Report

Talkeetna Airport Improvements Phase II

Heliport Relocation Study

State Project No. 54660

Federal Project No. 3-02-0287-04-02

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Abbreviations

AC	FAA Advisory Circular
ADOT&PF	Alaska Department of Transportation and Public Facilities
AGL	Above ground level
AIP	Airport Improvement Program
ARC	Airport Reference Code
ARRC	Alaska Railroad Corporation
ATC	Air traffic control
CH-47	CH-47 Chinook helicopter
dB	Decibel
DGC	Division of Government Coordination
DME	Distance measuring equipment
DNL	Day-Night Noise Level
DNPP	Denali National Park and Preserve
EA	Environmental Assessment
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FATO	Final Approach and Takeoff Area
FEMA	Federal Emergency Management Agency
FSS	Flight Service Station
Ft	Foot
GA	General aviation
GPS	Global Positioning System
HPZ	Heliport protection zone
IFR	Instrument flight rules
IMC	Instrument meteorological conditions
MIRL	Medium-intensity runway lighting

MITL	Medium-intensity taxiway lighting
M&O	Maintenance and operations
MSB	Matanuska-Susitna Borough
MSL	Mean sea level
NAVAIDs	Navigational aids
NDB	Non-directional radio beacon
NM	Nautical miles
NOAA	National Oceanic and Atmospheric Administration
NPIAS	National Plan of Integrated Airport Systems
NPS	U.S. National Park Service
ROM	Rough Order of Magnitude
RW	Runway
SY	Square yards
TKA	Talkeetna Airport
TLOF	Touchdown and liftoff area
TVA	Talkeetna Village Airstrip
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
VASI	Visual approach slope indicator
VMC	Visual meteorological conditions
VFR	Visual flight rules
VOR	Very high frequency omnirange
WSCMO	Weather service contract meteorological observatory

SECTION 1

Goals and Objectives

As directed by the Alaska Department of Transportation and Public Facilities (ADOT&PF) and the Federal Aviation Administration (FAA), the goals and objectives of this study are to evaluate options for relocating the existing helipad at the Talkeetna Airport (TKA) to enhance safety and operating efficiency, and to accommodate unmet existing and projected demand. This study is being undertaken to address helicopter needs not addressed in the 2001 Talkeetna Airport Master Plan (AMP).

The existing helipad does not currently meet FAA standards and industry typical operating principles, resulting in operating conditions that present potential hazards to the pilots and general public. These operating conditions are a result of the following heliport deficiencies:

- The current helipad is located too close to the existing and proposed commercial apron, and as a result, aircraft parked on the commercial apron are subjected to high winds and the risk of damage resulting from helicopter rotor wash and flying debris.
- Larger helicopters interfere with the safe and efficient operation of the smaller helicopters and fixed-wing aircraft.
- The helipad is unusable from the time period extending from dusk to dawn. his is most notably a problem during winter months when there is very little daylight, although activity is lower during this season

In order to address these deficiencies, illustrated in **Exhibit 1-1**, and to create a facility that will remain safe and efficient as airport development occurs, a set of specific criteria regarding the relocation of the helipad was developed. These criteria were developed through personal interviews with airport users, the public, and ADOT&PF and would be implemented to meet FAA standards. The criteria include the following:

- Locate the helipad away from fixed-wing aircraft operations.
- Provide an adequate number of paved parking positions for based and itinerant helicopters at the heliport throughout the planning period (2003 to 2015) in order to reduce flying debris.
- Select a location that minimizes helicopter-related noise impacts to the community.
- Design a helipad that is operational before dawn and after dusk.
- Provide safe vehicle and pedestrian access to the proposed helipad.
- Address passenger-related concerns, like customer visibility and passenger-holding facilities that contain restrooms, food, and parking.
- Relocate the helipad such that aircraft operations at Talkeetna Airport, Talkeetna Village Airstrip, and Christiansen Lake Floatplane Basin are impacted as little as possible.

Whereas this report will inventory the environmental conditions on and around the airport property, the report will not describe or mitigate potential environmental impacts associated with the relocation of the heliport. These impacts will be addressed in detail as part of the Environmental Assessment (EA) that will be drafted following the completion of this report.

Exhibit 1-1 Existing Heliport Deficiencies

SECTION 2

Inventory

The inventory of existing conditions at TKA summarized below is drawn from information available in the ,the *Talkeetna Airport Environmental Assessment* (EA) (ADOT&PF, 2000), the *Talkeetna Airport Master Plan* (ADOT&PF, 2001), as well as various FAA and ADOT&PF publications and site visits. This section is organized as follows:

- Heliport background
- Surrounding environment
- Airport and heliport facilities
- Aircraft operational procedures
- Meteorological data
- Environmental inventory

This information is the basis of the study and will be utilized in this report.

2.1 Heliport Background

This section will address the history, role, and location of the Talkeetna Heliport.

2.1.1 Airport/Heliport History

TKA was constructed in 1941 and is owned and operated by ADOT&PF. Talkeetna does not have scheduled air service, but is served by many non-scheduled air taxi operators, including 7 who are based at the airport. The U.S. National Park Service (NPS) and U.S. Army operate both fixed-wing aircraft and helicopters at TKA in response to Mt. McKinley search and rescue missions.

The Alaska Aviation System Plan (AASP) classifies TKA as a "local" airport. Local airports serve as secondary access for communities and include recreational and emergency airports. Aviation is a significant economic generator for the village of Talkeetna and is frequently used as the base for guide service operations to outlying areas. Air taxi service, in support of the Mt. McKinley summer climbing season, is a major aspect of aviation activities at TKA. Flightseeing operations are also increasingly popular to the Denali National Park and Preserve (DNPP).

2.1.2 Heliport Role

The Talkeetna Heliport has different service areas during the winter and summer and different service areas for civilian versus military/government helicopter operations. In general, helicopter operations at Talkeetna are either air taxi operations or military/government operations. Helicopters are based at Talkeetna during the peak summer months.

During the summer, helicopter operations primarily serve mountaineering and flightseeing activities. These helicopter passengers are drawn from all parts of the world by the

internationally renowned attraction of Mt. McKinley, Denali National Park and the surrounding Alaska Range Mountain area. The Talkeetna Heliport is also used as a base for guide service operations to outlying areas. In the winter, the heliport primarily serves the emergency needs of the local residents living north and south along the George Parks Highway. Throughout the year, the heliport serves as a convenient fueling point for itinerant helicopters passing through the area.

Military helicopter flights are relatively infrequent. However, the Talkeetna Heliport serves the military in three important ways: as a refueling and transit stop for flights between Fairbanks and Anchorage, as a stop or destination for training flights, and as a base for search and rescue operations in support of the NPS. Military and government helicopter flights during the winter are primarily in response to emergencies.

The NPS operates both fixed and rotary-wing aircraft from TKA during the Denali and Mt. Foraker summer climbing season. The NPS's helicopters are used primarily for search and rescue operations during the summer months.

2.1.3 Heliport Location

Talkeetna is located at the junction of the Talkeetna and Susitna rivers, approximately 70 nautical miles (NM) north of Anchorage (see **Exhibit 2-1**). The village is accessed from the Talkeetna Spur Road that runs 14 miles east from the George Parks Highway. Talkeetna is an unincorporated community located within the Matanuska-Susitna Borough (MSB) and the Talkeetna Recording District. The village encompasses 41.6 square miles of land and 1.4 square miles of water.

2.2 Surrounding Environment

Talkeetna Airport is surrounded by various land uses, including private residential and commercial development, recreational land and neighboring airports, which must be considered when the heliport is relocated. This section of the report will detail the following:

- Surrounding land uses
- Neighboring airports

The information presented in this section will be used during the Alternatives Analysis phase of this study.

2.2.1 Surrounding Land Ownership and Land Use

The Talkeetna area comprises approximately 275,000 acres of land. The State of Alaska owns the majority of the land, totaling approximately 200,000 acres. The TKA property, comprising approximately 670 acres, is the largest block of state land near the Talkeetna town site. Other majority landowners include the MSB, Cook Inlet Region, Inc. native land entitlement, federal government, University of Alaska, and private entities. A land ownership map is shown in **Exhibit 2-2**.

Land ownership surrounding TKA is equally diverse. The University of Alaska owns approximately 600 acres, of which the majority is located north and west of Christiansen

Exhibit 2-1 Location and Vicinity Maps

Exhibit 2-1 back

Exhibit 2-2 Surrounding Land Use and Land Ownership

Exhibit 2-2 back

Lake. Additionally, a small tract of university-owned land is located at the junction of Talkeetna Spur Road and the Alaska Railroad, just south of TKA.

Land just to the west of TKA is primarily private land developed for residential and commercial uses and is commonly referred to as East Talkeetna. The Talkeetna town site lies farther west, across the Alaska Railroad Corporation (ARRC) tracks. The town site comprises the historic area of old Talkeetna and the majority of the tourist-oriented businesses, such as restaurants, lodging, and gift shops.

Most of the land north of TKA is privately owned, held in trust, or owned by the MSB and remains largely undeveloped. There are scattered residential units between TKA property and the Talkeetna River.

The Talkeetna Alaskan Lodge is located southeast of TKA. There is, however, very little development directly south, between TKA and the Talkeetna Spur Road. This land is owned by the MSB. Along the southwest side of TKA and west of the ARRC tracks is a mixture of residential, small commercial businesses, and public uses including the Talkeetna Library and Talkeetna Elementary School.

The MSB has established land use policies for the Talkeetna area. While TKA and lands surrounding TKA are not formally zoned, the MSB recognizes the Talkeetna Community Council as the local advisory body for planning and land use issues.

2.2.2 Neighboring Airports

There are two airports located within 1 mile of the Talkeetna Heliport. These facilities, including the Talkeetna Airport and Heliport, are presented in the area map in **Exhibit 2-1**.

