MNICS AIR OPERATIONS WORKING TEAM – 2013

ASSIGNMENT WORKSHEET # 9 EMS Landing Area Standards—Sheldon Mack

ISSUE: Coordinate helicopter landing area standards with MN DOT Aeronautics—Eric Peltier. Look into MN DNR/Interagency standards and compare with MN DOT standards.

BACKGROUND: Need clarification of what standards DNR fire helicopter landing areas will be held to by MN DOT Aeronautics.

RECOMMENDATIONS / EXPECTED PRODUCT: Greg Dahn had a follow up meeting with Mr. Peliter of MN DOT Aeronautics and his concerns have been addressed. Aviation personnel need to recognize that definitions and interpretations of helicopter landing areas vary widely. Coming to common terminology or common agreement on a term is the first step to clarifying individual positions. On the following pages is a list of varying terms and definitions followed by the written definition of MN DNR fire landing area standards.

A. Implementation Plan: Complete prior to MNICS/GLFFC aviation meeting

B. Tasked to:

a. Individual

Sheldon Mack

b. Group -

i. Leader –

ii. Committee –

iii. Meeting Date(s) -

iv. Meeting Location -

C. Target Completion Date: February 19, 2013

Submit completed products/reports to Acting Chair, Bill Schuster, so they can be forwarded to the MNICS Task Force for review/approval.

There are several designations of helicopter landing areas based on their usage and agency differences in terminology. Landing areas could be designated Personal, Private, Prior Permission Required, Public Use, Restricted Use, Official Use, General Aviation and other sub-classes.

Some examples are listed below:

Interagency Helicopter Operations Guide Definitions include:

Helibase - Permanent: A designated, permanent facility for helicopter operations.

Helibase - Temporary: A base for helicopter operations established to serve a temporary or intermittent incident or project need.

Helipad: See Touchdown Pad

Helispot: A helispot is a natural or improved takeoff and landing area intended for temporary or occasional helicopter use. It may or may not have road access. In many cases, helispots do not meet the requirements of a helibase and thus should not be referred to as helibases.

Touchdown Pad: A designated area, usually with a prepared or improved surface, on a heliport, airport, takeoff/landing area, apron/ramp, or movement area used for takeoff, landing, or parking of helicopters.

Unimproved Landing Site or Area: A landing spot used for the first time at the discretion of the Pilot and to which no improvements (for example, pad leveling, obstruction removal, placement of wind indicator) have been made. If it is to be used on a recurring basis, approval is necessary and improvements should be made.

FAA Definitions include:

Heliport means an area of land, water, or structure used or intended to be used for the landing and takeoff of helicopters

Heliport. The area of land, water, or a structure used or intended to be used for the landing and takeoff of helicopters, together with appurtenant buildings and facilities.

Helistop. A term sometimes used to describe a minimally developed heliport for boarding and discharging passengers or cargo.

Medical emergency site. An unprepared site at or near the scene of an accident or similar medical emergency on which a helicopter may land to pick up a patient in order to provide emergency medical transport. A medical emergency site is not a heliport.

Public use heliport. A heliport available for use by the general public without a requirement for prior approval of the owner or operator.

Transport heliport. A heliport intended to accommodate air carrier operators providing scheduled service.

General aviation heliport. A heliport intended to accommodate individuals, corporations, helicopter air taxi operators, and public safety agencies. For the purposes of this AC, "general aviation" refers to all helicopter operations other than scheduled passenger service. Hospital heliports and emergency landing facilities fall under general aviation, but are treated separately in the AC due to their unique requirements.

Elevated heliport. A heliport located on a rooftop or other elevated structure where the TLOF is at least 30 inches (76 cm) above the surrounding surface (a ground level heliport with the TLOF on a mound is not an elevated heliport).

Emergency helicopter landing facility (EHLF). A clear area at ground level or on the roof of a building capable of accommodating helicopters engaged in fire fighting and/or emergency evacuation operations. An EHLF meets the definition of a heliport in this AC and under Title 14 CFR Part 157, Notice of Construction, Alteration, Activation, and Deactivation of Airports.

General aviation heliport. A heliport intended to accommodate individuals, corporations, helicopter air taxi operators, and public safety agencies. For the purposes of this AC, "general aviation" refers to all helicopter operations other than scheduled passenger service. Hospital heliports and emergency landing facilities fall under general aviation, but are treated separately in the AC due to their unique requirements.

Transport heliports. Transport heliports will provide the community with a full range of vertical flight services including scheduled service by air carriers (airlines) using helicopters. These operations will require a more extensive airside and landside infrastructure with the potential capability to operate in instrument meteorological conditions. Find design standards for transport heliports in Chapter 3.

Hospital heliports. Hospital heliports are general aviation heliports that provide a unique public service. They are normally located close to the hospital emergency room or a medical facility.

