Federal Aviation Administration

Study for the House and Senate Appropriations Committees

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Aviation Access to Remote Locations In Alaska

Recommendations to Increase Aviation Access to Medical Facilities

House Report 106-940 accompanying
H.R. 4475, FY 2001 DOT Appropriations

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Glossary

AIP	Airport Improvement Program
ASOS	Automated surface observing system
ATC	Air traffic control
AWOS	Automated weather observing system
GPS	Global positioning system
IFR	Instrument flight rules
IHS	Indian Health Service
NIOSH	National Institute of Occupational Safety and Health
NTSB	National Transportation Safety Board
NWS	National Weather Service
PAPI	Precision approach path indicator
RCAG	Remote communications air-ground facility
RCO	Remote communications outlet
VFR	Visual flight rules

Overview

There are 201 Alaskan communities with no road access to the nearest inpatient medical facilities – 25 of these have no airport. Residents in these communities travel an average of 147 miles one way for access to the next level of medical care.[1] Their combined population of more than 64,000[2] represents 10 percent of the state. More than one-half of the people served by the Alaska Native health system live in these rural and remote locations.[3] Among the most critical factors affecting aviation access are runway length, surface, and condition; airport lighting; weather reporting systems; communications; and instrument approaches. The Federal Aviation Administration (FAA) has invested in essential aviation infrastructure at the 176 airports serving these 201 communities to improve the safety, reliability, and accessibility of flight. In fiscal year 2001, the FAA plans to increase Airport Improvement Program (AIP) funds for these communities by more than 50 percent over previous years. We are seeing significant increases in safety and access through research and demonstration projects in other technologies such as weather cameras and Capstone.

The problem with access to medical care is not unique to Alaska. There are communities in other states that do not have inpatient medical facilities, requiring that sick or injured persons travel long distances for medical emergencies or specialized care. However, Alaska has many such communities and a large percentage of the population that relies on aviation as the sole means of transportation to medical care.

Requirement for this Study

The conference report accompanying the FY 2001 Department of Transportation Appropriations, (House Report 106-940), directs the Administrator to determine the extent of the problem of aviation access in remote locations in Alaska. Page 88 of that document contains the following paragraph:

> Aviation access, remote locations in Alaska. – The conferees note that most remote Alaska villages do not have access to hospitals because they are not connected to the road system. Therefore, they must rely on aircraft medevacs in the event of a medical emergency. The conferees have been informed that an air evacuation of a heart attack victim was delayed for three days because the village of Hoonah lacked navigational aids, and that medevacs in winter months are restricted to just a few hours of daylight because communities lack runway lights. The Administrator is directed to work with the Indian Health Service and the Coast Guard to determine the extent of this problem, and similar access problems in other remote communities, and make recommendations to the House and Senate Committees on Appropriations by March 1, 2001, on what steps should be taken.

[1] All distances are statute miles and calculated using FlyByNav v1.5 by SkyWriter Software or GeoClock v8.3
[2] Population figures from Alaska Department of Community and Economic Development, Research, and Analysis Section. Population for organized communities is certified as of December 2000; others are estimated as of 1999
[3] Alaska Area Office of the Indian Health Service

The Alaskan Region of the FAA prepared this study with the cooperation of the 17th District of the United States Coast Guard and the Alaska Area of the Indian Health Service (IHS). While the focus of the study is on the role of aviation in access to medical facilities, it is important to note that every facet of the community benefits with improved aviation access – economic, educational, cultural, and political. Any improvements to the aviation infrastructure benefit the community at large.

Background on Alaska

Alaska is so unlike the rest of the United States that most attempts to describe it to those who have never seen it often fall short of success. One of the most startling characteristics to newcomers is its vastness. Alaska is larger than the combined area of the next three larger states (Texas, California, and Montana) or 21 of the smaller states.[4] Alaska is 565 times larger than Rhode Island, the smallest state. For all its size, its population is less than 47 states (only Wyoming and Vermont have fewer people). Population density is about one person per square mile compared to more than 90 per square mile in the other 49 states.[5] Alaska was a territory of the United States from 1867 until statehood in 1959, longer than any state.[6]

Many areas of the northern rim of the lower 48 states experience harsh, sometimes arctic, weather. Only Alaska, however, is truly part of the arctic. One-fifth of its land area is north of the Arctic Circle and has little if any daylight for weeks, even months, each winter season.

Nine distinct physiographic and environmental regions create the widest climatic ranges of any state. Temperatures range from +100°F to –80°F. Glaciers cover more than 5 percent of the state[7]. Alaska has temperate rainforests in the southeast; tundra through the west, central, and north; more coastline than the combined total of the remaining states; and more than 40 active volcanoes and volcanic fields.[8] Alaska has 17 of the 20 highest peaks in the United States and 50 mountain ranges.[9]

Communities in Alaska

Communities in Alaska developed in much the same way as in the rest of the United States. Some were once seasonal hunting or fishing camps. Others developed along trade or migration routes. Many are along rivers or the coast. Some are located at the sites of former trading posts established in the 1800's. A few communities have existed for thousands of years. The Aleut villages are among the oldest places of habitation on this continent -- the village of Nikolski, for example, has been determined to have been occupied for more than 8,000 years.[10] More recently, communities have formed as a result of oil and mineral exploration and development, military defense, and Federal agency activities.

[4] U.S. Census Bureau; State and County Quick Facts
[5] U.S. Census Bureau; Resident Population of the 50 States, the District of Columbia, and Puerto Rico: Census 2000
[6] Encyclopedia Britannica
[7] Alaska Department of Community and Economic Development, Division of Community and Business Development
[8] Alaska Volcano Observatory
[9] "Alaska Atlas & Gazetteer", Second Edition, DeLorme, 1998
[10] 131 Cong Rec S 5222, 99th Congress, 1st Session, Senator Spark M. Matsunaga, remarks on S. 1053

There is no official definition of the term "community" in Alaska. Neither the FAA nor the State of Alaska makes formal determinations regarding whether or not a specific group of persons comprises a community. Communities considered in this study include all legally incorporated municipalities (cities and boroughs), all federally recognized Native villages, and all "Census-Designated Places." Also considered are a number of other "communities" that do not come under these classifications.