2.2.2.1 Talkeetna Village Airstrip

The Talkeetna Village Airstrip (TVA) is a small, unpaved runway located in downtown Talkeetna, approximately 1 mile west of TKA. The airstrip measures 1,575 feet in length and 30 feet in width. The airstrip is open to the public and supports a limited number of itinerant single-engine general aviation (GA) aircraft operations. The airport has five year-round single-engine aircraft based at the airport. The village airstrip supports additional aircraft during the summer months.

2.2.2.2 Christiansen Floatplane Basin

Christiansen Lake is located approximately 1 mile southeast of TKA. The facility is used as a base for both private and commercial floatplane operations. Private homes and a public-use park, owned by MSB, are located on the shore of the lake. The longest reach on the lake, about 4,000 feet, runs northwest to southeast and is the predominant floatplane run.

2.3 Airport and Heliport Facilities

This section summarizes TKA's existing facilities. The facilities are discussed in the following functional categories:

- Runway and taxiway
- Helipad
- Common use

The layout of the airport and heliport is shown in **Exhibit 2-3**.

2.3.1 Runway and Taxiway Facilities

The airport has a 3,500-foot-long by 75-foot-wide asphalt runway with non-precision runway markings. The runway is serviced by a full-length parallel taxiway and is equipped with a 150-foot-wide runway safety area that extends 300 feet beyond each end of the runway. The runway has been classified as an Airport Reference Code (ARC) B-II facility. This code reflects common use by aircraft with approach speeds and wingspans up to, but not including, 121 knots and 79 feet, respectively. The runway pavement section is designed to support aircraft weighing less than 30,000 pounds.

The airport is equipped with medium-intensity runway lighting (MIRL), medium-intensity taxiway lighting (MITL), and runway threshold lights.

2.3.2 Helipad Facilities

The existing helipad is located south of the commercial aircraft apron. The heliport consists of a gravel apron approximately 480 feet long and 85 feet wide. A distinct landing area within the helicopter apron is not marked, and helicopters can land anywhere on this apron. The existing helipad apron is not lighted.

2.3.3 Common-use Facilities

The airport and heliport are supported by common facilities. These facilities are as follows:

- Aircraft apron
- Passenger facilities
- Navigational aids (NAVAIDs)
- Ground access and automobile parking

These facilities are discussed in the following sections.

2.3.3.1 Aircraft Apron

TKA has two aircraft parking apron areas. The first is a paved apron, located on the west side of the runway. This apron is approximately 1,200 feet long by 200 feet wide, for a total area of 26,667 square yards (SY). The apron can accommodate about 50 aircraft at a time and provides parking for air taxi, commuter, military, and other government agency aircraft. A second gravel apron was constructed in 1997 and adds an additional 8,880 SY near the Flight Service Station (FSS) to accommodate about 20 aircraft.

2.3.3.2 Passenger Facilities

There is no consolidated public passenger terminal at TKA, although terminal area facilities have been constructed by many of the lease lot holders.. There are currently 14 developed lease lots at TKA.

Exhibit 2-3 Existing Airport Facilities

Exhibit 2-3 back

2.3.3.3 NAVAIDs

There are three NAVAIDs located in close proximity to TKA. The Talkeetna very high frequency omnirange (VOR) transmitter and the distance measuring equipment (DME) transceiver are co-located approximately 1.6 miles south of the airport. The Peters Creek non-directional radio beacon (NDB) transmitter is located 0.6 mile northwest of the airport. Additionally, TKA is outfitted with visual approach slope indicators (VASIs) on both runway ends and a rotating beacon.

2.3.3.4 Airspace and Instrument Approaches

TKA is located within Class E airspace. The purpose of the Class E airspace is to provide increased weather minimums to separate visual flight rules (VFR) aircraft from instrument flight rules (IFR) aircraft on one of the airport's seven instrument approaches. These approaches, as well as descent and visibility minimums, are summarized in **Table 2-1**.

TABLE 2-1
Talkeetna Airport Instrument Approaches

	Minimum Descent Altitude (feet)		Visibility (miles)	
Aircraft Approach Category	**A**	**B**	**A**	**B**
VOR/DME – RW 36	1,000	1,000	1.0	1.0
VOR/DME – Circling	1,060	1,060	1.0	1.0
VOR-A (Circling Only)	1,060	1,060	1.0	1.0
NDB – RW 36	1,100	1,100	1.0	1.25
NDB – Circling	1,100	1,100	1.0	1.25
GPS – RW 36	1,000	1,000	1.0	1.25
GPS – Circling	1,000	1,000	1.0	1.25

Source: National Oceanic and Atmospheric Administration (NOAA)

Notes:
DME = distance measuring equipment
GPS = Global Positioning System
NDB = non-directional radio beacon
RW = runway
VOR = very high frequency omnirange

It should be noted that the neighboring airports are permitted to utilize these approaches to gain access to their facilities.

2.3.3.5 Ground Access and Automobile Parking

Airport vehicle access is provided from 2nd Avenue and is the primary route for tourists traveling between the airport and the historic parts of Talkeetna. There is a limited space for designated automobile parking spaces at TKA. During heavy snowfall winters, snow storage stockpiles further encroach upon the limited available parking area.

2.4 Aircraft Operational Procedures

There are three airports (TKA, Village Airstrip, and Christiansen Lake Floatplane Basin) that operate in proximity to one another. Operating procedures for these facilities need to be considered in the process to successfully relocate the heliport on TKA. This section will discuss the three airports' operating procedures.

2.4.1 Talkeetna Operating Procedures

There are two separate weather conditions that need to be addressed at Talkeetna: instrument meteorological conditions (IMC) and visual meteorological conditions (VMC).[1] Aircraft may only operate in IMC while under an instrument flight clearance issued by FAA air traffic control (ATC) facilities. Furthermore, all aircraft operating on an instrument flight clearance must maintain contact with ATC and follow established instrument procedures as well as directions issued by ATC. TKA is the only facility in the area that is directly supported by instrument approaches. Theoretically, aircraft desiring to land at one of the other two facilities could enter the airspace through the use of one of the Talkeetna approaches and then circle to land at a nearby airport. However, because Talkeetna is a non-towered airport, ATC treats the three airports as a single facility and will allow only one aircraft to enter the airspace at a time under IMC conditions. Therefore, converging traffic under IMC is not be an issue.

During VMC flight plans, or clearances, with ATC are not required. Standard operating procedures set up for TKA request that aircraft departing Runway 18 climb straight until 1,000 feet above ground level (AGL) prior to turning west, in order to remain clear of the Village Airstrip. When arriving on Runway 36, aircraft are requested to maintain 1,000 feet AGL before turning final to remain clear of the Village Airstrip. The airport traffic pattern, with exception to the arrival and departure phases, operates at 1,000 feet AGL. The traffic pattern for TKA, as well as the neighboring airports, is detailed in **Exhibit 2-4**.

2.4.2 Operational Impacts from/to Neighboring Traffic Patterns

The traffic pattern for the Village Airstrip does not follow typical operating procedures for small GA airports, but the traffic pattern is within the guidelines of the Federal Aviation Regulations (FAR). The Village Airstrip's traffic pattern at approximately 1/4-mile separation between the downwind leg and the runway, is unusually tight (rather than the more typical 1/2-mile to 3/4-mile separation). In addition the aircraft in the pattern operate at or below 500 feet AGL (rather than the more typical 600 to 1,000 feet AGL). These patterns, as shown in **Exhibit 2-4,** were established to reduce potential conflicts between aircraft operating at separate facilities.

Christiansen Lake Floatplane Basin aircraft typically operate using a more standard 1,000 AGL pattern with standard downwind runway separation (approximately 0.5 mile). As shown on **Exhibit 2-4**, this traffic pattern does not interfere with operations at TKA.

[1] IMC are conditions in which visual references such as the ground and the horizon are obscured by conditions such as clouds, requiring pilots to refer to aircraft instrumentation to maintain aircraft control and to navigate through the area. IFR are the regulations and procedures to operate under instrument flight plans and clearances, and are not influenced by meteorological conditions. An aircraft may operate under IFR while in visual meteorological conditions as well as IMC.

Exhibit 2-4 Local Airport Traffic Patterns

Figure 2-4 back

2.5 Meteorological Data

Meteorological data for TKA is summarized in the following sections.

2.5.1 Wind

The winds at TKA predominantly come from the south in summer and the north in winter. Winds are below 10 knots approximately 94.1 percent of the time. Winds greater than 10 knots predominately occur from the north, 4.5 percent of the time and from the south, 1.2 percent of the time, with a small fraction of those winds exceeding 16 knots. The remaining 0.2 percent of observations cannot be grouped into significant wind speed or direction. These data are summarized on the wind rose for the TKA (see **Exhibit 2-5**).

2.5.2 Climatic Summary

Table 2-2 details the climatic conditions for Talkeetna.

TABLE 2-2
Climatic Conditions

	Jan	Feb	Mar	Apr.	May	June	July	Aug	Sep	Oct	Nov	Dec	Ann
Ave. Max. Temp.	19.7	25.8	33.6	44.4	56.5	65.6	67.8	64.4	55.4	39.6	26.2	19.9	43.2
Ave. Min. Temp.	1.8	5.4	9.7	23.1	34.3	44.9	49.3	46.1	37.0	23.5	9.7	2.8	24.0
Ave. Total Precip.[a]	1.4	1.5	1.3	1.4	1.5	2.3	3.4	4.68	4.2	2.85	1.7	1.7	27.9
Ave. Total Snowfall[a]	18.6	20.0	17.1	9.2	0.9	0.0	0.0	0.0	1.2	11.6	19.2	22.8	120.6
Ave. Snow Depth[a]	27.0	30.0	31.0	18.0	2.0	0.0	0.0	0.0	0.0	2.0	8.0	17.0	11

[a] Inches
Source: Talkeetna (Weather service contract meteorological observatory [WSCMO]).

