wing aircraft tours of the surrounding mountains, glaciers, and ocean. Typical aircraft are Cessna 172 or similar. The increase in passengers could cause an increase in the number of tourism-related flights.

Alaska Railroad (ARRC) Facility Improvements

The ARRC is planning a substantial investment and improvements in the port and rail facilities adjacent to the airport. During a project coordination meeting and again at the November Seward Working Group (SWG) meeting, ARRC staff indicated that if the airport had regularly scheduled flights, ARRC would prefer to have its crews and management teams who occasionally commute to/from Seward fly versus traveling by rail or highway. Travel time and safety were the primary reasons cited. The specific number of enplanements this would add is undetermined, but could be substantial if reliable services could be provided.

Gas Line Construction

Seward experienced significant activity during the construction of the Trans-Alaska Pipeline in the 1970s. Most of the pipe was shipped through the port of Seward. During a project co-ordination meeting, ARRC staff predicted that if a new gas pipeline were constructed through Alaska, activity through the combined port/rail terminal would increase. This would also likely increase activity at the Seward Airport. This construction impact would be transitory, however. Short-term effects such as this normally do not drive long-term investment in airport facilities, especially if other (albeit less efficient) modes of transportation can meet the demand.

Other Oil & Gas Related Activity

Seward's ice-free deep sea port and shipyard capabilities combined with gas and oil exploration and potential development in the Outer Continental Shelf make Seward a desirable port for use by oil companies such as Shell to maintain and store marine vessels. Like Vigor Alaska and the ARRC, Shell Oil has indicated air travel demand could increase with its presence. "An upgrade to the existing airport would permit Shell to factor charter air transportation of material and personnel more aggressively than in the past to support our current operations while introducing a strong planning factor for future operations." (See attached letter of support.)

Medevac Operations

The term "medevac" is an abbreviation for "medical evacuation." This and other terms referring to a type of medical emergency response (e.g., "helicopter emergency medical service" and "air ambulance") are used interchangeably in the United States. The value of air access to remote locations or in the event of an emergency is not generally recognized until it occurs, and it is difficult to place an economic value on such capabilities. Often, the primary means of reaching a community immediately after a major act of nature such as a flood, earthquake, wildfire, or landslide is via air transport.

Both fixed wing aircraft and rotary wing aircraft (helicopters) are used in medical emergency response situations. Patients are flown by fixed wing aircraft for many different reasons. These can range from the stable patient involved in an accident or with a long-term medical condition wishing to relocate closer to family for rehabilitative care to the critical heart failure patient requiring intensive-care transfer to receive a transplant. The fixed wing environment differs from the rotary wing environment primarily in that fixed wing aircraft travel farther, faster, and higher. The fixed wing aircraft is primarily a long-distance facility-to-facility transport and includes a range of multi-engine turboprop and small jet aircraft specially equipped and staffed to respond to patient needs while en route. Rotary wing service is typically engaged for moving a patient from an accident or incident scene to a trauma center and for air transport of stable patients; the helicopters are also suitably staffed and equipped for these missions.

Not all medevac transport is associated with an emergency situation. Many medevacs involve medically appropriate, hospital-to-hospital transport on a scheduled basis. Therefore, medevac service providers are actively engaged in both emergency response and critical care transport.

Air transportation of patients between Seward and Anchorage is fairly common. Although Seward is connected to Anchorage via the highway system, the local volunteer ambulance service does not have enough staff to transport patients to Anchorage. Therefore, fixed-wing aircraft and helicopters are used for medevac transport.

Three medevac operators currently provide service to Seward: LifeFlight, LifeMed, and Guardian. LifeMed and Guardian are the most common medevac operators at SWD, with approximately 300 annual operations combined.

Table 8 - Medevac Operations at SWD

Medevac Operator	Aircraft	Estimated Annual Operations
LifeMed	King Air B200[1]	60
LifeMed	A-Star Helicopter	140
Guardian	King Air B200	100
LifeFlight	King Air B200	40

LifeMed and Guardian also utilize Lear Jets for medevacs. Those aircraft require 5,000 feet of runway length and are therefore not used at SWD. Discussions with medevac operators, however, did indicate that Lear Jets based in Anchorage would be utilized for approximately half of the medevacs if the runway were longer and the instrument approach were better.

Commuter Travel

Seward has not had scheduled air service since 2002. Recent contact with Alaska Airlines and RAVN Alaska, the two air operators most likely to offer commuter service, indicate they have no plans (within the foreseeable future) to offer scheduled service. When asked what would trigger the addition of SWD to their schedule, RAVN replied demand and a better approach to ensure they could offer reliable service.