Transportation in Alaska

Unlike the lower 48 states, the development of the transportation system in Alaska has not been continuous. The development of the core transportation infrastructure consisted of projects of almost overwhelming magnitude for the time they were constructed. After completion, the projects see little more than maintenance and modernization. Alaska's one railroad, built by the Federal Government to spur coal and mineral development, has essentially the same track miles as at its completion in 1923.[11] The U.S. Army built the Alaska Highway, the only land connection to the United States and Canadian road system, for overland access for military defense during World War II. Alaska has not seen a new interurban highway since the opening of the Parks Highway to Fairbanks in the early 1970's.

Alaska is the only state not part of the 42,700 miles in the Interstate Highway System.[12] In 40 years of construction, the average mile of interstate highway cost about $7 million (in 1996 dollars).[13] This is an equivalent cost to building a remote Alaskan airport with 3,300-foot gravel runway, runway and approach lights, taxiways, and safety areas.

Alaska's 12,667 road miles[14] and 482 rail miles[15] are less than those in Vermont[16] although Alaska is 62 times larger. Flight from the farthest west civilian community of Adak to the farthest east community with hard surface airport of Ketchikan is over 1,800 miles, the distance from Washington, D.C., to Salt Lake City, Utah. A flight from the northernmost community of Barrow to the southernmost of Ketchikan is over 1,300 miles, the distance from Boston, Massachusetts, to Miami, Florida. By comparison, Vermont is 157 miles from north to south and 90 miles at the widest.

Factors Influencing Aviation Access in Remote Alaskan Communities

Many factors that influence aviation access in Alaska are similar to those in the contiguous United States. However, there are several significant attributes that are unique to Alaska.

Weather – Throughout the Aleutian chain and the Gulf of Alaska, the warmer waters of the Japanese current skirt the colder waters of the Bering Sea. The temperature and barometric differences create extreme wind, high seas, and fog conditions for days, even weeks. Temperatures in interior and northern Alaska often drop to -50°F each winter.

[11] Encyclopedia Britannica
[12] "40 Years of the US Interstate Highway System: An Analysis"; Wendell Cox & Jean Love for the American Highway Users Alliance, June 1996
[13] ibid
[14] U.S. Federal Highway Administration; Public Road Length – 1999, Miles by Function System; October 2000
[15] Association of American Railroads, Legislation and Communications Department
[16] ibid

Many seasons have low temperatures of -60°F or lower. Gasoline begins to congeal at these temperatures and reciprocating engines become almost useless.

Volcanic Activity – Several of Alaska's 40 volcanoes have affected aviation in recent years. Most notable are Mt. Augustine (1986), Mt. Redoubt (1989-90), and Mt. Spurr (1992). Volcanic activity from these three mountains disrupted commercial, military, and general aviation because of clouds of ash and particulate. The Alaska Volcano Observatory monitors 22 volcanoes in real time for seismic activity and precursors to eruption.

Fires – In 1999, more than 1,000,000 acres in Alaska fell to 468 wildfires.[17] The resultant smoke and obscuration limited flight under visual flight rules (VFR) for days at a time over large areas of interior Alaska. FAA established temporary flight restrictions at the request of the Bureau of Land Management to avoid conflict with fire fighting aircraft. This was an average year for number and size of wildfires in Alaska.

Hours of Daylight – The 49th parallel forms the northern border of the contiguous states from Washington to Minnesota. The southern most point in Alaska is 51° 13' north latitude, in the Aleutian Islands. Consequently, there is far greater variation in hours of daylight through the year. Between the autumnal and vernal equinoxes, VFR aviation throughout the state is greatly reduced. The amount of daylight in Fairbanks, for example, decreases each fall by about 6 minutes a day until the winter solstice when the sun is above the horizon for 3 hours and 42 minutes. The sun's zenith then is less than 2° above the horizon. Even as far south as Anchorage, daylight decreases to less than 5 ½ hours with the sun no higher than 6°. When this reduced, low-angle light is combined with overcast skies and snow-covered terrain, even highly experienced VFR pilots can lose visual reference to the ground. Also, there are far fewer ground references for night VFR cross-country flight in Alaska than in most of the country. There are no roads and, therefore, no road lights. With so few communities, there are very few towns and streetlights.

Terrain – Throughout significant areas of the state, the terrain offers little aid to the VFR pilot flying primarily by reference to the ground and geographical features. For example, using lakes for landmarks is complicated by their sheer numbers – 3 million in Alaska[18] compared with 11,842 lakes in all Minnesota.[19]

Runway Length, Surface Type, and Condition – There is a direct relationship between runway length and composition and the type of aircraft that can land on it. The faster the approach speed, the longer the runway must be. The heavier the aircraft, the greater stress on the runway and the need for hard, well-drained surface.

Airport Lighting – The various airport lighting systems serve to increase the safety of flight operations during the many types and phases of flight. An airport beacon primarily serves the VFR pilot. Approach lights and runway lights serve both VFR and instrument flight rules (IFR) operations. Medium or high intensity approach lights primarily serve IFR operations. Runway lights are the key component for night operations. Instrument approaches are restricted to daylight hours only at airports lacking runway lights.

[17] DisasterRelief.org, "U.S. 1999 Wildfire Season Ranks Among the Worst", September 22, 1999
[18] Alaska Department of Community and Economic Development, "Geography of Alaska"
[19] Minnesota Department of Natural Resources, "Facts on Water"

Weather Reporting Systems – There are several weather observations affecting aviation access. Among these are barometric pressure, wind speed, wind direction, ceiling, and visibility. The aircraft altimeter is accurate only when calibrated in relation to local barometric pressure. The information can come from a contract weather observer, National Weather Service (NWS) Office, FAA Flight Service Station, Automated Surface Observing System (ASOS), or Automated Weather Observing System (AWOS). A barometric reading from another location within 75 miles can be used but the approach profile is adjusted higher to allow for the possibility of different pressures causing different indicated altitudes. A local altimeter setting may significantly lower landing minimums.