National Wildfire Coordinating Group definitions include:

Helispot:

1. A natural or improved takeoff and landing area intended for temporary or occasional helicopter use.

2. An **unimproved landing site** becomes a helispot when it is used on a recurring basis for the purpose of transporting personnel and/or cargo to or from the site. It should then be managed, improved to the extent necessary, and supplied with the appropriate equipment.

Helibase:

1. The main location within the general incident area for parking, fueling, maintenance, and loading of helicopters. It is usually located at or near the incident base.

Following are the written definition of Interagency fire landing area standards.

CHAPTER 8: HELICOPTER LANDING AREAS.

I. Introduction.

The proper selection and construction of landing areas is essential to both the safety and efficiency of helicopter operations. Landing areas that are poorly located or constructed may contribute to or be the cause of an accident. At a minimum, inadequate areas heighten risk, increase Pilot workload, and result in inefficient operations.

This chapter establishes the requirements and specifications for helibases (permanent or temporary), helispots, and unimproved landing sites. Consult the Glossary for definitions.

To achieve the maximum degree of safety and efficiency in helispot and helibase operations, personnel must be able to anticipate current and future needs, plan effectively to meet those needs, supervise and monitor the operation, and take timely corrective action in response to problems encountered.

Helibase complexity can range from a simple, single-helicopter operation to a complex multiple- helicopter one, with as many as 10-20 aircraft working from an airport or large field. Helispot complexity can range from a location with limited use to a location servicing considerable personnel and/or cargo transport missions.



An unimproved landing site becomes a helispot when it is used on a recurring basis for the purpose of transporting personnel and/or cargo to or from the site. It should then be managed, improved to the extent necessary, and supplied with the appropriate equipment.

Helibases and helispots are used for both incident and resource missions. There is little or no difference between a helispot serving as a landing area for wildlife biologists and one being used to transport crews and supplies to the fireline.

Similarly, the helibase that serves as the aerial transportation focal point for a 50,000 acre fire could also have functioned as the helibase for a 200,000 acre aerial seeding project the year previous. Requirements for good planning and emphasis on safety and efficiency in operations remain the same.

Regardless of the size or complexity of an operation, there are sequential and logical steps which must be taken to achieve a safe, efficient operation and accomplish incident or project objectives. Items such as site selection, set-up and layout, operational phases, and demobilization must be considered for any helibase operation to be successful. The versatility of helicopters employed in natural resource operations, coupled with the wide variety of missions, adds to the complexity of helibase and helispot management.

The need to be flexible, as well as to anticipate and plan for most reasonable occurrences and contingencies, cannot be overemphasized.

II. Planning.

Good planning prior to the start of a project or during the initial stages of an incident will contribute to safe, efficient operations. Conversely, poor site selection will hinder the management and adversely affect the safety of the operation. Remember to think and plan ahead for an increase in helicopters, changes in weather conditions such as fog or inversions, and other factors outlined on the Helibase Manager's Reminders List.

Helibases can be relocated, but usually at great inconvenience and temporary disruption of operations. Good planning will prevent this from becoming necessary. However, do not hesitate to relocate if safety and/or efficiency can be improved.

Appendix H, Helibase Manager's Reminders List, Sections I and II, contains specific criteria to consider when selecting a helibase or helispot site.

- Section I should be reviewed during initial helibase site selection.
- Section II should be reviewed whenever a helispot is established.

The selection of an area or areas on which to land the helicopter(s) is an important planning activity. When possible, the Pilot(s) should have input. The following general requirements should always be considered.

- The types of activity and volume of traffic will affect selection, as well as initial and later development of the landing area(s).
- The site should lend itself to economic and environmentally sensitive development to the size which will accommodate the type of helicopters and volume of traffic expected in both the short- and long-term. Anticipate future needs.
- Weather (potential for smoke or fog inversions, winds) plays a significant role in the location of facilities, both short- and long-term.
- Site planning and construction of all sites, both permanent and temporary, shall be in accordance with local agency land management policy.

A. Permanent Helibase.

A careful study should be made of local, state, and federal laws, rules and regulations relating to construction of a permanent helibase. Site selection should provide for adequate approach and departure paths which avoid housing areas, schools, churches, and any other facilities that might be disturbed by low-flying helicopters.

1. **Accommodation for Different Helicopter Types (Sizes).** All permanent facilities should, at a minimum, be built to accommodate one Type 2 (medium) helicopter.

2. **Planning and Construction Specifications.** The planning and construction of permanent helibases shall be according to agency-specific and/or FAA policy and specifications, as well as applicable local, state, and federal regulations.

B. Temporary Helibases and Helispots.

Helibase or helispot construction, especially in wilderness or similarly sensitive areas, can cause a double impact -- the impact of an abrupt or unnatural opening in the landscape, and the impact resulting from cut-faces of stumps and boles of trees or shrubs.