RAVN does provide charter service to SWD, generally in support of the cruise ship industry. Also, RAVN provides scheduled service to Homer and Kenai Airports. A brief analysis was conducted to compare and contrast Seward with Homer and Kenai to evaluate potential for future air service to SWD.

Table 9 – Comparison with Homer and Kenai

Community	Airport	Population	Distance/Drive Time	Commercial Flights
Seward (+ Moose Pass)	SWD	5,775	127 miles/2.5 hours	0
Kenai (+ surrounding contributing communities)	ENA	33,489	157 miles/3.25 hours	10 daily
Homer (+ surrounding area)	HOM	8,408	224 miles/4.5 hours	5 daily

Homer and Kenai have better instrument approach capabilities than Seward. Homer has six published approaches with as low as one mile visibility and minimum descent altitude of 437 feet (389' height above touchdown). Kenai has six published approaches with as low as one half mile visibility and minimum descent altitude of 298 feet (200-foot height above touchdown). Seward has a single circling approach for aircraft approach categories A and B only, with as low as 1-1/4 mile visibility and minimum descent altitude of 2,660 feet (2,638-foot height above touchdown).

The anticipated economic growth in Seward improves the probability of an air carrier increasing service to Seward. Improved approach procedures with lower minimums would also increase the likelihood of scheduled air service. Conversations with FAA Flight Standards indicate an improved public approach would be difficult if not impossible to design in Seward. However an improved special approach designed for an individual carrier or for specially qualified aircrew and equipment may be possible. Such special procedures are expensive to have designed, so an air carrier or other sponsor would only be likely to pursue a special procedure if they felt reasonably assured that the cost would be outweighed by profit or benefit.

[1] The King Air B200 is a fixed-wing aircraft.

Initially, carriers would most likely serve Seward with charter aircraft, but if reliable air transportation is available, demand may increase over the next 20 years to make scheduled service with the larger commuter aircraft currently flying into Kenai and Homer a feasible option, at least seasonally. Kenai is presently served on a regular basis by the Beech 1900 (B-II) and Dash 8 (C-III) aircraft, and Homer is served by the Beech 1900.

Emergency Preparedness

A larger runway supports emergency preparedness. Although Seward is connected to other communities by rail, road, and the marine highway, the airport provides essential access during emergency or disaster situations when other access (single rail line and single highway) may be vulnerable. Reportedly, during the 1964 earthquake, the airport was minimally damaged but remained the only connection with the rest of Alaska for an extended period of time because the railroad, the Seward Highway, and the port facilities were completely destroyed (Seward Airport Master Plan, Phase II, Hydrology Report, by Skip Barber, July 25, 2006).

The U.S. Coast Guard (USCG) has landed C-130s at Seward in the past and would continue to use this aircraft at Seward if the pavement strength allowed it to land. The C-130 is an ADG IV aircraft used for support of search and rescue and for medical evacuation of mass casualties. The C-130 is not forecast to meet the threshold of regular use (500 annual operations), but it is extremely useful during emergencies such as avalanches, earthquakes, or flooding that disrupt road access to Seward. The USCG indicated that with a runway length of 4,500 feet they can normally operate at about 120,000 lbs., allowing enough fuel and gear to respond to most situations. The H-60 helicopters could also be used for mass casualty response, but the C-130 can respond more quickly; additionally, if the H-60 needed fuel, the C-130 could provide it. (See attached e-mail, 8/14/2014, LT Robert Hornick, C-130 Assistant Operations Officer.)

Forecast Method

The most demanding aircraft (largest wingspan and longest required runway length) currently using the airport regularly is the **King Air B200**, which is used for medical evacuations. While the annual operations of the medevac aircraft alone do not meet the FAA threshold of 500, the B200 is a part of the family of B-II aircraft serving Seward. Other ADG II aircraft operating in Seward are the air taxi and charter aircraft listed in the fleet mix (Table 7). Air taxi, charter, and medevac operations can be expected to increase as the population increases. The population of Seward has historically grown at 1.23%. The population of the entire Kenai Peninsula Borough is forecast to grow at 0.5% annually. Seward has the potential to grow even faster if the economic factors discussed begin to materialize (Vigor Alaska, tourism, SWD Marine Center, CDQ fleet, ARRC, and offshoots of gas and oil activities). Following consultation with the Seward Working Group, it was decided that a 1.23% growth rate would be used, but that a higher growth scenario using 2% could be conceivable. Table 10 presents forecasts with both growth rates.