Communications – Local communications are integral to flight planning and weather briefings. With no radio communications at an airport, pilots must make telephone contact with air traffic control (ATC) to file and close out flight plans. For flight under IFR, the pilot may receive a briefing, file the flight plan, and receive instrument clearance through a local telephone system. Without radio contact on the ground, the clearance will be valid only for a set time slot. If the flight does not begin during this window, the pilot must begin anew with another flight plan and briefing. In flight, aircraft must maintain radio contact with ATC. Through a network of remote communications outlets (RCO) and remote communications air-ground (RCAG) facilities, it is possible to establish radio contact with ATC through most of the state. The availability varies with terrain, distance, and altitude. As an aircraft descends, though, the signal may fade and contact will be lost. For an arriving IFR flight, radio contact must be maintained through the missed approach point. This lets ATC redirect other IFR traffic that may be affected. Otherwise, ATC must "lock down" the airspace until the pilot closes the IFR flight plan with ATC through a local telephone. Depending on the location of the RCO or RCAG, communication with ATC may be possible through approach, landing, and taxi.

Local Infrastructure – In considering sites for FAA communications, navigational aids, weather reporting, and other systems, the local infrastructure plays a critical part. Decades of operating experience indicate that recurring operating costs often exceed the equipment and installation costs by a factor of 10 or more. In many remote communities, the electrical generation capacity is matched closely with the residential requirements of the population. An increase of a few hundred kilowatts may place a power generation plant at or over capacity. The local public utility usually passes on the cost of adding capacity to the user that requested the increase. This has resulted in FAA paying for its power needs at extremely high rates. For example, each kilowatt at Minchumina, one of the remote communities that rely solely on aviation for access to inpatient care, costs the FAA $1.84. Kilowatt-hour rates of $0.50 are not unusual.

Many FAA systems at remote locations need reliable, continuously available telecommunications. For flight planning, data from automated weather information systems must be accessible to the FAA weather briefer and pilots. This is achieved either through a dedicated, continuously open telephone line or with a dial-up feature. Several of these remote communities have only a few telephone lines serving all residents. The cost for a single, dedicated telephone line from Deadhorse to Fairbanks averages more than $5,000 per month. Reliable telephone lines (landlines or satellite links) are essential to remote monitoring and maintenance of FAA systems.

Instrument Approaches – The extent to which instrument approaches increase access at an airport is highly dependent on the infrastructure on the ground. Without lights, the instrument approach is restricted to day only. Without local weather information, a remote

altimeter setting can be used but the approach altitude is raised by up to several hundred feet to allow for the effects of differing barometric pressures. Without local wind speed and direction, the approach is more hazardous on the shorter runways. Federal Aviation Regulations require that commercial operations under Part 121 or 135 must have local weather reporting by an FAA-approved source.[20]

For airports with no ground based navigational aid, a global positioning system (GPS) instrument approach offers a relatively low cost means of improving access. The figurative and literal building block for a GPS approach is the completion of a GPS survey. Recent GPS surveys have found errors exceeding one-half mile in the location of some Alaskan airports surveyed with traditional methods. Using the survey monuments positioned by GPS, the runway elevation, runway ends, centerline, and other critical measurements can be determined within a few centimeters.

In the past, a new GPS approach in Alaska took more than 1 year to develop. We are pursuing modifications to criteria that would provide additional options to meet the unique environment in Alaska. Currently, in those areas where adequate survey data exist, a new GPS approach can be developed, certified, and published in 6 to 12 months. We expect that, with additional surveys coupled with modifications to criteria, this will be the norm for all of Alaska. There are several interdependent steps in the process:

- Defining the airspace and integrating the approach into existing controlled airspace
- Environmental impact determination
- On site survey with obstacle evaluation
- Approach design
- Verifying the approach through flight check
- Publication of the approach

One factor outside the capability of the FAA to improve is the accuracy and reliability of the survey information on surrounding terrain. Alaska is mapped at half the contour accuracy of the lower 48 states. Consequently, the FAA must add up to several hundred feet to the minimum en route altitude, missed approach point location and altitude, and minimum descent altitude. The Bureau of Land Management is supporting an effort to map all of Alaska with 7.5-minute quadrangle charts and a digital terrain database.

NIOSH/NTSB/NWS/FAA Safety Study

Alaska has the highest traumatic worker fatality rate in the United States.[21] The highest fatality rate of any Alaskan occupation is commercial pilots.[22] The National Institute of Occupational Safety and Health (NIOSH), along with the National Transportation Safety Board (NTSB), the NWS, and the FAA, is conducting a study of safety in Alaska in aviation and related occupations. The goal of this 3-year joint effort is to reduce the number of occupational aviation fatalities in Alaska by 50 percent for the years 2000 through 2009 and to reduce substantially the number of aviation accidents and resultant deaths in the state.[23] In addition to pilots and crew, the study also is looking at occupations that rely on

[20] FAR §121.119 and §135.213
[21] State of Alaska Epidemiology Bulletin No. 10, July 2, 1998
[22] ibid
[23] NTSB, Northwest Field Office, Testimony of James LaBelle, before field hearing of Senate Appropriations Committee, Transportation Sub-Committee, Anchorage, Alaska, December 14, 1999

aviation for a substantial part of the job. This includes the air ambulance medical personnel, along with doctors and nurses en route to clinics and remote facilities.

Medical Facilities of the Indian Health Service

Tribal hospitals are located in the six rural communities of Barrow, Bethel, Dillingham, Kotzebue, Nome, and Sitka. There are 29 Tribal health centers and 176 Tribal community health aide clinics operated throughout the state. The Alaska Native Medical Center in Anchorage serves as the area's referral center and gatekeeper for specialty care.[24]

The Alaska Native Tribal Health Consortium provided this illustration of the network of primary, secondary, and tertiary health care facilities in Alaska. The great distances and the critical role of aviation in overcoming those distances are unlike any state in the Union.