The information was collected at the Talkeetna weather station. The period of record is 9-1-1949 to 3-31-2003.

2.6 Environmental Inventory

An environmental inventory was conducted as part of the December 2000 Draft Environmental Assessment (2000 EA).[2] The information presented in this section is derived from that study and summarizes only the environmental categories that are applicable to the Heliport Relocation study. It is important to note that this section simply inventories the information and does not provide analysis concerning potential impacts to the environment associated with relocating the heliport. This information will be used to assist in the planning process by helping in the avoidance of significant environmental issues. The analysis concerning the impacts to the environment resulting from the relocation of the heliport will be conducted as part of an Environmental Assessment to be conducted after the completion of this study.

[2] USKH, Inc. conducted the December 2000 Draft Environmental Assessment for Talkeetna Airport.

2.6.1 Noise

A noise study (CH2M HILL, 2004) was performed to address the concerns the community had concerning the fixed- and rotary-wing aircraft activity at the Talkeetna Airport and Heliport.

The concern with noise has led this study to adopt the FAA's procedures and criteria for evaluating noise impacts outlined by FAA Order 5050.4a, Airport Environmental Handbook. The order established a Day-Night Noise Level (DNL) of 65 decibels (dB) as the threshold of incompatibility for residential and other noise-sensitive land uses, such as schools, hospitals, and religious facilities, located in the vicinity of civilian airports. DNL, which accounts for the greater annoyance caused by noise during the nighttime hours, is the standard measure of noise impact used by FAA and is accepted by other federal agencies.

The noise analysis indicates that future noise levels at or above the DNL 65-dB threshold would only occur beyond TKA's property boundary at up to 8 of the adjoining first-row residential lots in the Denali Subdivision.

However, it is understood from public comment, that some residents feel Talkeetna is not representative of the typical community faced with noise impacts from airports. As a result, a number of guidelines included in the noise study address noise-related issues on a level that are reflective of the potential concerns identified by the public. Specifically, potential aircraft noise effects on outdoor speech communication are discussed.

2.6.2 Compatible Land Use

A description of the surrounding land use and land ownership is summarized in Section 2.2.1 and illustrated in **Exhibit 2-2**. TKA is a key component of Talkeetna's transportation system and economy. Talkeetna's economy relies heavily on tourism due to its proximity to DNPP, Mt. McKinley, and Denali State Park. The transportation and communications industries account for over one-half of the employment base for Talkeetna, and retail businesses are mostly tourism related.

In an effort to manage community growth responsibly and reduce land use conflicts, the Village of Talkeetna prepared a Comprehensive Plan. The Plan was adopted in January 1998, and provides the framework for development in the community. Specific actions to manage and respond to recent and rapid tourism growth are addressed in the Community and Tourism Plan. The Tourism Plan identified the following goals and objectives as well as allowances for land use in the area:

- Mitigating the side effects of rapid tourism growth
- Guiding the character, location, and amount of tourism and related growth
- Improving community capacity to make and carry out community policy, within the community and with parties whose actions affect Talkeetna

Exhibit 2-5 TKA Wind rose

Exhibit 2-5 back

- Spur Road between downtown and the railroad crossing – acceptable location for new tourist-related commercial development
- East Talkeetna, by the TKA – acceptable location for new tourist-related commercial development

Both the Comprehensive Plan and Tourism Plan support TKA's role in the community and provide guidelines to ensure that development adjacent to TKA is reasonably compatible with aircraft operations.

2.6.3 DOT Section 4(f) Lands

The U.S. Department of Transportation (USDOT) Act Section 4(f) lands are publicly owned lands in public parks, recreation areas, wildlife and waterfowl refuges, or historic sites. There are no Section 4(f) lands within TKA.

2.6.4 Historic, Architectural, Archeological, and Cultural Resources

No historic, cultural, architectural, or archeological resources have been identified at TKA according to the State of Alaska State Historic Preservation Officer.

2.6.5 Biotic Communities

The inventory of biotic communities includes fish and aquatic resources, vegetation and terrestrial habitats, terrestrial mammals, and birds. These topics are summarized within this section.

2.6.5.1 Fish and Aquatic Resources

Rivers, streams, lakes, and wetlands comprise aquatic habitats in the vicinity of TKA. Twister Creek parallels the existing runway to the east and flows into the Susitna River after flowing under the ARRC tracks and the Talkeetna Spur Road. A flooded gravel pit pond is located to the north of the runway and various wetlands are located to the east and south of the runway. Wetland habitat within, and adjacent to, TKA will be further identified in the EA.

2.6.5.2 Vegetation and Terrestrial Habitats

The communities of Talkeetna and TKA are located within the Susitna River Basin, bounded on the west and north by the Alaska Range, on the east by the Talkeetna Mountains, and on the south by Cook Inlet. The lowland region surrounding TKA is an interspersion of upland habitats and extensive riverine and palustrine wetlands associated with the floodplains of the Talkeetna and Susitna rivers.

2.6.5.3 Terrestrial Mammals

Terrestrial mammals that occur in the TKA area include moose, grizzly bear, black bear, wolf, coyote, and red fox. Smaller mammals in the region include beaver, lynx, marten, mink, muskrat, river otter, weasel, porcupine, snowshoe hare, and red squirrel.

Moose are present in the area, particularly during the winter. The airport is located within a recognized winter concentration area for moose.

Grizzly and black bears may be present along the banks of the Talkeetna and Susitna rivers and the lower portion of Twister Creek. Black bears are occasionally observed in the vicinity of TKA during the summer. Beavers are present along the floodplain of Twister Creek where they construct and maintain beaver ponds in wetland areas south of the existing runway.

2.6.5.4 Birds

Bird species that have been observed at the airport include swallows, ducks, cranes, eagles, ravens and gulls. Ducks and gulls have been noted to be fairly plentiful around the sewage lagoon during the summer months. Swans have been sighted, on occasion, in wetland areas south of runway 36.

2.6.6 Endangered or Threatened Species of Flora and Fauna

The United States Fish and Wildlife Service (USFWS) has not identified the presence of any threatened or endangered species of fish, wildlife, or plants in the vicinity of TKA.

2.6.7 Wetlands

As depicted in **Exhibit 2-6**, three general types of wetlands occur in the vicinity of TKA: palustrine, lacustrine, and riverine. Of the three types, palustrine is the most widespread. This type of wetland is found along Twister Creek, between the existing runway and Twister Creek, and at the south end of the runway. Riverine wetlands are found within Twister Creek and the Susitna River, while a flooded gravel pit north of the existing runway represents lacustrine wetlands. Wetlands within, and adjacent to, TKA will be further identified in the EA.

2.6.8 Floodplains

A majority of the land occupied by TKA is within the 100-year floodplain of the Susitna and Talkeetna rivers, as designated by the Federal Emergency Management Agency (FEMA). A 100-year floodplain map is depicted in **Exhibit 2-7**.

2.6.9 Coastal Zone Management Plan

The MSB Coastal Zone Management Program boundary extends to the 1,000-foot contour interval for the Talkeetna River, including all lands and waters within the 100-year floodplain or 200 feet [ft]) on each side of the river ordinary high-water mark, whichever is greater. FEMA's maps indicate that the 100-year floodplain along the Susitna and Talkeetna rivers encompasses essentially all of the lands west of the southern half of the existing runway and all the wetlands along Twister Creek. All uses and activities within this boundary must comply with the enforceable policies of the MSB Coastal Zone Management Program and the State of Alaska, Office of the Governor, Division of Governmental Coordination (DGC). An Alaska Coastal Zone Management Program consistency review will be in effect for any state permits or authorizations needed to develop the heliport alternatives.

Exhibit 2-6 Wetlands

Exhibit 2-6 back

Exhibit 2-7 100-Year Floodplain

Exhibit 2-7 back

2.6.10 Coastal Barriers

Coastal barriers as defined in the Coastal Barriers Resources Act of 1982, Public Law 97-348, do not exist in this area.

2.6.11 Wild and Scenic Rivers

There are no rivers within the project area that are designated as wild and scenic under the Wild and Scenic Rivers Act, Public Law 90-542.

2.6.12 Prime and Unique Farmlands

There are no farmlands near TKA. The State of Alaska does not have any unique or prime agricultural lands as defined by the Farmland Protection Policy Act of 1981, Public Law 97-98.

SECTION 3

Heliport Activity Forecasts

Forecasts of aviation activity form the foundation on which all the facilities requirements and improvements are based. The historical data and aviation forecasts presented in the 2001 Master Plan (Master Plan) and since accepted by the FAA, are used in this study. The Master Plan forecasts for both fixed-wing aircraft and helicopters were developed from a survey of the commercial operators at the airport and anecdotal information provided by FSS personnel. Information presented in this study was also used to form the passenger enplanement forecasts. The information is divided into two parts:

- Forecast assumptions
- Helicopter forecasts

The information presented in this section will be used in Section 4 to determine the requirements of the new heliport.

3.1 Forecast Assumptions

The traffic forecasts developed in the Master Plan and used in this study are unconstrained traffic forecasts, which depend on a number of implicit and explicit assumptions. The most important assumptions directly impacting the traffic forecasts are as follows:

- The Alaska economy and tourism industry will continue to grow at the current rate.
- Tourism growth at Talkeetna is expected to exceed the Alaska state average, especially with the completion of the Princess Resort Lodge and the development of access to the south side of Denali National Park and Preserve.
- The population of Talkeetna will continue to grow at a rate of between 4.0 percent and 5.0 percent per year over the 1995 to 2015 period.
- The seasonality of the air traffic at TKA will remain unchanged over the forecast period.
- TKA will not receive year-round, regularly scheduled, fixed-wing air service during the forecasting timeframe.
- Part of the fixed-wing forecast traffic demand will continue to be accommodated by the Talkeetna Village Airstrip and the neighboring floatplane facilities.