The following issues should be addressed and actions performed during the planning stage for helibases and helispots.

1. **Initial Planning Actions at an Incident or Project.** Project helibases and helispots can be adequately planned in advance of the project start. Incident helibases and helispots, on the other hand, are established and become operational in a very short time frame. The rapidity of incident response does not, however, relieve the Helibase or Helispot Manager from performing basic planning actions.

    - Upon arrival, the Helibase Manager should gather intelligence by obtaining maps from the dispatch office, talking to local inhabitants, flying a reconnaissance, reading the local aviation plan, etc.
    - Check with the local Resource Advisor to ensure that the sites for the helibase(s) and helispots are acceptable from an environmental standpoint. Factors to consider include, but are not limited to:
        - Impact of construction and aerial activity on threatened and endangered species or on wilderness or similar values.
        - Hazardous materials (fuel) handling.
    - The Helibase Manager should reference Appendix H, Helibase Manager's Reminders List for factors to consider. These include items for both the Helibase Manager and Helispot Manager to review when initially selecting sites. Even though they should be initially considered, a review at timely intervals (for example, every 5-7 days) is also appropriate.
    - Good planning for project operations should preclude poor site selection. The rapidity with which incidents occur sometimes results in a poor site being used initially. If a poor site for either the helibase or a helispot has been selected, do not hesitate to relocate if a better site can be established. Do this immediately

during the initial stages of the transition from initial or extended attack, or prior to the start of the project. Otherwise, unacceptable delays in operational and logistical support, as well as safety hazards, may result.

- Perform an aerial reconnaissance to locate desired helispots. Individuals on this reconnaissance should include the local Resource Advisor, Operations Section Chief (or designee) or Project Aviation Manager, Air Operations Branch Director (or a designee such as the Air Support Group Supervisor or Helibase Manager), and, if possible, the Helispot Manager who will be responsible for constructing the spot. Consider the following:
- Where possible, identify natural openings which could be used as a helibase or helispot with little or no improvements.
- What will be the primary function of a helispot (crew shuttle, cargo transport, or both)? If used for cargo transport only, consider designating the spot for longline/ remote hook operations only (referred to as a sling site) in lieu of constructing a helispot.
- If a helispot cannot be constructed due to environmental or other issues, consider designating the spot a sling site.
- Avoid high visitor use areas, especially if construction is necessary.
- Avoid use of schoolyards, parking lots, local parks, etc. unless absolutely necessary and then only if strict security by local authorities can be provided.
- Discuss construction standards relative to the type of helicopters which will be using the helispot. Provide specific instructions (if possible, in writing) for the Helispot Manager assigned. Remember that construction standards shall not be compromised.
- If a high environmental impact is anticipated, examine other potential sites some distance away from the ideal location which would result in lower impact and still accomplish intended incident or project objectives.
- Discuss measures to restore the helispot to as natural a condition as possible. Consult the local Resource Advisor for standards.



2. Site Ownership and Approval. It cannot be assumed that any suitable piece of property can be used for a helibase over an extended period of time without first determining ownership. This is often overlooked in the rush to establish a helibase on incidents. It should not happen with the advance planning time available for projects. During the site selection and planning process, site approval issues must be addressed.

   Check that the land being considered, whether it be a meadow, field, airport, or airstrip, is owned by an individual or entity that supports the operation being

conducted. Do not assume that the land immediately adjacent to an incident or project area is managed by a government agency.

a. Private Ownership. If the land is owned by an individual or corporation, contact must be established as soon as possible to request permission to continue to use the land. This assumes that initial attack crews have chosen the site as optimal from an operational standpoint and have already established initial helibase operations. Consideration must be given to the following:

   - There may be restrictions that the landowner desires. These might include not using certain areas, such as those the landowner planned to irrigate or plow.
   - There may be rental costs involved. Refer to the section on Finance Section Chief or local Administrative Officer involvement. A Helicopter Manager, Helibase Manager, or other air operations staff member usually does not have the authority to negotiate rental costs.
   - Rehabilitation of the land is often an issue.

b. Public Ownership. If the land is managed by a federal, state, or local agency, the Helibase Manager must coordinate with the agency's Resource Advisor to determine if use of the site is appropriate and any mitigation measures that must be taken.

   If the site is owned by a local municipality, contact the local manager or public official.

c. Role of the Finance Section Chief or Local Agency Administrative Officer. The Helibase Manager should immediately coordinate with the Finance Section Chief on incidents or the local administrative officer responsible for the project. The Finance Section Chief or local agency administrative officer should establish an agreement with the landowner that includes the following, at a minimum:

   - Cost (if any) for use of the land.
   - Any restrictions on use of the land such as keeping fuel trucks away from certain areas, use of soil stabilizers, etc.
   - Rehabilitation requirements after the incident has ended or the project is completed.

d. Use of Airports and Airstrips. Use of airports or airstrips requires the permission of the Airport Manager or a responsible agency such as the state Aeronautics Division. In some cases, closure of the airport or airstrip may be necessary. If so, prior and continued coordination and communication with the applicable authority is essential.