Current State of Aviation Access

Access to Medical Facilities in Other States

The problem of access to inpatient medical facilities from remote communities is not limited to Alaska. There are 3,038 counties and 31 combined city/county governments in the United States.[25] Of these, only 40 counties in 11 states have a population density less than Alaska -- one person per square mile.[26] These are listed in appendix III. Lincoln County, Nevada, is the largest of these low-density counties with 3,775 people in 10,634 square miles. The maximum distance within the county from Caliente and its 20-bed[27]

[24] Alaska Area Office of the Indian Health Service
[25] National Association of Counties
[26] "Land Area, Population, and Density for States and Counties: 1990", U.S. Census Bureau, Released March 12, 1996, Revised June 26, 2000
[27] "City of Caliente, Nevada". Governet: Your Government Portal

hospital is 77 road miles. Loving County, Texas, is the least populous county in the 49 states with a density of 0.16 people per square mile (107 people in 673 square miles). Mentone, the only community in Loving County, is 23 road miles from an inpatient hospital in Pecos, Texas. By comparison, six Alaskan boroughs or census areas have lower population densities than Loving County. The largest, Yukon-Koyukuk census area, has 8,478 people in 157,121 square miles - a density of .05 people per square mile or 18.5 square miles per person.[28] At this density, Montana, which is equivalent in land area to Yukon-Koyukuk, would contain less than 8,000 people or 99 percent less than the 2000 population of 902,195.[29] Since half of Alaska's population lives in Anchorage, the population density drops to 0.48 people per square mile if Anchorage is not considered. Only 13 counties in the Nation have a lesser density.

Communities in these counties, as throughout the contiguous United States, have more than a single means of access to medical care. Besides having year round road access, most remote communities outside of Alaska are within range of air ambulance. With a more developed system of roads (Interstate, U.S., state, county, and local), weather reporting systems, navigational aids, and other aviation infrastructure, even the most remote communities in the lower 48 have unimpeded access for a much higher number of hours each day and days each year than in Alaska.

Alaskan Communities with Limited Access to Medical Facilities

There are 201 Alaskan communities with a year round population greater than 20 that rely entirely on air transport to the nearest inpatient medical facilities.[30] The average population is 318. There are airports at 176 of these communities. The 25 communities with no local airport or road access are either adjacent to or within a short distance of a community with an airport, or are accessible by floatplanes but without a seaplane base. The median distance to the nearest inpatient facility is 100 miles by air. Since the air ambulance services are not positioned in these communities, emergency medevac flights most often require a round trip to the community. The round trip flight distance is equivalent to citizens of Washington, D.C., flying one way to New York City or Pittsburgh, Pennsylvania, but in a Cessna 207.

Only 53 of the 176 airports are equipped for at least minimum IFR operations. The remaining airports lack some or all of the essential elements of current weather, runway lightings, navigational aids, communications, and instrument approach procedures.

Of the 176 airports serving these 201 remote communities, all but 4 are listed in the National Plan of Integrated Airport Systems. Nikolski is a U.S. Air Force Air Station. Port Clarence is a U.S. Coast Guard Station. Beluga, serving the community of Tyonek, is a private airport. Jakolof Bay is a public domain airport but is in the last stages of deterioration. The remaining 172 airports are open for public use and are eligible for AIP assistance. Also, the State of Alaska Department of Transportation and Public Facilities own 156 of the airports. The state's priorities and decisions on budget, operations, and maintenance are a significant factor in the planning and allocation of AIP funds.

[28] U.S. Census Bureau
[29] U.S. Census Bureau, Montana Quick Facts
[30] Denali Commission, et al., Alaska Rural Primary Care Facility Needs Assessment, Volume I, Overview

Table 1

Nearest Inpatient Medical Facilities for Remote Alaskan Communities that Rely Entirely on Air Transport

Nearest Inpatient Medical Facility	Number of Communities	Population	Average Distance Minimum/Maximum
Anchorage	26	9,092	411 28/1188
Barrow	5	1,550	135 59/203
Bethel	52	19,615	109 6/403
Cordova	1	105	49 49/49
Dillingham	19	3,768	96 14/218
Fairbanks	27	4,720	200 82/384
Homer	5	750	18 12/26
Juneau	16	5,684	68 35/198
Ketchikan	11	5,949	45 16/70
Kodiak	6	1,022	48 12/84
Kotzebue	11	4,637	92 43/155
Nome	16	5,582	111 57/196
Petersburg	1	702	38
Sitka	2	706	52 42/62
Wrangell	3	163	45 38/49
Total	201	64,045	147 6/1188

Use of Air Transport for Access to Medical Inpatient Facilities

The FAA has operating specifications for air carriers engaged in air ambulance services. Thirteen air carriers now operate full or part time as air ambulances. This does not restrict other operators or pilots from conducting an emergency air transport. It does, however, establish flight standards for those operating as a business for hire. There are no statewide statistics on the use of air transport for medical purposes. For villages in the Yukon-Kuskokwim area, AeroMed International provides air ambulance service between 56 villages and Bethel. These villages are served by 52 airports and are an average of 109 miles distance from Bethel. In FY 2000, AeroMed conducted 441 air ambulance transports to and from Bethel and 49 communities.[31] AeroMed pilots recently identified 18 airports at which they chronically experience delays in medevacs due to lack of runway lights. They also reported that another seven airports have runway lengths too short for most of the air ambulance aircraft.

[31] Mr. David Harbour, Chief of Flight Operations, Aeromed International

Throughout coastal Alaska, the U.S. Coast Guard is sometimes the primary medevac service for many of the outlying communities that fall within its area of responsibility. What it does best is get into and out of communities at all hours of the night and in bad weather. This is something commercial air ambulances and other air service providers cannot do. It also does not charge for these services. The U.S. Coast Guard can be considered the medevac transporter of last resort since it does not compete with commercial air ambulance providers. It also is not well equipped to provide emergency medical services aboard its aircraft with emergency medical technician Level II being the normal standard of care. It most often uses rotary wing aircraft (HH-60J or HH-65) for these missions but sometimes also uses HC-130H as a cover aircraft for longer distances. It conducts most of the medevacs in southeast Alaska, mostly from the communities of Angoon, Hoonah, Craig, Klawock, and Hydaburg. All medevacs conducted by the U.S. Coast Guard is for life or death situations and extreme medical emergencies. In the last 3 years, it has conducted 278 emergency medevac operations and has saved 232 lives through the actions of the aircrews. About two-thirds of the operations were in Southeast Alaska.[32]

Space in the Coast Guard helicopters is at a premium. With the existing inventory of aircraft, particularly in southeast Alaska, the Coast Guard is greatly challenged by a multiple patient medevac from any of these remote communities. During the research for this study, the Coast Guard received medevac requests for two different locations with only one aircraft available. They evaluated other mission priorities, recalled a second aircraft, and successfully completed both medevacs.