Step 5 – Apply Forecast Methods and Evaluate Results

With a either a 1.23% or 2.0% annual growth rate, SWD will see modest growth in aircraft operations (Table 10), with general aviation continuing to be the dominant type of operation.

Table 10 - Forecast Operations at SWD at 1.23% growth/*2.0% growth*

Operations	Base Year 2013	+5 Years	+10 Years	+15 Years
Local GA	2,000	2,127 / *2,208*	2,260 / *2,438*	2,402 / *2,693*
Itinerant GA	4,000	4,252 / *4,417*	4,520 / *4,877*	4,805 / *5,387*
Medevac	200	213 / *220*	228 / *2,43*	243 / *268*
Air Taxi/Charter	4,500	4,783 / *4,969*	5,085 / *5,485*	5,406 / *6,056*

Step 6 – Compare Forecast with TAF

The base year data used in this forecast are consistent with the TAF. The TAF shows no change in aircraft operations at SWD throughout the planning period, however, which will likely not be the case. Table 11 summarizes the differences between the 1.23% growth forecast and the TAF.

Table 11 - Forecast - TAF Comparison

	2018			2023			2028		
	Forecast	**TAF**	***Difference***	**Forecast**	**TAF**	***Difference***	**Forecast**	**TAF**	***Difference***
Local GA	2,127	2,000	***127***	2,260	2,000	***260***	2,402	2,000	***402***
Itinerant GA	4,252	4,000	***252***	4,520	4,000	***520***	4,805	4,000	***805***
Air Taxi/ Charter	4,783	4,500	***283***	5,085	4,500	***585***	5,406	4,500	***906***

Facility Requirements

The facility requirements depend on the critical design aircraft or group of aircraft. With the increasing economic activity and population in Seward, the fleet mix providing the air taxi and charter operations will likely include a greater percentage of the larger B-II aircraft. There is a good probability that over 500 operations of the B-II family of aircraft will result from these changes. Thus, the Seward Airport facilities should meet the B-II facility standards. This standard is consistent with the 2008 Airport Master Plan and approved Airport Layout Plan. A minimum runway length of 3,300 feet is needed to serve the existing based aircraft and medevac operations. A longer, 4,000-foot runway should be considered long term to accommodate the potential demand for commuter aircraft such as the Beech 1900 and/or the Dash 8.

Wind Coverage

Wind conditions affect aircraft in varying degrees. Generally, the smaller the aircraft, the more it is affected by wind, particularly crosswinds, which are often a contributing factor in small aircraft accidents. The FAA provides the following guidance on maximum crosswind components for small to medium-sized aircraft.

Table 12 – Allowable Crosswind Components by Aircraft Design Group

Aircraft Design Group	Allowable Crosswind Component
ADG I Cessna 170, 185, 206	10.5 knots
ADG II Beech 200, 1900; Cessna 208, Grand Caravan	13 knots
ADG-III DC-6, Dash 8, 737	16 knots

Wind coverage is the percentage of time crosswind components are below an unacceptable velocity. A runway oriented to provide the greatest wind coverage with the minimum crosswind components is preferred. The desirable wind coverage for an airport is 95%. A second (crosswind) runway is recommended when the primary runway orientation provides less than 95% wind coverage.

Based on the current wind data available for Seward, a single runway oriented between 156 and 204 degrees north azimuth provides 95% or greater wind coverage (for ADG I aircraft, which have the least tolerance for crosswinds).

- Runway 16-34 is oriented at 183 degrees, providing 98.6% wind coverage for ADG I aircraft.
- Runway 13-31 is oriented at 146 degrees, providing 91.1% coverage for ADG I aircraft and 96.0% coverage for ADG II aircraft.

Aircraft Use at Seward

The based aircraft at Seward are similar in design characteristics and could be served by an airport designed to the standards for ADG I, Approach Category A, with a runway length of 3,300 feet or less for small (under 12,500 lb.) aircraft. In addition, the Alaska Aviation Preconstruction Manual identifies a minimum runway length of 3,300 feet for community class airports such as SWD. This is the minimum runway length under consideration.

Seward has experienced a large number of medivac aircraft operations over the years. The King Air B-200 (used by three of the air ambulance companies) serves the community. If the King Air B-200 is used as the critical design aircraft, the airport design standards increase to ADG II. US DOT T-100 statistics indicated other ADG II aircraft using Seward Airport in the past 5 years include the Beech 1900, Cessna 208 Caravan, and Pilatus PC-12. Although a 3,300 feet runway would serve the existing based aircraft and medevac operations, the facility should have a long-term plan to accommodate a runway length up to 4,000 feet to support commuter aircraft such as the Beech 1900 and/or the Dash 8.