   Helibases established at airports or airstrips should be located such that both landing areas and approach/departure paths are segregated from airplane operations. It is recommended that a Fixed-Wing Base Manager be ordered to perform this coordination.

3. Helispots. The same considerations addressed above may apply to the use of helispots, especially those that require improvements. The helispot site selection and approval process is addressed elsewhere in this chapter.

4. Water Sources. The same considerations addressed above apply to the location and use of water sources for dipping or bucket/tank fill operations. Do not assume that each pond or lake is managed by the government. Provisions for replenishment of water sources can be made if use of water is an issue. The use of water additives (foam or retardant), as well as invasive aquatic species are additional issues to discuss with agency Resource Advisors and private landowners.

III. Selection of and Specifications for Temporary Helibases, Helispots, and Unimproved Landing Sites.

A. Landings at Unimproved Landing Sites.

The Pilot is responsible for making the decision to use unimproved landing sites. The government representative on board may make a recommendation, but must defer to the Pilot's judgment, even if the Pilot's preferred site is at a distance from that desired. Conversely, the government representative has the option to advise the Pilot that he or she does not feel comfortable landing at a site selected by the Pilot, and may decline to land at the site.

Prior to landing for the first time at an unimproved site, the Pilot shall make a high- level reconnaissance of the area to determine the location of any aerial hazards in the approach or departure path and to determine wind conditions, slope, ground stability, rotor clearances, ground hazards, and size of touchdown area.



B. Construction and Improvement.

Construction of approach/departure paths for helibases and helispots should conform as closely as possible to the specifications in Exhibit 8-1 and as discussed later in this chapter. It is recognized that the use of a one-way helispot as depicted in Exhibit 8-2 is sometimes unavoidable.

Exhibit 8-1: Example of a Two-Way Helispot

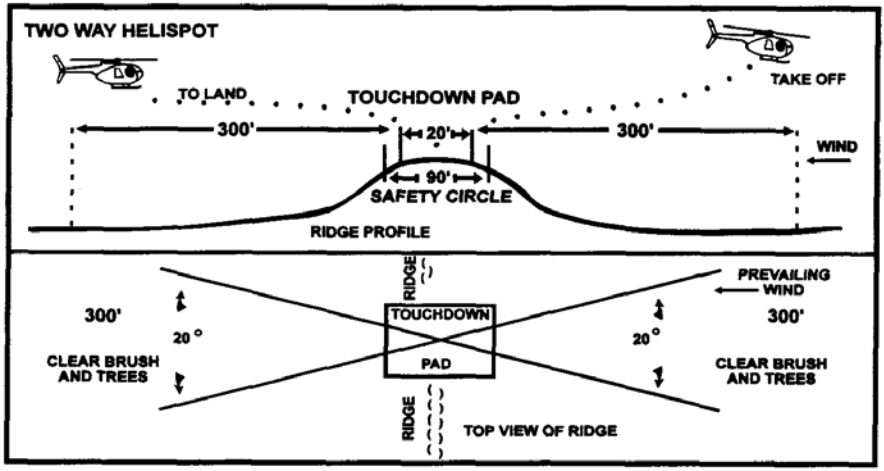
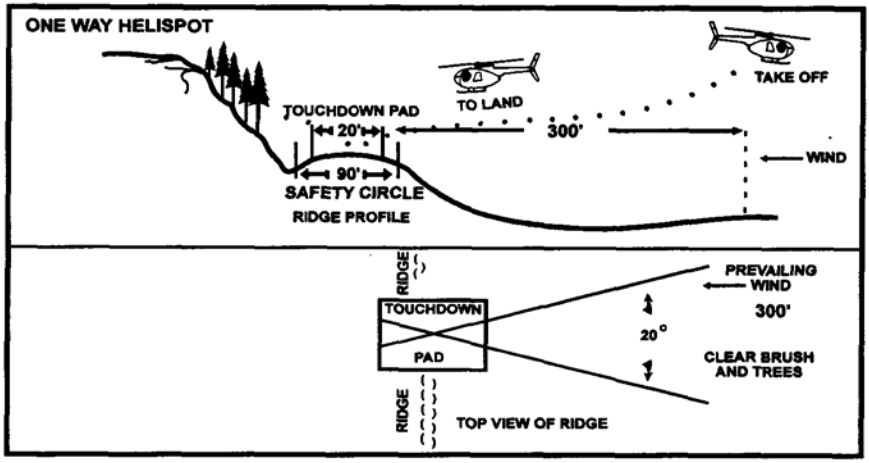