Runway Length and Condition

The 176 airports serving the 201 communities with no inpatient medical facilities are of five categories:

Table 2

Surface Type and Length of Airports at Remote Locations in Alaska			
Surface Type	Number of Airports	Average Length	Number less than 3300 Feet
Water	17	--	--
Asphalt	21	5385’	2
Gravel	137	3125’	87
Turf	1	1700’	1
Total*	176	3414’ (land only)	92

*Does not Include one Heliport at Diomede

From 1982 to 2000, the FAA has funded through the AIP 348 projects at 142 of these remote communities that rely entirely on air transport to inpatient medical facilities. These projects totaled $507,259,941. Many of these projects were directed at bringing all airports up to the new minimum standard of 3,300-foot runway with all weather surfaces with lights. Because of the engineering and design difficulties of runway construction in tundra, permafrost, or low-lying areas, runway projects often are completed in two to three phases over several years.

[32] U.S. Coast Guard 17th District, Juneau, Alaska

Table 3

Airport Improvement Program Projects FY 1982 – FY 2000			
Project Type	Total Grants 1982-2000	Number of Projects	Number of Communities
Construct new runways, aprons, taxiways, and safety areas. Rehabilitate, improve, or expand runways and seaplane bases.	$413,112,149	169	128
Snow removal equipment and buildings	$8,817,106	37	34
All other categories	$85,320,666	142	
Total	$507,259,941	348	142

Airport Lighting

There is some type of airport lights at 113 airports at these remote communities relying on air transport for medical access. Most of these serve VFR flight. There are beacons at 94 of the airports. Precision approach path indicator (PAPI) or visual approach slope indicator lights are located at 43 airports. Twelve airports have instrument approach lights. There are runway lights at 108 of these airports of which 10 have high intensity runway lights. There are no lights of any type at 63 airports.

The FAA is researching other technology for use at remote airports without runway lights. Through a $250,000 grant by the FAA to Great Lands Technology, the proof of concept is being tested in Alaska for low power, high intensity laser lights for marked runway center lines, ends, or edges.

Weather Reporting Systems

The FAA has commissioned 20 ASOS and 45 AWOS among these remote communities that rely entirely on aviation for access to inpatient facilities. There are 111 communities with no local weather reporting systems.

Instrument Approaches

The FAA has developed 174 instrument approaches for 53 of these remote airports. Most rely on ground based navigational aids such as a very high frequency omni directional range or nondirectional radio beacon. Currently, there are 73 GPS approaches to these airports either as an overlay to an existing instrument approach or as a standalone. The FAA has completed GPS surveys at 46 additional airports and need a request from the airport owner/operator to proceed with the development of instrument approaches. Another 47 locations are candidates for GPS approaches. Most locations will need runway lighting, weather reporting systems, or improved communications systems before GPS approaches can be used.

Weather Cameras

The FAA has deployed digital cameras at remote sites around Alaska. These cameras provide weather images to pilots via the Internet and are updated as often as every 10 minutes. The cameras are aimed to give the best indication of weather in the direction most relevant to VFR traffic. They provide images from locations where weather observation does not exist. Of the 18 cameras now in operation, 12 are located at airports that rely entirely on air transport to the nearest inpatient medical facility. These cameras do not replace official weather information but provide an additional source of information for the VFR pilot. All the images are paired with a clear day image for comparison. Several of these are annotated with the azimuth, elevation, and distance for landmarks.

Mike-In-Hand

In partnership with the NWS, the FAA has begun a “mike-in-hand” program to provide weather information at communities with NWS offices but no 24-hour FAA presence. Seven of the thirteen communities are among those that rely on air transport to inpatient medical facilities. At these locations, pilots can receive full weather briefings, as well as description of local conditions bearing on flight safety.

Recommendations

Each of these recommendations improves aviation access into and out of these remote locations under VFR or IFR flight. Each contributes to increasing the types of aircraft, increasing the hours each day, and decreasing the visibility and ceiling minima for safe flight.

The FAA is conducting the most intensive and extensive AIP construction program in the history of Alaska. Through the AIP, the FAA has invested $507.3 million since 1982 to improve access at these communities that are totally reliant on air transport to the nearest inpatient facility. In the next 5 years, the FAA plans to continue the growth in investment of the past 19 years through the AIP.

Federal Aviation Administration

The FAA will host a meeting in Alaska of organizations that provide and support the healthcare system in remote locations in Alaska. Besides Federal and state agencies, we will include representatives from nonprofit organizations, Native organizations, and industry organizations. With a focus on improving access to the healthcare system for remote communities in Alaska, the participants will develop a long-term strategy on coordinated planning, information sharing, and the setting of priorities.

For the 5 years from FY 2001 through FY 2005, the FAA has identified AIP eligible investment needs of $565 million for these communities. These include projects to construct, rehabilitate, and extend or expand airports, runways and taxiways, and seaplane bases at 118 of these remote communities over the next several years. In FY 2001, approximately $75 million is planned for 65 projects at 38 of the communities. This includes 22 projects at 18 communities specifically for runway improvements. Every major runway project will include runway lights and PAPI lights. Many other projects will improve and increase access, particularly grants for snow removal equipment.

The FAA recognizes and will continue to consider the need for a community's access to the medical system during the AIP planning process.

The FAA will evaluate the results of the laser technology research for application at remote locations in Alaska.