Pilots and local officials expressed the need for a runway that can accommodate small charter jets for tourism, emergency preparedness and search and rescue aircraft such as the Coast Guard C-130, and potential scheduled air service.

The C-130 and small charter jets are not forecast to meet the threshold of regular use, but they have been used at Seward in the past and pilots continue to request to land them. FAA does not fund public airports to support military or other federal agency operations or aircraft. The Coast Guard needs to provide funding if this activity drives airport improvements.

Anecdotal information indicates that up to 20 small charter jets per year have landed at Seward in the past. A 4,000-foot runway could support this occasional demand, if the aircraft is not fully loaded. (see attachments for runway length information provided by NetJet) Beyond the current project planning horizon further lengthening and widening of the facility could be considered.

Airfield Requirements

Runways

Given the number of operations and amount of growth anticipated in Seward, a greater growth factor in the forecast of operations (2% vs 1.23%) would not show an increase great enough to warrant substantial changes in the facility requirements (such as a second runway or parallel taxiway). A single runway can handle between 62,000 and 131,000 operations annually based on VFR conditions and calculations with a taxiway located at the runway midpoint and airport open for operation 8 to 12 hours per day, 5 to 7 days per week. This is significantly more operations than projected. Parallel taxiway systems to help improve runway capacity and minimize user delays are typically not warranted until annual operations approach 20,000.

Facility requirements are listed in the table below for three potential groups and compared with the larger of the two existing runways. Data collected and analyzed in this document supports the "Current Demand & Medevac" scenario. Currently, there is an insufficient number of operations by large aircraft to support the "Growth Scenario & Emergency Preparedness" column in the chart below. That scenario is included for future planning purposes.

Table 13 – Runway Dimensional Standards for Various Scenarios

Feature	Current Based Aircraft Group	Current Demand & Medevac (King Air B200) Recommended for Near-Term Development	Growth Scenario & Emergency Preparedness (Beech 1900) Consider for Long-Term Development	Existing RW 13-31
Approach Category	A	**B**	B	B
ADG	I	**II**	II	II
Runway Length	3,300' (Note 1)	**3,300' (Note 1)**	4,000'/4,700' (Note 2)	4,533'
Runway Width	60'	**75'**	75' (Note 3)	100'
Visibility Minimums	1 mile	**1 mile**	1 mile	1 mile
Crosswind Component	10.5 knots	**13 knots**	16 knots	13 knots
Runway Safety Area	120' x 3,780'	**150' x 3,900'**	150' x 5,300'	150' x 4,749'
Object Free Area	400' x 3,780'	**500' x 3,900'**	500' x 5,300'	500' x 4,749'
RPZ	1,000' x 500' x 700'	**1,000' x 500' x 700'**	1,700' x 500' x 1,010'	1,000' x 500' x 700'
Part 77 Primary Surface	500' x 3,700'	**500' x 3,700'**	500' x 5,100'	500' x 4,649'
Part 77 Approach Slope	20:1 (Visual)	**20:1 (Visual) (Note 4)**	20:1 (Visual) (Note 4)	20:1 (Visual)

1. Minimum runway length for community airports per Alaska Aviation Preconstruction Manual exceeds FAA AC 150/5325-4B (2,750 feet for 95% of fleet or 3,250 feet for 100% of fleet) and King Air B200 published takeoff and landing distances.

2. The 4,700-foot runway length is based on FAA AC 150/5325-4B for aircraft over 12,500 lbs. but less than 60,000 lbs. (75% of fleet at 60% useful load). The FAA is circulating a Draft AC 150/5325-4C, which recommends using manufacturer's airport planning manuals for all large airplanes (over 12,500 lbs.). The Beech 1900D specification and performance sheet lists a takeoff length of 3,737 feet. Discussions with the primary air carrier in Alaska using this aircraft indicated a need for a 4,000-foot runway to accommodate it. A 4,000-foot runway option is being considered, which would accommodate the Beech 1900 and other large aircraft such as the Dash 8 and Sherpa.

3. Runway width may be increased to 100 feet to provide for larger emergency response aircraft such as the C-130.

4. By definition, a non-precision instrument (NPI) approach runway means a straight-in approach is planned or has been approved (Part 77.2). SWD's approach is currently a circling approach (RNAV [GPS]-A). Review of the FAA flight standards and local topography indicates a straight-in approach is not viable at Seward due to the mountainous terrain on all sides.