Exhibit 8-2: Example of a One-Way Helispot



1. Hand Construction. Hand construction methods are best since there is less ground disturbance than that created by mechanized construction. There are measures which can be implemented during construction of a helibase or helispot that will lessen the workload during rehabilitation and help ensure that the objective of restoration to as close to a natural state as possible is achieved. These include:

   - Cut trees or snags close to the ground, leaving stump heights of 0-3 inches. It is recognized that this may not always be possible during initial construction. Follow up flush cutting may be necessary.
   - If possible, and only if it can be performed safely, fell trees or other vegetation so that some cut trees and snags will be in a crisscrossed or natural appearing arrangement.
   - Buck up only what is necessary to achieve a safe operation in and around the touchdown pad and in the approach/departure path(s). Bucked pieces are unnatural and also increase the workload of camouflaging cuts during helispot rehabilitation.
   - Limb only what is necessary to achieve a safe operation in and around the touchdown pad and in the approach/departure path(s). If possible, breaking of limbs is preferred to sawing. Excessive limbing results in additional, smooth-cut spots along the boles. It also creates an increased amount of limbs to either dispose of in the timbered area or to arrange in a fashion that resembles a natural ecosystem floor.

2. Mechanized Construction. Basic requirements are the same as those for hand construction. If large rocks are dislodged, they should be removed and placed in an area where they appear to be natural. Hand work is frequently necessary to cut the fringe of brush left by bulldozers. Dozer constructed landing areas generally have soil that is disturbed, requiring . Unless necessary, mechanized construction or improvement is to be avoided.

C. Specifications for Planning and Constructing Landing Areas.

Chart 8-1: Touchdown Pad and Safety Circle Dimensions

Type	1	2	3
Touchdown Pad Dimension	30' x 30'	20' x 20'	15' x 15'
Safety Circle Diameter	110'	90'	75'

Safety circles and touchdown pad dimensions in Chart 8-1 are minimums for construction.

The Touchdown Pad is a designated area, that may have a prepared or improved surface, at a helispot or helibase that is used for takeoff, landing or parking of helicopters.

The Safety Circle is a zone that provides an obstruction-free area on all sides of the touchdown pad. For helispots and helibases, the only items that should be within the safety circle are a fire extinguisher, a pad marker, and if applicable, external loads awaiting transport. The Parking Tender may also be within the safety circle.

When there are multiple helicopters at a helibase, safety circle dimensions may or may not provide adequate clearance and separation between helicopters when rotors are turning.

Chart 8-2: Recommended Separation of Helicopters at Helibases

TYPE	I	II	III
Rotor to Rotor Separation	100’	75’	60’
Pad to Pad Separation	200’	125’	90’

Use the separation distances listed in Chart 8-2 as a guide when laying out a helibase. These recommended distances are not mandatory, but they can be used to provide appropriate separation between helicopters.

- When helicopter makes/models are known, the Rotor to Rotor separation dimensions may be used as a guide to provide adequate separation between helicopters.
- When helicopter makes/models are unknown, it is recommended that the Pad to Pad separation dimensions be used as a guide to provide adequate separation between helicopters.

D. General Locations for Helispots and Unimproved Landing Sites.

1. Ridge Tops. An exposed knob on a ridge offers the best location, especially if approach/departure is available from all or several directions. Consider the following. See Exhibit 8-1.
   - Minimum approach/departure path should be no less than the required safety circle.
   - Avoid cutting timber keyhole helispots visible from scenic roads, towns, rivers etc.
   - Clear brush and trees below the level of the landing area. Jumbled brush and limbs tend to dissipate the ground-effect cushion, resulting in an abrupt transition to out-of-ground-effect flight.
2. Lakes or Rivers. Bodies of water, with their less-than-solid surfaces, may reduce the benefits of ground effect. A helibase or helispot should offer a take-off and landing profile that will not place an aircraft loaded for “In-Ground-Effect” over water before sufficient airspeed and lift is achieved. Depth perception can also be a problem for overwater portions of approach/departure paths.

3. Canyon Bottoms. If the canyon is deep, the helicopter will need a long forward run to climb out of the canyon, or a wide spot in the canyon where it can circle to gain altitude.

4. Meadows. Caution should be exercised prior to using meadows with high grass. Grass tends to dissipate the ground-effect cushion. High grass may also hide rocks, logs, and swampy areas which are a hazard to both personnel and the helicopter's skids, wheels, or fuselage. Grassy areas are also a potential fire hazard.

5. Snow Areas. Depth perception on snow and glacial ice is often poor. It is important to clearly mark the landing site with objects of contrasting color. To reduce blowing snow, tramp the area thoroughly inside the safety circle. Reference Deep Snow Landings in Chapter 6 for additional information.