The FAA will install an AWOS at Hoonah during FY 2001. The FAA will consider other systems following site analysis and with funding in subsequent years.

The FAA will continue to expand the weather camera system and will install 18 weather cameras in FY 2001 to serve remote airports. Weather cameras will be placed, when possible, at high sites and mountain passes where no weather information exists. The FAA also will integrate the weather camera images into the three Automated Flight Service Stations and all Flight Service Stations for use in pilot and weather briefings.

The FAA will continue and expand its Capstone initiative to improve safety and access in remote areas of Alaska including expansion into southeast Alaska. Capstone is an accelerated effort to improve aviation safety and efficiency through installation of government-furnished GPS-based avionics and data link communications suites in most commercial aircraft serving the Yukon-Kuskokwim delta area.

U.S. Coast Guard

The FAA commends the U.S. Coast Guard for its valorous lifesaving missions in Alaska and continues to support its mission in medical air transport. The aircrews perform heroically under unimaginable extremes of weather and terrain to preserve the lives of people in the direst need. A fourth HH-60J assigned to the Coast Guard Station in Sitka will increase the aircraft availability, possibly decrease the medevac response time, and improve their ability to respond to simultaneous medevac requests.

Indian Health Service and the Alaska Native Tribal Health Consortium

The FAA recognizes and supports the contributions of the IHS in Alaska. Through its compact with the Alaska Native Tribal Health Consortium, the IHS oversees the healthcare of more than 100,000 Alaska Native people, Eskimos, Aleuts, and Indians in 226 tribes. The overwhelming task of providing statewide healthcare over the vastness of Alaska is daunting. The IHS and its partners continue their journey to provide the highest quality health care for all Alaska Natives.

National Weather Service

The FAA and the NWS will continue to support the mike-in-hand program of briefing on local conditions by the NWS.

NIOSH/NTSB/NWS FAA Safety Study

The FAA will continue to participate in this vital study and will conduct a comprehensive review of its ultimate recommendations.

Conclusions

The problem of access to medical facilities from remote locations in Alaska is extensive, complex, and daunting. Even communities on the road system rely on aviation for emergency medical transport. No single Federal, state, or local government agency has the mission or resources to bring these communities up to the emergency response standards enjoyed throughout the rest of the United States. It may be years, perhaps decades, before a call to 911 from anywhere in Alaska will result in a response within minutes.

The FAA has invested more than one-half billion dollars in these remote communities in the last 19 years to improve markedly the aviation access. The improvements include several new, all weather runways, rehabilitated and extended runways, installation of approach and runway lights for night operations, greatly improved weather reporting, new instrument approaches for IFR flight, and weather cameras for the VFR pilot. Travel to and from these communities is safer, more reliable, and is less affected by weather. However, the challenge remains to bring all these airports up to a standard of unfettered access during all seasons of the year and all conditions of weather. The FAA will continue to improve the infrastructure at these and other communities in Alaska.

While the FAA is the leader in improving aviation access, it cannot address the other aspects of the question such as:

- Location, nature, and capabilities of local medical facilities
- Local telephone and satellite communications
- Road, highway, or rail construction
- Electrical power generation
- Telemedicine and remote diagnostic methods
- Geological mapping standards

The FAA in Alaska continues to confront the challenges of providing safe, reliable, and efficient air transportation in the most uncooperative land in all the United States. Through an aggressive AIP, dramatically improved reliability of national airspace system equipment, innovative research and demonstration projects, and partnerships with other Federal agencies, the State of Alaska, industry and aviation associations, and the people of Alaska, the FAA is committed to improve the aviation access by Alaskans to the healthcare system.

Appendix A
Alaskan Communities with Only Air Access to Nearest Inpatient Facility

Community	*IFR*	*ID*[*]	*Population*[**]	*Nearest Inpatient Facility*	*VIA*	*Air Distance*
Adak		ADK	106	Anchorage		1,188
Akhiok		AKK	99	Kodiak		84
Akiachak		Z13	560	Bethel		16
Akiak		AKI	325	Bethel		22
Akutan		KQA	425	Anchorage	Unalaska	823
Alakanuk		AUK	677	Bethel		160
Alatna			34	Fairbanks	Allakaket	181
Alexander Creek			39	Anchorage		28
Allakaket		6A8	197	Fairbanks		181
Ambler	X	AFM	298	Kotzebue		128
Anaktuvuk	X	AKP	312	Fairbanks		253
Andreafsky			442	Bethel	St. Mary's	101
Angoon		AGN	616	Sitka		42
Aniak	X	ANI	594	Bethel		94
Anvik	X	ANV	91	Bethel		139
Arctic Village		ARC	138	Fairbanks		236
Atka	X	AKA	99	Anchorage		1,096
Atmautluak		4A2	296	Bethel		16
Atqasuk	X	ATK	273	Barrow		59
Beaver		WBQ	126	Fairbanks		108
Bettles	X	BTT	36	Fairbanks		178
Birch Creek		Z91	35	Fairbanks		116
Brevig Mission		KTS	291	Nome		64
Buckland	X	BVK	442	Kotzebue		74
Chalkyitsik		CIK	102	Fairbanks		172
Chase			55	Anchorage		77
Chefornak		CFK	408	Bethel		94
Chenega Bay		C05	69	Anchorage		102
Chevak		VAK	769	Bethel		135
Chignik		AIC	96	Dillingham		188
Chignik Lagoon		KCL	68	Dillingham		188
Chignik Lake		A79	136	Dillingham		188
Chuathbaluk		9A3	127	Bethel		102

[*] Communities with no airport ID are either located adjacent to or within a short distance from a community with an airport, or are accessible by floatplanes but without a seaplane base.

[**] Population for organized communities is certified as of December 2000; others are estimated as of 1999.