These assumptions will be utilized in the following sections.

3.2 Forecasts of Helicopter Activity

This section reviews the helicopter forecasts that were presented initially in the 2001 Master Plan document. The following forecasts are presented in this section:

- Helicopter operations
- Helicopter fleet mix
- Based helicopters
- Helicopter passenger enplanements

Helicopter facilities will be based on the results of this forecast review. Adjustments to the 2001 Master Plan forecasts may be required to reflect the current conditions of TKA helicopter activity.

3.2.1 Helicopter Operations

TKA aircraft operations are presented in **Table 3-1**. An estimate of fixed-wing aircraft versus helicopter operations for the forecast years was developed using data provided by TKA, FSS personnel, the U.S. Army, and the Alaska Army National Guard.

TABLE 3-1
Annual Aircraft Operations

	Estimated Actual							Forecasts		
Type of Operation	**1980**	**1985**	**1990**	**1992**	**1994**	**1995**	**2000**	**2005**	**2010**	**2015**
Fixed-wing Aircraft Operations										
Air Carrier/Air Taxi	3,500	5,000	9,500	11,500	13,000	12,500	15,900	20,300	26,000	33,100
General Aviation	3,000	4,000	5,000	5,500	6,000	6,500	7,200	8,000	8,900	9,900
Fixed-wing Total	**6,500**	**9,000**	**14,500**	**17,000**	**19,000**	**19,000**	**23,100**	**28,300**	**34,900**	**43,000**
Rotary-wing Aircraft Operations										
Commercial (air taxi/flightseeing)	N/A	N/A	N/A	N/A	N/A	900	2,160	2,628	3,197	3,890
National Park Service	N/A	N/A	N/A	N/A	N/A	NA	410	440	450	480
Military	500	500	500	500	500	500	500	500	500	500
Other	N/A	N/A	N/A	N/A	N/A	N/A	50	50	60	60
Rotary-wing Total	**500**	**500**	**500**	**500**	**500**	**1,400**	**3,120**	**3,618**	**4,207**	**4,930**
Total Aircraft Operations	**7,000**	**9,500**	**15,000**	**17,500**	**19,500**	**20,400**	**26,220**	**31,918**	**39,107**	**47,930**

Source: USKH, Talkeetna Airport Master Plan, September 2001, Commercial Activity updated by CH2M HILL, Inc.
NA = data not available

Commercial, non-scheduled, air taxi, and flightseeing helicopter flights are conducted throughout the year. This service experiences a peak during the summer months. Most of the flightseeing helicopter operators use the Bell 206 Jet Ranger aircraft. During the spring and summer months (primarily May, June, and July) when mountain climbing activities peak on Mt. McKinley and Mt. Foraker, the NPS operates a Eurocopter 315B Lama helicopter from Talkeetna Heliport. The TKA is an important transfer point between the

fixed- and rotary-wing aircraft, especially when handling medical emergencies. Information from the NPS did not indicate any significant change in operations expected in the foreseeable future.

The military operates Boeing 234/CH-47 Chinook helicopters from Talkeetna. The U.S. Army and the Alaska Army National Guard occasionally fly CH-47 Chinook helicopters into Talkeetna on training exercises, when in transit, or for refueling on flights between Fairbanks and Anchorage. The military also uses Talkeetna Heliport as a base for search and rescue operations in the nearby Denali National Park and Preserve and Alaska Range Mountain areas.

As shown in **Table 3-1**, all of the growth in helicopter operations will come from the non-military segment. Non-military helicopter operations are forecast to grow from 900 annual operations in 1995 to 3,890 annual operations by 2015. This amounts to a growth rate of 3 percent per year over the forecast time period. Tourist-related flightseeing and search and rescue flights out of TKA will continue to grow at rates between 2 percent and 8 percent per year. Military helicopter operations are forecast to remain at a level of 500 annual operations.

The severe seasonal traffic peaking pattern observed for the helicopter operations is forecast to continue. Based on past experience, it is estimated that 80 percent of all the helicopter operations take place during the 6-month period between April and September.

Overall, total helicopter forecasts show a steady growth from an estimated 1,400 annual operations in 1995 to 4,930 annual operations by 2015.

It is important to note that the commercial helicopter operational forecast presented in this report was increased since the writing of the 2001 Master Plan. The Master Plan study indicated a very modest growth rate of approximately 1 percent per year. However, in the time since the drafting of that document, several tourism-related business operations have been introduced into the Talkeetna economy. Some of these businesses include the Talkeetna Alaska Lodge and a new ARRC train depot. Due to the introduction of these tourism attractions, and the marked increase of commercial helicopter activity at the heliport, it appears reasonable to grow this activity at a rate closer to that of the 5 to 8 percent rate anticipated by fixed-wing aircraft. Because the cost of a rotary-wing flightseeing trip is markedly greater than that of fixed wing, it cannot be assumed that both categories would grow at the same rate. Therefore, commercial helicopter activity was increased at an annual rate of 3 percent per year.

3.2.2 Helicopter Fleet Mix

Using the available fleet mix information in the Master Plan and other information received from other operators at the airport, helicopter fleet mix forecasts shown in **Table 3-2** were developed. In 1995, it was estimated that about one-third of all helicopter operations were generated by the civilian use of the Bell 206 Jet Ranger, which is anticipated to account for 79 percent of total aircraft operations by 2015. The NPS's Eurocopter 315 Lama helicopters accounted for 28 to 29 percent of all helicopter operations in 1995. It is estimated that this proportion will decline through 2010. The military helicopter operations accounted for a little more than 35 percent of all the helicopter operations in 1995. While the actual number of military helicopter operations is expected to remain constant at 500 helicopter operations

TABLE 3-2
Helicopter Fleet Mix

Helicopter Type	1995 Estimated Operations	% of Total	2000 Operations	% of Total	2005 Operations	% of Total	2010 Operations	% of Total	2015 Operations	% of Total
Bell 206 Jet Ranger or equivalent	**462**	**33**	**2,160**	69	**2,628**	73	**3,197**	76	**3,890**	79
Eurocopter 315 Lama or equivalent	**392**	**28**	**410**	13	**440**	12	**450**	11	**480**	10
Boeing 234/CH-47 Chinook or equivalent	**490**	**35**	**500**	16	**500**	14	**500**	12	**500**	10
Miscellaneous other types	**56**	**4**	**50**	2	**50**	1	**60**	1	**60**	1
Total Helicopter Operations	**1,400**	**100**	**3,120**	**100**	**3,618**	**100**	**4,207**	**100**	**4,930**	**100**

Source: USKH, Talkeetna Airport Master Plan, September 2001, p. 3-18, and CH2M HILL analysis and estimates.

per year, its percent of total will gradually decrease from about 35 percent in 1995 to 10 percent in 2015. Miscellaneous operations will account for approximately 4 percent of the total helicopter operations by the end of the planning period.

3.2.3 Based Helicopters

Based on discussions with the Airport Manager and Part 135 commercial operators, the following forecasts of based helicopters were developed and are reported in **Table 3-3**.

TABLE 3-3
Based Helicopters

	2000 Based Aircraft	2005 Based Aircraft	2010 Based Aircraft	2015 Based Aircraft
Bell 206 Jet Ranger or equivalent	1	2	3	4
Eurocopter 315 Lama or equivalent	1	1	1	1
Boeing 234/CH-47 Chinook or equivalent	3	3	3	3
Total	**5**	**6**	**7**	**8**

Source: CH2M HILL analysis and estimates

3.2.4 Helicopter Passenger Enplanements

Passenger enplanements were determined for peak month, average daily of peak month, and peak hour. The enplanement forecasts are derived for commercial helicopter activity. The following assumptions were made to forecast passenger enplanements:

- Commercial passenger helicopter enplanements only were forecasted.
- Annual commercial helicopter operations were divided by two to determine departure operations.
- Seasonal commercial helicopter operations are 80 percent of annual commercial helicopter operations.
- Peak period is 75 percent of seasonal commercial helicopter operations.[3]
- Peak day is 1/60th of the peak period.
- Peak hour is 45 percent of the peak day.[4]
- According to airport management, during the peak season, passenger enplanements average approximately four passengers per departure.

Peak month, average daily of peak month, and peak hour passenger enplanements are presented in **Table 3-4**.

TABLE 3-4
Passenger Enplanements

	2000	2005	2010	2015
Annual Commercial Helicopter Operations	2,160	2,628	3,197	3,890
Annual Commercial Helicopter Departures	1,080	1,314	1,599	1,945
Seasonal Commercial Helicopter Departures	864	1,051	1,279	1,556
Peak Period Commercial Helicopter Departures	648	789	959	1,167
Peak Day Commercial Helicopter Departures	11	13	16	20
Peak Hour Commercial Helicopter Departures	5	6	7	9
Peak Hour Enplanements	**20**	**24**	**28**	**36**

Source: CH2M HILL analysis and estimates and Talkeetna Airport Manager

It is important to note that the military does make use of the commercial facilities. Facility planning should include non-commercial space to accommodate approximately 18 military personnel.

[3] Peak period extends from mid June to mid August.

[4] During peak season, tour buses tend to arrive in clusters.

SECTION 4

Facility Requirements

This section outlines the facilities that will be required at the new location of the Talkeetna Heliport. The need for these facilities is driven by the projections in Section 2 and known changes at the existing Talkeetna Heliport.

The requirements of future facilities at the new heliport location are reviewed as follows:

- Design aircraft
- Helipad siting requirements
- Heliport facility requirements

The facilities presented in this section will form the basis of the identification and evaluation of development alternatives, presented in the following section.