Taxiways / Taxilanes

Taxiways should be upgraded to meet the current standards. Major changes to taxiway standards have been made in the revisions to AC 150/5300-13 and AC 150/5300-13A since the design of the current airport. It will be critical to establish the design aircraft to be used for taxiway geometry, as taxiway design requirements are no longer established solely by the airplane design group, but also depend on the wheelbase and distance between the cockpit and main landing gear of the design aircraft.

Current guidance also indicates the taxiway intersections with runways should avoid the middle one third of the runway length, which ¶401.b(5)(d) defines as a "high energy" intersection. "By limiting runway crossings to the outer thirds of the runway, the portion of the runway where a pilot can least maneuver to avoid a collision is kept clear." Taxiways A and D currently conflict with this guidance.

Further, taxiways providing direct access from the aircraft parking areas to a runway should be avoided (¶401.b(5)(g) and ¶503.). Taxiways C, D, E, and F currently conflict with this guidance. Future layouts should consider correcting this deficiency.

The key minimum dimensional standards for taxiways that need to be considered in developing the layout of facility improvements are listed in the table below.

Table 14 – Taxiway and Taxilane Design Dimensions Based on Aircraft Design Group (per AC 150/5300-13A; Table 4-1)

Feature	Near Term & Ultimate – B-II (King Air B200 & Beech 1900)	Existing
Runway to Taxilane Separation	240'	184' (Note 1)
Taxiway Safety Area	79'	79'
Taxiway OFA	131'	131'
Taxilane OFA	115'	131'
Taxilane Centerline to Fixed or Movable Object	57.5'	
Taxilane Wing Tip Clearance	18'	

1. Separation distance shown on 2008 ALP between Runway 16/34 centerline and GA apron taxilane (A-I small requires 150 feet).

To meet the dimensional standards above and preserve the existing Building Restriction Line (BRL) and GA apron size, a runway parallel to the apron (Runway 16-35) would need to have a runway-to-BRL separation of 394.5 feet; the existing Runway 16-35 is separated from the BRL by only 300 feet. Additional separation may be needed to correct the layout deficiency of taxiways that provide direct access from the runway to aircraft parking areas.

Navigational Aids and Airfield Lighting

One set of VASI lights is installed on Runway 31. The previous master plan indicated the VASI should be replaced with PAPIs on both ends of all runways. This is not feasible at Seward because of the terrain on the north end of the airport. Only the south end can achieve the PAPI Obstacle Clearance Surface, which extends 4 miles out from the end of the runway.

The airfield lighting system is old and should be upgraded and expanded to include taxiways and all runways. The Electrical Equipment Building (EEB) should also be replaced or upgraded in association with the runway/taxiway lighting upgrades.

During any paving project, the runway and taxiway markings should be replaced with markings that meet current guidance. Seward Airport runways will continue to be marked as visual runways. SWD currently has a published GPS approach for Category A and B aircraft, but it is rarely used because of the high minimum descent altitude (2,660 feet). This published approach is not a straight-in approach, so the runway is not considered an NPI runway. There are no instrument approaches for Category C and D aircraft.

Lower minimums would make the airport more reliable and would weigh into the consideration for a commuter air taxi service to start scheduled service into Seward. Discussions with the FAA about lowering the minimums, however, did not result in optimism that this would occur. The surrounding terrain is an onerous constraint to improving the approaches in/out of Seward. (See phone log, conversation dated 2/6/2015 with Kyle Christianson of FAA.)

Other Facility Requirements

A new sand storage building is needed. The existing building is in poor condition. However the SSB is not presently part of the project.

The airport access road, Seward Highway, and the Alaska Railroad are all within the RPZ of Runway 13-31, and a small portion of the RPZ of Runway 16-34 overlaps the access road. Although prior to FAA's *Interim Guidance on Land Uses within a Runway Protection Zone* (9/27/2012) these transportation uses were acceptable, they are not encouraged. Additionally, due to their proximity to the end of Runway 13/31, these transportation features create an obstruction to that approach. Correction of these non-standard conditions should be considered to the extent practicable.

Attachments

- Aviation activity data (USDOT T-100, FAA TAF)
- Letter of support from Vigor Alaska
- U.S. Coast Guard correspondence
- Letter of support from Shell Oil
- NetJet correspondence and aircraft performance charts
- Phone log