Community	*IFR*	*ID*	*Population*	*Nearest Inpatient Facility*	*VIA*	*Air Distance*
Circle		CRC	89	Fairbanks		130
Clark's Point		CLP	76	Dillingham		14
Coffman Cove		KCC	200	Ketchikan		62
Cold Bay	X	CDB	104	Anchorage		618
Covenant Life			67	Juneau	Haines	70
Craig		CGA	2,124	Ketchikan		56
Crooked Creek		CJX	137	Bethel		144
Cube Cove			139	Juneau		30
Deering		DEE	155	Kotzebue		57
Diomede		DM2	133	Nome		135
Edna Bay			55	Ketchikan		88
Eek		EEK	289	Bethel		39
Egegik		EII	123	Dillingham		72
Ekwok		KEK	123	Dillingham		42
Elfin Cove		ELV	50	Juneau		65
Elim		ELI	316	Nome		94
Emmonak	X	ENM	804	Bethel		163
Evansville			24	Fairbanks	Bettles	178
False Pass		KFP	73	Anchorage	Cold Bay	654
Fort Yukon	X	FYU	565	Fairbanks		142
Galena	X	GAL	592	Fairbanks		267
Gambell	X	GAM	653	Nome		196
Game Creek			50	Juneau		35
Golovin		N93	142	Nome		71
Goodnews Bay		GNU	235	Bethel		115
Grayling		KGX	187	Bethel		157
Gustavus	X	GST	377	Juneau		41
Haines	X	HNS	1,808	Juneau		70
Halibut Cove			71	Homer		12
Healy Lake			61	Fairbanks		113
Hobart Bay			48	Juneau		72
Hollis		HYL	111	Ketchikan		38
Holy Cross	X	4Z4	259	Bethel		119
Hoonah		HNH	880	Juneau		35
Hooper Bay	X	HPB	1,066	Bethel		152
Hughes		HUS	77	Fairbanks		202
Huslia	X	HSL	283	Fairbanks		254
Hydaburg		HYG	369	Ketchikan		45

Community	*IFR*	*ID*	*Population*	*Nearest Inpatient Facility*	*VIA*	*Air Distance*
Igiugig		IGG	62	Dillingham		94
Iliamna	X	ILI	93	Anchorage		194
Ivanof Bay		KIB	29	Anchorage	Cold Bay	743
Jakolof Bay		4Z9	40	Homer		13
Kake	X	AFE	702	Petersburg		38
Kaktovik			254	Fairbanks	Barter Island	384
Kaltag		KAL	251	Fairbanks		324
Karluk		KYK	41	Kodiak		73
Kasaan		KXA	44	Ketchikan		30
Kasigluk		Z09	528	Bethel		24
Kiana		IAN	366	Kotzebue		59
King Cove		KVC	671	Anchorage	Cold Bay	637
King Salmon	X	AKN	499	Dillingham		71
Kipnuk	X	IIK	573	Bethel		95
Kivalina		KVL	382	Kotzebue		78
Klawock	X	AKW	750	Ketchikan		56
Klukwan			136	Juneau	Haines	70
Kobuk		OBU	96	Kotzebue		155
Kokhanok		9K2	163	Anchorage		204
Koliganek	X	JZZ	205	Dillingham		64
Kongiganak		DUY	359	Bethel		67
Kotlik		2A9	567	Bethel		165
Koyuk	X	KKA	289	Nome		130
Koyukuk		KYU	100	Fairbanks		289
Kwethluk		KWT	762	Bethel		13
Kwigillingok		A85	360	Bethel		77
Larsen Bay		2A3	120	Kodiak		57
Levelock		KLL	131	Dillingham		58
Lime Village		2AK	62	Anchorage		181
Lower Kalskag			297	Bethel	Kalskag	72
Lutak			53	Juneau	Haines	70
Manokotak		17Z	405	Dillingham		20
Marshall		MLL	340	Bethel		75
McCarthy		15Z	37	Anchorage		235
McGrath	X	MCG	408	Anchorage		219
Mekoryuk	X	MYU	191	Bethel		153
Metlakatla		MTM	1,499	Ketchikan		16
Meyers Chuck		84K	30	Ketchikan		34
Minchumina	X	MHM	38	Fairbanks		148
Mosquito Lake			94	Juneau	Haines	70
Mountain Village	X	MOU	757	Bethel		109

Community	*IFR*	*ID*	*Population*	*Nearest Inpatient Facility*	*VIA*	*Air Distance*
Naknek		5NK	624	Anchorage	King Salmon	287
Nanwalek		KEB	170	Homer	English Bay	26
Napakiak		WNA	357	Bethel		8
Napaskiak		PKA	395	Bethel		6
Naukati Bay			164	Ketchikan		70
Nelson Lagoon		Z73	87	Anchorage	Cold Bay	700
New Stuyahok		KNW	468	Dillingham		50
Newhalen			183	Anchorage	Iliamna	194
Newtok		EWU	284	Bethel		95
Nightmute		IGT	214	Bethel		100
Nikolai		5NI	101	Fairbanks		233
Nikolski		IKO	39	Anchorage	Unalaska	905
Noatak	X	WTK	423	Kotzebue		48
Nondalton		5NN	216	Anchorage		184
Noorvik		ORV	634	Kotzebue		43
Nuiqsut	X	AQT	468	Barrow		151
Nulato		NUL	347	Fairbanks		300
Nunapitchuk		16A	480	Bethel		22
Old Harbor		6R7	257	Kodiak		47
Oscarville			64	Bethel	Napaskiak	6
Ouzinkie		4K5	259	Kodiak		12
Pedro Bay		4K0	36	Anchorage		170
Pelican		PEC	135	Juneau		67
Perryville		AK5	102	Dillingham		218
Pilot Point		PNP	85	Dillingham		107
Pilot Station		0AK	582	Bethel		87
Pitka's Point			146	Bethel	St. Mary's	101
Platinum	X	PTU	36	Dillingham		118
Point Baker		KPB	51	Wrangell		49
Point Hope	X	PHO	792	Kotzebue		150
Point Lay		PIZ	217	Barrow		179
Port Alexander		AHP	90	Sitka		62
Port Alsworth			88	Anchorage		162
Port Clarence		KPC	22	Nome		66
Port Graham		PGM	178	Homer		24
Port Heiden	X	PTH	121	Dillingham		144
Port Lions		ORI	246	Kodiak		16
Port Protection		19P	50	Wrangell		49
Prudhoe Bay	X		47	Barrow	Deadhorse	203
Quinhagak		AQH	582	Bethel		71