4.1 Design Aircraft

Helicopter facilities are designed based on the requirements of specific helicopter models forecasted to utilize the heliport. FAA's Advisory Circular (AC) 150/5390-2A, "Heliport Design", contains helicopter data relevant to the design of heliports. **Table 4-1** summarizes the relevant dimensions of the forecasted helicopter fleet mix at the Talkeetna Heliport.

TABLE 4-1
Helicopter Characteristics, Talkeetna Airport

Model	Main Rotor Diameter (feet)	Overall Length (feet)	Undercarriage		Maximum Takeoff Weight (pounds)[c]
			Length (feet)	Width (feet)	
Eurocopter 315 Lama	37.0	43.0	5.3[a]	7.8[a]	4,300
Eurocopter 350 A Star	36.0	43.0	4.7[a]	7.1[a]	4,960
Bell 206 Jet Ranger	37.0	43.0	9.9[a]	7.2[a]	4,450
Sikorsky UH-60 Blackhawk	54.0	65.0	29.0	8.9	22,000
CH-47 Chinook	60.0[b]	99.0	25.8	10.5	48,500

[a] Skid equipped.

[b] The CH-47 Chinook has two rotors, each 60 feet in diameter.

[c] Helicopters that have a maximum gross takeoff weight over 12,000 lbs. are classified as heavy.

The CH-47 Chinook (CH-47) is the most demanding helicopter forecasted for TKA and is therefore identified as the design helicopter for TKA. It is important to note that common facilities, such as the helipad, will be designed for the most demanding aircraft, and helicopter-specific spaces, such as parking positions, will be designed per helicopter. **Exhibit 4-1** presents graphically the front, side, and rear views, including dimensions, of the Boeing CH-47 and the Bell Jet Ranger.

4.2 Helipad Siting Requirements

The FAA has established a series of clearances and imaginary airspace surfaces to ensure that adequate space is provided for approaching and departing helicopters. The clearance and boundary criteria are broken into the following categories:

- Final approach and takeoff area
- Touchdown and liftoff area
- Safety area
- Approach/takeoff surface
- Protection zone
- FAR Part 77 imaginary surfaces

Together, the space requirements for each of these clearances and boundaries provide the physical requirements for siting a helipad. The dimensional criteria for these clearances and boundaries are described below and depicted in **Exhibit 4-2**.

4.2.1 Final Approach and Takeoff Area

The Final Approach and Takeoff Area (FATO) is a defined area over which the final phase of the approach, to a hover or a landing, is completed and from which the takeoff is initiated. The helicopter design circular requires that the dimension of the FATO shall not be less than 1.5 times the overall length (with rotors turning) of the design helicopter.[5] Based on the overall length, with rotors turning, of the CH-47, the FATO should measure at not less than 150 feet by 150 feet.

4.2.2 Touchdown and Liftoff Area

The touchdown and liftoff area (TLOF), previously named a helipad or helideck, is the load-bearing portion of the helipad and is centered on the FATO. The FAA recommends that the center of the TLOF be at least three-fourths of the design aircraft's (CH-47) overall length from the FATO boundaries. In the case of Talkeetna, this distance is approximately 75 feet. Further, the TLOF should not be less than the rotor diameter of the design aircraft. Because the design aircraft at Talkeetna is the CH-47, an aircraft equipped with two main rotors, the TLOF should be at least the overall length of the aircraft, with rotors turning, or 99 feet.

The recommended dimensions of the TLOF at Talkeetna are 100 feet by 100 feet.

4.2.3 Operational Spacing Criteria

The recommended distance between the centerline of an approach to runway and the centerline of an approach to FATO for simultaneous same direction VFR operations is 700 feet.

[5] It should be noted that this requirement is for heliports that are less than 1,000 mean sea level (MSL), such as the Talkeetna Heliport.

Exhibit 4-1 Helicopter 3-View

Exhibit 4-1 back

Exhibit 4-2 Typical Heliport Layout

Exhibit 4-2 back

4.2.4 Safety Area

The heliport safety area is a defined area surrounding the FATO that is free of objects that can cause damage to an aircraft rotor, other than those objects, such as navigational aids, that are fixed by function. The safety area is intended to reduce the risk of damage to helicopters accidentally diverging from the FATO. The width of the safety area shall be equal to one-third the rotor diameter of the design helicopter but not less than 20 feet in accordance with AC 150-5390-2A, *Heliport Design*.

Both rotors on the CH-47 have a diameter of 60 feet. Based on this criterion, the safety area is required to extend 20 feet beyond the FATO.

4.2.5 Approach/Takeoff Surface

An approach/takeoff surface is centered on each approach/takeoff path. The surface begins at each end of the heliport take-off and landing areas with the same width as the primary surface and extends outward and upward for a horizontal distance of 4,000 feet where its width is 500 feet. The slope of the approach surface is 8 to 1 for heliports. This surface is identical in size to the FAR Part 77 heliport approach surface.

4.2.6 Protection Zone

The protection zone is an area on the ground that underlies the approach/takeoff surface to where the surface attains 35 feet above the heliport elevation. When establishing a new heliport, this surface should be positioned so the airport operator can control incompatible objects on the ground and the congregation of people.

The recommended length of the proposed protection zone at Talkeetna is 280 feet. The inner width of the heliport protection zone (HPZ) is 150 feet and the outer width is 174.5 feet.

4.2.7 FAR Part 77

FAR Part 77 establishes the standards for determining obstructions to air navigation. It applies to existing and proposed manmade objects, objects of natural growth, and terrain. The Part 77 standards apply to the use of navigable airspace by aircraft and to existing and planned air-navigation facilities.

The standards within Part 77 establish imaginary surfaces that protect the travel of helicopters approaching and departing a heliport. Three imaginary surfaces are established for heliports:

- Primary surface
- Approach surface
- Transitional surface

The size and shape of each imaginary surface are described below and illustrated in **Exhibit 4-3**. All alternatives will be screened to determine whether they comply with these regulations.

4.2.7.1 Primary Surface

The area of the primary surface coincides in size and shape with the designated TLOF. The surface is a horizontal plane at the elevation of the established heliport elevation, which will be determined later in this report when a preferred alternative is chosen. As mentioned in the previous section, the TLOF dimensions are 100 feet by 100 feet, which are based on the design helicopter (CH-47).

4.2.7.2 Approach Surface

The approach surface begins at each end of the heliport primary surface with the same width as the primary surface, and extends outward and upward for a horizontal distance of 4,000 feet where its width is 500 feet. The slope of the approach surface is 8 to 1.

4.2.7.3 Transitional Surfaces

These surfaces extend outward and upward from the lateral boundaries of the heliport primary surface and approach surfaces at a slope of 2 to 1 for a distance of 250 feet measured horizontally from the centerline of the primary and approach surfaces.

4.3 Heliport Facility Requirements

The helipad siting requirements in Section 4.2 establish the area limits required for the safe operation of helicopters approaching and departing the heliport. The heliport facility requirements are specific in identifying those facilities required to support helicopter landings (i.e., "helipad"), ground/hover taxiing, and parking.

The facility requirements are dependent largely on the aviation forecasts and the determination of the design helicopter as determined in Section 4.1. Based on the forecasts and design helicopter, the following facilities can be determined:

- Helicopter parking
- Taxi route and taxiway
- Heliport lighting
- Lease lots

Each facility is discussed in detail below.

4.3.1 Helicopter Parking

A public-use GA heliport should have an area designated for helicopter parking. The size of the parking apron depends on two factors: the number of helicopters to be accommodated and the range of helicopter sizes expected at the facility.

Parking position size is dependent on helicopter size and the taxi route locations. There should be a clearance equal to one-third of the rotor diameter, but not less than 10 feet, between skid-equipped helicopters and at least 10 feet for wheel-equipped helicopters to another helicopter or object. Clearances are measured from any part of a helicopter on its intended path.

Exhibit 4-3 Part 77 Imaginary Surfaces for Helicopters

Exhibit 4-3 back

Per the heliport forecasts presented in the previous section, the Talkeetna Heliport should accommodate eight parking positions by the end of the planning period (see **Table 4-2**). Three positions should be sized for a heavy helicopter, such as the CH-47 or UH-60 Blackhawk, and the remaining five positions sized for a small helicopter, such as a Bell 206 Jet Ranger or Eurocopter 315 Lama[6]. Based on the helicopter dimensions and required clearances, it is estimated that 625 SY are needed for each Jet Ranger/Lama parking position, and 1,670 SY for each CH-47 or UH-60 position. **Table 4-2** summarizes the number of parking positions and corresponding space requirements throughout the planning period.

TABLE 4-2
Helicopter Parking Requirements

	2000		2005		2010		2015	
Model	**Positions**	**Area**	**Positions**	**Area**	**Positions**	**Area**	**Positions**	**Area**
Small Helicopter[c]	2[a]	1,250 SY	3[a]	1,875 SY	4[a]	2,500 SY	5[a]	3,125 SY
Large Helicopter[c]	3[b]	5,010 SY	3[b]	5,010 SY	3[b]	5,010 SY	3[b]	5,010 SY
Total	**5**	**6,260 SY**	**6**	**6,885 SY**	**7**	**7,680 SY**	**8**	**8,135 SY**

[a] Seasonally based – summer
[b] Long-term transient
[c] small (≤ 6,000 lbs.), heavy (≥ 12,000 lbs.)

4.3.2 Taxi Route and Taxiway

A taxi route is an obstruction-free corridor above which helicopters hover at airspeeds less than approximately 20 knots. Taxiways are defined paths established for the ground-taxi of helicopters from one part of the heliport to another. The taxiways should be paved to accommodate wheel-equipped helicopters and to minimize flying dust and gravel.