   If surfaces are icy, avoid locations that are over 6° (9:1) slope. Choose a site large enough and flat enough to keep main and tail rotors from striking ice pinnacles or pressure ridges. Test the surface and load-bearing capability of the touchdown pad area to avoid snow bridges, thinly covered crevasses, crusts, and cornices.

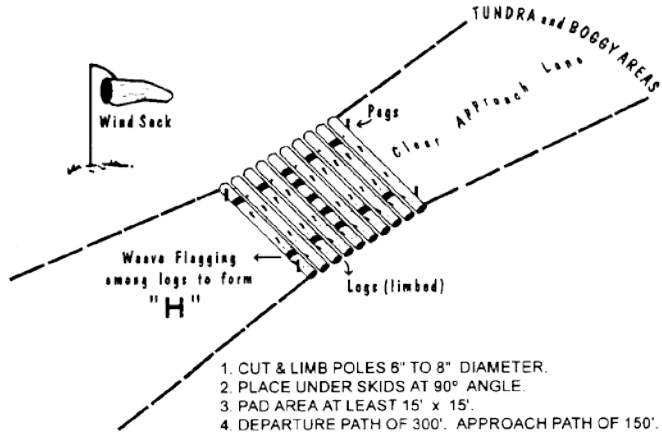
   Helicopters that operate in snow areas are usually equipped with snow pads which function similarly to snowshoes by spreading the weight of the helicopter over a larger load-bearing area. It is the Pilot's responsibility to determine if a landing can be safely made in snow conditions, with or without snow pads.

6. Tundra and Boggy Areas. Tundra and boggy areas are unstable surfaces. Helicopters that operate in tundra areas are usually equipped with tundra pads that function similarly to snow pads. See Exhibit 8-3.

   A log-deck pad may also be used. Cut and limb at least 10 poles, 20 feet long and approximately 6" to 8" in diameter. Use these to build a square touchdown pad. Place at right angles to the helicopter skids. The poles must be able to support the largest helicopter to be used. Secure the outer logs to prevent rolling or separation.

   Even when equipped with tundra pads, helicopters may sink into boggy tundra. To ensure adequate clearance for the tail rotor, there must be enough pad area and log strength to support the weight of the rear end of the skids. Exercise care when landing on and taking off from log-deck landing pads.

Exhibit 8-3: Log-Deck Landing Pad for Use in Tundra or Boggy Areas



E. Surface Features and Requirements.

Level or bottom land locations are best. The ideal approach/ departure path is 300' long minimum and slightly downhill. See Exhibits 8-1 and 8-2.

1. Slope.
   a. Avoid sloped pads that have over 9:1 slope ratio (6° or 11%) or 1.3"/foot slope.
   b. Pads must be as level as possible at temporary helibases and helispots.

Chart 8-3: Slope Conversion Chart

SLOPE RATIO	DEGREES SLOPE	PERCENT SLOPE	INCHES / FOOT
1:1	45.0	100	12
2:1	26.6	50	6
3:1	18.4	33	4
4:1	14.0	25	3
5:1	11.3	20	2.4
6:1	9.5	16.7	2.0
7:1	8.1	14.3	1.7
8:1	7.1	12.5	1.5
9:1	**6.3**	**11.1**	**1.3**
10:1	5.7	10	1.2

2. Safety Circle.
   a. Safety circles should be as level as possible with trees and large brush removed.
   b. Avoid damaging small bushes and grasses that help with . Limit dozer or other mechanical work as much as possible.
3. Touchdown Pad.
   a. The pad should be free of brush or other obstructions and large enough to accommodate all wheels or both skids. There must be adequate clearance under the fuselage to clear antennas, cargo hooks, or externally supported accessories.
   b. Pads must be firm enough to support the type of helicopter being used at temporary helibases and helispots.
   c. Where possible, avoid selection or construction of landing pads on a slope. The pad should be as level or as close to the terrain surface as possible without disturbing the small brush and grass cover.
4. Approach/Departure Path. Site selection should provide for approaches and departures in several directions. If the site is not located on a ridge top, an approach/ departure path aligned with the prevailing wind should be constructed. If possible, avoid one-way helispots, although these landing sites are not inherently unsafe provided correct piloting techniques are followed.
   a. Winds. When possible, locate landing areas so that takeoffs and landings may be made into the prevailing winds.
   b. Full Performance Takeoff and Landing. Almost-vertical approaches and departures are not inherently unsafe, but should be avoided if possible, especially on an extended-use basis. Remember that most small helicopters must be at approximately 400' AGL at zero airspeed to execute a safe autorotation in the event of an engine failure. See Exhibit 8-4.