Community	*IFR*	*ID*	*Population*	*Nearest Inpatient Facility*	*VIA*	*Air Distance*
Rampart		RMP	66	Fairbanks		82
Red Devil	X	RDV	44	Bethel		164
Ruby		RBY	179	Fairbanks		224
Russian Mission	X	RSH	307	Bethel		71
Saint George	X	PBV	164	Bethel		403
Saint Mary's	X	KSM	482	Bethel		101
Saint Michael	X	5S8	368	Nome		123
Saint Paul Island	X	SNP	585	Bethel		388
Sand Point	X	SDP	871	Anchorage		555
Savoonga	X	SVA	652	Nome		163
Scammon Bay	X	SCM	501	Bethel		144
Selawik	X	WLK	792	Kotzebue		74
Seldovia		SOV	291	Homer		16
Shageluk		SHX	128	Bethel		152
Shaktoolik		38A	227	Nome		127
Sheldon Point		SXP	201	Bethel		156
Shishmaref	X	SHH	547	Nome		121
Shungnak		SHG	257	Kotzebue		148
Skagway		SGY	880	Juneau		81
Skwentna		SKW	72	Anchorage		67
Sleetmute		SLQ	103	Bethel		168
South Naknek		WSN	132	Dillingham		57
Stebbins		WBB	543	Nome		118
Stevens Village		SVS	92	Fairbanks		90
Stony River		SRV	35	Bethel		188
Takotna		TCT	48	Bethel		242
Tanana	X	TAL	300	Fairbanks		127
Tatitlek		7KA	105	Cordova		49
Teller		K54	281	Nome		57
Tenakee Springs		TKE	105	Juneau		46
Tetlin		5TE	89	Fairbanks		199
Thorne Bay		KTB	603	Ketchikan		40
Togiak	X	TOG	824	Dillingham		67
Toksook Bay		OOK	527	Bethel		112
Tuluksak		TLT	443	Bethel		37
Tuntutuliak		A61	350	Bethel		42
Tununak		4KA	331	Bethel		117
Twin Hills		A63	76	Dillingham		63
Tyonek		BLG	160	Anchorage		50
Unalakleet	X	UNK	757	Nome		146
Unalaska	X	DUT	4,283	Anchorage		734
Upper Kalskag	X	KLG	262	Bethel		72

Community	*IFR*	*ID*	*Population*	*Nearest Inpatient Facility*	*VIA*	*Air Distance*
Venetie		VEE	232	Fairbanks		158
Wainwright	X	AWI	545	Barrow		85
Wales		IWK	154	Nome		109
Whale Pass			62	Wrangell		38
White Mountain		WMO	207	Nome		61
Whitestone Logging Camp			118	Juneau		35
Yakutat	X	YAK	744	Juneau		198

Appendix B

Bethel Area Airports Identified by AeroMed International* As Critical

Runways that chronically cause delays in medevacs due to lack of runway lights:

Akiachak	Atmautlauk	Chefornak
Chuathbaluk	Crooked Creek	Eek
Kongiganak	Kwethluk	Kwigillingok
Marshall	Napakiak	Newtok
Nightmute	Nunapitchuk	
Shageluk	Stony River	Toksook Bay
Tuluksak		

Runways too short for current medevac plane:

Akiachak	Chuathbaluk	Eek
Kwethluk	Toksook Bay	Nightmute
Tuntutuliak		

Runways that would benefit from an instrument approach and automated weather reporting system:

Alakanuk	Chevak	Crooked Creek
Grayling	Holy Cross	Kalskag
Kongiganak	Kotlik	Kwigillingok
Marshall	Mountain Village	Newtok
Nightmute	Nunapitchuk	Pilot Station
Russian Mission	Scammon Bay	Sheldon's Point
Shageluk	Sleetmute	Stony River
Toksook Bay	Tuluksak	Tununak

* AeroMed International provides air ambulance services throughout the Yukon Kuskokwim delta under contract to Yukon Kuskokwim Health Corporation.

Appendix C
U.S. Counties with Population Density Less Than 1.0 per Square Mile*

State	County	Population Density	Population 1990	Land Area In Square Miles
Colorado	Hinsdale**	0.4	467	1117
	Mineral	0.6	558	875
Idaho	Camas	0.7	727	1075
	Clark**	0.4	762	1764
	Custer	0.8	4133	4925
Montana	Carter**	0.5	1503	3339
	Garfield**	0.3	1589	4668
	Golden Valley	0.8	912	1175
	McCone	0.9	2276	2642
	Meagher	0.8	1819	2391
	Petroleum**	0.3	519	1653
	Powder River	0.6	2090	3297
	Prairie	0.8	874	978
Nebraska	Arthur	0.6	462	715
	Blaine	0.9	675	710
	McPherson	0.6	546	859
	Sioux	0.3	1549	5352
Nevada	Esmeralda**	0.4	1344	3588
	Eureka**	0.4	1547	4176
	Lincoln**	0.4	3775	10634
	Pershing	0.7	4336	6009
New Mexico	Catron**	0.4	2563	6928
	Harding**	0.5	987	2125
North Dakota	Slope	0.7	907	1218
Oregon	Harvey	0.7	7060	10134
	Lake	0.9	7186	8136
	Wheeler	0.8	1396	1715
South Dakota	Harding	0.6	1669	2670
Texas	Borden	0.9	799	898
	Culberson	0.9	3407	3812
	Hudspeth	0.6	2915	4571
	Jeff Davis	0.9	1946	2264
	Kenedy**	0.3	460	1456
	King**	0.4	354	912
	Loving**	0.2	107	673
	McMullen	0.7	817	1113
	Terrell	0.6	1410	2357
Utah	Garfield	0.8	3980	5174
	Wayne	0.9	2177	2460

* "Land Area, Population, and Density for States and Counties: 1990", U.S. Census Bureau, March 12, 1996, revised June 26, 2000

** Counties with lower population density than Alaska without Anchorage