The FAA requires that taxi routes be designed to provide 20 feet of rotor tip clearance to objects and parked helicopters for hover taxiing and 10 feet of clearance for ground taxiing. The width of the paved taxiway should be designed to provide at least twice the undercarriage width of the design helicopter. The surface of taxiways should be paved and designed to withstand the maximum gross weight of the design helicopter.

Based on the design aircraft (CH-47), the taxi route should be 100 feet wide to accommodate hover taxiing, and the taxiway is recommended to be 25 feet wide.

4.3.3 Heliport Lighting

Lighting is a critical component of the heliport that promotes the operational safety during night and poor-weather conditions. AC 150/5390-2A prescribes the lighting requirements for public-use GA heliports. The requirements include the following:

- Perimeter and apron lighting
- Taxiway lights
- Rotating beacon

[6] Helicopters are classified as small (≤ 6,000 lbs.), medium (6,000 < 12,000 lbs.), or heavy (≥ 12,000 lbs.).

The lighting requirements are described below.

4.3.3.1 Perimeter and Apron Lighting

In accordance with Heliport Design circular, the FATO or TLOF, but not both, need to be lighted. Yellow lights define the limits of the FATO or TLOF. A minimum of four flush-mounted or raised light fixtures is recommended per side of a square or rectangular FATO or TLOF. A light is located at each corner with additional lights uniformly spaced between the corner lights with a maximum interval of 25 feet.

Floodlights may be used to illuminate the helipad. Floodlights must be placed clear of the safety area, the approach/takeoff surfaces, and the transitional surfaces. Special care must be taken to ensure that the floodlights do not interfere with the pilot's vision.

4.3.3.2 Taxi Route and Taxiway Lighting

Taxiway centerlines are to be defined with flush green lights. Taxiway and taxi route edge lighting consists of omnidirectional blue edge lighting. Retro-reflective markers, meeting FAA standards for taxiways, may be used in lieu of the lighting fixtures.

4.3.3.3 Rotating Beacon

Heliports that do not have a prominent lighted landmark are suggested to have a rotating beacon to aid pilots in the identification of the facility. The rotating beacon for heliports consists of a white/green/yellow-flashing pattern. Currently, TKA has a rotating beacon intended for use by fixed-wing aircraft with a flash pattern of green/white. Although the existing rotating beacon does not conform to FAA recommendations for a heliport, it does provide a prominent lighted landmark and should therefore continue to meet the requirements set forth by the FAA.

4.3.4 Lease Lots

The steady growth at TKA has prompted demand for additional lease lots at TKA. The 2001 Talkeetna Airport Master Plan estimates the future need for lease lots associated with fixed-wing aircraft on the commercial apron. The Master Plan does not estimate the need for lease lots associated with helicopter operations.

It is forecasted that four helicopters will be seasonally based at TKA, and three transient military helicopters will regularly use TKA as its base for launching search and rescue missions on Mt. McKinley. It is estimated that three of the four seasonally based helicopters will be operated by commercial air taxi services, and the remaining helicopter will be operated by the NPS.

Based on the individual users, it is estimated that three lease lots will be required to support the helicopter operations. The three lots would be leased to two commercial air taxi services and one to the NPS. Because the military operations are not based at TKA, it is not expected that they would require a lease lot. The NPS currently leases a seasonal lot near the maintenance and operations (M&O) facility. Depending on the future build out of TKA's commercial and transient apron to the northwest, the NPS may be able to maintain its current seasonal lease lot and eliminate the need for a NPS lease lot adjacent to the helicopter parking area. Therefore, three helicopter lease lots are required.

ADOT&PF has published guidelines for sizing lease lots. Although the guidelines do not specify lease lots adjacent to helipads, the minimum commercial lease lot size of 22,500 square feet (150 feet by 150 feet) recommended by ADOT&PF should be implemented for two of the three lease lots. This area can accommodate areas for employees, staging for passengers, automobile parking, and some storage. A lease lot equal to half of the commercial lot size can be constructed for the NPS. A total of 66,250 square feet will be required for the three lease lots.

4.3.5 Passenger Facilities

Passenger facilities will be required at the Talkeetna Airport. These facilities will mostly be utilized during periods of high activity and as a place to rest out of the weather. A general rule of thumb, for small facilities (less than 100 persons), is to provide approximately 15 square feet per individual. The design standard allows adequate room for seating, a water cooler, and a unisex restroom facility. The passenger facility requirements for the proposed heliport are detailed in **Table 4-3.**

TABLE 4-3
Passenger Facility Requirements

	2000	2005	2010	2015
Passengers	20	24	28	36
Space Requirement (square feet)	300	360	420	540

Source: CH2M HILL, Inc.

4.3.6 Summary of Facility Requirements

Talkeetna heliport's facility requirements are summarized in **Table 4-4.**

TABLE 4-4
Facility Requirement Summary

Design Element	Requirement
Touchdown and Lift-off Area – Length	100 ft
Touchdown and Lift-off Area - Width	100 ft
Final Approach and Takeoff Area - Length	150 ft
Final Approach and Takeoff Area - Width	150 ft
Final Approach and Takeoff Area – Runway Separation	700 ft
Taxiway Width	25 ft
Taxi Route Width	100 ft
Helicopter Parking Pads	
Number	5 small/ 3 large
Size of Small Pad	625 SY
Size of Large Pad	1,670 SY

Source: CH2M HILL, Inc.

SECTION 5

Heliport Alternatives

The objective of this section is to define and evaluate alternative sites for relocating the Talkeetna Heliport. Ultimately, the site selection process will provide a location for constructing a new heliport that, , meets the helicopter demand forecasted throughout the planning horizon, is inconsistent with FAA design standards, and is consistent with community goals. The alternatives that best fulfill this purpose and need will then undergo a more detailed analysis in Section 6 and will also be further evaluated in the EA.

5.1 Alternative Evaluation Criteria

An evaluation process was created to select the best site alternatives. This process includes the following four steps:

- Develop initial site alternatives.
- Screen initial site alternatives to two final alternatives.
- Perform a detailed evaluation on the final two alternatives.
- Select a preferred alternative.

Initial site alternatives were developed during the preparation of the Talkeetna Airport Master Plan. These alternatives, including a few new options developed since the completion of the Master Plan, will be evaluated.

A total of 7 site alternatives will be screened to 2 final alternatives by evaluating each site against a set of 10 criteria. Each alternative will be measured against the criteria and assigned a point value for how well the alternative meets each criterion. In some cases, the assessment may result in a fatal flaw for 1 or more criteria. The 2 highest ranking alternatives will go through a detailed analysis to finally determine the preferred site.

The initial screening criteria are categorized and described below.

Environmental:

1. **Impact to Surrounding Community –** This criterion rates the overall impact of the proposed heliport site to the surrounding community. Impacts include helicopter noise, rotor turbulence, economic stimulus, etc.

2. **Proximity to Wildlife Attractants –** This criterion evaluates the potential wildlife interference to the proposed heliport sites caused by nearby wildlife attractants (i.e., wetland, sewage lagoon, landfill, etc.).

3. **Wetland Compatibility –** This criterion rates the potential impact to wetlands caused by the construction and operation of the proposed heliport site.

4. **100-year Floodplain –** This criterion assesses the impact to the 100-year floodplain for each alternative. Since TKA is located at the edge of the 100-year floodplain, and future

development could be lifted up out of the floodplain through the use of fill, no alternative will be assessed a fatal flaw for this criterion.

5. **Noise Impacts –** The criterion rates the impact of the heliport, relating to noise, on the surrounding community.

Functional:

1. **Proximity to Airport Services –** This criterion measures the distance between the proposed heliport site and existing TKA services located in the southwest corner of the TKA.

2. **Ground Access –** This criterion rates the ground accessibility of the proposed heliport site.

3. **Compatibility with Existing and Future Development –** This criterion assesses the land availability based on existing land ownership and planned development for the proposed heliport site, both on airport property and off airport property. This evaluation considers the future development plans documented in the Master Plan.

4. **Impact to Airport Operations –** The criterion assesses the potential interference of the proposed heliport with other TKA operations, primarily in terms of noise and/or rotor turbulence disturbance(s).

Regulatory:

1. **Airspace Compatibility –** This criterion rates the airspace compatibility between the proposed heliport site and flight paths established for the TKA, Christiansen Lake, and the local Talkeetna Village Airstrip.

2. **Compliance with FAA Design Standards –** This criterion evaluates the proposed heliport site against FAA standards. The site will be classified in one of three ways: 1) meets all FAA standards; 2) fails to meet one or more FAA standards, but issue can be mitigated; 3) fails to meet FAA standards, and issue cannot be mitigated (fatal flaw).

5.2 Presentation and Review of Initial Site Alternatives

Exhibits 5-1 and **5-2** present the six site location alternatives developed for relocating the Talkeetna Heliport. Five of the six heliport sites are located on airport property, while the remaining site is located off airport property. This site is located on FAA property near the Talkeetna VOR/DME.

All of the site location alternatives incorporate the facility requirements identified in the previous section. Also, all of the proposed heliport site alternatives are developed to maximize wind coverage by establishing parallel approach and takeoff paths to the existing runway. The six site alternatives are discussed in the following sections.

Exhibit 5-1 Heliport Alternatives A, B, C, D, and E

Exhibit 5-1 back

Exhibit 5-2 Heliport Alternative F

Exhibit 5-2 back

5.2.1 Alternative A – West of Runway 18 Threshold

Alternative A is located 700 feet west of the existing TKA runway and approximately 800 feet north of the existing M&O facility and future government land reserve. An access road would be constructed on TKA property from the M&O facility.