Exhibit 8-4: Full Performance Takeoff and Landing



c. Distance to Obstructions. An 8:1 slope can be used as a guide to provide an adequate slope for approach/departure. The 8:1 slope is measured from the edge of the safety circle and may be used as a guideline for obstruction removal when the terrain is relatively flat and level.

Chart 8-4: Distance form Obstacles

Distance from edge of Safety Circle	Height of Obstacle
80’	10’
160’	20’
240’	30’
320’	40’

d. Minimum Width. The minimum width for an approach/departure path is the diameter of the safety circle. Construction starts at the edge of the safety circle and extends in the takeoff direction far enough to permit normal no-wind takeoffs for the expected density altitudes. Safety is increased if the paths can be widened to a 20º angle from the center of the landing pad. To determine if additional clearing of obstructions is prudent or necessary:

- Take a compass reading down the center of the approach/departure path.
- Take a new reading 10º on each side of the centerline to determine the optimal, or 20º- wide path.
- Obstacles that occur between the point where these lines intersect with the minimum width of the approach/departure path (safety circle diameter) may be removed to increase safety.

e. Approach. The path should be free of obstructions which would prevent a normal approach. If environmental considerations restrict this from being accomplished, the helispot should not be built.

f. Departure. There should be enough level running space to permit normal acceleration from hover to translational lift and initial climb. If environmental considerations restrict this from being accomplished, the helispot should not be built.

g. Downdraft Areas. Avoid downdraft areas on lee sides of ridges.

IV. Required Equipment and Facilities.

Chart 8-5 lists equipment and facility requirements and standards for permanent helibases, temporary helibases, and helispots. Construction should take into account these needs and requirements.

Chart 8-5: Required and Recommended Facilities For Permanent Helibases, Temporary Helibases, and Helispots

REQUIREMENT	Permanent Helibase	Temporary Helibase	Helispot
Operations office or area for communications/ administrative purposes	Required	Required	NA
Communications equipment, to include, as appropriate, telephone, station-to-station and air- to-ground radios. Where no telephone service is available, a mobile or cellular phone should be installed at the site	Required	Required	Required (Handheld Radio Only)
Ready room/rest area for vendor personnel, including cots, toilet, desks, and, if possible, stove and refrigerator	Required	Required (Rest And Sanitation Facilities Only)	NA
Cache for agency-owned equipment	Required	NA	NA
Storage area for helicopter equipment and servicing supplies	Required	Recom-mended	NA
Parking and staging areas for vehicles (for ground-accessible sites)	Required	Required	NA
Water supply for drinking, utilities, and aircraft maintenance	Required	Recom-mended	NA
Maintenance lights, including electrical outlets if pos-sible at each touchdown pad	Required	NA	NA
Security fence at least 150' from the center of the touchdown pad on the approach/departure path	Recom-mended	NA	NA
"No Smoking" and other safety and warning signs	Required	Required	Recommended
Evacuation and Crash rescue Kit	Required	Required	Recommended
Fire extinguisher located at each pad	Required	Required	Required
Scales for weighing passengers/cargo	Required	Required	Recommended
Wind indicators	Required	Required	Required
, if necessary	Required	Required	Required
Fueling capabilities	Required	Required	NA
Identifiable, marked touchdown pads	Required	Required	Required
Hazard map	Required	Required	NA
First Aid Kit	Required	Required	Recommended

* See Extinguisher, Crash Rescue, and Evacuation Kit Requirements for Helibase Chart 9-7 for specific extinguisher requirements.

V. Markings for Aerial Identification.

A. Helibases.

Permanent helibases should use the triangle and "H" marking in accordance with the approved FAA heliport standard. If a smaller area is to bear the marking, the design may be scaled down. The triangle-H design should be placed in the center of the touchdown pad with the solid apex of the triangle pointing to magnetic north. The base name, elevation, and latitude and longitude should also be painted on the pad. Permanent markings for temporary helibases are not required.

B. Helispots.

Incident or project helispots used on a recurrent basis by more than one helicopter should be numbered or identifiable from the air. Markers are available through warehouse caches.

1. Log-deck Touchdown Pad. Weave flagging or other colored cloth strips around the logs to form a letter "H". Ensure cloth strip is secure and cannot unravel. See Exhibit 8-3.
2. Snow Areas. Depth perception on snow and glaciers is often poor, so it is important to clearly mark helispots with objects of contrasting color. Wands about 3 feet high with streamers attached, packs, tramping a trench to create shadows, spray painting, colored chalk, and smoke grenades are several methods of marking snow areas.
3. Miscellaneous Markings.
    - Painted rocks or well-secured and weighted signal panels may be used to outline a touchdown pad or landing area.
    - Color markings should provide sufficient contrast with the background area. Reflective material may be used. If paint is to be used, it must be environmentally acceptable (for example, a water-based paint).
    - Known hazards outside the safety circle such as poles, pipes, and high vegetation should be marked with colored ribbon or other means. Known hazards must also be marked on the hazard map at helibases and on Form HBM-2, Aviation Locations Summary, which identifies helispot hazards.