This alternative is located outside of previously delineated wetland areas and the 100-year base floodplain (Exhibit 6-1), but would occupy the space identified for the commercial apron avoidance alternative option. In addition, the site has a closer proximity to the Talkeetna Heights Subdivision and nearby ski plane parking. The M&O facility obstructs the line-of-sight from aircraft departing Runway 36 to the proposed heliport. This alternative causes some operational concern, as arriving and departing helicopters must cross the existing runway to the preferred flight path for helicopters to and from Denali, therefore increasing the chance for runway incursions.

5.2.2 Alternative B – Improve Existing Talkeetna Heliport

Alternative B involves upgrading the existing heliport to meet FAA design standards. The existing heliport is located immediately south of the proposed commercial apron, adjacent to an abandoned landfill.

A heliport in this location would not effectively separate helicopters from fixed-wing aircraft parked on the commercial apron. Like Alternative A, arriving and departing helicopters must also cross an existing runway to the preferred flight path for helicopters to and from Denali, therefore increasing the chance for runway incursions.

Further, this alternative meets FAA design standards and wetland area compatibility and has good ground access. This site is also highly visible for approaching fixed-wing aircraft. However, the 2001 Master Plan indicates that this area will be redeveloped into commercial lease lots and fixed-wing aircraft parking in the long term (15-year planning horizon). Unless consideration is given to this redevelopment, the land for a heliport is not available and a fatal flaw would occur.

5.2.3 Alternative C – East of Runway 36 Threshold

Alternative C is located 700 feet east of the Runway 36 threshold, inside the Twister Creek wetland area. This location would require a 3,700-foot-long access road to be constructed, extending south from the existing commercial apron and around the southern end of the Runway 36 protection zone, and finally north to the proposed Alternative C site. Utilities would be located in the access road embankment to avoid additional impacts to the wetland.

This alternative meets FAA design standards, with exception of the separation from wildlife attractants, and mixes well with other airport operations and services. The eastern location allows helicopter arrivals and departures to remain east of the existing runway traffic. This alternative can also take advantage of the approach lighting systems in inclement weather and provides good site visibility for other aircraft approaching and departing Runway 36. Intermittent pockets of frozen soil were noted in one boring (TH 02-34) near Alternative C helipad location. Development encroachment into previously delineated wetlands and possible essential fish habitat, pose significant permitting issues for this site. The design and

layout of the heliport could be rearranged to a more linear layout to reduce, but not eliminate, wetland encroachment.

5.2.4 Alternative D – Northwest of Runway 18 Threshold

Alternative D is located in the northwest corner of the airport, approximately 2,100 feet northwest of the Runway 18 threshold. This location requires a 620-foot-long access road to be constructed from Beaver Street straight to the proposed site.

This location minimizes the potential impacts to wetland areas; however, the proposed site is located 1,000 feet southeast from the airport's sewage lagoon. The sewage lagoon can be considered a hazardous wildlife attractant. A study conducted by the U.S. Department of Agriculture, Animal and Plant Health Inspection Service, and Wildlife Services in April 1999 determined that a number of birds are present at the sewage lagoon. Wildlife Services concluded that the proposed heliport's close proximity to the sewage lagoon would likely necessitate the management of potentially hazardous wildlife species in that area.

The site is compatible with existing and future airport development plans, but encroaches on the Talkeetna River Subdivision and is currently forested. A significant amount of tree removal would be required to construct the heliport and allow for its associated approach and takeoff surfaces. Other issues include strong community opposition to noise and rotor turbulence near residential areas, and site access would be separated from the main airport entrance by providing access from Beaver Street only. In this case, both access to and distance from existing airport services would require travel around the perimeter fence.

5.2.5 Alternative E – Northeast of Runway 18 Threshold

Alternative E is located in the northeast corner of the TKA, approximately 2,500 feet northeast of the Runway 18 threshold. This location requires a 2,000-foot-long access road to be constructed from the existing M&O facility, around the runway protection zone for Runway 18, and straight to the heliport.

The center of the touchdown and lift-off area for Alternative E is located approximately 720 feet from the centerline of Runway 18-36. The forested area between the heliport and Runway 18-36 would be cleared to eliminate an obstruction to the line of sight between the two. This alternative separates helicopter parking from fixed-wing operations, and reduces the chance for airspace conflicts between helicopter and fixed-wing aircraft operating from TKA or the Village Airstrip.

Operational ground access, such as maintenance and operation traffic, requires that vehicles travel by way of a paved service road constructed from the existing M&O facility. No access will be provided from Beaver Street. This alternative is located away from residential areas, thereby reducing noise impacts.

5.2.6 Alternative F – Talkeetna VOR/DME Location

Site Alternative F is located on FAA property at the Talkeetna VOR/DME site between the Talkeetna Spur Road and the Susitna River, approximately 1.6 miles south of TKA. The site consists of about 140 acres. The Talkeetna VOR/DME antenna is placed on a hilltop in the western portion of the site. The remaining portion of property falls away to a ravine located

adjacent to the Talkeetna Spur Road right-of-way line. The proposed heliport would sit in the area of the ravine near the Talkeetna Spur Road (refer to **Exhibit 5-2**).

Several siting and design standards apply to VOR/DME facilities to minimize interference to the antenna. These standards are as follows:

1. The ground slope and ground smoothness are very critical within the first 1,000 feet of the antenna location. The ground in the vicinity of the antenna must be level or fall away gently from the ground level at the base of the structure.
2. Chain link fences are not permitted within 500 feet of the antenna.
3. Power and control lines must be installed underground within 600 feet of the antenna.
4. No overhead conductors, except those serving the site, are permitted within 1,200 feet of the antenna.
5. No structures shall be located within 1,000 feet of the antenna.
6. The FAA requires an independent review of all construction in the vicinity of the antenna.

Based on these standards, the FAA, who owns and operates the VOR, has conducted a detailed review of this alternative. Several divisions of the FAA have objected to the construction of a heliport at this location. As a result, Alternative F is determined to have a fatal flaw.

5.3 Initial Screening of Alternatives

Table 5-1 presents the results of the prescreening evaluation. As shown in the table, point values are given for each criterion by alternative. The rating system describes whether the alternative rates, below average (rating equal to 1), average (rating equal to 2), above average (rating equal to 3), or in a few cases the alternative reaches a fatal flaw (rating equal to F) against the screening criteria. If a fatal flaw is anticipated, the remaining scores are not totaled and the "F" rating is carried forward for the alternative. Based on the total of points, Site Alternatives C and E are selected as the best two alternatives and will be further examined in Section 6 to select the preferred site. An explanation of the analysis is detailed below.

5.3.1 Alternative A

Alternative A was rated either average or above average for eight of the 11 review criteria. The primary flaw with this Alternative, which accounted for the low scores on noise impacts and impacts to the surrounding community, is the closeness of the site to the surrounding community. This alternative, due to conflicts with TKA fixed wing airport traffic patterns, was downgraded with regards to the airspace compatibility criteria. This incompatibility resulting from the requirement for arriving and departing helicopter traffic to cross either through the traffic pattern, thereby affecting TKA fixed-wing traffic, or beneath the traffic pattern, thereby affecting village airstrip traffic.

5.3.2 Alternative B

Since Alternative B is located in the expansion area for the proposed tie-down expansion, this alternative was assessed a fatal flaw. Further, this Alternative was granted a low grade

TABLE 5-1
Results of Prescreening Evaluation

SITE ALTERNATIVE	Airspace Compatibility	Impact to Surrounding Community	Proximity to Airport Services	Meets FAA Design Standards	Proximity to Wildlife Attractants	Wetland Compatibility	100-year Floodplain	Compatibility with Existing and Future Development	Ground Access	Noise Impacts	Impact to Airport Operations	TOTAL
A	1	1	2	3	2	3	3	3	2	1	2	**23**
B	1	2	3	3	3	3	1	F	3	1	2	**F**
C	3	2	2	3	2	1	1	3	2	2	3	**24**
D	1	1	1	3	1	3	2	3	2	1	3	**21**
E	3	3	1	3	2	2	3	3	1	2	3	**26**
F	3	2	1	F	1	3	3	3	1	3	3	**F**

Rating System:
1: Below average
2: Average
3: Above average

Source: CH2M HILL, Inc.

with respect to the airspace compatibility and noise impacts criteria for the same reasons as Alternative A. Further, this Alternative is wholly located within the 100-year floodplain.

5.3.3 Alternative C

Alternative C received either average or above average grades on nine of the 11 criteria. The primary flaw with Alternative C is that the site is located within the 100-year flood plain and a wetland/potential fish habitat area.

5.3.4 Alternative D

There are a number of problems with Alternative D. The primary problem with this Alternative is that it is located near residential development, which resulted in low grades in noise impact and impacts to the surrounding community. This Alternative is also located adjacent to a landfill (wildlife attractant). The Alternative was also downgraded due to impacts, similar to Alternative A and B, to the existing traffic pattern. The final problem with the site is that it is located on the other side of Beaver Road away from the established airport services.

5.3.5 Alternative E

This Alternative received either average or above average grades on nine of the 11 criteria. The issue with this Alternative is that it is a considerable distance from the exiting airport services. Further, this distance will also require the construction of the longest access road of all of the viable alternatives presented in this chapter.

5.3.6 Alternative F

Alternative F was assessed a fatal flaw with respect to meeting FAA design criteria. This site is located within the clearance area for the TKA VOR. The FAA is on record stating their opposition to this Alternative. Further, Alternative F is located a considerable distance from the airport and therefore was downgraded with respect to proximity to airport services.

SECTION 6

Preferred Site Alternative Selection Analysis

As determined by the initial screening summarized in **Table 5-1**, Alternatives C and E were selected as the best 2 alternatives for Talkeetna Heliport that would be carried forward for further consideration. These alternatives are analyzed in further detail with respect to the following 10 criteria:

- Meeting FAA standards
- Airspace compatibility
- Site visibility
- Ground access
- Wetlands impacts
- 100-year floodplain impacts
- Land-use impacts
- Construction costs
- Maintenance and operation impacts
- Noise compatibility

Exhibit 6-1 presents a more detailed depiction of Alternatives C and E.

6.1 Meeting FAA Standards

Both heliport locations will meet FAA standards for runway separation under simultaneous visual operations. The need for helicopters to regularly cross the runway to and from the prescribed helicopter approach and takeoff path is eliminated because both locations are east of the runway centerline or extended centerline. The airspace analysis, in Section 2.4, indicates that conflicts with Christiansen Lake air traffic will be minimal. Helicopter operations parallel the existing TKA runway traffic until approximately 1 mile north of TKA, where helicopters turn northwest to their destination.

6.2 Airspace Compatibility

Both heliport alternatives are similar in terms of airspace compatibility between the proposed heliport and the traffic patterns and airspace for TKA Runway 18-36, Christiansen Lake, and the TVA. As outlined in Subsection 2.4.1 of this document, VFR air traffic at Talkeetna will be separated by elevation, with Talkeetna traffic remaining above 1,000 ft AGL and TVA traffic remaining below 500 ft AGL. Traffic at both Alternative C and Alternative E sites would be handled by keeping helicopters below 500 ft AGL until they are in the vicinity of Talkeetna Airport. The straight-in approach and departure tracks from the north would continue to allow helicopters to avoid the flow of fixed-wing traffic (**Exhibit 6-2**).

6.3 Site Visibility

Because TKA does not have an air traffic control tower, maintaining visibility between the TLOF and Runway 18-36 is desirable to maintaining visual contact between other aircraft operating in the vicinity. The existing forested areas between the TLOF and the entire runway would be cleared under both alternatives. Alternative C is immediately adjacent to the runway. Alternative E is located north of the runway.

6.4 Ground Access

Public ground access to the heliport lease lots will need to be constructed. The planned access for Heliport Alternative C will start at the existing commercial apron and be constructed around the south end of Runway 18-36, then turn north toward the heliport. The road would be approximately 0.70 mile long.

The access for heliport Alternative E will start from the M&O facility. This assumes TKA moves ahead with constructing a public access road from Second Street to the M&O facility, which parallels the southern boundary of the Talkeetna Heights and Denali Subdivisions. From the M&O facility, the access road would be constructed around the north end of Runway 18-36 and turn east toward the heliport. The access road under this scenario would be approximately 0.40 mile long. Should the roadway from Second Street to the M&O facility be constructed as part of the heliport project, then approximately 0.40 mile of additional roadway would need to be constructed.

Ground access from Beaver Street to heliport Alternative E was considered, however, the increase in traffic along "F" Street and Beaver Street was determined to be unsatisfactory as these are primarily for residential access. The commercial operators prefer the main entrance of TKA for attracting walk-up customers. Connectivity to the main airfield is also important for vehicle movements to and from the helipad.

6.5 Wetlands Impacts

Alternative C is located in the Twister Creek wetland complex. Alternative E is located in an upland area adjacent to the Twister Creek wetland complex.

Alternative C can be constructed partially in an adjacent upland area to minimize wetland impacts. For this study the typical heliport layout (refer to **Exhibit 4-2**) was positioned to optimize the upland area. Based on this layout, approximately 7 acres of wetland would be impacted by Alternative C. Alternative E layout would impact approximately 0.7 acres of wetlands. **Table 6-1** summarizes the wetland impact area in acres.

TABLE 6-1
Wetland Impact

	Impacted Area (AC)	
Alternative C access road (approx. 2,000 ft x 50 ft)	2.5	
Alternative C helipad/parking – construction area (1,000 ft x 200 ft)	4.5	
Alternative E access road		0.1
Alternative E helipad/parking		0.6
TOTAL	**7.0**	**0.7**

Exhibit 6-1 Preferred Heliport Site Alternatives C and E

Exhibit 6-1 back

Exhibit 6-2 Heliport Approach/Departure Tracks

Exhibit 6-2 back

6.6 100-Year Floodplain Impacts

According to the Hydrologic/Hydraulic Assessment Final Report (URS, 2004), Alternative C is located entirely within the 100-year floodplain (**Exhibit 6-1**). The depth of the floodwater near Alternative C would be about 1 foot. Any backwater effect created by the construction would not likely affect any existing improvements. Alternative E is located outside the 100-year floodplain.

6.7 Land-Use Impacts

ADOT&PF does not have a comprehensive airport management plan that details airport land use. However, land use within the existing airport property is strictly airport related. Both Alternates C and E are located within the existing airport property and are therefore in areas dedicated for airport use.

Existing trails located on, and adjacent to, airport property are used by local residents for recreation. Both Alternative C and Alternative E are located adjacent to these trails.

6.8 Rough Order of Magnitude Construction Costs

Rough Order of Magnitude (ROM) construction costs for each alternative vary due to differing clearing areas and access road lengths. In general, the Alternative C costs are higher due to site location in a wetland area and a longer access road. **Table 6-2** shows ROM construction costs for each alternative.

6.9 Maintenance and Operation Impacts

ADOT&PF provides personnel and equipment to maintain TKA. According to ADOT&PF, maintenance costs at TKA for fiscal year 2001 totaled $260,000. Additional airport development and developing a new heliport will cause this cost to escalate. Differences in maintenance costs between heliport Alternatives C and E would vary primarily because of differing maintenance costs (e.g., snow removal) for the proposed access road.

Discussions with the TKA Airport Manager have indicated that heliport Alternative E will be slightly more difficult than Alternative C from an M&O perspective, based on the current layout of the airport. The majority of airport activity would still occur on the commercial ramp areas, such as response to fueling and snow removal needs.

6.10 Noise Compatibility

Alternatives C and E are similar in terms of noise impacts. For both heliport alternatives, the DNL 65 contour is contained within airport property for the 2015 annual average day condition. Under the 2015 peak season average day condition, the DNL 65 contour would be exceeded at up to 8 of the adjacent lots in Denali Subdivision. This condition is identical under both heliport alternatives. The TKA Phase II Noise Study (CH2M HILL, 2004) contains a full evaluation of aircraft noise impacts resulting from operations at TKA.

TABLE 6-2
ROM Construction Costs

Item	Unit	Unit Price	Quantity		Cost	
			ALT C	ALT E	ALT C	ALT E
Mobilization	LS	$100,000.00	1	1	$100,000.00	$100,000.00
DBE	LS	$5,000.00	1	1	$5,000.00	$5,000.00
Construct. Surveying	LS	$25,000.00	1	1	$25,000.00	$25,000.00
Eng. Field Office	LS	$8,000.00	1	1	$8,000.00	$8,000.00
Erosion & Pollution Control	LS	$10,000.00	1	1	$10,000.00	$10,000.00
Clear and Grub	AC	$3,000.00	14	14	$42,000.00	$42,000.00
Unclassified Excavation	CY	$3.50	17,100	17,200	$59,850.00	$60,200.00
Subbase (Embankment)	TN	$8.00	105,100	103,600	$840,800.00	$828,800.00
Base Course	TN	$13.00	7,610	7,710	$98,930.00	$100,230.00
Asphalt Concrete	TN	$30.00	3,570	3,610	$107,100.00	$108,000.00
Asphalt Cement	TN	$250.00	215	220	$53,750.00	$55,000.00
Tie-down Anchors	EA	$150.00	24	24	$3,600.00	$3,600.00
PCC Pavement (w/ reinforcing)	SY	$110.00	2,220	2,220	$244,200.00	$244,200.00
Lighting	LS	$30,000.00	1	1	$30,000.00	$30,000.00
Culvert Pipe	EA	$2,000.00	7	7	$14,000.00	$14,000.00
Security Fence and Gate	LF	$30.00	0	1,100	$0	$33,000.00
Wind Sock	EA	$10,000.00	-	1	$0	$10,000.00
SUBTOTAL					**$1,642,230.00**	**$1,677,330.00**
ENGINEERING (15%)					$246,334.00	$251,600.00
10% CONTINGENCY					$164,223.00	$167,733.00
TOTAL					**$2,052,787.00**	**$2,096,663.00**

6.11 Recommended Heliport Site

Based on the detailed evaluation of Alternatives C and E, Alternative E is the recommended heliport location. The primary factor is the wetland and potential fish habitat impacts. The remaining other selection criteria are relatively equal (i.e., in terms of cost, noise, other land use impacts, etc.), However, heliport Alternative E does not impact adjacent Twister Creek wetland habitat areas. Operationally, the two alternatives are similar. However, a slight reduction in flight time will be realized from Alternative E, as this location would have to be crossed over from Alternative C.

Although this study was performed separately from the TKA Master Plan, the relocation of the existing heliport is a critical component to the future development of TKA. The current EA is addressing the airport improvements (including the heliport) planned to support the growth and operational needs of TKA until 2015. The EA shall rely on the Master Plan forecasts presented in 5-year increments from 1995 to 2015. The EA shall also rely on the updated helicopter forecasts presented in this study. Together, these forecasts will provide the basis for the facility requirements and translate into the short-term, mid-term, and long-term improvement projects identified in the Master Plan.

In addition to determining the facilities required to meet the future helicopter demand, this study addresses and recommends an alternative heliport location that resolves some of the safety and operational needs of TKA. This study addresses the need to separate hovering/taxiing helicopters from fixed-wing operations as well as to minimize the number of runway crossings.

The purpose and need of the EA is specific not to describe the location of the heliport, or other commercial businesses for that matter, as "required" to be visible from the railroad or Talkeetna Spur Road so as not to restrict the development possibilities. Changes in the main airport entrance may shift to the central portion of the airfield over time as development occurs, thus the proximity of heliport Alternative E may ultimately be the better location from a ground access standpoint. However, until that time, an on-airport access roadway is planned to serve the heliport from the existing airport entrance.

SECTION 7

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Appendix A
Correspondence