VI. .

A. Types and Methods.

The potential for dusty conditions usually exists when not operating from turf or pavement. must be accomplished at all helibases and helispots. This may be as simple as the application of water by ground equipment or from helicopter buckets or fixed tanks. A more complicated approach involves the application of chemical products. Their use may be of concern from an environmental standpoint and local authorities must be consulted prior to application.

1. Water.
   - Most commonly used.
   - Is usually the most economical.
   - Can be applied via ground or aerial delivery.
2. Chemical Products. Chemical products are usually more expensive than water, but provide a longer-lasting application. In the end, they may be less expensive since far fewer applications are required.
   a. Lignin Sulphate. The most commonly used chemical for is lignin sulphate. It is a by-product of the lumber industry, derived from wood pulp in the lumber milling process. The resulting lignin is mixed with ammonia and calcium bases to enhance its fertilizing characteristics. It has been used successfully on roads for soil stabilization and dust control. The cost, compared to other materials, is reasonable.

      Application considerations for lignin sulphate include:

      - Approved on an agency-specific basis.
      - Not approved for fixed-tank application.
      - Local Resource Advisor must be consulted prior to use.
      - No ground preparation is necessary.
      - Commercial sources who will travel to the site and apply the chemicals are available.

      Lignin Sulphate can be applied by many methods except for helicopter fixed-tank. Methods include using back-pack pumps, pillow tanks, rigid tank/ pump operations, helicopter buckets, and engines. Do not use potable water containers.

      Lignin Sulphate is mixed with water in ratios of 1:1 to 1:3, depending on temperatures and soil condition. Lignin sulphate is ready for use 15 to 30 minutes

after mixing, depending on the ambient temperature. It can then be applied using any approved method. When the site is ready, apply the lignin sulphate/water mixture evenly and ensure proper coverage. If the area becomes churned up during operations, apply a small amount of water or more lignin sulphate/water mixture to make effective again.

All equipment must be cleaned with water. If the lignin sulphate dries, it breaks down with application of water and will wash out of clothing easily.

b. Retardant. Retardant is the most expensive method of and least desirable due to cost and cleanup factors.

B. Hazardous Materials and Materials Safety Data Sheets (MSDS).

MSDS sheets for materials should be obtained prior to use. These are available from the manufacturers or online. They should be available for the local Resource Advisor to review in determining environmental or ecological impacts.

VII. Procedures for Landings.

The Pilot and Helicopter Manager are responsible for choosing safe landing sites. The Helicopter Manager or passengers may indicate landing sites that are convenient to their ground work site or drop-off point. However, in no case will safety be compromised for convenience, nor will any passenger implicitly or explicitly attempt to pressure the Pilot into performing a landing, takeoff, or flight maneuver that is unsafe.

A. Load Calculations.

Prior to repetitive flights to and from the same helispot, the Helicopter Manager will consult with Pilot(s) and designate sites as either HIGE or HOGE. In planning and computing loads for those sites, applicable performance charts will be used.

B. High-Level Reconnaissance.

The Pilot shall fly a high-level reconnaissance before descending on the approach path to an unimproved landing site that has not been used before.

C. Areas to Avoid.

Avoid dusty landing areas. A low, slow flyby may be necessary to determine dust conditions. Avoid marshy areas and areas with high grass or shrubs where ground hazards and soil stability cannot be determined.

D. Wind Direction.

Ground personnel, if available, should furnish the Pilot with wind direction indication. This can be accomplished by throwing dirt, attaching flagging to vegetation, radio communication, or hand signal.

E. Reduction of Power.

Care must be taken to ensure that skids or wheels are down on solid ground before reducing power.

F. Pre-Exit Briefing.

The Pilot shall ensure that passengers are briefed on proper exit direction, especially when sloping terrain may pose a hazard to personnel exiting the helicopter.

G. One-Skid, Toe-In, or Step-Out Landings.

See Glossary for definitions. Except in a life threatening emergency, these types of landings are prohibited unless specifically authorized. Exemptions are agency-specific and should be carried by agency personnel or vendors engaging in these activities.

H. Tundra or Boggy Areas.

Inform the Pilot if landing gear or skids begin to sink into tundra or boggy area.

I. Snow Landings.

Snow landings may require agency approval. Check the Pilot Qualification Card for snow operations and ensure that the helicopter is equipped with snow pads.

VIII. Helibase and Helispot Rehabilitation and Restoration.

Refer to local resource management plans or local Resource Advisor for rehabilitation standards and guidelines.